Watch out!
AQUATIC INVADERS

GUIDE TO THE ALIEN AND INVASIVE SPECIES OF RIVERS, LAKES AND ESTUARIES IN THE IBERIAN PENINSULA

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GOBIERNO DE ESPAÑA
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LIFE INVASAQUA

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LIFE INVASAQUA

WHY PRODUCE A GUIDE ABOUT THE INVASIVE ALIEN SPECIES OF FRESHWATER AND ESTUARINE ECOSYSTEMS IN THE IBERIAN PENINSULA?

Our ecosystems are suffering from innumerable pressures and threats. Some of these pressures have focused media attention and have spurred our societies into action with some degree of success. When we think of Global Change, most of us think about Climate Change and, without any doubt, this is one of the main factors involved in Global Change. However, invasive alien species (IAS) are another factor in Global Change; in many cases they are even ushered in by Climate Change, since it mediates the occurrence of some exotic species.

Exotic species may arrive by natural means as a result of natural dispersal dynamics, and this process has taken place countless times. However, the expansion of global trade coupled with Climate Change has led to an exponential increase in both, the number of species and the quantity of individuals or propagules dispersed, and in the successful establishment of exotic species. At the same time, the alteration of our ecosystems has caused a deterioration in the environmental conditions in which our native species live, with the result that their populations are displaced, reduced in size or even extirpated, providing an opportunity for exotic species to become established.

The introduction of IAS is currently one of the most severe pressures on ecosystems throughout the planet. It is a serious threat to many species and is the main cause of extinction for many of them. In addition, IAS have significant economic impacts and they can carry diseases that affect native species and even human beings.

In freshwater and estuarine ecosystems (lakes, lagoons, rivers, estuaries, etc.) the introduction of aquatic IAS is the reason why many species – often threatened or endangered ones – go extinct, and it causes enormous damage costing the EU more than 12 billion euros per year at the present time. Both the European Union and the Member States, including Spain and Portugal, are taking steps to address this issue. They have prepared a series of lists and catalogues of invasive species and have implemented a plethora of measures and actions to mitigate the impacts these species are having on our aquatic ecosystems. The scientific literature and the experience that we are gradually

acquiring in the management of IAS in general, and aquatic ones in particular, show that the most effective way to deal with this problem is to focus efforts on prevention, by avoiding the introduction of new exotic species and the spread of those IAS already present.

The LIFE INVASAQUA project (**www.lifeinvasaqua.com**; @LifeInvasaqua on Twitter and Facebook; @Lifeinvasaqua on Facebook; #lifeinvasaqua on Instagram) calls on all of us who enjoy our rivers, lakes, estuaries and wetlands to help by focusing all our efforts on prevention and early warning. We need to identify all the Aquatic IAS that are already present or may appear in the Iberian Peninsula and report them as soon as possible to the authorities.

So far, at least 264 species have been identified as a potential risk to our freshwater ecosystems; at least 216 of them have already been recorded and it has been detected that at least 179 species have established populations. The list of IAS is constantly increasing and may well be an underestimate. In fact, in some of our freshwater ecosystems there are now more exotic than native species. Most of the aquatic IAS present are animals, together with smaller numbers of plants and algae. Of the introduced fauna, the largest number of species are fish, followed by crustaceans and molluscs.

In the Iberian Peninsula this situation is especially worrying, since Spain and Portugal's rivers and lakes host a wealth of unique endemic freshwater species whose survival is now seriously threatened by exotic species. IAS not only interact with native species, but they can also significantly affect and impair the structure and functioning of our ecosystems. This is having major consequences not only for the populations of native species but also for the goods and services that these ecosystems provide. Therefore, increased awareness of this problem, the prevention of new exotic species introductions, and early warnings of IAS presence are essential and critical weapons in the fight for the protection, conservation and improvement of our freshwater aquatic ecosystems and, consequently, a priority objective. And you can help us.

WHAT IS AN ALIEN SPECIES?

There are many terms to refer to species that come from different ecosystems or biogeographical or ecological environments and whose presence has been mediated by humans; that is, species occurring outside their natural ranges due to anthropic causes. These species are called exotic, allochthonous, introduced, non-native or alien species.

When we talk about exotic species, we are, in fact, referring to any species, subspecies or lower taxon – as well as any part, gamete, seed, egg or propagule of these species – which is able to survive, establish itself, reproduce and possibly spread outside its natural area of distribution, current or past, and its potential area of dispersal.

In contrast, those species that occur naturally in a specific ecosystem, are an intrinsic part of it and have evolved in it and with it are called native or autochthonous species. These concepts are, therefore, scale-dependent. For example, a species may be native to a biogeographic region such as Europe or the Mediterranean basin but alien to the Iberian Peninsula, since its natural range in Europe does not include the Iberian Peninsula.

A species' success in establishing itself may be determined by the characteristics of the ecosystem it reaches, although, obviously, the species has environmental requirements that must be met. In the case of a highly modified ecosystem (for example, a naturally flowing river transformed into stagnant water by a dike) where native species that might be natural competitors or predators of the exotic species are found under non-optimal conditions, the exotic species is more likely to be successful both in establishing itself and subsequently in increasing its population. Therefore, ecosystem changes and the artificial creation of new habitats provide opportunities for new species to invade and become established.

The European Union considers a species to be invasive when it becomes unusually abundant outside its natural range, in habitats that are not normally its own, resulting in

adverse impacts on ecosystem structure (species richness, populations, etc.) and function (cycles of matter and energy, ecosystem goods and services, etc.) or socioeconomic impacts. Not all exotic species are invasive, since the ability to be invasive is not intrinsic to all exotic species. So, what does it mean to say that an exotic species is also invasive? To a large extent this is conditioned by the biological characteristics of the species (type of reproduction, dispersal ability, size, etc.) and by the environmental conditions of the colonised ecosystem.

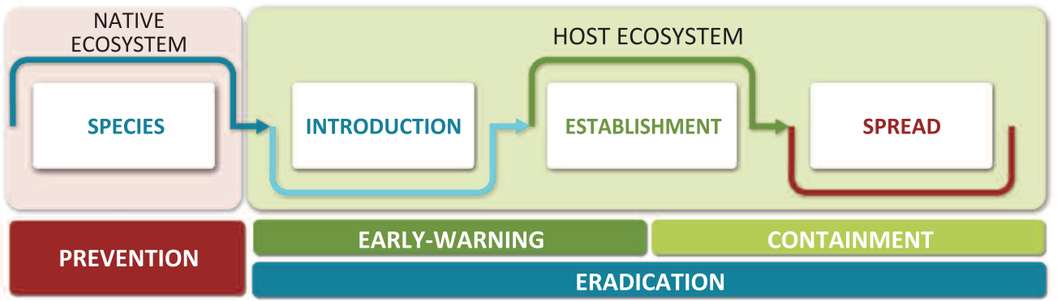
It has already been pointed out that the definition of an exotic species is clearly geographical in character and is scale-dependent. In this respect, there are species in our rivers and lakes that are native to certain Iberian river basins but not to the entire Iberian Peninsula, which for various reasons and purposes have been introduced into other drainages where previously they were not naturally present. These species are called translocated species.

A priori, it might seem easy to identify which species are exotic and which are not. However, it is not always so simple. A cryptogenic species is one for which it is difficult or even impossible to identify its origins, which remain unknown, and it cannot therefore be classified as either exotic or native. This is due to the absence of any historical, archaeological or other type of record that shows that this species arrived from elsewhere or, conversely, that confirms it as naturally occurring.

HOW DO ALIEN SPECIES ARRIVE?

The process by which alien species arrive and become established is complex, and fortunately they are not always successful. Each stage in the process is subject to a certain probability determined by multiple factors. For example, some individuals may die during the journey from their native ecosystem to the host ecosystem, and this mortality rate together with the conditions of entry and reception in the host ecosystem will affect the entry rate. Once they have arrived, they will not always be able to establish themselves, since conditions may not be optimal, and individuals that have entered may die without reproducing or may not number enough to be considered an established population. Finally, once the species has become successfully established it may or may not disperse and spread. This propagation will depend on the biological characteristics of the organism.

The fight against exotic species needs to focus on each of the following steps. Prevention aims to reduce or avoid the entry of new exotic species and/or individuals, and it has been shown to be the most effective tool in the fight against IAS. Then, an early warning system can prevent an alien species from becoming established once its presence has been detected; this has frequently proved effective since such a system will trigger eradication and/or control measures. Total eradication is only possible in the early stages of establishment of an exotic species. Therefore, measures to control the species need to be implemented promptly to prevent or minimise its spread.



PATHWAYS

The entry mechanism, the way in which an exotic species reaches our ecosystems, has been called its pathway. These pathways of entry are here grouped into six types depending on their nature and how deliberate or accidental the introduction is.

Release. This category includes those routes of entry that involve the deliberate, active release of individuals into the natural environment for any purpose.

Escape. In this case the arrival of the species is deliberate since it has been brought here for captive breeding or cultivation. However, its introduction into the natural environment is unintentional. For whatever reason, it may escape from the place where it is confined and reach the environment.

Contaminant. The introduction in this case is not intentional; the exotic organisms are contaminants in a commodity or on other organisms that are imported for some other purpose.

Stowaway. This, again, is the unintentional introduction of an organism attached to or carried within merchandise or a means of transport; the presence of the stowaway species is unnoticed.

Corridor. This is an unintentional form of introduction that occurs as a result of the building of infrastructure joining regions that were not previously connected. Without this infrastructure, the exotic species would not have been able to disperse.

Unaided. This is unintended introduction across political borders as a result of the natural spread of exotic species whose presence has been confirmed in neighbouring regions.

VECTORS

Each of the pathways previously listed is associated with a set of vectors that are involved in or mediate the arrival of invasive alien species. These vectors are:

Release
- Biocontrol
- Hunting and sport fishing. Game species
- Erosion control and landscaping
- Pets
- Species from terrariums and aquariums. Fishkeeping
- Other

Escape
- Livestock, breeding and agriculture
- Aquaculture
- Ornamentation. Ornamental plants
- Species used as live bait
- Pets
- Species from terrariums and aquariums. Fishkeeping
- Zoos
- Botanic Gardens

Contaminant
- Traffic of contaminated goods
- Aquaculture
- Packaging materials

Stowaway
- Marine or river transport
- Air transport
- Land transport

Corridor
- Canals, and irrigation and water-transfer channels
- Railway tracks. Railways
- Motorways, highways and roads
- Lessepsian migrations (through the Suez Canal)

Unaided
- Natural dispersal
- Climate change
- Other natural processes

Degree of human intervention in the entry of alien species in terms of their pathways and vectors

IMPACTS

The arrival and subsequent establishment of exotic species and the expansion of their populations will have impacts on local ecosystems and their species and populations. Depending on their consequences, these impacts can be grouped into three categories:

Ecosystem–habitat impact. This category includes habitat degradation, loss of shelter or suitable habitats, changes in hydrology or soil moisture, alteration of primary production, shifts in nutrient flows or trophic networks, reduced biodiversity, changes in community composition, impaired capacity of recovery, erosion, bioaccumulation, changes in soil structure, altered physicochemical parameters, etc.

Species–population impact. This category includes effects on population size, distribution, growth rates, genetic resources, reproduction, indirect or direct mortality, animal or plant health, etc.

Socio-economic impact. This may involve damage to human activities (agriculture, aquaculture, fisheries, etc.), human health conditions, human disturbance, landscape alteration, damage to structures, tourism or recreational activities, trade, etc.

These impacts can in turn be classified according to the mechanisms that generate them, which include:

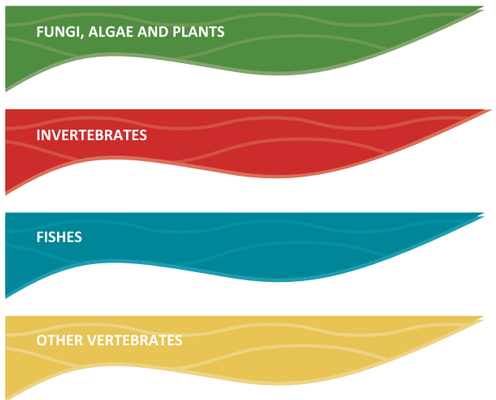
- Competition
- Predation
- Hybridisation
- Disease transmission
- Parasitism
- Toxicity
- Biofouling
- Grazing/Herbivory
- Rooting/Burrowing
- Trampling
- Increased fire risk
- Interaction with other invasive species
- Other

WHAT DOES THIS GUIDE CONTAIN?

The book you have in your hands aims to draw attention to the problem of alien species in freshwater and estuarine ecosystems and, at the same time, to get people involved in tackling this problem by raising public awareness. It is impossible to include all the IAS that have been detected or have become established in the Iberian Peninsula, but we can illustrate the magnitude of the problem by giving some examples of IAS that have reached our rivers, lakes, reservoirs and estuaries.

This guide introduces the 100 most significant exotic species that occur in the inland aquatic ecosystems and estuaries of the Iberian Peninsula. Many more have been reported and many more will arrive in the future if preventive measures are not implemented. These 100 species have been selected for their impacts on other populations and species, for their effects on ecosystems and habitats and for their socio-economic impacts, as described above, and also for their 'media impact' and/or for being interesting and instructive examples of this serious problem.

The selected species have been divided into 4 groups of 25 species each – 10 of special importance and significance and 15 that deserve to be better known. The four groups are:



Even though these groups have a taxonomic basis, their purpose is not to emphasise that, but to draw attention to the most emblematic and well-known alien species without forgetting organisms that may still be unknown to the general public but whose introduction is having major consequences for our ecosystems and society.

Detailed fact sheets with the following content and structure are provided for the 10 most significant species in each group:

More simplified fact sheets with similar content and structure are provided for the other species.

The information on each species is organised under the following headings:

Scientific name

This section shows the scientific name (genus and species, in italics) accepted at the time of publication of this guide, as well as the name of the author or authors of the scientific name.

Common name

Since these exotic species are recent arrivals, most of them have not long been part of our ecosystems and so they may not yet have a common name. Where a common name exists, it is included here.

Description

To help with identification, a brief description of the most important traits of each species is included. This short description is sometimes enough to identify the species correctly. However, in most cases a taxonomic key and/or identification by a specialist will be required. If you come across an alien species, please use the tools provided in this guide to report it.

Ecology and habitat

A section describing the ecology of each species as well as the main characteristics of the habitats in which they can be found is included to provide a better understanding of these IAS. It is surprising to see how these species can adapt to very different habitats from those they occupy in their natural range.

Native distribution

The place of origin and native distribution of each species is included to show how far they have travelled to get to the Iberian Peninsula.

Distribution in the Iberian Peninsula

This section and the accompanying map show the known distribution of the species in the Iberian Peninsula and the locations where it has been reported. These areas of distribution are constantly changing and in most cases, unfortunately, increasing. Therefore, the maps should not be taken as definitive but as a reflection of the current situation.

Pathways

As mentioned above, this guide aims to raise awareness of IAS and to tackle them through preventive measures. It is therefore essential to recognise the pathways by which these species arrive to prevent them from spreading and to avoid further introductions. This section specifies and describes the pathways involved.

Vectors

As in the previous case, this section lists and describes the vectors involved in the arrival of these exotic species, with the aim of increasing the involvement of the public in prevention.

Impacts

The establishment of an IAS in Iberian ecosystems produces a series of impacts, which are summarised in this section.

