



Implementing the National Strategy of Invasive Species FIRST REPORT OF THE SCIENTIFIC COMMITTEE OF THE GEF-INVASIVE SPECIES PROJECT

**"Enhancing National Capacities to Manage Invasive Alien Species (IAS) by
Implementing the National Strategy on IAS" progress made between 2015 and
the first trimester of 2017.**



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The opinions, analysis and political recommendations included in this report do not reflect necessarily the point of view of the United Nations Development Program, the executive board, nor its state members.

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1. Summary

Through the National Strategy on Invasive Species (ENEI, after its acronym in Spanish), Mexico seeks to contribute to the conservation of the natural capital and human well-being through actions aimed at the prevention, control and eradication of Invasive Species. In response to this, the GEF Project "Enhancing National Capacities to Manage Invasive Alien Species (IAS) by Implementing the National Strategy on IAS", is linked with the ENEI, carrying out actions at the national level (component 1) and at pilot sites (component 2) to strengthen the effective management of natural resources and protect vulnerable ecosystems of global importance, respectively. The GEF project collaborates with more than 15 institutions, in addition to the joint coordination of CONABIO and CONANP. As part of the progress made by this project and in order to establish a more robust coordination, three committees were set up: a Scientific, Executive and Technical Committee. This report is part of the products prepared by the Scientific Committee, which consists of five research experts in IAS, who have reviewed the project products and have given their recommendations to align the work of the project with the ENEI. This first report aims to show the progress of the project, taking into account the proposed indicators and the comments made by the Scientific Committee. Likewise, a list of the products elaborated in the framework of the project was presented, which in turn can be downloaded in the web page of the project <http://www.biodiversidad.gob.mx/especies/Invasoras/proyecto.html>. Advances in the project indicators show significant progress in the battle against IAS; however, the conclusions will be determined in the final phase of the project and included in the second report of the Scientific Committee.



2. Introduction

Mexico is one of the most ecologically diverse nations of the world, with high ecosystem and species diversity that lead to a high genetic variability. In global terms, Mexico is notable not only for the richness of species of several groups of organisms, but also for the high level of endemism. This is the result of its location between the Nearctic and Neotropical biogeographic regions, its steep orography and relief, its shape and location, and its variety of climates. The *National Biodiversity Strategy of Mexico and Action Plan 2016-2030*, incorporated guidelines defined in the 2010 National Strategy on Invasive Species (NSIS). The latter highlights that invasive alien species (IAS) represent a critical threat to biodiversity and proposes cross-cutting objectives and strategic actions in order to reduce the impact of these species (Figure 1).

IAS cause severe environmental damage, for example, by displacing native species through competition, depredation, habitat alteration, diseases, among others, and can cause changes in the functions and conditions of ecosystems; such as the modification of trophic networks, and habitat alteration, degradation and fragmentation. The effects of IAS are particularly devastating in insular environments; in fact, they are the main cause of biodiversity loss on islands. The Government of Mexico (GoM) has made considerable investments to face the threat of high risk IAS pests and quarantine pests, including a well-established system of inspection, quarantine, and rapid response to prevent IAS introduction and spread in the country.

However, these investments have been focused mainly on the productive sectors, particularly agriculture, livestock and forest products, as well as on human health, while actions to address prevention, control and eradications of IAS threatening biodiversity and ecological functions are still insufficient. In response to this situation, the objective of the project is to safeguard biodiversity of global importance in vulnerable ecosystems, by building capacities to prevent, detect, control and manage IAS in Mexico (PRODOC, 2014).

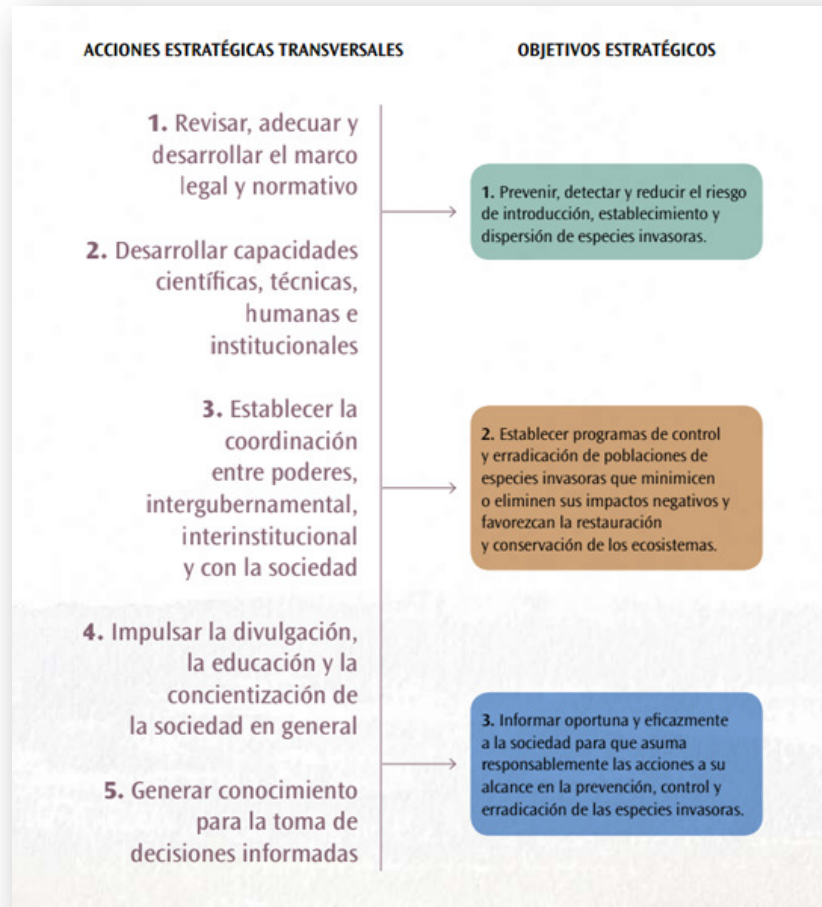


Figure 1. Strategic objectives and crosscutting actions identified in the National Strategy on Invasive Species (taken from: CANEI, 2010).

2. Objectives and Scope of the GEF Invasive species Project

The project is divided into two main components that contain priority activities established in the NSIS that are carried out at two levels:

At the national level, component 1 of the project seeks to strengthen the effective management of natural resources, orienting it more concretely towards biodiversity conservation. It also develops quality information resources on IAS, establishes priorities and decision-making tools, strengthens capacity in key institutions, and involves collaborators and partners (specific actors of the productive

sector) whose participation is critical regarding IAS prevention and control activities. In addition, it addresses policies, regulations, capacities and tools to reduce or eliminate unsustainable practices (or those that may cause damage to the environment) in productive sectors of great economic importance. The emphasis on productive sectors such as aquaculture, trade in ornamental species, forest products and wildlife allows the project to address many of the high-risk pathways and vectors of IAS into and throughout Mexico, particularly with respect to priority conservation areas. These objectives are being achieved through the following subcomponents (Figure 2) PRODOC, 2014; CESOP, 2017).

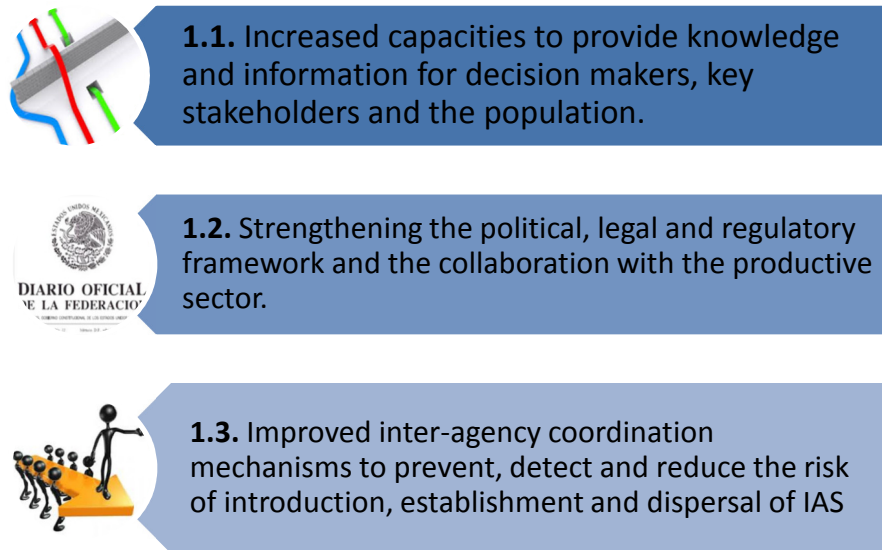


Figure 2. Component 1: National Framework for IAS management

In the pilot sites that is in component 2, the project is executed in 15 Protected Areas (PA); of which six are on islands and nine are continental. Collectively, these 15 PA cover nine different ecoregions and three environments: terrestrial, freshwater and coastal. The selection of PA was made during the preparatory phase of the project through a study that used multilevel prioritization criteria, ensuring the representativeness of different ecoregions and emphasizing traits as areas of high biodiversity and vulnerability (see Tables 1 and 2). The primary emphasis at the site level is to prevent the entry and spread of IAS into these areas through prevention and implementation of early detection and rapid response systems, thereby reducing the risk of establishing IAS and avoiding costly efforts of control and eradication. The project will promote the integrated planning and coordination of IAS activities, including the first biosecurity plans at these sites (Figure 3). The project also supports local communities and producers to reduce the potential impact of IAS arising from productive activities within and around NAPs (e.g., preventing the use of alien species in forestry, gardening, agriculture and aquaculture). The project supports measures to manage IAS already present in some of these areas, specifically in places where they already cause severe impacts on biodiversity and ecosystems, and where control and eradication measures can be implemented cost effectively and with a high level of success (PRODOC, 2014; CESOP Report, 2017).



2.1 Strengthened prevention and control of key IAS populations in selected islands: Isla Guadalupe, Espíritu Santo, Isla Socorro, Arrecife Alacranes, Banco Chinchorro and Archipiélago San Benito.



2.2. Enhanced IAS surveillance and control strategies reduce introduction rates from productive landscapes and contain populations below thresholds that endanger endemic species and their habitats at 9 mainland Protected Areas

Figure 3. Component 2: Integrated management of IAS to protect vulnerable and globally significant ecosystems.

Marine Ecoregion in which they are located	Surface (ha)		Ramsar (ha)
Biosphere Reserve Archipiélago de Revillagigedo (Isla Socorro)	Mexican transitional Pacific	636,685	636,685
Biosphere Reserve Isla Guadalupe	South Californian Pacific	4,769.71	
Biosphere Reserve Islas de Pacífico de Baja California (Isla San Benito)	South Californian Pacific	1,161,222	
Protected Areas of Fauna and Flora Islas del Golfo de California (Espíritu Santo - two islands)	Gulf de California	420,809	
National Park Arrecife Alacranes (five islands)	Caribbean Sea	31,670	334,113
Biosphere Reserve Banco Chinchorro (four islands/cays)	Caribbean Sea	144,360	144,360

Table 1. Island Pilot Sites

Name of PA	State	Surface (ha)	Ramsar (ha)
Biosphere Reserve El Vizcaíno	Baja California Sur	2,547,790	44,100
Área de Protección de Fauna y Flora Sierra de Álamos-Río Cuchujaqui	Sonora	92,890	174.12
Protected Areas of Fauna and Flora Tutuaca	Chihuahua	444,489	NA
National Park Cumbres de Monterrey	Nuevo León	177,396	NA
Biosphere Reserve Marismas Nacionales Nayarit	Nayarit	133,854	200,000
Protected Areas of Natural Resources Cuencas de los Ríos Valle de Bravo, Malacatepec, Tilostoc and Temascaltepec	Estado de México	139,871	NA
Biosphere Reserve Los Tuxtlas	Veracruz de la Llave	155,122	8,921
National Park Cañón del Sumidero	Chiapas	217,894	21,789
Biosphere Reserve Sian Ka'an	Quintana Roo	528,148	652,193

Table 2. Mainland PA pilot sites

Project Partners:

Eight federal government institutions collaborate with CONABIO and CONANP in the project; in particular the Ministry of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales - SEMARNAT) through the Undersecretary of Environmental Promotion and Regulation (SFNA), the National Forestry Commission (Comisión Nacional Forestal - CONAFOR), the National Institute of Ecology and Climate Change (Instituto Nacional de Ecología y Cambio Climático - INECC), the Mexican Institute of Water Technology (Instituto Mexicano de Tecnología del Agua - IMTA), the Federal Attorney for Environmental Protection (Procuraduría Federal de Protección al Ambiente - PROFEPA), through the General Division of Environmental Inspection in Ports, Airports and Borders (Dirección General de Inspección Ambiental en Puertos, Aeropuertos y Fronteras - DGIAPAF) and the Directorate General of Forest Inspection and Verification (Dirección General de Inspección y Verificación Forestal - DGIVF). The Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación - SAGARPA) also collaborates through the National Commission for Aquaculture and Fishery (Comisión Nacional de Acuicultura y Pesca - CONAPESCA) that joined the project in 2016, and the National Fisheries Institute (INAPESCA) and the Ministry of the Navy (Secretaría de Marina - SEMAR), the Aquatic Health Committee of the State of Morelos (Comité Estatal de Sanidad Acuícola del estado de Morelos - CESAEM), as well as civil society organizations such as the Ecology and Island Conservation Group (Grupo de Ecología y Conservación de Islas - GECI) and the Environmental Communication and Education Fund (Fondo de Comunicación y Educación Ambiental - FCEA) and three universities: Autonomous Metropolitan University (Universidad



- Autónoma Metropolitana UAM), Autonomous University of Nuevo León (Universidad Autónoma de Nuevo León - UANL) and National Autonomous University of Mexico (Universidad Nacional Autónoma de México - UNAM). Additionally, the project collaborate through the different Committees with other SEMARNAT Divisions such as the General Department of Wildlife (Dirección General de Vida Silvestre - DGVS) and seeks for synergies with various related initiatives of other UNDP projects (see below).

3. Project Indicators

	Indicator	Baseline	Target	Means of Verification	Risks and Assumptions																		
Project Objective: To safeguard globally significant biodiversity in vulnerable ecosystems by building capacity to prevent, detect, control and manage IAS in Mexico	0.a Strengthened national level invasive species management framework, measured by an increase in total score of the IAS TT: Problema	Scores at Start of Project:	Scores at End of Project:	GEF Tracking Tool applied at Preparation Phase (PPG), Mid Term Review (MTR) and Final Evaluation (TE)	<u>Risks:</u> - Extreme weather events and/or fires beyond predicted levels. <u>Assumptions:</u> - Stability and commitment of governmental institutions throughout project implementation. - Willingness within the GoM to commit																		
	1) Is there a National Coordination Mechanism to assist with the design and implementation of a national IAS strategy?	<table border="1"> <thead> <tr> <th>Baseline Score</th> <th>Target Score</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> </tr> <tr> <td>2</td> <td>3</td> </tr> <tr> <td>2</td> <td>4</td> </tr> <tr> <td>1</td> <td>2</td> </tr> <tr> <td>1</td> <td>5</td> </tr> <tr> <td>1</td> <td>8</td> </tr> <tr> <td>8</td> <td>25</td> </tr> <tr> <td>29</td> <td>29</td> </tr> </tbody> </table>	Baseline Score			Target Score	1	3	2	3	2	4	1	2	1	5	1	8	8	25	29	29	
	Baseline Score	Target Score																					
	1	3																					
	2	3																					
	2	4																					
	1	2																					
	1	5																					
	1	8																					
	8	25																					
29	29																						
2) Is there a National IAS strategy and is it being implemented?																							
3) Has the national IAS strategy led to the development and adoption of comprehensive framework of policies, legislation, and regulations across sectors																							
4) Have priority pathways for invasions been identified and actively managed and monitored?																							
5) Are detection, delimiting and monitoring surveys conducted on a regular basis?																							
6) Are best management practices being applied in project target areas?																							
TOTAL SCORE																							
TOTAL POSSIBLE																							

	Indicator	Baseline	Target	Means of Verification	Risks and Assumptions
To safeguard globally significant biodiversity in vulnerable ecosystems by building capacity to prevent, detect, control and manage IAS in Mexico	0.b Strengthened national capacities for IAS management ¹ , as measured by the UNDP Capacity Development Scorecard	Average score on Capacity Development Scorecard: 43	Average score on Capacity Development Scorecard by end of project: 76	Scorecard applied PPG, MTR y TE.	funding - resources to the management of IAS that impact biodiversity. National and international macroeconomic conditions remain stable.
	0.c Supporting framework for implementation of the National Strategy for Invasive Species (NSIS), as measured by: National (federal and state level) and international institutions (government, NGOs & Universities) involved in the implementation process of the NSIS	# of official institutional partners involved in IAS management in Mexico: 8 governmental institutions, 3 Universities, 2 NGOs, 1 State level organization	1 additional institutional partner becomes involved in IAS management each year of the project	MoUs for participation in the NSIS	
	0.d Cost effectiveness of IAS management actions	No consolidated information on the costs of different IAS management strategies (prevention, response, control, etc.) in Mexico, or how costs differ in varying ecological / logistical conditions	Cost coefficients, based on IAS management activities carried out at selected project field sites, developed and guiding priority setting of NSIS goals / activities by end of project	Project report on cost coefficients	
	0.e Entry and spread of IAS into 15 islands (6 island groups) reduced through biosecurity inspections of goods/persons who arrive at the islands by air/sea	0% of goods and persons arriving at islands are subject to biosecurity inspections	Goods and persons arriving at islands are subject to biosecurity inspections 100%: Guadalupe, Socorro, Banco Chinchorro 50%: San Benito, Espíritu Santo • 25%: Arrecife Alacranes	Reports of inspection authorities	

¹ Institutions / Organizations include: CONABIO, CONANP, CONAFOR, SENASICA, INAPESCA, SEMARNAT, INECC, IMTA, PROFEPA, as well as Universities, NGOs/CSOs, and Private Sector Association.

