State Management Plan for Aquatic Invasive Species in Louisiana

Final Management Plan

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Funded by EPA Gulf of Mexico Program, Barataria-Terrebonne National Estuary Program, NOAA, and Louisiana Department of Wildlife and Fisheries

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Inherent in understanding and addressing any invasive species/pathway issue is to fully recognize that a competent group from government, industry, academia and the public must collaborate in an orderly and coordinated approach to have any reasonable expectation of successfully preventing or managing an exotic species' potential, or real negative impacts. Governor Mike Foster understood this concept when he formed the Louisiana Non-Indigenous Aquatic Species Advisory Task Force and appointed 29 members representing both public and government entities. We thank Governor Foster for his leadership and resolve to initiate the process to develop this management plan.

We thank the task force membership for generously giving of their time while working on this plan. Indeed, it was only through their dedication and willing determination to apply their expertise that this plan was possible.

Long before any work started on this plan, Ms. Marilyn O'Leary's aim was to get Louisianan's thinking about invasive species issues. Her passion to understand the issues and teach others was truly inspiring. We thank Marilyn for her encouragement and contributions throughout this process and keeping us all focused on our charge.

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Lastly, we offer this plan as a tribute to our late friend, Mr. Bill Holland, EPA, Gulf of Mexico Program for his courage and commitment to "jump start" our state in this effort.

Louisiana Aquatic Invasive Species Task Force, October 2003. *Photo by LDWF, 2003*.

Acronyms

ANSTF	Aquatic Nuisance Species Task Force
APCS	Aquatic Plant Control Section (Louisiana)
APHIS	Animal and Plant Health Inspection Service (USDA)
ASPEA	Alien Species Prevention and Enforcement Act of 1992
BMP	Best Management Practice
BTNEP	Barataria-Terrebonne National Estuary Program
CBR	Center for Bioenvironmental Research at Tulane and Xavier Universities
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
DOI	United States Department of the Interior
EPCC	Exotic Pest Control Council
GIWW	Gulf Intracoastal Waterway
GoM	Gulf of Mexico
GoMP	Gulf of Mexico Program
GSMFC	Gulf States Marine Fisheries Commission
LAISTF	Louisiana Aquatic Invasive Species Task Force
LDAF	Louisiana Department of Agriculture and Forestry
LDHH	Louisiana Department of Health and Hospitals
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LMRCC	Lower Mississippi River Conservation Committee
LOPH	Louisiana Office of Public Health
LPB	Louisiana Public Broadcasting
LSG	Louisiana Sea Grant
LSU	Louisiana State University
LUMCON	Louisiana Universities Marine Consortium
LWF	Louisiana Wildlife Federation
NAISA	National Aquatic Invasive Species Act (reauthorization in 2004)
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
NBWC	National Ballast Water Clearinghouse at the Smithsonian Institute
NISA	National Invasive Species Act of 1996
NRCS	Natural Resources Conservation Service
Port of NO	Port of New Orleans
TNC	The Nature Conservancy
ULL	University of Louisiana at Lafayette
UNO	University of New Orleans
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1 Executive Summary

The Louisiana Aquatic Invasive Species Task Force, formed by authority of *Executive Order MJF 02-11* on June 4, 2002 and convened six times during 2002-2004, has determined that invasive species[1] pose a serious threat to the economic and ecological health of the State of Louisiana. Even in the time it has taken to write this management plan, new bioinvaders have surfaced: Peruvian watergrass has emerged as a new threat to the wetlands near Lake Charles, and black carp, a potential threat to native shellfish, have been discovered in the Red River. This highlights the urgency for action in addressing invasive species in Louisiana.

The Task Force, led by the Louisiana Department of Wildlife and Fisheries, submits this *State Management Plan for Aquatic Invasive Species in Louisiana*, to (1) describe the nature and extent of this environmental problem, which afflicts Louisiana to a degree far greater than most other states, and (2) propose specific management actions to minimize negative impacts. This living document is Louisiana's first state management plan for invasive species, and one of the first in the region.

Situated at the crossroads of major transportation routes, Louisiana decided that its invasive species state management plan should reflect this geographically distinguishing characteristic. That is, the plan emphasizes how these species arrived here and spread, because these geographical factors inform how invasive species may be controlled and managed. The following pathways and media[2] of concern are described herein:

- Shipping
- Recreational Boating and Fishing
- Transportation corridors (highways, waterways, railroads)
- River Diversions
- Ballast water, fouling, and dunnage
- Deliberate horticultural introductions
- Deliberate aquaculture introductions
- Deliberate sportfishing introductions
- Deliberate pet and aquarium introductions

The Task Force also recognized the utility of understanding this problem at the species level, because some management actions are most effective when targeted at particular species rather than certain geographical features. The following species of concern are described herein:

Water hyacinth	Chinese tallow tree	Parrot feather
Hydrilla	Wild taro	Brazilian waterweed
Eurasian watermilfoil	Water lettuce	Common salvinia
Giant salvinia	Cogongrass	Purple loosestrife
"Cylindro," a blue-green algae	Rio Grande cichlid	Common carp
Grass carp	Silver carp	Bighead carp
Black carp	Tilapia	Asian clam
Zebra mussel	Brown mussel	Green mussel
Channeled apple snail	Nutria	Feral hogs
Red imported fire ant	Formosan termite	Asian tiger mosquito
Africanized honeybee	Australian spotted jellyfish	*Daphnia lumholtzi*, a water flea
Chinese mitten crab	Green crab	Various viruses, bacteria, and other microbes

The goal of this state management plan is to prevent and control the introduction of new nonindigenous species into Louisiana; to control the spread and impact of existing invasive species; and to eradicate locally established invasive species wherever possible. It endeavors to do this through five objectives:

[1] Invasive species are non-native organisms whose introductions cause or are likely to cause adverse environmental, economic, and/or human health impacts.

[2] Pathways are geographical features or patterns by which species are physically transported to new areas; media are natural and man-made materials infested or utilized by species as they are transported to new locations.

1. Coordinate all AIS management activities or programs within Louisiana and collaborate with regional, national, and international AIS programs.
2. Prevent and control the introduction/reintroduction of nonindigenous invasive species through education about species and pathways, targeting the general public (including schools), industries and user groups, government agencies, and nongovernmental organizations.
3. Eliminate locally established invasive species through monitoring, early detection, rapid response, and early eradication.
4. Control the spread of established invasive species through cooperative management activities designed to minimize impacts when eradication is impossible.
5. Prevent the introduction of non-native species, or the spread of existing ones, through legislation and regulation.

The plan identifies specific management actions geared toward resolving this problem, of which some are partially or fully funded, and others remain unfunded. Examples of ongoing, funded management activities in Louisiana are:

- the Nuisance Aquatic Plant Control program (ongoing water hyacinth, hydrilla, and other invasive plant removal from wetlands and bayous);
- the nutria bounty program; and
- development of a "Citizen's Guide to Invasive Species in Louisiana" for outreach purposes.

Priority unfunded management actions are listed below and include the development of a statewide Rapid Response and Early Eradication Plan.

The purpose of the *State Management Plan for Aquatic Invasive Species in Louisiana* is to coordinate and support all state invasive species efforts from a single node under conditions of collaboration and full communication, rather than from dispersed, uncoordinated locales susceptible to duplications or gaps in effort. Not only does such a planning effort improve the efficacy of field actions, it also opens doors to funding opportunities for the proposed actions. Cooperation among the Task Force members (drawn from nine state entities, six federal agencies, four universities, six stakeholder groups, and four industry representatives) was key to the development of this management plan, and will be even more critical to its execution.

In spring 2004, Task Force members Senator Gerald Theunnissen and Representative Wilfred Pierre co-sponsored a bill in the legislature that called for the creation of the Louisiana Aquatic Invasive Species (LAIS) Council and Advisory Task Force to implement this management plan. The bill passed both the House and Senate, and was signed into law by Governor Kathleen Blanco.

The LAIS Task Force recommends to the future Council these management actions:

- <u>Hire staff to administer the LAIS Council and Advisory Task Force;</u>
- <u>Develop a Rapid Response and Early Eradication Plan;</u>
- <u>Assess Louisiana ports and waterways for invasive species</u>.

The Louisiana Department of Wildlife and Fisheries and the Louisiana Aquatic Invasive Species Task Force recommend the approval of this plan by the Governor of Louisiana so that implementation may commence.

2 Introduction

Introduced species arrived in Louisiana with the earliest waves of French colonizers at the turn of the 18th century. Many introductions, particularly agricultural and horticultural plants, have imparted significant benefits to the state. But nearly two centuries would pass before authorities appreciated that the accidental or intentional diffusion of non-native life forms into new environs could also initiate great costs, as dramatically illustrated by the 19th-century yellow fever epidemics traced to the *Aedes aegypti* mosquito, introduced from Africa. Louisiana, with its subtropical environment, extensive coastal wetlands, and strategically positioned shipping industry, suffers disproportionately from "invasive species"—that is, introduced species that cause extensive economic or ecological harm. The complex nature of species introduction, the various pathways of diffusion, and the myriad governmental jurisdictions through which invasive species spread conspire to make this a particularly challenging resource management issue. The *State Management Plan for Aquatic Invasive Species in Louisiana* identifies and characterizes the scope of this problem in the state, and—for the first time—plans a coordinated suite of actions (summarized in the Implementation Table Section 8) toward these five objectives:

1. Coordinate all AIS management activities or programs within Louisiana and collaborate with regional, national, and international AIS programs.
2. Prevent and control the introduction/reintroduction of nonindigenous invasive species through education about species and pathways, targeting the general public (including schools), industries and user groups, government agencies, and nongovernmental organizations.
3. Eliminate locally established invasive species through monitoring, early detection, rapid response, and early eradication.
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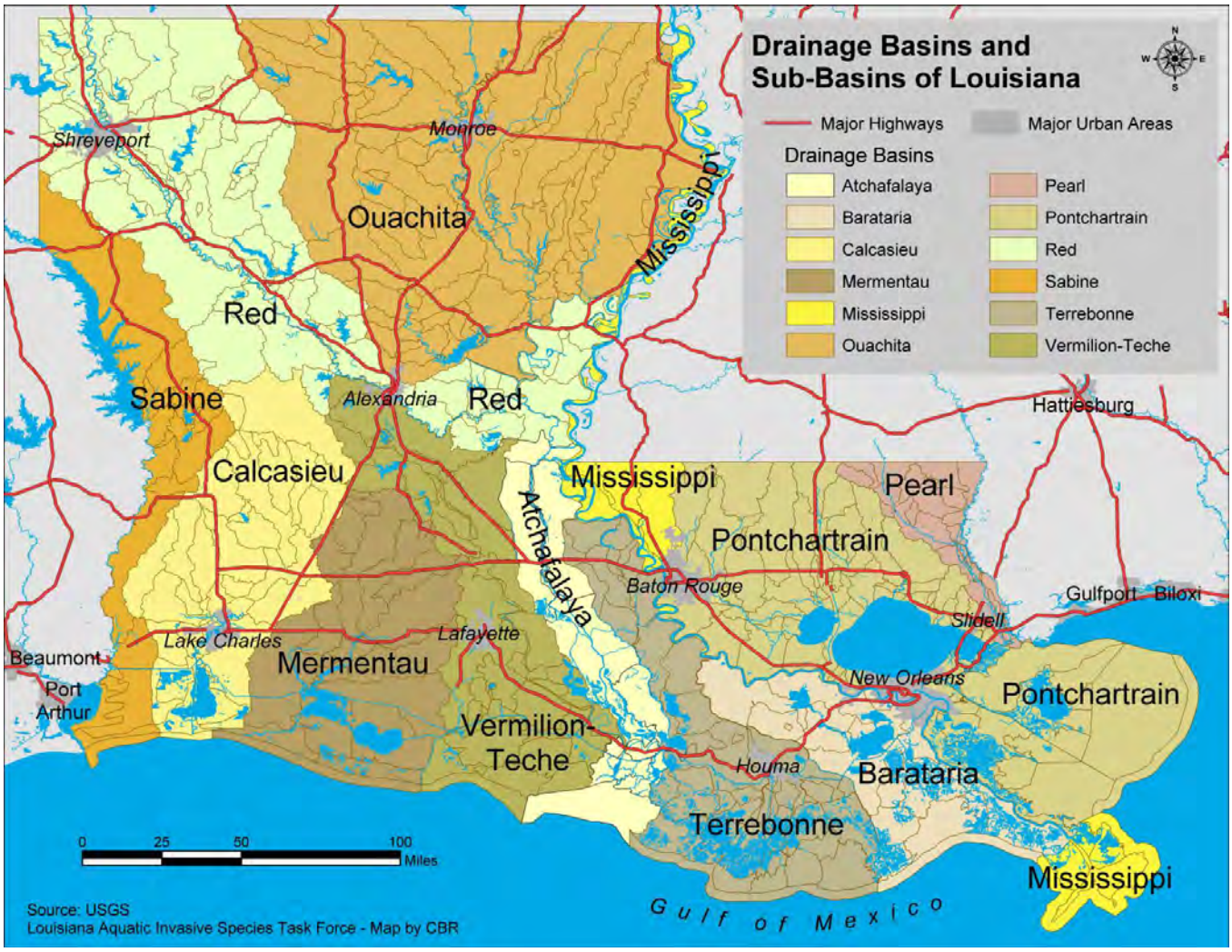
The purpose of the management plan is to coordinate and support all state invasive species efforts from a single node under conditions of full communication, rather than from dispersed, isolated locations susceptible to duplications or gaps in collaboration and effort. Not only does such a planning effort improve the efficacy of field actions, it also opens doors to funding opportunities for the proposed actions.

The management plan focuses not on all invasive species in Louisiana, but on those inhabiting aquatic environments (particularly aquatic plants) and those spread via aquatic pathways. Emphasis was also placed on those species and pathways not addressed by other entities. Many viruses and agricultural pests, for example, fall under the definition of invasive species but are best left to the specialized jurisdictions of medical researchers and agronomists. The management plan covers two years into the future for specific actions, while foreseeing the next five years for general, long-range planning.

Invasive species issues are highly multidisciplinary. Ecologists, engineers, economists, educators, and ethicists all see the issue from different perspectives and play roles in resolving it. The multifaceted nature of invasive species also challenged the authors in structuring this plan. We decided to define the problem by breaking it down by pathway and media (how species arrived here and how they are diffused), by species, and by existing circumstances that exacerbate the problem. Pathways and species were then prioritized and summarized in tabular form, and existing authorities and jurisdictions were researched and documented. Management actions were then detailed according to the four objectives (listed above), and summarized in an implementation table. The plan concludes with a monitoring and evaluation plan, glossary, literature cited section, and appendices, all of which were designed to make the *State Management Plan for Aquatic Invasive Species in Louisiana* a "go-to" resource for this topic.

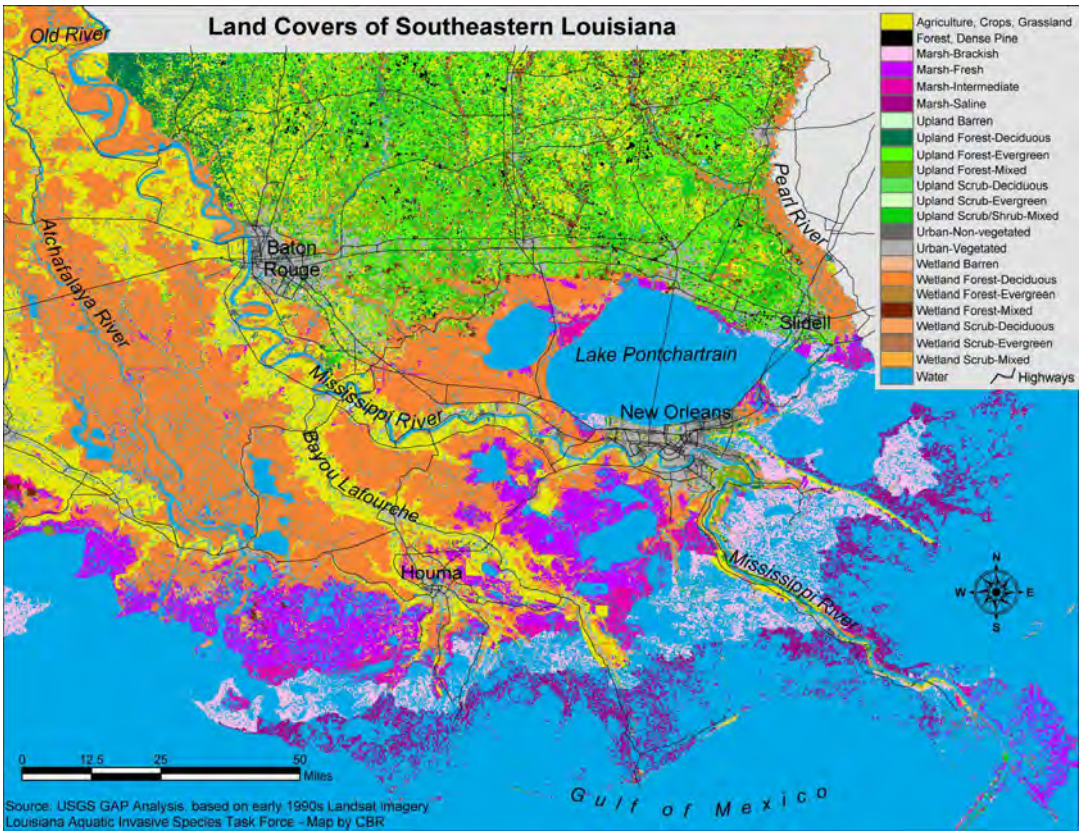
Participants in the planning process were as varied as those affected by this issue: state and federal agencies, universities, trade associations, private industries, port authorities, and research centers. Representatives of these entities, listed in Appendix A, were invited to serve on the Louisiana Aquatic Invasive Species Task Force, which met in Baton Rouge six times throughout 2002-2004 to help assemble this plan. Authority for the plan and the Task Force are derived from *Executive Order MJF 02-11: Louisiana Non-Indigenous Aquatic Species Advisory Task Force*, signed by Governor M.J. "Mike"

Foster, Jr. on June 4, 2002. Mark McElroy of the Louisiana Department of Wildlife and Fisheries and Marilyn Barrett-O'Leary of Louisiana Sea Grant oversaw the planning process and assembly of the Task Force, assisted by the Center for Bioenvironmental Research at Tulane and Xavier Universities, which wrote the plan. Funding for this effort came from the EPA Gulf of Mexico Program, the Barataria-Terrebonne National Estuary Program, the National Oceanic and Atmospheric Administration, and the Louisiana Department of Wildlife and Fisheries. The plan follows the guidelines of the Aquatic Nuisance Species Task Force, an intergovernmental organization which standardizes and approves state management plans nationwide.



Drainage basins and sub-basins in Louisiana are usually separated by slight topographic ridges in inland areas, and by waterways in the deltaic region of the state. Invasive aquatic plants often diffuse throughout connecting water bodies within a basin and, unimpeded by topography, may spread into neighboring basins. *Map by CBR, 2004.*

Wetlands and freshwater marshes are the land covers of Louisiana most prone to extensive establishments of aquatic invasive species. *Maps by CBR, 2004.*



3 Problem Definitions

This chapter describes the scope of Louisiana's invasive species problem, in terms of pathways and media (how species arrived here), species and groups of species (which biota prove most problematic), and exacerbating circumstances (what other factors intensify this problem).

3.A Pathways and Media

3.A.1 Shipping

The confluence of waterways in Louisiana and sheer magnitude of waterborne shipping in the state have unintentionally made this vital Louisiana industry the state's premier pathway for accidental species introduction. "Shipping" as a pathway refers not exclusively to hull fouling, ballast water, or packing materials (these phenomena are considered "media;" see page 20), but rather to the network of waterways, shipping trends, and the port infrastructure through which waterborne vessels deliver and obtain cargo (including infested media) — and therefore may spread species into new habitats. Louisiana and its neighbors form the premier gateway of foreign shipping to America, making the state that much more susceptible to accidental species introduction via shipping pathways. In fairness, it should be noted that waterborne shipping offers a multitude of economic and environmental benefits compared to alternatives (particularly trucking). The goal here is simply to minimize one of waterborne shipping's potential environmental costs.

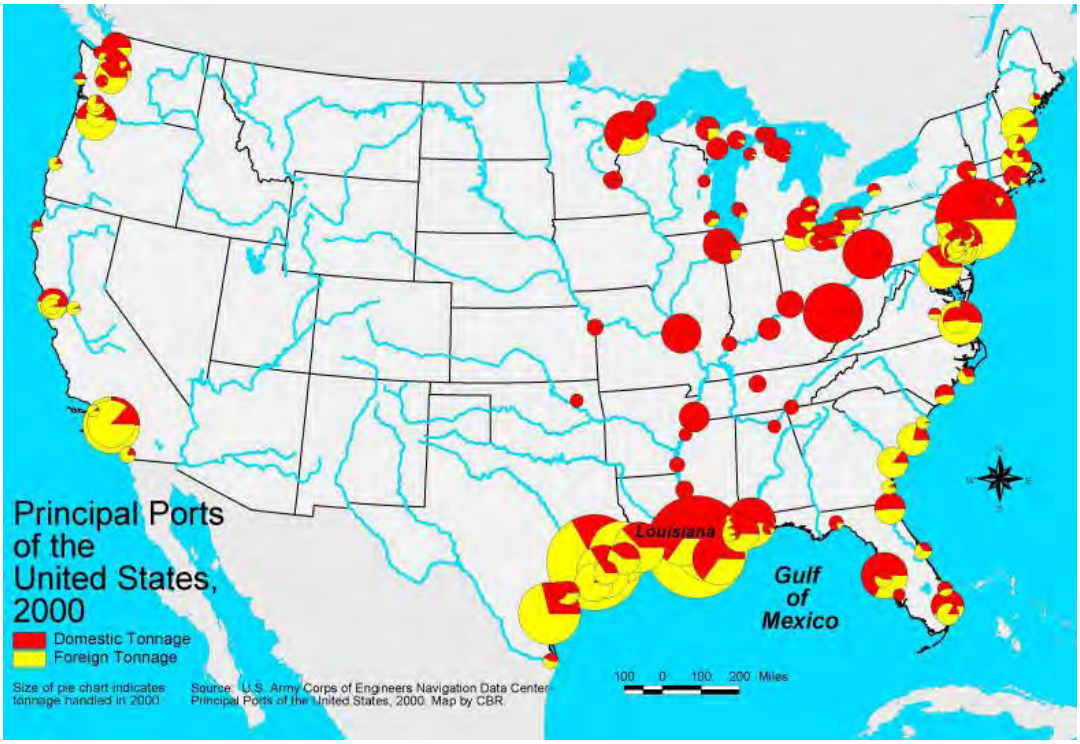
Understanding shipping pathways is critical in invasive species management because they offer preventative opportunities when an accidental introduction is at its most controllable stage. The purpose of this section is to characterize trends in the distribution, content, type, and magnitude of shipping activity occurring along Louisiana's navigable waterways and through its points of ingress and egress, as a first step toward prevention. Five perspectives are offered: (1) shipping and port activity in Louisiana; (2) cargo types and their susceptibility to invasive species; (3) patterns of commodity shipments destined for Louisiana; (4) patterns of commodity shipments originating from Louisiana; and (5) patterns of foreign imports to Louisiana.

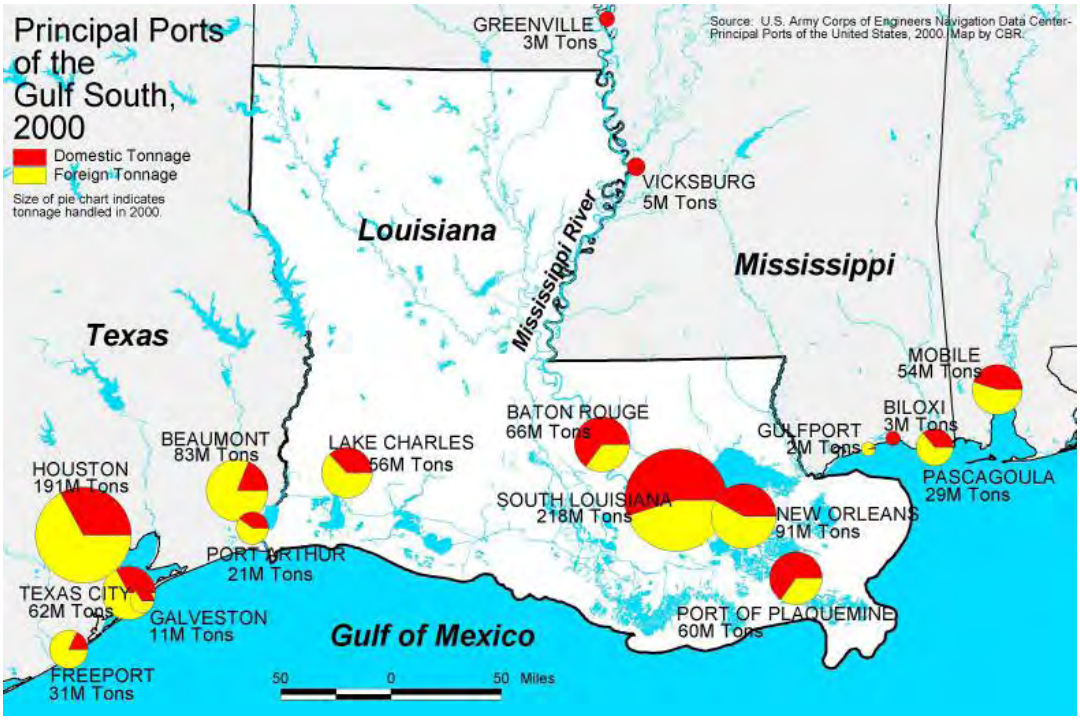
Shipping and Port Activity in Louisiana

Louisiana is home to the busiest port system in the nation as measured by the most reliable gauge of port activity: tonnage. In 2000, over a half-billion cargo tons — about one-fifth the national total — were imported or exported through Louisiana, a state in which one in every eight jobs can be traced to port activity.[1] According to the U.S. Army Corps of Engineers' *Port and Waterway Facilities*, 882 separate port-infrastructure entities — docks, wharves, terminals, piers, turning basins, facilities, landings — dot the Bayou State, most of which are categorized into five principal intermodal ports: Port of South Louisiana, Port of New Orleans, Port of Baton Rouge, Port of Plaquemines, and Port of Lake Charles. These five major ports (which are not single, specific locations but agglomerations lining miles of waterways) are described below. However, from an invasive species perspective, the hundreds of smaller port-infrastructure entities each represent potential portals and pathways for foreign species introduction. Contact information (including names and telephone numbers for responsible individuals) for each entity is listed in the U.S. Army Corps of Engineers' *Port and Waterway Facilities* documents, published by the Institute for Water Resources-Navigation Data Center and may be downloaded from http://www.iwr.usace.army.mil/ndc/data/datapwd.htm.

Port of South Louisiana comprises eight facilities (123 total docks, wharves, terminals, and other entities) of general cargo, bulk docks, grain elevators, and petroleum infrastructure along the 54 miles of the lower Mississippi River that pass through St. James, St. John the Baptist, and St. Charles parishes. These eight facilities are leased to operating companies. Additionally, the Globalplex Intermodal Terminal is expanding to become a major complex to handle dry bulk and break-bulk cargo. Together, this port system "is the largest tonnage port in the Western Hemisphere and ranks

[1] U.S. Army Corps of Engineers Water Resources Support Center 2002.





Louisiana is home to the busiest port system in the nation in terms of tonnage. In 2000, over one half-billion cargo tons — about one-fifth the national total — passed through Louisiana, where one in every eight jobs can be traced to port activity. The Gulf South region is the nation's premier handler of foreign tonnage, potentially putting it at greater risk for species introductions. Louisiana's five principal ports, shown above, all ranked among the top 15 busiest in the U.S.; the Port of South Louisiana ranked first and Port of New Orleans ranked fourth. *Maps by CBR, 2004.*

third in the world. It handled over 245 million tons of cargo in 2000, brought to its terminals by vessel, barge, rail, and truck."[2]

Port of New Orleans, historically one of the world's great ports and the *raison d'etre* for the city of New Orleans, comprises 315 docks, wharves, terminals, and facilities of all types along the Mississippi River, Industrial Canal, Gulf Intracoastal Waterway (GIWW), Mississippi River-Gulf Outlet (MR-GO) Canal, Harvey Canal, and adjacent waterways in the urbanized area of Orleans, Jefferson, and St. Bernard parishes. The Port of New Orleans accommodates roughly 2,200 vessel calls per year, and more than 6,000 vessels move through New Orleans via the Mississippi River each year. On the import side, it is a major through-port for steel and rubber, and a major destination port for coffee and petroleum products. Poultry and grain comprise the largest exports that originate upriver

Louisiana's port infrastructure (docks, wharves, terminals, piers, turning basins, etc.) comprises 882 separate facilities, most of which are categorized into five principal intermodal ports: South Louisiana, New Orleans, Baton Rouge, Plaquemines, and Lake Charles. Ports represent a potential portal and pathway for species introductions. *Map by CBR, 2004.*

and pass through the Port of New Orleans, while plywood and petroleum products are the largest exports that originate locally. Port facilities were concentrated along the Mississippi River until the mid-20th century, when many facilities were relocated to the eastern Industrial Canal and Mississippi River-Gulf Outlet Canal. Recent limitations in wharf space and access have resulted in major new containerized facilities along the Mississippi River in uptown New Orleans and the return of port activity to its historical riverside location. The entire port infrastructure supports over 107,000 jobs, spends $13 billion per year, and contributes $231 million in state taxes annually.[3]

Port of Baton Rouge, seventh in the nation in total tonnage, connects the Mississippi River with the thousand-mile GIWW with 107 docks, wharves, terminals, and facilities of all types along 50 river miles below Louisiana's capital city. The river / GIWW junction is occupied by the port's 60-acre

[2] Port of South Louisiana (no date).
[3] The Port of New Orleans 2001.

Inland Rivers Marine Terminal. In addition, the Port of Baton Rouge features general cargo docks and transit sheds along 3,000 contiguous feet of wharf space for paper and forest products, steel, bagged goods, heavy lifts, and other general cargo; expansive grain elevators serving farmers in 31 parishes and exporting 1.4 million tons of grain worldwide; liquid commodity storage for a wide range of petroleum products and chemicals; and the largest molasses terminals in the world.[4]

Port of Plaquemines, headquartered in Braithwaite on the 82nd mile of the lower Mississippi River, is the first major Louisiana port facility for incoming ocean-going vessels. It imports steel, crude oil, and iron ore and exports coal, coke, soybeans, corn, and wheat. Most of the Port of Plaquemines' tonnage comes in the form of dry bulk cargo (19 million tons annually), followed by liquid (13 million) and general cargo (700,000 tons).[5]

Port of Lake Charles currently offers the most direct access to the Gulf of Mexico of all major Louisiana ports, by means of the Calcasieu River. "The Port of Lake Charles is the 12th largest seaport in the U.S., 4th largest liner service seaport in the U.S. Gulf and a major West Gulf container load center."[6] The port's district covers 203 square miles and features three marine terminals, docks, a bulk terminal, a three-mile-long Industrial Canal, two industrial parks, and access to the Gulf Intracoastal Waterway—a total of 155 facilities of all types spanning 42 miles. In all, the Port of Lake Charles handles five million cargo tons annually at its public facilities, including rice, flour, food, paper, wood products including woodchips, petroleum products, barites, and rutile.

Cargo Types and Their Susceptibility to Invasive Species

Three types of cargo flow through Louisiana's ports, each with an invasive species implication.[7]

Bulk cargo is unpackaged cargo that is piled or pumped into a vessel's hold and handled in non-unitized mass, such as coal, petroleum, gravel, and grain. It may be solid, granular, pulverized, liquid, semi-liquid, or gaseous in form. Bulk cargo *per se* sometimes serves as media for species introduction—wood chips and plant matter may harbor insects, snails, slugs, and plant pathogens; gravel, grain, and fibers may harbor seeds and weeds[8]—but a more serious impact comes from heavy bulk cargo's need for more ballast water, which is one of the most problematic media of invasive species in shipping pathways.

Break-bulk cargo is loose cargo unitized into crates, cartons, boxes, bags, or staked palettes, which are stored in the hold and handled in a piece-by-piece manner. Examples may include textiles, retail merchandise, rubber, lumber, equipment, and any other unitized goods that are not containerized. Break-bulk cargo is often associated with species introduction because the varied nature of their unitization makes them permeable and penetrable by insects, seeds, etc and the dunnage in which they are packed is susceptible to infestations. Dunnage is any packing material used to protect cargo from movement, moisture, contamination, or other damage. It includes wood, straw, plastic, Styrofoam, jute and other fibers, rice matting, tarpaulins, or bags. Organic dunnage on the wet floors and sweating walls of ship holds is a likely media for species introduction on shipping pathways, more so than the cargo itself. Crates used for break-bulk cargo also serve as media: 11 percent of the mollusks intercepted by inspectors in the late 1980s arrived in crates.[9] Locally, Formosan termites and cogongrass arrived by means of break-bulk cargo, the former in wooden shipping palettes and the latter as dunnage. Tropical plywood piled high in riverside warehouses awaiting shipment may also offer infestation opportunities.

Containerized cargo is packaged into boxcar-like containers, available in two standardized sizes, which are handled in a mass-production mode, regardless of contents. Starting in the 1960s, ports started a revolutionary movement toward this standardization at the expense of traditional ship-hold storage of break-bulk and bulk cargo. Even liquid and gas cargo may be containerized in special tank-fit units. While containerization of ships and port facilities requires massive changes of costly equipment, the savings in labor and increase in efficiency has more than offset the costs. After years

[4] Port of Baton Rouge (no date).
[5] Louisiana Economic Development 1998.
[6] Port of Lake Charles (no date).
[7] Cargo information gathered from a number of government sources on the Internet, and Wallace 1975.
[8] Office of Technology Assessment 1993, page 79.
[9] Office of Technology Assessment 1993, page 80.

of falling behind in containerization, the Port of New Orleans recently completed a vast new containerized facility along its uptown Napoleon Avenue wharves. From an invasive species standpoint, containerization offers some benefits, because (1) the container itself often serves to contain not only its contents but hitchhiking organisms as well, preventing their release into the local environment, and (2) containers use fewer wooden crates, burlap, grass, and other dunnage compared to equivalent quantities of traditional break-bulk cargo. For example, coffee used to be stored in burlap sacks piled in holds or containers, but now is more often blown into containers lined with plastic, a material less likely to harbor organisms than burlap. Additionally, a manifest is prepared for all contents of all containers no matter what their stage of shipment; this document may be used to identify those containers more likely to harbor introduced organisms. However, containers present the following problems:

- Containers are difficult to inspect because cargo must be fully unloaded and reloaded. It is the responsibility of the U.S. Bureau of Customs and Border Protection, formerly the U.S. Customs Service, to inspect containers. (Effective March 1, 2003, all border agencies in the United States Government, including the U.S. Customs Service, were unified into one agency — the U.S. Bureau of Customs and Border Protection (CBP). The CBP is housed within the Department of Homeland Security.)
- Containers are usually not cleaned after each unloading.
- Full containers often sit idle for long periods of time on wharves near species-rich water bodies, during which time organisms may enter, settle, and reproduce.
- Because containerized cargo (unlike break bulk cargo) is usually unloaded at destination ports rather than at entry ports, containers can release introduced species at numerous small interior points rather than at major entry points such as New Orleans. In essence, containerization has partially reversed the geography of species introduction.