Legislation

Considerable concern has arisen at the serious impacts that IAS have generated in the European Union as a whole and in individual Member States, Portugal and Spain in our case. Regulations have been introduced to address this problem. This section indicates whether the species in question is included in any of the following three regulations:

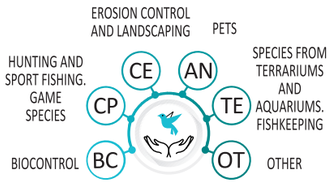
The List of Invasive Alien Species of Union Concern Commission Implementing Regulations (UE) 2016/1141; 2017/1263 y 2019/1262

The Spanish Catalogue of Invasive Alien Species (Royal Decree 630/2013 and Royal Decree 216/2019)

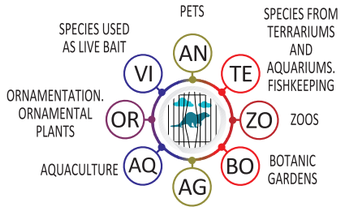
The Portuguese National List of Invasive Species (Decree-Law No 92/2019)

ICONS AND CODES USED

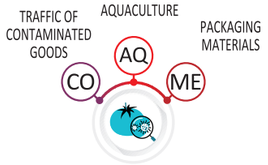
RELEASE



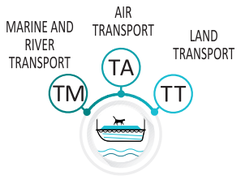
ESCAPE



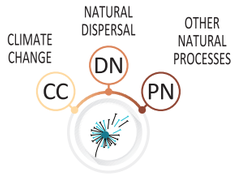
CONTAMINANT



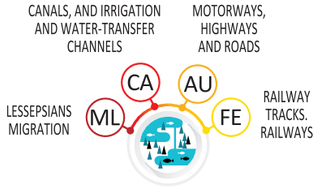
STOWAWAY



UNAIDED



CORRIDOR



LEGISLATION

IMPACTS

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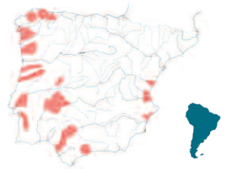
FUNGI, ALGAE AND PLANTS

Eichhornia crassipes (Mart.) Solms 1883
Water hyacinth



Description: Free-floating freshwater hydrophyte. It varies in size, depending on its population density, habitat and stage of development. It can develop a stem up to 1 m tall. It can reproduce both asexually through stolons and sexually through seeds produced in its lavender or purple-blue flowers.

Ecology and habitat: It grows at the edges of rivers, ponds and other wetlands with stagnant or slow-flowing waters and abundant nutrients. It grows in a temperature range of 10–40 °C. Its growth benefits from high concentrations of nitrogen and phosphorus.

Native distribution: The species is native to the Amazon basin, South America.

Distribution in the Iberian Peninsula: Reported from the Guadalquivir, Tagus, Júcar, Ebro, Guadiana, Vouga, Mondego, Cávado, Ave and Sado basins. Also isolated occurrences in other areas such as the Cíes Islands in Galicia and smaller river basins.

Pathways: Stowaway. Escape. Release. Unaided.

Vectors: Marine and river transport. Ornamental plant. Species from aquariums. Cattle feed. Natural dispersal once established.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Antonio Guillén-Beltrán, Pablo García-Murillo, Jorge R. Sánchez-González

TM OR TE AG DN

UE ES PT

Codium fragile subsp. *fragile* (Suringar) Hariot, 1889
Green sea fingers

Description: Large seaweed (> 1 m in length), dark green in colour, with one or several erect fronds (leaves) 15–20 cm high, with abundant cylindrical branches with a diameter of 0.3–1.0 cm, distributed dichotomously. The final fronds form a superficial layer of palisade tissue as the utricle cortex. They are attached to the substrate by a broad, spongy basal disk. Shape and structure may vary depending on the environmental conditions.

Ecology and habitat: This species inhabits pools on rocky, sandy or muddy substrates in the intertidal zone and down to 20 m depth in the sublittoral. It has high growth rates under favourable conditions. It tolerates large variations in salinity and temperature, which allows it to colonise a wide variety of environments. It reproduces asexually by fragmentation and parthenogenesis.

Native distribution: North-western Pacific.

Distribution in the Iberian Peninsula: Coasts of the northern Iberian Peninsula, Atlantic coasts of the southern Iberian Peninsula and some points along the Mediterranean coast.

Pathways: Contaminant. Stowaway. Unaided.

Vectors: Aquaculture. Traffic of contaminated goods. Marine and river transport. Natural dispersal once established.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species.

Authors: Jorge R. Sánchez-González, Mario Quevedo

AQ CO TM DN ES

Batrachochytrium dendrobatidis Longcore, Pessier & D.K. Nichols, 1999
Chytrid frog fungus

Description: Asexual, spherical, eukaryotic fungal organism, which develops in keratinised skin cells of amphibians. A distinctive feature of *Batrachochytrium dendrobatidis* is the presence of internal septa. It produces swimming zoospores 3–5 µm in diameter. The duration of the life cycle in vitro is 4–5 days at 22 °C and it is assumed to be the same in the skin of amphibians.

Ecology and habitat: It has a wide environmental tolerance, surviving in a temperature range of 0–28 °C and a rainfall threshold of 290–4,400 mm.

Native distribution: It is a species native to East Asia.

Distribution in the Iberian Peninsula: Widely distributed throughout the Iberian Peninsula.

Pathways: Escape. Release. Contaminant. Stowaway. Corridor.

Vectors: Pets. Aquaculture. Ornamentation. Species from terrariums and aquariums. Fishkeeping. Marine, river and land transport. Traffic of contaminated goods. Zoos. Botanic gardens. Navigation channels, irrigation and water transfers.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species.

Authors: Antonio Guillén-Beltrán, Adrián Guerrero-Gómez

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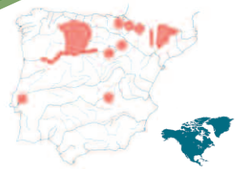
Didymosphenia geminata (Lyngbye) M. Schmidt, 1999
Didymo. Rock snot



Description: Unicellular alga in the diatom group forming macroscopic brown colonies. It forms dense mucilaginous masses that are viscous, spongy and rough to the touch. These masses can cover rocks in rivers, blanketing the entire riverbed. The stems of this mucous blanket end in an adhesive pad, by which they attach to the substrate.

Ecology and habitat: Oligotrophic species occurring in almost any freshwater environment, although it prefers shallow, cold, clear waters.

Native distribution: Nearctic Region.

Distribution in the Iberian Peninsula: Massive infestations have been found throughout the northern Iberian Peninsula.

Pathways: Contaminant. Corridor. Unaided.

Vectors: Fishing (and fishing equipment). Other aquatic recreational activities. Natural dispersal by zoochory. Canals, and irrigation and water-transfer channels.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species.

Authors: Jorge R. Sánchez-González, Saúl Blanco Lanza

CP OT DN CA ES

Salvinia molesta D.S. Mitch., 1972
African payal

Description: Free-floating water fern with a submerged rhizome and groups of three fronds, two buoyant and one submerged. Rapid growth from fragments.

Ecology and habitat: Found in still waters in rivers, wetlands and drainage channels.

Native distribution: Southern and eastern Brazil.

Distribution in the Iberian Peninsula: Extremadura, Algarve, Alentejo and Valencia.

Pathways: Release. Escape.

Vectors: Species from aquariums. Fishkeeping. Ornamental plant.

Impacts: Ecosystems–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Antonio Guillén-Beltrán, Antonio Zamora-López

TE OR UE ES PT

Agarophyton vermiculophyllum (Ohmi) Gurgel, J.N.Norris et Fredericq, 2018
Asian gracilaria

Description: Macroalga that can reach a length greater than 50 cm. Reddish-brown in colour but can turn green due to discoloration. Very easy to confuse with other species of the genus.

Ecology and habitat: It is usually found in areas protected from the swell or marshy areas with influence of fresh water on soft substrates, where it grows loose on the bottom. It also grows well in shallow lagoons. It usually occurs in association with other native algae or carpeting angiosperm meadows.

Native distribution: North-east Asia. Its natural range is the coasts of China, Korea, Vietnam and Japan.

Distribution in the Iberian Peninsula: Found mainly on the Atlantic coast. The first confirmed records were from parts of Galicia and southern Portugal. It probably extends along several estuaries.

Pathways: Contaminant. Stowaway.

Vectors: Aquaculture, through oyster farming. Marine transport, as a stowaway in ballast waters and fouling vessel hulls. At the regional level, secondary dispersal has been favoured by the high fragmentation capacity of these algae, which can be transported between estuaries by boats, fishing tackle, nets, etc.

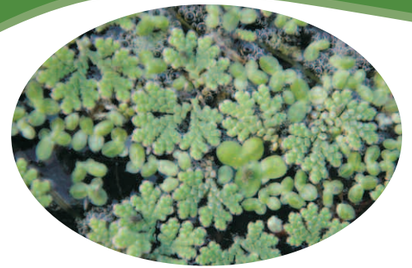
Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

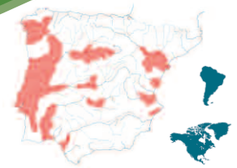
Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Juan B. Vera-Pérez, Pedro Sánchez-Gómez
Rosa Olivo del Amo

AQ TM ES PT

Azolla filiculoides Lam., 1783
Fairy moss





Description: Small, floating fern with branched stems up to 10 cm in length, densely covered with bilobed leaves 1–2 mm long, arranged alternately and imbricated. The colour of the leaves varies according to the conditions in which the plant is growing. In an optimal environment, the leaves are green, but if the plant is at all stressed the leaves acquire a reddish hue. It reproduces both sexually and, occasionally, asexually.

Ecology and habitat: Slow-moving waters; stronger growth is seen in stagnant and eutrophic waters with high levels of phosphorus, the main limiting factor for growth. It can live in brackish waters.

Native distribution: Tropical America, ranging from south-eastern Canada to southern Brazil, Uruguay and Argentina.

Distribution in the Iberian Peninsula: Fairy moss has been present in the Iberian Peninsula since the early twentieth century; in little more than 50 years it colonised large areas of several river basins and regions, including the Ebro delta, the Albufera in Valencia and the Doñana National Park.

Pathways: Release. Escape. Contaminant.

Vectors: Traffic of contaminated goods related to rice agriculture. Agriculture and crops. Other vectors.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Antonio Guillén-Beltrán

CO AG OT ES PT

Asparagopsis armata (Harvey, 1855)
Harpoon weed

Description: Red alga, typically pink, reddish or brownish with long, bare stolons at the base and harpoon-like barbs. Fronds bushy and irregularly branched. Tetrasporophyte brownish-red in cotton-like tufts.

Ecology and habitat: Gametophyte attaches to other algae with its barbs or to hard surfaces on well-lit, shallow coasts. Tetrasporophyte typically occurs deeper.

Native distribution: Australia and New Zealand.

Distribution in the Iberian Peninsula: Observed along the entire coastline (both Atlantic and Mediterranean) including the Balearic Islands.

Pathways: Release. Contaminant. Stowaway.

Vectors: Species from aquariums. Fishkeeping. Traffic of contaminated goods. Marine transport.

Impacts: Species–population impacts through competition.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Arturo H. Ariño

TE CO TM ES PT

Alternanthera philoxeroides (Mart.) Griseb., 1879
Alligator-weed

Description: Herbaceous aquatic plant up to 1 m tall, with whitish flowers and bright, lanceolate leaves, 2–7 cm long and 1–2 cm wide. Dioecious species. Reproduction mainly through floating stolons, which can grow at high densities on the water surface.

Ecology and habitat: Emergent floating plant, capable of surviving in both aquatic and terrestrial environments near water. It occurs in estuaries, lakes, riverine areas, water courses and wetlands.

Native distribution: South America around the Paraná River, including Argentina, Brazil, Paraguay and Uruguay.

Distribution in the Iberian Peninsula: Scattered locations, especially in the Besòs basin in the Mediterranean and along the north-western Atlantic coast peninsulas.

Pathways: Stowaway. Escape.

Vectors: Marine transport, accidentally introduced from cargo ships. Species from aquariums.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: María José Bañuelos

TM TE UE ES PT

Lemna minuta Kunth, 1816
Least duckweed. Dinky duckweed. Minute duckweed. Minuscule duckweed

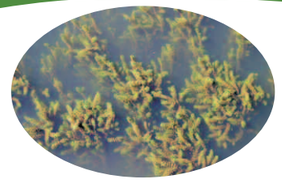
Description: Floating, perennial aquatic macrophyte originating in temperate, tropical, and subtropical zones of the American continent. Plant is formed of undifferentiated sheets, called fronds. Roots up to 1.5 cm in length, tip rounded to pointed, one root per frond. Flowering is rare. Propagation is almost exclusively by vegetative reproduction.

Ecology and habitat:	Stagnant or very slow-moving waters with mesotrophic and eutrophic characteristics.
Native distribution:	Temperate and subtropical zones of America.
Distribution in the Iberian Peninsula:	It has been found in Navarra, Gran Canaria, Huelva, Valencia, the Balearic Islands (Mallorca and Menorca), Beira Alta and Douro Litoral.
Pathways:	Escape. Stowaway. Corridor. Unaided.
Vectors:	Ornamental plant. Species from terrariums and aquariums. Land transport of crop products. Marine and river transport. Canals, and irrigation and water-transfer channels. Natural dispersal.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	Not included in any current legislation.

Authors: Mª Esther Pérez-Corona, Paloma de las Heras

OR TE TT TM CA DN

Egeria densa Planch., 1849
Leafy elodea



Description: Herbaceous aquatic plant with bright green leaves and stems up to 90 cm in length. Free floating or anchored to the bottom. Floating white flowers, with three petals. Vegetative reproduction through fragments produced by broken stems.

Ecology and habitat:	It prefers slow, clear, fresh waters in rivers, reservoirs, lakes or irrigation ponds.
Native distribution:	South America.
Distribution in the Iberian Peninsula:	Eastern Spain, Guadalquivir basin, Alentejo and the Atlantic area of the north-western Iberian Peninsula.
Pathways:	Escape.
Vectors:	Fishkeeping. Pets.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Antonio Guillén-Beltrán, Antonio Zamora-López

TE AN

Colpomenia peregrina (Sauvageau) Hamel, 1927
Oyster thief. Bladder weed

Description: Brown seaweed with a gametophyte about 10 cm in length with a globose appearance, which can swell up with oxygen accumulated during photosynthesis; as it floats away it can pull up from the bottom the bivalves (oysters) to which it is attached. Firm, smooth wall. Sporophyte a few millimetres long.

Ecology and habitat:	Common in intertidal pools and in the shallow sublittoral zone down to 3 m depth, attached to hard substrates.
Native distribution:	East Pacific.
Distribution in the Iberian Peninsula:	Galicia, Basque Country and Mediterranean coast.
Pathways:	Escape. Contaminant.
Vectors:	Aquaculture (oyster commerce).
Impacts:	Species–population impacts.
Legislation:	This species is included on the Portuguese National List of Invasive Species.

Author: Arturo H. Ariño

ES PT AQ PT

Elodea nuttallii (Planch.) H. St. John, 1920
Western waterweed. Nuttall's waterweed

Description: Aquatic, bright green, perennial herbaceous phanerogam with adventitious roots along the stem that can hang freely in the water or anchor in the bottom mud. It can grow rapidly to 3 m in length. Branched and very foliar stems.

Ecology and habitat:	It lives in stagnant or calm, relatively clean, eutrophic, calcareous and sunny waters. In winter it disappears and regrows in spring.
Native distribution:	Temperate regions of North America.
Distribution in the Iberian Peninsula:	Unknown presence. Very easy to confuse wifh E. canadensis.
Pathways:	Release. Stowaway.
Vectors:	Marine and river transport (timber trade). Species from terrariums and aquariums.
Impacts:	Species–population impacts.
Legislation:	This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Arturo H. Ariño

Ludwigia grandiflora (Michaux) Greuter & Burdet, 1987
Water primrose

Description: Perennial aquatic herbaceous plant, aerial part 40–80 cm in height. Lanceolate alternate leaves. Large yellow flowers with five petals.

Ecology and habitat:	Backwaters, riversides. Reproduction by seeds and by cuttings.
Native distribution:	America.
Distribution in the Iberian Peninsula:	Atlantic and Mediterranean basins and Douro sub-basin.
Pathways:	Escape.
Vectors:	Ornamental plant.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: María José Bañuelos

Myriophyllum aquaticum (Velloso) Verdc. (1973)
Parrot feather

Description: Dioecious, perennial plant with an erect stem, with pinnate leaves arranged in groups of 4–6 leaves. The leaves measure 1.5–3.5 cm and have 20–30 divisions (filiform segments) that give it a feathery appearance.

