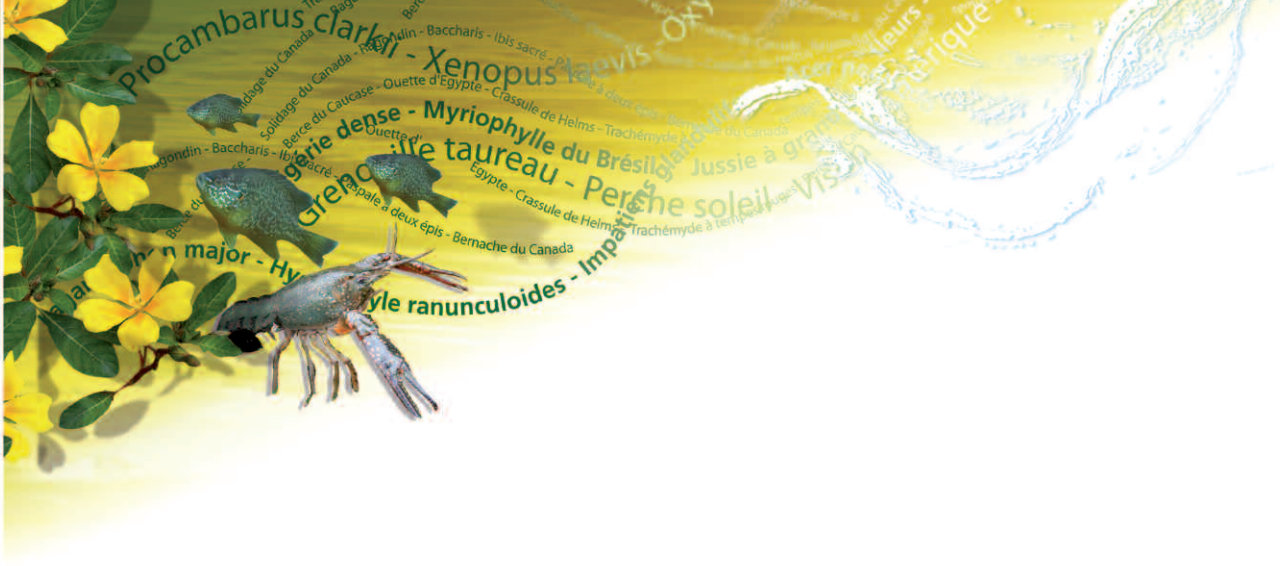


Introduction

The overall objective of these two volumes is to provide managers with a 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 the current situation concerning invasive alien species in aquatic environments in continental France. This second volume presents an illustrated panorama of management projects for invasive alien species (IAS) in aquatic environments, discusses issues and outlines processes for management work, for and by managers taking into account the specifics of each situation (including the site itself, the alien species and the human issues involved).

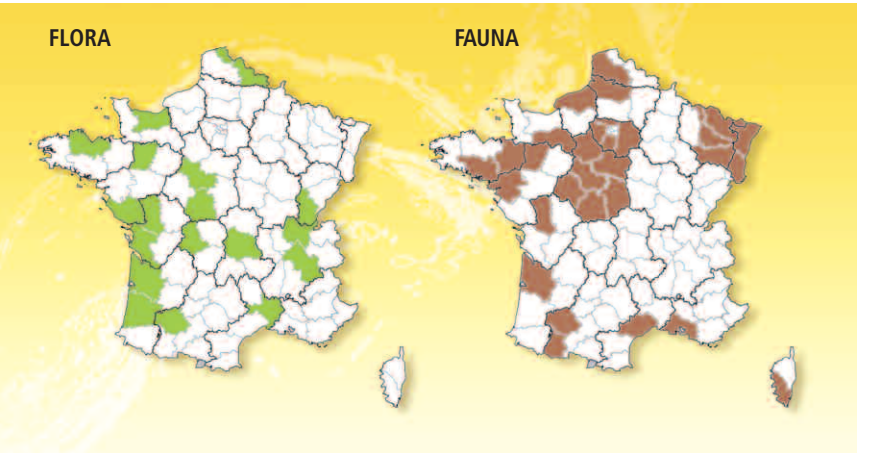
This unique collection of management insights is the product of a collaborative approach that mobilised over 60 managers of natural areas both in France and in neighbouring countries. A total of 26 different species and 52 management projects are presented (see Table 1 and Figure 1). Several examples 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 *Breakdown of the management projects presented in this volume.*