	Indicator	Baseline	Target	Means of Verification	Risks and Assumptions
To safeguard globally significant biodiversity in vulnerable ecosystems by building capacity to prevent, detect, control and manage IAS in Mexico	0.f Populations of key IAS contained to below thresholds that endanger native species and their habitats, providing additional protection to at least ² :	Populations of selected high impact IAS at sites (low, medium, high; estimates will be validated during year 1 of the project):	Al final del proyecto se han seleccionado sitios con poblaciones de EEI de alto impacto:		
	155 endemic species and 168 species of flora and fauna classified under NOM-059 ³ , at 15 islands (island group) totaling 46,420 hectares.	Feral cats (<i>Felis gatus</i>) on Isla Guadalupe, Isla Espiritu Santo, Isla Socorro and Banco Chinchorro - <u>Medium</u>	0 on Isla Espiritu Santo and Banco Chinchorro; Low on Isla Guadalupe and Isla Socorro		
		• Mice (<i>Peromyscus eremicus cedrosensi</i>) on San Benito Archipelago – <u>High</u>	0		
		• Feral goats (<i>Capra hircus</i>) on Isla Espiritu Santo - <u>Medium</u>	0		
		• Black rats (<i>Rattus rattus</i>) on Banco Chinchorro – <u>High</u>	0		
	• 191 endemic species, and 983 species of flora and fauna classified under NOM-059, at 9 mainland protected areas totaling 4,240,349 hectares	• Vidrillo (<i>Mesembryanthemum crystallinum</i>) at El Vizcaíno Biosphere Reserve – <u>High</u>	Medium		
	• Pacific Oyster (<i>Crassostrea gigas</i>) at El Vizcaíno Biosphere Reserve - <u>Medium</u>	Low			

² Overall, 87% of the costs of these control and eradication activities will be paid for with co-financing, and the GEF funding of US\$312,500 represents only 5.84% of the overall GEF support for the project.

³ NOM-059: Norma Oficial Mexicana (SEMARNAT-2010, Protección Ambiental; especies nativas en México de flora y fauna; lista de especies en riesgo).



Indicator	Baseline	Target	Means of Verification	Risks and Assumptions
	<ul style="list-style-type: none"> Black rats (<i>Rattus rattus</i>) at the APFF Sierra de Álamos-Río Cuchujaqu – <u>High</u> 	Medium		
	<ul style="list-style-type: none"> Salt cedar (<i>Tamarix ramosissima</i>) at the APFF Sierra de Álamos-Río Cuchujaqu – <u>High</u> 	Medium		
	<ul style="list-style-type: none"> Giant Cane (<i>Arundo donax</i>) (90 hectares) and Chinese Privet (<i>Ligustrum lucidum</i>) (120 hectares) at the Cumbres de Monterrey National Park – <u>Medium</u> 	Low		
	<ul style="list-style-type: none"> Feral dogs (<i>Canis lupus familiaris</i>) and feral cats (<i>Felis catus</i>) at the Cañón del Sumidero National Park – <u>High</u> 	Low		
	<ul style="list-style-type: none"> Lionfish (<i>Pterois volitans</i>) at the Sian Ka'an Biosphere Reserve - <u>Medium</u> 	Low		
being imported into first time that have a risk potential impacts on	0%	100% of species are subject to risk analyses or at least rapid assessments for potential impacts on biodiversity	Risk analysis protocols and manuals	<u>Risks:</u> - State Authorities may not be willing to implement robust IAS management controls
security systems at	Productive sector companies	10 productive sector facilities that	HACCP reports	

	Indicator	Baseline	Target	Means of Verification	Risks and Assumptions
Componente 1: Marco de Manejo Nacional de EEI	nurseries, breeding ponds / farms, distribution centers, UMAs and PIMVS ⁴	knowledge, experience and capacities for applying biosecurity protocols or technologies for IAS that impact biodiversity	biodiversity applying Hazard Analysis and Critical Control Points (HACCP) systems and/or implementing improved IAS management technologies by the end of the project	technologies implemented	- Standards, codes of conduct and certification systems for productive sectors may not be ready for implementation by the end of the project
	1.c Regulations under existing legislation to strengthen management authority over IAS that impact biodiversity (laws / regulations that might need to be revised / strengthened include): <ul style="list-style-type: none"> • Ley General de Vida Silvestre • El Sistema Nacional de Sanidad, Inocuidad y Calidad Agropecuaria y Alimentaria (SENASICA) • Ley Federal de Derechos (LFD) • Leyes y reglamentos de vida silvestre, forestal y acuícola • Ley Orgánica de la Administración Pública Federal (LOAPF) 	Laws and regulations for wildlife, forestry and fisheries are insufficient for prevention, early detection, rapid response, and control and eradication of IAS that impact biodiversity	Regulations for management of IAS that impact biodiversity in wildlife, forestry and fisheries are drafted by the end of the project	Draft laws, regulations, and other legal instrument	<u>Assumptions:</u> - Institutional willingness to share information and adopt harmonized protocols on IAS - Productive sector players understand the role of IAS management in ensuring long-term viability of their operations
	1.d % of inspectors at points of entry or other inspection sites within Mexico are trained in use of the National List of Invasive Species or in protocols to prevent the introduction/spread of IAS that impact BD	0%	> 90%	Training reports; statistics on # of inspections carried out	

⁴ UMA (Unidades de Manejo Ambiental) are authorized governmental centers to support natural resources related to production; PIMVS (Predios o Instalaciones que Manejan Vida Silvestre) are facilities in which Wildlife is raised and managed under a controlled system outside of its natural habitat.



Al servicio de las personas y las naciones

	Indicator	Baseline	Target	Means of Verification	Risks and Assumptions
	<p>1.e Early Detection and Rapid Response (EDRR) systems for IAS that impact biodiversity.</p>	<p>No EDRR systems exist in Mexico for IAS that impact biodiversity</p>	<p>EDRR systems have been developed and implemented nationally for at least 2 invasive species (e.g. <i>Cactoblastics cactorum</i> and <i>Dreissena polymorpha</i>) by the end of the project</p>	<p>Official reports of EDRR systems</p>	<ul style="list-style-type: none"> - Political will exists to approve and implement strengthened IAS laws and/or regulations - Institutional willingness to integrate IAS management priorities into existing plans and functions

	Indicator	Baseline	Objective	Means of Verification	Risks and assumptions
Component 2: Integrated IAS management to protect vulnerable globally significant	2.a Financing for control and prevention activities	USD 0.8 million per year for activities related to IAS management at 6 selected island sites	Average 25% increase of budget for IAS control and prevention in selected island sites by the end of the project	Detailed budget analysis using common methodologies across all sites will be done at beginning, midterm and end of project	<u>Risks:</u> - Deterioration of security conditions could prevent implementation of field activities at some mainland PA sites <u>Assumptions:</u> - Acceptance among local stakeholders at island sites of IAS management restrictions
	2.b Sustained control of feral cats (Guadalupe and Socorro)	Feral cat populations on two islands having severe negative impact on native species through predation	Sustained control of feral cats (Guadalupe and Socorro) by end of project		
	2.c Removal of IAS from selected island sites	A total of 15 populations of invasive mammals (i.e. rodents, cats and ungulates) have already been removed from the selected island sites between 1998-2012	<ul style="list-style-type: none"> • End of year 1: Eradication of feral cats (Espiritu Santo); mice (San Benito Oeste); and 5 species of exotic vascular plants (Arrecife Alacranes) 		
			<ul style="list-style-type: none"> • End of year 2: Eradication of black rats and feral cats on Banco Chinchorro (Cayo Centro) • End of year 3: Eradication of feral goats on Isla Espiritu Santo • End of Project: Post-eradication monitoring completed for 9 IAS (eradicated in years 1-2) 		
2.d Early Detection and Rapid Response (EDDR) systems to prevent the establishment and spread of specific high priority IAS applied at selected mainland PA sites:	0 mainland PAs have systems for EDRR (baseline populations to be determined during year 1 of project)	4 mainland PAs with operating participatory EDRR systems sites by end of the project, with the following results:	Logs of documented EDRR activities	<ul style="list-style-type: none"> - Willingness within CONANP to increase funding / resources 	

	Indicator	Baseline	Objective	Means of Verification	Risks and assumptions
Component 2: Integrated IAS management to protect vulnerable globally significant	<ul style="list-style-type: none"> • Monk Parakeet (<i>Myiopsitta monachus</i>) at Vizcaino 	<ul style="list-style-type: none"> • Outcompetes native bird species for food sources 	<ul style="list-style-type: none"> • 80 % reduction in successful escapes of monk parakeet. 	Annual reports of PA Advisory Councils and project monitoring reports.	for management of IAS that impact biodiversity - Acceptance among local stakeholders at mainland PA sites of IAS management restrictions - Local actors understand the role of IAS management in reducing social vulnerability. - Productive sector players understand the role of IAS management in ensuring long-term
	<ul style="list-style-type: none"> • Mozambique Tilapia (<i>Oreochromis mossambicus</i>) at Tutuaca 	<ul style="list-style-type: none"> • Outcompetes native fish species; changes aquatic environment 	<ul style="list-style-type: none"> • No increase in # of water bodies with presence of tilapia 		
	<ul style="list-style-type: none"> • Feral cat, feral dogs, and the devil fish (<i>Loriicaridae</i>) at Cañón del Sumidero • 	<ul style="list-style-type: none"> • Feral cats and dogs prey on native species and transmit diseases; devil fish competes with native fish species and transmits diseases. 	<ul style="list-style-type: none"> • Reduced rate of spread of feral cats and dogs into PA; no increase in # of water bodies with devil fish 		
	<ul style="list-style-type: none"> • Giant cane (<i>Arundo donax</i>), vine (<i>Cassytha filiformis</i>) and palm weevil (<i>Rhynchophorus palmarum</i>) at Sian Ka'an. 	<ul style="list-style-type: none"> • Giant cane disrupts aquatic systems; vine kills native vegetation; weevil kills palms 	<ul style="list-style-type: none"> • No increase in area impacted by giant cane or vine; no increase in # of palms impacted by weevil 		
	<p>2.e Best practices for IAS management among productive sector partners at 6 mainland PA sites reduce IAS populations as follows:</p>	Current production sector practices result in the following IAS impacts:	Best practices instituted at 6 mainland PA sites by the end of project, with the following results:		
	<ul style="list-style-type: none"> • Planting of buffel grass (<i>Cenchrus ciliaris</i>) and natal grass (<i>Melinis repens</i>) at Tutuaca and natal grass (<i>Melinis repens</i>) at Sierra de Álamos 	<ul style="list-style-type: none"> • Exotic grasses displace native grassland species and increase the incidence and severity of fires within the PA • 	<ul style="list-style-type: none"> • No more planting of buffel grass and natal grass 		
	<ul style="list-style-type: none"> • Planting of exotic tree species such as cedro blanco (<i>Cupressus lindleyi</i>), eucalyptus (<i>Eucalyptus camaldulensis</i>) and casuarina (<i>Casuarina equisetifolia</i>) at Vallee de Bravo. 	<ul style="list-style-type: none"> • Exotic tree species reduce habitat for native species and change hydrological conditions 	<ul style="list-style-type: none"> • Planting of exotic tree species ended, and replaced with native tree species • 		

	Indicator	Baseline	Objective	Means of Verification	Risks and assumptions
Componente 2: Manejo Integral de EEI para proteger ecosistemas vulnerables de importancia global	<ul style="list-style-type: none"> Extensive cattle ranching within PA boundaries at Marismas Nacionales and Sian Ka'an 	<ul style="list-style-type: none"> Destruction of mangrove seedlings by foraging cattle; pollution caused by livestock waste; negative impacts on re-vegetation 	<ul style="list-style-type: none"> Cattle ranching restricted in scope (e.g. no access to priority conservation areas such as mangroves) 		viability of their operations
	<ul style="list-style-type: none"> Aquaculture utilizing exotic trout (<i>Oncorhynchus mykiss</i>) at Tutuaca; exotic carp and trout at Valle de Bravo; various exotic species at Cañón del Sumidero; and Mozambique Tilapia (<i>Oreochromis mossambicus</i>) at Sian Ka'an 	<ul style="list-style-type: none"> Exotic fish species outcompete native fish species and produce changes in the aquatic environment 	<ul style="list-style-type: none"> Replacement of exotic aquaculture species with native species; enhanced biosecurity systems for remaining exotic aquaculture operations 		

Table 3. Results and Indicators.



4. Summary of the project progress

During the first two years of the project, results have been achieved and products developed according to the established objectives. This section describes the progress made as of March 31, 2017 for each of the subcomponents of the project. On the project website you can download the project document (RPODOC), as well as any of the products generated within the project.

(<http://www.biodiversidad.gob.mx/especies/Invasoras/proyecto.html>).

1.1. Increased capacities to provide knowledge and information for decision makers, key stakeholders, and the general public.

1.1.1 Strengthening of the National Invasive Alien Species Information System (NIASIS).

Regarding the provision of knowledge and information for decision makers and key stakeholders, an important increase in the contents of the National Invasive Species Information System (NISIS) was achieved by the Invasive Alien Species Department of CONABIO. The number of records of exotic species and invasive alien species included in this system at the end of 2016 totaled 197,785, which represents an increase of 295% compared to the 50,000 records of the project's baseline (see indicators above, PRODOC, 2014). This increase is largely due to the work of updating the National Information System of Biodiversity (SNIB) of CONABIO to include new records. At the end of 2016, the SIEI had compiled 1920 exotic species, which had with invasive potential for the country. This number includes 516 species already evaluated as invasive and integrated into the system, which implies an increase of 35% compared to the 381 species at the beginning of the project. In addition, through the GEF-Invasive species project, 1,689 records of IAS presence were obtained, and will be integrated into the SIEI. To supplement these records, an additional 593 rapid risk assessments have been carried out based on the Rapid Risk Assessment Method for Invasives (MERI, after its initials in Spanish) and 19 complete Risk Analysis (see 1.1.6), which represents an increase of 38% compared to the 450 performed at the start of the project. These data have been a fundamental input for the preparation and publication of the official IAS list (see 1.1.5), and have also been crucial for other aspects of sectoral regulation in which IAS are implicated, as well as to disseminate public information on these species. It should be noted that some species that appear on the official list are already present in the country. With these risk analyses, other species with a high probability of entry, especially through the pet trade, have been identified (including several reptiles, mollusks and aquarium plants). Reviews and queries of the system by organizations and individuals across Mexico have increased significantly, which shows a greater interest in IAS. This could be attributed to the dissemination of information disclosed in various media and forums by CONABIO, in particular by staff of the Department for Invasive species of CONABIO and the Coordination Unit of the GEF-Invasive species project, PNUD-CONABIO (Figure 4).



Figure 4. Queries made to the Information System on Invasive Species of CONABIO, from 2005 through March 31, 2017. Source: CONABIO. 2017. Information system on invasive species in Mexico.

Through the project, scientific data collections for native and exotic invasive waterweeds have been carried out in 28 of the 51 waterbodies in the most important water basins of the Mexican Republic. Of these, 15 were accomplished in 2015 in eight states (State of Mexico, Chiapas, Guanajuato, Michoacán, Oaxaca, Puebla, Querétaro and Tlaxcala). In 2016, 13 water bodies were sampled in the states of Chiapas, Jalisco, Sonora, and again in the state of Mexico. This work was conducted by the Mexican Institute of Water Technology (IMTA) and shows that only 18% of the waterbodies sampled in these basins were free of invasive weeds. In the remaining waterbodies, which had documented invasions, the presence of 31 different IAS species was confirmed; the water lily (*Eichhornia crassipes*) was the most prevalent invasive species (found in 19 of the 28 waterbodies), followed by common reed (*Phragmites australis*), and water lettuce (*Pistia stratiotes*). The last two species are present in six of the sampled waterbodies. Descriptive sheets of each species and each water body are being prepared; these sheets will serve as input for the information systems of CONABIO.