Ecology and habitat:	Temperate areas. It prefers shallow waters with some degree of eutrophication, which favours its growth.
Native distribution:	South America.
Distribution in the Iberian Peninsula:	Central region of Portugal, and Pontevedra and Barcelona in Spain.
Pathways:	Release. Escape.
Vectors:	Species from terrariums and aquariums. Ornamental plant. Agriculture.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Juan B. Vera-Pérez, Pedro Sánchez-Gómez

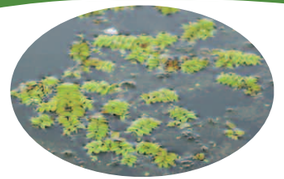
Pistia stratiotes (Linnaeus, 1753)
Water lettuce

Description: Perennial floating aquatic macrophyte, with a rosette of spatulate, wavy-edged leaves covered with short hairs. The upper side of the leaf is light green, while the underside is almost white. It has large systems of feathery roots that hang freely submerged in water.

Ecology and habitat:	Occurs in freshwater lentic habitats.
Native distribution:	South America.
Distribution in the Iberian Peninsula:	Basque Country and Andalusia.
Pathways:	Escape. Unaided.
Vectors:	Ornamental plant. Natural dispersal.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Mª Esther Pérez-Corona, Paloma de las Heras

Salvinia natans (L.) All., 1785
Floating fern. Watermoss

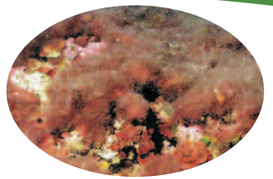


Description: Emergent floating plant, sometimes with filiform leaves that perform the functions of roots. Invades aquatic areas and adjacent land. It has hollow stems at maturity and can grow up to 1 m tall. Leaves are bright, lanceolate, opposite, sessile and entire, 2–7 cm long and 1–2 cm wide.

Ecology and habitat:	Floating in lakes, ponds, rivers and streams.
Native distribution:	South America.
Distribution in the Iberian Peninsula:	Empurdà (Girona), mouth of the Ebro, Pontevedra and garden ponds in Elche (Alicante).
Pathways:	Release. Escape.
Vectors:	Species from terrariums and aquariums.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Authors: Juan B. Vera-Pérez, Pedro Sánchez-Gómez

Womersleyella setacea (Hollenberg) R. E. Norris, 1992
Unknown

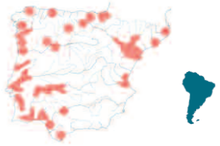


Description: A perennial filamentous red alga, red-pink to brown, usually epiphytic. It forms large, dense, monospecific mats resembling cotton, 1 cm thick. Its identification requires a specialist.

Ecology and habitat:	A marine species but also occurring in estuaries at depths of 0–15 m in dimly lit habitats at relatively low temperatures.
Native distribution:	Indian Ocean.
Distribution in the Iberian Peninsula:	Widely distributed along the whole Mediterranean coastline.
Pathways:	Stowaway. Escape.
Vectors:	Marine transport. Species from terrariums and aquariums.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Jorge R. Sánchez-González

Cyperus eragrostis (Lamarck, 1791)
Golden nutsedge



Description: Herbaceous perennial with short, thick rhizome, trigonal stem, usually up to 40 cm high. It has flat or canalicular basal leaves. The flowers are greenish, forming a composite anther. Fruits are trigonal and indehiscent achenes.

Ecology and habitat:	It grows in wet and human-disturbed places such as ditches, ponds and river banks.
Native distribution:	South America.
Distribution in the Iberian Peninsula:	Scattered distribution, especially in floodplain areas used for agriculture.
Pathways:	Release. Stowaway.
Vectors:	Ornamental plant. Marine and river transport.
Impacts:	Ecosystem–habitat and Species–population impacts.
Legislation:	Not included in any current legislation.

Author: Filipe Banha

Sargassum muticum ((Yendo) Fensholt, 1955)
Japanese wireweed

Description: Brown alga up to 2 m high, with a short cauloid (up to 2 cm). Spherical or ovoid aerocysts. Pseudoperennial.

Ecology and habitat:	Hard substrates protected from waves. It tolerates a wide range of temperatures (10–30 °C) and salinities. Opportunistic species.
Native distribution:	North-western Pacific.
Distribution in the Iberian Peninsula:	Cantabrian coast, Northern and Southern Atlantic coasts and Catalonia.
Pathways:	Stowaway. Contaminant. Escape.
Vectors:	Marine transport. Aquaculture. Species from aquariums.
Impacts:	Ecosystem–habitat and Species-population impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Jorge R. Sánchez-González

Nymphaea mexicana Zuccarini, 1832
Banana water lily

Description: Perennial, rhizomatous aquatic plant. Its rhizomes are unbranched and cylindrical, with elongated stolons. It has large floating leaves, up to 25 cm long, green and flat. Vegetative reproduction by stolons and propagules that are also dispersed by the current.

Ecology and habitat: Coastal plains at the edges of lakes and ponds, hot springs, swamps, stretches of rivers with slow-moving, nutrient-rich waters.

Native distribution: North America.

Distribution in the Iberian Peninsula: Guadiana.

Pathways: Escape. Stowaway. Unaided. Contaminant.

Vectors: Ornamental plant. Traffic of contaminated goods. Marine, river, air or land transport. Natural dispersal once established.

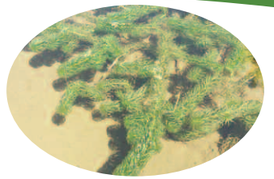
Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is and in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Antonio Guillén-Beltrán, Pablo García-Murillo

OR CO TM TA TT DN ES PT

Lagarosiphon major (Ridley) Moss, 1928
African elodea. Curly waterweed. Oxygen weed. South African oxygen weed



Description: Dioecious, perennial submerged aquatic plant with adventitious roots and rhizomes, with dark green leaves minutely toothed and alternately spiralled around the stem. Very small flower and fruit as a beaked capsule.

Ecology and habitat: Inhabits lentic, shaded and protected systems with sandy substrates.

Native distribution: South Africa.

Distribution in the Iberian Peninsula: Mondego river, Ribeira de Odeleite (Guadiana) in southern Portugal.

Pathways: Escape. Unaided.

Vectors: Species from aquariums. Ornamentation. Natural dispersal.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern and on the Portuguese National List of Invasive Species.

Author: Rafael Miranda

TE OR DN UE PT

Elodea canadensis Michx., 1803
Canadian pondweed

Description: Perennial, submerged aquatic macrophyte, with elongated flexible stems and long internodes that are lined with sessile leaf spirals, thoroughly serrated and rooted from their nodes.

Ecology and habitat: Prefers ponds and lakes with muddy or muddy-silt substrates but can grow in a wide variety of habitats.

Native distribution: North America.

Distribution in the Iberian Peninsula: Isolated populations throughout Spain and Mondego river in Portugal.

Pathways: Escape. Unaided.

Vectors: Species from aquariums. Ornamentation. Natural dispersal.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Rafael Miranda

TE OR DN ES PT

Hydrocotyle ranunculoides L.f. 1782
Floating pennywort

Description: Aquatic stoloniferous plant with creeping stem with nodes at intervals and profuse filiform roots. The emergent leaves are reniform with lobed edges.

Ecology and habitat: Occurs in the backwaters of watercourses. Very tolerant of a wide range of habitats and temperatures.

Native distribution: North and South America.

Distribution in the Iberian Peninsula: Valencian Community.

Pathways: Escape. Unaided.

Vectors: Species from aquariums. Ornamentation. Natural dispersal.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Rafael Miranda

TE OR DN UE ES PT

Crassula helmsii A. Berger, 1930
Swamp stonecrop. New Zealand pigmyweed

Description: Aquatic or semi-terrestrial succulent herbaceous perennial plant with fine round stems that creep or float. Succulent and elongated leaves are opposite and sessile. The white or pinkish flowers are borne individually in the leaf axils.

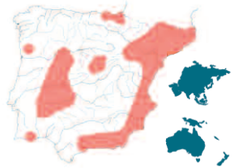
Ecology and habitat:	It spreads rapidly to form dense mats and is very tolerant of a wide range of habitats and temperatures.
Native distribution:	Australia and New Zealand.
Distribution in the Iberian Peninsula:	Reported in Spain.
Pathways:	Escape. Unaided.
Vectors:	Fishkeeping. Ornamentation. Natural dispersal.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Rafael Miranda

TE OR DN ES

INVERTEBRATES

Aedes albopictus (Skuse, 1894)
Tiger mosquito



Description: Mosquito in the *Culicidae* family, no more than 1 cm in length. Slim body with a pair of narrow wings. Characteristic colour pattern on abdomen, thorax and legs; white midline stripe on a black background on head and thorax with small white spots on a black background. This mosquito feeds on plant nectar, but females need a blood meal – which they obtain mainly from mammals – to produce eggs. They lay clutches of 70–250 eggs, which can survive desiccation. The whole cycle takes just 8–12 days.

Ecology and habitat: This species prefers damp, shady, densely vegetated areas. It can colonise a wide range of anthropised environments with small bodies of water.

Native distribution: Jungles of the tropical region of South-east Asia, parts of the Pacific and islands of the Indian Ocean.

Distribution in the Iberian Peninsula: Spanish Levante, including the Balearic Islands, and areas of Aragon, Madrid, Andalusia, Extremadura, Basque Country, Algarve and Northern Region of Portugal.

Pathways: Stowaway. Unaided. Contaminant.

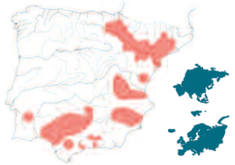
Vectors: Traffic of contaminated goods. Stowaway in marine, river, air and/or land transport. Natural dispersal once established.

Impacts: Species–population impacts through competition with other species, and Socio-economic impacts due to disease transmission (e.g. dengue, yellow fever and zika).

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Antonio Guillén-Beltrán

Dreissena polymorpha (Pallas, 1771)
Zebra mussel



Description: Bivalve mollusc with rapid growth. Individuals up to 5 cm long have been found. The shell, triangular in shape, has a marked pattern of dark background and white zigzag bands. It is a filtering organism. Reproduces in spring and summer, when females release around 40,000 eggs in the water column.

Ecology and habitat: Reservoirs, rivers, lakes and freshwater lagoons, but also irrigation channels and reservoirs. This species tolerates a wide range of environmental conditions. It can withstand long periods of starvation, desiccation, a certain degree of salinity, extreme high and low temperatures (between -2 °C and 40 °C) and very wide variations in oxygen levels. It requires hydrogen peroxide for optimal development.

Native distribution: Originally from the Black Sea and Caspian Sea basins.

Distribution in the Iberian Peninsula: Especially problematic in the Ebro, Júcar, Segura and Guadalquivir river basins in Spain. It is expanding its range in the Iberian Peninsula and has been found in scattered locations in many other river basins.

Pathways: Stowaway. Contaminant. Corridor.

Vectors: Marine and river transport, by yachting or recreational boating. Commercial and sport fishing. Canals, and irrigation and water-transfer channels. Traffic of contaminated goods.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Antonio Guillén-Beltrán

TM CP CA CO ES PT

Procambarus clarkii (Girard, 1852)
Red swamp crayfish. Louisiana crayfish. Mudbug

Description: Crustacean that can reach 15 cm in total length and weigh up to 60 g, but normally not more than 40 g. Its colour ranges from deep red to brown and dark garnet. It has two long main antennae. The pincers have a multitude of spiny and jagged features, particularly a characteristic spur on the inner side of the joint. Its cephalothorax is granular with small tubercles on the surface.

Ecology and habitat: Omnivorous, it can be a cannibal. It prefers lotic environments with little current, although it can be found in almost any aquatic ecosystem with muddy or clay substrates where it can dig its burrows. It is ecologically plastic and tolerant, capable of withstanding a wide range of environmental conditions.

Native distribution: North America.

Distribution in the Iberian Peninsula: Widely distributed throughout the Iberian Peninsula, especially abundant in the south.

Pathways: Release. Escape. Unaided.

Vectors: Aquaculture, from which it has escaped. Fishing, introduced as a food resource. Natural dispersal once established.

Impacts: Ecosystem–habitat, Species–population, through predation, competition, and disease transmission (e.g. aphanomycosis due to *Aphanomyces astaci*), and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Antonio Guillén-Beltrán, Jorge R. Sánchez-González

AQ CP DN UE ES PT

Pacifastacus leniusculus Dana, 1852
Signal crayfish

Description: Crayfish up to 16 cm long (from tip of rostrum to telson). Can weigh more than 100 g and males are generally larger than females. Dark brown with sturdy claws and a distinctive white to turquoise patch at the base of the claw hinge. The margin of the rostrum is soft. Males lack spines on the 3rd segment of their legs. Females have no seminal receptacle.

Ecology and habitat: From small mountain streams to large rivers and even mountain lakes. It can tolerate brackish water and high temperatures. Absent from waters with pH below 6.0. It shows aggressive territorial behaviour and is mainly nocturnal. It is an opportunistic omnivorous species with rapid growth.

Native distribution: Endemic to western North America between the Pacific Ocean and the Rocky Mountains.

Distribution in the Iberian Peninsula: Widely distributed in the northern and central areas of the Iberian Peninsula, especially in the upper parts of the Tagus, Ebro and Douro river basins.

Pathways: Release. Escape.

Vectors: Aquaculture. Sport fishing.

Impacts: Species–population impacts through predation, competition, and disease transmission (e.g. aphanomycosis due to *Aphanomyces astaci*).

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Filipe Banha, Pedro M. Anastácio

AQ CP UE ES PT

Corbicula fluminea (Müller, 1774)
Asian clam

Description: The shell is hard and strong with a triangular outline (length: 5 cm). The outside of the shell is normally yellow-green with concentric rings. The colour can flake off, leaving white spots. The shell is pale purple on the inside.

Ecology and habitat: It inhabits almost any aquatic ecosystem on any substrate. It can be found in lakes, reservoirs, estuaries with brackish water and many other water bodies. However, it prefers clear, well-oxygenated waters with temperatures ranging from 2 °C to 30 °C, and sand, mud or gravel bottoms where it can bury itself. It can produce eggs and sperm simultaneously and can self-fertilise.

Native distribution: South-east Asia, and islands of the Pacific.

Distribution in the Iberian Peninsula: Currently found in most river basins in the Iberian Peninsula.

Pathways: Stowaway (principally). Escape. Release. Contaminant.

Vectors: Marine and river transport. Sport fishing. Specie from aquariums. Traffic of contaminated goods. Release as a food resource.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Jorge R. Sánchez-González, Antonio Guillén-Beltrán

TM CP TE CO AG ES PT

Eriocheir sinensis Milne-Edwards, 1852
Chinese mitten crab. Shanghai hairy crab

Description: This is a large crab species with a convex, square carapace, four sharp spines on either side and a notch between the eyes. It can easily be distinguished from other European species since both sexes have setal mats on the chelae, although these mats are more developed on males. Adult carapace is usually 5–7 cm in length, but sometimes larger.

Ecology and habitat: This is a catadromous species. Juveniles migrate up the river and adults return to the mouth of the estuary to reproduce. It is an indiscriminate omnivorous feeder. Has been subjected to control by trapping in or out of the water in other European countries.

Native distribution: This species is native to Eastern Asia, from Hong Kong to the Korean peninsula.

Distribution in the Iberian Peninsula: Currently found only in the Tagus and Guadalquivir river basins. Recorded from the Minho/Miño river but apparently failed to establish itself there.

Pathways: Stowaway. Unaided.

Vectors: Marine Transport. Natural dispersal, because adults and juveniles are very efficient migrators and can often disperse overland.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Pedro M. Anastácio

TM DN UE ES PT

Pomacea spp.
Apple snail. Golden apple snail

Description: This genus includes, at least, two species reported from Spain, namely the more common *Pomacea maculata* (= *insularum*) and also *Pomacea canaliculata*. It is very difficult to determine the species without genetic analyses. *Pomacea* are the largest freshwater snails known. The bright red or pink egg masses laid out of the water – on emergent vegetation, for example – are the most conspicuous sign of the presence of these snails.

Ecology and habitat: These are freshwater species, living in slow-moving waters, and are very common in wetlands, including rice fields. They feed on aquatic vegetation and have nocturnal habits.

Native distribution: Both species are native to South America, but their exact distribution limits are not totally clear.

Distribution in the Iberian Peninsula: Found in the Ebro river delta.