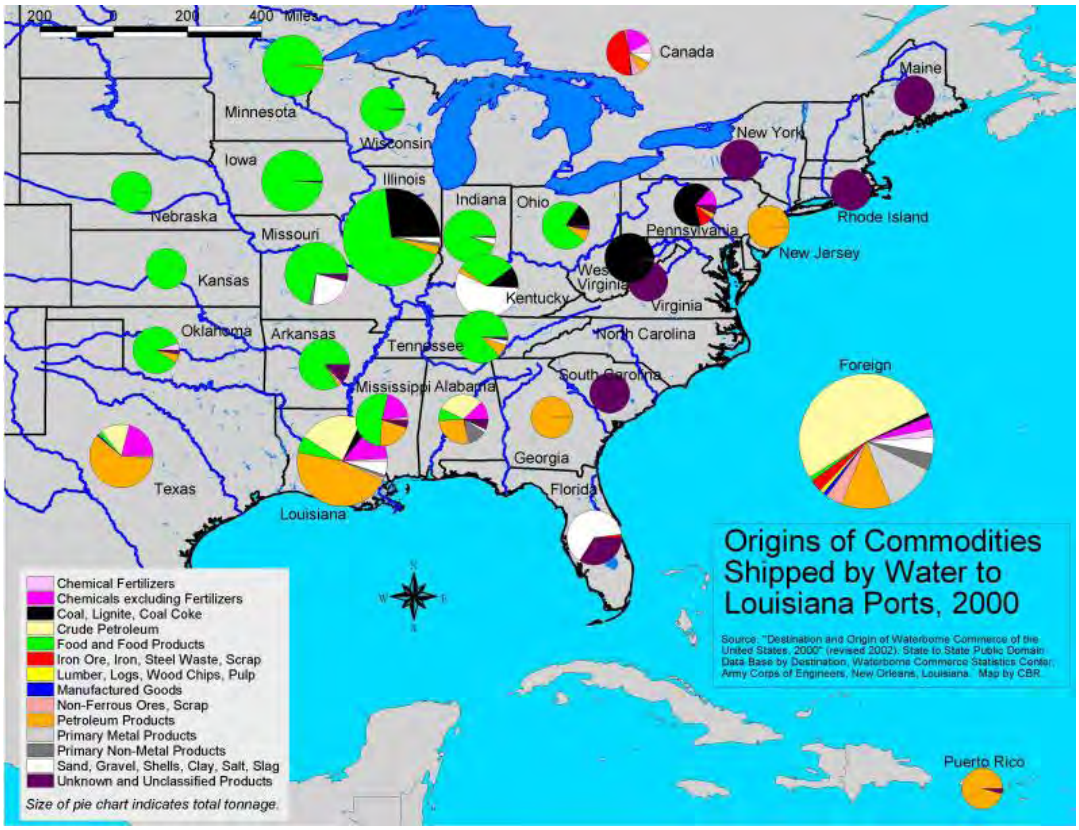
Containerized shipments of used tires were the origin of the Asian tiger mosquito introduction in the late 1980s. Additionally, "at least 15 percent of the snails and slugs intercepted by Federal agriculture inspectors between 1984 and 1991 were in freight containers."[10]

Patterns of Commodity Shipments Destined for Louisiana

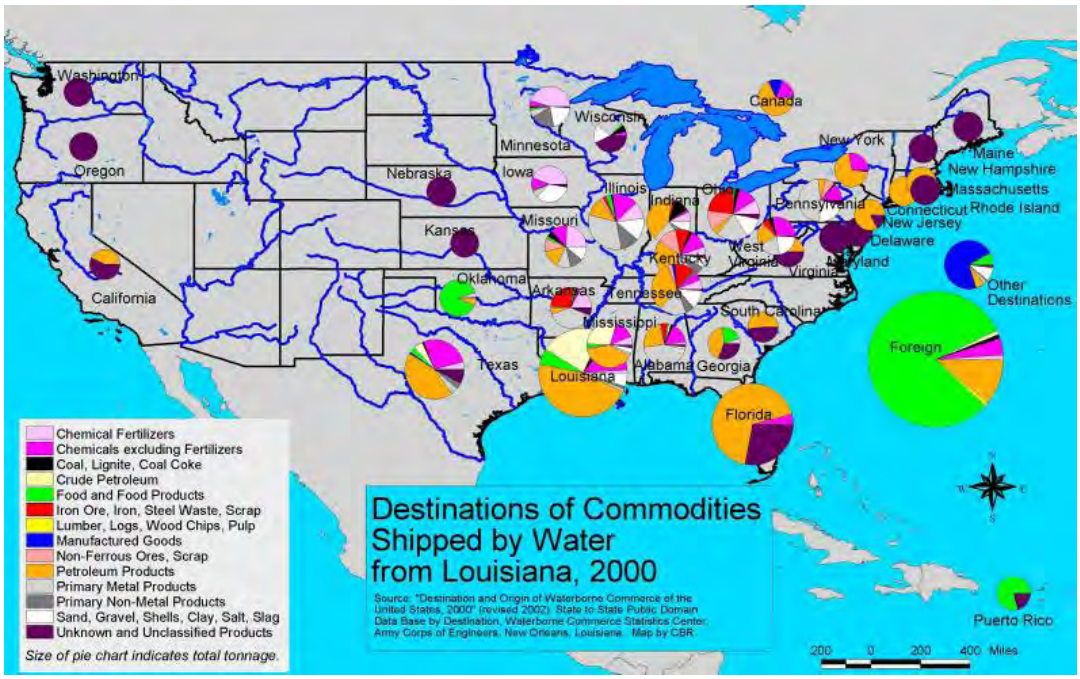
Waterborne commodities destined for Louisiana originate from the states of the Mississippi River basin and the Eastern Seaboard. (See map.) The following patterns in the origins of commodity shipments to Louisiana in 2000 are offered (these data do not include commodities shipped *through* Louisiana destined for other ports):[11]

- As a wood-producing state, relatively little lumber, logs, wood chips, and pulp are shipped to Louisiana. Those that do, originate mostly from foreign sources, often in the form of tropical plywood. Louisiana itself ships wood products to other ports within the state — a potential pathway for the spread or introduction of tropical pests, particularly termites.
- Most food shipments (agricultural commodities as well as processed food) come from the Mid-western states, particularly Illinois. Potential introductions associated with grains, such as any grain mite or other insect that inhabits stored dry grain, may use this pathway.
- Most chemicals come from the Gulf South; most coal-related commodities come from the northern Appalachian region west to Illinois; and most iron ore comes from Canada. While these bulk commodities per se are rarely associated with species introduction, their transport vessels may carry media that are.
- Most petroleum products (such as gasoline) come from the Gulf South and foreign sources; most crude petroleum comes from foreign sources.
- Sand, gravel, shells, clay, salt, and slag come primarily from Florida, Kentucky, Missouri, and Louisiana itself, as well as foreign sources.
- Unknown and unclassified products generally come from the Eastern Seaboard and Northeast.
- In addition to these bulk commodities, manufactured goods and other high-value shipments may also introduce new species through the dunnage or packing crates used to store such break-bulk or containerized cargo.

[10] Office of Technology Assessment 1993, page 80.
[11] U.S. Army Corps of Engineers 2002.



Among the multitude of commodities handled in Louisiana ports (above), imports such as wood products and fill material may harbor species from other environs. Other commodities or merchandise may be packed in materials vulnerable to infestations. Likewise, Louisiana ships various commodities to ports worldwide (below), in which species both native or introduced to the state could be transported to other environs. *Maps by CBR, 2004.*



The original source of these data (*Destination and Origin of Waterborne Commerce of the United States, 2000* from the Waterborne Commerce Statistics Center at the Army Corps of Engineers in New Orleans) breaks these commodity categories down to the commodity itself (sugar, fish, corn, wood chips, etc.). This information should be consulted to target origins of commodities highly correlated with potential species introductions or spreads.

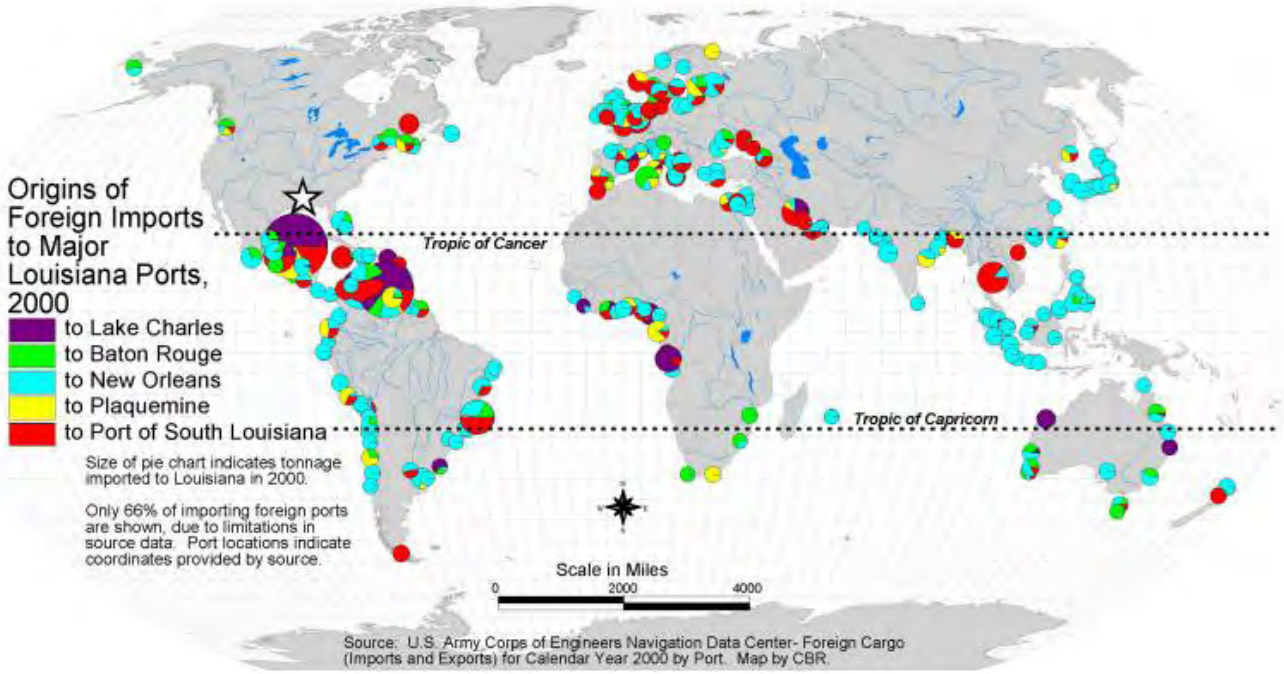
Patterns of Commodity Shipments Originating from Louisiana

Commodities originating in Louisiana destined for other states not only illustrate potential pathways by which Louisiana's species (introduced or native) may spread elsewhere, but pathways by which media such as ballast water, potentially carrying exotic organisms, may arrive here. The following trends in shipments from Louisiana are observed: [12]

- By far, most of Louisiana's food products are shipped to foreign ports. A smaller portion is destined for Illinois, Oklahoma, Puerto Rico, and Louisiana itself.
- Most chemicals go to the agricultural and industrial regions of the Midwest.
- Most petroleum goes to Florida, throughout the Mississippi Valley, and to the Northeast.
- Metal products are shipped throughout the Mississippi Valley, as are Louisiana's exports of sand, gravel, shells, clay, salt, and slag.
- Manufactured goods go mostly to "other" destinations. This category is not explained in the original dataset, but may include the delivery of offshore oil rigs to the Gulf of Mexico. Louisiana has a relatively small manufacturing sector.
- Unknown and unclassified products generally were shipped to the Eastern Seaboard and Northeast, just as those areas were shipping similarly unknown commodities to Louisiana.

Patterns of Foreign Imports to Louisiana

Patterns of foreign cargo by origin imported to Louisiana help identify potential pathways by which species may arrive. Import trends involving Louisiana's five principal ports in 2000 reveal the following information relevant to introduced species:[13]



A significant portion of cargo shipped from foreign ports to Louisiana originates in tropical or subtropical regions, particularly Central and South America. These regions have similar climates as Louisiana, increasing the chance that an introduced species may become established. *Map by CBR, 2004.*

[12] U.S. Army Corps of Engineers 2002.
[13] U.S. Army Corps of Engineers Institute for Water Resources Navigation Data Center 2002.

- **Caribbean Basin Shipping Lanes** — Mexican ports and sites in the Gulf of Mexico, importing mostly petroleum products, shipped more tonnage to Louisiana than any other origins. Venezuelan ports were second, again reflecting petroleum imports. This trend generally remained true for each individual Louisiana port, although it is clear that the petroleum refineries associated with the Port of South Louisiana along the lower Mississippi River made them a major importer of cargo from Gulf of Mexico origins. The shipping of petroleum products is generally less vulnerable to accidental species introductions, except to the extent that ballast water media or hull fouling may be involved. (See Section 3.A.5 for more information.) To the extent that these pathways may usher in unwanted species regardless of the type of cargo, researchers may consider focusing on circum-Caribbean ports to maximize the effectiveness of prevention efforts or to foresee future introductions.
- **Worldwide Susceptibility** — The importance of Louisiana ports is by no means limited to the Caribbean Basin. Countries or regions importing more than one million tons to Louisiana ports in 2000 are dispersed worldwide: Mexico / Gulf of Mexico, Venezuela, Colombia, China, Aruba, Brazil, Angola, Thailand, Qatar, Brazil, South Africa, Russia, Belgium, Trinidad-Tobago, Kuwait, and Gabon.

These fives aspects of waterborne shipping are but a few of the perspectives that may be studied to reduce the risk of species introduction by this pathway.

3.A.2 Boating

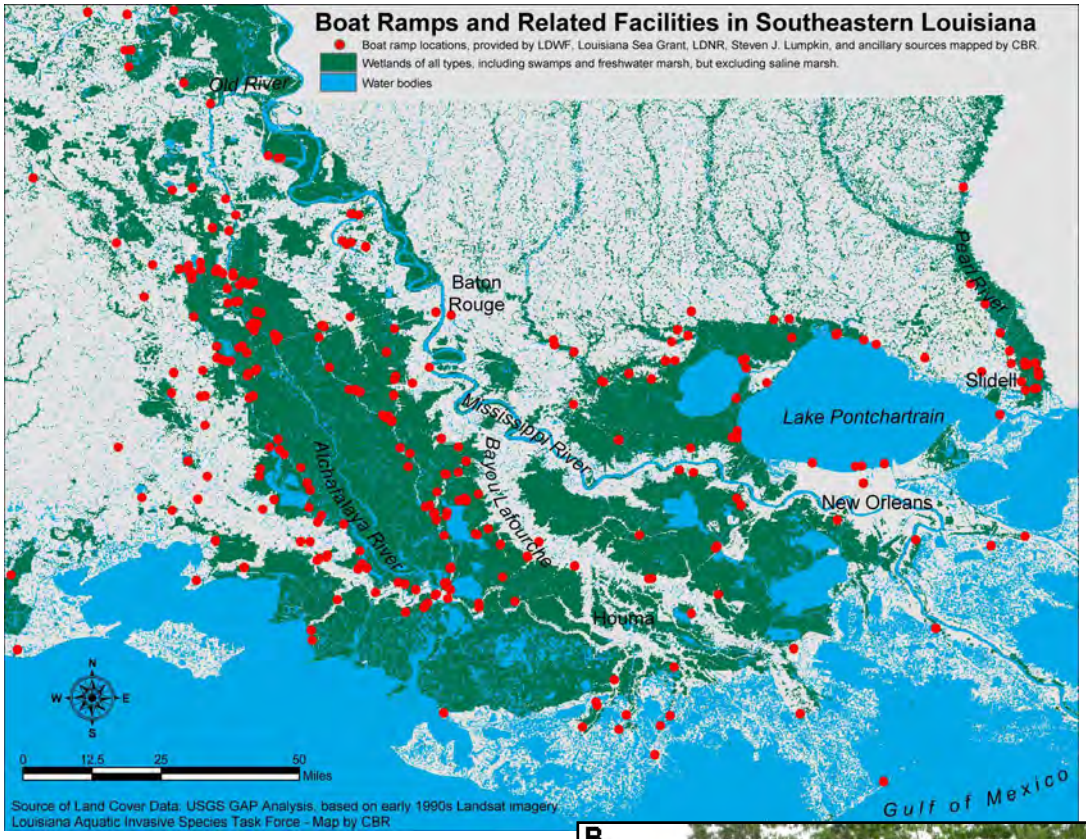
Recreational boating is a primary pathway by which invasive species spread throughout Louisiana's waterways. In 2002, more than 1.7 million boaters, fishermen, and hunters registered with the Louisiana Department of Wildlife and Fisheries (LDWF). By not thoroughly washing or rinsing boats and boat trailers, boaters can easily transport an aquatic weed from one water body to another. Louisiana is also at risk for invasive species introductions from neighboring states with similar ecosystems and climates, since the "Sportsman's Paradise" attracts fishermen from Texas, Mississippi, Florida, and Alabama. The Gulf of Mexico Regional Aquatic Nuisance Species Panel is in the process of devising a strategy to address this problem.

Louisiana is home to some of the most productive fisheries in North America. In 2001, Louisiana water provided recreational opportunities to about 970,000 total anglers, of whom 68% were freshwater fishermen. The total economic impact of sportfishing to Louisiana in 2001 was estimated at over $1.5 billion, providing almost 16,000 jobs, and generating over $9 million and $57 million in state and federal income taxes, respectively.[14]

Strictly with regard to fishing licenses, commercial fishing license sales alone generated more than $4.2 million in revenue in 2002. Combined with sport fishing, hunting, and recreational boating from both in-state and out of state, the total revenue generated by license sales in 2002 was more than $20 million. In most years, commercial fishermen from Mississippi, Texas, Florida, and Alabama are the primary source of out-of-state commercial fishing license sales.[15] Similarly to recreational boating and fishing, the attraction of commercial fishermen to Louisiana from neighboring states increases the potential for an invasive species to become established in Louisiana waters.

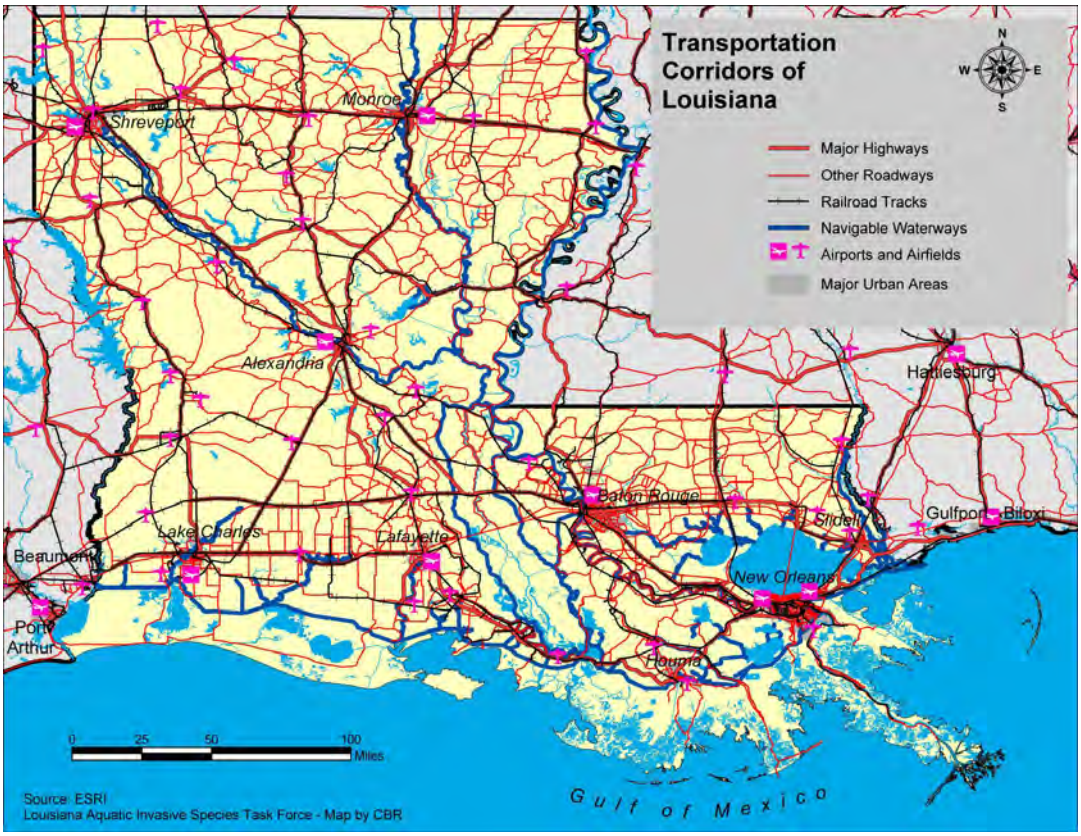
LDWF maintains annual reports detailing the total number of active motorboats per parish (more than 330,000 active motorboats are registered in the state); the total number of hunting, fishing, and boating licenses sold in the state; and the total revenue generated from the license sales. These publicly available statistics are kept by LDWF's Fiscal Section, and could be used to focus invasive species control efforts.[16]

[14] American Sportfishing Association 2002
[15] LDWF 2002a; LDWF 2002c; LDWF 2002b.
[16] LDWF 2002e; LDWF 2002d.



Boating

Boat ramps sometimes serve to spread invasive species, as aquatic plant debris cling to recreational watercraft and trailers (A) and are transported to new water bodies. Most ramps in Louisiana provide access to prime invasive species habitat (map, top), making such introductions more likely to become established. Field signage (B) provides an opportunity to educate outdoor recreationists about invasive species. Ironically, an invasive Chinese tallow tree grows a few feet behind this sign. *Map and photos by CBR, 2004.*



Transportation Corridors

Transportation corridors such as highways, railroads, and waterways, serve as pathways for the spread of invasive species, by the vehicles traveling on them and by the disturbed habitats that often parallel them. Chinese tallow trees, cogon grass, and privet thrive in these sunlight-rich areas. Note the water hyacinth growing at this dock (bottom right) in St. John the Baptist Parish. *Map and photos by CBR, 2004; river photo courtesy SouthWings and The Nature Conservancy.*

3.A.3 Transportation Corridors

Invasive species may be introduced or spread through transportation corridors such as highways railroads, and navigable waterways, and their associated rights-of-way. Cogongrass is an example of an aquatic invasive species that spreads along highway rights-of-way, migrating from Mississippi to Louisiana by exploiting the disturbed soils shouldering the Interstate 10 corridor. Its continued range expansion is partially due to the transport of dirt and soil containing cogongrass tubers to new, uninfested locations. Cogongrass infestations are primarily concentrated in the Florida parishes of Louisiana. (See section 3.B.1.b.ii on cogongrass for more information.)

Formosan termites have expanded their range through railroads and railroad ties by infesting one tie to the next. Instances of termite range expansion also have been documented when old, infested railroad ties were transported to a new, uninfested location, frequently for use in gardening and landscaping. In these examples, the railroads served both as the pathway and as the media for invasive species introductions. (See section 3.B.5.a.ii on Formosan termites for more information.)

3.A.4 River Diversions

The diversion of Mississippi River water into adjacent wetlands reestablishes salinity gradients within the ecosystem. An added benefit is the reintroduction of deprived nutrients and sediments to the wetlands, slowing down coastal erosion in Louisiana. One unintended consequence of river diversions may be the spread of invasive species from the river into wetlands.

South Louisiana risks eroding into the Gulf of Mexico due to the gradual loss of important wetland ecosystems. Every year, Louisiana loses 25-30 square miles of land area, and it is estimated that over 1,500 square miles of marsh have been lost since 1930.[17] The land loss can be attributed to many factors, among them the levee system, canal construction, and the invasive nutria (*Myocastor coypus*), a rodent-like mammal introduced from Argentina.

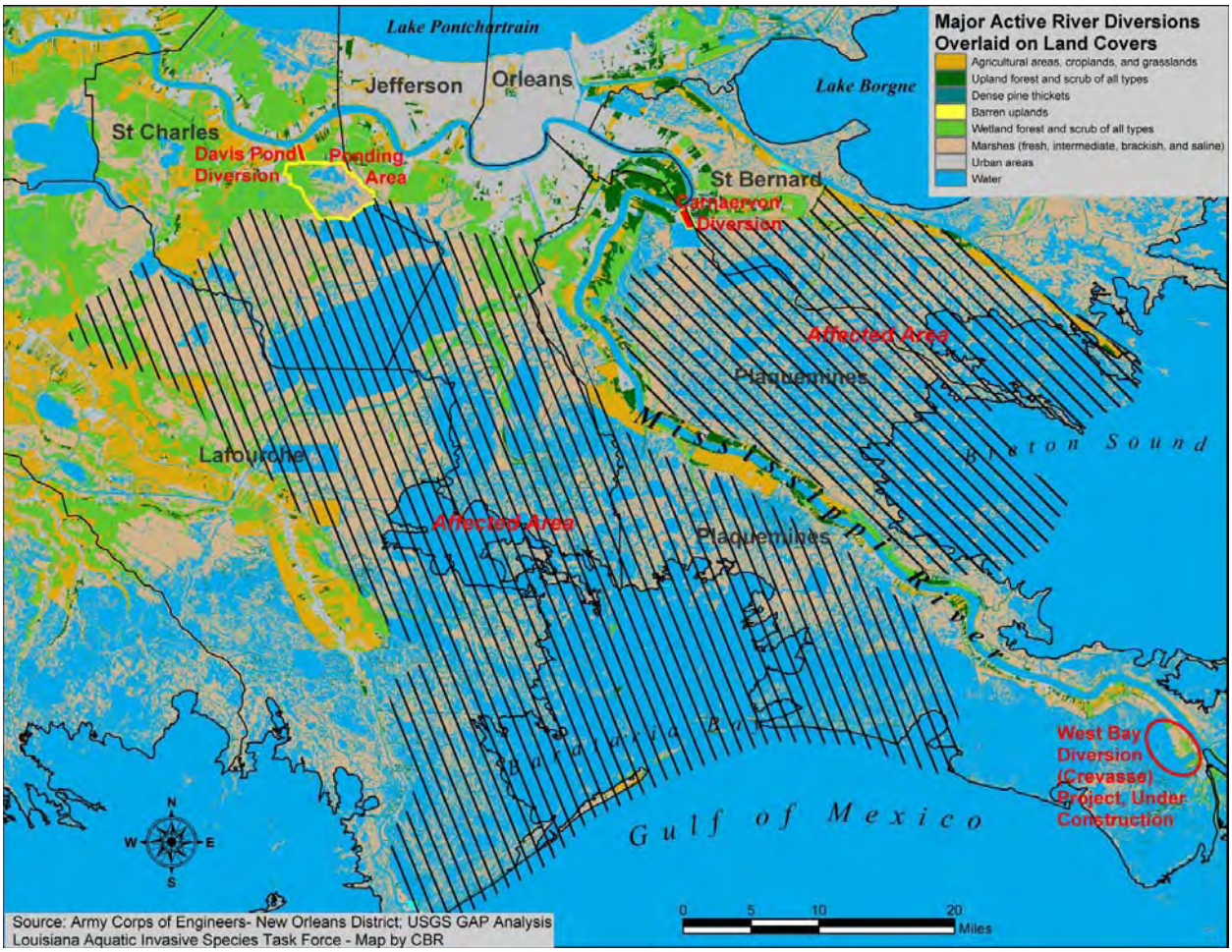
Mississippi River levees sustain the city of New Orleans and southeastern Louisiana by preventing floods. However, levees deprive the wetlands and marshes of essential freshwater, nutrients, and sediments that traditionally would arrive during historic river overflows in the spring.[18] Without the continuing sediment supply, the existing land and soils subside and become open water.

The U.S. Army Corps of Engineers (USACE) is planning and constructing controlled diversion structures on the Mississippi River to divert nutrients and sediments from the river into coastal wetland areas. USACE predicts that diversions will help (1) restore proper salinities to the marshes, thereby counteracting vegetation loss through saltwater intrusion; (2) restore freshwater species of plants and animals to the marsh; and (3) rebuild land through the deposition of sediments and nutrients. Dozens of diversions, crevasses, pipelines, and other devices are currently planned as part of Louisiana's coastal restoration plan; the two currently operational large-scale freshwater diversion structures are the Caernarvon and Davis Pond diversions.

The Caernarvon Freshwater Diversion was opened in 1991 and is operated by the Louisiana Department of Natural Resources (LDNR). It is located on the east bank of the Mississippi River on the St. Bernard-Plaquemines parish line and discharges up to 8,000 cubic feet per second (cfs) from the Mississippi River toward the Breton Sound. The diversion is working: freshwater marsh plants have increased seven-fold since 1991, while the amount of salt marsh vegetation has decreased by 50 percent. In 1998, surveys showed marshland increased by 406 acres in the sampling area.[19]

Located approximately 15 miles upriver from New Orleans on the west bank of St. Charles Parish, the Davis Pond Freshwater Diversion can divert up to 10,650 cfs of Mississippi River water into the

[17] Coalition to Restore Coastal Louisiana 2002.
[18] Addison 1999a.
[19] Naomi 1998.



Wetlands and marshes affected by the freshwater diversions at Davis Pond and Caernarvon. Diversions slow saltwater intrusion and coastal erosion by transferring sediment-laden freshwater to wetlands and mashes. They could also introduce river-borne invasive species to adjacent wetlands and water bodies. *Map by CBR, 2004.*

Barataria Bay estuary.[20] The structure opened in stages starting in March 2002 and has been described as the largest coastal restoration project in the world.

The Bonnet Carré Spillway, located in St. Charles Parish upriver from the New Orleans metropolitan area, is designed not to restore wetlands but to prevent flooding by diverting water from the Mississippi River into Lake Pontchartrain in times of high river flow. The spillway, which can divert up to 250,000 cfs into the lake, has been opened eight times between 1937 and 1997.[21] Recent plans include new diversionary structures paralleling the Bonnet Carré Spillway designed to restore marshes along the south shore of Lake Pontchartrain.

As the Caernarvon and Davis Pond freshwater diversions continue to operate, the Breton Sound and Barataria Bay marshes and estuaries will become increasingly fresh, thus providing more suitable habitat for freshwater plants and animals, including invasives. The diversions themselves pose a minor risk of introducing invasive river species to the freshwater marsh, possibly including grass carp, bighead carp, silver carp, black carp, Asian clams, and zebra mussels. Water monitoring by USACE and LDNR provide data on salinity, nutrient load, sediment load, and some species composition, but little monitoring for invasive species occurs at the diversion structures, despite complaints by fishermen that water hyacinth, Eurasian watermilfoil, and other invasive aquatic plants frequently clog canals and impede boat traffic around the Caernarvon Diversion.[22] The state currently does not

[20] Addison 1999a.
[21] Addison 1999b.
[22] Grandy 2002; Villarrubia 2003.

regularly monitor for invasive species at the diversion structures or in the receiving waterbodies when these structures are open.

Despite the invasive species implications of diversions as a pathway, the river diversions are vitally important to coastal restoration efforts, and the benefits they provide likely outweigh potential invasive species introductions.

3.A.5 Media

3.A.5.a Ballast Water

Ballast is weight stored in the hold of a ship to prevent capsizing when its cargo load is light. Sea water is often used as ballast for large ocean-going vessels, which discharge it in anticipation of new cargo. Discharging ballast water into new maritime environments has been shown to introduce new species, some of which have become invasive. Because of invasive species concerns, some regions require mandatory ballast water exchange, in which ships must discharge their ballast in the open ocean and take on new ocean water ballast before coming to port. Although no known introductions of invasive species have occurred directly to Louisiana via ballast water discharges, it may only be a matter of time before such an introduction.

According to the National Invasive Species Act (NISA) of 1996, ships entering U.S. waters from outside the Exclusive Economic Zone (EEZ) are not required to perform ballast water exchange, though reporting is mandatory. NISA, however, currently designates the Gulf of Mexico as a "sea" instead of an "ocean," thus exempting the Gulf from ballast water reporting regulations.[23] Because of this exemption, ballast water reporting for ships entering Louisiana ports has generally been low. The National Ballast Information Clearinghouse shows that from July 1999 to July 2001, ships entering the Port of Baton Rouge submitted only 59 ballast water reports. From July 1999 to September 2001, only 859 vessels (roughly 20 percent of traffic) entering the Port of New Orleans submitted ballast water reports. The Port of South Louisiana has similarly low numbers: from October 1999 to August 2000, only 10 vessels submitted ballast water reporting forms.[24] Lack of reporting data makes it difficult to estimate ballast discharge into Louisiana waters, and the invasive species implications of those discharges.

The U.S. Coast Guard (USCG) has recently tightened ballast water regulations, by imposing monetary penalties for reporting violations and requiring ballast water management practices, some of which were formerly voluntary. Effective September 27, 2004, all ships entering U.S. waters from outside the EEZ must either:

- perform complete ballast water exchange;
- retain ballast water onboard; or
- utilize an alternative, USCG-approved method of ballast water treatment, before entering U.S. waters.

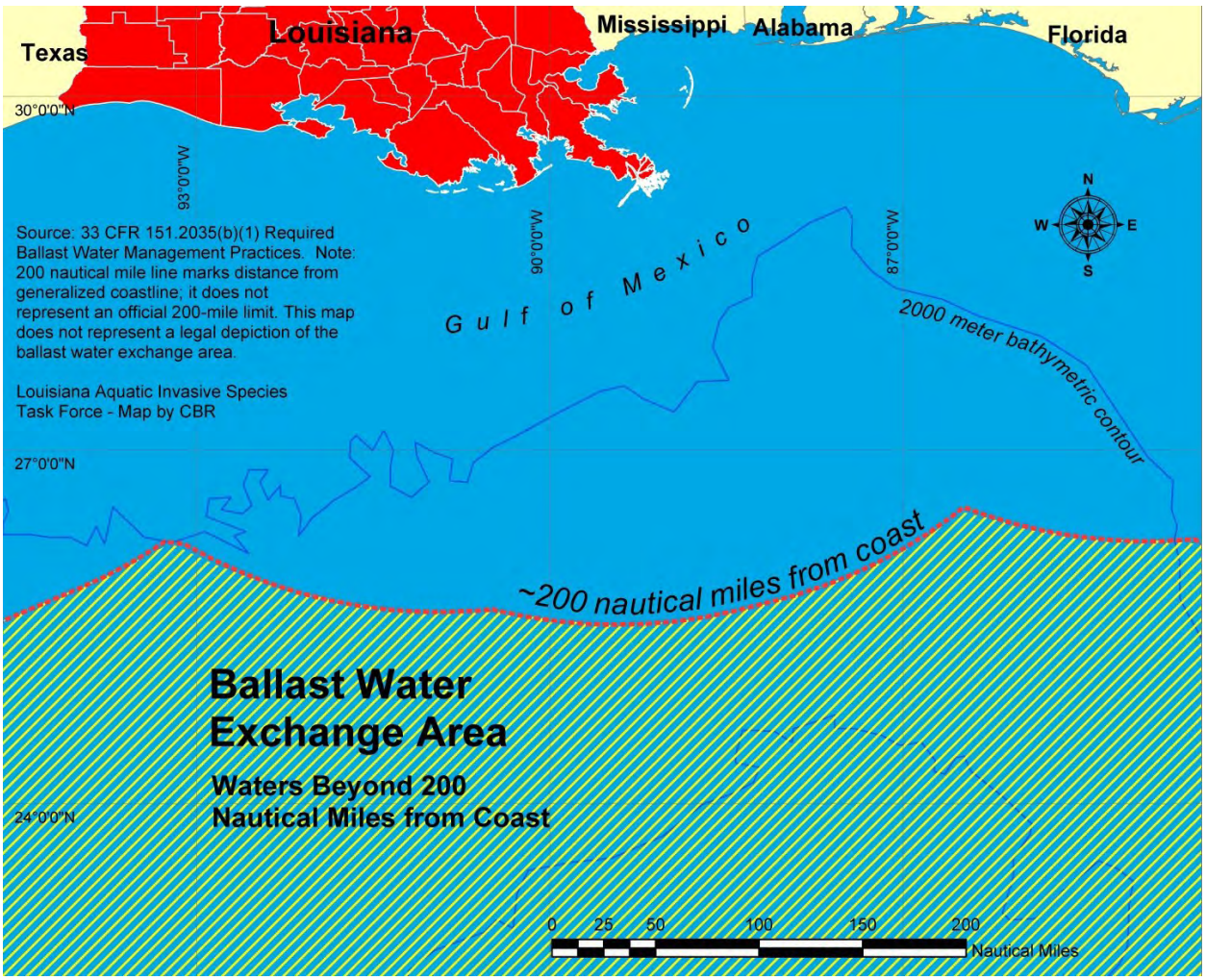
The USCG believes "defining mid-ocean ballast water exchange as taking place at least 200 [nautical miles] from shore allows more vessels to conduct exchange and simplifies enforceability."[25] This rule supercedes earlier regulations which restricted exchange to areas that were at least 200 nm offshore *and* deeper than 2,000 meters (6,562 feet).[26] Despite the NISA exemption for the Gulf of Mexico, the new USCG rule applies to all ships entering U.S. waters, including the Gulf of Mexico, from outside the EEZ.[27]

Despite these new regulations, risk remains for species introduction through ballast water exchange. Oil tankers, which comprise almost 25 percent of Louisiana shipping, are exempt from the above rules, as are military vessels and passenger ships with ballast water treatment systems.[28] Also, the new exchange requirement does not include coastwise trade, meaning that

[23] Meyers 2002; Barrett-O'Leary 2003.
[24] National Ballast Information Clearinghouse (no date); Port of New Orleans 2001.
[25] United States Coast Guard 2004.
[26] Meyers 2002; United States Coast Guard (no date).
[27] United States Coast Guard 2004.
[28] Gulf of Mexico Program 1998; United States Coast Guard (no date).

vessels traveling from the Caribbean to Gulf ports along continental coastlines will not be required to perform ballast exchange.

Carlton (2001) estimates that at least 7,000 species of marine life are transported around the world everyday, and ballast water arrives in the United States at a rate of 2 million gallons per hour.[29] Not enough data currently exist to evaluate fully the risk posed by ballast water discharges to Louisiana.



Ballast water, taken on by ships for stability, often incorporates species that are thence transported to new environs when the load is discharged. To minimize the risk of such introductions, ballast water should be "exchanged" in environs that will most likely kill the hitchhiking species. New U.S. Coast Guard guidelines restrict ballast water exchange to areas beyond 200 nautical miles offshore, superceding earlier regulations that required exchange in areas that were also at least 2000 meters deep. Removing the depth requirement significantly enlarged the area in the Gulf where exchange can occur. *Map by CBR, 2004.*

Marilyn Barrett-O'Leary, invasive species coordinator for Louisiana Sea Grant and a member of the Louisiana Aquatic Invasive Species Task Force, states "we have no idea how many or what species come into this region every day."[30]

One of the few regional studies on this issue was conducted in 1998 by Battelle for EPA's Gulf of Mexico Program. Battelle attempted to approximate the volume of ballast water discharged at five major ports in the Gulf of Mexico: Houston, Lower Mississippi, Gulfport, Mobile, and Tampa. The Port of Lower Mississippi was defined as the ports of New Orleans, Greater Baton Rouge, and

[29] Carlton 2001, page 12.
[30] Barrett-O'Leary 2003.

South Louisiana.[31] Battelle reported that "[t]he total ballast water released from ocean-going vessels in the three ports during 1996 [was] estimated at 26.6 million metric tons. This equates to 7.0 billion gallons per year, or approximately 13,400 gallons per minute."[32]

3.A.5.b Fouling of Ships, Dry Docks, and Drilling Platforms

Fouling organisms, such as barnacles, mussels, sponges, coelenterates, annelids, and seaweeds, can attach to vessels, dry docks, and drilling platforms. The worldwide transportation of vessels and infrastructure sometimes carries fouling species across oceans, a trip they normally would not survive if drifting on their own. The potentially high biological diversity of fouling organisms on ships led Godwin to describe ocean vessels as "biological islands" for organisms living in ports and estuaries.[33]

In 1999, Louisiana had 130 active drilling rigs, 4,489 producing oil wells, and 3,813 producing gas wells.[34] Though there are no species known to have been introduced via hull fouling, Louisiana's shipping economy and off-shore infrastructure offer ideal circumstances for this to occur.

3.A.5.c Dunnage

Dunnage is any loose material used to support and protect cargo from movement, moisture, contamination, or other damage. *Floor dunnage* protects moisture-sensitive cargo such as coffee, tea, and tobacco from water that may accumulate in the cargo hold. *Lateral dunnage* fills gaps between cargo. *Interlayer dunnage* is placed between cargo layers to prevent contamination of underlying cargo from top cargo. *Top dunnage* protects cargo against moisture, condensation, and contamination at the top of the cargo hold.[35]

Dunnage may serve as media for invasive species, or may itself be an invasive species. Some problematic dunnage materials include:

- wooden palettes
- jute coverings
- paper
- straw
- matting
- squared lumber
- planks or boards

Several invasive species in Louisiana arrived via dunnage. The premier example is the Formosan termite, which was introduced through infested wooden palettes (floor dunnage) during World War II. Another example is cogongrass, accidentally introduced to Mobile, Alabama, when it was used as a packing material in shipping crates. Now spreading across the Gulf South, cogongrass can be found in at least seven parishes in Louisiana. The imported red fire ant, known for its painful bite and aggressive behavior, was introduced in dunnage and ballast soil to Mobile in the 1930s, and quickly spread throughout the southern United States by transport of nursery stock and relocation of construction and landscaping equipment.[36]

(For more information on these invasive species, see the Species Section, 3.B.)