	Flora	Fauna
Number of species	13	13
Number of management projects	27	25
Countries involved	6	6
French departments involved	24	44
Organisations involved	30	28
Contributing managers	30	33

Figure 1



French departments 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 detailed management projects presented in the following pages adopt the same approach.

For example, the management projects concerning plant species are grouped according to the following types of plants (see Box 1 on the next page):

- hydrophytes;
- amphibious plants;
- riparian plants.

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

- invertebrates;
- fish;
- amphibians;
- reptiles;
- birds;
- 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.

To the degree possible and depending on the effectively available information, each management example is structured similarly, in a number 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.);

- sources of information, links, other contacts.

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, see Figure 2).

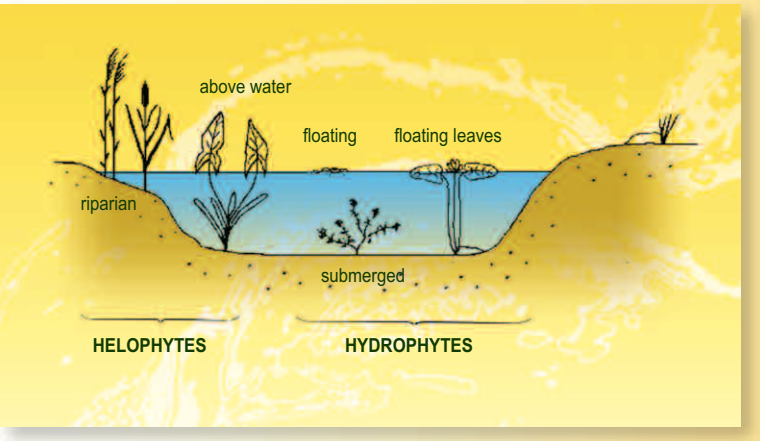
Hydrophytes

"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.

Data pooling and collaboration with other initiatives

The feedback from the management projects was shared with other recent initiatives, documents and projects having similar objectives. That was particularly the case for the document on invasive alien vertebrate species (not including fish) in the Loire basin, produced by the National agency for hunting and wildlife (Sarat (ed.), 2012, see Figure 3b), that comprises 16 management reports, some of which are included here.

(http://www.oncfs.gouv.fr/IMG/file/dir_CIDF/vertebres_exotiques_Loire.pdf)

Information was also exchanged with the Federation of conservatories for natural areas (FCEN) which also intends to publish a collection of IAS-management reports.

Other management examples were drawn from Chapter 5 of the Managing invasive alien plants and coordinating the work document published in the framework of the Water, land and species project for the Loire Grandeur Nature plan (Hudin (ed.), 2013, see Figure 3a), notably concerning knotweed, water primrose and efforts to create a coordination network.

(http://www.plan-loire.fr/fileadmin/pce/PF_EauEspaceEspeces/RecueilV2/Receuil_BD_complet.pdf)

The species fact sheets were designed simply as a complement to existing fact sheets because many sources of information on plant and animal species already exist. For that reason, the fact sheets presented here are particularly succinct and propose, wherever possible, references to fact sheets that have already been validated by experts, for example those in the identification guide published by the Loire-Bretagne work group (Hudin and Vahrameev, 2010) or those drafted by the Federation of national botanical conservatories (FCBN) for plants and, for animals, those contained in the document on invasive alien vertebrate species in the Loire basin (the above documents are available on line at the Loire Nature resource centre: (http://centrederessources-loirenature.com/home.php?num_niv_1=1&num_niv_2=4&num_niv_3=11&num_niv_4=58).

Figure 3

Information was shared with documents on management projects carried out in the Loire basin.