Furthermore, 16 hydrological regions were selected (Regions: 9. Sonora Sur, 10. Sinaloa, 12. Lerma-Santiago, 15. Costa de Jalisco, 16. Armería-Coahuayana, 18. Balsas, 19. Costa Grande Guerrero, 20. Costa Chica de Guerrero, 21. Costa de Oaxaca, 22. Tehuantepec, 24. Bravo-Conchos, 25. San Fernando Soto la Marina, 26. Pánuco, 28. Papaloapan, 30. Grijalva-Usumacinta y 36. Nazas-Aguanaval (see figure 5) based on their hydrological importance and condition. These will be analyzed to determine the variability of seasonal and extreme cycles within an annual cycle, as well as the frequency and duration of cycles of dry and abundant years regarding precipitation and runoff, indicating extreme periods of drought and rains. These data will allow analyzing the influence on the infestations of invasive exotic aquatic plants in the country's waterbodies.



Figure 5. Hydrological regions of Mexico. Source: CONABIO, accessed 30.05.2018

1.1.2 Establishment and operation of an Information System to measure the implementation of the National Strategy on Invasive Species.

In order to have a tool that brings together all the projects related to IAS in Mexico, the Platform for monitoring the activities of the Implementation of the National Strategy on Invasive Species (System PREVIENE, for its abbreviation in Spanish) is being developed. Currently, a beta version of the "PREVIENE" System has been unveiled, which when finalized, will serve in the future to measure the implementation of activities regarding IAS and the achievement of the objectives described in the National Strategy on Invasive Species (NSIS). This platform is being tested for its implementation, while working on the module for consultation and reporting.



1.1.3 Creation of Participatory Networks to support IAS management.

The conceptual framework to develop an IAS experts database has been designed (similar to the system "Delivering Alien Invasive Species Inventories for Europe" or DAISIE), which includes all the necessary fields and will be available online. Once a programmer is hired, the programming process can start. The tool will allow users to find information about experts in Mexico on specific issues or taxonomic groups of IAS and resource managers and inspectors have faster and more efficient access to experts; it will also facilitate the sharing of information among Mexican experts with international counterparts. In addition, CONABIO has already implemented the online iNaturalist (Naturalista) system and developed a mobile application in which both experts and the public can upload photos and data of IAS sightings and request help from other participants to identify the species; through this tool, CONABIO recorded the presence of three new IAS in the country.

1.1.4 Establishment and operation of an IAS National Gateway.

The Invasive Alien Species Department of CONABIO is planning a system to establish an IAS National Gateway to initiate with programming in 2018.

1.1.5 Publication and Release of the National List of Invasive Alien Species.

On December 6, 2016, the agreement approving the official list of invasive alien species in Mexico was published in the DOF. This list identifies 348 invasive species. It is based on: 1) the technical work carried out by SEI-DGAP-CONABIO regarding the risk evaluation of the species invasiveness present in Mexico or of possible entry into the country, and 2) the regulatory impact and legal considerations to avoid duplicating efforts (species that are already regulated by other legal instruments). Following the recommendation of SEMARNAT, this list does not include forest species, which must be regulated with a specific Standard, nor aquatic species, which lie within the responsibility of CONAPESCA (SAGARPA).

1.1.6 Development and use of risk analysis methodologies for high-risk species / pathways.

Researchers from UAM-Xochimilco and UNAM carried out rapid risk analyses using the Rapid Risk Assessment Method for Invasives (MERI) (Golubov et al., 2014) for 251 invasive alien plants in Mexico, which will be used as input for the validation of different Weed Risk Assessment models. An analysis of the use of the Australian Weed Risk Assessment Method (AWRA) at global scale was carried out, since it has been used in at least 15 studies (Mediterranean, Eastern Africa, Continental US and Hawaii, Republic Czech Republic, Canada, Japan, the Netherlands and Singapore). Three fields were identified that would have to be modified in the case of Mexico. The attributes of impact were associated with the impacts recognized in other parts of the world. In 2015, complete risk analyses were commissioned for 27 species with high invasive potential for Mexico, these consultancies have already concluded and the final results are available. Likewise, 12 more risk analyses are pending, corresponding to four ants and

eight mollusks, which were also identified as high risk through the rapid risk assessment of invasives, and for which extensive analysis is required.

Scientific name	Scientific name
Reptiles	Plants
<i>Agama agama</i>	<i>Aegilops cylindrica</i>
<i>Anolis carolinensis</i>	<i>Commelina benghalensis</i>
<i>Anolis sagrei</i>	<i>Pueraria phaseoloides</i>
<i>Boa constrictor</i>	<i>Pueraria montana</i>
<i>Chamaeleo senegalensis</i>	<i>Caulerpa taxifolia</i>
<i>Chrysemys picta</i>	<i>Salvinia molesta</i>
<i>Dendroaspis viridis</i>	<i>Egeria densa</i>
<i>Gekko gekko</i>	<i>Hydrilla verticillata</i>
<i>Malayopython reticulatus</i>	<i>Vallisneria spiralis</i>
<i>Pseudemys nelsoni</i>	<i>Myriophyllum aquaticum</i>
<i>Python brongersmai</i>	<i>Myriophyllum spicatum</i>
<i>Python molurus</i>	
<i>Python regius</i>	
<i>Trachemys scripta</i>	
<i>Varanus indicus</i>	
<i>Varanus niloticus</i>	

Table 4. Species on which a full risk analysis has been carried out within the GEF-Invasive Species Project

1.1.7 Development and application of Inspection Tools for IAS that threaten biodiversity.

Since 2011, CONABIO has formally initiated collaboration with the Center for Agriculture and Biosciences International (CABI), collaboration, which has continued during the GEF-Invasive Species project, as the information collected by CABI has been an important data source for the NISIS (which seeks to keep information from reliable sources up-to-date). Given the magnitude of the work, CONABIO provides feedback to CABI on the species present in Mexico, as well as on those for which information is not available, so that CABI's work is complementary and does not duplicate efforts. The information of the NISIS is available at the portal Enciclovida <http://www.enciclovida.mx/exoticas-invasoras>), developed by CONABIO to provide updated information on all species to the public.

1.1.8 Development and testing of a model for mapping IAS flora

Researchers from the UNAM and UAM-X are working on a tool containing geographic information on the main invasive exotic plants in Mexico, at a scale of 1: 50,000 that includes the risk assessment associated to each species, human footprint, phylogenetic diversity and potential distribution. The tool has been tested in the Sierra Gorda Biosphere Reserve (SGBR) and El Cimatario National Park, both located in the state of Querétaro. In addition, a field manual has been prepared with information sheets for 53 species. Through this effort, the number of IAS identified in the state has increased by 26% to date since the tool was first tested. During the field trips, 10 previously unregistered species have been recorded within SGBR. As part of the collaboration with the Cadereyta Regional Botanical Garden, invasive exotic plants such as *Asphodelus fistulosus*, *Kalanchoe daigremontana* and *K. delagoensis* are being controlled.

1.1.9 Integrate information on IAS into the National Forest and Soils Inventory (INFyS).

The National System for Monitoring Biodiversity (SNMB) developed and implemented by CONABIO, CONAFOR, CONANP and the Mexican Fund for Nature Conservation (FMCN), provides quantitative and qualitative information on Mexico's ecosystems. This program had a pilot phase in 2015, however it officially started in August 2016; it counts 8,000 sampling points based on a grid throughout the country. As part of the collaboration, a catalog with species identification sheets for 23 IAS was included. Based on this catalog current information on their distribution is collected within the National Forest and Soil Inventory (INFyS), which is the basis of the SNMB (see Table 5). CONABIO, with support of academics from the Universities UAM and COLPOS, prepared the identification sheets to make it easier for the brigades to identify these species. Although plans have been made to develop five additional identification sheets over the span of the project, to date no additional sheets have been completed. The analysis of the data from the pilot phase in 2015, including the corresponding reports and photos, indicates 66 new records, 44 of which are clearly identified IAS. The commonly noted species that appear in these records are: giant reed (*Arundo donax*), water lily (*Eichhornia crassipes*), natal grass (*Melinis repens*) and monk orchid (*Oeceoclades maculata*). However, the tools to analyze and validate the records are still in development by the General Direction of international projects of CONABIO.



Scientific name	Commun Name
Insects	
<i>Cactoblastis cactorum</i> *	Cactus moth
Plants	
<i>Arundo donax</i>	Giant Reed
<i>Bassia scoparia</i>	Kochia, burning bush
<i>Bromus madritensis</i>	Compact brome, foxtail brome
<i>Carpobrotus</i> sp.	Hottentot fig
<i>Cyperus papyrus</i>	Papyrus
<i>Eichhornia crassipes</i>	Water hyacinth
<i>Hedera helix</i>	Ivy
<i>Lepidium draba</i>	Hoary cress
<i>Melinis minutiflora</i>	Molasses grass
<i>Melinis repens</i>	Natal grass
<i>Mesembryanthemum cristallinum</i>	Common iceplant
<i>Oeceoclades maculata</i>	Monk orchid
<i>Pennisetum clandestinum</i>	Kikuyu grass
<i>Pueraria</i> sp. (=montana lobata or phaseoloides*)	Kudzu
<i>Rottboellia cochichinensis</i>	Itch grass
<i>Salsola tragus</i>	Russian thistle
<i>Strizolobium pruriens/Mucuna pruriens</i>	Velvet bean
<i>Tamarix</i> sp.	Salt cedar
Mammals	
<i>Axis axis</i>	Indian spotted deer
<i>Myocastor coypus</i>	Coypu
<i>Sus scrofa</i>	Feral pig
Birds	
<i>Myiopsitta monachus</i>	Monk parkeet

*: species not present in Mexico

Table 5. List of IAS for which an identification sheet for the INFyS has been prepared.

1.1.10 Development of niche distribution models for 60 high-risk IAS under climate change scenarios.

Another important aspect for decision makers, necessary to identify the areas in the country most susceptible to invasion, has been the development of a modeling scheme under climate change scenarios, with the collaboration of researchers from UNAM. Current and future potential distribution under four different climate change scenarios in Mexico (REA 2050 and 2070, which is the ensemble of 15 General Circulation Models used by INECC, RCP, which is radiative forcing 4.5 low emissions and 8.5 high emissions) for 60 terrestrial high-risk invasive alien species (based on the invasiveness index of the analyses performed and compiled by CONABIO) were modeled (Figure 6). These maps help identify the highest risk areas of the country, as well as future trends regarding the distribution of these species, that

will help establish strategies to guide prevention efforts. However, INECC has just informed that the aforementioned models will no longer be used, so it is necessary to redo this exercise with new models.

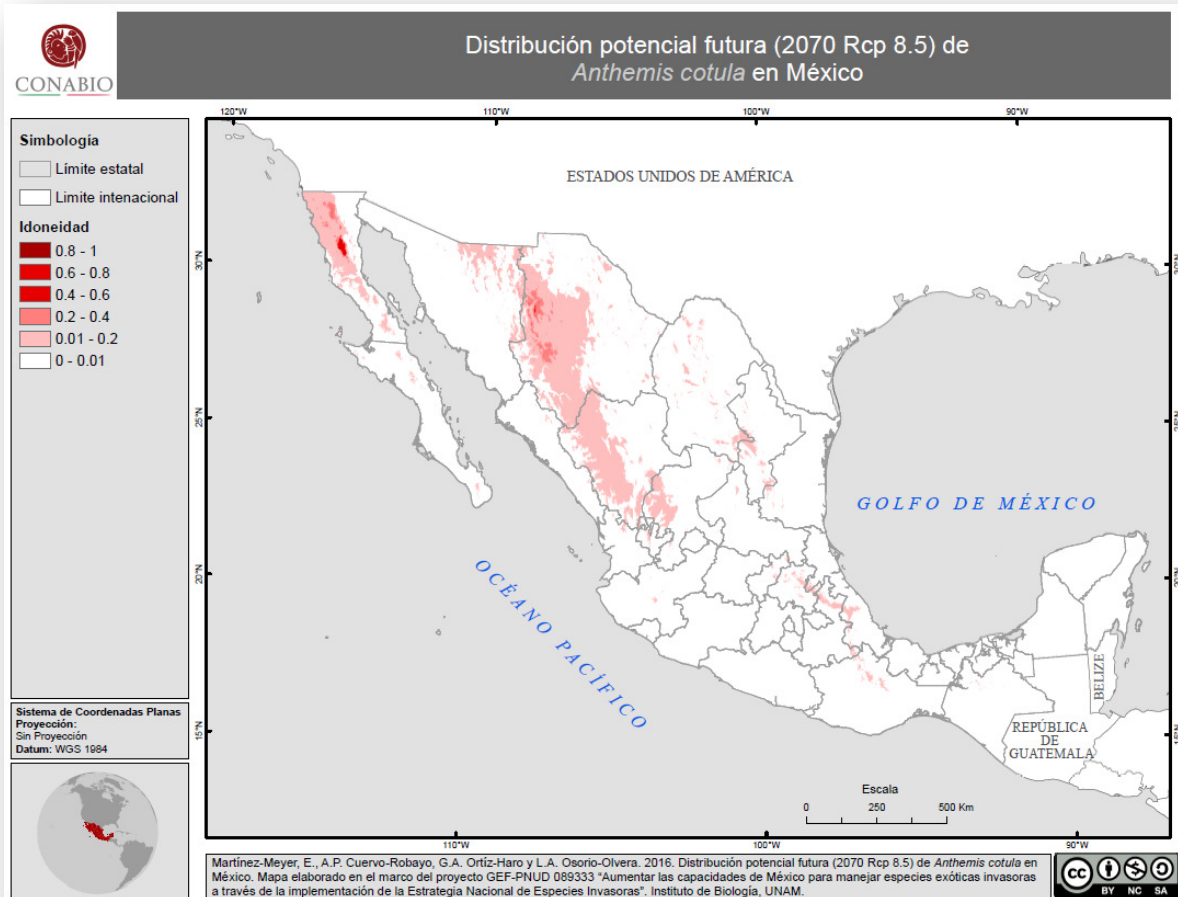


Figure 6. Example of the distribution maps obtained through ecological niche modeling for IAS (*Anthemis cotula*) based on the climate change scenario Rcp 8.5 for the year 2070).

1.1.11 Establish cost coefficients for different IAS management strategies in Mexico

This activity is scheduled for the last year of the project.

1.1.12 Develop economic models to estimate the costs to the Mexican economy of high-impact IAS

A capacity building on Cost-Benefit-Analysis (CBA) for IAS management projects for 17 professionals belonging to various institutions (CONAFOR, CONANP, CONABIO, CONAPESCA, UNAM, UABC, UAEM, UAM, ECOSUR, University of Quintana Roo, ITEC Oaxaca, GECI) has been completed. The training was

carried out in two face-to-face workshops, coupled with online counseling which was provided throughout the year by Landcare Research staff. Because of this training, the participants are working on nine specific case studies for the following species:

Red palm mite (<i>Raoiella indica</i>)
Mussels (<i>Corbicula fluminea</i> ; <i>Melanoides tuberculata</i> ; <i>Tarebia granifera</i>)
Lion fish (<i>Pterois volitans</i>)
Ornamental fish (in general)
Tilapia (<i>Tilapia cf. zillii</i>)
Suckermouth catfish (family Loricariidae)
Small mammals at islands (not yet specified)
Feral goats (<i>Capra hircus</i>)
Monk parakeet (<i>Myiopsitta monachus</i>)

Table 6. Case studies for the preparation of cost benefit studies related to IAS.

1.2. Enhancing the political, legal and regulatory framework and collaboration with the productive sector.

The work with the productive sector is directed to aquaculture, trade in ornamental fish, wildlife products and forest products, as key contributors regarding the introduction and spread of IAS in Mexico.

1.2.1 Draft regulations for control of IAS in productive sector operations.

This subcomponent highlights the legal study aimed at proposing legal improvements, necessary in forestry, aquaculture and fisheries, wildlife, invasive aquatic plants, genetically modified organisms that develop invasive behavior, electronic commerce and maritime transport, in order to strengthen the attention of IAS in Mexico. This study has multiple facets. First, it emphasizes “the appropriate and coordinated application, as well as on the alternatives to incentivize achieving the full provisions in force regarding IAS” (CESOP, 2017). Secondly, proposals were developed that require modifications of the legal system. In addition, the study proposes mechanisms for institutional collaboration and for the interpretation of existing regulations. By means of surveys, public servants responsible for applying measures, or with legal attributions in various aspects related to the management of invasive species were involved within the scope of their responsibilities as well as other involved actors; so that the proposals and recommendations developed were the product of practical and concrete problems faced during the implementation of the National Strategy on Invasive Species (CESOP, 2017).