3.A.6 Deliberate Introductions

Species are introduced to new environs either accidentally or deliberately. Accidental introductions arrive through pathways such as those listed in the previous sections. Deliberate (or intentional) introductions are purposely brought in by humans, usually for economic gain and with little consideration for how the species may affect natural ecosystems. Deliberate introductions occur in

[31] Battelle grouped these three ports together because of their "location[s] and similar geographical attributes, as well as similar ship traffic and cargo."
[32] Gulf of Mexico Program 1998, page 14.
[33] Carlton 2001, page 12; Godwin 2001.
[34] Addison 1999c, page 4.
[35] Transport Information Service 2000.
[36] Agricultural Research Service 2002a; Johnson and Shilling 1998; Morisawa 2000.

the context of the aquaculture, agriculture, and fishing industries; aquarium and pet industries; gardening and landscaping; and others.

3.A.6.a Aquaculture Industry

Louisiana's flat terrain, abundant water supply, and productive wetlands foster a large aquaculture industry. If privately managed oyster leases are included, Louisiana devotes more total acreage to aquaculture than any other state. The Louisiana State University Agricultural Center (LSU AgCenter) estimates the total economic benefit to Louisiana from cultured aquatic species exceeded $203 million in 2001.[37] Major aquaculture commodities include crawfish, catfish, minnows, alligators, soft shell crabs, and fish species such as redfish, grass carp, and tilapia.[38] While many of these species are native to Louisiana and provide tremendous economic benefit, some species, including tilapia, grass carp, and black carp, pose a threat to natural resources when the species escape cultivation. These fish outcompete native fish for food and habitat and can alter ecosystems and food chains.

Tilapia are typically farm-raised for human consumption, but triploid grass carp are usually cultivated for the biocontrol of aquatic plants. Black carp are used as a form of biocontrol for snails and yellow grub (*Clinostomum margaritumin*) in aquaculture ponds.[39] To curb deliberate stocking of ponds and reservoirs with grass carp and tilapia, the state has made it illegal to "import, export, transport, culture, possess, dispose, transfer or sell" live tilapia and triploid grass carp without a permit from the Department of Wildlife and Fisheries.[40]

3.A.6.b Fishing and Fisheries

Freshwater sportfish are the fisheries most at risk from invasive species introductions, therefore commercial fisheries and marine sportfish will not be included in this section of the management plan. It is acknowledged, though, that some of the same concepts apply to these sectors.

Deliberate Fish Stocking for Sportfishing — According to the American Sportfishing Association, in 2001, the total economic impact of freshwater sportfishing to Louisiana was $759 million.[41] This figure is down from $1.03 billion in 1996.[42] Louisiana is known as "Sportsman's Paradise" because its waters and wetlands are rich in nutrients and biodiversity of species that recreational anglers and hunters find desirable. Some popular fish species are deliberately stocked by the Louisiana Department of Wildlife and Fisheries (LDWF) to ensure large numbers for sportfishing. Many stocked species are non-native, but few are considered invasive; on the contrary, most are regarded as beneficial and commercially valuable, such as striped bass (*Morone saxatilis*), which is native to some parts of southeastern Louisiana but has been stocked statewide.

In 2002, LDWF stocked more than 7.1 million fish in Louisiana public waters. The total number of fish stocked annually by LDWF has increased three-fold since 1997, when 2.4 million fish were stocked in public waters. The species stocked in 2002 included Florida largemouth bass, striped bass, hybrid striped bass, channel catfish, flathead catfish, bluegill/redear sunfish, paddlefish, and black crappie.[43]

Some species introduced to Louisiana waters for sportfishing now may be considered invasive. According to the U.S. Geological Survey (USGS), the redbreasted sunfish (*Lepomis auritus*) was intentionally introduced as a sportfish, but now scientists believe it may be displacing the native longear sunfish (*Lepomis megalotis*) through direct competition for resources.[44]

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[37] This figure includes proceeds from private and public leases of oyster beds in oyster production. LDWF has jurisdiction over most aspects of oyster production in Louisiana; however, oysters are regarded as both a commercial fishery and as a form of aquaculture.
[38] LSU AgCenter (no date).
[39] Nico 2000a.
[40] Aquaculture Exotic Species 2000.
[41] American Sportfishing Association 2002.
[42] American Sportfishing Association (no date).
[43] LDWF (no date).
[44] USGS (no date)a.

Accidental introductions could occur through deliberate fish stocking. Though the fish stocks themselves might not be invasive, the water used to transport them could be contaminated with invasive plants, invertebrates, or viruses. Fish stocks should be carefully inspected for such biological contaminants before relocation to a new water body. Fish stocking by unqualified individuals increases the chance of biological contamination. In addition to acting illegally, these individuals are less likely to adhere to regulations and standards regarding transport methods and equipment. Carlton (2001) states that though there are no data to report on the magnitude of illegal attempts to start new fisheries, "these attempts may be a significant source of introductions."[45]

Baitfish Introductions — Live bait also pose an invasive species risk. When anglers discard live bait or the bait's packing material into a water body, they may inadvertently introduce an invasive species to that water body. These actions are sometimes referred to as "bait bucket releases" or "bait bucket dumps." Anecdotal evidence indicates that this ostensibly small pathway may in fact contribute significantly to the invasive species problem. In some parts of the U.S., discarded earthworms intended as baitfish may be causing significant changes in forest plant compositions.[46]

Researchers believe that one fish species, the Rio Grande cichlid, may have been introduced in several locations on the south shore of Lake Pontchartrain both through aquarium releases and multiple bait bucket releases. University of New Orleans ichthyologist Martin O'Connell, Ph.D., states that bait bucket releases are a big problem on the south shore of Lake Pontchartrain and probably the rest of Louisiana as well.[47] The fathead minnow, a common baitfish species, is not generally regarded as invasive, but its widespread range in Louisiana and the rest of the United States is most likely due to numerous bait bucket dumps.[48]

3.A.6.c Nursery Industry and Water Gardens

A recent increase in interest has made water gardening one of the fastest growing sectors of the gardening and nursery industry, and sales of aquatic plants are greater than ever. This also means that the sale of aquatic invasive plants is on the rise. Since there is no specific data on invasive plant sales at nurseries and watergarden stores in Louisiana, we conducted an informal survey of selected nurseries in the New Orleans metropolitan area. The surveyed businesses included two national home improvement stores, a national pet and aquarium store, and two locally owned nurseries, one of which specializes in aquatic plants and water gardens.

Although some invasive plant species were found at the nurseries, such as parrot feather, Japanese and Chinese privet, and Brazilian waterweed, several common plant species we expected to find were not available. Some merchants expressed willingness to order the plants. We also found discrepancies in the naming of plants, which could confuse buyers who prefer native species.

University of Minnesota Researchers investigated the long-range transport of aquatic invasive plants through the water garden trade. In their experiment, Maki and Galatowitsch (2003) placed 40 aquatic plant orders for 681 plant individuals from catalogs and the Internet. Federally listed noxious plants, as well as plants banned or regulated by the state of Minnesota, were deliberately ordered to determine if state and federal regulations are followed. Once received, the plants were allowed to grow in a greenhouse for five weeks. The results were as follows:

- Federally listed noxious weeds and Minnesota-regulated plants were obtained in 92 percent of the orders requesting those species, including purple loosestrife and curly pondweed.
- Only one of 13 vendors informed the customer that he could not sell the plants because of regulations.

[45] Carlton 2001, page 13.
[46] Holdsworth, Hale, and Frelich 2003.
[47] O'Connell 2003.
[48] USGS (no date)a.

- Ninety percent of all purchases contained a plant species that was not specifically ordered, some of which (10 percent) contained banned or regulated plants, such as hydrilla, purple loosestrife, giant salvinia, or curly pondweed.

Every plant in this photograph, taken at a commercial aquatic nursery, is non-native to Louisiana and possibly to the United States. Water gardens and nurseries are an increasingly problematic pathway for invasive species in Louisiana. *Photo by CBR, 2003*.

- Forty-one percent of the orders contained seeds of both ordered and unordered plants.
- Fifteen percent of the orders contained misidentified plants.
- Other unintended organisms received were several invertebrates (snails) and some vertebrates, including two fish.[49]

LDWF maintains a list of noxious plants, however, the law behind it is inconsistent. The law states that the listed species cannot be transported into Louisiana, but it is not illegal to sell the plants or transport them within the state once they are already here.[50] Because of this loophole, invasive plants such as water hyacinth, giant salvinia, and water lettuce can be found at some Louisiana nurseries and water garden stores.

3.A.6.d Agriculture Industry

In general, agricultural commodities in Louisiana are non-native but not invasive. Many of Louisiana's most commercially important agricultural products are non-native plants and animals

[49] Maki and Galatowitsch 2003.
[50] Dugas 2003.

including cotton, soybeans, corn, cattle, rice, and sugarcane.[51] For 2002, the gross farm value of these and other agricultural commodities (both plant and animal) was approximately $3.04 billion. Once the agricultural products were processed, transported, and/or marketed, the value added for these commodities was about $3.72 billion, producing a total economic impact of $6.76 billion in 2002.[52]

Insects are the invasive pests most commonly associated with non-native agricultural crops. Some examples include:

- The Mexican boll weevil, a cotton pest that has caused an estimated $14 billion in damage to the cotton industry since its accidental introduction from Mexico in the 1890s[53]
- The sugarcane borer, a moth whose larvae bore into the sugarcane stalks causing plants to weaken or die. The invasive red imported fire ant is a predator of the sugarcane borer and, therefore, is favored by sugarcane farmers
- The sweetpotato weevil, an insect whose larvae bore into and tunnel through sweet potatoes, damaging the crop and rendering it unusable[54]

Although these insects are not aquatic and are thus beyond the scope of this management plan, it should be recognized that they cause extensive damage to important Louisiana crops. The U.S. Department of Agriculture (USDA) and the Louisiana Department of Agriculture and Forestry (LDAF) have extensive resources to control or eradicate these agricultural pests. Regarding the spread of invasive insect pests, such as the Asian long-horned beetle expanding its U.S. range, the USDA has rapid response plans already in place.

3.A.6.e Aquarium and Pet Industry

Aquarium Release — The majority of plant and animal species sold in aquarium and pet stores are non-native. These sales of non-native species represent a "deliberate pathway," by which more than 2000 fish species are introduced to the United States every year, primarily from Central and South America, Africa, and Southeast Asia.[55] To become invasive, the species must escape, establish itself in the wild, reproduce and spread, and exert a negative impact or economic or ecological effect. Aquarium releases usually occur when an aquarium or pet owner no longer wishes to care for his or her pet; the owner chooses to be "humane" and releases the pet into a water body. This is sometimes referred to as "aquarium dumping."

Many non-native fish and plants have been introduced to the United States through suspected aquarium dumping. According to the USGS, "at least 185 different species of exotic fishes have been caught in open waters of the United States, and 75 of these are known to have established breeding populations. Over half of these introductions are due to the release or escape of aquarium fishes."[56] Some examples of suspected aquaria releases in Louisiana include the Rio Grande cichlid, giant salvinia, Brazilian waterweed, hydrilla, and koi / common carp. (For more information on any of these species, see the Species Section, 3.B.)

Misidentified Aquarium and Pet Store Species — In March 2000, the Louisiana Department of Agriculture and Forestry (LDAF) discovered that the East Baton Rouge Science Resource Center, a public school entity, was using "golden apple snails" as part of an elementary school ecology project. The snails were obtained from a local pet store that sold them under the name *Pomacea bridgesi*, sometimes known as the spiketop apple snail, the Brazilian apple snail, or the albino mystery snail. However, APHIS Plant Protection and Quarantine National Identifier David Robinson, Ph.D., confirmed the species to be *Pomacea canaliculata*, the channeled apple snail, an invasive species and a potential threat to the rice industry. After that discovery, LDAF surveyed 32 pet stores in Louisiana and found that 31 percent carried *Pomacea canaliculata* or a closely related

[51] Evers and Barrett-O'Leary 2002.
[52] LSU AgCenter 2003, page 19.
[53] Center for Bioenvironmental Research 2002.
[54] Capinera 2001; Capinera 1998.
[55] USGS (no date)b.
[56] USGS (no date)b.

species under generic common names such as “golden apple snail”, “apple snail”, or “mystery snail.” Only one store used scientific names, but used an incorrect one for the snail species.[57] This case study illustrates the potential pathway of invasive species introductions through aquarium and pet stores, a problem exacerbated by the frequent misidentification of species by vendors. (For more information, see Channeled Apple Snail, section number 3.B.3.c.iii.)

Live aquatic plant sales are problematic as well. Hundreds of online aquarium supply websites sell thousands of non-native plant and animal species. One example is www.LiveAquaria.com, an aquarium supplies vendor that delivers aquatic plants “Direct to Your Door.”[58] Many of these plants are exotics known to be invasive. A common example is the oxygenating plant “Anacharis”, otherwise known as Brazilian waterweed. (See section 3.B.1.a.vi for more information.) Despite the establishment of this invasive plant in 33 states,[59] LiveAquaria.com praises this plant as “an ideal aquatic plant for beginners” and “an excellent oxygen producer for all types of freshwater aquariums.”[60] LiveAquaria.com’s “Anacharis” sales page states that the plant cannot be shipped to New Hampshire, Vermont, or Washington but does not explain why.

Other invasive species for sale on LiveAquaria.com include water hyacinth, parrot feather, various apple snails only identified to the Genus *Pomacea*, and koi / common carp. The website also offers a fish identified as the Texas cichlid, *“Herichthys cynoguttatus”* [sic], also called the Rio Grande Perch or Rio Grande cichlid.[61] Ichthyologist and Rio Grande cichlid expert Martin O’Connell, Ph.D., confirmed that the fish on the LivaAquaria.com website is the Rio Grande cichlid and noted that although there is some debate over whether this species belongs in the Genus *Herichthys* or *Cichlasoma*, the misspelled species name on the website could lead to further confusion.[62] The Rio Grande cichlid is established and becoming invasive in Lake Pontchartrain and the connected New Orleans drainage canals. (For more information on any of these species, see the Species Section, 3.B.)

Solutions to these problems include education (such as signage at marinas and piers warning against aquarium dumping), internal pet industry education and self-regulation, and, as last resort, state regulation.

3.A.6.f Fur Industry

Historically, native mammals, including muskrat, beaver, wild mink, fox, and bobcat, have been trapped for fur in Louisiana. In the 1930s, fur interests and others introduced nutria to Louisiana, primarily to offer a new fur resource to the state, and secondarily as a biocontrol for the invasive plant water hyacinth. Although legend says that Tabasco Sauce™ tycoon E.A. McIllhenny was responsible for the escape of 20 nutria held at Avery Island, recently discovered documents indicate that fur trappers or growers deliberately released nutria at several other locations in coastal Louisiana in the 1930s and 1940s.[63]

By the 1950s, the number of nutria harvested every year exceeded 200,000 individuals and did not fall below that level until the late 1980s and early 1990s. In fact, until about 15 years ago, nutria harvesting was so profitable that harvests exceeded 1,000,000 individuals every year between 1961 and 1980, when the price per pelt hovered between $7 and $8. During the late 1970s and early 1980s, nutria fur harvests were a $15 million per year industry. In 1988, a few years after the price of nutria fur peaked and the number of animals harvested annually fell, landowners began noticing an increase in the nutria population and in damage to vegetation occurring on their properties.[64]

[57] Hardy 2001.
[58] LiveAquaria.com (no date)a.
[59] USGS (no date)c.
[60] LiveAquaria.com (no date)a.
[61] LiveAquaria.com (no date)b.
[62] O’Connell 15 May 2003.
[63] Linscombe 2003a.
[64] Linscombe 2003a.

A variety of factors contributed to the decline of the nutria market, including a series of mild winters in Europe and Russia, previously the largest importers of nutria furs; an overproduction of ranch mink, which lowered the price of mink fur; a saturation of the fur market among people most likely to purchase fur coats; and an increased preference for leather coats, particularly for women. Contrary to popular belief, the animal rights movement caused, at most, a minor impact on this decline. Despite concerted efforts to increase demand through advertising under the label BayouNutria™, the demand for nutria never rebounded. The Fur and Alligator Advisory Council of Louisiana, in partnership with the Louisiana Department of Wildlife and Fisheries, recently attempted to create a demand for nutria meat, but these efforts, too, have proven disappointing, despite the support of famous chefs such as Paul Prudhomme.[65]

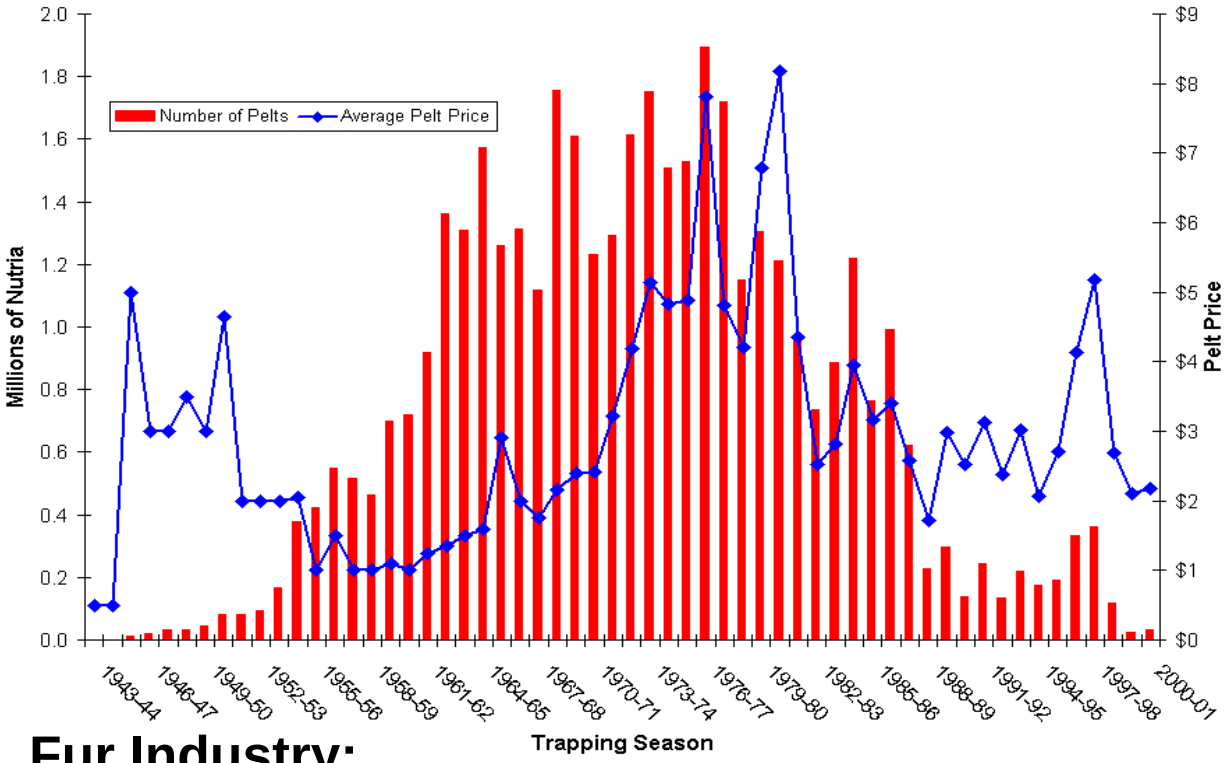
This South American rodent has become one of Louisiana's most notorious invasive species, wreaking ecological havoc on native wetland vegetation and contributing to Louisiana's coastal erosion problems. To help control nutria, a new bounty program, designed to create an economic incentive for trappers to harvest nutria, was implemented in 2002. (For more information on nutria and the nutria bounty program, see section 3.B.4.a.i on "Nutria" in the Species Section of the management plan.)

3.A.6.g Cultural Traditions

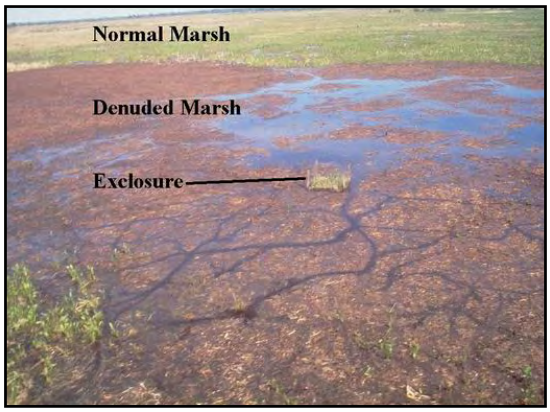
For purposes of this management plan, "cultural traditions" are defined as traits associated with the ethnic or religious identity of a people beyond the influence of economics (which is covered by the sections on agriculture, fishing, shipping, boating, etc). Although Louisiana once ranked as a premier destination for immigrants to the South, few present-day invasive species in the state can be traced back to an original introduction for reasons of cultural tradition. Nationally, there are a number of examples. In 1997, a Buddhist group purchased 2,500 fish from a pet store in New York's Chinatown and released them in a New Jersey pond. Some Buddhists believe that setting animals free is an act of compassion that will be rewarded with good karma.[66] Similar cultural pathways may exist in Louisiana.

For example, the eastern New Orleans neighborhood known as Versailles is home to an enclave of Vietnamese refugees and their descendents, first established in the mid-to-late 1970s. As is common to many refugee and immigrant communities, the elders of this group re-established cultural traditions practiced in their homeland for generations, including the creation of intensively cultivated backyard vegetable gardens. According to geographer Christopher A. Airriess, "approximately 34 different leafy green vegetables, tubers, cucurbits, condiments and herbs, legumes, and medicinal plants not common to the Western diet are cultivated [in Versailles gardens]. The plants are propagated from seeds or cuttings acquired from enclave stores, sent directly from Vietnam, or acquired from enclave friends and relatives."[67] It is not the intention of the Task Force to condemn such traditions, as they play important roles in the acculturation of recently arrived refugees and immigrants. Indeed, European charter groups indulged liberally in the introduction of species from their homelands upon their initial arrival. Nevertheless, the possibility of a genuinely harmful species arriving and spreading via this pathway cannot be overlooked by agencies charged with the protection of the greater public good. Management actions that assess the risk level of such introductions and propose reasonable and appropriate responses if the risk level is significant would be of interest to Louisiana's invasive species efforts.

[65] Linscombe 2003a.
[66] West 1997.
[67] Airriess 2002.



Fur Industry: Nutria



Fur interests introduced nutria to Louisiana in the 1930s. By the 1950s (graph, top), the number of nutria harvested every year exceeded 200,000 individuals, and until about 15 years ago, nutria pelts were so profitable that harvests resulted in a $15 million per year industry. In 1988, after harvests fell, landowners began noticing increased nutria populations and damaged vegetation. This South American rodent has since wreaked ecological havoc on native wetland vegetation and is contributing to Louisiana's coastal erosion problems. *Graph data and photos by LDWF.*

3.B Species

Aquatic species are organisms living primarily in a water environment. Usage commonly refers to aquatic plants such as water hyacinth and salvinia, fish, and invertebrates, but also includes mammals such as nutria. The definition of "aquatic species" has been expanded for this management plan to include species that arrived through aquatic pathways. Therefore, the Louisiana Aquatic Invasive Species Management Plan will address some species that are not traditionally considered aquatic, such as cogongrass and Formosan termites.

3.B.1 Aquatic Plants

Aquatic invasive plants of Louisiana are categorized in this management plan as Extensively Established Species, Locally Established Species, and Potential Arrivals, based on range data from the USGS Nonindigenous Aquatic Species Program. Aquatic invasive plants found in eight or more of the 13 drainage basins spanning Louisiana and adjacent area were categorized as "Extensively Established Species." Those that occur in three to seven drainages were categorized as "Locally Established Species," and plants found in two or fewer drainages were listed as "Potential Arrivals."

It is important to note that this method of categorization emphasizes distribution in the state rather than density in a particular location. One plant species sparsely distributed throughout eight drainages may be listed as "extensively established", whereas another species could be extensively established in only one drainage basin but listed only as a "locally established species".

Also, note that not all non-native plants listed by USGS as present in Louisiana appear in this section. Only those plants generally recognized as the most problematic, regardless of establishment, are described below. (Please see Appendix B for a complete list of all aquatic invasive plants in Louisiana.)

3.B.1.a Extensively Established Species

According to USGS, the following aquatic plants occur in eight or more drainage basins in Louisiana:

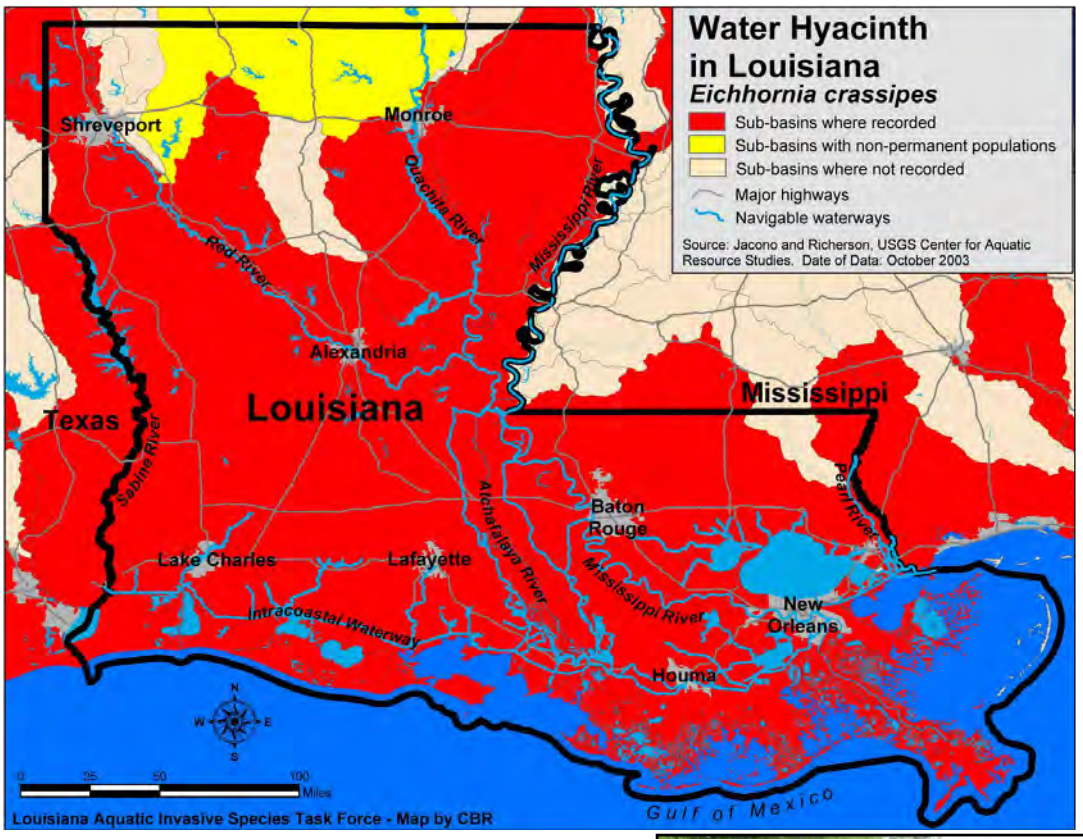
3.B.1.a.i Water Hyacinth (*Eichhornia crassipes*)

Water hyacinth was first introduced to the United States as an ornamental plant at the World's Industrial and Cotton Centennial Exposition in New Orleans in 1884-1885. A South American native, water hyacinth frequently clogs bayous and canals, impedes boat traffic, slows water currents, and blocks light to native submerged aquatic vegetation (SAV) which degrades water quality and harms wildlife. Known for its beautiful flowers, hyacinth can be found in almost every drainage basin in Louisiana.[68]

3.B.1.a.ii Chinese Tallow Tree (*Sapium sebiferum*)

Benjamin Franklin first introduced Chinese tallow trees to the United States in 1772 as ornamentals.[69] Widely sold by nurseries and promoted by landscapers for its attractive red and green foliage, the hardy Chinese tallow — a source of tallow oil and wax — was also planted throughout the Gulf South in the early 20th century in hopes of establishing a local soap industry.[70] Tallow trees escaped tree farms when natural processes (animal interaction, bird consumption, wind, etc.) spread the seeds over long distances. Today, these trees are considered nuisances in many Louisiana prairies, parks, and wetlands.

[68] Jacono and Richerson 2003.
[69] McQuaid 1998.
[70] USGS 2000a.



Water Hyacinth

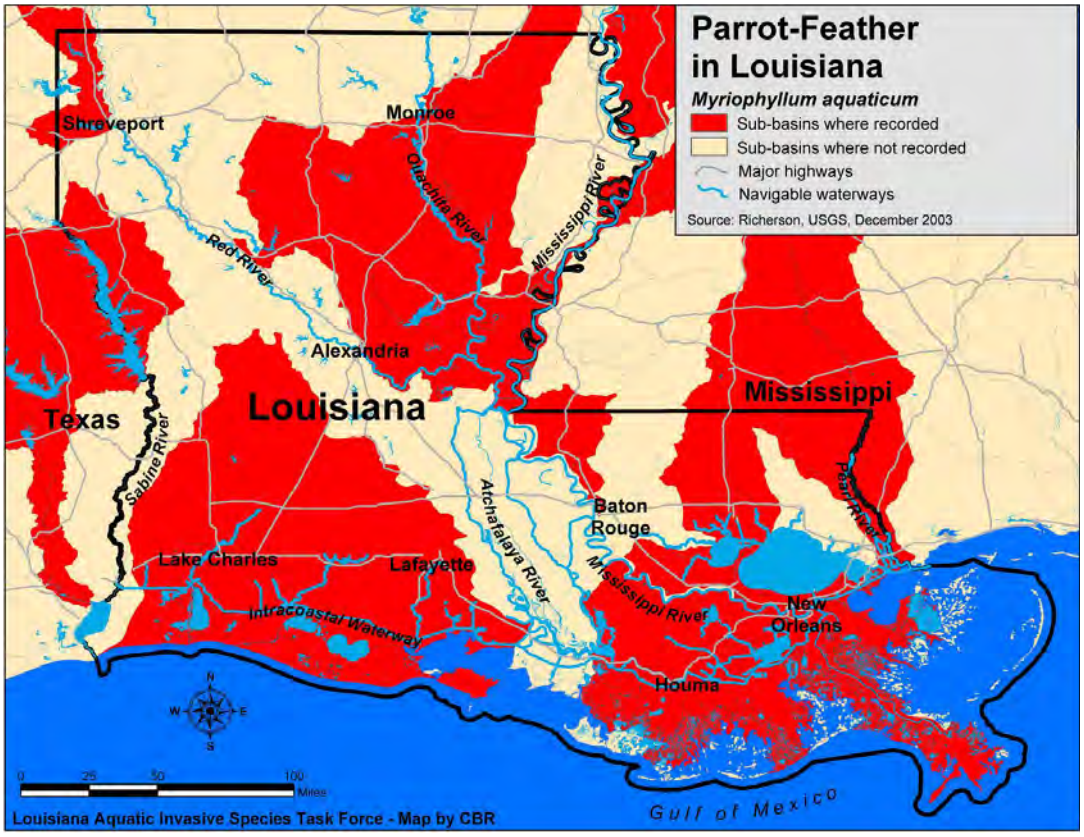
Distribution of water hyacinth in Louisiana (map, top), aggregated by drainage basin. First introduced to the U.S. as an ornamental plant at an exposition in New Orleans in 1884-1885, this South American native frequently clogs waterways, impedes boat traffic, slows water currents, and blocks light to submerged vegetation, which degrades water quality and harms wildlife. Because of its attractive purple flowers, water hyacinth quickly became popular among gardeners and landscapers. Many invasive species are aesthetically appealing, which aids their spread and exacerbates their ecological and economic harm. This invasive plant infests nearly 200,000 acres of Louisiana's waters. *Map and photos by CBR, 2003-2004.*

Chinese Tallow

Chinese tallow trees can reach up to 30 feet in height and form dense monocultures in wooded areas, affecting the growth of native trees and shrubs. *Photo by CBR, 2004.*

Parrot Feather

Distribution of parrot feather in Louisiana (map, below), aggregated by drainage basin. A popular plant in aquatic gardens and aquariums, parrot feather probably escaped through aquarium releases into open water bodies. It can reproduce vegetatively, so boat traffic or the natural flow of water may serve as a pathway. Parrot feather is also known as Brazilian watermilfoil and is sometimes mistaken for Eurasian watermilfoil. *Map by CBR, 2004.*



Still sold by some plant nurseries, Chinese tallow trees grow quickly and resist many pests. Sometimes called "popcorn trees," they can grow to a height of 30 feet, tend to form thick stands, and can easily shade-out native plants. Chinese tallow trees are dispersed throughout almost every Louisiana parish. [71]

The Louisiana Department of Agriculture and Forestry runs a state-wide cost-share program with private landowners to combat Chinese tallow trees. Tallow trees can be controlled with fire and some chemical spraying in pine stands, but these methods are not effective in bottomland hardwood forests because fire and chemicals kill deciduous trees.[72]

3.B.1.a.iii Parrot feather (*Myriophyllum aquaticum*)

Parrot feather is a submerged aquatic plant that can grow in riparian areas and at water surfaces. Sold at gardening centers, and frequently under an incorrect name,[73] parrot feather is also known as Brazilian watermilfoil and is sometimes mistaken for its "cousin", Eurasian watermilfoil (*Myriophyllum spicatum*).

This aquatic weed is a native of the Amazon River basin in South America, but is now found worldwide. Its exact date of introduction to the U.S. is unknown, but it was first discovered here in a Washington, D.C., pond in 1890. A popular plant in aquatic gardens and indoor and outdoor aquariums, parrot feather probably escaped cultivation through aquarium releases into open water bodies. It can reproduce vegetatively, so boat traffic or the natural flow of water may serve as a pathway in spreading it.

Brazilian watermilfoil shades out native submerged aquatic vegetation and seriously disrupts the aquatic food chain. This aquatic weed can block waterways, suspending boat traffic and fishing, and could potentially clog irrigation and drainage canals. Thick growth at the water surface can also provide ideal mosquito breeding habitat.[74]

3.B.1.a.iv Hydrilla (*Hydrilla verticillata*)

Originally from Asia, hydrilla is a rooted, aquatic weed that inhabits both deep and shallow waters. In shallower areas, hydrilla forms thick mats that impede boat traffic and swimming. It adversely affects water quality by shading out native vegetation, lowering dissolved oxygen concentrations, and can result in fish kills.[75]

It is believed that hydrilla was first discarded from a home aquarium or possibly was planted in canals in Miami and Tampa, Florida. Accidental introduction through boating, usually when attached to a boat or boat trailer, is the primary pathway spreading hydrilla into new areas. Hydrilla is appearing more frequently in Louisiana drainages, particularly in the Atchafalaya Basin and along Highway 1. In Bayou Lafourche, Louisiana, hydrilla clogged an intake pipe for a drinking water treatment plant, causing public health concerns. At times, it made several water bodies virtually unusable for aquatic recreation, in particular the Spring Bayou Wildlife Management Area and Henderson Lake in the Atchafalaya Basin.[76]

3.B.1.a.v Wild Taro (*Colocasia esculenta*)

Wild taro was initially introduced to North America in association with the slave trade, but spread when the U.S. Department of Agriculture promoted it as a substitute for potatoes in the early 1900s. Wild taro forms dense growth stands in riparian zones and displaces native vegetation.[77] Many types of taro are sold at garden stores as ornamental plants.

