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1 Introduction to the Invasive Alien Species Europe App

Alien Species are increasing worldwide and are currently present in almost every ecosystem type on Earth. They belong to all major taxonomic groups, including viruses, fungi, algae, mosses, ferns, higher plants, invertebrates, fish, amphibians, reptiles, birds and mammals. Several alien species are invasive, affecting native biota. Invasive alien species (IAS) can transform the function, structure, and species composition of ecosystems, competing with native species, either directly by predation and for resources, or indirectly by modifying habitats. Further impacts include effects on human health with the spread of diseases and allergens, and on the economy with damages to agriculture and infrastructures.

Recognizing the increasingly serious problem of IAS in Europe, the European Commission published a dedicated Regulation (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:JOL_2014_317_R_0003). The Regulation foresees three main types of interventions: prevention, early detection and rapid eradication; and management. It gives priority to a subset of IAS, included in the list of IAS of Union concern. Species are included in this list inter alia because they can cause such a significant damage in Member States justifying the adoption of dedicated measures at Union level. The implementation of this Regulation is supported by an official information system developed by the Joint Research Centre (JRC) (https://easin.jrc.ec.europa.eu/), which collects scientific information and spatial data on IAS in Europe, supporting Member States Competent Authorities in the implementation of the Regulation on IAS.

In the context of the IAS Regulation, a specific mobile application called Invasive Alien Species Europe app (further down called the App) was developed by the JRC, the in-house science service of the European Commission. The App’s purposes are:

1) to allow reporting IAS of Union concern occurrences by using citizen phones’ GPS system and phones’ cameras, supplementing Member States official surveillance systems;
2) to provide information about IAS listed as of Union concern (pictures, short description, additional useful information);
3) to foster citizens’ awareness about the problems caused by IAS in Europe and actively getting the public involved in the management of IAS to the benefit of European environment and natural ecosystems.

The App includes the current list of IAS of Union concern. More species are expected to be added in that list, following the progress of the European policy on IAS. At the same time, we offer the possibility for including also lists of invasive alien species that are of macro-regional and national concern.

The App can be downloaded from the most common app stores: https://play.google.com/store/apps/details?id=eu.europa.publications.mygeossias (Android)

2 First steps

After the download and successful installation on the user’s mobile, and after passing the Opening screen (see also cover page of this manual), the Home screen of the App (Figure 1) consists of eight main sections: Invasive species, My species records, Report a sighting, Sightings map, Log in or register, Links, Contact us and About the app.
The App always displays at the top an **Account icon**, that indicates if the App is currently connected to a registered user account (green) or not (red), as well as the **Information menu icon** providing access to background information.

![Home screen of the Invasive Alien Species Europe app](image)

**Figure 1. Home screen of the Invasive Alien Species Europe app**

Basic information on the App is available from **About the app** section of the **Home screen**, while further information (including **Acknowledgment**, **Disclaimer**, **Legal notice**, **Privacy statement** and **EU IAS Regulation**) is available from the **Information menu** that is placed in the upper right corner (Figure 2).

This menu also allows to set the **Language**. Currently, the App is provided in five languages: English, Italian, German, Spanish and Romanian. Users can choose the language from the icon on the top right corner of the main menu screen.

The list of IAS of Union concern (further down also called Species Catalog) is subject to changes in the legislation, therefore through the App, when online, the user may check if there is an update of the Species Catalog clicking on **Check Catalog Update** from the **Information menu**.
3 Log in and registration to the App system account

The App can be used also without being logged in. However, the sending of Reports requires personal registration and log-in.

The App uses the EASIN (European Alien Species Information Network: https://easin.jrc.ec.europa.eu/) Login system for registration and the management of personal data. The account can be set from the Log in or register section of the Home screen (Figure 3), or by clicking on the Account icon (Figure 3).
For using an already existing Login account, it is enough to click on the **Log in button** and to follow the instructions on the screen.

In the absence of an existing Login account, a new account can be created. In order to do so, it is necessary to click on the **Register button** and to fill the registration form (Figure 4). This can only be done if the device is on-line.
If there is a need to change the password for security reason, or to reset it if it is forgotten, by clicking on **Forgot password** and filling in the registered mail address, a reset token will be sent to the registered mail address.

The **registered user will be active on the App for a period of 7 days**, after which the App will automatically log-off.

### 4 Listing of Invasive Alien Species of Union concern

The App provides access to information on about 49 invasive alien species, currently listed as IAS of Union concern as of 12.07.2017 (Commission Implementing Regulation EU 2017/1263). All these species can be searched, filtered and visualized within the App.

By selecting the icon **Invasive species** from the **Home screen**, the complete list of all IAS of Union concern will appear (Figure 5) for consultation. The list of IAS is sorted by the scientific name of the species, in alphabetical order. The species are visualized having 10 species per page.