1.2.2 Provide information, resources and training for improved IAS management to the private sector stakeholders, and to government agencies in the Wildlife and Forest sectors.

During 2015 and 2016, 266 inspectors of PROFEPA were trained in the recognition and detection of potential invasive species in forest products, as well as in the identification of exotic ornamental fish. Eight training workshops were carried out for 170 inspectors belonging to the Environmental Inspection Program for Ports, Airports and Borders (DGPAF) and four other workshops addressed to 97 Inspectors who perform Forest Inspection and Surveillance tasks (DGIFV), assigned to the 32 delegations of PROFEPA in the states, and central offices of the Deputy Attorney's Office of Natural Resources (Figure 7). Likewise, equipment (hygrometers and microscopes) was purchased to help in the detection.



Figure 6. Images of the IAS recognition and detection trainings. They have been carried out in different locations, for example, in Chetumal (DGPAF) (left) and with different topics such as identification and interception of aquatic IAS associated with international

In order to prevent, detect and reduce the risk of introduction, establishment, and spread of IAS, the Directorate General for Environmental Inspection in Ports, Airports and Borders of PROFEPA carried out 105,831 inspections of pallets and packaging for imports in 2016. As a result, of these inspections, 208 pest cases were detected, of which 68 were quarantine pests. During the 2016 season, 704,223 Christmas trees were inspected of which 30,887 were returned, as they were infested with pests. PROFEPA conducted a total of 239 forestry inspection visits to properties with notification of forest sanitation to verify compliance with the authorizations related to the extraction of infested wood and verify its proper management to avoid pest dispersion. Moreover, PROFEPA directed 177 inspections of companies that apply phytosanitary treatment to timber products in accordance with NOM-144 SEMARNAT 2012.

Likewise, CONAFOR already has compiled a Manual to identify the best reforestation practices in degraded forest ecosystems using native species, to help prevent the introduction of new exotic species. This manual provides guidance for the implementation of the national reforestation and soil restoration



program. A study is also being carried out in collaboration with CONAFOR to analyze the use of fire to manage invasive plants. Through CONAFOR, a system for monitoring points of entry or distribution (warehouses in ports and airports) into the country was established to detect the presence of invasive exotic forest pests. This system allows the integration of information regarding the identification, status, origin, recurrence and quantitative data of the insects that arrive alive at the ports of entry through international trade and prevent their introduction. In addition, CONAFOR has identified the environmental requirements with which a risk model has been developed for the five main hosts of two exotic forest pests (*Silex noctilio* and *Anoplophora glabripennis*), which are an important cause of mortality in forests (commercial plantations and natural forests) in the United States and Canada, and have a high potential for entry, establishment and spread in Mexico.

1.2.3 Provide information, resources and training for improved IAS management to private sector stakeholders and government agencies in the Aquarium Trade and Aquaculture Sector.

Representatives of CESAEM have participated in several events with talks on invasive alien species in aquaculture such as the *9th. State Conference on Science, Technology and Innovation 2015*, *2nd. Colloquium on teaching ethics, citizenship and sustainability* and the *Conference of aquatic organisms*.

During the two years of the project, various information materials have been developed, specifically for the aquaculture and ornamental fish sectors. In addition to those prepared in the Natural Resources Protection Area of Valle de Bravo, CONANP (see section 2.2.4), a leaflet on the threats of invasive aquatic species has been designed by FCEA and CONABIO. The Association of Fish Farmers of Mexico City, together with CONABIO and UNDP, created a poster to raise awareness among producers and users about the threat of escapes and releases of exotic fish into the natural environment (see also section 1.3.8).

In 2016, INAPESCA carried out a training on the Incident Command System for government personnel with the aim of developing a protocol in case of biological invasions in aquatic environments. This workshop was attended by 41 people from the following institutions SEMARNAT, CONAPESCA, INAPESCA, CONANP, CONABIO, SENASICA and PROFEPA (Figure 8). Based on a field test in the state of Morelos, a functional protocol should be available in 2018 (see also section 1.3.3.).



Figure 7. Group photo of the workshop participants.

1.2.4 Implement IAS biosecurity pilot activities with the Aquaculture Sector of the State of Morelos.

Throughout 2015 and 2016, the data from the *Register of ornamental fish producers in the state of Morelos* have been updated, incorporating biosecurity data for 50 of the production units, in order to prepare ad hoc Biosecurity Plans for different types of farm. Likewise, an Inventory of the species of ornamental fish produced in the state in 2016 has been prepared, as well as a Catalog of all ornamental fish farmed (Figure 9). A map with the location of all the units is available, where each of the species is bred. This information has been shared in meetings convened by the Project Coordinating Unit, or by CESAEM, with actors from the academia dedicated to the subject, the productive sector, and state and federal government institutions (including the Secretary of Environment of the state of Morelos), in order to strengthen inter-institutional collaboration on these species.



Figure 8. Image of one of the species included in the ornamental fish catalog of the state of Morelos.

1.2.5 Outreach to State-level authorities and productive sector stakeholders on IAS threats, new controls and regulations, and incorporating IAS planning in to institutional planning:

Following-up on what was mentioned in the previous point, the project is collaborating also with the Ministry of the Environment of the state of Morelos since its State Study on Biodiversity is being revised and updated; This will allow to better deal with IAS. The Invasive Alien Species Department of CONABIO as well as the PCU did collaborate with the state study on biodiversity of Mexico City, published at the end of 2016.

During the Second National Meeting on State Biodiversity Strategies held in Boca del Río (Veracruz) in January 2016, outreach activities were carried out regarding the National Strategy on Invasive Species.

1.3. Improvement of inter-institutional coordination mechanism to prevent, detect y reduce the risk of introduction, establishment and dispersion of IAS

1.3.1 Draft revised and harmonized existing laws / regulations related to IAS management.

To date, the publication of invasive alien species list regulated by SEMARNAT (DOF 2016) stands out.

1.3.2 Institutional structures strengthened / established to facilitate inter-institutional coordination for overall IAS management.

In order to establish a more robust coordination, participatory planning and a monitoring mechanism for the management of IAS in the country, three Committees were established through the project: A Scientific, Executive and Technical Committee. As of March 31, 2017, three meetings of the Scientific Committee, three of the Executive Committee and one of the Technical Committee have been held. The Executive Committee consists of high-level representatives from the following institutions SEMARNAT, SAGARPA-SENASICA, CONANP, CONABIO, CONAFOR, CONAGUA, CONAPESCA and INECC and acts as a coordination body among these institutions to discuss IAS issues of common interest (Figure 10). The Technical Committee, involves personnel from these institutions that work directly with IAS and some other federal government entities (PROFEPA and INAPESCA), as well as representatives of the productive sector (Ornamental Fish Association), of civil society (Grupo de Ecología y Conservación de Islas - GECl /Group of Ecology and Conservation of Islands) and of the State Government of Morelos. The Scientific Committee, consists of five renowned scientists who have contributed in different fields of knowledge and in particular in topics related to IAS; It reviews the quality of the products compiled by the project and makes recommendations to align the work of the project with the NSIAS. This report is one of the outputs of the work of the Scientific Committee.



Figure 9. Image of the High-level Committee meeting of the project, which took place the 17, of February 2016 in Mexico City.

1.3.3 Institutional Coordination to prevent the entry and spread of IAS in Mexico through protocol for taxonomic group or pathways at strategic entry points.

As a first step to establish effective and timely interagency coordination regarding IAS management, the project held meetings with representatives of government institutions involved as part of the committees work (see above 1.3.2) to define and develop standardized protocols for: 1) communication



procedures and protocols to respond to new biological invasions and other urgent IAS management issues; 2) outlining and coordination of institutional responsibilities and exchange of contact information for key personnel of each institution; and 3) mechanisms to exchange information in current and potential joint initiatives. Another activity contributing to this output is the above-mentioned training, held at the end of 2016 for government personnel on the Incident Command System (see 1.2.3).

1.3.4 Strengthen the country's capacity for Early Detection and Rapid Response (EDRR) systems for IAS.

Linked to points 1.3.3 and 1.3.7, the development of this point is foreseen throughout 2017. However, CONAFOR already has established a collaboration framework with SENASICA, through the Forest Health Network, to monitor the presence of ambrosial insects and exchange information about them.

1.3.5 Development and application of financial mechanism to support IAS management.

A study proposing economic and financial instruments (EI) to reduce the risk of intentional introductions of invasive alien species was prepared by Laura Saad. From there, meetings have been held with different institutions (INECC, SHCP and SEMARNAT) in order to develop some of these proposals throughout 2017. In addition, the results have been presented and discussed in the different Committees.

1.3.6 Budgetary coordination between sectors to ensure coherent investments and actions to address threats cost efficiently

This point will be analyzed by the High-level Committee.

1.3.7 Establish harmonized standards and training programs for IAS management across key institutions.

The project evaluated the necessary skills and training required for the staff of key institutions (including PROFEPA, SAGARPA-SENASICA, CONANP, CONAFOR, among others) in IAS management using the surveys, interviews and analysis conducted regarding institutional responsibilities and roles. Based on this analysis, the project developed as a first step towards the training standards to be implemented in the offices and in the field, a general online training divided in 5 modules, addressing the following topics: I. Invasive species: processes, impacts and situation in Mexico, II. Main groups of invasive species in Mexico 1, III. Main groups of invasive species in Mexico 2, IV. Comprehensive strategic design of programs for the prevention, control and eradication of invasive species and V. Legal framework, public policies and strategic alliances to attend invasive species (see also 1.3.8). IMTA developed specific training standards and tools for the prevention, detection and management of invasive aquatic plants through biological control.

1.3.8 Implement education and awareness campaigns on IAS for policymakers, private landowners, NGO, volunteer groups and the general public.

In addition to the products already discussed in section 1.2.3, the dissemination of the aquatic exotic species subject was continued through the platform “Our water” (<https://app.agua.org.mx/>) of the water portal, with the collaboration of the FCEA. The director of the organization has conducted various radio events to disseminate these issues. Likewise, environmental education activities have been carried out in six schools in the state of Veracruz, in which 93 teachers and 4,159 students participated (Figures 11 and 12). On the other hand, throughout 2014, CONABIO developed outreach material during the preparatory phase of the project, such as stickers, magnets, and luggage tags among others, which were distributed in all the events of 2015 and 2016 in which project staff participated.



Figure 10. Examples of school work focused on EEI in primary schools of Veracruz (Photos: FCEA).

With regard to the matter of training, it should be noted that the Invasive Alien Species Department of CONABIO has organized several training events for students of the UAM for the use of the Rapid Invasive Risk Assessment Method (MERI). Another important achievement is the Online Diploma "Fundamentals for the Prevention, Management and Eradication of Invasive Alien Species", whose platform was developed with funds from the Fish and Wildlife Service of the United States Government (USFWS). This training was given to decision makers and technicians of CONANP at the national level (see 1.3.7). In the context of the collaboration with the Regional Botanical Garden of Cadereyta, academics from the UAM conducted environmental education talks to three groups of visitors.



Figure 11. Children participating in summer school in the botanical garden of Cadereyta, Querétaro. Photo: Jatziri Delgado, July 2016.

2.1. Strengthened prevention and control of key IAS populations in six key groups of islands: Isla Guadalupe, Espíritu Santo, Isla Socorro, Arrecife Alacranes, Banco Chinchorro and Archipiélago San Benito.

Activities carried out by the civil society organization Ecology and Island Conservation Group (GECI) S.C. through a collaboration agreement.

2.1.1 Establish and maintain Island Biosecurity programs.

Significant progress was made with regard to the objective of developing the biosecurity plan (PBI) for the islands, since there are very advanced drafts for: RB Isla Guadalupe, RB Revillagigedo Archipelago (Isla Socorro), APFF Gulf of California Islands (Isla Espiritu Santo), RB Banco Chinchorro and PN Arrecife Alacranes. During 2016, two workshops were held to review and update the Insular Biosecurity Protocols (PBI) of the Revillagigedo Archipelago and Isla Espiritu Santo in a participatory manner. Likewise, the base document was developed by means of which the Insular Biosafety Committees (CBI) will be formed. Within the Advisory Board of the Revillagigedo Archipelago Biosphere Reserve (RBAR), which includes Isla Socorro, the Special Commission for Biosafety was created, composed of nine representatives from all sectors involved in the area.

2.1.2 Implement education and training to support IAS management.

During these two years of the Project, GECI has held several talks about biosecurity with a wide variety of stakeholders of the islands, island communities, SEMAR detachments or the general public. Specifically, with the personnel of SEMAR located at the Isla Guadalupe detachment, monthly biosafety talks are held, reaching a total of 120 marines. Two talks were also held in the detachment of Cayo Norte Mayor (Banco Chinchorro) and Isla Pérez (Arrecife Alacranes), with an attendance of 20 people each.

Regarding outreach material, GECI designed and produced a great diversity of products (Figure 13) (brochures, stickers, games, posters) for the islands Guadalupe, Espíritu Santo, Revillagigedo Archipelago and Banco Chinchorro. GECI also produced two educational videos: "*San Benito Archipelago: a symphony for sea birds*" and "*Islands of Art and Life*". Signposting was done for Banco Chinchorro and designed for Guadalupe and Arrecife Alacranes.



Figure 12. Infographic on insular biosecurity mechanisms, Grupo de Ecología y Conservación de Islas/ Ecology and Island Conservation Group, A.C.

2.1.3 Implement targeted high priority IAS Control & Eradication programs.

At the end of 2016, the objectives were achieved for the feral cat eradication project (*Felis catus*) in Banco Chinchorro, of the black rat (*Rattus rattus*) (Figure 14) and feral cat in Cayo Centro (Banco Chinchorro) and of mice (*Peromyscus eremicus cedrosensis*) in San Benito West Island. Likewise, on Socorro Island, after an effort of more than 50,000 trap-nights since 2011, 502 feral cats have been captured (139 during the two years of the GEF project); a fact that implies a reduction of more than 90%

of the feral cat population on the island. In Isla Espíritu Santo, the eradication of feral cat is in the final phase of confirmation of absence, since in 2016 only two cats were put down with a trapping effort of 1,042 nights /trap. Meanwhile, Isla Guadalupe has captured 552 cats in the two years of the project. The abundance indicators of this species show the downward trend of this feral population, although there are still some years to go to confirm the absence of cats on the island. On Isla Espíritu Santo, the eradication of feral goats has advanced by 30% by extracting 187 live goats from the island during 2016, which were donated to local universities and ranchers. Finally, GECl is working also on the baseline to learn about plant communities in Arrecife Alacranes in order to plan the eradication of invasive alien plants.



Figure 13. Conclusion of the eradication of the black rat in 2015 in Cayo Centro of the Banco Chinchorro Biosphere Reserve, the largest wet tropical island where this species has been eradicated. ©Archive GECl/ J.A. Soriano.

2.1.4 Establish and maintain monitoring programs to ensure effectiveness of biosecurity and IAS control and eradications efforts.

During the two years of the project, monitoring of native fauna, especially of seabirds, was carried out to verify the effects of the eradication or control of IAS on isla Guadalupe, Socorro, Arrecife Alacranes, Banco Chinchorro and San Benito West, achieving very significant results for some species such as the Laysan albatross on Isla Guadalupe or the black-vented shearwater of Revillagigedo and the endemic lizards of Isla Socorro (see table 7 and figure 15). Likewise, the effectiveness of the eradications already completed is evaluated, verifying that there are no new invasions. In one case, on Espiritu Santo Island, a cat was detected with the early detection systems established, which immediately lead to its capture.

Isla Guadalupe
Laysan Albatros (<i>Phoebastria immutabilis</i>)
Guadalupe Murrelet (<i>Synthliboramphus hypoleucus</i>)
Leach's Storm-petrel (<i>Oceanodroma leucorhoa</i>)
Black-vented shearwater (<i>Puffinus opisthomelas</i>),
Cassin's Auklet (<i>Ptychoramphus aleuticus</i>)
Arrecife Alacranes
Crabs
Reptiles
Masked Booby (<i>Sula dactylatra</i>)
Brown Noddy (<i>Anous stolidus</i>)
San Benito Oeste
Least Storm-petrel (<i>Oceanodroma microsoma</i>)
Isla Socorro
Flora
Terrestrial birds
Socorro island tree lizzard (<i>Urosaurus auriculatus</i>)
Banco Chinchorro
Crabs
Reptiles

Table 7. Native species, which benefited from the activities of IAS eradication on islands and object of population monitoring in the context of the project.



Figure 14. Thematic blanket elaborated to illustrate the restoration activities carried out on Isla Guadalupe. ©Archive GECI/J.A. Soriano.

2.2. Enhanced IAS surveillance and control strategies reduce introduction rates from productive landscapes and contain populations below threshold that endanger endemic species and their habitats at nine mainland protected areas.