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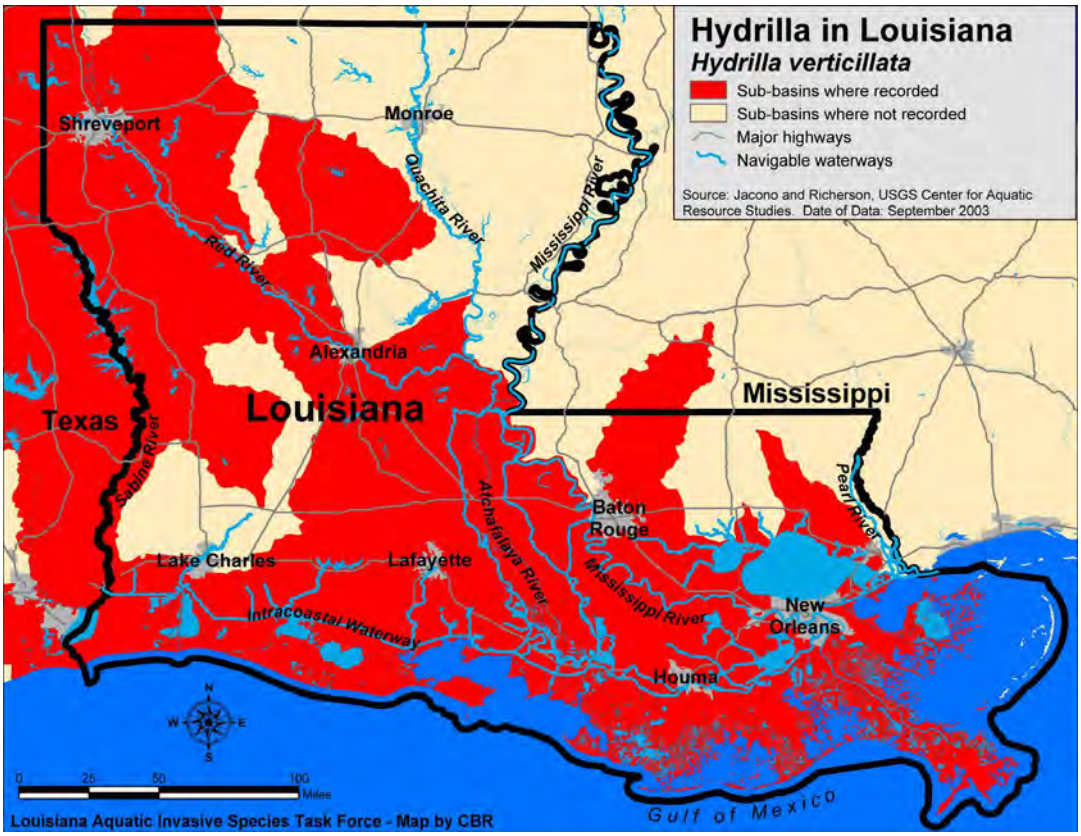
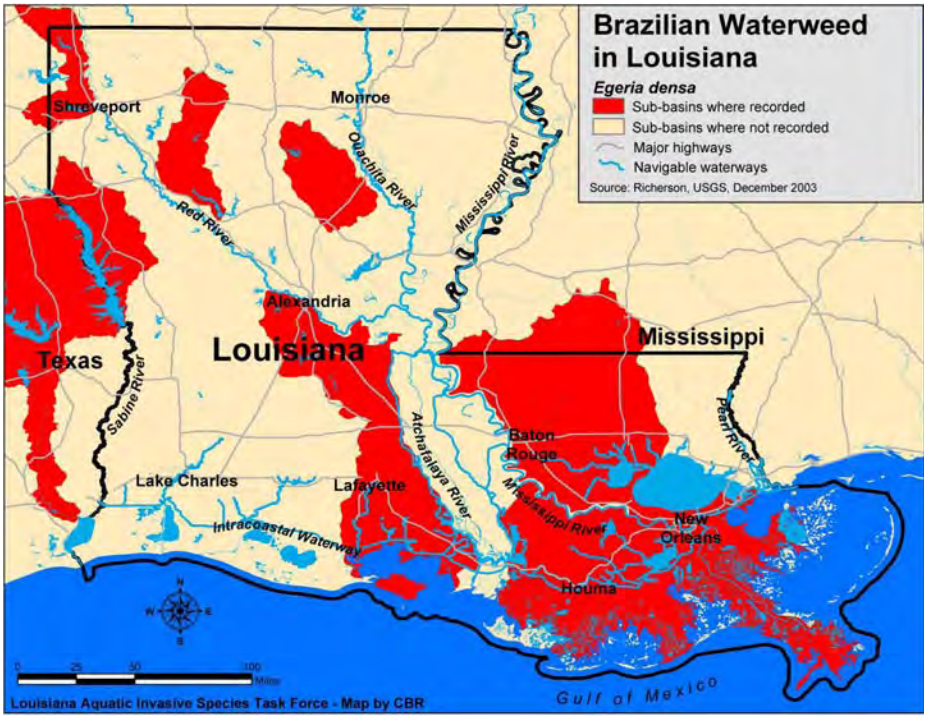
[71] University of Florida Center for Aquatic and Invasive Plants 2001a.
[72] Frey 2003.
[73] University of Florida Center for Aquatic and Invasive Plants 2001b.
[74] Washington State Department of Ecology 2003.
[75] Jacono 2002a.
[76] Jacono 2002a; Lovell and Bahlinger 2002.
[77] University of Florida Center for Aquatic and Invasive Plants (no date).

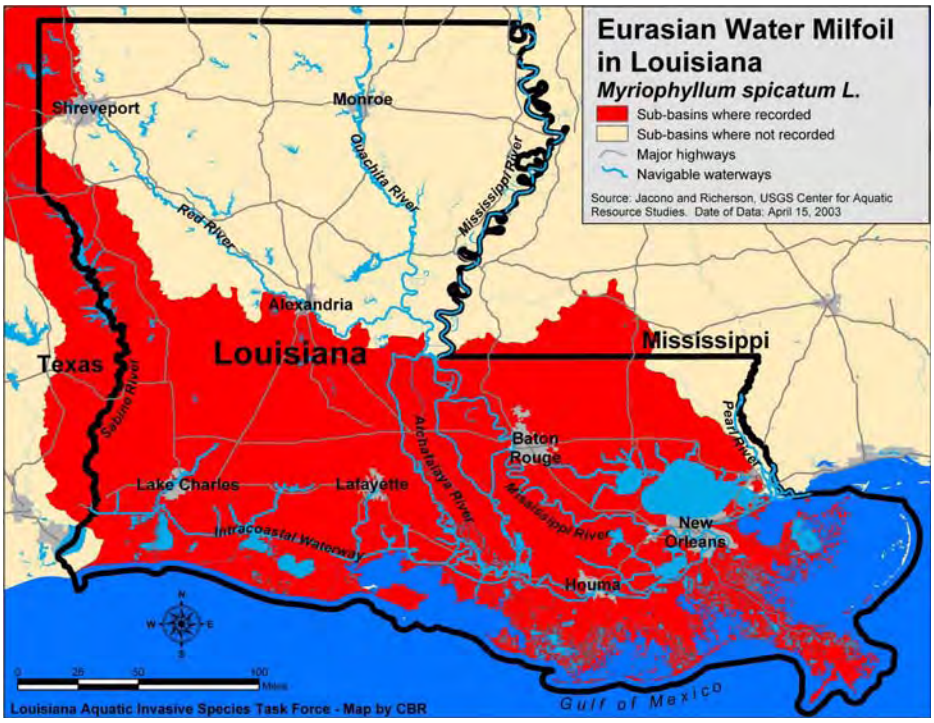


Hydrilla

Distribution of hydrilla in Louisiana, aggregated by drainage basin. This rooted aquatic weed from Asia forms thick mats which can impede boat traffic and swimming, diminish water quality, and kill fish. In Bayou Lafourche, hydrilla clogged an intake pipe for a drinking water treatment plant (A), causing public health concerns. To alleviate the infestation, a hydrilla mower clears a mat on Bayou Lafourche (B). *Map by CBR, 2003-2004. Photos by BTNEP, 2003.*



Distribution of Brazilian water weed in Louisiana, aggregated by drainage basin. Deliberately introduced by the aquarium trade, this aquatic weed became established in the wild most likely through aquarium releases. It may also have been planted for malaria eradication, as its oxygenating properties led researchers to believe it could control mosquito larvae. *Map by CBR, 2004.*



Distribution of Eurasian water milfoil in Louisiana, aggregated by drainage basin. Eurasian watermilfoil was first recorded in the U.S. in Washington, D.C. in 1942, possibly introduced intentionally by federal authorities. It has since spread throughout the U.S. as a disposed packing material for baitworms, and as vegetative debris attached to boats and boat trailers. It is still sold by some pet stores and on the Internet as an aquarium plant. *Map by CBR, 2004.*

3.B.1.a.vi Brazilian Waterweed (*Egeria densa*)

Since as early as 1915, Brazilian waterweed has been a popular aquarium plant for its rapid growth and oxygenating properties. Pet and aquarium stores sometimes sell this plant under the name "Anacharis". To date, it is one of the most widely distributed and utilized aquarium oxygenator plants. Also known as common waterweed and Brazilian elodea, *Egeria densa* prefers the slow-moving waters of streams, ponds, and lakes.

The aquarium trade deliberately introduced this aquatic weed, but its establishment in natural ecosystems is likely due to aquarium releases. It may also have been planted for malaria eradication: its oxygenating properties led researchers to believe it could control mosquito larvae.[78]

Brazilian waterweed forms thick mats at the water surface, impeding recreational activities such as swimming, boating, and fishing. The weed chokes out native vegetation and degrades water quality and fish habitat. *Egeria densa* can reproduce vegetatively and is therefore prone to spreading through boat traffic and water currents.[79]

3.B.1.a.vii Eurasian Watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil, also called spike watermilfoil, aggressively outcompetes native vegetation and degrades water quality for fish and birds. *Myriophyllum spicatum* prefers slow moving waters, such as ponds, lakes, bayous, shallow reservoirs, streams, and low-energy rivers, but can tolerate brackish waters. It forms thick, dense mats at the water surface and impedes recreational activities, such as boating and swimming.[80]

Myriophyllum spicatum was first recorded in the United States in Washington, D.C., in 1942, possibly an intentional introduction by federal authorities. Its rapid spread throughout the country may derive from its use as packing material for baitworms sold to fishermen. Today, the most common pathway is vegetative fragments attached to boats and boat trailers. Eurasian watermilfoil is still sold by some pet stores and on the Internet as an aquarium plant. Some introductions may be due to aquarium releases.[81]

3.B.1.a.viii Water Lettuce (*Pistia stratiotes*)

Water lettuce is a floating plant resembling a head of lettuce with thick green leaves. A perennial, water lettuce infestations impede boat traffic, swimming, fishing, and other recreational activities. It degrades water quality for native vegetation and adversely affects fish and bird populations.

Some experts believe the plant is native to Africa and was introduced in ballast water by early explorers (there are records of *Pistia stratiotes* in Florida as early as 1765). Though this plant is on the Federal Noxious Weed List, water lettuce is still available through aquarium suppliers and on the Internet.[82]

3.B.1.a.ix Common Salvinia (*Salvinia minima*)

A floating fern, common salvinia is also sometimes called "water spangles" or "water fern." *Salvinia minima* prefers slow-moving freshwaters such as bayous, cypress swamps, marshes, and ponds and lakes. Common salvinia forms thick mats on the water surface, up to almost 25 centimeters (10 inches) deep in some instances. These mats shade and crowd-out native plants, degrading habitat for fish and birds and negatively affecting water quality.[83]

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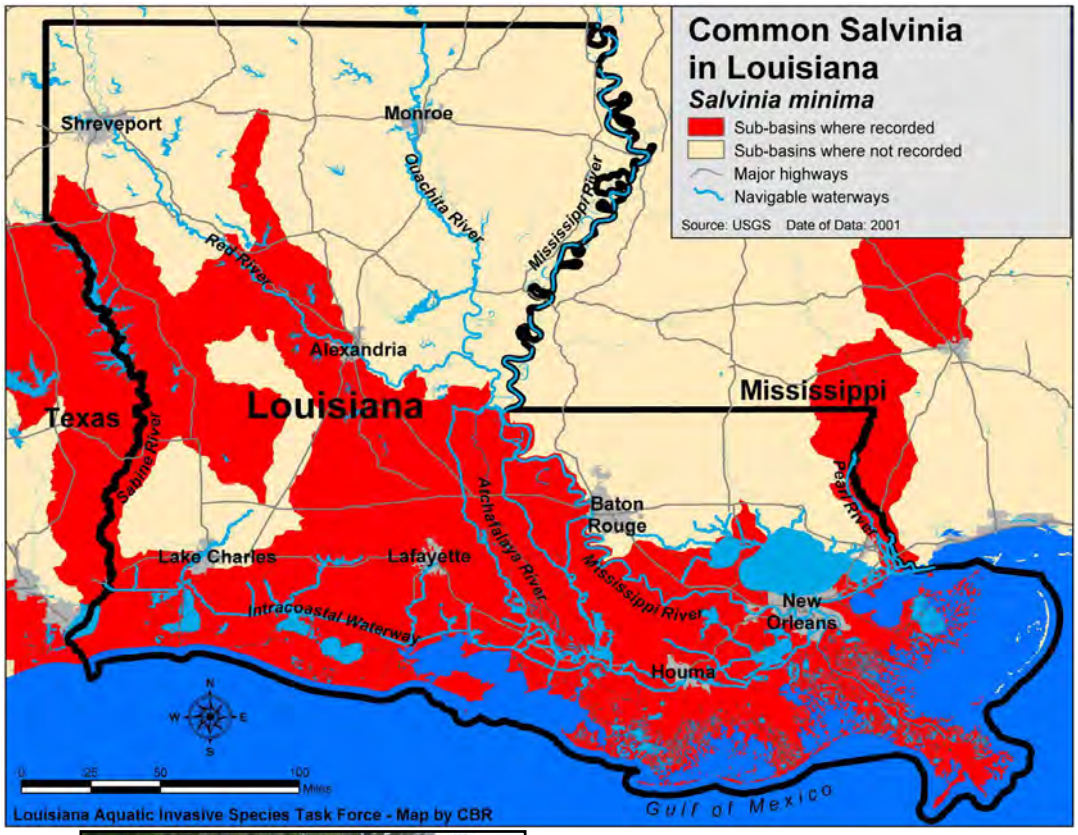
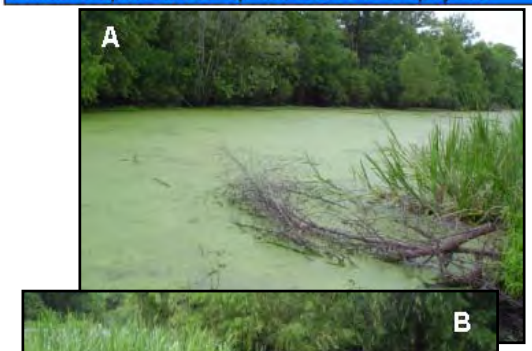
[78] University of Florida Center for Aquatic and Invasive Plants 1996.
[79] Washington State Department of Ecology (no date)a.
[80] Jacono 2002b; University of Florida Center for Aquatic and Invasive Plants 2001c.
[81] University of Florida Center for Aquatic and Invasive Plants 2001c; Jacono 2002b.
[82] Ramey 2001.
[83] Jacono 2002c.



Common Salvinia



Distribution of common salvinia in Louisiana, aggregated by drainage basin. This Central and South American native has been cultivated in water gardens in the United States since the 1880s. First recorded in Louisiana in 1980 in the Bayou Teche area of St. Mary Parish, common salvinia has since spread into rice and crawfish farms via irrigation systems and is now considered a nuisance throughout the state. Common salvinia frequently spreads when boaters fail to wash their boats and trailers before launching at new ramps. In photo A, taken in St. John the Baptist Parish, salvinia covers the surface of a canal, hindering boat traffic; in photo B, it lines the edge of a boat ramp. Photo C shows common salvinia in swamp waters of Tangipahoa Parish. Salvinia and other aquatic weed mats provide ideal habitat for mosquitoes and other disease-carrying organisms. *Map and photos by CBR, 2004.*

LSU researchers release Florida-strain salvinia weevils in an experiment to control common salvinia at Cypress Lake. Biocontrol can be an effective method for curbing the spread of invasive species, but risks introducing new species which can prove even more harmful. *Photo by LSU Agricultural Center*.

This Central and South American native has been cultivated in the United States since the 1880s for water gardens. Researchers believe *Salvinia minima* escaped from cultivation into Florida's St. Johns River in 1928, probably when a water garden flooded, but possibly from an intentional release. It was first recorded in Louisiana in 1980 in the Bayou Teche area of St. Mary Parish, and is now considered a nuisance throughout the state. Introduction into rice and crawfish farms via irrigation practices has caused problems for farmers. One of the most common *Salvinia minima* pathways is boat traffic traversing Louisiana's waterways. [84]

The USDA Agricultural Research Service, in cooperation with the National Park Service, is experimenting with the Florida salvinia weevils (*Cyrtobagous salviniae*) as a form of biocontrol for common salvinia. Tests began in June 2002 at Jean Lafitte National Historical Park and Preserve. The sites are monitored regularly for survival of the weevils and for salvinia damage. Despite additional weevil releases in August and December 2002, the March 2003 surveys did not find any adult weevils. However, a July 2003 survey resulted in the discovery of one adult. It is believed that this weevil, though solitary, is part of a new generation from a reproducing population. An additional 1,000 salvinia weevils were released at the experiment sites in June and July 2003.[85]

3.B.1.b Locally Established Species

According to USGS, the following aquatic invasive plants occur in three to seven drainage basins in Louisiana:

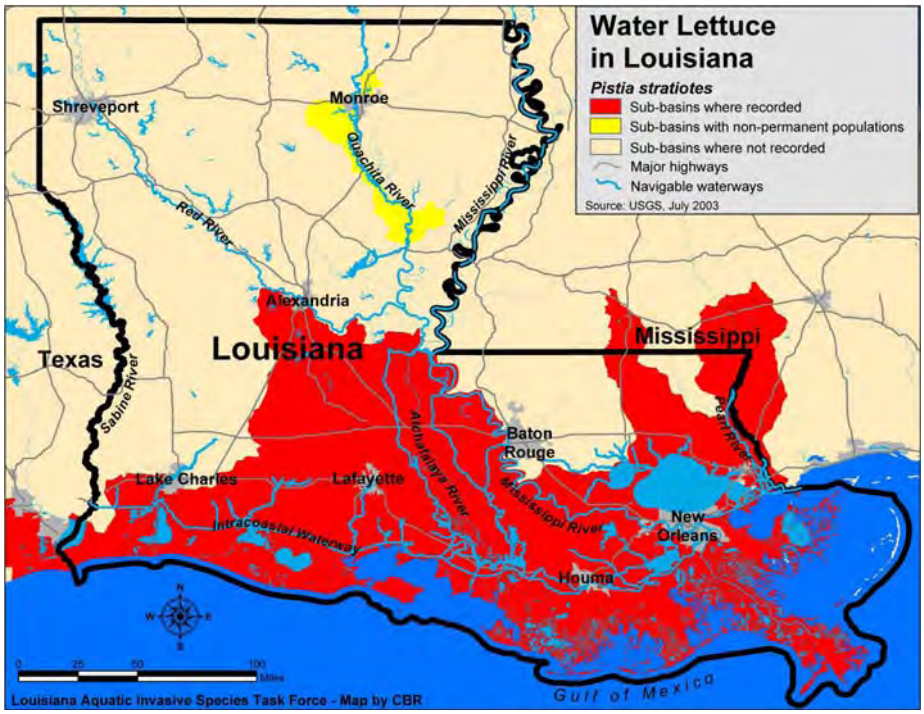
3.B.1.b.i Giant Salvinia (*Salvinia molesta*)

Salvinia molesta was probably intentionally introduced to the United States as an aquarium plant, and, in fact, has been linked to several aquatic plant nurseries. The plant was probably kept in an aquarium until overgrowth occurred, at which point the aquarium contents were dumped into a local stream or pond.[86] Giant salvinia expands its range through reproduction, wind transport, and boaters and fishermen who do not rinse their gear.

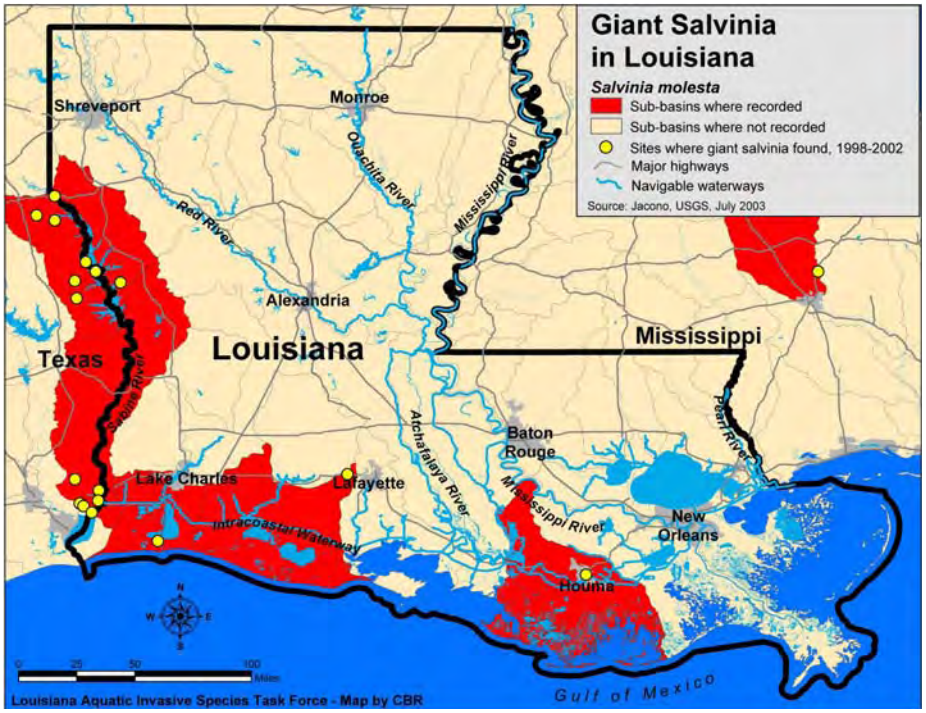
Giant salvinia first appeared in Louisiana in 1998 in the Toledo Bend Reservoir on the Texas-Louisiana border. Since then, it expanded into at least 15 locations throughout southern Louisiana. It is a free-floating, rootless plant that reproduces quickly; under ideal conditions, *Salvinia molesta* can double its biomass every seven to ten days. It chokes bayous and canals, and can cover large portions of lakes and reservoirs, degrading water quality, harming wildlife, and impeding boat traffic. In Cameron Parish, Louisiana, giant salvinia posed a public health threat because it blocked the operation of floodgates.[87]

The USDA Agricultural Research Service is working with Texas Parks and Wildlife to determine the success of the Florida salvinia weevil (*Cyrtobagous salviniae*) as a biocontrol for *Salvinia molesta*. Experiments begun in 2001 are ongoing. March 2003 surveys found the adult weevils over-wintered at all release sites, and numbers of weevils appeared larger than in 2002. Biomass of *Salvinia molesta* appeared to be decreasing. In June 2003, surveys found adult weevils at all sites, but in smaller numbers than were found in March. Researchers state, "The reason for this is simple and very exciting: much of the giant salvinia is no longer suitable for feeding."[88] Researchers observed rotting and sinking mats of *Salvinia molesta* vegetation, and no healthy, undamaged buds were found. Overall, water coverage was down from 100 percent in March to 60 percent in June.

[84] Jacono 2002c.
[85] Tipping, Center, Hulslander, and Muth 2003.
[86] Jacono 2002d.
[87] Jacono 2002d; Louisiana Aquatic Invasive Species Task Force 18 September 2002.
[88] Tipping, Center, Helton, and Findeisen 2003.



Distribution of water lettuce in Louisiana, aggregated by drainage basin. Water lettuce infestations impede boat traffic, swimming, fishing, and other recreational activities. Some experts believe this perennial is native to Africa and was introduced in ballast water by early explorers. Though on the Federal Noxious Weed List, water lettuce is still available through aquarium suppliers and on the Internet. *Map by CBR, 2004.*



Distribution of giant salvinia in Louisiana, aggregated by drainage (red) as well as individual sites (yellow). Giant salvinia first appeared in Louisiana in 1998 in the Toledo Bend Reservoir on the Texas-Louisiana border. Since then, it expanded into at least 15 locations throughout southern Louisiana. It chokes bayous and canals, and can cover large portions of lakes and reservoirs, degrading water quality, harming wildlife, and impeding boat traffic. *Map by CBR, 2004.*

In Cameron Parish, control efforts included introducing saltwater from the Gulf Intracoastal Waterway into the infested water body located on private property. This method appears to have been successful, as the giant salvinia has not reappeared in the marsh where saltwater was introduced.[89]

3.B.1.b.ii Cogongrass (*Imperata cylindrica*) [90]

Cogongrass is a hardy species tolerant of shade, drought, and high salinities, which tends to invade disturbed ecosystems such as roadway shoulders. Its dense growth pattern creates unsuitable habitat for native plants, insects, mammals, and birds. Johnson and Shilling (1998) report that "large infestations of cogongrass can alter the normal fire regime of a fire-driven ecosystem by causing more frequent and intense fires that injure or destroy native plants."[91]

Cogongrass was accidentally introduced to the United States in Mobile, Alabama, as a packing material in shipping crates. The USDA also intentionally introduced it for controlling soil erosion and as a foraging grass. Its hardiness and attractive leaves have made it a popular grass sold by plant nurseries.[92]

In Louisiana, cogongrass is rapidly spreading along roads and right-of-ways through the relocation of soil containing cogongrass rhizomes. Sometimes called "Red Baron" or "Blood Grass" for its striking red foliage, cogongrass is becoming prominent in the Florida parishes (West Feliciana, East Feliciana, East Baton Rouge, St. Helena, Livingston, Tangipahoa, Washington, and St. Tammany).[93]

3.B.1.c Potential Arrivals

According to USGS, the following aquatic plants occur in fewer than three drainage basins in Louisiana:

3.B.1.c.i Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife is an invasive plant introduced from Europe in the 1800s as an ornamental plant. It also may have arrived in the northeastern United States in ships' ballast. Loosestrife stalks can grow up to nine feet tall, and just one mature loosestrife plant can produce an estimated 3 million seeds annually. Seeds are prone to wind, animal, and water dispersal. Purple loosestrife stands disrupt wetland ecosystems by displacing native wildlife, and affect agriculture by clogging irrigation systems or destroying grazing pastures by replacing range grasses.[94]

An easy-to-grow plant with attractive purplish-magenta flowers, purple loosestrife can be purchased in many plant nurseries, garden stores, and over the Internet. Some nurseries claim to sell only sterile loosestrife plants, but these claims have often proven false.[95]

While the U.S. Fish and Wildlife Service reports that purple loosestrife is present in every state except Florida, the USDA and USGS have no record of purple loosestrife Louisiana.[96] Conflicting reports about the presence of *Lythrum salicaria* in Louisiana may be due to two native loosestrife species, *Lythrum lineare* and *Lythrum alatum*.

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[89] Savoie 2003.
[90] Cogongrass is not listed by USGS as an aquatic invasive plant. The LAIS Task Force, however, has chosen to classify cogongrass as an aquatic invasive because it occurs in areas that experience some flooding, and it was introduced through an aquatic pathway.
[91] Johnson and Shilling 1998.
[92] University of Florida Center for Aquatic and Invasive Plants 2001d; Johnson and Shilling 1998.
[93] Frey 2003.
[94] Swearingen 1997; Thompson, Stuckey, and Thompson 1987; Washington State Department of Ecology (no date)b.
[95] Urbatsch and Skinner 2000.
[96] Swearingen 1997; USDA Natural Resources Conservation Service 2002; USGS 2001.

Invasive Species in Disturbed Habitats

Invasive species often thrive in disturbed habitats, thus further altering the area and possibly "enabling" the establishment of additional invasives. Multiple invasive plant species often grow together in disturbed habitats, such as in A and B, where alligator weed and common salvinia clog a bayou in St. John the Baptist Parish, and C, where common salvinia, wild taro (heart-shaped leaves), and alligator weed (narrow leaves; center right) co-exist in Jean Lafitte National Historical Park and Preserve. *Photos by CBR, 2004.*

Records from Tulane University's Herbarium in New Orleans indicate two *Lythrum salicaria* samples were collected and identified in the mid- to late-1980s. The first sample was collected in 1986 from Plaquemines Parish, approximately eight miles south of Venice, Louisiana, and about two miles east of the Mississippi River. The second specimen was collected from a cultivated garden at Longue Vue House and Gardens in 1988 in New Orleans.[97]

3.B.1.c.ii A Blue-Green Algae, *Cylindrospermopsis raciborskii* ("Cylindro")

Cylindrospermopsis raciborskii, or "Cylindro" for short, is an invasive, subtropical, microscopic blue-green alga. Researchers believe it was introduced to Florida about 30 years ago and has spread rapidly across North America over the last 10-15 years. It is likely that this alga occurs in a wide range of North American water bodies, but, due to its size, it is difficult to identify and easily confused with other blue-green algae. It is unclear how this species arrived in the United States, but it is probably spreading to new U.S. water bodies by boats, boat trailers, and waterfowl. According to St. Amand (2002), this species has been identified in water bodies throughout Florida, parts of Alabama, and central Texas. Unconfirmed reports indicate that this species was found in waters near the Caernarvon Freshwater Diversion in summer 2002.[98]

Like most blue-green algae, Cylindro has no serious adverse effect on water quality or wildlife when found in small concentrations. In fact, blue-green algae are beneficial in small concentrations because they fix nitrogen and add nutrients to the water. However, in higher concentrations, Cylindro can be very detrimental. In some Florida lakes, Cylindro outcompeted other blue-green algae species and now comprises 95 percent of the total algal biomass. When an alga species reaches high concentrations, it is called an algae bloom. Cylindro blooms in Florida can last for months at a time, although sometimes they are difficult to identify. Unlike other blue-green algae species, *Cylindrospermopsis* does not form scum on the water surface. St. Amand says Cylindro "often stays well-distributed throughout the water column and has the highest concentrations below the surface. In fact, other than a deep green-brown color, it's often difficult to determine that a serious blue-green bloom is occurring at all."[99]

Cylindro is known to produce at least three toxins — cylindrospermopsin, anatoxin-a, and saxitoxin, of which the first is the best documented. Cylindrospermopsin is a hepatotoxin which harms the liver and kidneys. Anatoxin-a and saxitoxin are neurotoxins which cause lethargy, muscle aches, confusion, memory impairment, and, at sufficiently high concentrations, death.[100] During Cylindro algae blooms, the concentration of these toxins can reach high levels and adversely impact the ecosystem, agriculture, and human health. For example, researchers suspect that *Cylindrospermopsis* may be linked to the deaths of more than 200 alligators in Lake Griffin, Florida, between 1998 and 2000. Cylindro comprises 90 percent of all microscopic algae in Lake Griffin, and researchers observed the Lake Griffin alligators behaving erratically and sluggishly, a symptom consistent with neurotoxicity.[101]

In 1997, three cows and 10 calves were found dead near a dam on a cattle farm in Queensland, Australia. Cyanobacteria blooms near the dam consisted of "a virtual monoculture of the cyanobacterium *Cylindrospermopsis raciborskii*."[102] An autopsy on one of the calves and an examination of several of the calf's organs showed damage consistent with hepatotoxin poisoning.[103]

In 1979, 150 people (mostly children) were hospitalized after ingesting from a drinking water reservoir in Australia. The water had been treated with copper sulfate to remove cyanobacteria that were blooming in the reservoir at the time, but this caused *Cylindrospermopsis*, the dominant

[97] White 1986; Darwin and Wolf 1988.
[98] St. Amand 2002; Chronic Neurotoxins 2002; St. Amand 2002, page 36; Rick 2003.
[99] Chronic Neurotoxins 2002; St. Amand 2002, page 37.
[100] St. Amand 2002, page 36; Chronic Neurotoxins 2002.
[101] Hunter 2000; Chronic Neurotoxins 2002.
[102] Saker, Thomas, and Norton 1999.
[103] Saker, Thomas, and Norton 1999, page 179.

cyanobacterial species in the reservoir, to release even more cylindrospermopsin toxin into the water. Symptoms of the cylindrospermopsin poisoning included liver enlargement, constipation, bloody diarrhea, kidney damage, and dehydration.[104]

In Brazil, a water reservoir was treated with chlorine to kill blooming cyanobacteria, but when the algae cells died, they released more toxin into the water. More than 50 patients at a dialysis clinic died from hepatotoxin poisoning, and more than 50 more became severely ill with liver and nerve damage.

In Florida, the Cylindro seems to be resistant to copper sulfate and benomyl, a fungicide, and is non-responsive to other algae poisons.[105]

3.B.2 Finfish

The categories of "extensively established species" and "locally established species" were combined for the Finfish section of the management plan. Mobility of fish blurs the distinction between "extensively established" and "locally established." Also, the network of interconnected waterways within the state makes it easy for fish to relocate, constantly changing their ranges.

3.B.2.a Extensively Established Species

3.B.2.a.i Rio Grande Cichlid (*Cichlasoma cyanoguttatum*)

The Rio Grande cichlid, also sometimes called the Rio Grande perch or the Texas cichlid, is native to parts of southern Texas and northeastern Mexico, but its range is expanding due to human activities. Researchers speculate that the Rio Grande cichlid was introduced to Louisiana in the late 1980s or early 1990s through aquarium releases into freshwater bayous and canals on the south shore of Lake Pontchartrain. Less than 20 years after its initial introduction, this fish has been collected in numerous habitats surrounding greater New Orleans, including urban canals, freshwater marshes and bayous, and the Lake Pontchartrain estuary. Reproductive populations have been observed in many of these locations, so clearly aquarium releases are no longer the main cause of range expansion.[106]

An omnivorous fish, the Rio Grande cichlid poses a threat to aquatic vegetation and possibly commercially valuable species such as shrimp. The cichlids also may harbor parasites or diseases that can harm native fish. Recent collection locations indicate this freshwater fish is becoming tolerant of salinities of at least 5 ppt, causing concern that increased salinity tolerance will enable the Rio Grande cichlid to penetrate farther into the Lake Pontchartrain estuary, causing further displacement of native fish.[107]

3.B.2.a.ii Common Carp (*Cyprinus carpio*)

Common carp were introduced to the United States so long ago, and are so widespread, they are commonly mistaken as an indigenous species. Records of the earliest common carp introductions are sketchy, but this freshwater fish was certainly introduced to the United States from Asia at least by 1877, and possibly as far back as the 1830s. In 1877, the U.S. Fish Commission began stocking this fish throughout the United States for food purposes. In addition to deliberate stockings, *Cyprinus carpio* escaped cultivation from fish farms and spread into wild water bodies. More recently, use of juvenile common carp as baitfish has resulted in additional introductions. Also known as German or European carp, mirror carp, leather carp, and koi, common carp have been introduced through the aquarium and water garden trade. Koi are more colorful variations of common carp that sometimes are kept as pets. It must be noted that only a small portion of common carp introductions have resulted from this pathway.[108]

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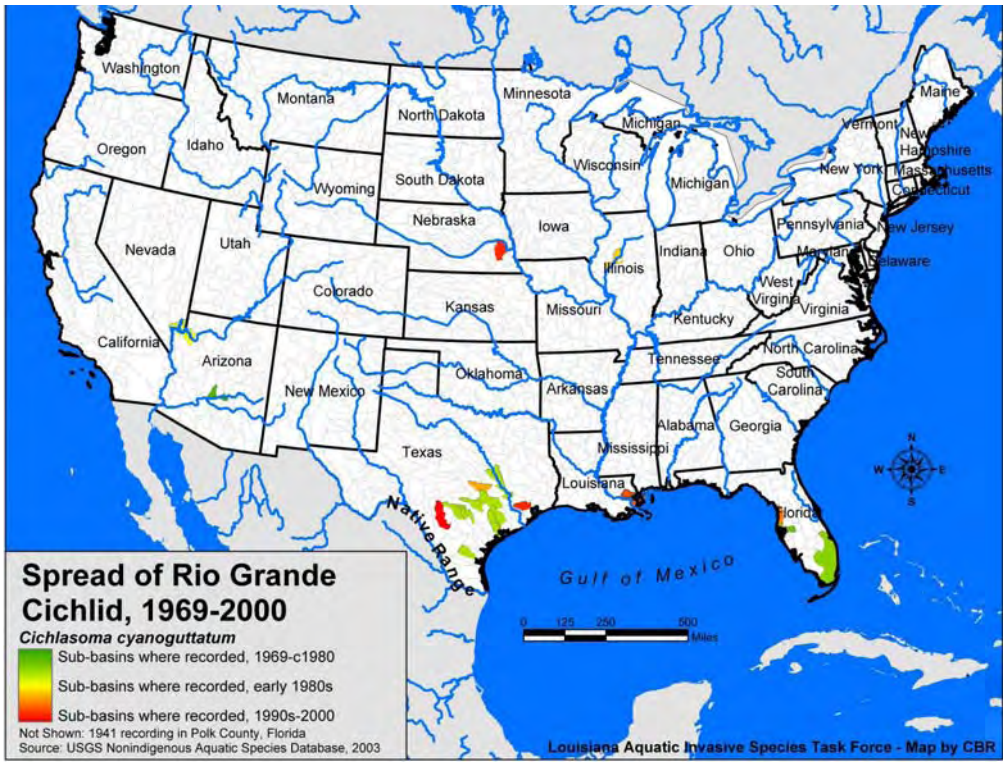
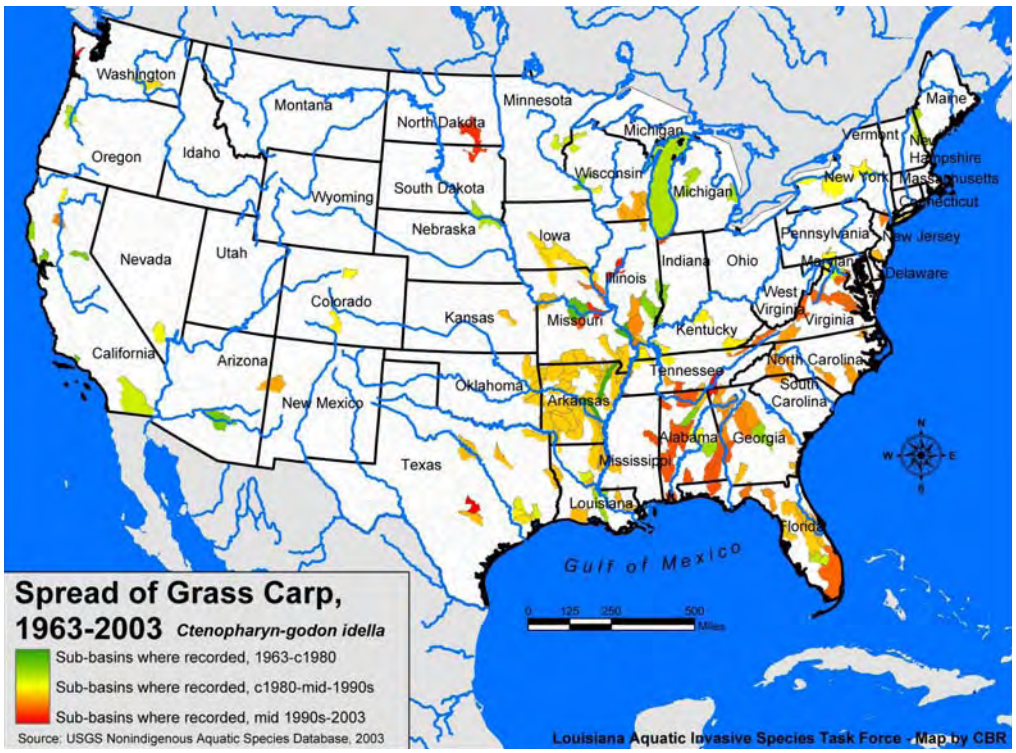
[104] Falconer 1999; St. Amand 2002, page 37; Falconer 1999, page 9.
[105] Chronic Neurotoxins 2002.
[106] Nico 2000b; Cashner 2001; Aguirre and Poss 1999a; O'Connell, Cashner, and Fuentes 2002, page 16.
[107] O'Connell 2001; Cashner 2001; O'Connell, Cashner, and Fuentes 2002, page 16.
[108] Nico 1999.