Pathways: Escape. Release. Stowaway.

Vectors: Breeding. Aquaculture. Pets. Land transport, as a stowaway on agricultural vehicles.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Pedro M. Anastácio

AG AQ AN TT ES PT

Potamopyrgus antipodarum (Gray, 1853)
New Zealand mudsnail

Description: This is a very small snail, usually 5–6 mm long. The most common colour is dark brown, but it can be very variable, often light yellow. It has a conical shell with 5–7 whorls (depending on its age) and the shell opening has an operculum. This opening is on the right side when viewed with the tip of the shell pointing up. The opening is oval and smaller than the snail's spire.

Ecology and habitat: Found in numerous habitats from still to running waters and from fresh to brackish water. Usually forms dense populations. Can survive out of water for long periods. Parthenogenetic.

Native distribution: Native to North and South Islands in New Zealand and nearby smaller islands.

Distribution in the Iberian Peninsula: Present in all major river basins of the Iberian Peninsula, although information is lacking in some areas.

Pathways: Stowaway. Contaminant.

Vectors: Marine and river transport, by recreational vessels such as rafts and kayaks, water tankers, etc. Traffic of contaminated goods, such as trade in aquatic plants or farmed fish. Aquaculture.

Impacts: Ecosystem–habitat impacts. Species–population impacts, because it may dominate and outcompete native mollusc communities, reducing available food and space. It can also pass through the digestive tract of fish without being digested, causing them to lose weight.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Pedro M. Anastácio

TM CO AQ ES PT

Crepidula fornicata (Linnaeus, 1758)
American limpet. Atlantic slippersnail. Slipper limpet

Description: Oval shell, maximum length 5 cm, smooth with irregular growth lines. White/yellow/pink with streaks of red/brown.

Ecology and habitat: Marine. Hermaphrodite. Tolerates a wide range of environmental conditions. Prefers wave-protected areas such as bays and estuaries.

Native distribution: North-eastern coast of North America.

Distribution in the Iberian Peninsula: Scattered locations, including the Ebro delta, Galicia, and Tagus and Cávado estuaries.

Pathways: Escape. Stowaway.

Vectors: Aquaculture. Marine transport, as a stowaway in ballast water and fouling vessel hulls.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Mafalda Gama

AQ TM ES

Callinectes sapidus M. J. Rathbun, 1896
Blue crab. Atlantic blue crab

Description: Decapod crustacean with an anterolaterally arched carapace, broader than long with a strong lateral spine on each side. Carapace is greyish, olive-brown or bluish-green dorsally. Claws are blue in males and red-orange in females. The last pair of legs are flattened in the form of paddles for swimming.

Ecology and habitat: Eurythermal and euryhaline species. Omnivore. Inhabits estuaries and bays, from the shore to 90 m depth. On muddy and sandy bottoms or in seagrass meadows, critical habitats for breeding.

Native distribution: Western Atlantic Ocean.

Distribution in the Iberian Peninsula: Along the whole coastline, especially the Mediterranean and southern coast. Occasionally found along the western and northern coasts of the Iberian Peninsula.

Pathways: Stowaway. Release. Unaided.

Vectors: Marine transport, as a stowaway in ballast water. Fishing, due to its high commercial value. Natural dispersal once established.

Impacts: Species–population and Socio-economic impacts.

Legislation: Not included in any current legislation.

Author: Felipe Morcillo

Orconectes limosus (Rafinesque, 1817)
Spinycheek crayfish

Description: Greenish-brown crayfish with brown spots on each abdominal segment. Tips of chelae orange with black band visible on underside.

Ecology and habitat: It prefers calm, warm waters; it is very adaptable and tolerant of salinity and pollution. Omnivore.

Native distribution: North-east American coast.

Distribution in the Iberian Peninsula: Muga river.

Pathways: Release. Escape.

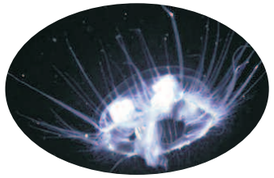
Vectors: Species used as bait. Other.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Javier Oscoz

Craspedacusta sowerbii (Lankester, 1880)
Freshwater jellyfish



Description: Polyp form just a few millimetres tall, without tentacles. Jellyfish with a 10–20 mm diameter bell surrounded by tentacles, a well-developed manubrium and the characteristic veil of hydromedusae.

Ecology and habitat: Their presence goes unnoticed while in the polyp state in lentic environments, where they live attached to vegetation, feeding on micrometazoa. The jellyfish undergo striking population explosions and sudden disappearances.

Native distribution: Yangtze Basin (China).

Distribution in the Iberian Peninsula: Scattered locations throughout the Iberian Peninsula.

Pathways: Contaminant. Stowaway. Unaided.

Vectors: Species from aquariums. Natural dispersal.

Impacts: Species–population impacts.

Legislation: Not included in any current legislation.

Authors: Fernando Cobo, Sandra Barca-Bravo, Rufino Vieira-Lanero

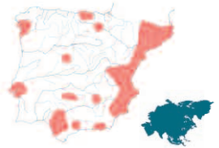
Mytilopsis leucophaeata (Conrad, 1831)
Dark false mussel

Description: Mytiliform shell up to 25 mm in length, elongated, slightly rectangular with straight dorsal and rounded ventral margin, cream to dark brown periostracum. Pearly grey interior, hinge ligament with apophysis shaped like a triangular tooth.

Ecology and habitat:	Filter feeder attached by the byssus to a wide variety of substrates. It can tolerate a range of temperature and salinity conditions in the habitats it colonises as an invasive species.
Native distribution:	Fresh and brackish waters of the Atlantic coast of North America.
Distribution in the Iberian Peninsula:	Guadalquivir river.
Pathways:	Stowaway.
Vectors:	Marine and river transport.
Impacts:	Socio-economic impacts through bioincrustation.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Authors: Fernando Cobo, Sandra Barca-Bravo, Rufino Vieira-Lanero

Physella acuta (Drapanaud, 1805)
Tadpole snail. Bladder snail



Description: Aquatic pulmonate snail up to 17 mm in length. Sinistral shell (opening on the left side of the observer), with long, wide opening. Smooth, translucent shell, pale brown to yellow in colour.

Ecology and habitat:	It inhabits all types of freshwater environments, especially in slow-moving waters. It can survive in polluted and brackish waters.
Native distribution:	North America.
Distribution in the Iberian Peninsula:	Widely distributed throughout the Iberian Peninsula.
Pathways:	Contaminant.
Vectors:	Traffic of contaminated goods.
Impacts:	Species–population and Socio-economic impacts.
Legislation:	Not included in any current legislation.

Authors: Filipe Banha, Pedro M. Anastácio

Crangonyx pseudogracilis (Bousfield, 1958)
Northern river crangonyctid

Description: Small amphipod up to 10 mm in length, variable in colour. Distinctive V-shaped telson (caudal appendage) composed of a single structure. Urosomes 1 and 2 (caudal appendages) without spikes.

Ecology and habitat:	Rivers, streams, marshes, dams, rice fields, including caves.
Native distribution:	North America.
Distribution in the Iberian Peninsula:	Lower reaches of the Tagus, (main stretch of the Tagus in Portugal and its main tributaries).
Pathways:	Contaminant.
Vectors:	Traffic of contaminated goods.
Impacts:	Species–population impacts through competition and transmission of parasites.
Legislation:	Not included in any current legislation.

Authors: Filipe Banha, Pedro M. Anastácio

Xenostrobus securis (Lamarck, 1819)
Black-pygmy mussel

Description: Mytiliform shell up to 30 mm in length, equivalve, subcylindrical. Straight or slightly arched ventral margin, dark brown, shiny and hairy periostracum in the youngest specimens. Internally pearly, purple above and white below the umbonal keel.

Ecology and habitat:	Filter feeder attached by the byssus to a wide variety of substrates.
Native distribution:	Brackish waters of New Zealand and Australia.
Distribution in the Iberian Peninsula:	Rías Baixas, mouth of the River Fluvià and Bay of Biscay.
Pathways:	Stowaway. Contaminant.
Vectors:	Marine transport. Aquaculture.
Impacts:	Species–population, through competition, and Socio-economic impacts, through bioincrustation.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Authors: Fernando Cobo, Sandra Barca-Bravo, Rufino Vieira-Lanero

Rhithropanopeus harrisii (Gould, 1841)
Harris mud crab

Description: Small crab with a maximum carapace width of about 2–3 cm and large white-tipped claws of unequal size. The front of the carapace is almost straight but slightly notched.

Ecology and habitat:	An estuarine species which feeds on detritus, algae or small invertebrates, including amphipods, polychaetes and bivalves.
Native distribution:	Atlantic coast of North America.
Distribution in the Iberian Peninsula:	Estuaries of the Guadalquivir, Mondego and Tagus rivers.
Pathways:	Contaminant. Stowaway.
Vectors:	Aquaculture. Marine and river transport.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Pedro M. Anastácio

Cherax destructor (Clark, 1936)
Yabby

Description: A freshwater crayfish up to 15 cm in length with a smooth carapace and large claws. It is usually beige to almost black but captive individuals may often be blue-grey.

Ecology and habitat:	Omnivorous. Found in a variety of freshwater habitats in its native range. Tolerates 1 °C but grows best at 28 °C. Can be controlled using crayfish plague.
Native distribution:	South-eastern Australia.
Distribution in the Iberian Peninsula:	Restricted to a few locations in Aragón and Navarra.
Pathways:	Release. Escape.
Vectors:	Aquaculture. Species from terrariums and aquariums.
Impacts:	Ecosystem–habitat, Species–population impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Pedro M. Anastácio

Sinanodonta woodiana (Lea, 1834)
Chinese pond mussel

Description: Large freshwater mussel reaching up to 30 cm in length and living 12–14 years. It has a wide shell with a deeply rounded ventral margin.

Ecology and habitat:	A freshwater species that may reach very high densities. Needs a fish host to complete larval development and this facilitates its spread.
Native distribution:	South-east Asia.
Distribution in the Iberian Peninsula:	Fluvià, Ter and Daró river basins.
Pathways:	Contaminant. Corridor.
Vectors:	Traffic of contaminated goods (fish for aquaculture and sport fishing). Canals, and irrigation and water-transfer channels, where used by fish.
Impacts:	Ecosystem–habitat and Species–population impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Pedro M. Anastácio

Austrominius modestus (Darwin, 1854)
Australasian barnacle. New Zealand barnacle

Description: Small Balanomorpha species (10 mm). Wall made of 4 calcareous plates with grey lines and a scalloped, non-calcified base.

Ecology and habitat:	Sessile, intertidal, suspensivorous, euryhaline and eurythermal species, occurring in waters with low hydrodynamics.
Native distribution:	Australasia.
Distribution in the Iberian Peninsula:	Dispersed populations in estuaries, harbours and sheltered coves on the Atlantic coast as far south as Faro.
Pathways:	Stowaway.
Vectors:	Marine and river transport.
Impacts:	Species–population, through competition, and Socio-economic impacts through bioincrustation.
Legislation:	This species is included on the Portuguese National List of Invasive Species.

Authors: Fernando Cobo, Sandra Barca-Bravo, Rufino Vieira-Lanero

Ferrissia californica (Rowel, 1863)
Fragile ancylid

Description: A 4 mm long and 3 mm wide limpet with an oval, transparent shell. It has a broad, blunt apex, turned to the right and slightly posteriorly.

Ecology and habitat:	Herbivore, living in slow-moving waters, attached to hard surfaces such as rocks or to aquatic vegetation.
Native distribution:	North America.
Distribution in the Iberian Peninsula:	Alicante, Barcelona, Girona, Navarra, Tarragona, Valencia, Castile-La Mancha and Madrid.
Pathways:	Escape. Contaminant. Unaided.
Vectors:	Species from aquariums. Land transport. Natural dispersal by birds.
Impacts:	Species–population impacts.
Legislation:	Not included in any current legislation.

Author: Pedro M. Anastácio

TE TT DN

Girardia tigrina (Girard, 1850)
Brown planaria

Description: Small flat body (10 mm in length). Triangular head with two wide auricles and two submedian eyes. The mouth and genital pores are in the mid-ventral line of the body. Spotted dorsal surface with varying degree of pigmentation.

Ecology and habitat:	All types of freshwater environments, under stones or among vegetation. Reproduction is sexual (hermaphrodite) or asexual (by fragmentation). Carnivorous feeder, predator on zoobenthos.
Native distribution:	North America.
Distribution in the Iberian Peninsula:	Scattered localities, especially common in Mediterranean rivers and canals.
Pathways:	Escape.
Vectors:	Fishkeeping.
Impacts:	Species–population impacts through competition.
Legislation:	Not included in any current legislation.

Authors: Fernando Cobo, Sandra Barca-Bravo, Rufino Vieira-Lanero

TE

Pectinatella magnifica (Leidy, 1851)
Freshwater bryozoan

Description: Small bryozoan forming large brownish gelatinous masses. Red pigmentation around the mouth. White spots on the tentacles of the lophophore. Statoblasts with a single row of anchor-shaped peripheral spines.

Ecology and habitat:	Freshwater species. Large colonies develop attached to submerged branches and other substrates. In autumn, the colonies die and fall apart. Statoblasts are released and spend the winter dormant.
Native distribution:	North America.
Distribution in the Iberian Peninsula:	Reported in the Cávado, Ave, Vouga, Mondego and Douro rivers.
Pathways:	Stowaway.
Vectors:	Marine and river transport.
Impacts:	Socio-economic impacts.
Legislation:	Not included in any current legislation.

Author: Mafalda Gama

TM

Cordylophora caspia (Pallas, 1771)
European fouling hydroid. Ponto-Caspian hydroid

Description: Hydroid that grows in branching light-brown colonies ending in whitish polyps.

Ecology and habitat:	It inhabits freshwater and brackish habitats. Broad environmental tolerance. It is a benthic predator and can reproduce sexually or asexually.
Native distribution:	Black and Caspian seas.
Distribution in the Iberian Peninsula:	Coastal lagoon of Santo André, Albufera of Valencia and lower reaches of the Tagus, Minho/Miño, Bermaña, Guadalquivir, Guadiana and Ebro rivers.
Pathways:	Stowaway. Release.
Vectors:	Marine and river transport. Species from aquariums.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Javier Oscoz

TM TE ES

Pseudosuccinea columella (Say, 1817)
American ribbed fluke snail

Description: Dark coloured with whitish spots, eyes at the inner base of the tentacles, small and black. Pointed, thin, translucent apical shell with microsculpture and oval opening. 8–13 mm in width and 15–25 mm in height.

Ecology and habitat: Associated with macrophytes in artificial aquatic environments, channels and lentic ecosystems. Omnivorous. Intermediate host of several species of digenean trematodes.

Native distribution: North America.

Distribution in the Iberian Peninsula: Artificial aquatic environments in Barcelona and Blanes Botanical Garden, Gándaras de Budiño (O Porriño, Pontevedra), streams, coastal canyons and basin of the Piedras river (Huelva), Arroyo del Pantano (Benalmádena, Málaga) and lower reaches of the Vouga and Mondego rivers.

Pathways: Escape.

Vectors: Species from aquariums.

Impacts: Species–population impacts through competition and disease transmission.

Legislation: Not included in any current legislation.

Authors: Fernando Cobo, Sandra Barca-Bravo, Rufino Vieira-Lanero

LIFE INVASAQUA

TE

FISHES

Silurus glanis Linnaeus, 1758
European catfish. Wels catfish. Sheatfish

Description: Large catfish, usually up to 2.8 m in total length and 130 kg in weight. It has no scales. It has 6 peribuccal barbels: 2 longer ones on the upper jaw, and 4 shorter ones ventrally on the lower jaw (2 medial and anterior and 2 posterior and more lateral). Its body is elongated and compressed laterally with a large dorsoventrally flattened head. It has a dorsal fin with only 4–5 rays and very long anal fin. The caudal fin is rounded or truncated. Very dark coloration.

Ecology and habitat: It is a benthic, sedentary fish. It is a macro-predator, inhabiting middle and lower reaches of rivers with clear, calm, deep waters, abundant vegetation, especially macrophytes, and silty and sandy bottoms with little current. Crepuscular habits. It can tolerate brackish waters.