2.2.1 Develop baseline information necessary for effective IAS management planning.

To date, work has been done in collaboration with CONANP to establish baseline information and management plans for five priority IAS in the NPA Cumbres de Monterrey; three priority species in the Vizcaíno Biosphere Reserve and one in APFF Sierra de Álamos-Río Cuchujaqui (see table 7). Thus, the objective with regard to updating the lists of IAS present in the PA and having management plans in these areas was partially fulfilled. It should be highlighted, that the 3 management plans prepared for the El Vizcaíno Biosphere Reserve for the ice plant (*Mesembryanthemum crystallinum*) (Figure 16), the American bullfrog (*Lithobates catesbeianus*) and the red belly tilapia (*Tilapia zillii*), are products that can serve as examples for other PA. Likewise, a base line study of IAS in the BR Los Tuxtlas is being prepared, which will also provide the management plan for five additional invasive alien species that will be defined according to the results of the study.

Cumbres de Monterrey	El Vizcaíno
Glossy privet (<i>Ligustrum lucidum</i>)	Ice plant (<i>Mesembryanthemum crystallinum</i>)
Golden raintree (<i>Koelreuteria paniculata</i>)	American bullfrog (<i>Lithobates catesbeianus</i>)
Gigant reed (<i>Arundo donax</i>)	Redbelly Tilapia (<i>Tilapia zillii</i>)
Mother of millions (<i>Kalanchoe xhoughtonii</i>)	
Tree tobacco (<i>Nicotiana glauca</i>)	
Sierra Álamos	
Salt cedar (<i>Tamarix ramosissima</i>)	

Table 8. Species for which a baseline study was done in three continental PA.

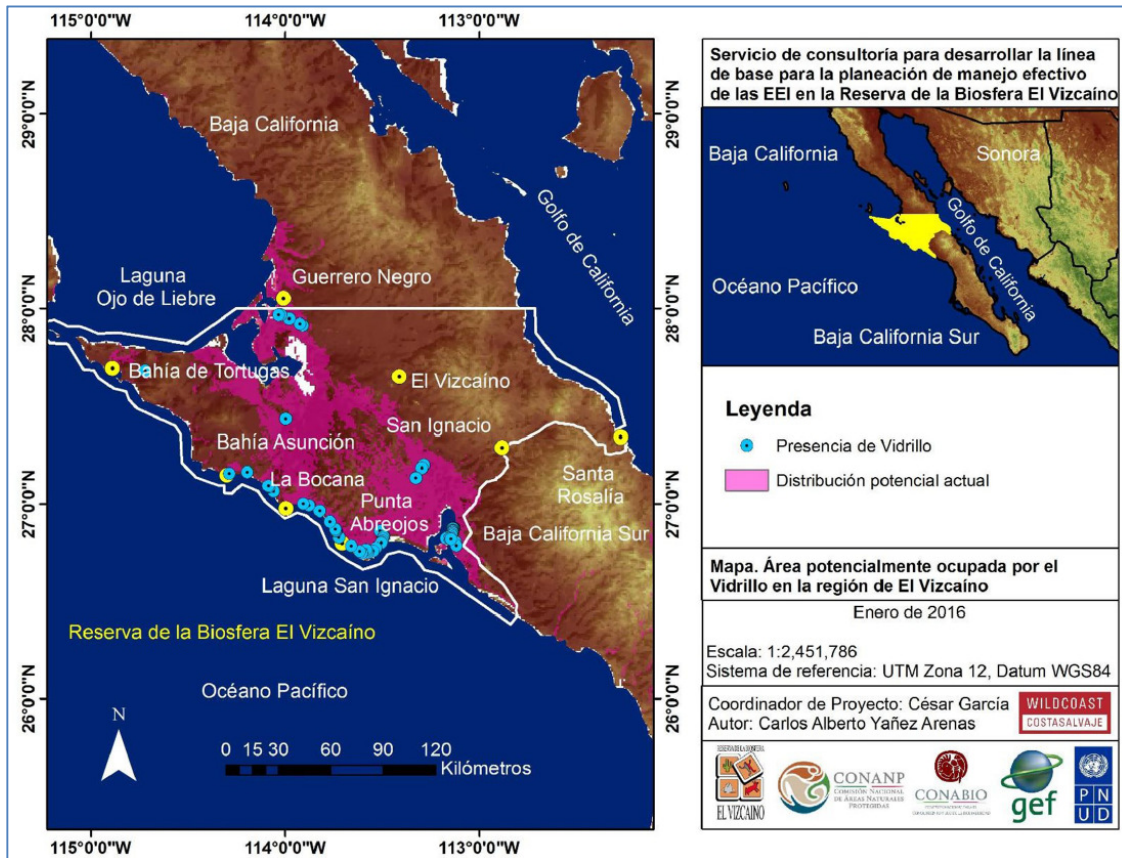


Figure 15. Example of a potential distribution map of the ice plant (*Mesembryanthemum crystallinum*) in the El Vizcaíno Biosphere Reserve.

2.2.2. Strengthen IAS management capacities and processes for landscapes within and surrounding mainland Protected Areas.

In mid-February 2017, the Sub-Council of IAS is constituted in the Los Tuxtlas Biosphere Reserve. Including this one, there are already three PA that have, formally, this figure as it is added to the already existing one for the BR Marismas Nacionales and NP Cumbres de Monterrey. For 2017, it is expected, that two more will be constituted in the APFF of Sierra Álamos and Tutuaca. Until this does occur, the work on IAS is attended in all areas through the Advisory Councils, in cases where they are in operation. Likewise, in the Cumbres de Monterrey National Park, six training workshops were held for the rural communities within the park and surrounding urban areas on issues related to IAS. Finally, in the Los Tuxtlas Biosphere Reserve, three awareness and capacity building workshops were held for personnel of the brigades, representatives of the productive sectors of the Reserve and public institutions. In total, 57 people were trained.

2.2.3 Introduce best practices in IAS management in targeted production sectors to reduce IAS spread.

In the Biosphere Reserves Marismas Nacionales of Nayarit and El Vizcaíno, Good Practice Plans focused on livestock activities have been prepared. In the first case, the activity of the cattle farmers was studied and a livestock reconversion plan was expanded with concrete proposals so that the cattle do not feed on the mangroves during the dry season. In the second case, a plan of good practices for goat farming was developed in order to reduce livestock pressure on the native vegetation of the Reserve. For 2017, the implementation of a pilot plan is foreseen for each of these areas, where the effectiveness of the good practice plans will be assessed as defined in the objectives of the project. These two projects both the baseline study and the capacity building in good practices, have been carried out with the active participation of farmers. In total, 72 farmers have been trained.

Likewise, almost finished drafts are available of the baseline study for cattle and trout farming in the municipalities of Ixtapan del Oro and Santo Tomás de los Plátanos, in the first case and Amanalco, in the second. All taking place within the APRN of Valle de Bravo.

2.2.4 Increase community awareness and participation in IAS management in and around mainland PA sites.

To date, outreach materials have been prepared for the identification of IAS, and awareness of their problems, in the APFF Sierra de Álamos-Río Cuchujaqui and the APRN in Valle de Bravo. In total, outreach materials (posters, postcards, bills and banners) focused on the following ten IAS and two feral species were elaborated:

Valle de Bravo
American dodder (<i>Cuscuta americana</i>)
Broadleaf cattail (<i>Typha latifolia</i>)
Giant reed (<i>Arundo donax</i>)
Eucalyptus (<i>Eucalyptus</i> sp.)
Red-eared slider (<i>Trachemys scripta elegans</i>)
Monk parakeet (<i>Myiopsitta monachus</i>)
Paloma turca (<i>Streptopelia decaocto</i>)
Feral dog (<i>Canis familiaris</i>)
Feral cat (<i>Felis catus</i>)
Sierra de Álamos
Salt cedar (<i>Tamarix ramosissima</i>)
Black rat (<i>Rattus rattus</i>)
Natal grass (<i>Melinis repens</i>)



Table 9. Species for which outreach material has been designed for the PA.



Materials are also produced in Valle de Bravo, on good practices in forestry, livestock and fish farming. Likewise, work is currently being done in the National Parks of Cañón del Sumidero and Cumbres de Monterrey, designing various outreach material such as posters, postcards, bills and games.

2.2.5 Develop and implement Biosecurity programs (Prevention, Early Detection and Rapid Response) at selected mainland PA sites.

The objective of developing a protocol for an early detection and rapid response system (DTRR) in the Sumidero Canyon National Park was reached. This protocol also includes a hazard analysis of critical control points (HACCP) and covers the following species or groups of species: exotic grasses (*Cynodon nlemfuensis*, *Melinis repens* and *Hyparrhenia rufa*), exotic hydrophytes (*Eichhornia crassipes* and *Pistia stratiotes*), ear turtle red (*Trachemys scripta ssp. elegans*) and devil fish (Fam. *Loricariidae*).

On the other hand, a study of pathways has been started, with the presentation of the work plan. It includes the elaboration of a DTRR protocol for three species in the BR Marismas Nacionales de Nayarit. These are the giant reed (*Arundo donax*), the buffel grass (*Cenchrus ciliaris*) and the zopilote gut (*Cissus sicyoides*; synonym: *C. verticillata*).

2.2.6 Implement targeted IAS Control, Eradication and Monitoring at selected mainland PA sites.

In the Cañón de Sumidero National Park, the campaigns to prevent the entry of IAS and the sterilization of dogs and cats of private pet owners in the surrounding areas have continued. These campaigns have resulted in the capture of 17 dogs and 9 cats in the last three years, as well as the sterilization of 215 dogs and 83 cats belonging to the communities close to the Park. In addition, the legal formalities have been initiated for the control of 5 hectares of Jaragua grass (*Hyparrhenia rufa*) on the banks of the Grijalva River, in an area that had suffered a wild fire years ago. In the APFF Sierra de Álamos-Río Cuchujaqui, the salted cedar has been completely eliminated in 6.6 ha, additionally the distribution of the remaining plants in the PA has been mapped to plan future control campaigns. In the same area, the project to diagnose the extension of the populations of Natal grass (*Melinis repens*) and to control this species in 10 ha has initiated. Also, in the Cumbres de Monterrey National Park control actions are being carried out for Glossy privet (*Ligustrum lucidum*), Golden raintree (*Koelreuteria paniculata*), giant reed (*Arundo donax*) and mother of millions (*Kalanchoe × houghtonii*) (Figure 17). Additionally, it has been planned to eliminate the princess vine (*Cissus sicyoides*) in 5 ha of mangrove from the BR Marismas Nacionales de Nayarit. The species is native to Mexico, but not native to this area, and causing great problems of survival to the mangroves of the reserve.



Figure 16. Example of giant reed control activities in Cumbres de Monterrey (left) and salt cedar in Sierra de Álamos (right) Pronatura Noroeste A.C. 2016.

2.2.7 Undertake Ecosystem Restoration in areas negatively impacted by IAS.

So far, no specific projects have been developed in this line of action; however, some of the projects contemplated in the previous section include some restoration actions. This would be the case, for example, of the Jaragua grass control project in the Cañón del Sumidero NP, which contemplates restoration efforts with nine native species of riparian vegetation.



5. Progress of indicators

IMPACT INDICATORS (Objectives already achieved are marked in green color)

Id.	Indicator	Baseline	Objective	2016	
				Dic.	Obs.
0.a	Strengthened national level invasive species management framework, measured by an increase in total score of the IAS TT:	Scores at Start of Project: 8	Scores of Tracking tool at End of Project: 25	11	
0.b	Strengthened national capacities for IAS management ⁵ , as measured by the UNDP Capacity Development Scorecard	Average score on Capacity Development Scorecard: 43	Average score on Capacity Development Scorecard by end of project: 76	47	
0.c	Supporting framework for implementation of the National Strategy on Invasive Species (NSIS), as measured by: National (federal and state level) and international institutions (government, NGOs & Universities) involved in the implementation process of the NSIS.	# of official institutional partners involved in IAS management in Mexico: 8 governmental institutions, 3 Universities, 2 NGOs, 1 State level organization.	1 additional institutional partner becomes involved in IAS management each year of the project	↑↑	Work is under way on the incorporation of SENASICA and CONAGUA. Also with an association of fish farmers of the CDMX, with the TEC of Monterrey, the Institute of Economic Studies of the UNAM. Collaboration established with other GEF-projects (BIOFIN and Resilience)

Id.	Indicator	Baseline	Objective	2016	
				Dic.	Obs.
0.d	Supporting framework for implementation of the National Strategy on Invasive Species (NSIS), as measured by: Cost effectiveness of IAS management actions	No consolidated information on the costs of different IAS management strategies (prevention, response, control, etc.) in Mexico, or how costs differ in varying ecological / logistical conditions	· Cost coefficients, based on IAS management activities carried out at selected project field sites, developed and guiding priority setting of NSIS goals / activities by end of project	=	Activity to be carried out in 2018
0.e	Entry and spread of IAS into 15 islands (6 island groups) reduced through biosecurity inspections of goods/persons who arrive at the islands by air/sea	0% of goods and persons arriving at islands are subject to biosecurity inspections	<ul style="list-style-type: none"> • 100%: Guadalupe, Socorro, Banco Chinchorro. • 50%: San Benito, Espíritu Santo. • 25%: Arrecife Alacranes. 	↑	There are PBS drafts for Guadalupe and Socorro. Workshops have been held in La Paz and Ensenada and the Biosafety Commission of Revillagigedo was established.

Id.	Indicator	Baseline	Objective	2016	
				Dic.	Obs.
0.f1	<p>Populations of key IAS contained to below thresholds that endanger native species and their habitats, providing additional protection to at least⁶:</p> <ul style="list-style-type: none"> · 155 endemic species, and 168 species of flora and fauna classified under NOM-059⁷, at 15 islands (6 island groups) totaling 46,420 hectares · 191 endemic species, and 983 species of flora and fauna classified under NOM-059, at 9 mainland protected areas totaling 4,240,349 hectares 	Populations of selected high impact IAS at sites (low, medium, high; estimates will be validated during year 1 of the project):	Populations of selected high impact IAS at sites by end of project:	0	Population eradicated
0.f2		<ul style="list-style-type: none"> • Feral cats (<i>Felis gatus</i>) on Isla Guadalupe, Isla Espiritu Santo, Isla Socorro and Banco Chinchorro - Medium 	• 0	↑↑↑	Guadalupe: Low 549 feral cats eliminated Socorro: Low 95% of the cats eradicated
0.f3		Mice (<i>Peromyscus eremicus cedrosensis</i>) on San Benito Archipelago – High	• 0	0	Population eradicated
0.f4		Feral goats (<i>Capra hircus</i>) on Isla Espiritu Santo - Medium	• 0	↑↑	187 goats captured (30% progress made)
0.f5		Black rats (<i>Rattus rattus</i>) on Banco Chinchorro – High	• 0	0	Population eradicated
0.f6		Vidriillo (<i>Mesembryanthemum crystallinum</i>) at El Vizcaíno Biosphere Reserve – High	• Medium	↑↑	Baseline and management plan ready
0.f7		Pacific Oyster (<i>Crassostrea gigas</i>) at El Vizcaíno Biosphere Reserve - Medium	• Low	↑↑	Specie substituted by tilapia (<i>Oreochromis niloticus</i>) y american bullfrog (<i>Lithobates catesbeianus</i>). Baseline and management plan ready

Id.	Indicator	Baseline	Objective	2016	
				Dic.	Obs.
0.f8	Populations of key IAS contained to below thresholds that endanger native species and their habitats, providing additional protection to at least ² : <ul style="list-style-type: none"> 155 endemic species, and 168 species of flora and fauna classified under NOM-059⁹, at 15 islands (6 island groups) totaling 46,420 hectares 191 endemic species, and 983 species of flora and fauna classified under NOM-059, at 9 mainland protected areas totaling 4,240,349 hectares. 	Black rats (<i>Rattus rattus</i>) at the APFF Sierra de Álamos-Río Cuchujaqui – High	• Medium	=	No progress made so far
0.f9		Salt cedar (<i>Tamarix ramosissima</i>) at the APFF Sierra de Álamos-Río Cuchujaqui – High	• Medium	↑	118 trees extracted which represents 4.32 % of the treated area in Uvalama y 5.69 in El Mentidero
0.f10		Giant Cane (<i>Arundo donax</i>) (90 hectares) and Chinese Privet (<i>Ligustrum lucidum</i>) (120 hectares) at the Cumbres de Monterrey National Park – Medium	• Low	↑	30 ha of giant reed controlled (1/3) and 25 ha of Chinese privet (21%). Additionally, 10 ha of goldenrain tree (<i>Koelreuteria paniculata</i>), 5 of Tree Tabaco (<i>Nicotiana glauca</i>) y 15 of mother of millions (<i>Kalanchoe</i> sp.).
0.f11		Feral dogs (<i>Canis lupus familiaris</i>) and feral cats (<i>Felis gatus</i>) at the Cañón del Sumidero National Park – High	• Low	↑↑	17 feral dogs and 9 cats captured since 2014
0.f12		Lionfish (<i>Pterois volitans</i>) at the Sian Ka'an Biosphere Reserve - Medium	• Low	=	No progress made so far

Note: ↑ indicates 25%; ↑↑ indicates 50%; ↑↑↑ indicates 75 %, field marked in green color indicates 100% of progress.