Researchers suspect the Rio Grande cichlid was introduced to Louisiana around 1990 through aquarium releases into freshwater bayous and canals on the south shore of Lake Pontchartrain. An omnivore, the Rio Grande cichlid poses a threat to aquatic vegetation and possibly commercially valuable species such as shrimp. *Map by CBR, 2004.*



Grass carp were first imported to the U.S. in 1963 for Arkansas and Alabama aquaculture facilities, to control vegetation (including invasives) in fish ponds. The fish first escaped into the White River in 1966 near Stuttgart, Arkansas and were first reported in the Mississippi River in the early 1970s. Its rapid spread throughout adjacent waterways, coupled with continued deliberate stockings for biological control, allowed this fish to establish in 45 states. In Louisiana, grass carp are established in the Mississippi and Red rivers, Atchafalaya Basin, Lake Pontchartrain, and drainages on the Louisiana-Arkansas border. *Map by CBR, 2004.*

Cyprinus carpio is a freshwater fish but is able to withstand brackish waters in its native range. Its non-native range in the Gulf of Mexico is not limited by temperature; the Gulf of Mexico region's temperate waters are suitable habitat for this fish. An omnivore, *Cyprinus carpio* will consume both zoo- and phytoplankton and will frequently disturb bottom sediments while feeding. The increased turbidity and dislodging of plants disturb habitat for native species that require rooted vegetation and clear waters. Common carp also adversely impact native fishes by consuming fish eggs and larvae.[109]

Most abundant in man-made water bodies, common carp are also plentiful in waters polluted by sewage and agricultural runoff.[110] Common carp are widely distributed throughout Louisiana.

3.B.2.a.iii Grass Carp (*Ctenopharyngodon idella*)

Grass carp were first imported to the United States in 1963 for Arkansas and Alabama aquaculture facilities, where they served to control vegetation (including invasives) in fish ponds. The fish first escaped from cultivation into the White River in 1966 from the Fish Farming Experimental Station in Stuttgart, Arkansas. Grass carp were also legally and illegally stocked in many rivers, streams, and reservoirs to control unwanted submerged vegetation. Known also as white amur, grass carp were first reported in the Mississippi River in the early 1970s. Its rapid spread throughout adjacent United States waterways, coupled with continued deliberate stockings for biological control, allowed this fish to establish in 45 states. In Louisiana, grass carp are established in the Mississippi River, Red River, Atchafalaya Basin, Lake Pontchartrain, and other drainages on the Louisiana-Arkansas border.[111]

Grass carp can have serious detrimental effects on riverine, limnetic, and littoral ecosystems. They decrease available habitat and food, and change macrophyte and phytoplankton community composition, ultimately altering an ecosystem's food web. According to Nico and Fuller (2001), "although grass carp are often used to control selected aquatic weeds, these fish sometimes feed on preferred rather than on target plant species."[112] Several researchers have noted that in high numbers, grass carp can eliminate all macrophyte aquatic vegetation. Grass carp also may carry and transmit parasites and diseases to native fishes.[113]

In Louisiana, it is illegal to at any time to possess, sell, or transport live carp without written permission from LDWF.[114] This statute applies to all species of carp, including diploid and triploid grass carp. Triploid grass carp are generally sterile, but some researchers are questioning the effectiveness of triploidy as a sterilization tool. Nico and Fuller (2001) state that "techniques used to induce triploidy are not always totally effective and every individual needs to be genetically checked."[115] Other states, however, including Arkansas and Mississippi, have no restrictions.[116]

3.B.2.a.iv Silver Carp (*Hypophthalmichthys molitrix*)

Hypophthalmichthys molitrix is native to eastern Asia, particularly China, and naturally occurs in temperate and primarily freshwaters. This species was first introduced to the United States around 1973 for phytoplankton control in aquaculture ponds, and as a food fish. Earliest reports indicate that a private fish farmer imported silver carp into Arkansas in the early 1970s, but by the mid 1970s, silver carp were being stocked in private and public ponds as well as municipal sewage lagoons. By the 1980s, silver carp were found in natural water bodies.[117]

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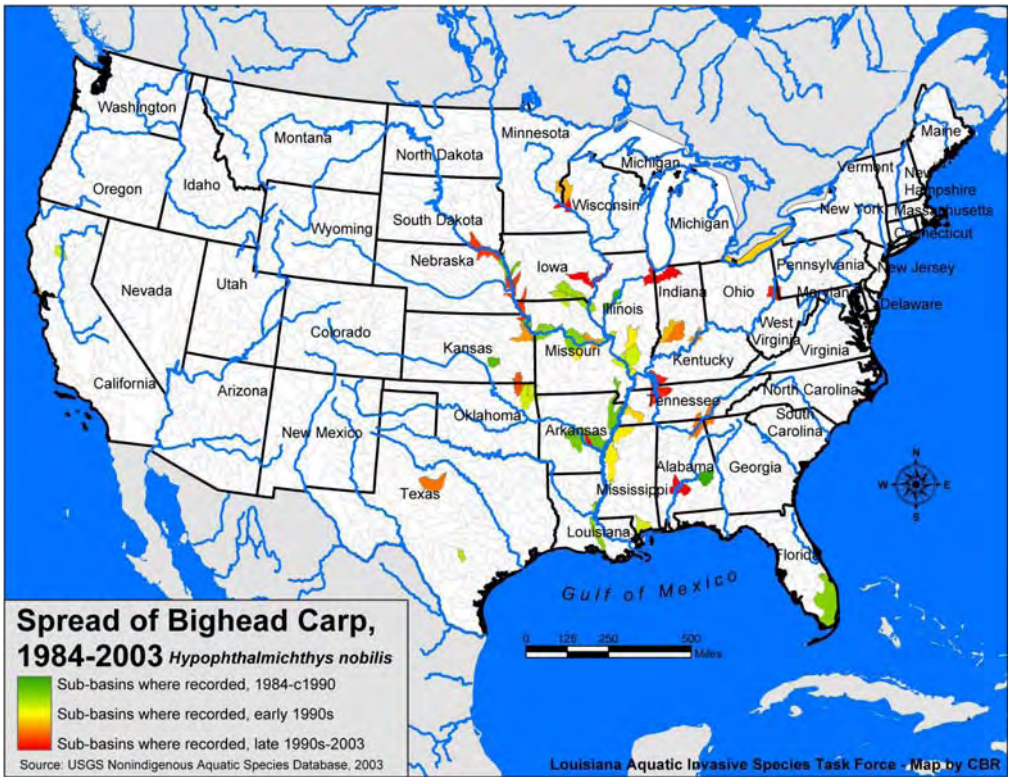
[109] Aguirre and Poss 2000a.
[110] Nico 1999.
[111] Poss and Aguirre 2000; Nico and Fuller 2001.
[112] Nico and Fuller 2001.
[113] Poss and Aguirre 2000; Nico and Fuller 2001.
[114] *Louisiana Revised Statutes, Title 56 §319* (no date).
[115] Nico and Fuller 2001.
[116] Nico and Fuller 2001.
[117] Aguirre and Poss 1998; Nico and Fuller 2000.

Native to East Asia, silver carp were first introduced to the U.S. in Arkansas in the early 1970s for phytoplankton control in aquaculture ponds and for human consumption. In Louisiana, silver carp have been reported in the Mississippi, Atchafalaya, Red, Boeuf, Ouachita, and Little rivers, plus connecting water bodies. *Map by CBR, 2004.*



Bighead carp, a zooplanktivore from Asia, was introduced by fish farmers to improve water quality and increase production in aquaculture ponds. *Map by CBR, 2004.*

In Louisiana, silver carp have been reported in the Mississippi River and its tributaries and distributaries, such as the Atchafalaya, Red, Boeuf, Ouachita, and Little rivers. Silver carp have also been collected from the Lafourche Canal, Miller Lake, and Loggy Bayou.[118]

Unlike grass carp, silver carp are planktivorous fishes that sometimes also consume detritus.[119] This could present an ecological threat to native mussels and fish larvae, organisms which are also filter-feeding planktivores. In addition to the threat to native fish and shellfish, silver carp also can be physically dangerous to fishermen and boaters. Silver carp have a tendency to leap out of the water, possibly when startled by boat motors or other noises. Flying carp land can in boats, and some significant injuries to fishermen and boaters have been documented.

3.B.2.a.v Bighead Carp (*Hypophthalmichthys nobilis*)

Similar to the silver carp, bighead carp were introduced to the United States by a private fish farmer in Arkansas in the early 1970s, who sought to use them with other herbivorous fish to improve water quality and increase production in his aquaculture ponds. Probably the result of an escape from such aquaculture facilities, bighead carp began to appear in open waters in the early 1980s. In 1994, researchers collected more than 1,600 bighead carp larvae from the Black River in Louisiana. To date, several water bodies in Louisiana have reported bighead carp sightings, including the Atchafalaya River, Turkey Creek, and the Red-Ouachita River.[120]

Both the bighead carp and the silver carp are filter feeders; bighead carp prefer zooplankton, while silver carp are primarily phytoplanktivorous. In waters with low levels of zooplankton, though, bighead carp will consume phytoplankton and detritus. In large numbers, bighead carp can deplete zooplankton populations, which could reduce native zooplanktivorous species and threaten existing food webs.[121]

3.B.2.b Locally Established Species

See fish species above.

3.B.2.c Potential Arrivals

No known established populations exist in Louisiana for the following fish species, but the LAIS Task Force identified them as species of concern in neighboring areas.

3.B.2.c.i Black Carp (*Mylopharyngodon piceus*)

Recent black carp collections from the Red River have sparked concern among fisheries managers that this species may soon become established in natural ecosystems. Also known as the snail carp, Chinese black carp, black amur, Chinese roach, or black Chinese roach, the black carp is a freshwater fish native to China, parts of eastern Russia, and possibly northern Vietnam. A bottom-dwelling mollusk eater, black carp also are known to eat freshwater shrimp, insects, and crawfish. In large numbers, black carp could threaten native shellfish and mollusks, including snails and mussels. Black carp host many parasites and flukes, not to mention bacteria and viruses, which may infect commercially valuable sportfish, food fish, or threatened and endangered species.[122]

The first introduction of black carp to the United States, in the early 1970s, was as an accidental specimen in imported grass carp stocks sent to a private fish farmer in Arkansas. The second introduction in the 1980s was deliberate: the carp were imported both as a food fish and as a biocontrol for yellow grubs at aquaculture facilities.[123] The only known introduction of black carp to open waters occurred in 1994 when high waters flooded an aquaculture facility near the Missouri River. An estimated 30 black carp, along with thousands of bighead carp, escaped into

[118] Nico and Fuller 2000.
[119] Aguirre and Poss 1998.
[120] Nico 2000c.
[121] Aguirre and Poss 2000b; Nico 2000c.
[122] U.S. Fish and Wildlife Service 2002, pages 49281 – 49282.
[123] U.S. Fish and Wildlife Service 2002, page 49281; Nico 2000a.

the Osage River.[124] According to the U.S. Fish and Wildlife Service, if black carp became established in large lakes or river systems, "eradication and/or control of black carp [would be] nearly impossible and they would likely become permanent members of the fish community."[125]

In April 2004, a 43-inch black carp was caught by a commercial fisherman in the upper Atchafalaya / lower Red rivers region of Louisiana. A second specimen was caught nearby in early May. Researchers felt that the Osage River population was too far removed from these two Louisiana specimens to explain their origin and suspected a new source. One possible explanation is that the carp escaped from a second aquaculture facility, possibly one to which LDWF had previously issued a permit to evaluate triploid black carp effectiveness for snail control. LDWF had permitted one catfish producer for this evaluation in 1996 and a second producer in 2000. Preliminary tests indicate the two black carp specimens may be diploid, indicating that they may be reproducing in open waters. The commercial fisherman who caught the carp reported that he had been catching "strange-looking grass carp in this area for over eight years."[126] LDWF is working with the fisherman to monitor the river.[127]

On March 26, 2003, Illinois fisherman Jim Beasley caught the first recorded black carp from open waters in Horseshoe Lake, Alexander County, Illinois. The carp measured 78.3 centimeters long (30.8 inches) and weighed 5.8 kilograms (12.8 pounds). Horseshoe Lake is located a few miles from the Mississippi River, which periodically floods into the lake. River floodwaters last entered Horseshoe Lake in May 2002. This particular black carp specimen was determined to be triploid (sterile), leading managers to believe it escaped from a commercial aquaculture facility. The Illinois Department of Natural Resources is working with commercial fishermen in Horseshoe Lake to determine if there are any other black carp in the lake.[128]

On July 30, 2002, the U.S. Fish and Wildlife Service published a proposed rule in the *Federal Register* which, if finalized, would add the black carp to the federally maintained list of injurious species, prohibiting "the importation of any live animal or viable egg of the black carp into the United States … live black carp or viable eggs could be imported only by permit for scientific, medical, educational, or zoological purposes, or without a permit by Federal agencies solely for their own use; permits would also be required for the interstate transportation of live black carp or viable eggs currently held in the United States for scientific, medical, educational, or zoological purposes." Furthermore, the rule would prohibit "interstate transportation of live black carp or viable eggs."[129]

3.B.2.c.ii Tilapia (*Tilapia spp., Oreochromis spp.,* and *Sarotherodon spp.*)

"Tilapia" is a general name given to many related fish species from the Genera *Tilapia*, *Oreochromis*, and *Sarotherodon*. Tilapia are increasingly common in aquaculture production in the United States, second only to carp production. Louisiana Department of Wildlife and Fisheries, the permitting agency for aquaculture fish species, allows Blue tilapia (*Tilapia aurea*), Mozambique tilapia (*Tilapia mossambica*), Nile tilapia (*Tilapia nilotica*), and Wami tilapia (*Tilapia hornorum*) in Louisiana.[130]

Though there are no known tilapia species established in the wild in Louisiana, LDWF officials are concerned that potential tilapia fish farm "escapees" could become established and degrade native fisheries. In addition to competing with natives, most tilapia species are aggressive toward other fish. Tilapia are omnivores, consuming detritus, algae, phytoplankton, zooplankton, insects,

[124] Nico 2000a; U.S. Fish and Wildlife Service 2002, page 49281.
[125] U.S. Fish and Wildlife Service 2002, page 49282.
[126] USGS 2004.
[127] McElroy 2004.
[128] Maher 2003.
[129] U.S. Fish and Wildlife Service 2002, page 49280.
[130] Lutz 1998; McElroy 2003.

vascular plant fragments, small fish, and crustaceans. Several tilapia species are established in parts of Florida, Texas, and Alabama.[131]

Others, however, question whether tilapia pose a threat to Louisiana wildlife if they escape cultivation. Though tilapia have wide salinity tolerances, they are not cold-tolerant. According to Lutz, "growth is generally limited at water temperatures below 70 degrees Fahrenheit (F), and most tilapia become severely distressed at 65 degrees F. Death begins to occur at 60 degrees F, with few surviving temperatures below 50 degrees F for any period of time."[132]

To prevent escapes from aquaculture facilities, in Louisiana, tilapia cultivation is prohibited in outdoor ponds. All water utilized in the tilapia production must be accounted for, and must be screened and / or sterilized before allowed to leave the aquaculture facility.[133]

3.B.3 Mollusks

The two known invasive mollusks in Louisiana, the zebra mussel (*Dreissena polymorpha*) and the Asian clam (*Corbicula fluminea*), are predominantly freshwater mollusks, and, in general, are confined to river drainages.

The largest rivers in Louisiana are the Mississippi, Red, and Atchafalaya; zebra mussels and Asian clams are established in all three and, therefore, are considered extensively established.

The brown mussel, *Perna perna*, is a marine species from the Gulf of Mexico near the Texas-Louisiana border. The green mussel, *Perna viridis*, is currently established in Tampa Bay, but specimens have been found in Pensacola, St. Augustine, and New Smyrna Beach, Florida, as well as on the Atlantic coast of Georgia. Louisiana waters would be suitable habitat for this species. The channeled apple snail, *Pomacea canaliculata*, is established in Texas close to Louisiana and may be here already. Unconfirmed reports indicate that this species has been found in St. Martin Parish. Pacific and Asian oysters (*Crassostrea gigas* and *Crassostrea ariakensis*, respectively) are being considered for introduction into the Chesapeake Bay to attempt to rebuild oyster stocks decimated by disease. As these potential introductions may impact Louisiana's native oyster, *Crassostrea virginica*, descriptions of the non-native oysters are provided below.

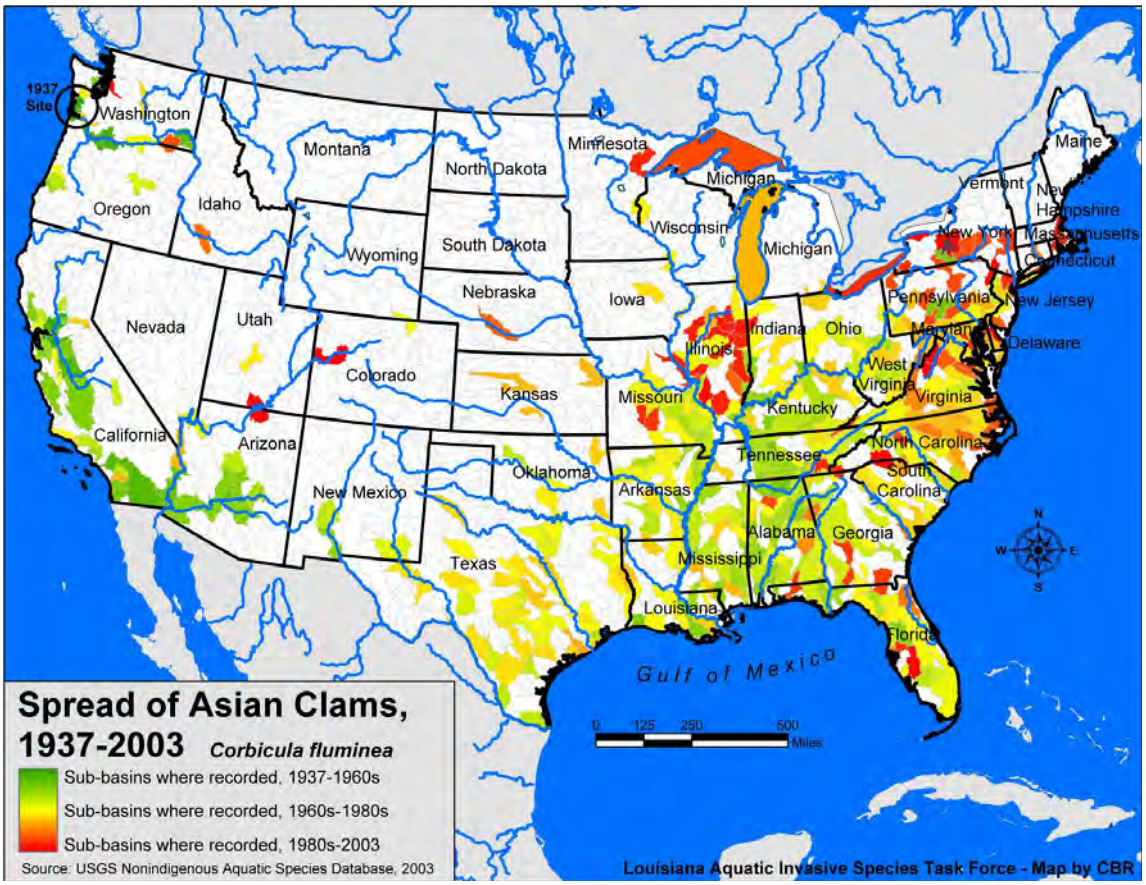
3.B.3.a Extensively Established Species

3.B.3.a.i Asian Clam (*Corbicula fluminea*)

Asian clams were likely introduced to the United States as a food source for Chinese immigrants on the West Coast, possibly as early as the mid 1800s. The clams were first discovered in Washington in 1938. Now established in at least 38 states and Washington, D.C., *Corbicula fluminea* spread mostly through human activities, such as bait bucket dumping, aquaria releases into streams or canals, and intentional releases by people who bought the clams at food markets. Asian clams may also have been a contaminant in an imported aquaculture species. Another pathway for dispersal is the passive movement of larvae in water currents. In Louisiana, *Corbicula fluminea* has been reported in 13 parishes touched by the Mississippi, Red, Pearl, and Atchafalaya rivers.[134]

The Asian clam typically measures less than 25 millimeters (one inch), although some can reach 65 millimeters (2.5 inches.) Optimum growth occurs at low salinities and in freshwater, but this species can tolerate salinities up to 24 ppt when acclimatized.[135] This may be cause for concern because the freshwater river diversions (see page 19) could serve as pathways for an Asian clam range expansion into the coastal wetlands and Lake Pontchartrain, an estuary with salinities ranging from 0 ppt to 25 ppt.

[131] McElroy 2003; Aguirre and Poss 1999b.
[132] Lutz 1998, page 1.
[133] Lutz 1998, pages 1, 4.
[134] Aguirre and Poss 1999c; Foster, Fuller, and Benson 2000.
[135] Aguirre and Poss 1999c.



Asian clams were likely introduced to the West Coast as a food source for Chinese immigrants in the mid-1800s, but were not recorded until 1938 in Washington. Now established in at least 38 states, the clams spread mostly through human activity, such as bait bucket dumping and aquaria releases. *Map by CBR, 2004.*

Ecological impacts of Asian clam infestations include the altering of benthic substrate and increased competition with native species for food and habitat resources. Asian clams also serve as a food source for many species favored by fishermen, including largemouth bass and freshwater drum. But this benefit is outweighed by the economic burden borne by industries and municipalities. Asian clams are "biofoulers" that clog power plant intake pipes and other industrial water systems. In some parts of the United States, *C. fluminea* also causes problems in irrigation canals and pipes.[136]

3.B.3.a.ii Zebra Mussel (*Dreissena polymorpha*)

The zebra mussel, native to the Black, Caspian, and Azov seas, was first discovered in North America in 1988 in Lake St. Clair, near Detroit, probably the result of a release of veligers (larvae) in ballast water. In subsequent years, zebra mussels quickly spread throughout the Great Lakes, down the Mississippi River, and up its tributaries, including the Ohio, Tennessee, Cumberland, and Arkansas rivers.[137]

In Louisiana, zebra mussels are established in the Mississippi River between Baton Rouge and New Orleans, while localized colonies exist below New Orleans near the river's mouth, and upriver near Vicksburg. In addition to the Mississippi, zebra mussels are moving northwest up the Red River toward Shreveport, while several sightings have been reported in the Atchafalaya River, Bayou Teche, Bayou Lafourche, and the Intracoastal Waterway near Houma.[138] The freshwater diversion structures and the Bonnet Carré Spillway on the Mississippi River are

[136] Foster, Fuller, and Benson 2000; Aguirre and Poss 1999c.
[137] Hard, Allen, and Poss 1999.
[138] New York Sea Grant 2003; USGS (no date)d.

potential pathways by which zebra mussels may spread to new waterways. (See section 3.A.4 on River Diversions for more information.)

In addition to other environmental problems, zebra mussels are notorious biofoulers and colonizers of water intake/outtake pipes at industrial facilities located along rivers. Entergy Corporation, the region's premier energy and gas utility, operates at least six facilities affected by zebra mussels on the Mississippi River. Entergy has implemented various monitoring and control programs. These include heating the water in a closed system to 35-36.7 degrees Celsius (95-98 degrees Fahrenheit) for several hours and chemical treatment using oxidizing and nonoxidizing chemicals. Costs associated with these treatments vary by location, but typically range from $15,000 to $100,000 per treatment.[139]

On the federal level, the U.S. Army Corps of Engineers performs periodic zebra mussel monitoring surveys at locks and other structures during dewatering or when gates are removed for maintenance. The U.S. Fish and Wildlife Service's 100th Meridian Initiative aims to prevent the westward spread of zebra mussels by trailered boats. The agency's Southeast Region Office is working with Louisiana to implement an outreach program aimed at boaters visiting the Atchafalaya and other locations of confirmed or potential zebra mussel sightings.[140]

Zebra mussel infestations, while costly to industry and public works, have not been as widespread in the lower Mississippi River as elsewhere in the United States, primarily due to current speed and water temperature. In the spring, when zebra mussel veligers are most abundant, snowmelt raises the stage of the river, which steepens its gradient and thus increases its velocity. The rapid current prevents many veligers from attaching to hard substrates in the river. Consequently, the larvae are swept to the Gulf of Mexico and die in saline waters. In the late summer and early fall, the river lowers and loses velocity, as water temperate rises. Mussels expend energy to prevent overheating, causing them to decrease their consumption and subsequently starve to death.[141]

3.B.3.b Locally Established Species

See above.

3.B.3.c Potential Arrivals

3.B.3.c.i Brown Mussel (*Perna perna*)

In 1990, for the first time in U.S. waters, two juvenile edible brown mussels were discovered on jetty rocks at Port Aransas, Texas. Native to selected coasts of the Indian and South Atlantic oceans, the *P. perna* population in Texas seems to have originated from Venezuela, according to recent DNA tracking research. The mussels were likely carried on the hulls or in the ballast water of ships calling at Venezuelan ports.[142] Brown mussels "now occur on other isolated hardshores along 1,700 km [1,056 miles] of coast from Freeport, Texas, to southern Veracruz, Mexico,"[143] and brown mussels have been found on offshore oil rigs in the Gulf of Mexico. Reports that *P. perna* are established near the Texas-Louisiana border are unconfirmed. Researchers from Texas A&M University at Corpus Christi and Texas Parks and Wildlife Department have no knowledge of *P. perna*'s existence any farther east than Freeport, Texas.[144] However, Hicks et al. (2001) suggest that, based on analyses of *P. perna* in its native ranges, the coastal Gulf of Mexico is a suitable habitat for brown mussel colonization. They predict the non-native range of *P. perna* could "spread beyond the species' present Texas/Mexico range,"[145] including the northern Gulf of Mexico coast. Probable pathways for brown mussel range expansion are ocean

[139] Stoma 2003.
[140] Saucier 2003; Carter 2003.
[141] Dietz 1995.
[142] Hicks, Tunnell, and McMahon 2001, page 181; McGrath, Hyde, and Tunnell 1999.
[143] Hicks, Tunnell, and McMahon 2001, page 181.
[144] Howells 2003; Hicks 2003.
[145] Hicks, Tunnell, and McMahon 2001, page 190.

currents or shipping routes between Texas and Louisiana ports. *P. perna* larvae in ballast water or adults attached to ship hulls could introduce this mussel to Louisiana.

The brown mussel is predominantly a marine mussel, though a colony was discovered in a bay environment in Port O'Conner, Texas. In their natural range, adult brown mussels tolerate salinities from 19 ppt to 44 ppt, and veligers (larvae) tolerate salinities of 15 ppt to 55 ppt. The Texas *P. perna* populations withstand salinities from 15 ppt to 50 ppt. However, the lowest end of this salinity range may be below their tolerance. According to Hicks (2003), *P. perna* can survive but cannot form byssal threads (strong protein "ropes" that a mussel produces to attach and anchor itself to substrate) at 15 ppt. Nevertheless, *P. perna* can survive the more saline waters of coastal Louisiana. Though no negative environmental effects have been attributed to the brown mussel in Texas, researchers believe this species can form such dense colonies that an infestation could sink navigation buoys and affect shipping safety.[146]

3.B.3.c.ii Green Mussel (*Perna viridis*)

The Asian green mussel, also sometimes called the green-lipped mussel, is native to the Indo-Pacific region, from the Persian Gulf to the South China Sea. It was introduced to the Gulf of Mexico around 1990 when larvae were transported in ballast water to Trinidad. Green mussels subsequently appeared in Venezuela in 1993, and in the United States in 1999, when underwater divers performing maintenance work at a power plant in Tampa Bay, Florida, discovered the mussels clogging the inside of cooling water intake tunnels. According to Benson et al. (2001), "phylogenetic comparisons between known *Perna* species and species collected from Tampa Bay indicated that the Tampa Bay specimens were most closely related to *Perna viridis* acquired from Trinidad."[147] As of December 2002, the range of *Perna viridis* in the United States was confined to Tampa Bay and the Gulf of Mexico between Johns Pass and Charlotte Harbor in Florida, but in February 2003, live mussels were found on the Atlantic Coast of Florida, from St. Augustine to New Smyrna Beach. In addition, the green mussel is spreading north and west. Researchers from the Smithsonian Environmental Research Center (SERC) found a *Perna viridis* specimen on a fouling plate in Pensacola, Florida. SERC believes recreational boaters probably transported the mussel.[148] Georgia Department of Natural Resources officials and researchers at the University of Georgia recently found green mussel specimens in Georgia waters, near Brunswick and Tybee Island at the mouth of the Savannah River.[149]

Green mussels prefer estuarine environments with salinities similar to Louisiana estuaries. The lower limit of *Perna viridis'* salinity tolerance is 16 ppt and researchers have shown that *P. viridis* can survive in turbid waters.[150] Researchers are concerned that as filter feeders, green mussels will impact the availability of phytoplankton for native species and increase water clarity in previously turbid waters.[151] In addition to ecological impacts, *P. viridis* is a known biofouler of boats and submerged infrastructure such as bridges, seawalls, docks, and buoys. Like the zebra mussel, the green mussel can interfere with industry and power plant activities by clogging cooling-water intakes and outflow pipes. Tampa Bay area oyster beds have recently been invaded by *Perna viridis*, which attach to and suffocate native oysters. Florida's oyster reefs consist of the species *Crassostrea virginica*, which is also commercially valuable to Louisiana's seafood industry. In the invaded Tampa Bay area oyster reefs, up to 90 percent of the dead oysters were killed recently, meaning that the oyster was still attached to the shell and normal predation was probably not a factor. Researchers suspect that the green mussel may be having a negative effect on commercially important oyster beds in Florida.[152]

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[146] Crochet, Hicks, and Poss 1998; Hicks 2003.
[147] Benson, Marelli, Frischer, Danforth, and Williams 2002.
[148] Benson et al. 2002; USGS 2003; Miller 2003.
[149] Power 2003.
[150] Florida Caribbean Science Center 2001; Crochet, Hicks, and Poss 1999.
[151] Zebra mussels had a similar effect on the Great Lakes. Water clarity improved, but some areas are experiencing overgrowths of submerged aquatic vegetation, and there is less phytoplankton for native species.
[152] Benson et al. 2002; Baker, Fajans, and Bergquist 2003.

Recreational boat traffic and commercial shipping lanes between Florida (particularly Tampa Bay and Pensacola) and Louisiana could serve as a pathway for *P. viridis* into Louisiana waters. If introduced, *P. viridis* could become established in Louisiana coastal waters. According to Hicks, *P. viridis*, with its lower salinity tolerances, is probably a greater threat than *P. perna*, despite the latter's greater proximity to Louisiana.[153]

3.B.3.c.iii Channeled Apple Snail (*Pomacea canaliculata*)

Native to Central and South America, the channeled apple snail is currently established in Texas, California, Florida, and has been reported in North Carolina. This snail was first found in the Texas Gulf Coast in mid 2000 and has since spread via interconnected canals and with the help of Tropical Storm Allison in June 2001. Unconfirmed reports indicate that this species was found in St. Martin Parish, Louisiana, in 2001. Though no confirmed sightings of *Pomacea canaliculata* in Louisiana exist, its range in Texas is expanding north and east. Texas wildlife managers claim that if the snail is not already established in Louisiana, its current non-native range approaches the Texas-Louisiana border.[154]

Sold in North American pet and aquarium stores, *Pomacea canaliculata* introductions are probably the result of aquarium releases. Aquarium dealers sometimes mislabel the apple snail species; *P. canaliculata* has been sold under the names "giant Peruvian apple snail," "South American apple snail," and "mystery snail."[155]

An edible snail, *P. canaliculata* was introduced to Taiwan and other parts of Asia as a food source. The snail escaped cultivation and spread to Hong Kong, Thailand, southern China, Japan, and Indonesia, destroying rice crops in those countries. Texas rice farmers worry that a population explosion of *P. canaliculata* could have similarly devastating effects on their crops. Adults of this species are voracious eaters and prefer the soft vegetation of young rice plants.

The channeled apple snail is a hardy species that tolerates poor water quality, including pollutants or low dissolved oxygen. A shell door enables it to close itself off from harsh external conditions, so the channeled apple snail can survive droughts and can even hibernate in the mud for up to six months, reemerging when water and temperature conditions are favorable. *Pomacea canaliculata* can endure cold temperatures and a broad range of salinities. In their native environments, *P. canaliculata*'s ideal habitats include swamps, marshes, and canals, all of which are common throughout southern Louisiana.[156]

3.B.3.c.iv Pacific Oyster (*Crassostrea gigas*)

Native to Japan, this oyster was introduced to the west coast of the U.S. in the early 1900s and quickly became an important part of the aquaculture industry, particularly in Washington, where it remains the state's most valuable shellfish species. When diseases decimated the native eastern oyster (*Crassostrea virginica*) of Chesapeake Bay in the late 20th century, some researchers suggested introducing the Pacific oyster as a substitute, but it proved inadequate for reasons of growth rates, taste, and disease tolerance. Should entities suggest the introduction of the Pacific oyster into Louisiana waters, the Task Force notes that LDWF maintains jurisdiction over this matter and urges that a risk assessment be conducted on its potential impacts. Currently, the North American distribution of the Pacific oyster spans from southeast Alaska to Baja California, primarily on coastal oyster farms, though some wild populations exist in Washington, British Columbia, and Hawaii.[157]

The two diseases that devastated the native Chesapeake Bay oyster are MSX (Multinucleated sphere unknown, *Haplosporidia nelsoni*) and Dermo (*Perkinsus marinus*). Scientists believe MSX

[153] Hicks 2003.
[154] Gaudé 2002; Howells 2000.
[155] U.S. Rice Producers 2002; Howells 2000.
[156] U.S. Rice Producers 2002; Aguirre and Poss 1999d.
[157] Maryland Sea Grant 2003; Pacific States Marine Fisheries Commission 1996; USGS 2005.

arrived to the east coast via the introduction of *Crassostrea gigas* in the 1930s, which failed to establish a population.[158]

3.B.3.c.v Asian Oyster (*Crassostrea ariakensis*)

When the Pacific oyster *Crassostrea gigas* proved unsuitable for culture in the Chesapeake Bay, scientists investigated introducing the Asian (or Suminoe) oyster, *Crassostrea ariakensis*, instead. In comparative studies with the native *Crassostrea virginica*, the Asian oyster proved to be faster growing and more resistant to MSX and Dermo diseases. It was found to reach market size in only nine months, whereas native eastern oysters may require almost two years before they are large enough to harvest.[159]

Resulting pressure from the seafood industry to introduce *Crassostrea ariakensis* to the Chesapeake is causing much controversy, as scientists and natural resource managers are still unsure of the long-term ecological impacts of such introductions. Triploid (sterile) oysters are offered to control introductions, but triploids can sometimes revert to diploidy and reproduce. Ecological and economic concerns include possible adverse food web impacts, new parasites and pathogens, and a potential biofouling problem if the oysters reproduce too effectively.[160]

A final decision on the introduction has not yet been made, but the U.S. Army Corps of Engineers, Norfolk, Virginia district is currently seeking public comment on an Environmental Impact Statement. If the introduction is authorized, it may set a precedent for similar introductions in other coastal regions, including the Gulf of Mexico.

3.B.4 Mammals

Although nutria are not distributed throughout Louisiana, their numbers and environmental impact in coastal Louisiana are so great that they warrant consideration as extensively established and extremely problematic. Feral hogs (*Sus scrofa*) are established sporadically throughout the Gulf Coast and southern United States, and thus are considered extensively established for this management plan. The problems caused by feral hogs in Louisiana, however, are dwarfed by those caused by nutria. Feral hogs also provide some social and economic benefit for local hunters and trappers, whereas nutria no longer offer any benefit to Louisiana residents.

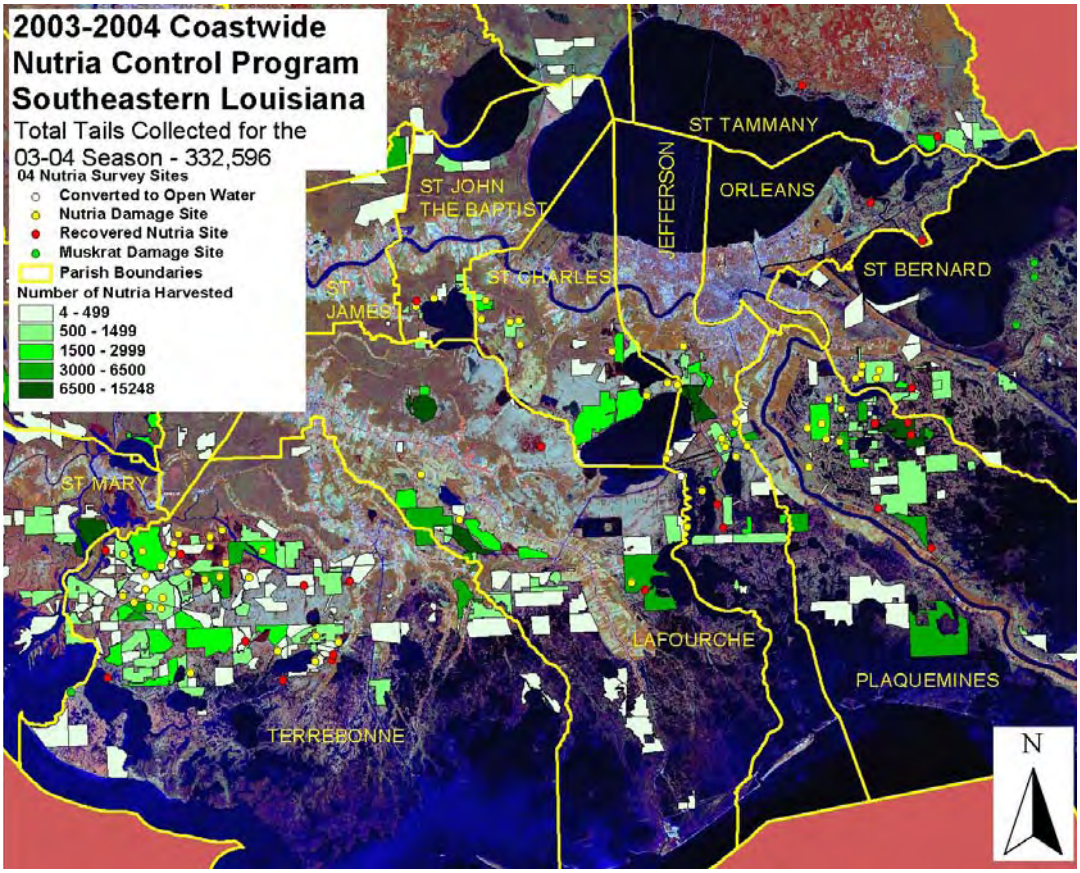
These two species are the only mammals identified as invasive in Louisiana.