Native distribution: Eastern Europe, Central Asia and Asia Minor.

Distribution in the Iberian Peninsula: Middle and lower reaches of the Ebro river and many large reservoirs along the Douro, Tagus and Guadalquivir rivers. Also found in some other river basins in Catalonia.

Pathways: Release.

Vectors: Sport fishing. Fishing. Aquaculture.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Jorge R. Sánchez-González

Cyprinus carpio Linnaeus, 1758
Common carp

Description: Cyprinid with robust, laterally compressed body and short caudal peduncle. Can exceed 70 cm in total length. Small terminal mouth with fleshy lips and two pairs of short barbels on each side. A single, long-based dorsal fin with a robust, hard, serrated leading ray, and caudal fin deeply emarginate.

Ecology and habitat: Gregarious species that prefers slow or standing waters, temperate temperatures and silty, muddy bottoms with vegetation. Very abundant in reservoirs and the middle and lower reaches of rivers. Tolerates low oxygen concentrations and organic pollution. It is a generalist species and an omnivorous feeder that consumes detritus, invertebrates, plant debris and the fry of other fish.

Native distribution: Originally from Eurasia, in the Black, Caspian and Aral Sea basins.

Distribution in the Iberian Peninsula: Found in most Iberian drainage basins except in the north-west. It was introduced in the Iberian Peninsula as an ornamental species under the Habsburg dynasty (16^{th}–17^{th} centuries).

Pathways: Release. Escape.

Vectors: Sport fishing, for which it is highly prized, in reservoirs, irrigation ponds and lakes. Ornamentation, commonly introduced as an ornamental species, with selection of different varieties.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species.

Authors: Mar Torralva, Carlos Fernández-Delgado

Micropterus salmoides (Lacépède, 1802)
Large-mouth bass

Description: Fish with a laterally compressed and fusiform body (30–40 cm up to 65 mm in length). Prominent head and mouth extending beyond the edge of the eye. It has a prominent dorsal fin divided into two parts: the first part with spiny rays and the second with soft rays. The operculum ends in a strong spine. The fish is green in coloration with a darker horizontal line.

Ecology and habitat: Occurs in lentic areas of large rivers and in reservoirs, preferring reaches with abundant vegetation and shelters. It is a predator that feeds on crustaceans and other fish, and has caused the disappearance of *Salaria fluviatilis* and *Cobitis paludica* in some localities.

Native distribution: North America.

Distribution in the Iberian Peninsula: Present in almost all the river basins in the Iberian Peninsula, especially in central and southern parts.

Pathways: Release.

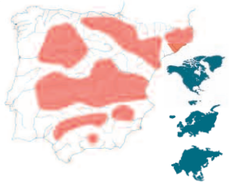
Vectors: Sport fishing.

Impacts: Species–population, through predation, and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Filipe Ribeiro

Esox lucius Linnaeus, 1758
Northern pike



Description: Very large, wide, flattened, duckbill-shaped snout. Dorsal and anal fins set very far back, close to the tail fin and opposite each other, allowing for explosive acceleration. Greenish body with yellowish lines. It often exceeds 70 cm in length (up to 1.5 m and 28 kg in weight). It can live for more than 30 years. It has 105–148 scales along the lateral line. It has strong maxillary teeth.

Ecology and habitat: Occurs in slow-moving waters in freshwater ecosystems and estuaries with abundant vegetation, on which it lays its eggs. It is a predator with a mixed diet since it consumes both invertebrates and vertebrates, but when it exceeds 30 cm it feeds almost exclusively on fish. Ambush predator. Territorial and solitary.

Native distribution: Species with circumpolar distribution, native to northern Europe, Asia and North America.

Distribution in the Iberian Peninsula: Established in most of the Iberian Peninsula. First recorded in 1949.

Pathways: Release. Escape.

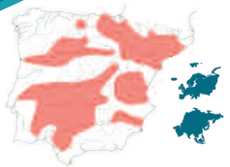
Vectors: Sport fishing. Aquaculture. Species from aquariums.

Impacts: Species–population impacts through predation on native fish and other aquatic species.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Jorge R. Sánchez-González

Alburnus alburnus (Linnaeus, 1758)
Common bleak



Description: Small cyprinid not exceeding 25 cm in length. Fusiform, laterally compressed body covered with very deciduous scales. Mouth slightly superior. Short dorsal fin, smaller than anal fin and set slightly back. Grey-greenish coloration on the back, silver on the sides and belly due to its iridescent scales. Translucent fins, which may have a slightly orange or reddish hue during the spawning season, especially in males.

Ecology and habitat: Omnivorous and opportunistic. In the Iberian Peninsula, it has shown high adaptability to the food resources found in various environments. A limnophilous, gregarious species that forms schools in areas of clear water and medium current, also in lentic habitats or reservoirs. Potamodromous, although sedentary populations may occur in reservoirs; also inhabits Mediterranean-type rivers.

Native distribution: Central Europe, from France to the Urals in the north-eastern and Anatolia in the south-eastern.

Distribution in the Iberian Peninsula: Inhabits all major river basins and smaller basins in the Mediterranean area.

Pathways: Release. Escape. Corridor.

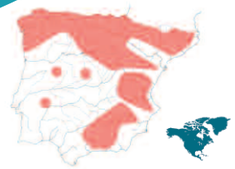
Vectors: Sport fishing. Species used as live bait. Canals, and irrigation and interbasin water-transfer channels.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: Included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Francisco J. Oliva-Paterna, David Almeida

Oncorhynchus mykiss (Walbaum, 1792)
Rainbow trout



Description: Salmonid, therefore with an adipose fin behind the dorsal fin. Medium-sized fish 40–60 cm in total length, although it can exceed 100 cm. Prominent black spots on the caudal fin but not ventrally. An iridescent pink stripe runs along the midline of the body. Elongated and laterally compressed body, especially in large individuals.

Ecology and habitat: Inhabits brooks to large rivers and lakes with clear, cold water (below 25 °C in summer). It is anadromous in coastal rivers. Predator feeding especially on zooplankton when juvenile and on invertebrate larvae and small fish when adult.

Native distribution: North Pacific.

Distribution in the Iberian Peninsula: Widely introduced all over Spain. In Portugal, it is present in some mountain lakes and reservoirs.

Pathways: Release. Escape.

Vectors: Sport fishing. Aquaculture. Species used as live bait.

Impacts: Ecosystem–habitat and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Jorge R. Sánchez-González

Gambusia holbrooki (Agassiz, 1859)
Eastern mosquitofish. Gambusia

Description: Small fish with sexual dimorphism, the females being larger (not exceeding 6 cm in length). Wide, flattened head with superior mouth. Females during the reproduction period exhibit a black spot on the side of the belly. They are mature when 5 or 6 weeks old, and reproduce with internal fertilisation because males have their ventral fin modified as a copulatory organ. The females incubate their eggs internally, later giving birth to fry.

Ecology and habitat: Opportunistic, its diet consists mainly of invertebrates, but it can also feed on fish larvae and even plants. Although it has been used for the biocontrol of mosquito populations, it is a generalist predator and there are doubts about the effectiveness of this control. Gregarious, occurring in a wide variety of habitats, preferably in slow-moving, shallow waters with vegetation. It tolerates a wide spectrum of conditions and is resistant to pollutants.

Native distribution: Atlantic coast of North America.

Distribution in the Iberian Peninsula: Inhabits all major river basins and smaller basins, but less in the Cantabrian region and the north-west.

Pathways: Release. Escape.

Vectors: Biocontrol. Ornamentation. Fishkeeping.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Francisco J. Oliva-Paterna, Ana Ruiz-Navarro, Carlos Fernández-Delgado

Pseudorasbora parva (Temminck & Schlegel, 1846)
Topmouth gudgeon. Stone moroko

Description: Small-sized fusiform fish, similar to the gudgeon. Superior mouth with pointed preorbital region, without barbels. Silver greyish or greenish grey, sometimes violet, darker dorsally and the ventral side is silver. Relatively large scales with dark edges that give a reticulated appearance.

Ecology and habitat: Freshwater fish occurring in a wide variety of habitats, abundant in small channels with vegetation, ponds, lagoons, lakes and reservoirs. Opportunistic, with a broad diet. Adaptable lifestyle favouring its invasive potential.

Native distribution: East Asia, from the Amur basin (Siberia and China) to the Zhujiang river in China and river basins in Mongolia, Taiwan, Korea and Japan.

Distribution in the Iberian Peninsula: Catalan basins and Ebro delta, Manzanares river in the Tagus basin, Guadiana river in Extremadura, and Hozgarganta and Guadiaro rivers in Andalusia.

Pathways: Release. Escape. Contaminant. Corridor. Unaided.

Vectors: Aquaculture. Species used as live bait and live feed. Sport fishing and fishing equipment. Canals, and irrigation and interbasin water-transfer channels. Natural dispersal.

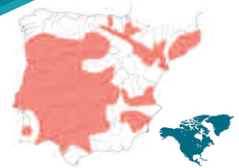
Impacts: Ecosystem–habitat, Species–population, because healthy carrier of parasites dangerous to native fish species, and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Felipe Morcillo, Ignacio Doadrio

AQ VI CP CA DN UE ES PT

Lepomis gibbosus (Linnaeus, 1758)
Pumpkinseed



Description: Member of the *Centrarchidae* family of fishes. Laterally compressed, with an average adult total length of 18–23 cm (they can reach 40 cm). It is a colourful species, with varied colour patterns on its scales. It has sharp spines on the dorsal and anal fins. Males have opercular spots of a darker and more marked colour than females.

Ecology and habitat: Inhabits slow, shallow waters in lakes, rivers, reservoirs, etc. but it can be found in virtually any body of water. It prefers sheltered environments such as bottom vegetation or rock accumulations. It prefers temperate waters (4–22 °C). The male guards the eggs and fry. Omnivorous, but a voracious predator of aquatic invertebrates.

Native distribution: North America.

Distribution in the Iberian Peninsula: Widely distributed in all the major river basins: Ebro, Douro, Tagus, Guadiana, Guadalquivir and Segura.

Pathways: Release. Escape.

Vectors: Sport fishing. Aquaculture. Species from aquariums. Species used as live bait.

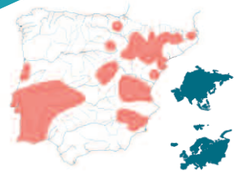
Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Autor: Antonio Guillén-Beltrán

CP AQ TE VI UE ES PT

Sander lucioperca (Linnaeus, 1758)
Pikeperch



Description: The pikeperch has a long, laterally compressed body, a head of considerable size and a mouth with large, strong teeth. It has two dorsal fins, the first with spinous rays and the second with soft rays. The anal fin has 2 or 3 spines. Coloration varies between cream and light brown, becoming lighter on the lower flanks, with a white belly and indistinct dusky bars on the side.

Ecology and habitat: The pikeperch is found mainly in reservoirs and large rivers, where it can be a relatively common and abundant species. It can invade small rivers near dams, always in areas of slow currents with plenty of vegetation, and estuaries, especially in areas of low salinity. The pikeperch performs short migrations, usually less than 50 km, to reproduce. It displays parental care. It is an opportunistic and voracious piscivorous fish, which occasionally also feeds on crayfish.

Native distribution: From the rivers that flow into the Caspian, Aral, Baltic and Black Seas (eastern limit of this species) to the Elbe basin (Germany and Czech Republic, western limit).

Distribution in the Iberian Peninsula: It is found in almost the entire peninsula, except in the Guadalquivir and the south, and in the northern basins.

Pathways: Release. Unaided. Corridor.

Vectors: Sport fishing. Natural dispersal. Canals, and irrigation and interbasin water-transfer channels.

Impacts: Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Filipe Ribeiro

CP DN CA ES PT

Perca fluviatilis Linnaeus, 1758
European perch. River perch. Perch

Description: Medium-sized fish (total length 20–30 cm, can reach 60 cm) with an elongated body. It has two dorsal fins very close to each other and a dark spot towards the back of the first dorsal. It has between 5 and 8 dark vertical bands on the flanks, which may form a Y-shape.

Ecology and habitat: Sedentary, gregarious species that prefers murky waters with abundant vegetation and clayey bottoms, such as reservoirs, lakes and slow-moving stretches of rivers.

Native distribution: Europe.

Distribution in the Iberian Peninsula: Boadella Reservoir, Lake Banyoles and the Muga, Tagus and Ebro river basins.

Pathways: Release.

Vectors: Sport fishing.

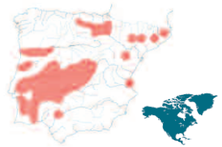
Impacts: Species–population impacts through predation and competition.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Mar Torralva, Carlos Fernández-Delgado

CP ES PT

Ameiurus melas (Rafinesque, 1820)
Black bullhead



Description: Catfish with truncated caudal fin, adipose fin, 4 pairs of barbels. Naked skin (without scales). Strong spine on dorsal and pectoral fins.

Ecology and habitat: Occurs in reservoirs and lentic areas of large rivers. Omnivore, occasional predator.

Native distribution: North America.

Distribution in the Iberian Peninsula: Occurs in most of the main drainages of the Iberian Peninsula, but is most common in Catalonia.

Pathways: Release. Unaided.

Vectors: Sport fishing. Natural dispersal.

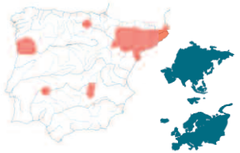
Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Felipe Morcillo, Filipe Ribeiro

CP DN ES PT

Rutilus rutilus (Linnaeus,1758)
Roach

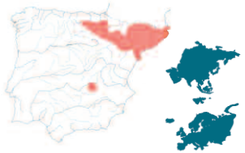


Description: Medium-sized (30–40 cm in total length) cyprinid with relatively small head, silver body. Orange fins and orange upper part of the eye.

Ecology and habitat:	Gregarious, it prefers slow-moving waters, tolerating some salinity or pollution. Omnivore.
Native distribution:	Europe and western Asia.
Distribution in the Iberian Peninsula:	Ave, Ter, Douro, Cávado, Fluvià, Muga, Llobregat, Ebro and Guadiana river basins.
Pathways:	Release.
Vectors:	Sport fishing. Species used as live bait.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Javier Oscoz

Scardinius erythrophthalmus (Linnaeus,1758)
Rudd

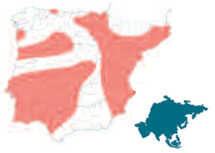


Description: Medium-sized cyprinid with deep, silver body, reddish fins and orange eyes.

Ecology and habitat:	Prefers well-vegetated slow waters. Omnivore.
Native distribution:	Most of Europe eastward to the Aral and Caspian seas.
Distribution in the Iberian Peninsula:	Muga, Ter, Besós, Tordera, Llobregat and Ebro river basins and Ruidera lagoons.
Pathways:	Release.
Vectors:	Sport fishing.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Javier Oscoz

Carassius auratus (Linnaeus, 1758)
Goldfish



Description: Medium-sized cyprinid (10–20 cm in total length). Its body is short, deep, robust and lacks barbels. Very varied coloration, from very cryptic brown to aposematic golden or red. Large scales. A single dorsal fin and forked caudal fin.

Ecology and habitat:	Occurs in a wide range of freshwater habitats. Omnivorous-Detritivorous.
Native distribution:	Asia.
Distribution in the Iberian Peninsula:	All over the Iberian Peninsula, although at low densities.
Pathways:	Release. Escape
Vectors:	Species from aquariums. Ornamentation.
Impacts:	Ecosystem–habitat and Species–population impacts.
Legislation:	This species is included on the Portuguese National List of Invasive Species.

Authors: Mar Torralva, Carlos Fernández-Delgado

Abramis brama (Linnaeus, 1758)
Common bream. Freshwater bream. Bream

Description: Adults medium-sized (25–50 cm in length), with a deep, laterally compressed body and small head relative to body size. Long anal fin with 23–30 rays. Well-marked lateral line formed of 51–60 scales.

Ecology and habitat:	Inhabits lentic ecosystems (lakes and reservoirs), slow-flowing rivers, estuaries and brackish waters.
Native distribution:	From northern and central Europe to Asia.
Distribution in the Iberian Peninsula:	Released at Boadella reservoir (La Muga basin, Girona).
Pathways:	Release.
Vectors:	Sport fishing.
Impacts:	Unknown, probably Species–population impacts.
Legislation:	Not included in any current legislation.