The title bar of the **Invasive species screen** always indicates the current version of the Species Catalog that is used by the App (e.g. Invasive species – [v7.3-2]). The version information is also available in the **About the app screen**, informing the user which catalog is in use in the App.
During the installation of the App the user is asked the permission to download the latest species information and pictures from the Species Catalogue (Figure 6). In order to provide the user updates (additional species, more pictures, etc.) and only when online, the App checks the availability of a new catalogue of species and notifies the user if any new information is available for download.

If the user decides not to download the pictures on the first pop-up, or not to download the latest version of the Species Catalogue, (s)he can re-consider this option at a later stage by selecting **Check Catalogue Updates** from the **Information menu**. In this case, the user is asked again the permission for downloading the latest version of the catalogue.
4.1 Searching and filtering Invasive Alien Species

The list of IAS of Union concern can be searched by scientific and common name (depending on the selected language).

In addition, the App provides also a dedicated option for filtering by Animal Type and/or by Habitat. When filtering by animal type, more detailed sub filtering may be applied, namely by: Amphibians, Birds, Invertebrates, Mammals, Reptiles or Fish (Figure 7).
The same applies when filtering by habitat: marine, freshwater and terrestrial.

### 4.2 Displaying invasive alien species specific information

When selecting one IAS of Union concern on the **Invasive species screen**, the App displays the **Camera tab** related to the particular species screen.

All the functions related to a selected species are available through the main tabs of the species (Figure 8).

The **Camera tab** displays all available pictures of a species (downloaded from the Species Catalogue) in order to help users identifying the species and avoid possible confusion with similar species.

The **Info tab** consists of the basic information that describes how the species looks like, common features with similar species, living environment, behavior, invasion history, and links to further online information (Figure 9).
The **Map tab** on the top of the screen gives an overview on places where a species has been recorded through the App in Europe. The App displays a red dot representing a submitted sighting, and a blue marker for a sighting that has been approved and has a specified status (Validated, Pre-validated or Unclear) (Figure 10). Please see section 4.3 below.

Inappropriate content of pictures (e.g. adult content or violence) or inappropriate words in the free text will not be published. Once approved, the sighting and all the information regarding the sighting become visible on the **Map tab** (with a blue marker).
The App will display all sightings related to the selected species that are provided in an anonymous fashion by all users. By clicking on the blue marker a user can obtain more information about the reported sighting, via the **Photo tab**, **Information tab** and **Location tab** of the specific sighting (see Figure 11).

The sightings which have not been revised (red dot) are not clickable and their status is not available, except for information on the location where the species could have been sighted.
From the **species-specific information screen**, a new sighting of the selected species can be added by clicking on the **Plus tab** (Figure 12).

### 4.3 Creating a sighting record for a specific invasive alien species

When logged in with the personal Login account, the specific sighting can be submitted for validation by clicking on the button **Send**. Once sent, sightings cannot be modified. In order to modify a sighting, or when not logged in, the specific sighting can be saved as **local draft** to allow for checking, finalization, and later dispatch (see also Chapter 8.1).

![Figure 12. Species specific information – Plus tab](image)

After clicking the **Plus tab** to add a new sighting on a selected IAS, the following elements can be manually inserted in the form (Figure 12):

- upload a maximum of 3 pictures,
- the observation location;
- the observation date;
- estimated or measured scale coverage in m² or number of individuals,
- select the habitat where the species has been sighted (marine, freshwater or terrestrial), and
- a comment.

Each sighting must include at least one picture, the sighting location, the coverage in m² for plants or the number of individuals for all other species, and the related habitat. To allow for accuracy and consistency of recorded data, such information will be moderated and explicitly approved before publishing. Inappropriate content, pictures or inappropriate words in the free text will not be published. Once revised, the **Observation** becomes visible on the **Map tab** (Figure 10) of the specific invasive alien Species Catalog.
5 Listing of local invasive alien species in a specific local area

Local invasive alien species are species that are invasive for a specific local area, and are not listed in the IAS Catalogue of the Union concern. Such local areas might include invasive alien species that are of macro-regional or of national concern.

The App provides the user the possibility to send a sighting of a specific local invasive alien species after the user has downloaded the respective Local Species Catalogue for the specific local area. We currently offer this option for the Danube River Basin, which is Europe's second largest river basin, with a total area of 801,463 km². The according local species list has been provided by the International Commission for the Protection of the Danube River (ICPDR).

When a mobile device, with the location functionality turned on, detects that it is located in a specific local area a pop-up (Figure 13) informs the user that the device is close to or inside the specific local area.