3.B.4.a Extensively Established Species

3.B.4.a.i Nutria (*Myocastor coypus*)

Nutria, or coypu, are herbivorous, rodent-like aquatic mammals deliberately introduced to Louisiana from Argentina between 1900 and 1940 for fur farming. Some nutria were released into the wild, and others were used as biocontrol for invasive water hyacinth. A prolific breeder, nutria reach sexual maturity at just four months of age, and females are able to breed within 48 hours of giving birth to a litter. Nutria young are precocial (capable of a high degree of independent activity from birth,) and can swim and eat vegetation shortly after birth.[161]

[158] Chesapeake Bay Program 2004.
[159] Leffler 2002; Chesapeake Bay Program 2004.
[160] Leffler 2002; Chesapeake Bay Program 2004.
[161] LeBlanc 1994.



Coastwide Nutria Control Program

In 2002, LDWF and LDNR launched an incentive payment plan, the Coastwide Nutria Control Program, to reduce vegetative damage by increasing nutria harvest through a bounty. Registered trappers and hunters are paid $4 for every nutria taken south of the I-10/I-12 corridor. To receive payment, participants must bring well-preserved nutria tails (A) to designated collection sites, where officials tabulate them and issue vouchers (B). The program collected 308,160 and 332,596 nutria in its first two years, for which about $2.5 million was paid to participants. The above map shows number of nutria harvested by property in a portion of the program area, during the second season. *Map and photos by LDWF, 2003-2004.*

Coypu exacerbate coastal erosion by digging into thin soils and eating roots of marsh vegetation. As the vegetation dies, the fine-grained, denuded soils become more vulnerable to erosion, eventually forming expanding holes in the marsh called "eat-outs." With the exception of alligators, nutria have no natural predators in Louisiana; populations were kept in check for decades only by fur trappers motivated by a healthy demand for nutria pelts. After the price of nutria pelts plummeted in the late 1980s, populations exploded. Wildlife managers estimate that several million nutria inhabit Louisiana today. (For more information on nutria harvests for fur, see the "Fur Industry" section under "Deliberate Introductions," section 3.A.7.f.) By 1988, landowners complained of nutria-caused vegetative damage to coastal areas, for which the Louisiana Department of Wildlife and Fisheries began conducting vegetative surveys to document the damage.[162]

The table below, from the Louisiana Department of Wildlife and Fisheries Fur and Refuge Division, indicates the number of sites surveyed for nutria-related vegetative damage between 1998 and 2002, the number of those sites with vegetative damage, and the number of sites that showed vegetative recovery:

Year	Total Sites Surveyed	Sites with Vegetative Damage	Sites Experiencing Vegetative Recovery
1998	204	170	34
1999	184	150	34
2000	170	132	38
2001	142	123	19
2002	108	94	12

Overall, the area of coastal marsh with vegetative damage is increasing, and the numbers of sites recovering from nutria damage are decreasing. While it appears that nutria damage is decreasing overall because the number of vegetation-damaged sites is declining, many of the sites surveyed during this period in fact enlarged and merged to form the "eat-outs" mentioned earlier. Merged sites, regardless of size, were thence counted as one site instead of multiple sites.[163]

In late 2002, LDWF and the Louisiana Department of Natural Resources jointly launched an incentive payment plan called the Coastwide Nutria Control Program (CNCP). The purpose of the bounty program is to reduce vegetative damage by increasing nutria harvest. Registered trappers and hunters are paid $4 per tail (as proof of harvest) for every individual nutria taken within the project boundaries. Registered participants must obtain a valid Louisiana trapping license, complete an application, and obtain written permission from the landowner to take the nutria from his/her land. The trappers then receive a specific Nutria Control Program Registration Number. To receive the $4-per-tail bounty, trappers must bring well-preserved (fresh, frozen, salted, etc.) tails at least seven inches long to designated collection sites and must present their assigned registration numbers. As long as the nutria are taken between November and March, trappers meeting the above requirements receive vouchers for the tails, and a check is mailed to them shortly.[164]

The CNCP is funded through the Coastal Wetlands Planning, Protection, and Restoration Act for five years, for as many as 400,000 nutria per year. Program boundaries cover those coastal areas most affected by nutria, from the Interstate 10 — Interstate 12 corridor south to the coast, from the Texas border to the Mississippi border. Every year, transects along the coast are inspected from aircraft to determine nutria-caused vegetative damage. Photographs from the fly-overs will help assess the impact of the bounty program.[165]

Wildlife officials collected 308,160 and 332,596 nutria tails in the first two years of the program, for which about $2.5 million was paid to trappers.[166]

[162] USGS 2000b; Wilson 2002; Linscombe 2003a.
[163] Linscombe 2003a.
[164] Linscombe 2003a.
[165] Linscombe 2003a.
[166] Linscombe 2003b; Marshall 2004.

3.B.4.a.ii Feral Hogs (*Sus scrofa*)

Feral hogs, *Sus scrofa*, are sometimes hybrids of wild boars and domestic livestock. Domestic hogs were deliberately introduced as livestock to North America during colonial times; some escaped farms and established feral populations. In the 1940s, sportsmen deliberately introduced Russian black boars to the southeastern United States as a new game animal. Interbreeding between the boars and the feral hogs may have produced the hybrid feral hogs present in Louisiana today.[167]

Sus scrofa prefers wooded areas, flat coastal plains, swamps, marshes, and other habitats with plentiful water. Louisiana's warm and moist subtropical climate allows for reproduction almost year round, and nutrient-rich soils and diverse ecosystems abundantly produce the hogs' favorite foods: roots, leaves, nuts, tubers, snails, insects, frogs, snakes, and rats.[168]

Besides competing with deer, bears, rabbits, and other native species for habitat and food, *Sus scrofa* can pose a risk to humans. In their quest for food, feral hogs have been known to tear up hurricane protection levees with their snouts and hooves, causing scars which could erode, expand, and weaken the flood-prevention structures.[169] Feral hogs are also vectors for bovine tuberculosis and swine brucellosis, a potential human pathogen which could affect agriculture.

3.B.4.b Locally Established Species

No locally established invasive mammals currently warrant inclusion in this plan.

3.B.4.c Potential Arrivals

No potential invasive mammals are foreseen.

3.B.5 Insects

Due to the prolific nature of insects and their ability to rapidly adapt to a new environment, all insect species established in Louisiana are considered extensively established.

3.B.5.a Extensively Established Species

3.B.5.a.i Red Imported Fire Ant (*Solenopsis invicta*)

Red imported fire ants (RIFA) are thought to be native to Paraguay and the Parana river region in South America and were brought to the United States in the 1930s, probably in soil used as ballast or dunnage in commercial shipping vessels. RIFA were first detected in Mobile, Alabama but quickly spread throughout the southeastern United States, through the transport of nursery stock and earth-moving equipment. A federal quarantine was implemented in 1958 to prevent the spread of RIFA by restricting the movement of potentially infested hay, sod, soil, equipment, and nursery stock.[170]

RIFA cause a variety of adverse economic and environmental effects by outcompeting and preying on native species, feeding on agricultural crops (such as okra, cucumbers, corn, and soybeans), sometimes killing livestock, and nesting in electrical equipment such as air conditioners, traffic signal boxes, computers, airport landing lights, and telephone junctions. The estimated structural and electrical damage caused by RIFA every year is about $11.2 million, and the estimated damage to livestock, wildlife, and public health in Texas alone is $300 million per year. Medical treatment of fire ant stings costs approximately $7.9 million annually. The total cost associated with fire ants in the southern United States is estimated at $1 billion per year.[171]

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[167] Aguirre and Poss 1999e; Jensen 2001.
[168] Aguirre and Poss 1999e.
[169] Jensen 2001.
[170] Morisawa 2000.
[171] Morisawa 2000.

3.B.5.a.ii Formosan Termite (*Coptotermes formosanus*)

Formosan termites were introduced to the United States during and shortly after World War II, via wooden shipping palettes on ships returning from East Asia. The termites were introduced at various ports along the Gulf Coast, including Houston, Galveston, Lake Charles, and New Orleans, as well as Charleston, South Carolina. Formosan termites were not detected at the military bases until 1966, and the extent and impact of Formosan termite populations was not fully appreciated until the 1980s. By this time, this "super termite" was well established and spreading throughout Louisiana and the Gulf Coast.[172]

Formosan termites cause an estimated $500 million in damage to Louisiana every year, with $300 million in damages to New Orleans alone. In addition to damaged houses and other buildings, particularly historical structures, Formosan termites infest and structurally weaken native trees, including live oaks and other hardwoods, rendering them more vulnerable to wind damage and other threats. Even cypress are not immune to Formosan termites.[173]

For more information on Formosan termites, visit the Louisiana Department of Agriculture and Forestry website (www.ldaf.state.la.us) or contact Operation Fullstop at the USDA Southern Regional Research Center (http://www.ars.usda.gov/is/br/fullstop).

3.B.5.a.iii Asian Tiger Mosquito (*Aedes albopictus*)

Aedes albopictus, the Asian tiger mosquito, was accidentally introduced to the United States in 1985 when used tires containing larvae-infested water were shipped from Japan to Houston, Texas. Further transport of used tires spread *Aedes albopictus* to other Southern cities. Within the first year of its introduction, the Asian tiger mosquito was reported in New Orleans, Lake Charles, Baton Rouge, and Shreveport; today it is found in almost every parish in Louisiana.[174]

Aedes albopictus breeds in stagnant water pools found in outdoor containers, especially in shady areas. For this reason, this species does particularly well in urban residential settings. This mosquito threatens public health as a known vector of the viruses that cause dengue fever, eastern equine encephalitis, and the agent that causes dog heartworm. *Aedes albopictus* is a suspected vector of other viral diseases, including West Nile virus, yellow fever, and other types of encephalitis.[175]

3.B.5.b Locally Established Species

All invasive insects are considered "Extensively Established" in this plan.

3.B.5.c Potential Arrivals

3.B.5.c.i Africanized Honeybee (*Apis mellifera scutellata*)

Nicknamed "killer bees," Africanized honeybees were imported to Brazil with the intention of genetically improving European honeybees and making them more suitable for South America. Some were accidentally released from research facilities in 1956, and they hybridized with European varieties, thus becoming "Africanized honey bees." The bees spread through South America, into Central America, and arrived in Texas in October 1990. Since their arrival in Texas, the bees have spread primarily west, into New Mexico, Arizona, and California. Currently, no known populations of Africanized honeybees exist in Louisiana, although the bees have been found as close as Houston.

Africanized honeybees grow more quickly from egg into adult, swarm more often, and are more aggressive than their European counterparts. They are known to completely abandon a colony and move on to another location. They may decrease and even replace European honeybees in parts of the United States.[176]

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[172] Agricultural Research Service 2002a and b; Louisiana Formosan Termite Initiative 2003.
[173] Louisiana Formosan Termite Initiative 2003.
[174] Maryland Department of Agriculture (no date); Centers for Disease Control and Prevention 2001.
[175] Maryland Department of Agriculture (no date); Lounibos 2002.
[176] National Agricultural Pest Information System 1993, 2004.

3.B.6 Other Species

"Other species" are those that the Task Force decided are important and problematic, but do not fit into any of the above categories. These include coelenterates, crustaceans, and one cladoceran.

3.B.6.a Extensively Established Species

None to date.

3.B.6.b Locally Established Species

3.B.6.b.i Australian Spotted Jellyfish (*Phyllorhiza punctata*)

The Australian spotted jellyfish, native to the South Pacific Ocean, was introduced to the Caribbean probably between the 1950s and 1970s, but was not noticed in the northern Gulf of Mexico until June 2000. *P. punctata* was likely transported from Australia to the Caribbean through the Panama Canal, either as polyps in ballast water or attached to the hull of a ship. Transport of this species to the northern Gulf of Mexico is may have occurred when an eddy spun off of the Loop Current, which carries tropical water from the Caribbean to the Gulf of Mexico.[177]

During the *P. punctata* population explosion of 2000, researchers discovered the jellies from Mobile Bay in Alabama to the Texas-Louisiana border, with concentrations heaviest in the Mississippi Sound, the barrier islands off the coasts of Louisiana and Mississippi, and at the mouth of Lake Borgne, Louisiana.[178]

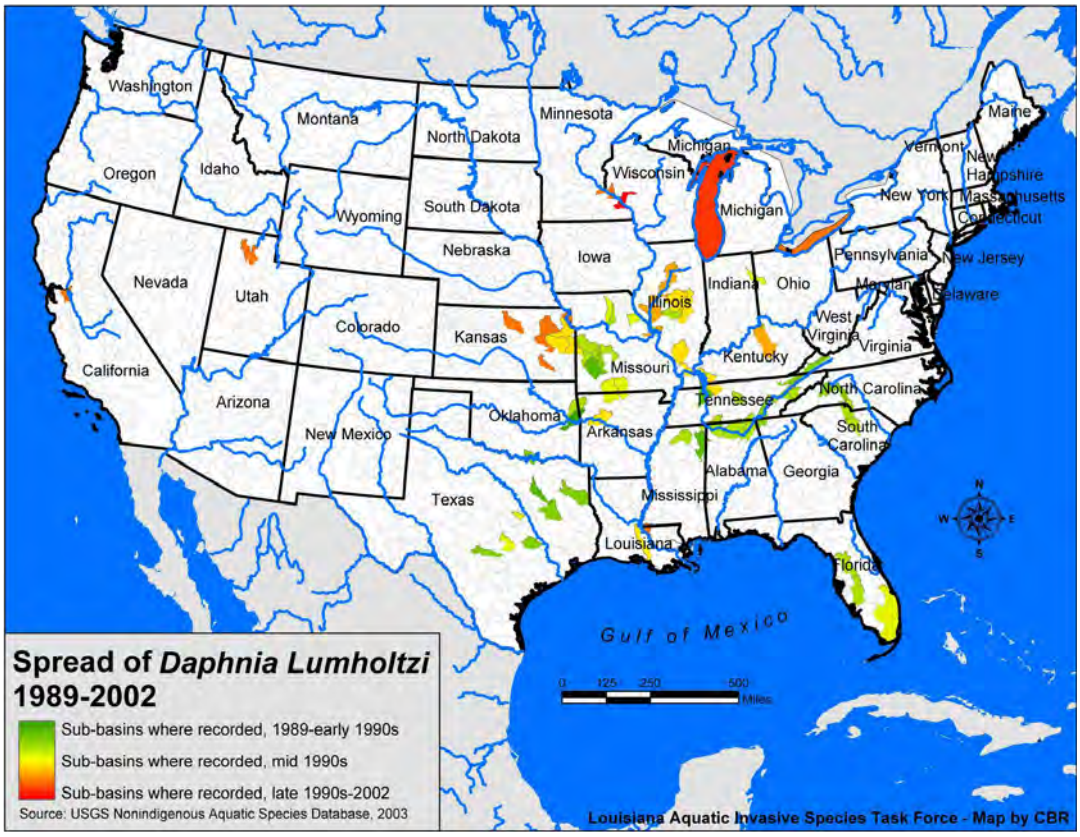
In summer 2000, when *Phyllorhiza punctata* populations were at their greatest, commercial fishermen, researchers, and environmental managers feared this species might have a significant impact on commercially valuable fisheries, specifically shrimp, menhaden, anchovies, crabs, and red snapper. Shrimpers complained that the gelatinous creatures were clogging their nets. Every summer, larval fish and eggs, particularly for the species mentioned above, are carried by tides to estuaries close to shore. The jellyfish in 2000 blocked the entrances to these estuaries. *Phyllorhiza punctata* is a filter-feeding omnivore that will consume every living organism smaller than a few millimeters across. Daily, each jellyfish can filter up to 50 cubic meters of water and eat approximately 2,400 fish and shellfish eggs.[179] According to Harriett Perry, Ph.D., director of the Fisheries Section of the Gulf Coast Research Laboratory in Mississippi, "You really have two problems in terms of commercially important fish. First, the jellies are ingesting the larvae and eggs of these commercially important species, and then the fish larvae must compete with these incredibly efficient jellies for the same food source."[180]

Though the spotted jellyfish population explosions of 2000 have not occurred since, recent evidence indicates *Phyllorhiza punctata* is established in the Gulf of Mexico, suggesting that a similar explosion could occur soon.

3.B.6.b.ii Zooplanktonic Water Flea (*Daphnia lumholtzi*)

Although several species in the Genus *Daphnia* are native to Louisiana and other parts of the United States, the water flea *Daphnia lumholtzi* is native to Africa, Asia, and Australia. It was first documented in Texas in 1990, and today can be found in Alabama, Arkansas, Florida, Illinois, Kansas, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, Ohio, South Carolina, Tennessee, Texas, and Utah. *D. lumholtzi* was first documented in Louisiana in 1994 when 19 zooplankton samples collected from 30 sites in the Atchafalaya Basin contained this water flea. Although its pathway is not known, scientists believe this daphnid species likely was brought to the U.S. in shipments of Nile perch from Lake Victoria in Africa. *D. lumholtzi* probably spread throughout the U.S. through contaminated water used to transport fish stocks, water

[177] Smithsonian Marine Station 2001; Dauphin Island Sea Lab (no date); Higgins 2001.
[178] Maynell 2000; Graham (no date).
[179] Raines 2000; Raines 2002.
[180] Raines 2000.



This water flea, native to Africa, Asia, and Australia, was first documented in Texas in 1990 and has since spread to at least 16 states. Although its pathway is not known, *Daphnia* was likely brought to the U.S. in shipments of Nile perch from Lake Victoria in Africa. *Map by CBR, 2004.*

drained from aquaculture ponds, and/or unwashed recreational boats trailered from one water body to another.[181]

The long-term effects of this species' introduction are currently unknown, but negative impacts are possible. Water fleas and other zooplankton are an important food source for many larval fish species, but because of *D. lumholtzi*'s head and tail spines, which are much longer and more numerous than those of native daphnid, this species of zooplankton is avoided by fish larvae, thus giving it an evolutionary advantage over natives. Stoeckel and Charlebois (1999) note "if this replacement occurs, the amount of food available to larval and juvenile fishes may be reduced."[182]

3.B.6.c Potential Arrivals

3.B.6.c.i Chinese Mitten Crab (*Eriochirus sinensis*)

Chinese mitten crabs are native to the coastal rivers and estuaries of the Yellow Sea region in China and Korea. This crab may have been introduced accidentally via ballast water discharges, or intentionally as a food source , or both. To date, there has been only one Chinese mitten crab sighting in Louisiana: in 1987, dead specimens were collected near the new St. Bernard Parish Highway-Highway 46 intersection in Bay Gardene, Louisiana.[183] Researchers believe they may have fallen off of a passing ship.

In Asia, Chinese mitten crabs are a host organism for several lung flukes (parasitic flatworms), one of which, *Paragonimus ringeri*, can affect humans. This crab species also burrows deep into

[181] Stoeckel and Charlebois 1999; USGS (no date)e.
[182] Stoeckel and Charlebois 1999.
[183] Washington Sea Grant 2000; Nates and Poss 2000.

soft river banks or levees. Burrowing could potentially weaken levees and cause ruptures, increasing flood hazards.[184]

3.B.6.c.ii Green Crab (*Carcinus maenas*)

The European green crab, *Carcinus maenas*, is native to coastal Europe and north Africa.[185] It was first introduced to the United States in the early 19th Century, primarily along the coast from New Jersey to Massachusetts and thence into Nova Scotia. *C. maenas*'s presence on the Pacific Coast of the United States was first documented in San Francisco Bay in 1998 and has since spread along coastal California, Oregon, Washington, and British Columbia. DNA tests indicate that the Pacific coast green crab population originated from the East Coast of North America, but the exact pathway of introduction is unknown.

C. maenas larvae may have been introduced to San Francisco Bay via ballast water discharges. Another likely pathway is packing material, probably seaweed containing live green crabs, used to protect live bait or live seafood during shipping from coast to coast. Improper disposal of the packing material, such as dumping it in San Francisco Bay, could have resulted in the introduction of this voracious predator.

Green crabs are a predatory species with a preference for bivalve mollusks such as clams, oysters, and mussels. They have also been observed eating polychaetes such as marine worms, and other small crustaceans. Green crabs will even prey on juvenile crabs and shellfish.[186]

If introduced to Louisiana waters, *C. maenas* could threaten Louisiana's lucrative commercial oyster, shrimp, and crab fisheries. Tolerant of wide range of temperatures and salinities—0 to 33 degrees Celsius (32-91 degrees Fahrenheit) and 4 ppt to 54 ppt—and able to live in a variety of habitats, from protected rocky shores to tidal marshes, the green crab would probably thrive in Louisiana waters.

California's Humbolt Bay experienced a 40 percent decline in its Manila clam harvest since the green crab became established there. According to the Washington Department of Fish and Wildlife, the green crab "is capable of learning and can improve its prey-handling skills while foraging."[187] This suggests that the green crab could adapt to Louisiana waters and prey on commercially important species.

3.B.7 Viruses, Bacteria, and Other Disease-Causing Microbes

West Nile Virus is one of the many examples of viruses, bacteria, and other disease-causing microbes that qualify as invasive species. Despite their acknowledged importance, the Louisiana Aquatic Invasive Species Task Force decided not to address these microorganisms in the Louisiana Aquatic Invasive Species Management Plan. The Task Force decided that few management actions that are not either planned or already in place through various other governmental health organizations, such as the Centers for Disease Control and Prevention, could address these disease-causing agents. The Task Force chooses to allocate scarce state and federal resources toward the prevention and control of invasive species that agencies focused on human health cannot address.

The LDWF would like to draw particular attention to the oyster disease MSX ("multinucleated sphere unknown"), caused by the deadly protozoan parasite *Haplosporidium nelsoni*. The origin of the disease is unknown, but it has been documented in Korean and Japanese oyster populations. In the U.S., MSX ranges from Maine to Florida on the east coast, but it is not yet present in the Gulf of Mexico. This disease devastated native oyster populations on the east coast, particularly in the mid-Atlantic region. Transfer of ballast water or estuarine animals from the east coast to the Gulf of Mexico could potentially put Louisiana's native *Crassostrea virginica* oysters at risk.[188]

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[184] Nates and Poss 2000.
[185] Copping and Smith 2001.
[186] Washington Department of Fish and Wildlife 2002; Copping and Smith 2001.
[187] Washington Department of Fish and Wildlife 2002.
[188] Virginia Institute of Marine Science (no date.)

3.C Exacerbating Circumstances

Factors such as lack of communication, legal loopholes and shortfalls, and unique geographical conditions complicate Louisiana's aquatic invasive species problems. These and other exacerbating circumstances are documented here.

Lack of Communication and/or Cooperation Among State Agencies — Task Force members recognize the lack of a single "point person" or agency for the public to contact with questions about invasive species. In addition, overlapping or unclear jurisdictions can create "turf wars" between state agencies, sometimes resulting in legal battles.

Lack of Education, Knowledge, and Concern or Ignorance of Existing Laws — This major problem is described by examples offered by Task Force members:

- "The vast majority of the boating and fishing public appear to be ignorant of the problem with invasive exotic species. Therefore, they do not exercise relatively easy measures to prevent the spread of these exotics."
- "Many of those involved with the aquarium, landscaping, and garden pond hobbies do not appear to recognize the problems with invasive species. This includes both consumers and merchants. For example, I have witnessed at least two Baton Rouge area nurseries that specialize in native plants. One of these nurseries was selling Chinese tallow trees, and the other was selling parrot feather."
- "Previous education efforts by USDA have not made enough of an impact, so international travelers continue to carry prohibited articles, which harbor exotic pests."
- "This [invasive species issue] is still a 'back burner' issue for most of the general public and many people in related and affected industries."
- "The public is generally aware of the negative impact of some invasives (i.e., Formosan termites, fire ants, hydrilla) but is not aware of how their actions could lead to the next problem."

Lack of Laws or Enforcement of Existing Laws — Gaps and loopholes in existing laws weaken their effectiveness. For example, Louisiana maintains a list of 16 noxious plant species, including water hyacinth, hydrilla, all plants in the genus *Salvinia*, purple loosestrife, and Eurasian watermilfoil. Although the law states that "no person shall … import or cause to be transported [into Louisiana], from any other state or country, without first obtaining a written permit from the commission, any of [these 16] noxious aquatic plants … ,"[1] the law does not state that the plants cannot be sold commercially or privately once they are already in Louisiana. Another common problem is the lack of enforcement of laws governing the aquarium trade and sale of aquatic plants.

Lack of Funding — Funds shortfalls for education, prevention, and control projects also exacerbate Louisiana's invasive species problem. One Task Force member observed that "government funding for invasive species detection has been spotty, with high-profile species and certain geographical areas (e.g., exotic fruit flies in Florida and California) receiving the lion's share, while smaller states desiring to survey for lower-profile species receive minimal dollars, if any."

Louisiana's Unique Geography and Subtropical Climate — Louisiana's rich soils and extensive waterways provide few barriers to the diffusion of species. Its wide salinity range offers habitat for a great variety of species. The wet, subtropical climate and long growing season allow numerous species to become established and proliferate. Tropical storms and hurricanes serve as natural dispersion mechanisms for invasive species, especially aquatic plants. Storms can also disturb habitats, making them more vulnerable to an invader. Winds and floodwaters, during the June 1-through-November 30 tropical storm season or at other times in the year, can transport seeds and plant fragments to new areas, potentially over long distances.

Other exacerbating circumstances and concerns raised by the Task Force members include:

[1] *Louisiana Revised Statutes* §328, Subsection B.

Competing Interests — Control of pests may require herbicides or pesticides, host removal, trapping, animal depopulation, etc., some of which are opposed by special interest groups.

Limited Detection Technology — Detecting the presence or absence of invasive species in an area usually relies on costly and time-consuming field surveys. Technologies to sense their presence remotely on a broader scale are available, but fail to consistently and directly detect target species in a variety of environments. For certain invasive plants (kudzu, water hyacinth, weed infestations in agricultural areas), multispectral and hyperspectral aerial and satellite imagery have proven useful in detection. Aerial surveys have been used to map marshland eat-outs to provide information on nutria distributions, and handheld thermal imagers have been used to find Formosan termite infestations inside structures. These approaches are mostly still in testing phases and have not been deployed operationally. Accurate and timely detection and mapping of invasive species remains a challenge.

Freshwater Diversions — Although freshwater diversions are critical to wetland restoration, they may create new habitat for invasives by freshening currently saline areas with Mississippi River water.

Lack of Data — Information on invasive species in Louisiana is difficult to find on the Internet, in scientific journals, and other sources, in large part because the research has not yet been done.

Fines Viewed as "Cost of Doing Business" — Economic gains in the smuggling and sale of species often outweigh monetary fines imposed by governments trying to prevent species introductions. Smugglers have little incentive to follow import regulations, and commercial smuggling of prohibited products in maritime containers is occurring more frequently. Some traders in invasive species view fines simply as a cost of doing business. USDA Animal and Plant Health Inspection Service (APHIS) recently increased civil penalties for such violations from a maximum penalty of $1,000 to $50,000 per violation and $250,000 for a business.

Globalized Economy — International trade continues to expand in terms of both volume and markets, and technological advances in transportation help facilitate species introductions. Globalization of the economy has, to date, led to extensive spread of species worldwide.

Uncoordinated Detection Efforts — Currently, each state and federal agency determines on its own which pests to survey, with only minimal input from other government agencies and stakeholders. In Louisiana, the "passive survey" (in which academic researchers or others notify agencies of new organisms) is the norm.

Task Force members also noted a need for more effective monitoring, an early detection and rapid response plan, and better decision-making processes.

4 State Jurisdictions

The following chapter, by attorney Lisa Schiavinato of Louisiana Sea Grant Legal Program, describes the myriad state agency jurisdictions related to aquatic invasive species in Louisiana. Although some jurisdictions below may only be peripherally relevant to AIS, they were included for two reasons: (1) this management plan may eventually be expanded to encompass terrestrial as well as aquatic invasive species, and including terrestrial jurisdictional information may aid Louisiana in the expansion process; and (2) due to the unpredictability of bioinvasions, the jurisdiction information below may be relevant in a future rapid-response scenario. The Louisiana Task Force chose to include both directly and indirectly invasive-species-relevant jurisdictional information in this first management plan.

Agricultural Commodities

The Louisiana Department of Agriculture and Forestry (LDAF) has jurisdiction over agricultural commodities in Louisiana.[1] Agricultural commodities include sugar, cotton, all agricultural products commonly classified as grain, including rice, rough rice, corn, wheat, oats, rye, soybeans, barley, milo, and grain sorghum,[2] and any other agricultural commodity or other farm product which the Agricultural Commodities Commission may declare a commodity by regulation.[3]

Apiaries

The Department of Agriculture and Forestry has jurisdiction over bees and requires beekeepers to register with the Commissioner of Agriculture and Forestry each year.[4] LDAF may enter any warehouse or other premises to inspect any honeybees or beekeeping equipment when there is probable cause that the bees or beekeeping equipment are infected with a contagious or infectious disease or to ascertain whether the bees have been transported in violation of the law.[5] LDAF may inspect honeybees or beekeeping equipment shipped into Louisiana, even if a certificate of inspection accompanies the honeybees or beekeeping equipment from another state.[6] If any honeybees or beekeeping equipment are brought into Louisiana in violation of the law, LDAF may require their removal.[7] If LDAF finds any honeybees or beekeeping equipment infected with or exposed to any contagious or infectious diseases, it may require their destruction, treatment, or disinfection.[8]

Aquaculture and Mariculture

The purpose of this portion of the State Jurisdictions section is to clarify the jurisdiction over non-native fish species used in aquaculture facilities in Louisiana. Jurisdiction in this area recently changed when the legislature passed an aquaculture bill creating the Louisiana Aquaculture Coordinating Council.

The Louisiana Department of Wildlife and Fisheries (LDWF) has jurisdiction over the permitting process of mariculture[9] in Louisiana's coastal zone[10] and over the harvest of mariculture fish.[11] LDWF shares jurisdiction over aquaculture with the Louisiana Department of Environmental Quality (LDEQ.) LDEQ regulates Concentrated Aquatic Animal Production Facilities (CAAPF), which means "a hatchery, fish farm, or other facility" with fish or other aquatic animals in ponds, raceways, or other similar structures which discharge at least 30 days per year.[12] The CAAPF definition does not include facilities of cold-water fish species that produce less than 9,090 harvest weight kilograms of aquatic animals per year and

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[1] *See* La. R.S. 3:3405.
[2] *See* La. R.S. 3:3402(1).
[3] *See id*. *See also* La. R.S. 3:3405(b)(4).
[4] *See* La. R.S. 3:2305(A).
[5] La. R.S. 3:2308(A).
[6] La. R.S. 3:2306(E).
[7] La. R.S. 3:2308(D).
[8] La. R.S. 3:2308(C).
[9] "Mariculture" is defined in the Louisiana Agriculture Finance Act as "aquaculture which is practiced in brackish or saline water and includes hatchery breeding, spawning, transportation, implantation, propagation, growout, and harvesting of domesticated fish and other domesticated aquatic species." La. R.S. 3:263(10).
[10] *See* La. R.S. 56:579.1. "Aquaculture" is defined in La. R.S. 56:356 as "the production of fish in a controlled environment in private waters on private lands." Aquaculture includes, but is not limited to, "the commercial production, storage, processing, marketing, distribution, export or importation of any seafood, including but not limited to catfish, crustaceans, freshwater prawns, mollusks, and shiners and other bait species." *Id.*
[11] *See* La. R.S. 56:579.2.
[12] LA. ADMIN. CODE Tit. 33, 9:Appendix C(I)(A).

that feed less than 2,272 kilograms of food during the calendar month of maximum feeding.[13] For facilities that produce warm-water fish species, the CAAPF definition does not include facilities with closed ponds that discharge only in periods of excess runoff or facilities that produce less than 45,454 harvest weight kilograms of aquatic animals per year.[14] However, despite these exemptions, LDEQ may still designate a facility as a CAAPF if LDEQ determines that it "significantly contributes" to pollution in state waters.[15] If a facility is designated as a CAAPF then it is a point source subject to the Louisiana Pollution Discharge Elimination System (LPDES) permit program, which is administered by LDEQ.[16] Discharges into aquaculture projects also are subject to the LPDES permit program.[17]

The Louisiana Aquacultural Development Act (LADA)[18] will develop a modern, sustainable aquaculture industry in the state through a regulatory program "that allows for the development of current and future aquacultural production, while at the same time protecting the native fish and aquatic life and wildlife and their natural habitat."[19] The primary mechanism by which this will be accomplished is through the Louisiana Aquaculture Coordinating Council (LACC), which is housed within LDAF.[20] The LACC consists of 15 members appointed by the Commissioner of Agriculture and Forestry (hereinafter referred to as the Commissioner) and confirmed by the state Senate.[21]

The powers of the LACC are to:

- Develop and advise a regulatory framework for the growth and maintenance of sustainable aquaculture in the state and to promote aquaculture and related products;
- Determine and recommend to the Wildlife and Fisheries Commission, based on scientific assessment, which species of aquatic livestock are suitable for aquaculture in the state;
- Recommend to the Commissioner criteria for requiring licenses and permits and for granting or denying licenses and permits;
- Hold hearings on alleged violations of the LADA or of rules and regulations pursuant thereto;
- Advise the Commissioner on civil penalties that may be imposed or injunctive or other civil relief that may be sought for violations; and
- Perform other advisory functions assigned to the LACC by the Commissioner.[22]

The LADA specifies a process for the determination of whether species of aquatic livestock are suitable for aquaculture in Louisiana. The LACC initiates the process by making a preliminary proposal regarding the species under consideration which must be approved by a majority vote.[23] No rule or regulation may be promulgated except following a recommendation by the LACC that a species of aquatic livestock is suitable for aquaculture in the state.[24] The LACC then holds a public meeting equipped with all reasonably available scientific data.[25] If a recommendation is approved at a public meeting by a majority

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[13] *Id*.
[14] LA. ADMIN. CODE Tit. 33, 9:Appendix C(I)(B).
[15] LA. ADMIN. CODE Tit. 33, 9:2337(C)(1).
[16] LA. ADMIN.CODE Tit. 33, 9:2337(A).
[17] LA. ADMIN. CODE Tit. 33, 9:2339. "Aquaculture project" means "a defined managed water area which uses discharges of pollutants into that designated area for the maintenance or production of harvestable freshwater, estuarine, or marine plants or animals." *Id*. A "designated project area" is "the portions of the waters of the state within which the permittee or permit applicant plans to confine the cultivated species, using a method or plan of operation (including, but not limited to, physical confinement) which, on the basis of scientific evidence, is expected to ensure that specific individual organisms comprising an aquaculture crop will enjoy increased growth attributable to the discharge of pollutants and be harvested within a defined geographic area." *Id*.
[18] La. R.S. 3:559.1-3:559.14 and 36:629(Q). Aquaculture is defined in LADA as "the producing, raising, managing, harvesting, or marketing of aquatic livestock under controlled conditions." La. R.S. 3:559.3(1). The LADA further defines "aquatic livestock" as "finfish and crawfish species produced, raised, managed, or harvested within or from a constructed impoundment in compliance with rules and regulations," but does not include species of fish excluded by La. R.S. 3:559.14. *Id*. at (2). Species previously approved for aquaculture as of July 1, 2004, will continue to be approved under the rules and regulations in effect at the time of their approval and shall be deemed aquatic livestock. The rules and regulations for these species may be amended as appropriate and in the best interest of the state. La. R.S. 3:559.7(D).
[19] La. R.S. 3:559.2.
[20] La. R.S. 3:559.4.
[21] *Id*.
[22] La. R.S. 3:559.6.
[23] La. R.S. 3:559.7(A).
[24] *Id*. at (B)(1).
[25] *Id*. at (B)(2), (B)(3).

of the LACC, a detailed report is produced that contains specific recommendations, reasons for the recommendations, and proposed regulations.[26]

A copy of the recommendations is then sent to the Wildlife and Fisheries Commission and to other interested state agencies and parties.[27] This commission considers the LACC's recommendations and determines suitability for aquaculture and, if approved, adopts rules and regulations deemed reasonable or necessary to prevent the species from having a detrimental impact on the state's natural resources.[28] No species can be authorized as suitable for aquaculture and deemed aquatic livestock except by rules and regulations adopted by the Wildlife and Fisheries Commission, or, if it fails to act within 90 days following submission of the LACC's report, by the Commissioner.[29] During this 90-day period, the Wildlife and Fisheries Commission takes one of three actions: (1) approval of the LACC's recommendations, (2) approval with modifications, or (3) rejection.[30] After the Wildlife and Fisheries Commission adopts rules and regulations, or if it fails to act within the 90-day period, the Commissioner may proceed with rulemaking.[31] The law specifically does not allow the Commissioner to lessen requirements imposed by the Wildlife and Fisheries Commission or provide a waiver thereof.[32]

If the Wildlife and Fisheries Commission modifies or rejects the LACC's recommendations, the Commissioner and Secretary of Wildlife and Fisheries (hereinafter referred to as the Secretary) can jointly decide whether to accept the action taken by the Wildlife and Fisheries Commission.[33] If the Commissioner and Secretary do not accept the commission's action, they can jointly present a revised recommendation to the commission, which may decide to accept it, accept it with modifications, or reject it.[34] The LACC or the Commissioner and Secretary may submit an unlimited number of recommendations regarding a particular species to the Wildlife and Fisheries Commission.[35] However, the LACC, Commissioner, or Secretary may seek judicial review of the commission's actions in the Nineteenth Judicial Circuit Court after the recommendation has been submitted to the commission more than three times.[36]

The criteria used by the LACC, LDWF, Wildlife and Fisheries Commission, and Commissioner to determine the suitability of a species for aquaculture are:

- Whether the species is established in Louisiana;
- Whether the aquacultural production and marketing of the species is viable and sustainable;
- Whether the species can be produced, maintained, and harvested in such a manner to minimize escape into the wild;
- Any other scientific data regarding the species, including the potential to harm Louisiana's natural resources; and
- Whether LDWF can insure the enforcement of rules and regulations regarding gamefish and maintenance and preservation of the species to the same extent as existed prior to July 1, 2004.[37]

The LADA requires every aquatic producer of a suitable species of aquatic livestock to obtain a license from LDAF for each facility owned or operated by the aquatic producer.[38] Each license is renewed annually.[39] Prior to approval and issuance of a license, LDAF and LDWF jointly inspect each facility to