RESULTS FRAMEWORK: OUTPUTS (Objectives already achieved are marked in green color)

ID	Indicator	Baseline	Objective	2016	
				Dic.	Obs.
Component 1: National Frame of IAS management					
1.a	% of species being imported into Mexico for the first time that have a risk analyses (for potential impacts on biodiversity)	0	100%	100% con MERI 22% with full RA	List published in the DOF the 7. December. All of the species listed have a MERI. 75 of these have a full RA
1.b	Effective biosecurity systems at productive sector facilities, including: nurseries, breeding ponds / farms, distribution centers, UMAs and PIMVS ¹⁰	0	10 productive sector facilities that deal in IAS with potential impacts on biodiversity applying Hazard Analysis and Critical Control Points (HACCP) systems and/or implementing improved IAS management technologies by the end of the project	↑	Biosecurity indices for 50 farms. Work going on regarding the proposal for the biosecurity plan
1.c1	Regulations under existing legislation to strengthen management authority over IAS that impact biodiversity (laws / regulations that might need to be revised / strengthened include): <ul style="list-style-type: none"> • Ley General de Vida Silvestre • El Sistema Nacional de Sanidad, Inocuidad y Calidad Agropecuaria y Alimentaria (SENASICA) • Ley Federal de Derechos (LFD) • Leyes y reglamentos de vida silvestre, forestal y acuícola Ley Orgánica de la Administración Pública Federal (LOAPF) 	N	Regulations for management of IAS that impact biodiversity in wildlife, forestry and fisheries are drafted by the end of the project	↑↑	Draft of legal study was presented, nearly finished.

ID	Indicator	Baseline	Objective	2016	
				Dic.	Obs.
1.c2	Modifications of the Forest law to strengthen the authority in the management of IAS	No	Proposals for modification exist		
1.c3	Modifications of the Law for Fisheries to strengthen the authority in the management of IAS	No	Proposals for modification exist		
1.c4	Modifications of the Law for Agriculture to strengthen the authority in the management of IAS	No	Proposals for modification exist		
1.c5	Modifications of the Federal Law of Rights to strengthen the authority in the management of IAS	No	Proposals for modification exist		
1.c6	Modifications of the Organic Law for Public Administration (LOAPF) to strengthen the authority in the management of IAS	No	Proposals for modification exist		
1.c7	Modifications of regulations to improve IAS management	0	Proposals for modification exist		
1.d	% of inspectors at points of entry or other inspection sites within Mexico are trained in use of the National List of Invasive Species or in protocols to prevent the introduction/spread of IAS that impact BD	0	> 90%	95%	170 inspectors of the Depart. for Harbor and airports and 97 of the Dept. for Natural Resources inspection
1.e	Early Detection and Rapid Response (EDRR) systems for IAS that impact biodiversity	0	DTRR developed and implemented for 2 IAS (<i>Cactoblastis cactorum</i> y <i>Dreissena polymorpha</i>)	=	No progress made yet
1.e1	Protocols Early Detection and Rapid Response (EDRR) for 2 IAS. Phase 1 developed: Detection of the specie and area of distribution defined	No	For the 2 IAS	=	No progress made yet



ID	Indicator	Baseline	Objective	2016	
				Dic.	Obs.
1.e2	Protocols Early Detection and Rapid Response (EDRR) systems for 2 IAS. Phase 2 developed: Generation of the rapid response mechanism	No	For the 2 IAS	=	No progress made yet
1.e3	Protocols Early Detection and Rapid Response (EDRR) for 2 IAS. Phase 3 developed: validation of the success of the system or preparation of more studies	No	For the 2 IAS	=	No progress made yet

Note: ↑ indicates 25%; ↑↑ indicates 50%; ↑↑↑ indicates 75 %, field marked in green color indicates 100% of progress.

ID	Indicator	Baseline	Target	2016	
				December	Obs.
Product (Output) 1.1: Decision making tools aimed at informing cost effective management decisions to address IAS threats in key landscapes and key sectors (aquarium trade, aquaculture, trade of wildlife and forest products)					
1.1.a	Extent of data in the National Invasive Alien Species Information System (NIASIS)	<ul style="list-style-type: none"> · 50,000 records · 381 species · 415 rapid assessments · 157 information sheets 	<ul style="list-style-type: none"> · 40% increase in the contents of data base (records, species, rapid assessments, and information sheet 	295% increase records 14% # IAS 20% assessments	<ul style="list-style-type: none"> · 197,785 records · 432 IAS · 492 rapid assessments · 157 information sheets
1.1.b	Agreed upon common protocols for priority species adopted by IAS management institutions, about harmonized protocols among IAS management institutions for carrying out risk analyses to identify highest risk species/pathways, or collecting and exchanging information.	0	3	↑	A workshop is held to establish a coordinated action protocol on biological invasions in the aquatic environment
1.1.c	Management plans for invasive species that have been identified as high priority for impacts on Biodiversity	0	15 management plans for high priority species identified in the approved NLIS developed and in operation	=	No progress made yet
1.1.d	Capacity to plan for IAS impacts in the fact of potential climate change	Lack of information on possible impacts of climate change on dispersion of IAS	Niche models developed on dispersion of 60 high risk IAS under climate change scenarios by end of year 2	60	Maps prepared for 60 species (present and 4 future scenarios)

ID	Indicador	Baseline	Target	2016	
				Dicember	Obs.
Product (Output) 1.2: Sectorial guidance and regulations in place to strengthen the control of main pathways of IAS to vulnerable areas					
1.2.a	Improved management of IAS in productive sectors of ornamental fish, aquaculture and nursery plant by authorities in Morelos State	No	Yes for the 3 sectors	↑	The catalog of ornamental fish producers and the inventory of species produced are available, as well as a biosecurity index for 50 farms
1.2.b	Productive sector industry standards/codes for management of IAS that may impact biodiversity	No	Yes	=	No progress made yet
1.2.c	Include IAS in biodiversity strategies at State level	6	· All State-level Biodiversity Strategies include the subject of IAS and have at least one objective referring to the issue	8	Presented the new EnBioMex

ID	Indicator	Baseline	Target	2016	
				Diciember	Obs.
Product 1.3: Multi-sectorial institutional framework in place to implement National Strategy on Invasive Species (NSIS)					
1.3.a	Oversight and coordination structures for implementation of the NSIS	0	· 3 committees (High-Level; Scientific; Technical) are officially established to guide implementation of the NSIS, with operating guidelines and authority, by the end of year 1	3	3 Committees are constituted
1.3.b	· Institutional protocols for the principle pathways for introduction and spread of IAS that impact biodiversity	· Systems to identify and control pathways for IAS introduction and spread are focused only on IAS with potential impacts on economic activities (agriculture, forest products, wildlife)	· By the end of the project, 5 protocols for taxonomic groups or pathways at strategic entry points have been developed and adopted by the environmental sector (CONAFOR, CONANP, SEMARNAT)	=	No progress made yet

Note: ↑ indicates 25%; ↑↑ indicates 50%; ↑↑↑ indicates 75 %, field marked in green color indicates 100% of progress.

ID	Indicator	Baseline	Target	2016	
				December	Obs.
Component 2: Integrated IAS management to protect vulnerable globally significant ecosystems					
2.a	Financing for control and prevention activities	USD 0.8 million per year for activities related to IAS management at 6 selected island sites	Average 25% increase of budget for IAS control and prevention in selected island sites by the end of the project	↑	1.98 million USD
2.b	Sustained control of feral cats (Guadalupe and Socorro)	Feral cat populations on two islands having severe negative impact on native species through predation	Yes	↑↑	Guadalupe: 549 feral cats eradicated Socorro: 95% cats eradicated
2.c1	Removal population of IAS from selected island sites	A total of 15 populations of invasive mammals (i.e. rodents, cats and ungulates) have already been removed from the selected island sites between 1998-2012	<ul style="list-style-type: none"> · End of year 1: Eradication of feral cats (Espiritu Santo); mice (San Benito Oeste); and 5 species of exotic vascular plants (Arrecife Alacranes) · End of year 2: Eradication of black rats and feral cats on Banco Chinchorro (Cayo Centro) · End of year 3: Eradication of feral goats on Isla Espiritu Santo. 	↑	(see Ind. before)
2.c2	Post-eradication monitoring on islands	Monitoring of native species to document their recovery by eradication and confirmation of absence of IAS	Complete to 9 IAS (eradicated in years 1-2).	↑↑	Confirmation of the absence of rodents in: San Benito Oeste and three islands of Banco Chinchorro (Cayo Norte Mayor and Cayo Norte Menor). Monitoring to evaluate recovery in the 6 groups of

ID	Indicator	Baseline	Target	2016	
				December	Obs.
					islands: plants, crustaceans, birds and reptiles.
2.d	Early Detection and Rapid Response (EDDR) systems to prevent the establishment and spread of specific high priority IAS applied at selected mainland PA sites:	mainland PAs have systems for EDRR (baseline populations to be determined during year 1 of project)	4 mainland PAs with operating participatory EDRR systems sites by end of the project, with the following results:	1	Complete in Cañón del Sumidero
2.d1	Monk Parakeet (<i>Myiopsitta monachus</i>) at Vizcaino	Outcompete native bird species	· 80% reduction in successful escapes of monk parakeet	=	Implementation is not expected
2.d2	Mozambique Tilapia (<i>Oreochromis mossambicus</i>) at Tutuaca.	0	· No increase in # of water bodies with presence of tilapia	↑	Contract for baseline study
2.d3	Feral cat, feral dogs, and the devil fish (Loricariidae fam.) at Cañón del Sumidero	Feral cats and dogs prey on native species and transmit diseases; devil fish competes with native fish species and transmits diseases 0	· Reduced rate of spread of feral cats and dogs into PA; no increase in # of water bodies with devil fish	1	Made for devil fish, exotic grasses, exotic aquatic plants and red-eared turtle.
2.d4	Giant cane (<i>Arundo donax</i>), vine (<i>Cassytha filiformis</i>) and palm weevil (<i>Rhynchophorus palmarum</i>) at Sian Ka'an	Giant cane disrupts aquatic systems; vine kills native vegetation; weevil kills palms	· No increase in area impacted by giant cane or vine; no increase in # of palms impacted by weevil.	=	No progress made yet

ID	Indicator	Baseline	Target	2016	
				December	Obs.
2.e	Best practices for IAS management among productive sector partners at 6 mainland PA sites reduce IAS populations as follows:	Current there are no studies of good practices	Best practices instituted at 6 mainland PA sites by the end of project, with the following results:	2	2 complete studies at Marismas Nacionales and El Vizcaíno. Working in two more at Valle de Bravo
2.e1	Planting of buffel grass (<i>Cenchrus ciliaris</i>) and natal grass (<i>Melinis repens</i>) at Tutaca	Exotic grasses displace native grassland species and increase the incidence and severity of fires within the PA	· No more planting of buffel grass and natal grass	↑	contracted baseline
2.e2	Planting of natal grass (<i>Melinis repens</i>) at Sierra de Álamos	Exotic grasses displace native grassland species and increase the incidence and severity of fires within the PA	· No more planting of buffel grass	=	No progress made yet
2.e3	Planting of exotic tree species such as cedro blanco (<i>Cupressus lindleyi</i>), eucalyptus (<i>Eucalyptus camaldulensis</i>) and casuarina (<i>Casuarina equisetifolia</i>) at Valle de Bravo	Exotic tree species reduce habitat for native species and change hydrological conditions	· Planting of exotic tree species ended, and replaced with native tree species	=	No progress made yet
2.e4	Extensive cattle ranching within PA boundaries at Marismas Nacionales	Destruction of mangrove seedlings by foraging cattle; pollution caused by livestock waste; negative impacts on re-vegetation	· Cattle ranching restricted in scope (e.g. no access to priority conservation areas such as mangroves)	↑↑	Complete PA boundaries and workshop to capacitation
2.e5	Extensive cattle ranching within PA boundaries at Sian Ka'an.	Destruction of mangrove seedlings by foraging cattle; pollution caused by livestock waste; negative impacts on re-vegetation	· Cattle ranching restricted in scope (e.g. no access to priority conservation areas such as mangroves)	=	No progress made yet

ID	Indicator	Baseline	Target	2016	
				December	Obs.
2f	Aquaculture utilizing exotic fishes in 4 PA (Tutuaca, Valle de Bravo, Cañón del Sumidero and Sian Ka'an)	There are unreliable biosecurity systems or they do not exist.	Enhanced biosecurity systems for remaining exotic aquaculture operations	↑	Started working at Tutuaca and Valle de Bravo
2f1	Aquaculture utilizing exotic trout (<i>Oncorhynchus mykiss</i>) at Tutuaca	The specie is used in aquaculture farms	% Replacement of exotic aquaculture species with native species;	↑	contracted baseline
2f2	Aquaculture utilizing exotic carp (<i>Carassius carassius</i> and <i>Cyprinus carpio</i>) at Valle de Bravo.	The species are used in aquaculture farms	% Replacement of exotic aquaculture species with native species;	↑	Started PA boundaries to and workshop to producers of trout
2f3	Aquaculture utilizing various exotic species at Cañón del Sumidero	The species are used in aquaculture farms	% Replacement of exotic aquaculture species with native species;	=	No progress made yet
2f4	Aquaculture utilizing exotic Mozambique Tilapia (<i>Oreochromis mossambicus</i>) at Sian Ka'an.	The specie is used in aquaculture farms	% Replacement of exotic aquaculture species with native species;	=	No progress made yet

Note: ↑ indicates 25%; ↑↑ indicates 50%; ↑↑↑ indicates 75 %, field marked in green color indicates 100% of progress.



ID	Indicator	Baseline	Target	2016	
				December	Obs.
Product (Output) 2.1: Strengthened prevention and control of key IAS populations in selected islands					
2.1.a	Capacity for coordinated management and planning for IAS management	0	· 6 Island IAS Management Committees operating by the end of year 1	↑↑	PBI drafts are available for RB Isla Guadalupe, RB Archipelago de Revillagigedo (Socorro), ÁPF Islands of the Gulf of California (Espiritu Santo), RB Banco Chinchorro and PN Arrecife Alacranes
2.1.b	Number of Island Biosecurity Plans (IBPs) supervised by island IAS management committees	0	· 6 Island Biosecurity Plans (IBPs) developed and implemented by end of year 1		
2.1.c	EDDR systems developed by the project applied at pilot level	0	6 by end of year 2		
2.1.c1	Early Detection and Rapid Response (EDRR) systems developed for 6 islands. Phase 1 developed: Detection of the specie and area of distribution defined	No	Yes by 6 islands		
2.1.c2	Early Detection and Rapid Response (EDRR) systems developed for 6 islands. Phase 2 developed: Generation of the rapid response mechanism	No	Yes by 6 islands		
2.1.c3	Early Detection and Rapid Response (EDRR) systems developed for 6 islands. Phase 3 developed: validation of the success of the system or preparation of more studies.	No	Yes by 6 islands		

ID	Indicator	Baseline	Target	2016	
				December	Obs.
Product (Output) 2.2: Enhanced IAS surveillance and control strategies reduce introduction rates from productive landscapes and contain populations below thresholds that endanger endemic species and their habitats at 9 mainland Protected Areas					
2.2.a	Capacity for coordinated management and planning for IAS management	0	9 mainland PAs with participatory IAS management committees by the end of year 1	3	Established at El Vizcaíno, Marismas and Cumbres de Monterrey and started in Los Tuxtlas
2.2.b	High priority local EEI lists	0	Lists of local high priority IAS (for PAs and surrounding landscapes) created for 9 sites by end of yr 2; lists being used by management agencies (e.g. CONANP, PROFEPA) to restrict use of IAS within and surrounding 9 sites by end of yr 3	↑	Developed the baseline in El Vizcaíno, Cumbres de Monterrey and Sierra Álamos. Working in Los Tuxtlas
2.2.c	IAS management plans for specific PA units	5 PA units have IAS management plans, but none of these plans is being implemented in an integrated manner	· By end of year 2, 5 mainland PAs are implementing IAS management plans · By end of project, remaining 4 PA sites are also implementing plans	↑	Management plans are available for 3 species in El Vizcaíno
2.2.d	EDDR systems developed by the project applied at pilot level	0	5	1	Available for 4 groups of species in Sumidero Canyon. Work begins for 3 species in the National Marshlands
2.2.d1	Early Detection and Rapid Response (EDRR) systems developed for 6 islands. Phase 1 developed: Detection of the specie and area of distribution defined	No	Yes by 5 PA		
2.2.d2	Early Detection and Rapid Response (EDRR) systems developed for 6 islands. Phase 2 developed: Generation of the rapid response mechanism	No	Yes by 5 PA		
2.2.d3	Early Detection and Rapid Response (EDRR) systems developed for 6 islands. Phase 3 developed: validation of the success of the system or preparation of more studies.	No	Yes by 5 PA		

Note: ↑ indicates 25%; ↑↑ indicates 50%; ↑↑↑ indicates 75 %, field marked in green color indicates 100% of progress.

