

## Introduction

The overall objective of these three volumes is to provide managers with a wide-ranging source of information that can help them in improving their management techniques for invasive alien species in their area. The animal species are handled in a manner identical to that for the plant species, which is rarely the case in the documents available to date.

The first volume presents a general outline of the available knowledge on invasive alien species in aquatic environments in continental France (scientific data, regulations, management strategies and techniques, etc.). The second and third volumes present an illustrated panorama of management projects for invasive alien species (IAS), discuss issues and outline processes for management work, for and by managers taking into account the specifics of each situation (including the site itself, the alien species, project objectives and the human resources involved).

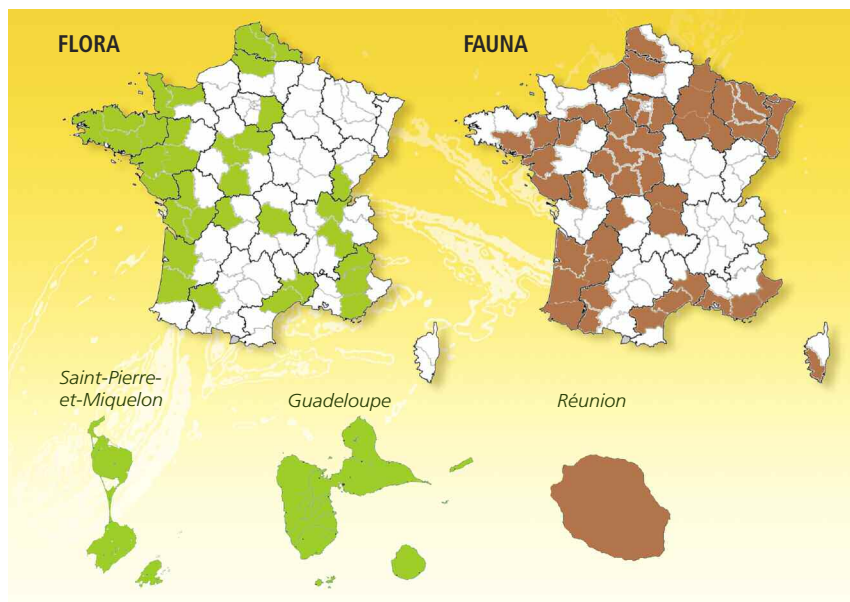
This unique collection of management insights is the product of a collaborative approach that mobilised over 100 managers of natural areas both in continental France, the overseas territories and in neighbouring countries. A total of 38 different species and 87 management projects are presented (see Table 1 and Figure 1). Several examples of management for a given species may be presented if the types of sites and approaches differ significantly.

The objective was to collect a fairly wide set of management projects, the purpose being not to suggest “one size fits all” solutions, but rather to assist managers in understanding their particular problem and in identifying the methods and techniques best suited to the local management needs.

**Table 1** Numerical data on the management reports presented in volumes 2 and 3.

|                               | Volume 2 |       | Volume 3                     |                             |
|-------------------------------|----------|-------|------------------------------|-----------------------------|
|                               | Flora    | Fauna | Flora                        | Fauna                       |
| Number of species             | 13       | 13    | 14 (including 8 new species) | 7 (including 4 new species) |
| Number of management projects | 27       | 25    | 27                           | 8                           |
| Countries involved            | 6        | 6     | 4                            | 2                           |
| French departments involved   | 24       | 44    | 21                           | 8                           |
| Organisations involved        | 30       | 28    | 30                           | 10                          |
| Contributing managers         | 30       | 33    | 32                           | 12                          |

Figure 1



*French departments and overseas territories involved in the management projects.*

## Organisation of the presented management projects

Managers are confronted with the disturbances caused by particular species in their areas and generally adopt an approach focussing on the species rather than on the type of environment. The management projects presented in detail in the following pages adopt the same approach.

To facilitate their study, the management projects concerning plant species are grouped according to the following types of plants:

- hydrophytes;
- amphibious plants;
- riparian plants.

Similarly, the management projects concerning animal species are grouped according to the following types of animals:

- invertebrates;
- amphibians;
- reptiles;
- mammals.

In addition, a brief, illustrated “species fact sheet” precedes the management examples for the species in question and provides a succinct presentation comprising:

- species taxonomy;
- a description (morphology, distinctive characteristics, etc.);
- species biology and ecology (types of habitat, living and reproductive conditions, etc.);
- sources of information.

As much as possible and depending on the available information, each management report is divided into an identical set of sections:

- a brief description of the management organisation with contact information;
- geographic location and description of the area concerned by the management project;
- detailed information on each intervention:
  - initial causes (disturbances and issues related to the presence of the species),
  - practical details and results (methods employed, costs, results of interventions, e.g. quantities removed, use of waste, etc.),
  - general assessment of the project and outlook,
  - promotion of the project (articles, etc.);
- any applicable regulations (for fauna);
- sources of information, links, other contacts.