Author: Lluís Benejam

Australoheros facetus (Jenyns, 1842)
Chameleon cichlid

Description: Greenish colour, varying from light olive green to dark green, with vertical bars on the body. Body moderately deep and laterally compressed. Long dorsal fin (more than 2/3 of body length).

Ecology and habitat: Low velocity waters in riverine habitats and reservoirs, closely associated with vegetation. Highly competitive and voracious insectivore. This species tolerates a wide range of temperatures (4–32 °C) and oxygen levels, tolerating brackish waters.

Native distribution: South America.

Distribution in the Iberian Peninsula: Widespread in the Guadiana, Sado and Arade rivers, localised in the Guadalquivir.

Pathways: Release. Escape.

Vectors: Sport fishing. Ornamentation.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Filipe Ribeiro

CP OR ES PT

Fundulus heteroclitus (Linnaeus, 1766)
Mummichog

Description: Elongated cyprinodontiform (up to 14 cm in length). Small superior mouth. Wide caudal peduncle. Greenish coloration in males with broad silver vertical bands on the flanks.

Ecology and habitat: Occurs in freshwater and brackish ecosystems. Sedentary. Omnivore.

Native distribution: Atlantic coasts of North America.

Distribution in the Iberian Peninsula: Southern Atlantic coast and Ebro delta.

Pathways: Release. Escape. Stowaway.

Vectors: Aquaculture. Escape from research facilities. Fishkeeping. Marine and river transport.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Francisco J. Oliva-Paterna, Quim Pou i Rovira, Carlos Fernández-Delgado

AQ OT TE TM ES PT

Salvelinus fontinalis (Mitchill, 1814)
Brook charr

Description: Medium-sized fish (usually 20–30 cm in length and 1 kg, up to 80 cm and 9 kg). Adipose fin. Caudal fin slightly or not forked. Spots on the body, not on fins. Greenish coloration with sinuous white spots in dorsal area.

Ecology and habitat: Brooks and small lakes with clear, cold and very well-oxygenated waters.

Native distribution: North America.

Distribution in the Iberian Peninsula: Isolated populations, especially in the northern part of the peninsula.

Pathways: Release. Escape.

Vectors: Sport fishing. Aquaculture. Fishkeeping.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Jorge R. Sánchez-González

CP AQ TE ES PT

Ictalurus punctatus (Rafinesque, 1818)
Channel catfish

Description: Catfish with long, cylindrical body, naked skin, four pairs of barbels, adipose fin. Caudal fin deeply forked and strong spine on dorsal and pectoral fins. Body with dark spots.

Ecology and habitat: Occupies lentic areas of rivers and is common in reservoirs. Omnivore with a tendency to carnivory. Nocturnal.

Native distribution: North America.

Distribution in the Iberian Peninsula: Guadiana and lower reaches of the Ebro.

Pathways: Release. Escape.

Vectors: Sport fishing. Aquaculture.

Impacts: Possible impacts on species and populations, through predation, which need to be studied at different levels.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Filipe Ribeiro

CP AQ ES PT

Barbatula barbatula (Linnaeus,1758)
Stone loach

Description: Small fish (120 mm in length), with a roughly cylindrical body, yellowish to brown with spots. Small scales. Inferior mouth with six barbels.

Ecology and habitat:	Clear waters with stony bottoms. Particularly active at night. Feeds on aquatic invertebrates.
Native distribution:	Most of Europe, from the Pyrenees to the Balkans and Russia.
Distribution in the Iberian Peninsula:	Porma, Cea, Esla and Orbigo rivers (Douro basin).
Pathways:	Escape.
Vectors:	Species used live bait.
Impacts:	Possible impacts on species and populations.
Legislation:	Not included in any current legislation.

Author: Javier Oscoz

Hucho hucho (Linnaeus, 1758)
Danube salmon. Huchen

Description: Relatively large salmonid (up to 165 cm and 60 kg). Black and red spots, absent on the fins. Long and slightly flattened head. Body with rounded cross-section, slightly compressed laterally. Caudal fin notched.

Ecology and habitat:	Upper and middle reaches of large rivers with gravelly beds and well-oxygenated water below 15 °C. Sedentary, territorial species.
Native distribution:	River Danube.
Distribution in the Iberian Peninsula:	Órbigo, Tormes and Esla rivers.
Pathways:	Release.
Vectors:	Sport fishing.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	Not included in any current legislation.

Author: Jorge R. Sánchez-González

Cobitis bilineata Canestrini, 1865
Italian spined loach

Description: Elongated, laterally compressed body up to 10 cm long. Mouth with 3 pairs of barbels. Dark blotches along the pale body. Suborbital spine. Diminutive scales. Two black spots at the base of the caudal fin. Males are smaller with larger pectoral fins.

Ecology and habitat:	Occurs in rivers, lakes and irrigation channels with slow currents and sandy bottoms.
Native distribution:	France, Italy and Croatia.
Distribution in the Iberian Peninsula:	Banyoles Lake (Catalonia).
Pathways:	Release.
Vectors:	Species from aquariums.
Impacts:	Species–population impacts through competition.
Legislation:	Not included in any current legislation.

Author: Anabel Perdices

Misgurnus anguillicaudatus (Cantor, 1842)
Oriental weather loach. Pond loach

Description: Anguilliform body. Inferior mouth with 5 pairs of barbels. Body brownish, mottled with numerous dark marks, with pale ventral surface. Adipose crests along the midlines of the caudal peduncle.

Ecology and habitat:	Occurs in rivers, lakes and irrigation channels with slow currents and muddy bottoms.
Native distribution:	East Asia.
Distribution in the Iberian Peninsula:	Introduced in the Ebro delta, Ter river, Llobregat river, Vallvidrera reservoir and Albufera lagoon.
Pathways:	Escape.
Vectors:	Fishkeeping. Ornamentation.
Impacts:	Species–population impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Anabel Perdices

VI CP TE TE OR ES PT

Poecilia reticulata Peters, 1859
Guppy

Description: Small fish with fusiform and slightly laterally compressed body. Broad, dorso-ventrally compressed head, with superior mouth and large eyes. The caudal peduncle is thin and conspicuously marked. Highly developed caudal fin in males.

Ecology and habitat:	Occurs in slow-moving waters with abundant vegetation. Tolerates high salinity and high temperatures. Omnivorous-detritivorous. Sedentary. Ovoviviparous.
Native distribution:	Caribbean and northern South America in river basins that drain into the Atlantic.
Distribution in the Iberian Peninsula:	Mijares river (Valencia).
Pathways:	Release. Escape.
Vectors:	Ornamentation. Fishkeeping. Biocontrol.
Impacts:	Ecosystem–habitat and Species–population impacts.
Legislation:	Not included in any current legislation.

Author: Mafalda Gama

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OTHER VERTEBRATES

Lithobates catesbeianus (Shaw, 1802)
American bullfrog

Description: This is the largest frog in North America (184 mm from snout to cloaca) but in Europe it reaches larger sizes (195 mm and 430 g). Its dorsal colour ranges from light green to dark olive green with brown spots and ventrally it is greyish or yellowish white. It has a robust body with a broad, flat head and smooth skin without wrinkles, warts or bumps. It has very conspicuous tympanic membranes that in mature males are twice the diameter of the eye.

Ecology and habitat:	It feeds on a wide range of prey (amphibians, small mammals, small birds, molluscs, crustaceans and insects). It inhabits all kinds of freshwater ecosystems with abundant vegetation.
Native distribution:	Eastern North America
Distribution in the Iberian Peninsula:	Ebro delta and other points in Catalonia and Irun.
Pathways:	Release. Escape.
Vectors:	Biocontrol. Food resource for humans.
Impacts:	Ecosystem–habitat impacts, because it alters ecosystems and trophic resources; Species–population impacts, through competition and predation, threatening endangered species and carrying diseases such as the fungus *Batrachochytrium dendrobatidis*; and Socio-economic impacts due to the huge sums invested in its eradication.
Legislation:	This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Jorge R. Sánchez-González

Myocastor coypus (Molina, 1782)
Coypu

Description: Large rodent (Body length: 40–60 cm, Weight: 4–9 kg) with a long cylindrical, naked tail (30–45 cm). Limbs have 5 digits and the hind feet are webbed. The ears are small, and the eyes and nostrils are located dorsally on the head.

Ecology and habitat: Occurs in almost any freshwater ecosystem (rivers, wetlands, lakes, flooded areas, etc.). Digs burrows in dams and riverbanks, and builds floating platforms. Nocturnal, gregarious, omnivorous and semi-aquatic.

Native distribution: South America.

Distribution in the Iberian Peninsula: Guipuzcoa, Navarra and Catalonia.

Pathways: Escape. Release. Unaided.

Vectors: Livestock. Pets. Natural dispersal.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Jorge Echegaray, Alberto Fernández-Gil, Jorge R. Sánchez-González

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Neovison vison (Schreber, 1777)
American mink

Description: Semi-aquatic, medium-sized mustelid carnivore (Adult head and body length: 30–45 cm; Tail length: 13–22 cm; Weight: 800–1,800 g). Sexually dimorphic (females smaller than males). Dark brown to black fur. Long and bushy tail. Relatively small head with small rounded ears. White patches ventrally, especially under the chin and on the lower lip, and occasionally on the abdomen and inguinal region.

Ecology and habitat: It occurs in practically all types of aquatic ecosystems: streams, rivers, reservoirs, lakes, lagoons, marshes, and also on the coast. Predator.

Native distribution: North America.

Distribution in the Iberian Peninsula: It has been confirmed in Galicia, Cantabria, the Basque Country, Navarra, Aragon, Catalonia, La Rioja, Castilla y León, Madrid, Castilla-La Mancha, Extremadura, Valencia, and in northern Portugal (Viana do Castelo, Braga, Porto, Vila Real and Bragança).

Pathways: Escape. Release.

Vectors: Breeding for fur production. Deliberate release due to vandalism at fur farms. Pets.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Jorge Echegaray, Alberto Fernández-Gil, Jorge R. Sánchez-González

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Ondatra zibethicus (Linnaeus, 1766)
Common muskrat

Description: Medium-sized rodent with very small eyes and ears, rounded snout, interdigital membranes on the hind feet and a robust, laterally flattened tail. Dense dark-brown fur, paler on the belly.

Ecology and habitat: Associated with freshwater environments and adjacent areas. It feeds mainly on the roots and basal parts of aquatic vegetation. Active in water by day and night. It can reproduce throughout the year.

Native distribution: North America.

Distribution in the Iberian Peninsula: Lower reaches of the Urumea and Bidasoa Rivers.

Pathways: Escape. Unaided.

Vectors: Livestock, breeding and agriculture (fur farms). Natural dispersal once established.

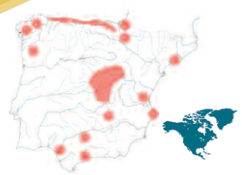
Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: David Galicia

AG DN UE ES PT

Procyon lotor (Linnaeus, 1758)
Raccoon



Description: Medium-sized carnivore with rounded ears and pointed snout. Characteristic fur pattern, with a silver-grey base against which dark bands stand out on the tail and face, forming a kind of mask. It has great morphological plasticity in coloration, in both colour intensity and pattern.

Ecology and habitat: Broad-spectrum generalist species. It prefers natural areas linked to aquatic habitats such as rivers, lakes and wetlands. An extremely skilful and ingenious animal, it makes frequent incursions into urban habitats in search of food.

Native distribution: North and Central America.

Distribution in the Iberian Peninsula: Scattered, isolated populations in the Iberian Peninsula.

Pathways: Release. Escape. Unaided.

Vectors: Pets. Zoo. Natural dispersal once established.

Impacts: Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: David Galicia

AN ZO DN UE ES PT

Cygnus olor (Gmelin, 1789)
Mute swan

Description: Large bird (Length: 1.15–1.24 m; Weight: 5.0–6.5 kg) with very characteristic white plumage. Very long neck and relatively small head. The beak is orange red with a black knob on the forehead. The nostrils, the edge of the beak and the claws are also black.

Ecology and habitat: Found in almost any freshwater ecosystem, it raises up to 8 eggs on banks with abundant vegetation. Considered semi-domestic, although territorial and aggressive. Common in pastures near wetlands.

Native distribution: British Isles and Northern Europe.

Distribution in the Iberian Peninsula: Scattered populations in the north-eastern Iberian Peninsula.

Pathways: Escape. Unaided.

Vectors: Ornamentation. Natural dispersal.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: Not included in any current legislation

Authors: Jorge R. Sánchez-González, David Galicia

Trachemys scripta Schoepff, 1792
Yellow-bellied slider turtle

Description: Medium-sized aquatic turtle (Length: 20–40 cm). Olive green in colour with yellow (or red) spots on head and neck. It has powerful claws on all four limbs. Long-lived up to 20 years in wildness, up to 40 years in captivity.

Ecology and habitat: Occurs in almost any type of aquatic ecosystems with a preference for calm waters with abundant vegetation. Omnivorous, feeding on small invertebrates, filamentous algae, macrophytes and vertebrates, depending on its size. Sexual maturity at 3–4 years old. Females dig holes 25 cm in depth where they lay 6–12 eggs in each clutch.

Native distribution: North America.

Distribution in the Iberian Peninsula: Distributed all over the Iberian Peninsula.

Pathways: Release. Escape.

Vectors: Pets. Species from terrariums.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts through *Salmonella* transmission.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Antonio Guillén-Beltrán

Oxyura jamaicensis (Gmelin, 1789)
Ruddy duck

Description: Medium-sized duck (Length: 35–43 cm, Weight: 350–800 g). Sexually dimorphic. Adult males are reddish-brown with a sky-blue beak in the breeding season. Jet-black hood down to the eye, contrasting with the white cheeks and throat.

Ecology and habitat: It feeds on seeds and roots of aquatic plants, as well as aquatic invertebrates. Inhabits small freshwater wetlands with abundant aquatic vegetation.

Native distribution: North and Central America and Caribbean islands.

Distribution in the Iberian Peninsula: Scattered all over the Iberian Peninsula, especially in the south.

Pathways: Release. Escape. Unaided.

Vectors: Pets, from private collections. Zoos. Natural dispersal once established.

Impacts: Species–population impacts through hybridisation.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Jorge R. Sánchez-González, Jose Manuel Zamora-Marín

AN ZO DN UE ES PT

Rhinella marina (Linnaeus, 1758)
Cane toad

Description: Toad (*Bufonidae* family) of robust appearance and large size, sometimes up to 30 cm in length (females). Males generally smaller. Skin is rough and warty, and brown, dark green or black in colour. The eardrum measures approximately half to two-thirds the size of the eye. The parotid glands are large and can ooze poison.

Ecology and habitat: This species tolerates highly anthropised areas. It is a generalist predator, opportunistic in its feeding habits, and will consume almost anything that it is able to catch, including vertebrates and organic matter; however, the major diet items are insects. Toxicity present in all life stages.

Native distribution: Northern South America, Central America and southern North America.

Distribution in the Iberian Peninsula: No established populations.

Pathways: Release. Escape. Contaminant.

Vectors: Biocontrol. Traffic of contaminated goods (plants). Pets. Species from terrariums. Zoos.

Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Adrián Guerrero-Gómez, Francisco J. Oliva-Paterna

BC CO AN TE ZO ES PT

Discoglossus pictus Otth, 1837
Painted frog

Description: Medium-sized with frog-like appearance, smooth skin, inconspicuous eardrum, pointed nose and rounded pupil. Variable dorsal coloration, often with striped patterns of pale bands, or circular spots with light edges. Whitish belly. Disc-shaped, almost immobile tongue.

Ecology and habitat:	Tolerates salinity and occurs in a wide variety of ecosystems, including open and sandy coastal areas, meadows, farmland and riverside forests. It reproduces in calm waters. Very voracious, it feeds mainly on insects and worms.
Native distribution:	North Africa and the islands of Sicily, Malta and Gozo.
Distribution in the Iberian Peninsula:	Girona and Barcelona.
Pathways:	Escape. Unaided.
Vectors:	Ornamentation. Natural dispersal.
Impacts:	Possible impacts on species and populations.
Legislation:	Not included in any current legislation.