6. Key Recommendations from the Scientific Committee Meeting

6.1 Key Recommendations from the First Scientific Committee Meeting

General Overview of SC Feedback

The members of the Scientific Committee (SC) met for the first time in September 2015. The aim of the meeting was to provide to the SC the background, targets and goals of the project and to comment on the progress made so far regarding the results and products. The SC acknowledged that this project was a good example of a transversal effort and had a strong potential to enhance capacities as well as to improve the legislation, regarding invasive alien species (IAS) in Mexico. The SC stressed that all actions to implement the National Strategy on Invasive Species (NSIS) should use the best available scientific data and information. To do this the SC recommended a strong connection to the Academic sector. In addition, the SC emphasized that it will be important to use this link to the Academic sector to assess the feasibility of all NSIS actions and prioritize those actions based on strong scientific information. As many of the NSIS actions are the responsibility of politicians, the SC recommended creating a communication strategy focused on the appropriate political authorities responsible for the various actions. For example, development of an outreach and awareness campaign targeting the National Conference of Governors (CONAGO, in Spanish) might be a good way to reach most of the States. The SC also suggested an additional effort should be made to obtain commitment letters, and more funds, from other institutions, not only from the federal government. SAGARPA and CONAPESCA should become more involved in the project as well.

Nevertheless, a “bottom-up” approach was also deemed to be necessary, and one concrete recommendation was to use existing bodies, such as the Basin Councils (Consejos de Cuenca), so they can account for local initiatives currently under way. These Basin Councils not only include local politicians, but also other local stakeholders. Even for a top-down approach, i.e. contacting federal institutions, it is not enough to send a letter to the head of the institution; instead, it is better to know who is the best person, meaning the one most closely implicated in these issues.

A. Assessing the Status of the Invasive Species Issue and Implementation of the NSIS

The SC recommended periodically reviewing the NSIS, including the vision, goals, objectives, and actions to assess the status and progress, and allow for adaptation reflective of the changing national conditions and implementation progress. This would potentially be accomplished through a peer-reviewed scientific paper that could be useful to project managers, and would help to mainstream the invasive species issue within the scientific community. Such a scientific paper could help highlight accomplishments in implementing the NSIS, provide an update of the status of the invasive species threats in Mexico (including economic and health impacts), by focusing on 3-5 species with the most essential information. Additionally, the identification of 3-4 major mechanisms through which harmful exotic species invade Mexico (or new ecosystems) could be incorporated into the paper; to increase awareness and support for stronger invasive species prevention policy.

B. Overall Project Management

The project was perceived as too ambitious since it includes more than 15 different collaborating organizations and the related administrative processes of UNDP necessary to fulfill all activities are very



demanding. This complexity is exacerbated by the fact that the Project Coordination unit (PCU) is quite small (1 Coordinator, 1 Technical Assistant, 1 Administrator and 1 administrative Assistant), with a risk that some of the goals will not be achieved. Therefore, the SC recommended that it is necessary to generate a priority scheme rank all the project actions. The strategy of work has to be adaptable accordingly, meaning if progress is too moderate in one area, the efforts can be shifted.

At the same time, it was suggested by the SC that the project, or its vision, should not be limited to 2020 but the government should rather think in longer terms to continue implementing the National Strategy on Invasive Species. In that sense, the National Strategy on Biodiversity and its Action Plan 2016-2030 identifies key actions that are aligned to continue programs and activities initiated with the NSIS. However, albeit every element of the project is important and needs to be taken on by someone, to be scrounging for resources is not a sustainable model. Therefore, there is a need to look for sustainable options, and to consider economy as a strategic issue, in order to attend the problem in the long term. The PCU should see that the project is appropriated by all the participants, as this will ensure its continuity.

C. General Scientific Committee Recommendations on Component 1 of the Project

Concerning Component 1, the focus should lie on prevention efforts. The SC confirmed the importance of the evaluation of the most common pathways for IAS considered in activity *1.1.6 Development and use of risk analysis methodologies of high risk species/pathways*, as well as estimation of the costs of introduced IAS for the economy, job security and natural capital, in order to estimate the total loss caused by invasive species, which is partly included in activity *1.1.11. Establish cost coefficients for different IAS management strategies in Mexico*.

D. General Scientific Committee Recommendations on Component 2 of the Project

Concerning Component 2, the SC recommended it would be very important to use local and regional media to create awareness (*2.2.4 Community awareness and participation in IAS Management*). Social media are very effective, but TV can convey information to a wider public. However, creating awareness is not enough as to change people's attitude it is necessary to turn awareness to action. This might be accomplished with incentives and educational programs, formal and informal.

E. Evaluating Project Effectiveness and Performance Accomplishments (All Components)

As for project performance accomplishment monitoring, the SC recommended that it will be important to establish clear indicators to measure progress – in both short-term outputs and long-term outcomes. These should be aligned with the goals and objectives within the NSIS. For example with prevention, an indicator of success might track how many exotic species are being imported (under what categories), whether or not there are risk assessments for them, and whether the incoming flow is being stopped. In addition, indicators should reflect both administrative objectives and results (one can finish a project with no results).

According to the opinion of the SC members, the scoring of the indicators presented by the Project Coordination Unit was too optimistic. The following was considered to be more accurate, and should include performance monitoring standards at each level which would objectively quantify the level of success/implementation:

- 0% for a project that has not started
 - Performance Monitoring not yet started
- 20% in progress / administrative clearance
 - Performance Monitoring linked directly to Terms of Reference Deliverables
- 50% initial stage of execution
 - Performance Monitoring linked directly to Terms of Reference Deliverables
- 75% advanced stages of execution
 - Performance Monitoring linked directly to Terms of Reference Deliverables
- 100% done
 - Performance Monitoring linked directly to Terms of Reference Deliverables

The UCP followed that recommendation and adjusted scoring for indicators.

- F. In addition, the SC provided advice regarding the following specific indicators for Component 1 activities:

0.3 Entry and spread of IAS into islands. This indicator is probably difficult to achieve. One needs to know what the people do when they come to the islands. It is necessary to assess, at least, whether inspection is working, whether the flow is being stopped, and whether the inspection is done through a hazard analysis and critical control points (HACCP) process.

1.3 Regulations under existing legislation (activity 1.2.1). There are some evident problems with current regulations. One example is lionfish (*Pterois volitans*), an IAS whose control can be hampered if *all* fishing is strictly forbidden in a given National Protected Area (NPA) or during closed fishing season. Due to its authority SEMARNAT, should take the lead regarding the improvement of legislation; CONABIO's budget should go towards achieving its goals (getting science and information, etc.), not towards pushing changes in the legislation, and alternatives might have to be considered if SEMARNAT can't make this happen, since some species (like quarantine pests) are already regulated by SAGARPA. Moreover, the SC regards this target as too broad, which makes it difficult to measure whether it is achieved or not. In addition, there are too many laws, which have to be changed, so it may be better to focus on 1 or 2 of the most important/strategic ones.

The baseline for this indicator needs to be clearly stated, to show what is missing in each law, and the goal should be to fill the gaps, detect contradictions or overlaps, check whether definitions are missing, and whether other laws are more suitable for regulation. Moreover, further stakeholders should be involved to achieve this target, e.g. CEMDA (Centro Mexicano de Derecho Ambiental). Emphasis should be on three laws: Wildlife, Fisheries, and Agriculture. At the time (September 2015), the SC considered it the right moment to make legislators focus on IAS as the aquaculture commission was not yet formed.

1.5 EDRR (Early Detection & Rapid Response) systems. This encompasses a large and diverse series of instruments, so the SC wondered whether the indicator implies that all the elements need to be in place for at least 2 species. The SC recommends to rather create a subset of indicator steps, considering the 3 key components (access to current and reliable scientific information, ability to identify and assess

species quickly, and mechanism in place for control effort) for an EDRR system. Responsible institutions should be identified for each one.

Information necessary to analyze achievement of outcomes and targets can be gathered through the basin councils and scientific societies by conducting a survey to assess who is working on IAS. A questionnaire of maximum 10-15 questions was suggested:

- Are you aware of the invasive species issues, how bad do you think it is in your area/country?
- Are you interested in the subject, do you know someone who is?
- Are you directly working on IAS issues? How long have you been working on IAS?
- Role of the organization/ what can you do, would you like to do?
- What are your main invasive threats and why are they a threat to you?
- What are the top five things that you think need to be done to overcome invasive species threats?

6.2 Key Recommendations from the Second Scientific Committee Meeting

General Overview of SC Feedback

The SC met again in April 2016, this time to assess progress made based on the performance indicators. New relevant collaborations started in 2016, e.g. with the National Commission of Aquaculture and Fisheries (CONAPESCA) and with The Mexican Biodiversity Finance Initiative (BIOFIN Mexico), a UNDP initiative that seeks to analyze current spending on conservation of biodiversity, determining real funding needs for the implementation of the National Biodiversity Strategy and Action Plan 2016-2030, and defining strategies to mobilize resources. This initiative aligns with one of the outputs of the GEF project, the study on economic instruments to finance measures to prevent the introductions of IAS, about to be completed.

As there is a clear trend in the government to focus on tourism development, the SC recommended it is important to identify how to couple it with the IAS. If tourism is aggressively developed, this will certainly imply more pressure to biodiversity. This trend should be considered so that it will not get ahead of the project; monitoring systems collecting information of established populations might not be as important as anticipating the species that could be introduced due to tourism. The aquaculture sector, for instance, is growing very fast, consequently, the SC stressed it is important to identify this sort of trends and see how the IAS project can may progress and share successful experiences.

Subcomponent 1.3 Multi-sectorial institutional framework in place to implement National Strategy on Invasive Species (NSIS)

Activity 1.3.1 Draft revised and harmonized existing laws / regulations related to IAS management.

In order to involve the advisors of the legislators in congress on the theme of invasive species, the SC recommended that Ana Ortiz, the legal consultant, include them in her interviews. An invasive species awareness week for legislators and their staff was also suggested.



Activity 1.3.4 Strengthen capacity for Early Detection and Rapid Response (EDRR) systems for IAS at national level)

Concerning the EDRR topic, using genetic barcoding is helpful and the SC recommended this project should explore the thematic network in CONACYT. The network is doing environmental barcoding, which has its limits, as it can produce false positives and false negatives, nevertheless it can be used in a controlled setting, such as the inspection of species imports. It was recommended to better focus EDRR on specific issues (areas, pathways, points of entry, etc.) rather than a huge national EDRR system trying to cover everything. The SC suggested the recently published National framework for EDRR “*Safeguarding Americas lands and Waters from Invasive Species*” should be reviewed as an example of working within different scales and might be useful.

Activity 1.3.8 Implement education and awareness campaigns on IAS for policymakers, private land owners, NGOs, volunteer groups and the general public.

There was also progress made in disseminating the invasive species topic in various forums, such as the water focused website www.agua.org.mx, and through an online diploma course for government officials and field staff

Subcomponent 2.1 Strengthened prevention and control of key IAS populations in selected island.

Improvements were reported regarding biosecurity programs (2.1.1 *Establish and maintain Island Biosecurity Programs*), dissemination of educational material (2.1.2 *Implement education and training to support IAS management*), and capacity building, as well as pilot eradication programs on islands (2.1.3 *Implement targeted high priority IAS Control & Eradication programs*), especially cats and feral goats, black rats and mice, carried out in five of the six islands.

Subcomponent 2.2 Enhanced IAS surveillance and control strategies reduce introduction rates from productive landscapes and contain populations below thresholds that endanger endemic species and their habitats at 9 mainland Protected Areas

Problems were encountered during the hiring of the consultants in 2015 for consultancies taking place in the pilot continental sites. However, the SC recommended more flexibility in the selection process of consultants, as there are not many experts in the country working on this topic who also have the experience to undertake such activities/studies. Deciding on the cheapest offer, as established by the UNDP rules, is not necessarily the best strategy and may compromise the final quality of the outcomes. The SC requested that specifications and terms of reference for calls for projects should be very clear, in order to make the selection process easier, and not set the cost of the studies as a main factor for selection. The SC stated that, by doing so and by working with percentages, the costs could gain more importance than the outcomes, while what is important are the results of each consultancy. The SC proposed to list lessons learned, stating the cases where the selection did not work out, how much time and money were invested etc. and to share it with the SC and other partners in the project.



Regarding activity 2.2.3 *Introduce best practices in IAS management in targeted production sectors to reduce IAS spread* the SC suggested to explore other relevant programs such as the “*Sustainable Livestock Production Program and Livestock and Beekeeping Management*” (PROGRAM in Spanish) from SAGARPA which has data from all over the country about pastures and vegetation remnants in ranches, and also the USDA office in Mexico, as they are in charge of monitoring and undertaking the pig control program in the north of the country.

The SC agreed on the structure of the present report and then discussed the best strategy for the side event for COP 13. Lobbying was part of the preparatory work. More in general, the SC recommended to start thinking about how to call attention from partners (presenting maps, lists, the AIS information system, pathway analysis, etc.). “Positive” examples should be presented, recognizing good work, and giving public credit for taking actions against invasive species, to stimulate people to do it more.

6.3 Key Recommendations from the Third Scientific Committee Meeting

General Overview of SC Feedback

The SC met in September 2016 to review the studies undertaken during the first 18 months of the GEF Project. Nineteen documents were reviewed by SC members prior to the meeting. The criteria used were those prepared by the Project Coordination Unit (PCU):

- ✓ **Quality of the Documents**
- ✓ **Achievement of Objectives and IAS Strategy goals**
- ✓ **Proposals for Improvements**
- ✓ **Other Comments and Recommendations**

A. Quality of the Documents

The SC found that in several products, there are mistakes related to scientific names, and other spelling, syntax, and style problems. It should be noted that the work done on islands (annual report 2015) by GECI was singled out by the SC as a very good and satisfactory product (Subcomponent 2.1 *Strengthened prevention and control of key IAS populations in selected island*), and the SC had no additional comments or recommendations. In fact, the SC considered that work had a good analysis of accomplishments and efficacy, the photos were pertinent and descriptive. This positive feedback from the SC is expected to be shared with other consultants and projects as a model for them to follow.

B. Achievement of objectives and IAS Strategy goals

The SC found that most products have a direct relation to the NSIS goals, especially in Component 1 (*National IAS management framework*), and most are suitable to achieve the Project objectives stated in the PRODOC. However, the SC found that practical studies in National Protected Areas (Component 2 *Integrated IAS management to protect vulnerable globally significant ecosystems*) did not include indicators to measure success of activities such as workshops. The SC suggested mechanisms and

approaches to evaluate the success of activities such as workshops, and emphasized that tracking the number of workshops held (or number of participants) is not a good measure of outcome success.

Component 1

Activity 1.1.10 Develop niche models for IAS dispersion related to climate change

With regard to the niche-based distribution models of the 60 most invasive species (, the SC detected a bias towards terrestrial species. The SC recommended complementing the study with another study using models for aquatic and marine species. The SC members would like to have more information regarding the accuracy, and hence the usefulness, of this modeling approach.

Activity 1.1.12 Develop economic models to estimate the costs to the Mexican economy of high-impact IAS)

The SC considers that the study on economic and financial instruments is on the right path. It makes good recommendations about putting policy and legal requirements in synchrony at the national level, although it may be difficult to be synchronized at the state level. Although there is a very good review in pages 13 to 25, it is not clear from the onset if Mexican legislation truly contemplates the purported 3-stage strategy outlined in page 6 (and thoroughly described in page 7), specifically sections “a” (economic instruments) and “c” (environmental funds). There is an urgent need to articulate available legislation to avoid confusion as to who is responsible of what. This might imply lobbying in the two Chambers, as well as in Treasury and other Secretariats, not to mention lobbying at the State level and communities, where these instruments should be put into practice.

Subcomponent 1.2 Sectorial guidance and regulations in place to strengthen the control of main pathways of IAS to vulnerable areas

In terms of the products related to this Subcomponent, in the State of Morelos, the SC suggested there is a need for a greater link between the studies of all consultants involved, despite the fact that only work plans were available at the time of the meeting. The purpose of the information to be obtained was not clear to the SC. The SC noted that the products are useful to achieve IAS Strategy goals, provided that they use the information to implement specific actions against specific invasive species in the state. It will be necessary to compare the information of the inventory of the ornamental fish farms with the current distribution of the exotic invasive species in the natural environment. The SC also noted that baseline information on the awareness of fish producers is missing in order to assess the scope/achievement of the project.