All the management reports contained in the two volumes may also be downloaded (PDF format) from the IBMA site ([www.especes-exotiques-envahissantes.fr](http://www.especes-exotiques-envahissantes.fr)) and from the AFB site (<https://professionnels.afbiodiversite.fr/node/67>).

## Plant species growing in or near water

The plant species discussed in the management projects are divided among the main types of plants growing in or near water (Fare et al., 2001<sup>1</sup>, see figure 2).

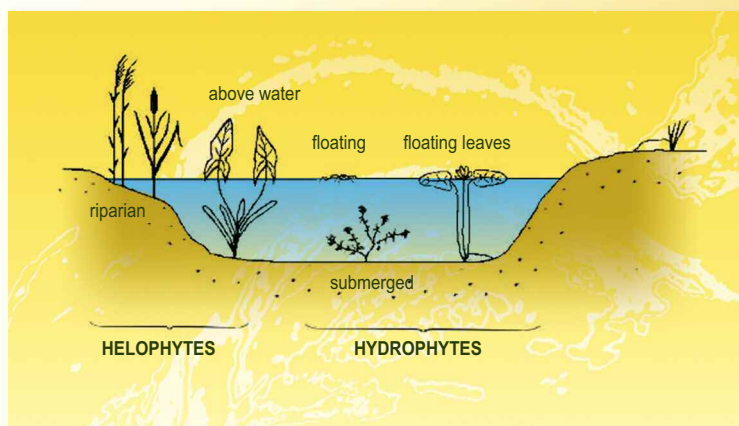
### Hydrophytes

*"Plant whose entire vegetative structure is located in a water body or on its surface. A hydrophyte may float on the surface and, in the fall, release buds (hibernacles) that spend the winter lying on the bottom of the water body. A hydrophyte may also have roots in the soil beneath the water body. Generally speaking, the reproductive organs of hydrophytes spend the winter below the water surface."* Hydrophytes necessarily grow in an aquatic environment and their entire vegetative structure develops in water.

### Helophytes

*"Plant whose vegetative and reproductive components rise into the air, but whose roots lie in water-permeated soil. During the winter, helophytes consist solely of their stalk rooted in the soil."*

Figure 2



*Different types of helophytes and hydrophytes (according to Moreau and Dutartre, 2000, modified by Mazaubert, 2013).*

### Amphibious plants

*"Plant capable of living both on land and in water."* These plants can withstand major variations in water levels.

### Riparian plants

The invasive alien species listed in the various nomenclatures include species that are not strictly aquatic. That is why another category was created to include species that are not absolutely dependent on a body of water, i.e. riparian plants that may be defined as species that are not strictly aquatic, but live near water.

## Benefits derived from the management reports and the work by IBMA<sup>2,3</sup>

The project to collect management reports started in 2013 with a call for contributions with no time limit. The objective was to assist managers in designing projects and to enable them to develop their own methods tailored to local situation, consequently the reports had to include the knowledge and know-how held by the people working in the field. This practical knowledge on managing IASs was wide ranging and difficult to collect in a systematic manner, which meant that it often remained unused unless it was presented during special meetings addressing practical aspects, meetings that took place all too rarely.

### ■ Availability and use of the knowledge gained by managers

This approach, based on regular contacts (meetings, forums) between work-group members from all types of organisations (local governments, non-profits, managers, etc.) and the drafting of detailed management reports with the people in the field, enabled the IBMA work group to create a large network and resulted in better use and awareness of the knowledge that had been scattered geographically and difficult to detect. These shared experiences now cover the needs that have been clearly identified on the international level and constitute a more complete and useful source of operational information for managers. The collected reports represent an indispensable first step in gathering the precise data needed for management projects.

### ■ Improvements in collecting management data and information

The frequent sharing of information and data within the IBMA work group was also a means of identifying missing links and potential improvements in management practices and in the technical and scientific information required in carrying out the management work. In drafting the management reports, the managers of natural areas, in conjunction with the coordinating team at IBMA, were in a position to clearly identify the information that had not been systematically gathered during projects, for example certain quantitative data, cost data and subsequent monitoring work. That data is, however, indispensable in precisely assessing project characteristics, in justifying management work to funding entities and in better defining objectives and adapting management techniques.

The changes made over time in this systematic collection of project data resulted in improved techniques, in developing management plans better adapted to the local context and in selecting numerous data points that could subsequently be analysed more effectively to produce more relevant results.

Figure 3



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*The sharing of information in the IBMA network and the drafting of management reports made available the knowledge gained by stakeholders in the field and improved the data-collection system for the management of invasive alien species.*

2. Sarat E., Dutartre A., Soubeyran Y., Poulet N. 2017. A French working group on biological invasions in aquatic environments. Toward an improvement of knowledge and management of freshwater invasive alien species. *Management of Biological Invasions*, 8 (3), pp.415-424.

3. Sarat E., Dutartre A. 2017. Le GT IBMA et le reste du monde. *Lettre d'information du GT IBMA n°20, novembre 2017.* <http://www.gt-ibma.eu/le-gt-ibma-et-le-reste-du-monde/>