Author: Nora Escribano

OR DN

Xenopus laevis (Daudin, 1802)
African clawed frog

Description: Frog with flattened body and head. Hind feet with three webbed and clawed toes.

Ecology and habitat:	It inhabits slow-moving waters. Nocturnal species. Insectivore.
Native distribution:	Southern Africa.
Distribution in the Iberian Peninsula:	It occurs in two coastal rivers west of Lisbon and in Catalonia.
Pathways:	Escape.
Vectors:	Pets. Species from terrariums.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Filipe Ribeiro, Rui Rebelo

AN TE ES PT

Chrysemys picta (Schneider, 1783)
Painted turtle

Description: Small turtle with yellow or red sutures between the shell scutes.

Ecology and habitat:	Inhabits a wide spectrum of freshwater bodies with a preference for slow and shallow waters. Omnivorous.
Native distribution:	North America.
Distribution in the Iberian Peninsula:	Reported in Catalonia.
Pathways:	Release. Escape.
Vectors:	Pets. Species from terrariums.
Impacts:	Species–population impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Amaia A. Rodeles

AN TE ES PT

Pseudemys peninsularis Carr, 1938
Peninsula cooter turtle

Description: Large turtle species. Olive skin with fine yellow or reddish stripes and square jaw. The ventral area of the shell is yellowish.

Ecology and habitat: It inhabits a wide spectrum of freshwater bodies, with a preference for slow and shallow waters with abundant vegetation. Omnivorous.

Native distribution: North America.

Distribution in the Iberian Peninsula: Mediterranean coast from the Valencian Community to Catalonia, and Portugal at the mouth of the Tagus.

Pathways: Release. Escape.

Vectors: Pets.

Impacts: Ecosystem–habitat impacts.

Legislation: This species is included in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Amaia A. Rodeles

AN ES PT

Threskiornis aethiopicus (Latham, 1790)
African sacred ibis

Description: Relatively large bird (Length: 65–89 cm; Weight: 1,500 g). White with black neck, head, beak and tertiary feathers. Down-curved bill.

Ecology and habitat: Gregarious. Common on the shores of various types of freshwater bodies and coastal lagoons, and on farms, landfills and rubbish dumps. Its diet ranges from insects to small mammals and carrion.

Native distribution: Sub-Saharan Africa.

Distribution in the Iberian Peninsula: Individuals have been recorded throughout the Iberian Peninsula.

Pathways: Escape.

Vectors: Zoos.

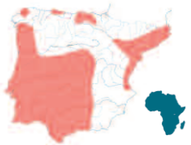
Impacts: Ecosystem–habitat, Species–population and Socio-economic impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Jorge R. Sánchez-González

ZO UE ES PT

Alopochen aegyptiaca (Linnaeus, 1766)
Egyptian goose



Description: Relatively large goose (Length: 63–73 cm, Weight: 1.5–2.2 m). Pale foxy-brown with a pinkish bill and long pink legs.

Ecology and habitat: Occupies a broad range of wetland habitats and hybridises with other species.

Native distribution: Africa.

Distribution in the Iberian Peninsula: Scattered all over the Iberian Peninsula.

Pathways: Release. Escape.

Vectors: Ornamentation. Zoos. Pets from private collections.

Impacts: Ecosystem–habitat and Species–population impacts.

Legislation: This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Author: Jorge R. Sánchez-González

OR ZO AN UE ES PT

Graptemys pseudogeographica (Gray, 1831)
False map turtle. Mississippi map turtle

Description: Medium-sized turtle, adult males up to 13 cm and females up to 25 cm in length. It can live for more than 30 years. Patterned carapace similar to a map, with prominent knurling on the back along the centre line.

Ecology and habitat: Lakes, rivers and streams.

Native distribution: Central and south-central North America.

Distribution in the Iberian Peninsula: Isolated populations mainly in lakes and reservoirs near metropolitan areas (e.g. Lisbon, Huelva and Segovia).

Pathways: Release.

Vectors: Pets.

Impacts: Species–population impacts through competition over native turtles, and Socio-economic impacts because it can transmit *Salmonella* to humans.

Legislation: This species is included on the Portuguese National List of Invasive Species.

Author: Filipe Banha

AN PT

Chelydra serpentina (Linnaeus, 1758)
Snapping turtle

Description: Medium-sized turtle (50–60 cm in length), robust, olive-coloured. Long, flexible neck, powerful jaws and long tail.

Ecology and habitat:	Inhabits a wide variety of freshwater and brackish ecosystems, with preference for shallow waters with sandy bottoms and abundant vegetation. Omnivorous scavenger.
Native distribution:	North America.
Distribution in the Iberian Peninsula:	Reported in Catalonia.
Pathways:	Release. Escape.
Vectors:	Pets. Species from terrariums.
Impacts:	Species–population impacts.
Legislation:	This species is included on the Portuguese National List of Invasive Species.

Author: Amaia A. Rodeles

AN TE PT

Mauremys sinensis (Gray, 1834), *M. reevesii* (Gray, 1831)
Chinese stripe-necked turtle. Chinese pond turtle

Description: Members of the *Geoemydidae* family. Females are larger but males have a longer and thicker tail. Green body. Green carapace in juveniles, turning brown in adults. Ivory-coloured plastron with black spots. (Photo: *M. sinensis*.)

Ecology and habitat:	These species prefer shallow waters such as ponds, small streams, canals and slow-moving rivers. It sometimes occurs on farmland. Omnivorous.
Native distribution:	South-east Asia.
Distribution in the Iberian Peninsula:	Scattered, isolated locations.
Pathways:	Release. Escape.
Vectors:	Pets. Species from terrariums.
Impacts:	Species–population impacts.
Legislation:	Not included in any current legislation.

Authors: Adrián Guerrero-Gómez, Francisco J. Oliva-Paterna, César Ayres

AN TE

Nyctereutes procyonoides (Gray, 1834)
Raccoon dog. Mangut. Tanuki

Description: Medium-sized canid (3–7 kg). Sturdy, elongated body, not very tall, with short legs and short tail. Yellowish, grey or reddish in colour. Black mask.

Ecology and habitat:	Inhabits wet and wooded areas. Omnivorous and generalist. Gregarious and nocturnal.
Native distribution:	South-eastern Asia.
Distribution in the Iberian Peninsula:	Murcia, Irati Forest (Western Pyrenees).
Pathways:	Release. Escape.
Vectors:	Hunting. Pets. Breeding.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included on the List of Invasive Alien Species of Union concern, in the Spanish Catalogue of Invasive Alien Species and on the Portuguese National List of Invasive Species.

Authors: Jorge R. Sánchez-González, Jorge Echegaray, Alberto Fernández-Gil, Mario Quevedo

CP AN AG UE ES PT

Aix galericulata (Linnaeus, 1758)
Mandarin duck

Description: Medium-sized duck (Length: 41–49 cm, Weight: 430–690 g) with obvious plumage-colour sexual dimorphism. Males have patches of orange wing feathers. Two broad, white eye stripes stand out on its head from bill to neck.

Ecology and habitat:	The mandarin duck's diet is based mainly on aquatic plants, grains and freshwater invertebrates. It breeds in small wetlands with abundant marshy vegetation, but it may also occur in large wetlands and reservoirs.
Native distribution:	Eastern Asia.
Distribution in the Iberian Peninsula:	Reported especially from the northern half of the Iberian Peninsula.
Pathways:	Release. Escape.
Vectors:	Pets, from private collections. Ornamentation. Zoos.
Impacts:	Species–population and Socio-economic impacts.
Legislation:	Not included in any current legislation.

Authors: Jose Manuel Zamora-Marín, Antonio Zamora-López

AN OR ZO

Branta canadensis (Linnaeus, 1758)
Canada goose

Description: Large goose (Length: 90–110 cm, Weight: 4–5 kg) with a long black neck and black head. White patch from the chin to the cheeks, and a brown body.

Ecology and habitat:	Occurs in a wide range of terrestrial and freshwater habitats. Omnivore.
Native distribution:	Neoarctic region.
Distribution in the Iberian Peninsula:	Scattered all over the Iberian Peninsula.
Pathways:	Release. Escape. Unaided.
Vectors:	Ornamentation. Hunting (Game species). Natural dispersal once established.
Impacts:	Ecosystem–habitat, Species–population and Socio-economic impacts.
Legislation:	This species is included in the Spanish Catalogue of Invasive Alien Species.

Author: Jorge R. Sánchez-González

OR CP DN ES

Ommatotriton ophryticus (Berthold, 1846)
Northern banded newt

Description: Thin, elongated body with short legs and a tail as long as the head and body. Smooth skin, slightly granular in some cases. Its coloration varies with its stage of development. The belly is yellow to light orange. Tail with spots, dark dorsally and more greenish blue ventrally.

Ecology and habitat:	Occurs in lakes, ponds or pools at elevations above 1,200 m a.s.l. It feeds on insects, molluscs and crustaceans.
Native distribution:	Black Sea basin.
Distribution in the Iberian Peninsula:	Ponds in the area of Pla de Busa, Lleida.
Pathways:	Release. Escape. Unaided.
Vectors:	Species from aquariums. Ornamentation. Natural dispersal.
Impacts:	Possible impacts on species and populations through hybridisation.
Legislation:	Not included in any current legislation.

Author: Nora Escribano

TE OR DN

Sclerophrys mauritanica Schlegel, 1841
Mauritanian toad

Description: Large toad in the *Bufonidae* family. Beige to olive green in colour, with brown, red, orange or green spots. Mottled grey belly. Large parotid glands. Conspicuous eardrums.

Ecology and habitat:	Generalist, even in anthropised areas. Tolerates brackish waters. Nocturnal. Diet based mainly on beetles.
Native distribution:	Maghreb endemic.
Distribution in the Iberian Peninsula:	Alcornocales Regional Park and surroundings of Algeciras, Cádiz.
Pathways:	Release.
Vectors:	Pets. Species from terrariums.
Impacts:	Possible impacts on species and populations.
Legislation:	Not included in any current legislation.

Authors: Adrián Guerrero-Gómez, Francisco J. Oliva-Paterna

AN TE

Pelophylax kl. *grafi* Fitzinger, 1843
Water frogs. True frogs

Description: Medium-sized frogs, green or brown in colour with a whitish midline stripe. The belly is usually more greyish. Usually the pupil is horizontal.

Ecology and habitat:	They live and reproduce in a wide variety of aquatic habitats, from ponds, lakes and reservoirs to swamps, rivers and streams.
Native distribution:	Europe to the Middle East, and North Africa.
Distribution in the Iberian Peninsula:	Caceres, Galicia, Catalonia and the Valencian Community.
Pathways:	Release. Escape.
Vectors:	Ornamentation. Species from terrariums.
Impacts:	Possible impacts on species and populations through hybridisation.
Legislation:	Not included in any current legislation.

Author: Nora Escribano

OR TE

Pelodiscus sinensis (Wiegmann, 1835)
Asian soft-shelled turtle

Description: Flat, flexible shell, with the carapace and plastron covered with leathery skin instead of plates. Light brown or greenish. The neck, head and snout are long.

Ecology and habitat:	Prefers ponds and lakes with muddy substrates, with nutrient-rich waters. Predatory, territorial, solitary species, which buries itself in the sand to ambush its prey.
Native distribution:	Eastern Asia.
Distribution in the Iberian Peninsula:	Found in Andalusia, Catalonia and the Basque Country.
Pathways:	Release. Escape. Unaided.
Vectors:	Species from terrariums. Pets. Natural dispersal.
Impacts:	Species–population impacts.
Legislation:	Not included in any current legislation.

Author: Rafael Miranda

TE AN DN

LIFE INVASAQUA

LIFE INVASAQUA

WHAT CAN I DO?

Biological invasions are a serious threat to the preservation of native biodiversity.

We must all get involved to fight them effectively.

Acquiring pets

- Choose or adopt your pet responsibly. Do not acquire alien species as pets.
- Never release your pet into the wild. If you cannot look after your pet, hand it over to your local animal shelter.
- If you buy exotic animals, make sure they have health and importation certificates.

In the garden or the pond

- Only buy plants and seeds that have information on their origin and composition.
- Preferably plant native species. They require less water and provide shelter and food for the local fauna.
- Never discard exotic ornamental or aquarium plants (or fragments) into waterways or drains.

In the wild

- If you see any species that may be invasive, take a picture and notify the local authorities. Early action is vital. Go to or call the Nature Protection Service (SEPRONA in Spain or SEPNA in Portugal), forest rangers or local police.
- Do not release exotic species into rivers thinking that you are saving their lives. On the contrary, you would only be harming the ecosystem's native species. Doing so is also a crime.

Travelling

- When entering or leaving the country, do not transport undeclared animals, plants or seeds. Comply with customs regulations.
- Clean the soles of your boots and your gear before hiking in a new area.

Fishing

- Disinfect fishing gear with chlorinated water and bleach.
- If you catch an exotic species, never return it to the wild.
- Be very careful with live bait. Do not release any excess or discard the packaging into the water. Instead, use plastic bags and throw them away in waste containers.
- If you go fishing, you should know and comply with current regulations.

Using water

- Use filters that prevent organisms from passing into river water or irrigation outlets.
- Disinfect water transport tanks prior to use.

Boating

- It is mandatory to follow the Disinfection Protocols for Boats and Equipment approved by the Hydrographic Confederations.
- Obtain official permits and follow all boating and cleaning protocols for reservoirs and rivers.

Find out and get involved! Make sure you know and comply with all current laws and regulations.

WHO SHOULD I CONTACT IF I FIND AN INVASIVE ALIEN SPECIES?

If you come across an invasive alien species, notify the relevant authorities as soon as possible:

PORTUGAL

ICNF – Instituto da Conservação da Natureza e das Florestas
At this link: www.icnf.pt
Avenida da República, 16
1050-191 Lisboa
Telephone: 213 507 900
(**Departamento de Conservação da Natureza e Biodiversidade** (**DCNB**):
drncn@icnf.pt)

Linha SOS Ambiente e Território
Telephone: 808 200 520

SEPNA – Serviço de Proteção da Natureza e do Ambiente da **GNR**
Telephone: 217 503 080

SPAIN

Ministerio para la Transición Ecológica y el Reto Demográfico.
Query Mailbox:
https://www.miteco.gob.es/es/ministerio/servicios/informacion/buzon-consulta/default.aspx (In the box headed 'Tema' [Subject], select 'Biodiversidad' [Biodiversity] from the drop-down list)

In addition, each autonomous community has postal and email addresses where you can report exotic species.