[26] *Id*. at (B)(4).
[27] *Id*. at (C).
[28] *Id*. at (D).
[29] *Id*.
[30] *Id*. at (E).
[31] *Id*.
[32] *Id*.
[33] *Id*.
[34] *Id*.
[35] *Id*.
[36] *Id*.
[37] *Id*. at (F).
[38] La. R.S. 3:559.8(A).
[39] *Id*.

determine that aquatic livestock producers are in compliance with rules and regulations.[40] Licensed aquatic producers are required to maintain and preserve records pursuant to rules and regulations.[41]

The Commissioner may issue a stop order prohibiting the production, harvesting, distribution, sale, application, movement, or disturbance of any aquatic livestock or products derived from aquatic livestock to prevent a violation[42] or continued violation of LADA or its rules and regulations.[43] Any person aggrieved by a stop order has the right to petition for a hearing on the matter.[44] Any person who violates the LADA or its rules and regulations or any provision of a stop order is subject to a civil penalty of not more than $5,000 for each violation and for each day of violation.[45] Violators may have their licenses or permits suspended, revoked, or placed on probation, in addition to other penalties,[46] including reimbursing the state or appropriate state agencies any costs incurred by them in destroying, removing, containing, or monitoring the release or discharge of aquatic livestock eggs, larvae, juveniles, or adults, or of their waste or unpurified water releases.[47] Moreover, action brought for a civil violation does not preclude criminal prosecution for the same violation.[48]

Aquatic Plants

The Louisiana Department of Wildlife and Fisheries uses monies from the Aquatic Plant Control Fund for the purposes of aquatic weed control and eradication.[49]

Coastal Zone of Louisiana

The Louisiana Department of Natural Resources (LDNR) has jurisdiction over coastal management,[50] coastal restoration,[51] mineral resources,[52] oilfield site restoration,[53] the fisherman's gear compensation fund,[54] and the Oyster Lease Damage Evaluation Board.[55] With respect to LDNR's Office of Mineral Resources, operating agreements relating to state-owned lands and water bottoms must follow the rules set forth by LDWF for the protection of oysters, fish, and wildlife.[56]

LDNR administers the Louisiana Coastal Wetlands Conservation and Restoration Act.[57] Among other responsibilities, LDNR:

- acquires by purchase, donation, or otherwise any land needed for wetlands and coastal restoration or conservation projects and other property required for the operation of the projects;
- develops procedures to evaluate new and improved coastal restoration and preservation technologies;
- coordinates coastal restoration efforts with local governments, interest groups, and the public; and
- develops, implements, operates, maintains, and monitors coastal restoration plans and projects.[58]

LDNR also administers the Louisiana Coastal Zone Management Program.[59] LDNR develops the overall state coastal management program, as well as coastal use guidelines that are developed in conjunction

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[40] *Id*. at (B). See section (C) for a list of criteria the LDAF and LDWF use in inspecting facilities.
[41] *Id*. at (D).
[42] *See* La. R.S. 3:559.12 for a list of violations.
[43] La. R.S. 3:559.10(A).
[44] *Id*. at (B).
[45] La. R.S. 3:559.13(A). Note: Each day on which a violation occurs is a separate offense.
[46] *Id* at (B).
[47] *Id*. at (C). Note: It is an affirmative defense that the release or discharge was an act of nature or sabotage if the aquatic producer held a valid license listing the facility at the time of the release or discharge. *Id*.
[48] *Id*. at (F). Note: A violation of Wildlife and Fisheries Commission rules and regulations pursuant to La. R.S. 3:559.7(D) is a class two violation, as defined by La. R.S. 56:32. *Id*.
[49] La. R.S. 56:10.1.
[50] *See* LA. ADMIN. CODE Tit. 43, 1:700-1:729.
[51] *See* LA. ADMIN. CODE Tit. 43, 1:801-1:895.
[52] *See* LA. ADMIN. CODE Tit. 43, 1:901-1:951.
[53] *See* LA. ADMIN. CODE Tit. 43, 1:2101-1:2107. *See also* LA. ADMIN. CODE Tit. 43, 1:2301-1:2307, 1:2501-1:2503, 1:2701-1:2703, 1:2901, and 1:3101.
[54] *See* LA. ADMIN. CODE Tit. 43, 1:1501-1:1517.
[55] *See* LA. ADMIN. CODE Tit. 43, 1:3701-1:3703. *See also* LA. ADMIN. CODE Tit. 43, 1:3901-1:3923.
[56] *See* LA. ADMIN. CODE Tit. 43, 2:201.
[57] *See* La. R.S. 49:214.1 et seq.
[58] La. R.S. 49:214.4.

with LDWF.[60] Additional jurisdiction of LDNR includes receiving and evaluating Coastal Use Permit applications, issuing Coastal Use Permits, monitoring and conducting surveillance of permitted uses to ensure that conditions of coastal use permits are satisfied; coordinating with local, state, regional, and federal agencies on coastal management matters; and providing advice and technical assistance to local governments.[61] However, LDNR is not the only agency that may be involved in permitting projects in the coastal zone; permits from the U.S. Army Corps of Engineers (USACE) and LDEQ also may be required. In addition to a Coastal Use Permit, an applicant also may be required to obtain permits from USACE pursuant to Section 404 of the Clean Water Act[62] if dredging or filling is required and Section 10 of the Rivers and Harbors Act[63] if the project will obstruct navigable waters. An applicant may be required to apply for a Water Quality Certification permit from LDEQ if there will be a discharge into state waters.[64]

No part of the Louisiana Coastal Zone Management Program is intended to curtail the authority of any other state department or agency.[65] Permits issued pursuant to LDNR's statutory authority for the location, drilling, exploration, and production of oil, gas, or other minerals are issued in lieu of Coastal Use Permits, provided that there is coordination during the permitting process and assurances that all permitted activities are consistent with coastal use guidelines, the state program, and any affected local program.[66] Permits issued pursuant to LDWF's statutory authority for leasing, seeding, cultivating, planting, harvesting, or marking of oyster bedding grounds are issued in lieu of Coastal Use Permits, provided that LDWF coordinates with LDNR during the permitting process and ensures that all permitted activities are consistent with coastal use guidelines, the state program, and any affected local program.[67]

Communicable Diseases

The Louisiana Department of Health and Hospitals (LDHH) provides for an immunization program to prevent the occurrence or spread of communicable diseases and also provides for the reporting, investigation, application, and implementation of appropriate control measures that include isolation and/or quarantine measures for all communicable diseases of public health significance.[68] LDHH also has jurisdiction over regulating the carriage and transport of persons, freight, and dead bodies brought into the state or transported in or through the state that may affect the public health.[69]

Dredge and Fill Activities and Commercial Shell Dredging

Jurisdiction over dredge and fill activities in Louisiana is shared between state agencies and the USACE. The USACE retains jurisdiction over dredge and fill activities that affect navigable waters pursuant to Section 404 of the Clean Water Act.[70] Section 404 gives the USACE jurisdiction over the issuance of permits for the discharge of dredged or fill material at specified disposal sites.[71] If the project that requires dredge and fill activity obstructs navigation, then a Section 10 permit from the USACE pursuant to the Rivers and Harbors Act[72] also will be required. If a dredge and fill activity will occur in Louisiana's

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[59] *See* La. R.S. 49:214.21 et seq.
[60] *See* La. R.S. 49:214.27.
[61] La. R.S. 49:214.26.
[62] *See* 33 U.S.C. 1344.
[63] *See* 33 U.S.C. 403. "The creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of the Army; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army prior to beginning the same." *Id*.
[64] *See* LA. ADMIN. CODE, Tit. 33, 9:1507.
[65] La. R.S. 49:214.31.
[66] *Id*.
[67] *Id*.
[68] La. R.S. 40:4(2).
[69] La. R.S. 40:4(14).
[70] *See* 33 U.S.C. 1344.
[71] 33 U.S.C. 1344(a).
[72] *See* 33 U.S.C. 403.

coastal zone, then LDNR has jurisdiction over the state permitting process.[73] State permits are required in addition to federal permits.

Pursuant to the Louisiana Water Discharge Permit System (LWDPS), LDEQ has jurisdiction over discharge from commercial dredging of shell and other natural resources.[74] However, the scope of LDEQ's jurisdiction via the LWDPS program does not include permitting the discharge into state waters of dredged or fill material resulting from activities that are permitted by USACE, such as channel dredging and construction.[75]

Dredge and fill activities are included in the definition of "water pollution" in Title 33 of the Louisiana Administrative Code as "substances in concentrations which tend to degrade the ... integrity of such waters [of the state]."[76] Therefore, LDEQ has some jurisdiction over dredge and fill activities pursuant to the Clean Water Act's Section 401 water quality certification authority.[77] In order to fulfill the purposes of the Louisiana Water Control Law[78] and Section 401,[79] LDEQ has an established procedure for issuing water quality certifications (WQC) for the state.[80] USACE will not issue a Section 404 permit without WQC from LDEQ. One of the application criteria for WQC is "the nature of the activity to be conducted by the applicant, including estimates of volume of excavation for dredge and fill activities."[81]

Environmental Quality

The Louisiana Department of Environmental Quality generally has jurisdiction over matters "affecting the regulation of the environment within the state, including but not limited to the regulation of air quality, noise pollution control, water pollution control, the regulation of solid waste disposal, the protection and preservation of the scenic rivers and streams of the state, the regulation and control of radiation, the management of hazardous waste, and the regulation of those programs which encourage, assist, and result in the reduction of wastes generated within Louisiana."[82] To ensure compliance with state environmental laws and regulations and to protect the environment and the public health, LDEQ may conduct inspections of all facilities subject to state environmental quality laws and regulations.[83] Furthermore, all permits, licenses, registrations, variances, and compliance schedules required by the Louisiana Environmental Quality Act[84] are issued by LDEQ.[85] It is also the purview of LDEQ to establish enforcement procedures and policies to ensure compliance and address violations of state environmental quality regulations.[86]

LDEQ administers the Louisiana Water Control Law[87] and the Louisiana Pollutant Discharge Elimination System (LPDES). The LPDES incorporates portions of the Louisiana Environmental Quality Act[88] and the Louisiana Water Control Law and all regulations promulgated under their authority which are deemed equivalent to the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act

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[73] *See* La. R.S. 49:214.30.
[74] *See* LA. ADMIN. CODE Tit. 33, 9:301(C)(7).
[75] LA. ADMIN. CODE Tit. 33, 9:301(D)(7).
[76] LA. ADMIN. CODE Tit. 33, 9:107.
[77] *See* 33 U.S.C. 1341. "Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or will originate ..." *Id*.
[78] *See* La. R.S. 30:2071 et seq.
[79] *See* 33 U.S.C. 1251 et seq.
[80] *See* LA. ADMIN. CODE, Tit. 33, 9:1507.
[81] *Id*.
[82] La. R.S. 30:2011(A)(1). Note: However, LDEQ's jurisdiction over the regulation of noise pollution control does not prevent local governments from adopting local noise pollution control ordinances that are at least as strict as state regulations regarding noise pollution. La. R.S. 30:2011(A)(2).
[83] *See* La. R.S. 30:2012. Note: The purpose of such inspections conducted by LDEQ is to determine whether certain conditions exist that would adversely affect the environment and the public health. These conditions are listed in La. R.S. 30:2012.
[84] *See* La. R.S. 30:2001 et seq.
[85] *See* La. R.S. 30:2014(A)(1).
[86] *See* La. R.S. 30:2050.1.
[87] *See* La. R.S. 30:2071 et seq.
[88] *See* La. R.S. 30:2001 et seq.

(CWA), and for which Louisiana has delegated authority.[89] LDEQ's authority under the LPDES includes issuance of all permits provided for under Sections 402 and 405 of the CWA as well as the general permits program, the storm water discharge program, the pretreatment program, the sewage sludge program, and the Louisiana Water Discharge Permit System (LWDPS) process for discharging or allowing the discharge of any pollutants into the waters of the state.[90] Generally, LDEQ's jurisdiction covers any activity that results in the discharge of any substance into the waters of the state with or without the required permit, variance, or license.[91] LDEQ is also responsible for establishing, maintaining, and enforcing surface water quality standards for waters of the state.[92] This is accomplished through wasteload allocation and permit processes for the development of effluent limitations for point source discharges and to form the basis for implementation of best management practices to control nonpoint sources of water pollution.[93] LDEQ is responsible for regulating facilities and discharges within the scope of the NPDES[94] for point source pollution into the waters of the state.[95]

LWDPS permits from LDEQ are also required for discharges into aquaculture projects[96] and for silviculture point sources.[97] LDEQ also has the authority to investigate violations of permitted discharges[98] and to commence enforcement proceedings for such violations.[99] LDEQ sets effluent standards to control wastewater discharges into the waters of the state,[100] including but not limited to exploration for and production of oil and natural gas,[101] secondary treatment for sanitary sewage,[102] and chlorine-bleaching pulp and paper mill dischargers.[103]

LDEQ administers the Louisiana Solid Waste Management and Resource Recovery Law.[104] One of the duties of LDEQ with regard to this law is to control and regulate pollution of the environment caused by solid waste disposal practices.[105] To this end, LDEQ adopts and promulgates "rules, regulations, and standards for the transportation, processing, resource recovery, and disposal of solid wastes consistent with the general solid waste management plan adopted by the department. Such rules and regulations shall include but not be limited to the disposal site location, construction, operation, compliance deadlines, citing of stations for the off-loading and transloading of treated solid waste and sewage sludge destined for disposal, and maintenance of the disposal process ..."[106]

LDEQ administers the Solid Waste Recycling and Reduction Law.[107] The powers and duties of LDEQ in administering the law include, but are not limited to:

- providing technical assistance to parishes, municipalities, and other persons, and coordinating with appropriate federal agencies and private organizations;

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[89] La. R.S. 30:2073(1).
[90] La. R.S. 30:2073(1).
[91] *See* La. R.S. 30:2075.
[92] *See* LA. ADMIN. CODE Tit. 33, 9:1101. *See also* LA. ADMIN. CODE Tit. 33, 9:1107.
[93] *See* LA. ADMIN. CODE Tit. 33, 9:1101(D).
[94] *See* LA. ADMIN. CODE Tit. 33, 9:2301(B).
[95] *See* LA. ADMIN. CODE Tit. 33, 9:2301. *See also* LA. ADMIN. CODE Tit. 33, 9:2311, 9:2403-9:2505, 9:2745-9:2753 (Ocean Discharge Criteria), and 9:2761-9:2781.
[96] *See* LA. ADMIN. CODE Tit. 33, 9:301(L).
[97] *See* LA. ADMIN. CODE Tit. 33, 9:301(M).
[98] *See* LA. ADMIN. CODE Tit. 33, 9:503.
[99] *See* LA. ADMIN. CODE Tit. 33, 9:505, 9:507.
[100] *See* LA. ADMIN. CODE Tit. 33, 9:701 et seq.
[101] *See* LA. ADMIN. CODE Tit. 33, 9:708.
[102] *See* LA. ADMIN. CODE Tit. 33, 7:711.
[103] *See* LA. ADMIN. CODE Tit. 33, 9:713.
[104] *See* La. R.S. 30:2151 et seq. "Solid waste" means "any garbage, refuse, sludge from a wastewater treatment plant, water supply plant, or air pollution control facility, and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities ..." La. R.S. 30:2153. However, this definition "does not include or mean solid or dissolved material from domestic sewage or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under R.S. 30:2074, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), or hazardous waste subject to permits under R.S. 30:2171 et seq." *Id*.
[105] *See* La. R.S. 30:2154.
[106] *Id*.
[107] *See* La. R.S. 30:2411 et seq.

- adopting rules and regulations to encourage reduction, recycling, and resource recovery of solid waste as a source of raw materials to be utilized in the production of goods in the state;
- assisting and encouraging, to the maximum extent possible, development of industries and commercial enterprises which are based upon resource recovery, recycling, and reuse of solid waste within the state; and
- serving as an information source of recycling businesses operating in the state and assisting in matching recovered materials with markets. Information that is compiled is made available to local governments to assist with their solid waste management activities.[108]

There are several areas related to environmental quality over which LDEQ has jurisdiction that, although they are not directly related to invasive species, nevertheless may exemplify how Louisiana might choose to structure rapid response to aquatic invasive species. Refer to Appendix C.3 for detailed information regarding LDEQ's jurisdiction over the administration of Louisiana's Air Quality Program, emergency response to the release of pollutants, Hazardous Waste Control Law, Louisiana Inactive and Abandoned Hazardous Waste Site Law, and Louisiana Waste Reduction Law. Appendix C.3 also discusses the Hazardous Materials Information, Development, Preparedness, and Response Act that is administered by the Department of Public Safety and the Oil Spill Prevention and Response Act that is administered by the Office of the Oil Spill Coordinator within the Governor's Office.

Fish and Seafood

Most issues related to fish and commercial and recreational fishing fall under the jurisdiction of the Louisiana Department of Wildlife and Fisheries. Other jurisdiction belongs to the Department of Agriculture and Forestry. LDWF's jurisdiction includes species of freshwater and saltwater fish. The agency has the authority to regulate or prohibit by rule the possession, sale, or transportation of any fish into Louisiana.[109] LDWF has jurisdiction over certain exotic fish species that may not be possessed, sold, or transported without permission from the agency, such as carnero catfish, common carp, goldfish, and all species of tilapia.[110] LDWF also has jurisdiction over piranha,[111] Rio Grande tetra,[112] and listed prohibited shark species (e.g., basking shark, white shark, and sand tiger shark).[113] In addition, LDWF has jurisdiction over the transfer of sharks between vessels in state or federal waters.[114]

LDWF has jurisdiction over freshwater game fish, saltwater game fish, and game fish fingerlings,[115] and the agency also has jurisdiction over the methods of taking freshwater and saltwater fish.[116] Additionally, the Wildlife and Fisheries Commission sets daily take, possession, and size limits for freshwater game fish[117] and saltwater finfish caught recreationally in Louisiana territorial waters.[118] LDWF is also responsible for commercial taking of saltwater finfish species, including but not limited to black drum, sheepshead and flounder.[119] The agency sets size and possession limits for commercial fish.[120] Other commercial fish species of which LDWF regulates the harvest include but are not limited to paddlefish,[121] sturgeon,[122] king and Spanish Mackerel,[123] cobia,[124] red snapper,[125] greater amberjack,[126] jewfish,[127]

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[108] La. R.S. 30:2413.
[109] La. R.S. 30:319.1.
[110] La. R.S. 56:319(A).
[111] *See* La. R.S. 56:319(D).
[112] *Id*.
[113] *See* LA. ADMIN. CODE Tit. 76, 7:357(K).
[114] LA. ADMIN. CODE Tit. 76, 7:357(L).
[115] *See* La. R.S. 56:327(A)(1).
[116] *See* La. R.S. 56:320.
[117] *See* La. R.S. 56:325.
[118] *See* La. R.S. 56:325.1.
[119] *See* La. R.S. 56:325.4.
[120] *See* La. R.S. 56:326.
[121] *See* LA. ADMIN. CODE Tit. 76, 7:137.
[122] *See* LA. ADMIN. CODE Tit. 76, 7:145.
[123] *See* LA. ADMIN. CODE Tit. 76, 7:323, 7:327.
[124] *See id*.
[125] *See* LA. ADMIN. CODE Tit. 76, 7:335.
[126] *See id*.
[127] *See id*.

Nassau grouper,[128] tuna,[129] and red drum.[130] LDWF also regulates the Experimental Fisheries Program.[131]

LDWF also has jurisdiction over the mariculture industry.[132] LDWF maintains jurisdiction over shipment of any saltwater game fish.[133] The Wildlife and Fisheries Commission may issue permits to Louisiana residents for raising all types of bass, crappie, and bream in the state.[134] Furthermore, LDWF has jurisdiction over the import, transport, and possession of live triploid grass carp, as well as over triploid grass carp fingerlings under six inches in total length. The agency has jurisdiction over enforcement of the prohibition against releasing live triploid grass carp into Louisiana waters without written approval from LDWF.[135]

Specifically regarding tilapia, LDWF has authority over the issuance of permits for the import, export, transport, and possession to the transfer and sale of live tilapia.[136] LDWF also has jurisdiction over all escape incidents and may implement or require the implementation of whatever measures deemed necessary to contain, recapture, or kill the escaped tilapia.[137] Furthermore, LDWF has jurisdiction over the rules for tilapia culture, live holding facilities, and live holding systems.[138]

LDAF has jurisdiction over catfish that are shipped into Louisiana.[139] Catfish that will be used for restocking purposes may be shipped into Louisiana by a person, firm, or corporation that possesses all the necessary wholesale licenses and a certification of inspection issued by the state or country of origin.[140] The certification of inspection must state that the catfish are free from contagious or infectious diseases based upon actual inspection of the catfish within 48 hours prior to the date of shipment.[141] LDWF also has jurisdiction over labeling of catfish packaging, whether the catfish are farm-raised or naturally produced, and the origin of the fish.[142] LDHH requires all packers or proprietors of packaged, processed products register each separate and distinct product annually and to supply LDHH with a sample of each product upon request.[143]

LDWF has jurisdiction over the raising and taking of oysters, fish, and seafood for sale through its certified aquaculture program or issuance of mariculture permits.[144] LDWF also regulates the oyster industry via licensing for oyster harvesting, transporting of oysters from the waters of Louisiana, and leasing of bedding grounds.[145]

Jurisdiction over the shrimp fishery and shrimp industry exclusively belongs to LDWF, from the taking and possession of shrimp to the transportation thereof.[146] LDWF also regulates the saltwater shrimp seasons and the taking and method of taking bait shrimp.[147]

LDWF regulates the taking of and method of taking crabs, the release of crabs in the berry stage, and promulgation and enforcement of crab trap rules.[148] LDWF also regulates the harvest and sale of crabs

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[128] *See id*.
[129] *See* LA. ADMIN. CODE Tit. 76, 7:361.
[130] *See* LA. ADMIN. CODE Tit. 76, 7:363.
[131] *See* LA. ADMIN. CODE Tit. 76, 7:701 et seq.
[132] *See* La. R.S. 56:579.1.
[133] *See* La. R.S. 56:327(A)(1)(c).
[134] *See* La. R.S. 56:327(A)(2).
[135] *See* LA. ADMIN. CODE Tit. 76, 7:901(3)(a). *See also* LA. ADMIN. CODE Tit. 76, 7:901(6)(b), 7:901(6)(d).
[136] *See* LA. ADMIN. CODE Tit. 76, 7:903(B).
[137] *See* LA. ADMIN. CODE Tit. 76, 7:903(H)(11).
[138] *See* LA. ADMIN. CODE Tit. 76, 7:903(D). *See also* LA. ADMIN. CODE Tit. 76, 7:903(F).
[139] La. R.S. 3:2356(B).
[140] *Id*.
[141] *Id*.
[142] La. R.S. 56:578.11.
[143] La. R.S. 40:627.
[144] La. R.S. 56:327(B). *See also* La. R.S. 56:579.1.
[145] La. R.S. 56:422.
[146] *See* La. R.S. 56:493.
[147] *See* La. R.S. 56:497.
[148] *See* La. R.S. 56:332.

produced in private, artificial, earthen reservoirs and the transport of crabs from commercial fish farm producers on the public roads and highways of Louisiana, including any and all equipment (except electric fish shocking devices), necessary for the harvest of domesticated fish produced in privately owned waters.[149] Also, LDWF regulates the methods, permits, and fees regarding the harvesting of freshwater mussels.[150]

LDWF regulates eel taken for commercial purposes and for recreational purposes using any legal recreational gear, the taking of eel using eel pots, and authorizes the sale of eel if the holder possesses a valid commercial fishing license in addition to any other applicable commercial licenses.[151]

LDWF regulates mullet taken commercially from saltwater areas of the state. LDWF also provides for zones, permits, fees, and other provisions necessary for regulating the commercial taking of mullet, as well as enforcing limitations on the saltwater areas from where mullet may be taken.[152] LDWF also regulates the commercial taking of mullet from freshwater areas of the state.[153] Specifically, LDWF provides rules for zones, permits, fees, daily take and possession limits, and other necessary provisions to the commercial taking of mullet.[154]

LDHH and LDAF share jurisdiction over the inspection of seafood. Inspection of seafood is pursuant to Louisiana's Public Health-Sanitary Code and LDAF's Seafood Inspection Program.[155] Inspection includes a recommendation for testing the environment, including the water source, to the appropriate agency only when evidence of contamination, adulteration, or spoilage that may harm the health of humans or animals is indicated.[156]

LDHH has jurisdiction over molluscan shellfish sanitation. LDHH classifies all state waters that have the potential to produce molluscan shellfish. Molluscan shellfish may be harvested only from growing areas that are approved by the State Health Officer. LDHH is authorized to immediately close and prohibit the harvest of any molluscan shellfish growing in an area adversely affected by health dangers, and is required to immediately reopen molluscan shellfish growing areas when the department has determined that the health dangers are no longer a threat to public health.[157] Harvesting molluscan shellfish from areas closed or not approved by the State Health Officer constitutes a violation of La. R.S. 56:424(E).

In order for LDHH to monitor molluscan shellfish-related diseases for verification and certification, the agency may collect from all water bottoms, both public and private, shellfish samples for bacteriological, chemical, and radiological analysis.[158] LDHH is required to collect oyster samples in Calcasieu Lake for the purpose of determining chemical, radiological, and metallic analysis 45 days prior to the opening of the oyster season as fixed by the commission in accordance with La. R.S. 56:435.1 or La. R.S. 56:435.2.

Food-borne and Vector-borne Diseases

The Louisiana Department of Health and Hospitals has jurisdiction over food-borne and vector-borne diseases. LDHH protects the public from food-borne diseases by requiring that all food products are produced from a safe and sanitary source, including but not limited to marine and freshwater seafood and animal products.[159] All food products must be prepared, processed, packaged, handled, stored, and transported in a sanitary manner that will prevent contamination, spoilage, or adulteration.[160] LDHH also supervises, inspects, and issues sanitation permits for water supplies, slaughterhouses, cold storage

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[149] La. R.S. 56:551.
[150] *See* La. R.S. 56:450. Note: A LDWF regulation labels zebra mussels as an "introduced nuisance aquatic species" and "strongly encourages actions to prevent the spread of zebra mussels." LA. ADMIN. CODE Tit. 76, 7:161(D)(5).
[151] *See* La. R.S. 56:332.1.
[152] *See* La. R.S. 56:333. *See also* La. R.S. 56:322(B).
[153] *See* La. R.S. 56:333.1.
[154] *See id*.
[155] *See* La. R.S. 40:4(1)(b).
[156] *See id*.
[157] La. R.S. 40:5.3.
[158] La. R.S. 40:5.3(H).
[159] La. R.S. 40:4(1)(a).
[160] *Id*.

plants, all places of public accommodation, and the handling and control of hygienic conditions with respect to all food products.[161] LDHH also has jurisdiction over sanitary inspection of meat, milk, and other products.[162] Furthermore, LDHH monitors and controls disease vectors at levels sufficient to prevent or abate outbreaks of diseases.[163]

Imported Wild Birds and Animals

The Louisiana Department of Wildlife and Fisheries has jurisdiction over the catch, snare, and pursuit of any wild animal or bird imported into Louisiana by the federal government or by any person under the supervision and consent of the Wildlife and Fisheries Commission for the purpose of experimentation or propagation.[164] LDWF also has jurisdiction over the take of any wild bird or wild quadruped imported into Louisiana by the state or federal government for the purpose of experimentation or propagation.[165]

LDAF regulates the licensing process regarding the raising, selling, or raising and selling of imported white tail deer, farm-raised white tail deer and exotic deer, antelope, and elk for commercial purposes on breeding farms or propagating preserves that are owned or leased by the licensee.[166]

Livestock

The Louisiana Department of Agriculture and Forestry has general jurisdiction over livestock, including the unlawful transportation of diseased animals or livestock, or adulterated meat.[167] In this context, "livestock" means "any animal bred, kept, maintained, raised, or used for show, profit, or for the purpose of selling or otherwise producing crops, animals, or plant or animal products for market."[168]

LDAF also regulates the licensing of pet turtle farmers and the monitoring and inspection of pet turtles.[169] LDAF regulates the quarantine of pet turtles or pet turtle eggs when laboratory analysis indicates the presence of bacteria harmful to humans or other pet turtles, such as Salmonella.[170] LDAF also regulates removal from the premises of licensed pet turtle farmers and disposal of pet turtles and turtle eggs that have been infected with bacteria harmful to humans or other pet turtles.[171]

LDAF's Livestock Sanitary Board deals with all contagious and infectious diseases of animals.[172]

Microorganisms in Food

The Louisiana Department of Health and Hospitals has the power to investigate whether or not the distribution of any class of food may be a threat to health by reason of contamination with microorganisms during the manufacture, processing, or packing thereof.[173] If such a threat cannot be adequately determined after the articles have entered state commerce, LDHH may, under these conditions only, govern the conditions of manufacture, processing, or packing for a temporary period of time to protect the public health.[174]

Natural and Scenic Rivers System

The Louisiana Department of Wildlife and Fisheries administers Louisiana's Natural and Scenic Rivers System in order to preserve, protect, develop, reclaim, and enhance the wilderness qualities, scenic beauty, and ecological regime of certain free-flowing streams or segments thereof. [175]

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[161] La. R.S. 40:5(5).
[162] *See* La. R.S. 40:5(15).
[163] *See* La. R.S. 40:4(9).
[164] La. R.S. 56:762.
[165] La. R.S. 56:113.
[166] La. R.S. 3:3102.
[167] La. R.S. 3:2097.
[168] La. R.S. 3:2097(3).
[169] *See* La. R.S. 3:2358.7(C), 3:2358.9.
[170] La. R.S. 3:2358.11(A).
[171] La. R.S. 3:2358.12(B).
[172] *See* LA. ADMIN. CODE Tit. 7, 21:121.
[173] La. R.S. 40:612.
[174] *Id*.
[175] La. R.S. 56:1841. *See also* LA. ADMIN. CODE Tit. 76, 9:101 *et seq*.

Noxious Aquatic Plants
The Louisiana Department of Wildlife and Fisheries has jurisdiction over listed noxious aquatic plants.[176] La. R.S. 56:328(B) prohibits anyone at any time from knowingly importing or causing the import of listed aquatic plant species or causing them to be transported into Louisiana from any other state or country without first obtaining a written permit from the Wildlife and Fisheries Commission. However, the Wildlife and Fisheries Commission may issue permits for the importation of listed noxious aquatic plants for the purpose of scientific investigation.[177] There is a gap in this statute that should be noted. Although La. R.S. 56:328 prohibits the importation of listed species, nothing in the law prohibits their sale once they are in Louisiana.

Noxious Weeds
The Louisiana Department of Agriculture and Forestry regulates terrestrial plants that the agency designates as "noxious weeds," particularly as the agency's jurisdiction relates to the enforcement of Louisiana's Seed Law, and places limitations on the seeds of designated noxious weeds.[178]

Nurseries
The Louisiana Department of Agriculture and Forestry has jurisdiction over the annual certification and permitting system of nursery stock[179] and their quarantine.[180] LDAF requires that purchasers in Louisiana of out-of-state nursery stock provide proof of origin of citrus trees in their possession.[181]

Pesticides
If the Louisiana Department of Agriculture and Forestry finds that a foreign pest or a pest not previously known to be established in Louisiana threatens to become established in the state, then LDAF may apply to the U.S. Environmental Protection Agency for a quarantine or public health exemption to allow the application of a pesticide.[182] A crisis exemption may be issued in accordance with federal regulations for the use of an unregistered pesticide if an unpredictable outbreak of pests in Louisiana is occurring and there is no readily available pesticide registered for the particular use in order to eradicate or control the pest.[183]

Pink Bollworm
Cotton plants, plant products, parts of cotton plants and plant products, and host materials for the pink bollworm are subject to the Louisiana Department of Agriculture and Forestry's quarantine regulations.[184] LDAF requires a permit to move untreated and/or unmanufactured articles within a regulated area, with exemptions.[185] Certification from LDAF is also required to move regulated articles from a regulated area to a pest-free area.[186]

Plant Pests and Diseases and Crop and Fruit Diseases
The Louisiana Department of Agriculture and Forestry generally has jurisdiction over plant pests and diseases. LDAF also has jurisdiction over all crop and fruit diseases and contagious and infectious crop and fruit diseases.[187] LDAF maintains a list of materials declared to be hosts for plant pests and diseases.[188] Among LDAF's responsibilities regarding plant pests and diseases are:

- inspecting any premises and/or property if there is reason to believe that a plant pest or diseases subject to regulation may be present in an area of the state;[189]

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[176] An "aquatic plant" is a plant that is or can be grown, submerged, or partly submerged or floating in water. La. R.S. 56:328(B) contains a complete list of noxious aquatic plants to which this statute applies.
[177] La. R.S. 56:328(C).
[178] *See* LA. ADMIN. CODE Tit. 7, 13:145.
[179] *See* LA. ADMIN. CODE Tit. 7, 15:126.
[180] *See* LA. ADMIN. CODE Tit. 7, 15:125.
[181] LA. ADMIN. CODE Tit. 7, 15:127(A).
[182] LA. ADMIN. CODE Tit. 7, 23:117(A)(3).
[183] *Id*.
[184] *See* LA. ADMIN. CODE Tit. 7, 15:149.
[185] *See* LA. ADMIN. CODE Tit. 7, 15:153.
[186] *See id*.
[187] *See* La. R.S. 3:1652.
[188] *See* LA. ADMIN. CODE Tit. 7, 15:123.
[189] LA. ADMIN. CODE Tit. 7, 15:105(A).

- establishing inspecting stations or utilizing existing inspection stations and inspecting any vehicle known or suspecting to be transporting any materials known to be hosts for plant pests and diseases if LDAF has reason to believe or suspect that any plant pest or disease has been or may be transported into Louisiana or transported between two or more locations in Louisiana;[190]
- quarantining properties or premises when inspection of these properties or premises indicates the presence of any plant pest or disease;[191] and
- regulating a system of reciprocal quarantines or embargoes between Louisiana and other states, territories, and foreign countries.[192]

Public and Private Markets

Municipal corporations may regulate the location, inspection, and operation of all public markets.[193] This power is subject to the superior right of inspection of the Louisiana Department of Health and Hospitals.[194] LDHH regulates the inspection and operation of all private markets outside of the market zones.[195] The agency provides regulations for the operation of these private markets, including rules affecting their cleanliness and the wholesomeness of the goods offered for sale therein.[196]

Ratites

The Louisiana Department of Agriculture and Forestry has jurisdiction over ratites[197] shipped into Louisiana.[198] In particular, LDAF has the power to inspect ratites shipped into Louisiana.[199] The state veterinarian has the power to deal with all contagious and infectious diseases of ratites and all other pests of ratites, and he or she may do and perform acts necessary to control, eradicate, or prevent their introduction, spread, or dissemination.[200]

Seeds

The Louisiana Department of Agriculture and Forestry has jurisdiction over prohibited and restricted noxious weed seeds.[201] LDAF's Seed Commission makes rules and regulations governing the methods of sampling, inspecting, and making analysis tests and examinations of all seeds and other propagating stock.[202] The Seed Commission also makes rules and regulations for governing the conditions for growing, harvesting, processing, preparing for market, labeling, distributing, and marketing seeds.[203] The Seed Commission is responsible for making rules and regulations for testing agricultural, vegetable, or flower seeds for sale, offered for sale, for transport, or for distribution.[204] The Seed Commission also has jurisdiction over the labeling of agricultural, vegetable, and flower seeds.[205] Furthermore, the Seed Commission has jurisdiction over the sale, offer for sale, transport, or distribution of agricultural seeds containing noxious weed seeds.[206]

Sweet Potato Weevil and Boll Weevil

Sweet potato weevil and boll weevil relate to the aquatic invasive species discussion because many insects can enter the state by an aquatic pathway. Discussion of the measures of control Louisiana employs over these particular insects may be a useful in future discussion over the measures of control

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[190] LA. ADMIN. CODE Tit. 7, 15:105(B).
[191] LA. ADMIN. CODE Tit.7, 15:197(A).
[192] La. R.S. 3:1771.
[193] La. R.S. 40:1241.
[194] *Id*.
[195] La. R.S. 40:1242.
[196] *Id*. *See also* LA. ADMIN. CODE Tit. 51, 6:101 et seq.
[197] A "ratite" is a flightless bird of the Order *Ratitae* with a flat chest bone, including but not limited to ostrich (*Struthio camelus*), rhea (*Rhea americana*), emu (*Dromaius novaehollandiae*), and cassowary (*Casuarius*). La. R.S. 3:3112. Domestic farm-raised ratites are considered livestock if they are identified and maintained for the commercial purpose of producing meat, hides, feathers, oil, or progeny. *Id*.
[198] *See* La. R.S. 3:3116.
[199] *See id*.
[200] La. R.S. 3:3114.
[201] *See* LA. ADMIN. CODE Tit. 7, 13:101. *See also* LA. ADMIN. CODE Tit.7, 13:109.
[202] La. R.S. 3:1433(A)(1)(a).
[203] La. R.S. 3:1433(A)(1)(c).
[204] La. R.S. 3:1444(1).
[205] La. R.S. 3:1436(1)(a) and (c). *See also* La. R.S. 3:1444(2).
[206] La. R.S. 3:1444(4).