![Figure 13 Pop-up that informs the user that the device is located in a specific local area](image)

In case the device has been located for the first time in a specific local area, and has not yet downloaded the respective local invasive alien species catalogue or an update of the Local Species Catalogue is available, the App propose the user to download the Local Species Catalogue (Figure 14).
The user may also download the Local Species Catalogue manually by going on the top right corner of the main menu screen, clicking on “Check Local Catalogue Updates” (Figure 15). The option is available to the user whenever the device is located in a specific local area (with the location functionality turned on).
5.1 Searching and filtering local Invasive Alien Species

After downloading a Local Species Catalogue (and while located in the specific local area), the list of local species will be available in the section *Invasive species*, together with the species of Union concern, whenever the device is located inside the specific local area.

The user has the possibility to filter just the local invasive alien species enabling the option for filtering the local invasive alien species (Figure 16).
The filtering option is available while the device is located in a specific local area (with the location functionality turned on). As soon as the device location functionality is turned off or the device is not any more located in the specific local area the local invasive alien species disappear and the filtering option for local invasive alien species would not be available anymore.

5.2 Displaying local invasive alien species specific information
All the information and functionalities concerning the specific local invasive alien species are available as for the IAS of Union concern (see also Chapter 4.2) whenever the device is located in a specific local area.

5.3 Creating a sighting record for a specific local invasive alien species
As for IAS of Union concern (see Chapter 4.3) the sighting for the local invasive alien species is possible through the section Report a sighting or directly through the specific local invasive alien species as long as the device is located in a specific local area.

Sighting of local invasive alien species may be possible also in the situation when the device is not located in the specific local area, provided if the device has downloaded the specific Local Species Catalogue. When on the section Report a sighting (see Chapter 7) and after the location is set manually inside the specific geographic area, the list of local invasive alien species will appear together with the IAS of Union concern (Figure 17) as part of the list Select a species. Doing so the user will have the option to do a sighting of a local invasive alien species even though the device at that moment is not inside the specific local area.
6 Displaying all sightings of IAS of Europe concern collected via the App

By selecting the icon **Sightings map** from the **Home screen**, a map opens, which contain all sightings of IAS of Union concern reported through the App.

If the location functionality of the mobile device is activated, the App will display all sightings in the surrounding areas (Figure 18). In this way, the user may find quickly if someone has already spotted an IAS nearby, or can have a look at the map if a species has been sighted in a location of interest.

When the location functionality of mobile device is not activated, the App will automatically set the position to the center of Europe.
7 Report a sighting

The App provides multiple ways to enter a new sighting of an IAS of Union concern. Besides accessing the reporting templates from the Invasive species list, an sighting can also be directly issued from the Home screen of the App, by clicking for example on Report a sighting- always linked to a specific IAS.

To be noted that, if no location for a report is set manually, or the location functionality of mobile device is not activated, the App will automatically set the position to the center of Europe.
A sighting is considered to be complete, and can therefore be submitted, upon successful authentication with a Login account, and (Figure 19) when:

- a species has been selected,
- at least one picture is uploaded,
- a location has been set,
- an estimated or measured scale for coverage in m² or number of individuals has been set, and
- one of the proposed habitats selected.

In order to control data transmissions, the number of pictures is limited to at most 3 pictures for each sighting.

The sighting will only be clickable (blue marker) in the **Sightings map** or **Map tab** of the selected invasive alien species, after revision and upon approval of the information provided.

### 8 Overview of user's species sightings

The App offers the possibility to view all sightings that have been submitted by the user linked to the same account via the **My species records section**. This includes already published sightings, as well as draft sightings that may still be edited and sent for publication.

The **My species records section** of the App is directly accessible from the **Home screen**. It displays the **Saved records** (draft sighting) and **My records** (published sightings with the used Login account). Records are displayed in chronological order, referenced by the date of publication (Figure 20).
8.1 Saved records

In order to allow for later editing and updating, the App offers the possibility to save draft sightings. Sightings are also saved as drafts when the user is not logged-in with his/her account, or when no internet connection is available for submitting. All locally saved draft sightings are available under the title Saved records of the My species records screen (see also Figure 20). Notably, these sightings are saved on the mobile device itself as such, they are not yet connected to the Login account.

For each draft sighting the user may send (if fully completed), delete or modify data related data. The screen for modifying the draft sighting is similar to the one for entering a new one (see also Chapter 7).

8.2 Submitted reports

A list of sightings sent from the same Login account is memorized (see also Figure 20) in My records title, under the My species records.

All sent reports –can be checked from there, including all information and photos of the relevant sighting (see also Figure 11).

All sightings of IAS of Union concern submitted via the app are visible in a web-map: http://digitalearthlab.jrc.ec.europa.eu/hub/ias/.

Figure 20. My species records screenshot
9 Closing remarks

We hope that this manual may help you in exploring the IAS App functionalities towards an enjoyable experience in the field, and would be happy to receive your sightings of invasive alien species of Union concern. Feedback is welcome and can be provided directly within the app stores, or using the Contact us section.