You can also contact the **Servicio de Protección de la Naturaleza (Seprona)** of the **Guardia Civil** at the following email address:
dg-seprona-jefatura@guardiacivil.org

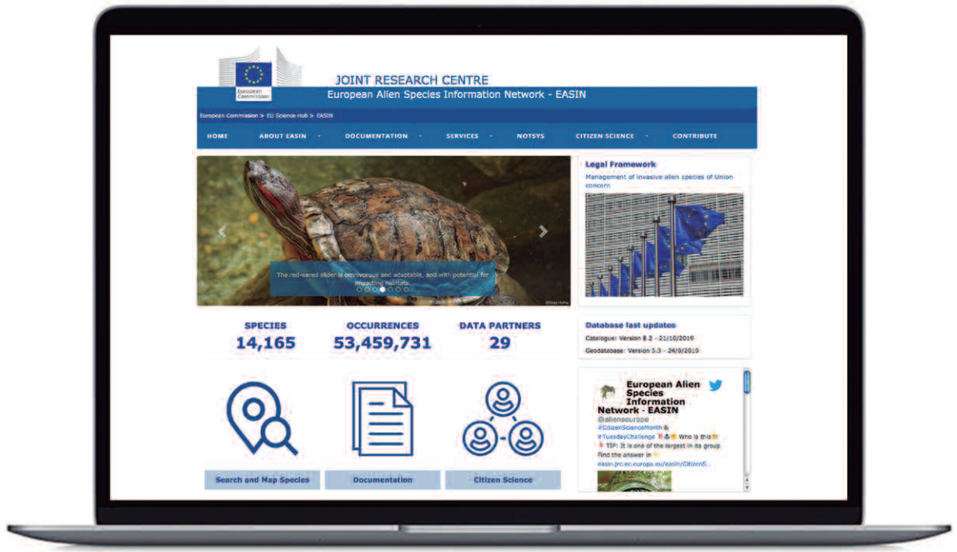
EUROPEAN UNION

You can report IAS through the Invasive Alien Species app (available in several languages, with a specific extension for the Iberian Peninsula), available for Android and Apple:

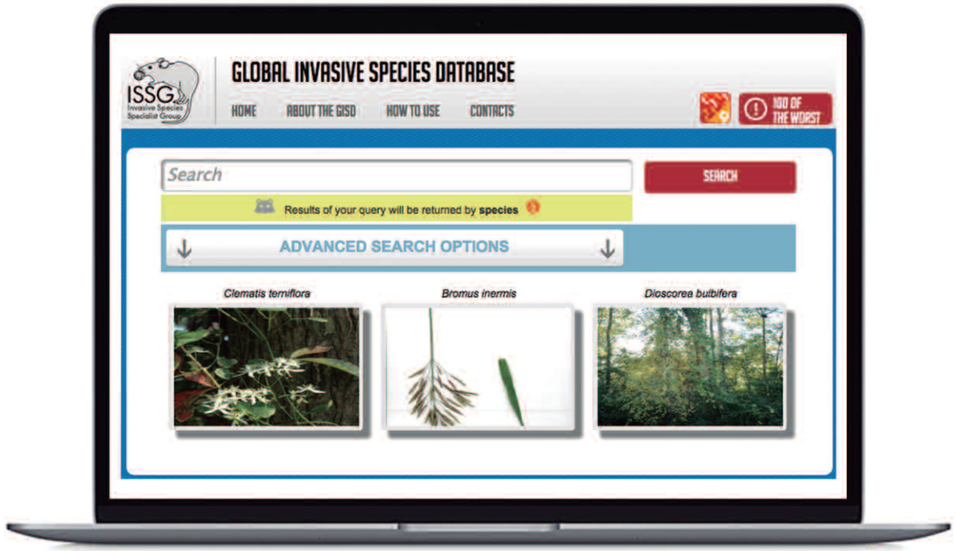
Download the app:

WHERE CAN I FIND OUT MORE ABOUT INVASIVE ALIEN SPECIES?

The **European Alien Species Information Network** (**EASIN**) is an initiative of the European Commission Joint Research Centre. It was established in recognition of the increasingly serious threat posed by Alien Species in Europe. EASIN facilitates the use of existing Alien Species information, including the List of Invasive Alien Species of Union concern (the Union list), from a variety of scattered information sources through freely available tools and interactive web services, compliant with internationally recognised standards. The EASIN web tools and services can be used freely and independently by any user, while ownership of the data remains with their sources, which are properly cited and linked.

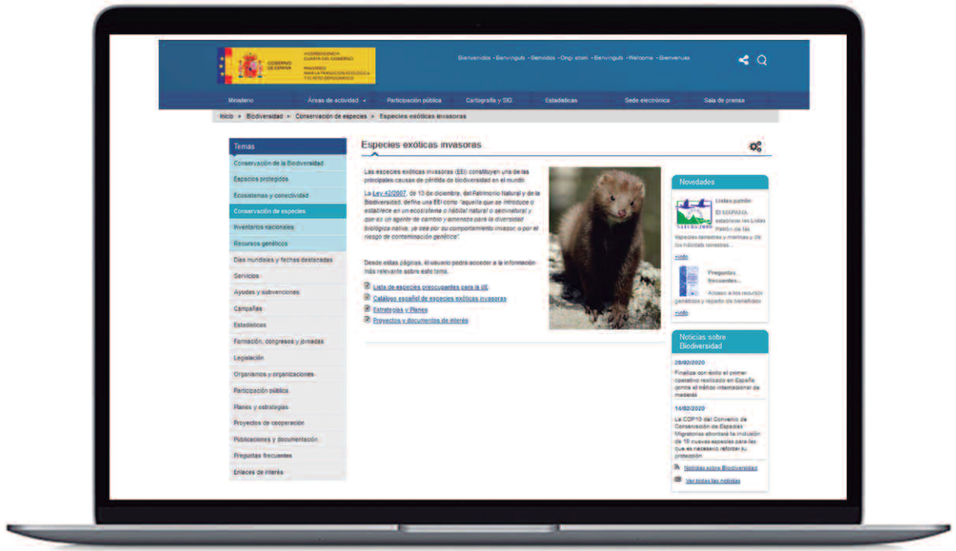


The **Global Invasive Species Database** (**GISD**) is a free, online searchable source of information about alien and invasive species that have an adverse impact on biodiversity. The GISD aims to increase public awareness about invasive species and to facilitate effective prevention and management activities by disseminating specialist knowledge and experience to a broad global audience. It focuses on invasive alien species that threaten native biodiversity and natural areas and covers all taxonomic groups from micro-organisms to animals and plants.



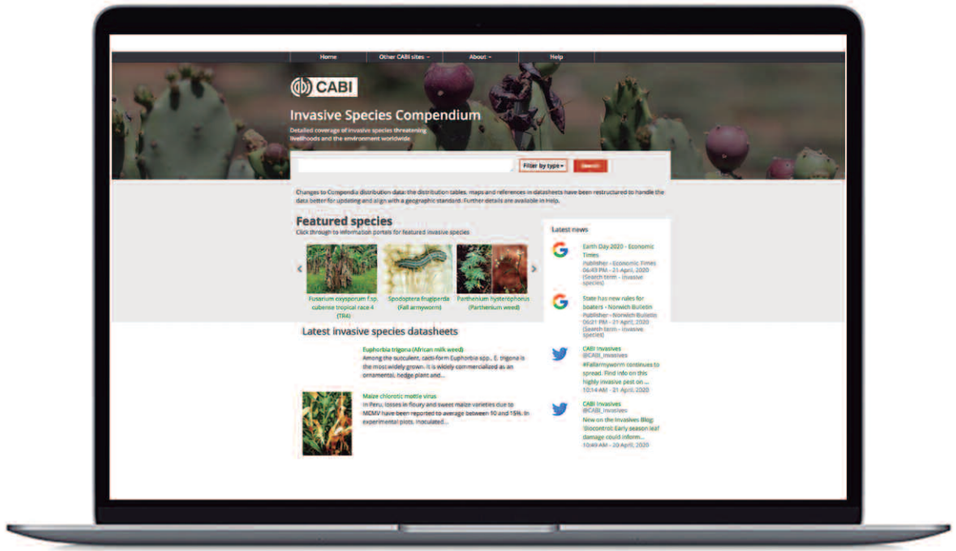
The **Global Register of Introduced and Invasive Species** (**GRIIS**) was developed as a concept and prototype by the IUCN SSC Invasive Species Specialist Group (ISSG) in 2006, as part of a project undertaken for the Defenders of Wildlife on the Regulation of Live Animal Imports into the United States.

Due to the global nature of the invasive alien species problem, the **Spanish Ministry for Ecological Transition and the Demographic Challenge** hosts a web space for Invasive Alien Species where you can find relevant legal information and access the Spanish Catalogue of Invasive Exotic Species and the List of Invasive Alien Species of Union concern. It contains detailed information (in Spanish) on all invasive alien species included in the catalogue, both aquatic and terrestrial.

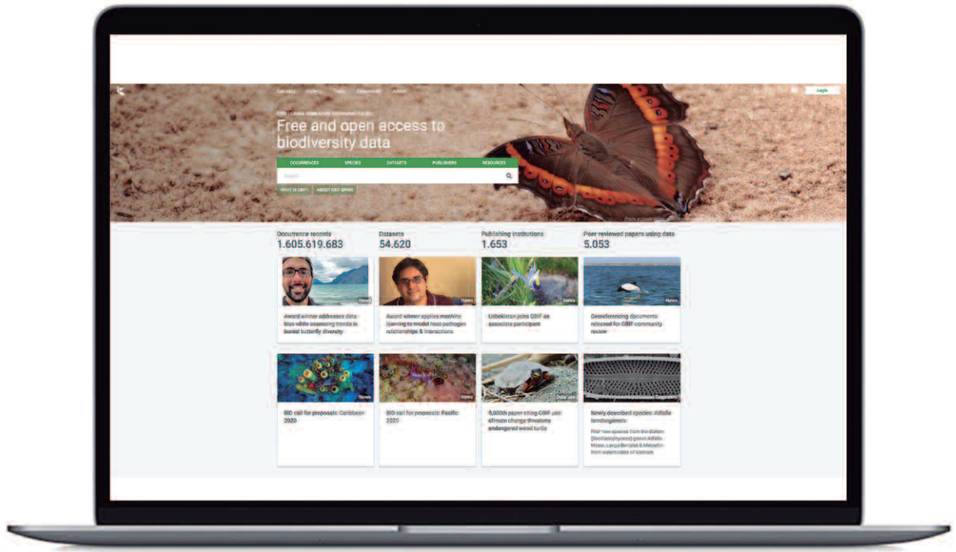


In Portugal, the **Institute for the Conservation of Nature and Forests** (**Instituto da Conservação da Natureza e das Florestas, ICNF**) demonstrates the same national concern. Its website (in Portuguese) reports both the species included on the Portuguese National List of Invasive Species and the projects being carried out to combat IAS, together with the latest information on these species.

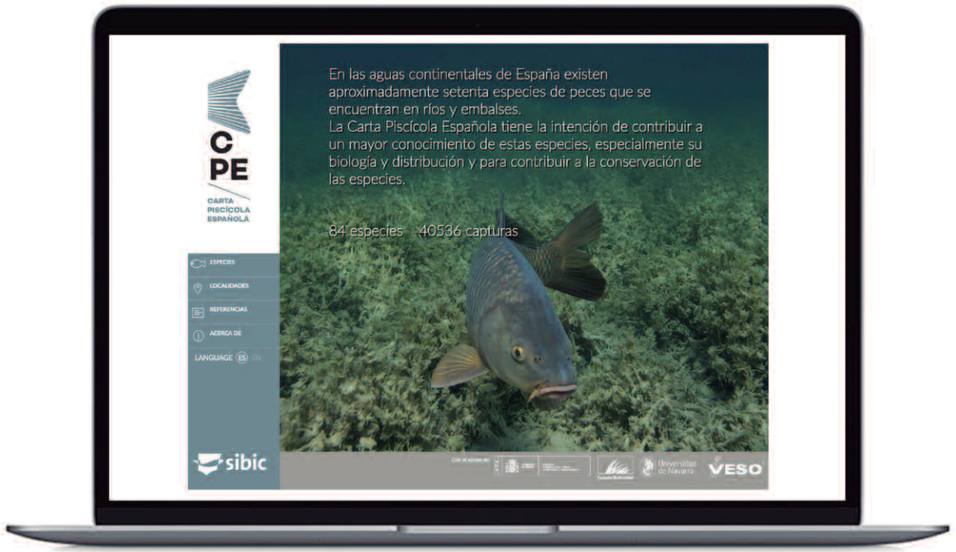
The **Invasive Species Compendium** (**ISC**) is an encyclopaedic resource that brings together a wide range of different types of science-based information to support decision making in invasive species management worldwide.



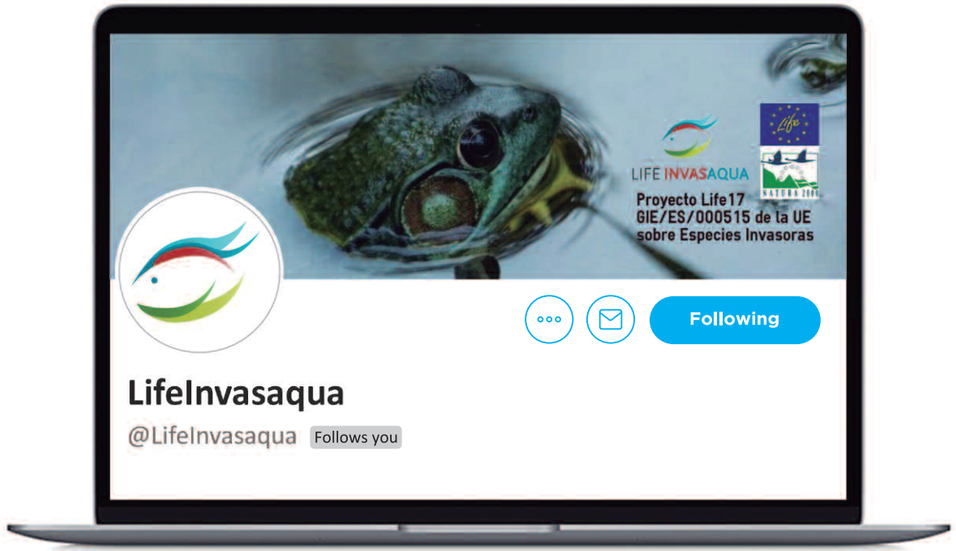
GBIF, the **Global Biodiversity Information Facility**, is an international network and research infrastructure funded by the world's governments and aimed at providing anyone, anywhere, with open access to data about all types of life on Earth.



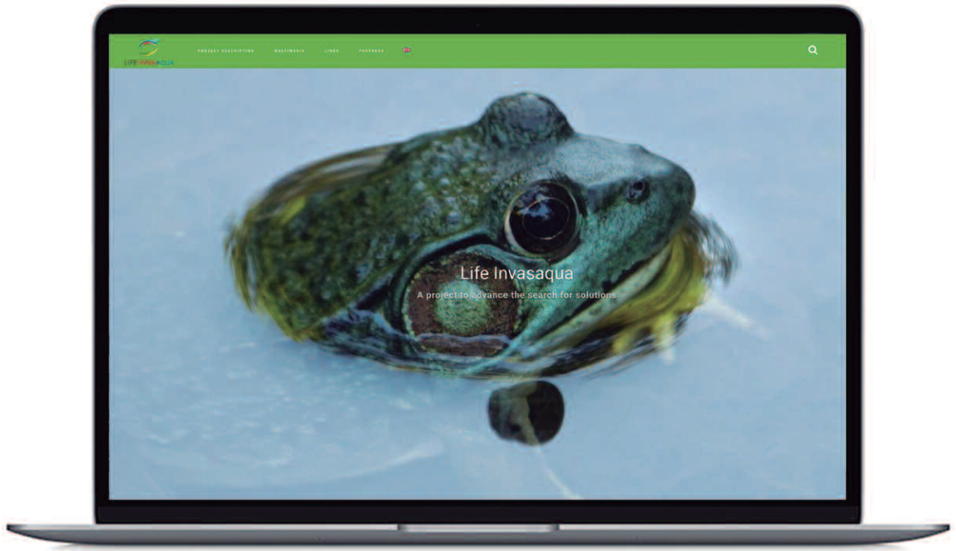
The **Iberian Society of Ichthyology** (**SIBIC**) has developed the **Carta Piscícola Española** (Spanish Fish Map) with the main objective of making all the information on Spanish freshwater fishes readily available. It compiles data from research centres and government bodies and places it online, creating a web platform on freshwater fish species for use by the general public. This database includes information on the biology and ecology of Spain's freshwater fishes and associated references.



If you would like to be kept up to date on the latest developments in our LIFE INVASQUA project, you can follow us on Twitter, Facebook and Instagram: **@LifeInvasaqua**.



Or on our website:
http://www.lifeinvasaqua.com/



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LIFE INVASAQUA

LIFE INVASAQUA

Aquatic Invasive Alien Species of Freshwater and Estuarine Systems: Awareness and Prevention in the Iberian Peninsula

What is LIFE INVASAQUA?

A European project that seeks to tackle aquatic invasive alien species in Spain and Portugal by increasing public and stakeholder awareness. It will contribute to improve IAS management and reduce their environmental, societal, economic and health impacts through information campaigns and the exchange of successful management solutions and practices.

How will it be achieved?

→ Creating priority lists of IAS and strategic management guidelines at the Iberian level to support and facilitate the implementation of the EU regulation.

→ Implementing training and information campaigns with key stakeholders.

→ Developing communication and awareness activities through volunteering campaigns, citizen science, events with students or travelling exhibits across the Iberian Peninsula.

Coordination

Universidad de Murcia

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