Activity 1.2.2 Provide information, resources and training for improved IAS management to private-sector stakeholders and government agencies in the Wildlife and Forest sectors)

The reforestation manual is a high-quality document; however, the SC sees no clear connection to invasive species or the NSIS. The manual does not refer to how invasive species affect reforestation. The SC congratulates the author of this study, and observes that some chapters are a bit extensive and the additional information could become annexes, especially if the target groups are rural communities. The objective of the reforestation manual is to enhance reforestation by the National Forestry Commission (CONAFOR) with native instead of exotic or translocated invasive tree species. The main target group for this study are CONAFOR’s employees that are in charge of reforestation programs, but shortening the manual would further allow its use by rural communities.

Activity 1.3.8 Implement education and awareness campaigns on IAS for policymakers, private land owners, NGOs, volunteer groups and the general public

In the case of the report submitted by the Fondo para la Comunicación y Educación Ambiental (FCEA) on outreach activities and the website, the SC mentioned that this site might not be the most relevant for outreach on IAS, as it is not a site dedicated to this issue. The SC noted there is a very low number of visitors, and this indicator is not adequate for measuring performance accomplishment. The SC considered that the work is lacking somewhat in relation to the importance of this product to the NSIS. Outreach activities need to include baseline measurement of change in people's attitudes and a way to evaluate their impact.

Component 2

Activity 2.2.1 Develop baseline information necessary for effective IAS management planning

Concerning the baseline study of five IAS in the National Park Cumbres de Monterrey, the SC considered that there was no need to focus so much on monitoring and that it would have been enough to just conduct inventory work and document the spatial extent and characteristics of each population, as well as to measure treatment efficacy. The SC also emphasized there was also no need to estimate relative densities, but rather to have worked on pathways and vectors to prioritize risks. There is a need to improve native plant restoration; the timing of the evaluation was not optimal.

Activity 2.2.3 Introduce best practices in IAS management in targeted production sectors to reduce IAS spread

Regarding the best practice studies undertaken on the biosphere reserves El Vizcaino and Marismas Nacionales, the SC did not see much of a connection to the NSIS. The term "feral species" should be used carefully, as cattle and goats and other livestock under control probably do not fit this definition. The study conducted in the biosphere reserve of El Vizcaino focuses mostly on aspects of productivity and includes just a short section on environmental aspects. Although the strategy of supporting goat ranching in the local community to make improvements is understandable, it is not clear enough what will be done to reduce and eliminate the threat goats pose on the native plants and environment. No account is provided of other potential impacts such as impact of feces. Good practices for foraging are mentioned, but fail to address specifically native species protection.

C. Proposals for Improvements

The SC recommended an important aspect to consider is the timing of the projects and the time it takes to start them. At least in one case it was not possible to identify some invasive plant species, because the flowering period was over when the project started. The ecology and conditions in the project area need to be a major factor in establishing timeframes and performance expectations.

○ **Subcomponent 1.2.4**

Awareness entails not only dispersing new knowledge on a given subject, but a change in attitude; in this case, preventing or minimizing the risk of IAS in ornamental fish species. Therefore, this project on ornamental fish should include a baseline and an indicator (or several) to evaluate success, which does not show in the proposal. Regarding the work plan, an update of the terminology is necessary. Based on the inventory of the fish farms, a biosecurity indicator

for the different fish farm types will be developed and a proposal for biosecurity measures will be generated as well as a communication strategy. Additional financial resources are being looked for in order to do DNA analysis at the point of water release of the farms.

○ **Subcomponent 2.2**

With regard to the results obtained in the case of the baseline study of 3 IAS in the Vizcaino biosphere reserve, the SC had a minor comment doubting the negative impact generated by *Xiphophorus hellerii*. Sampling effort is regarded to be rather scarce and isolated.

Activity 2.2.3 Introducir buenas prácticas en el manejo de EEI en sectores productivos específicos para reducir la propagación de EEI)

- **Marismas Nacionales Biosphere Reserve** the SC suggested it might be useful to concentrate efforts on reconversion of forage species for livestock, leaving the conservation of mangrove as a secondary line of action. The cost-benefit of either as forage for livestock is a key driver for behavioral change, but this proposal does not contemplate this aspect and this hampers success. Another question is how representative is Ejido Toro Mocho in Marismas in relation to both people and habitats. A more in-depth plan including willingness of the community and feasibility of using native species as forage was expected. The livestock practices manual in Marismas Nacionales Biosphere Reserve is good, yet it needs to be more hands-on and deal with practical issues such as adequate sites, costs, timing, etc. It would have been advisable to include an idea of how willing ranchers are to adopt the recommended livestock practices, as well as challenges and an idea of how to scale this study to the whole of the Reserve's potential livestock grazing grounds.
- **Trout farming project at Valle de Bravo**, a large portion of the proposal deals with basic knowledge, whose pertinence to the objectives is not clear. The section regarding development of technological packages is central and should be given more emphasis. A workshop with trout producers for best practices is proposed in the document; this is also a central component of the consultancy, yet is not clearly identified as such. There is mention of a plan for best practices, but it is intended to be produced after just one workshop with trout producers. The five components of the proposed plan for best practices might not be enough to produce tangible changes in practices. The SC recommends sharing concepts and approaches used in other workshops (for example, Los Tuxtlas Biosphere Reserve) with other areas in Mexico.

Activity 2.2.5 Desarrollar e implementar Programas de Bioseguridad (Prevención: Detección Temprana y Respuesta Rápida) en sitios seleccionados de las ANP

- **EDRR protocol in the National Park of Cañón de Sumidero**
The SC recommended that this project should include a section on preparedness as the first step in an EDRR system. This is a document really related to NSIS goals and should

be replicated in other areas. It should also include specific information on traps to be used for invasive Armored Catfish (Loricariidae).

Activity 2.2.6 Implement targeted IAS Control, Eradication and Monitoring at selected mainland PA sites

- **Control of *Tamarix* spp in APFF and Sierra de Álamos o PN Cumbres de Monterrey**
Regarding the promotion of specific control methods, the SC recommended that the consultancy (authors) should first objectively provide scientifically-based integrated pest management (IPM) options to prevent and control the referenced invasive species on the site, including describing the full spectrum of viable management techniques (including biological, cultural, pesticide (bio- and chemical pesticides), and mechanical/physical) for the conditions. Each IPM technique or approach may have varying requirements and efficacies, measured against the project's action thresholds and objectives. Although it may be enticing for the authors to recommend the use of certain techniques (in this case the use of chemical pesticides for the most effective approach to control the invasive species), all such recommendations need to be provided within the broader IPM context, and within the terms of reference for the consultancy. Ultimately, the management choices made will be exclusively the purview of the responsible land managers, not the consultancy, and will be made using a wide array of political, environmental, and economic considerations or other factors under consideration by the land managers.

D. Additional comments

Activity 1.2.2 Provide information, resources and training for improved IAS management to private-sector stakeholders and government agencies in the Wildlife and Forest sectors.

Regarding the work plan for the risk maps for the two forest pest species *Sirex noctilio* Fabricius y *Anoplophora glabripennis* (Motschulsky), the SC suggested that the planned trips to the countries of origin of the pest were considered unnecessary and a better methodological explanation was thought to be required. The SC did not see a connection to the National Strategy. However, as the proposal was submitted including these trips and UNDP procedures do not allow rejecting parts of a proposal, the full proposal has to be accepted or rejected, and no renegotiation of the content is possible.

6.5 Annexes

- Annex 1: Relationship project products with National Strategy goals and objectives
- Annex 2: Minute First meeting 17-18 September 2015
- Annex 3: Minute Second meeting 28-29 of April 2016
- Annex 4: Minute Third meeting 29-30 September 2016

7. List of products generated until Abril 2017 in the context of the project

Component 1:

- Detailed risk analysis for high-risk invasive species for Mexico: Risk of introducing aquarium plants to Mexico. Bonilla-Barbosa J.R., 2016. Center for Biological Research, Autonomous University of the State of Morelos, Cuernavaca, Morelos, Mexico. 252 pp.
- Detailed risk analysis for five species of reptiles with high-risk invasive potential for Mexico. Lira-Noriega, A., Ramírez, H. 2016. 129 pp.
- Risk analysis of exotic plants with invasive potential in Mexico. Rodríguez-Estrella, R., J.J. Pérez Navarro, A. Sánchez Velasco, Y. Sánchez Ferrer, C.J. Pérez Estrada, T. López Avendaño & A. Martínez Sarmiento. 2016. Laboratory group Space Analysis, Ecology and Conservation, CIBNOR, La Paz, Baja California Sur, Mexico. 375 pp. + 3 Annexes + 2 Appendices.
- Risk analysis of reptiles with invasive potential in Mexico. Yáñez-Arenas, C., Díaz-Gamboa, L., Rodríguez-Pérez, A., Salmerón-Flores, A., Patrón-Rivero, C., López-Reyes, K., Rodríguez-Silva, E., Rodríguez -Medina, K., Buenfil-Ávila, A. & Z. Naviat-Uc. 2016. Academic Unit of Yucatan - UNAM, Mexico. 90 pp. + 5 Annexes.
- Risk analysis of turtles with invasive potential in Mexico. Yáñez-Arenas, C., Díaz-Gamboa, L., Rodríguez-Pérez, A., Salmerón-Flores, A., Patrón-Rivero, C., López-Reyes, K., Rodríguez-Silva, E. & Buenfil- Ávila, A. 2016 Academic Unit of Yucatan -UNAM, Mexico. 55 pp. + 5 Annexes.
- Capacity Building and Training on Economic Analysis for Mexican Invasive Alien Species Professionals Workshop 1 Proceedings. Brown, P. Daigneault, Eppink, F. 2015. Landcare Research, Mexico.
- Capacity Building and Training on Economic Analysis for Mexican Invasive Alien Species Professionals Workshop 2 Proceedings. Brown, Eppink, F. 2016. Landcare Research, Mexico.
- Catalog of ornamental fish produced in Morelos with potential to become Invasive Alien Species (ISS). Martínez Castro, A. & Ramírez Herrera, M. 2016. Morelos, Mexico. 183 pp.
- Conclusions on the discussion to analyze and define a coordination scheme based on the legal attributions of government agencies to respond to alerts of aquatic invasive alien species. Mendoza, R. 2017. Mexico. 66 pp.
- Study regarding the viability of the development and implementation of economic instruments to reduce the risk of intentional introductions of IAS that threaten biodiversity. Saad Alvarado, L. 2016. Mexico. 227 pp.
- Implementation of education and public awareness campaigns on invasive alien species. FCEA 2015 and 2016. Catálogo de peces ornamentales producidos en Morelos con capacidad de ser Especies Exóticas Invasoras (EEI). Martínez Castro, A. & Ramírez Herrera, M. 2016. Morelos, México. 183 pp.

- Final Report on consulting services for conducting a training workshop for government personnel and the development of a cooperation protocol between government agencies in Mexico to respond to alerts of invasive aquaculture species. Mendoza, R. 2016. Mexico. 17 pp.
- Inventory of fish produced in 2016 in the State of Morelos. CESAEM. 2016. Morelos, Mexico.
- Integration of two risk prediction models for the exotic forest pests *Sirex noctilio* Fabricius and *Anoplophora glabripennis* (Motschulsky) in the Mexican territory. Interim report. Reygadas-Prado, D. 2016 Mexico. 79 pp. + 1 Annex.
- Handbook of best practices for the restoration of degraded ecosystems, using for reforestation only native species in priority areas. Vanegas López, M. 2016. Mexico. 158 pp.
- Improving the management of invasive exotic aquatic plants. Report of activities of year 1 (2015). Dr. Maricela Martínez Jiménez. IMTA, Jiutepec, Morelos. 56 pp.
- Improving the management of invasive exotic aquatic plants. Activity report for year 2 (2016). Dr. Maricela Martínez Jiménez. IMTA, Jiutepec, Morelos. 59 pp.
- Modeling of the current and future potential distribution of invasive species with the highest risk for Mexico. Martínez-Meyer, E., A.P. Cuervo-Robayo, G.A. Ortiz-Haro and L.A. Osorio-Olvera. 2017. Institute of Biology, UNAM. 39 pp.

Component 2:

- Salt pine control actions in the Sierra de Álamos Flora and Fauna Protection Area - Cachujaqui River. Pronatura Noroeste A.C. 2016.
- Establishing the baseline for planning the effective management of IAS in the El Vizcaíno Biosphere Reserve: Management and Control Plan for Invasive Alien Species in the Vizcaíno Biosphere Reserve: Tilapia (*Tilapia zillii*). Celaya Delgado S., Martínez Vázquez F., Ruiz Campos G., García Gutiérrez C., Yáñez Arenas C., Cuebas Montañó D. and Nájera Hillman E. 2016. Costa Salvaje, Ensenada, B.C., Mexico.
- Establishing the baseline for the planning of the effective management of IAS in the El Vizcaíno Biosphere Reserve: Management and Control Plan for Invasive Alien Species in the Vizcaíno Biosphere Reserve: Caso Vidrillo (*Mesembryanthemum crystallinum*). Martínez Vázquez F., García Gutiérrez C., Yáñez Arenas C., Palma Ordaz S. and Hillman Nájera E. 2016. COSTASALVAJE, Ensenada, B.C., Mexico.
- Develop the baseline for the planning of effective management of IAS in the El Vizcaíno Biosphere Reserve: Management and Control Plan for Invasive Alien Species in the Vizcaíno Biosphere Reserve: Rana Toro Case (*Lithobates catesbeianus*). Martínez Vázquez, F., Cuebas Montañó D., García Gutiérrez C., Ruiz Campos G., Celaya Delgado S., Yáñez Arenas C. and Nájera Hillman E. 2016. Costa Salvaje, Ensenada, B. C., Mexico. 49 pp
- Diagnosis of Invasive Exotic Species in 6 Island Protected Areas, in order to establish activities for their management. Report of activities of year 1 (2015). Latofski-Robles, M., F. Méndez-Sánchez, A. Aguirre-Muñoz, C. Jáuregui García, A. Castro-Girón. 2016. Ecology and Island Conservation Group, A.C. Ensenada, B.C., Mexico.



- Diagnosis of Invasive Exotic Species in 6 Island Protected Areas, in order to establish activities for their management. Report of activities of year 2 (2016). Latofski-Robles, M., F. Méndez-Sánchez, A. Aguirre-Muñoz, C. Jáuregui García, A. Castro-Girón. 2016. Ecology and Island Conservation Group, A.C. Ensenada, B.C., Mexico.
- Diagnosis of Invasive Alien Species (Chinese Thunder, Reed, Wild Tobacco, Kalanchoe and Japanese Umbrella) in PNCM Premises. Final report. Hernández Peña, J. and A., García Solís. 2016. Conservation and Sustainable Nature, A.C. (CONYNS) Monterrey, N.L. Mexico.
- Design and implementation of an early detection and rapid response protocol for high impact invasive alien species in the Cañón del Sumidero National Park. CONBIODES 2016.
- Preparation of outreach material in the Sierra Álamos-Cuchujaqui River Flora and Fauna Protection Area. Naturalia 2015.
- Preparation of outreach material in the Natural Resources Protection Area of Valle de Bravo. Pluralia Editions and impressions S.A. of C.V. 2016
- Establishment of a Sub-Council of IAS in the Los Tuxtlas Biosphere Reserve. Final report. Flores-Martínez, J.J., M. Pérez-Cabrales, V. Sánchez-Cordero & R. Rodríguez-Medina. 2016. Biological Conservation and Social Development A.C., Veracruz, Mexico. 69pp + 23 Annexes.
- Reports of six environmental education workshops held in various locations of the Cumbres de Monterrey National Park on the problem of invasive alien species in the National Park. Pompa Mansilla, S. and García Gutiérrez, I. 2017. Fuego Verde Civil Society, Linares, Nuevo León, Mexico. 23 pp. + 3 Annexes.
- Monitoring and Estimating Densities of Invasive Species: Chinese Thunder, Reed, Wild Tobacco, Kalanchoe and Japanese Umbrella in PNCM. Final report. Hernández Peña, J. and A., García Solís. 2016. Conservation and Sustainable Nature, A.C. (CONYNS) Monterrey, N.L. Mexico.
- Reconversion plan of the "Cattle Conversion Project as a strategy for the integral management of invasive and feral alien species in the Marismas Nacionales Nayarit Biosphere Reserve". Final report. Ramírez-Carballo, H. 2016. Consultancy, Advisory and Strategic Management S.C. Mexico.
- Program of Good Practices in Caprinocultura in the El Vizcaíno Biosphere Reserve. Angulo C., Ramírez-Serrano, R., Sánchez C., Moctezuma T., Sánchez I., Orduño A., López R., Argueta, JA, Villavicencio, E., Lucero, A., Lamb, A. Kachok, R. Avilés, S., Cepeda R. 2016. Mexico
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