Louisiana may use against other insects that may enter the state through an aquatic pathway. The Department of Agriculture and Forestry has jurisdiction over the sweet potato weevil.[207] LDAF also has jurisdiction over the boll weevil via the Boll Weevil Eradication Commission.[208] Not only can LDAF inspect possible boll weevil infestations and carry out suppression or eradication activities,[209] LDAF also is authorized to cooperate with any agency of the federal government, any state, any other agency in Louisiana or the region, or with any person engaged in the growing, processing, marketing, and handling of cotton so the agency can control and suppress the boll weevil.[210] LDAF also has the authority to "stop any person and inspect any 'regulated article'[211] or conveyance moving into, within, or from Louisiana when LDAF has reason to believe the regulated article or means of conveyance is infested with boll weevil."[212] Furthermore, LDAF has the authority to issue a stop order on, seize, or treat any regulated article infested with boll weevil moving in violation of laws or regulations and to destroy or otherwise dispose of any infested cotton when it is necessary.[213] LDAF may also issue certificates for articles that originated in noninfested premises in an eradication zone and otherwise have not been exposed to infestation.[214] Furthermore, LDAF may issue permits for movement of noncertified regulated articles, which allows the movement of articles into, within, or from Louisiana when the agency has determined that such movement will not result in the spread of boll weevil.[215] LDAF has the authority to issue quarantine orders to affected parties when necessary.[216] Orders shall be issued to prevent the movement, disturbance, or noncontainment of an actual or suspected boll weevil infestation or the prevention thereof.[217]

Wildlife Refuges, Wildlife Management Areas, and Public Hunting Grounds

The Louisiana Department of Wildlife and Fisheries has jurisdiction over wild animals and birds on wildlife refuges, wildlife management areas, and public hunting grounds.[218]

Wildlife

The Department of Wildlife and Fisheries has jurisdiction over wild birds, wild quadrupeds, and fish and other aquatic life.[219] LDWF also has jurisdiction over the beds and bottoms of rivers, streams, bayous, lagoons, lakes, bays, sounds, and inlets bordering on or connecting with the Gulf of Mexico within the territory or jurisdiction of the state.[220] This jurisdiction includes all oysters and other shellfish and their parts grown thereon, either naturally or cultivated, and all oysters in the shells after they are caught or taken.[221] LDWF also has jurisdiction over the killing, taking, trapping, and transportation of animals killed and administers licenses and permits for the possession and taking of wildlife.[222] LDWF also administers the Deer Management Assistance Program[223] and the Coastwide Nutria Control Program.[224]

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[207] *See* LA. ADMIN. CODE Tit. 7, 15:133.
[208] *See* La. R.S. 3:1604. *See also* La. R.S. 3:1602.
[209] *See* La. R.S. 3:1606(A).
[210] La. R.S. 3:1605.
[211] *See* LA. ADMIN. CODE Tit. 7, 15:305. Note: This section contains a list of regulated articles.
[212] LA. ADMIN. CODE Tit. 7, 15:311.
[213] *Id*.
[214] LA. ADMIN. CODE Tit. 7, 15:307(B).
[215] LA. ADMIN. CODE Tit. 7, 15:307(B)(2).
[216] LA. ADMIN. CODE Tit. 7, 15:315.
[217] *Id*.
[218] La. R.S. 56:761.
[219] *See* La. R.S. 56:3.
[220] *Id*.
[221] *Id*.
[222] *See*, *e.g.*, La. R.S. 56:172, 56:173, and 56:259 and LA. ADMIN. CODE Tit. 76, 19:101 et seq.
[223] *See* LA. ADMIN. CODE Tit. 76, 5:111 et seq.
[224] *See* La. R.S. 56:281. *See also* LA. ADMIN. CODE Tit. 76, 5:123.

5 Goal and Objectives

The Louisiana AIS Task Force decided upon the following goal and objectives to shape Louisiana's invasive species management responses:

5.A Goal

Prevent and control the introduction of new nonindigenous species into Louisiana; control the spread and impact of existing invasive species; and eradicate locally established invasive species wherever possible.

5.A.1 Objective 1

Coordinate all AIS management activities or programs within Louisiana and collaborate with regional, national, and international AIS programs.

5.A.2 Objective 2

Prevent and control the introduction/reintroduction of nonindigenous invasive species through education about species and pathways, targeting the general public (including schools), industries, user groups, government agencies, and nongovernmental organizations.

5.A.3 Objective 3

Eliminate locally established invasive species through monitoring, early detection, rapid response, and early eradication.

5.A.4 Objective 4

Control the spread of established invasive species through cooperative management activities designed to minimize impacts when eradication is impossible.

5.A.5 Objective 5

Prevent the introduction of non-native species, or the spread of existing ones, through legislation and regulation.

6 Prioritization of Problems

Prioritizing invasive species problems and solutions presents a special challenge. The LAIS Task Force has conducted literature reviews, engaged in discussions and debate, and employed numerical ranking techniques to prioritize the various pathways and species. It was decided that "exacerbating circumstances" would not be prioritized because all are equally important, and some are unresolvable. The Task Force has concluded that its collective intuition and professional judgment are the best guides to prioritize these aspects into "high," "medium," and "low" categories for each of the four objectives, rather than reliance on an overly complex and often misleading quantitative mechanism. Priorities were also based on the objectives of the management plan. It is important to note that ranking species by objective was conducted *relative to that species group*. For example, controlling the Rio Grande cichlid was ranked "high" as a priority among other finfish, but this does not necessarily imply it is as high a priority as controlling certain aquatic plants, which have proven far more problematic than cichlids. (See Section 6: Management Actions for more information on the goal and objectives of this management plan.) Justifications for some of the rankings are listed in footnotes below.

6.A Prioritization of Pathways

Prioritization of Pathways by Objective	Approach			
	Objective: Prevent and Control through Education	**Objective: Monitoring, Detection, Early Eradication**	**Objective: Control the Spread**	**Objective: Prevent through Legislation and Regulation**
Pathways / Media				
Shipping	High	NA	NA	Low
Boating	High	Low	NA	Low
Transportation Corridors	Medium	Low	NA	Medium
River Diversions	High[1]	Medium	NA	Low
Ballast Water	High	Low[2]	NA	Low
Hull Fouling	High	NA	NA	Low
Dunnage	High	NA	NA	Low
Aquaculture	High	NA	NA	High
Deliberate Stocking for Sportfishing	High	NA	NA	Low
Baitfish	High	Medium	NA	Medium
Nursery / Water Garden Industries	High	Medium	NA	Medium
Agriculture	Medium	NA	NA	Low
Aquarium / Pet Industries	High	Medium	NA	Medium
Fur Industry	Low	NA	NA	Low
Cultural Traditions	Low	NA	NA	Low

[1] Objective 1 for River Diversions was given a "High" priority, but the educational efforts should emphasize state and federal agency personnel rather than the general public.

[2] The general consensus among the Task Force was that there should be monitoring of ballast water. However, port and shipping industry officials were concerned about having different federal and state regulations regarding ballast water. Therefore, Objective 2 was given a "Low" priority.

6.B Prioritization of Species

PRIORITIZATION OF SPECIES BY OBJECTIVE	Approach			
	Objective: Prevent and Control through Education	**Objective:** Monitoring, Detection, Early Eradication	**Objective:** Control the Spread	**Objective:** Prevent through Legislation and Regulation
Aquatic Plants				
Water Hyacinth	Medium	Low	High	Low
Chinese Tallow Tree	High	Low	High	Low
Parrot feather	Medium	Medium	Medium	Low
Hydrilla	High	Low	High	Medium
Wild Taro	Medium	Low	Low	Low
Brazilian Waterweed	High	Medium	High	Low
Eurasian Watermilfoil	High	Medium	High	Medium
Water Lettuce	High	Low	Low	Low
Common Salvinia	High	Medium	High	Low
Giant Salvinia	High	High	High	Medium
Cogongrass	High	High	High	Medium
Purple Loosestrife	High	High	Medium	Medium
Cylindrospermopsis raciborskii	High	High	High	Low
Finfish				
Rio Grande Cichlid	Medium	Medium	High	Medium
Common Carp	Low	Low	Low	Low
Grass Carp	High	Medium	High	Low[3]
Silver Carp	High	Medium	High	High
Bighead Carp	High	Medium	High	High
Black Carp	High	High	High	High
Tilapia	Medium	High	Medium	High[4]
Mollusks[5]				
Asian Clam	Low	Low	Low	Low
Zebra Mussel	High	Medium	High	Low
Brown Mussel	High	Medium	Low	Low
Green Mussel	High	High	Low	Low
Channeled Apple Snail	Medium	High	Medium	Medium
Mammals				
Nutria	High	Low	High	Medium
Feral Hogs	Low	Low	Low	Low
Insects				
Red Imported Fire Ant	Medium	Low	Medium	Low

[3] Regulations for grass carp are already in place and are maintained by LDWF. Therefore, the Task Force assigned a "Low" priority to Objective 4. The regulations are for triploid grass carp only.
[4] Regulations for tilapia already exist and are overseen by LDWF. However, the Task Force assigned a "High" priority to regulate tilapia due to the impacts this fish is having in Mississippi, where it escaped from aquaculture facilities.
[5] Due to their late addition to the management plan, Pacific and Asian oysters (sections 3.B.3.c.iv and 3.B.3.c.v) do not appear in the above prioritization matrix.

PRIORITIZATION OF SPECIES BY OBJECTIVE	Approach			
	Objective: Prevent and Control through Education	**Objective:** Monitoring, Detection, Early Eradication	**Objective:** Control the Spread	**Objective:** Prevent through Legislation and Regulation
Formosan Termite	Medium	Low	Medium	Low
Asian Tiger Mosquito	Medium	Medium	Medium	Low
Africanized Honeybee	Medium	High	Medium	Low
Other				
Australian Spotted Jellyfish	Low	Medium	Low	Low
Daphnia lumholtzi	Low	Low	Low	Low
Chinese Mitten Crab	Medium	Medium	Low	Low
Green Crab	Medium	Medium	Low	Low
Viruses, Bacteria, and Other Disease-Causing Microbes				
Viruses, Bacteria, and Other Disease-Causing Microbes	Low	Low	Low	Low

7 Management Actions

This chapter describes the various ongoing and proposed management actions identified by the Louisiana Aquatic Invasive Species Task Force, listed according to the objective they support. A table version of this list appears in Chapter 8, including relevant budget and full-time-employee information, where available.

Goal: Prevent and control the introduction of new nonindigenous species into Louisiana; control the spread and impact of existing invasive species; and eradicate locally established invasive species wherever possible.

7.A Objective 1: Coordinate all AIS management activities or programs within Louisiana and collaborate with regional, national, and international AIS programs.

ACTIONS

The Task Force identified the following actions as the most important activities to be implemented as soon as possible, even before finalization of this AIS management plan:

7.A.1 Form a Permanent Louisiana Aquatic Invasive Species Council

In the 2004 Louisiana Legislative Session, a bill was passed to create the Louisiana Aquatic Invasive Species Council (LAISC). Both the Senate and House unanimously approved the legislation, and Governor Kathleen Babineaux Blanco signed the bill into law in June 2004. The bill designates LDWF as the lead agency, describes Council membership, duties and responsibilities, and authorizes the hiring of full-time Council staff. Membership includes the organizations already participating in the Task Force and adds Louisiana Department of Transportation and Development; Department of Education; Department of Culture, Recreation and Tourism; and others. The LAISC chair will come from the lead agency, and Council members will elect the vice-chair, who cannot be from the same organization as the chair. Council workgroups will be formed at a later date, and one workgroup will serve as an oversight board to monitor and evaluate progress in implementing this management plan. (See Section 9: Program Monitoring and Evaluation for more details on the oversight board.)

7.A.2 Establish Memorandum of Understanding to Address Overlapping Jurisdictions

The first step taken by the Louisiana Aquatic Invasive Species Council will be to establish one or several Memoranda of Understanding (MOU), to address overlapping or competing jurisdictions for invasive species.

7.A.3 Hire Statewide Louisiana Aquatic Invasive Species Coordinator

Task Force members agreed that a full-time coordinator would be essential for assisting the Council in carrying out its duties. The coordinator will likely be housed within the lead agency, and could be a new employee hired specifically to serve as the statewide invasive species coordinator or may be a person or group contracted by the lead agency to act as coordinator. This decision will be made at the discretion of lead agency personnel and/or the Council chairperson. Specific coordinator duties will be determined at a later date. This action is one of three for which the LAIS Council is requesting federal funding to implement. Estimated annual costs for a coordinator's salary plus a small budget (travel, supplies, printing costs, etc.) are $75,000.

7.B Objective 2: Prevent and control the introduction/reintroduction of nonindigenous invasive species through education about species and pathways, targeting the general public (including schools), industries, user groups, government agencies, and nongovernmental organizations.

ACTIONS

Actions are listed in alphabetical order, not in order of priority.

7.B.1 Barataria-Terrebonne National Estuary Program's Invasive Species Coordinator

The position of Invasive Species Coordinator at the Barataria-Terrebonne National Estuary Program (BTNEP) was created in 2003 with two years of funding. The position involves undertaking various projects to reduce the impacts of invasive species in the Barataria-Terrebonne Estuary System. Work focuses on encouraging native plants and developing appropriate educational materials for the general public.

7.B.2 Citizen's Guide to Invasive Species for Outdoor Recreationists

The Invasive Species Initiative at the Center for Bioenvironmental Research (CBR) at Tulane and Xavier Universities is creating a "Citizen's Guide for Invasive Species." Designed for outdoor recreationists, the guide will present the types and distributions of Louisiana invasive species, contact information, and field information and maps useful to outdoorspeople. Estimated production is 1,000 copies for distribution at fishing license locations, trail heads, visitor centers, nursery/gardening centers, pet stores, aquaculture sites, and other relevant locations. It is anticipated that the guide will be completed and distribution will begin in 2005.

7.B.3 Citizen's Guide to Invasive Species for Teachers and Students

The CBR will also produce a similar Citizen's Guide oriented toward teachers and students. Targeted distribution centers include schools/universities, visitor centers, nursery/gardening centers, pet stores, and other relevant locations. Provided adequate funding is available, CBR will begin production of the teachers and students guide in 2005.

7.B.4 Citizen's Guides and Invasive Species Pamphlets on the World Wide Web

The CBR will create interactive, real-time, Web-based versions of the Citizen's Guides and educational pamphlets (see actions 7.B.2, 7.B.3, and 7.B.10).

7.B.5 Louisiana Invasive Species Symbol and/or Slogan for Management/Education

A symbol or slogan for invasive species in Louisiana could raise public awareness of this issue. The symbol (equivalent to the Forest Service's Smokey the Bear or Woodsy Owl) and slogan (akin to the "Stop Aquatic Hitchhikers" campaign sponsored by the ANS Task Force, U.S. Fish and Wildlife Service, and U.S. Coast Guard) could be placed on all state-funded educational materials, such as pamphlets, boat ramp signs, etc. This project is not yet funded.

7.B.6 Develop Statewide Invasive Species Educational and Informational Website

This action will develop and maintain an interactive website focusing on Louisiana aquatic invasive species. The website could serve as a "clearinghouse" of invasive species information and link to all federal, state, and local regulatory agencies, as well as universities and organizations involved in this issue. One avenue could be to build on the public and formal education efforts already underway by Louisiana Sea Grant, Barataria-Terrebonne National Estuary Program, LSU AgCenter, and Louisiana Department of Wildlife and Fisheries. This project incorporates portions of action 7.B.4.

7.B.7 Education of Aquarium and Koi Fishpond Industries

The current conditions in the aquarium and koi (common carp) fishpond industries need to be assessed in order to develop effective educational materials and best management practices. Accountability of these industries should be stressed in education and possibly through regulation. This project is not yet funded, but it is estimated to cost $150,000 in the first year and $25,000 in the second year. This project would be lead by LDWF in cooperation with LDAF, universities, and the aquarium industry.

7.B.8 Education of Bait Industry

Louisiana's bait industry also needs to be assessed before developing educational materials and establishing best management practices for both the wholesale/retail industries as well as consumers. Educational materials, possibly to be distributed with every bait purchase, will be

essential. If appropriate, regulations may be used to ensure more accountability. Lead by LDWF, other cooperating organizations include universities and members of the bait industry. This project currently has no funding.

7.B.9 Education of Boaters and Fishermen

The education of boaters and fishermen on inadvertent transportation of noxious aquatic species is essential for slowing the spread of invasive species. This process must continue in a variety of ways, collaborating with researchers in action 7.B.2 and others.

7.B.10 Education of Commercial and Private Vectors for Invasive Species Introduction and Transport

It is also important to encourage aquarium, pet, and horticulture retailers and wholesalers, as well as garden societies, to develop an interest in native alternatives to introduced plants and animals. Retailers should be encouraged to inform their customers on the proper disposal procedures of unwanted plants and animals, rather than dumping the unwanted species in the environment. One possible education tool includes developing series of pamphlets for home and landowners, commercial developers, and nurseries, to explain the impacts of invasive plant species; identify alternative native plants for use in landscaping, aquariums, and ponds; and focus on the benefits of native species, especially those that attract various forms of wildlife (such as butterflies, hummingbirds, songbirds, and migratory birds). Native plant alternatives for specific gardening functions, such as hedges, borders, shrubs, vines, shade trees, etc., can be included as well. BTNEP and CBR are planning to develop these and other brochures. Limited funding for this work is pending through a BTNEP grant proposal, but more is needed. This project incorporates portions of actions 7.B.1 and 7.B.2.

7.B.11 GIS Vulnerability Index for Invasive Species in Southeastern Louisiana

CBR is developing a Geographic Information Systems (GIS)–based index and visualization of the portals and pathways of invasive species in Louisiana. In addition to being an educational tool, one potential application of the GIS Vulnerability Index is to help managers target scarce resources toward the most sensitive areas that are likely to experience bioinvasions. Development of the GIS Vulnerability Index began in 2002 and is ongoing.

7.B.12 Invasive Species Educational Video

This action aims to produce an invasive species educational video for the general public, with the intention of increasing citizen awareness of invasive species in Louisiana. The video would primarily focus on environmental, economic, and cultural/historical impacts of invasive species, and would provide alternatives to invasive vegetation in residential landscaping. Collaboration is possible with researchers from actions 7.B.1, 7.B.2, and 7.B.6, and possibly with Louisiana Public Broadcasting. This project is not yet funded.

7.B.13 Louisiana Invasive Species Training Workshop for State/Federal Workers

An intensive two-day training workshop on Louisiana's aquatic invasive species would educate relevant parish, state, and federal workers on this issue. Sessions would be held in a centralized location, such as Baton Rouge, and would focus on science, policy, and communication outreach.

7.B.14 Invasive Species Symposium

BTNEP will coordinate the Louisiana Invasive Species Symposium, planned for 2005, to foster collaboration among agency representatives, scientists, and the public on invasive species and coastal issues in Louisiana.

7.B.15 Partnership with Aquaculture Industry

To assess the risks associated with introducing aquatic species for cultivation, agencies must collaborate with the aquaculture industry. Through a partnership among aquaculturists, academics, and agency personnel, best management practices can be devised and initiated. The Louisiana Aquaculture Advisory Council (LAAC), created by Governor Foster's Executive Order in 2003, is beginning to discuss many of these issues. Membership in the LAAC includes LDAF, LDWF, LSU

AgCenter, catfish farmers, crawfish farmers, and others. Estimated funding, contingent on educational materials, monitoring, and development of risk assessments, is approximately $150,000.

7.B.16 Portals and Pathways Poster Map and Companion Website
The development and publication of a full-color poster map of invasive species in Louisiana, "Portals and Pathways: The Geography of Invasive Species in Louisiana," was completed in 2002. As of 2004, at least 1,500 posters were distributed to state and federal agencies, academic institutions, state and federal lawmakers, students, and members of the general public.

7.B.17 Public Perceptions of Invasive Species in the Media
A research project is underway to track and interpret recent changes in public perceptions of invasive species in Louisiana, the United States, and internationally. Specifically, CBR researchers are investigating invasive species terminologies used by the newspaper media, comparing specific species' media coverage, and determining the role geography plays, if any, in terminology usage.

7.B.18 School Curriculum on Invasive Species
The goal of this action is teacher and parent education. Louisiana Sea Grant has developed teacher lesson plans, a supplementary storybook on water hyacinth, a website (www.lamer.lsu.edu), and workshops for teacher conventions and other educational opportunities. This project is funded through 2006.

7.C Objective 3: Eliminate locally established invasive species through monitoring, early detection, rapid response, and early eradication.

ACTIONS
Actions are listed in alphabetical order, not in order of priority, except for action 7.C.1, "Develop Rapid Response and Early Eradication Plan," which is the highest prioritized action under this objective.

7.C.1 Develop Rapid Response and Early Eradication Plan
The creation of a Rapid Response and Early Eradication Plan, toward the creation of a readily deployable crew to execute this plan in the field, is a top priority and will be one of the first issues addressed by the LAIS Council. Among other elements, this plan should include:

- protocols for resolving potential jurisdictional conflicts;
- contact information for experts who can confirm the identity and recommend actions;
- establishment of reporting mechanisms (toll-free phone numbers, web pages, etc.);
- possible eradication options (herbicides, traps, manual extraction, etc.)

Estimated cost for developing the Rapid Response and Early Eradication Plan is $75,000.

7.C.2 Asian/European Gypsy Moth Detection
This ongoing project uses pheromone traps to survey both the Asian and European gypsy moths. The European gypsy moth is present in the United States, but the Asian gypsy moth is not. It may arrive soon via shipping, primarily on vessels that called at Siberian ports during the previous summer. High-risk vessels are inspected at anchor prior to entering the Mississippi River by Department of Homeland Security AQI inspectors. USDA APHIS, Forest Service, and LDAF employees run about 2,500 gypsy moth traps each summer across Louisiana.

7.C.3 "Big River" Monitoring Program
A "Big River" monitoring program is needed to detect and assess introductions of nonindigenous species, movement in and between major river systems, and potential for establishment. A monitoring program of this size, headed up by LDWF, would also aim to determine habitat alterations and economics surrounding bioinvasions. Working closely with academia and other government entities, LDWF plans to research potential markets for established invasive species and will work closely with commercial interests that would benefit from harvesting these species. It is estimated that $250,000 would be needed annually for staff and equipment.

7.C.4 Black Carp Surveys

With the recent discovery of triploid black carp in Illinois waters, Louisiana needs to begin monitoring for this species, particularly in wild waters near facilities permitted to hold black carp. U.S. Fish and Wildlife plans to begin this surveying program in 2004 in cooperation with state agencies such as LDWF.

7.C.5 Channeled Apple Snail Detection

Education and outreach efforts are needed to highlight the risk of this aquatic mollusk. Pet store surveys have been conducted in the past and may be needed in the future. Regulation may also be needed eventually; LDAF has a "Phytophagous Snail Quarantine" law on the books but the regulation references only nursery stock contamination. This snail is more likely to be imported through the aquarium pet trade.

7.C.6 Chinese Tallow Trees and Resident Arthropod Populations

This Tulane University study in the Department of Ecology and Evolutionary Biology is examining the arthropod populations found on Chinese tallow trees and the possible effects these trees have on native insectivorous birds. Data collections were completed in the summer of 2003, and analysis is ongoing.

7.C.7 Comprehensive Coast Wide Survey for Invasive Species

LDWF Marine Fisheries Division needs to conduct a comprehensive coastwide survey of invasive marine species, and, if present, their population and distribution. Special emphasis may be considered in areas of freshwater introduction from the Mississippi River. This action may occur in cooperation with the environmental assessment of Louisiana ports and inland waterways (see action 7.C.11).

7.C.8 Develop and Maintain Public Database of Collected and Identified [Plant and Animal] Specimens

Once a survey is undertaken and organisms are collected, quick identification is essential. The Louisiana State Arthropod Museum (LSAM) contains approximately 400,000 specimens of insects and related arthropods, and is engaged in a long-term effort to enter all collection specimens into a database. Much of the detailed collection data is posted on a publicly accessible, searchable Internet site (www.museum.lsu.edu). Data entry is slowed by lack of staff, with only 1.5 percent of specimens currently entered. In addition to the specimens already identified, thousands more await identification. The database will allow for public access and will be integrated with other state and regional invasive species databases. Louisiana Sea Grant completed a database (based on literature reviews) of all known species in Louisiana, and indicated whether the species were native, nonindigenous, or cryptogenic. (See action 7.C.17.) LSAM and Sea Grant may be able to partner to develop an even more comprehensive plant and animal database that could be made available to the public.

7.C.9 Develop GIS Maps for Louisiana Invasive Species

In addition to tabular database, the state should develop a GIS (map) database of invasive species ranges, habitats, and other relevant geographical data. Spatial distribution could be correlated with temporal and hydrological conditions, as well as other data layers that could affect the range and rate of spread of invasive species. The CBR has begun work on these GIS maps, and may collaborate in the future with LDWF to establish a larger GIS database.

7.C.10 DNA Tracking of Invasive Amphibians and Salamanders

This research project was initiated in 2001 and is ongoing at Tulane University. Researchers are using "DNA fingerprinting" techniques to track the origins and timings of bioinvasions of the greenhouse frog, the Mediterranean gecko, and the brown anole. Samples have been collected from Louisiana, Florida, Puerto Rico, the Bahamas, and Jamaica and are currently being analyzed. The researchers plan to use genetic analyses to map routes and timing of invasions into Louisiana and to determine if invasive populations genetically diverge from their source populations.

7.C.11 Environmental Assessment of Major Mississippi River Ports and Inland Waterbodies in Louisiana

A baseline of knowledge on invasive species in Louisiana would help serve as a measure success and failure in addressing this problem. The goal of this action is to conduct a full-scale field analysis of port waters for existing flora and fauna, water quality characteristics, locations of industrial entities, and sewage outflows. This environmental assessment could be conducted as a rapid assessment of Louisiana's ports or as a yearlong sampling project. A similar baseline of knowledge is needed for all Louisiana waterbodies — presence/absence of existing flora and fauna, water quality characteristics, ecological conditions, and level of use by recreational and commercial fishermen and boaters. This action is currently unfunded, and it is one of three actions for which the LAIS Council will request federal funding to implement. Estimated cost to plan and conduct the Environmental Assessment is $149,000.

7.C.12 Establish Database for Marine Invasive Species in Louisiana

Possibly housed within the Marine Fisheries Division of the Louisiana Department of Wildlife and Fisheries, a database for Louisiana's marine invasive species would serve as a clearinghouse for information and as a central node for reporting new sightings. Collaboration with Louisiana Sea Grant and LSAM is possible.

7.C.13 Exotic Fruitfly Detection

This USDA APHIS-run Exotic Fruitfly Survey uses various insect traps to detect newly introduced fruitflies in Louisiana. This project is ongoing.

7.C.14 Guide to Marine Invasive Species

This guide will aid personnel in the Marine Fisheries Division at LDWF in the identification of marine invasive species, and will include a recording and reporting protocol. Ideally, a cooperative network with researchers at universities and other agencies will develop, thus enabling collection, identification, and documentation of marine invasive species in Louisiana. Collaboration with the CBR is possible. (See action 7.B.2.)

7.C.15 Inspections of Ships and Cargo

This activity is ongoing at the Port of New Orleans as well as other Louisiana ports, and is conducted by USDA APHIS officials, Harbor Police, U.S. Coast Guard, and the U.S. Bureau of Customs and Border Protection. Duties include inspecting ships and cargo for possible infestations, and securing cargo, vessels, and terminals suspected of housing infestations.

7.C.16 Invasive Spider Populations in Fragmented Bottomland Hardwood Forests

A Tulane Ph.D. student is examining spider populations in fragmented versus non-fragmented bottomland hardwood forests in southeastern Louisiana. Researchers hypothesize that there are greater populations of invasive spider species in fragmented forested areas. This research is almost complete and should be ready for publication in 2004.

7.C.17 Louisiana Species Database

The purpose of creating the Louisiana Species Database, built during 2001-2002, was to document all known species in the state as a baseline of knowledge. The database, complied from scientific literature and complete with citations, lists known plant and animal species (native, nonindigenous, and cryptogenic) in Louisiana. Louisiana Sea Grant funded the construction of the database and periodically updates it with additional scientific literature reviews. In electronic format, the Louisiana Species Database could serve as the basis for additional species database construction, such as the ones described in actions 7.C.8, 7.C.9, and 7.C.12.

7.C.18 Model-Predicted Movement of Rio Grande Cichlid on South Shore of Lake Pontchartrain

Based on the results of a dispersal model developed at the University of New Orleans, it was predicted that invasive Rio Grande cichlids — primarily a freshwater fish — would expand into the

brackish Lake Pontchartrain estuary. With a grant from the American Cichlid Association, researchers are conducting surveys along the south shore of the lake and recently confirmed the movement of the cichlids along the seawall from the lake into the London Avenue Canal.

7.C.19 Monitor for Invasive "Cylindro" Blue-Green Algae
A research and monitoring program is needed to determine if the invasive "Cylindro" blue-green algae is present in Louisiana waters, and if so, if it is the toxin-producing strain. This species is present in Florida waters and is adversely affecting native wildlife. This program would be lead by the University of Louisiana at Lafayette in partnership with LDWF and the Louisiana Office of Public Health.

7.C.20 Monitoring and Predictive Modeling of the Invasive Asian Carp in the Mississippi River
This research initiative at Tulane University includes sampling the Mississippi River for Asian carp, monitoring their range, and developing a predictive model for range expansion. The researchers plan to use GARP, or Genetic Algorithm for Rule-set Production, as the modeling tool. Collaboration is possible with the researchers in action 7.C.21.

7.C.21 Monitoring for Asian Carp in the Mississippi River and Studying Impacts on Native Fish Species
The Nekton Research Laboratory at UNO is working with the Missouri Department of Conservation to obtain funding for developing dispersal models that would address the spread of invasive carp species throughout the entire Mississippi River Basin on a multi-state basis. Preliminary analyses of data collected show the expansion of these species into regions of valuable fishery resources. To better manage and model the carp, more data need to be collected on their distribution, movement abilities, and reproduction. Collaboration is possible with the researchers in action 7.C.20.

7.C.22 Monitoring of Invasive Mosquitoes and Mosquito-Borne Diseases
Researchers at Tulane University are studying native and invasive mosquito populations in urban, wetland, and terrestrial environments in southeast Louisiana. In addition, they also are analyzing the mosquitoes for mosquito-borne diseases such as West Nile virus, to determine the role native versus invasive populations play in transmission.

7.C.23 New Orleans District Invasive Species Program
This effort provides a district office contact for U.S. Army Corps of Engineers (USACE) nonindigenous species task force meetings, provides periodic inspections of Corps structures and facilities in Operations Division, and participates in Field Group Reviews as part of the Aquatic Nuisance Species Research Program sponsored by the USACE Engineer Research and Development Center.

7.C.24 Seasonal Feeding Preferences of Nutria
This research initiative at Tulane University is focusing on the seasonal feeding preferences of the invasive nutria. Exclosures were built to determine the effects of nutria herbivory on the marsh, and nutria were implanted with radio transmitters to track movements over two years. This project began in 2003 and is anticipated to conclude in 2005.

7.C.25 Treatment of Contaminated Cargo and Packaging
The Port of New Orleans and other Louisiana ports provide locations for cargo and packaging fumigation at port terminals. Infested cargo and packaging are quarantined and treated by the USDA.

7.D Objective 4: Control the spread of established invasive species through cooperative management activities designed to minimize impacts when eradication is impossible.

ACTIONS
Actions are listed in alphabetical order, not in order of priority.

7.D.1 Aquatic Plant Control Program

This USACE program focuses on research of invasive aquatic plant species. At the present time, the appropriation does not contain any operational funding for the New Orleans District.

7.D.2 Biological Control of Common Salvinia in Louisiana

This biological control experiment involves the rearing and release of *Cyrtobagous salviniae* (Florida strain), a salvinia weevil used to control the aquatic fern common salvinia, *Salvinia minima*. Similar trials are underway for giant salvinia and seem to be successful. This research initiative is lead by USDA in cooperation with LDWF and the LSU AgCenter and is in conjunction with actions 7.D.4 and 7.D.12.

7.D.3 Biological Control of Formosan Termites

Researchers at Tulane University are experimenting with viral transgenesis of the Formosan termite. The aim of this research is to identify a virus that infects and kills termites but not other species, and could be safely used in pest control. This ongoing research is in cooperation with the USDA Southern Regional Research Center in New Orleans.

7.D.4 Biological Control of Giant Salvinia in Louisiana

USDA APHIS, LDWF, and LSU AgCenter are working on developing an effective biological control agent for giant salvinia. The project involves establishment of four field insectaries for *Cyrtobagous salviniae* (Australian strain). USDA APHIS Center for Plant Health Science and Technology laboratories will supply biological control agents. Upon successful establishment of the biological control agents, Louisiana cooperators will assume sole responsibility for managing the field insectaries and continuation of the giant salvinia biological control program. (See also action 7.D.2.)

7.D.5 Biological Control of Red Imported Fire Ants

USDA APHIS and LSU are distributing biological control agents, including the Phorid fly, on the red imported fire ant, *Solenopsis invicta*. Biological control agents will be supplied by USDA APHIS Center for Plant Health Science and Technology laboratories and shipped to Louisiana for field releases.

7.D.6 Chinese Tallow Tree Impact on Native Food Webs

This is a three-year project of two UNO Ph.D. students to determine the impact of tallow invasion on bottomland forests and below-ground food webs. The goal is to identify impacts of tallow control or removal, allowing managers to better plan strategies and mitigate undesirable consequences of these plans. Collaboration is possible with the researchers in action 7.D.7.

7.D.7 Chinese Tallow Tree Invasion Process in Bottomland Hardwood Forests

This planned but still unfunded three-year project aims to determine the environmental characteristics that predispose bottomland forest habitat to vulnerability or resistance to tallow invasion. The study site is Bayou Sauvage National Wildlife Refuge. The goal is to provide managers with tools to help plan control and/or eradication strategies. Collaboration is possible with the researchers in action 7.D.6.

7.D.8 Coast Wide Nutria Control Program

The Coast Wide Nutria Control Program (nutria bounty) consists of an economic incentive payment of $4 per nutria tail. Registered participants may deliver the tails to collection centers established in various locations in coastal Louisiana. The goal of the program is to harvest up to 400,000 nutria annually from coastal Louisiana. Funded by Coastal Wetlands Planning Protection and Restoration Act through the LDNR and Natural Resources Conservation Service, the program covers all areas in Louisiana south of the Interstate 10/12 corridor. The 2003-2004 trapping season for the nutria bounty program began November 20, 2003 and ended March 31, 2004. The first year of the program, started in 2002, harvested 308,000 nutria and paid trappers more than $1.2 million.

7.D.9 Entergy Zebra Mussel Control Program

A joint zebra mussel research project was formed between Entergy and Louisiana Sea Grant in1994-1995 to conduct a one-year monitoring study of nine Entergy plants located on the Mississippi River. As a result of the study, Entergy was able to identify problem areas and formulate programs to mitigate zebra mussel infestations in power plant intakes.

7.D.10 Henderson Lake Hydrilla Control Project

A cooperative effort between USACE, LDNR, LDWF, and the LSU AgCenter involves an annual assessment of the hydrilla infestation on Henderson Lake by a team composed of state and federal personnel as well as academics. Agencies intend to issue an annual spraying contract to control hydrilla on the lake.

7.D.11 Invasive Plant Control at Various National Wildlife Refuges in Louisiana

Invasive species control and eradication programs are ongoing at many National Wildlife Refuges in Louisiana. Most are funded by USFWS, with some assistance from LDWF, and mainly focus on plant control. Some targeted species include Chinese tallow trees, trifoliate orange, American lotus, alligatorweed, cogongrass, hydrilla, and water hyacinth.

7.D.12 Nuisance Aquatic Plant Control

The LDWF Nuisance Aquatic Plant Control Program involves statewide control and management of nuisance aquatic weeds, including water hyacinth, hydrilla, two species of salvinia, alligatorweed, water lettuce and others using EPA-approved aquatic herbicides. Field crews routinely survey area waters for new infestations of invasive aquatic plants and report them to the Region Supervisor. LDWF recently began testing releases of salvinia weevils for biocontrol of both species of salvinia in cooperation USDA and the LSU AgCenter. See also actions 7.D.2 and 7.D.4.

7.D.13 Nutria Population Modeling

This unfunded three-year study of nutria population dynamics in fresh and brackish marsh in Louisiana is the dissertation topic of a UNO Ph.D. student. The goal is to develop a harvest model that local managers can implement to devise control strategies. Researchers plan to collaborate with LDWF to develop survival and mortality data to validate the model.

7.D.14 Prevent Illegal Discharges and Improper Disposal of Organic Materials

The Port of New Orleans provides shippers with standards on the proper disposal of garbage, food, plants, meat or other potentially infectious wastes in accord with International Maritime Organization protocols related to the prevention of pollution from ships. This effort may also curb the unintentional introduction of invasive species in port waters.

7.D.15 Removal of Aquatic Growth from Federally Maintained Waterways

This program monitors and issues contracts to control aquatic vegetation on federally maintained waterways and feeders located within the USACE New Orleans District. During fiscal year 2002, this program controlled vegetation, primarily water hyacinth, on approximately 25,000 acres of waterways.

7.E Objective 5: Prevent the introduction of non-native species, or the spread of existing ones, through legislation and regulation.

ACTIONS

Actions are listed in alphabetical order, not in order of priority.

7.E.1 Federal Agriculture Quarantine Inspection

USDA APHIS and Department of Homeland Security Border Control and Border Protection personnel inspect foreign arriving vessels, cargo, and cruise ship passengers at all Louisiana maritime docks for exotic plant/animal pests. This includes maritime containers arriving in Louisiana by rail from east/west coast ports and Canadian maritime ports.

7.E.2 Strengthen Laws Pertaining to Importation and Sale of Invasive Plant and Animal Species Through Nursery and Pet Trades

Sales of invasive species through the nursery and pet trade continue, despite known risks. In addition to education efforts, the LAIS Task Force may recommend legislation to the Louisiana Legislature to regulate elements of this industry to curb invasive species introductions. Enforcement of such regulations would require cooperation between LDAF and LDWF.

7.E.3 Voluntary/Mandatory Ballast Water Exchange

Currently, ballast water exchange and reporting is voluntary in the Gulf of Mexico. Reports are entered into a database at the National Ballast Water Clearinghouse at the Smithsonian, but data indicate there is widespread under-reporting in the Gulf of Mexico region. The National Aquatic Invasive Species Act reauthorization, if passed, will require ballast water exchange and reporting in the Gulf of Mexico. The U.S. Coast Guard oversees these activities.

8 Implementation Table

This implementation table summarizes the management actions described in Chapter 7. Louisiana requests $299,000 in funding from USFWS. These funds will be used to implement action 7.A.3 (hiring of a coordinator to staff the Louisiana AIS Council), action 7.C.1 (development of a statewide rapid response plan), and action 7.C.11 (environmental assessment of Mississippi River ports and inland waterbodies). The LAIS Task Force considers these three actions to be the most important activities requiring immediate funding.

Goal: Prevent and control the introduction of new nonindigenous species into Louisiana; control the spread and impact of existing invasive species; and eradicate locally established invasive species wherever possible.

Objective 1. Coordinate all AIS management programs within Louisiana and collaborate with regional, national, and international AIS programs.
Objective 2. Prevent and control the introduction/reintroduction of nonindigenous invasive species through education about species and pathways, targeting the general public (including schools), industries, user groups, government agencies, and nongovernmental organizations.
Objective 3. Eliminate locally established invasive species through monitoring, early detection, rapid response, and early eradication.
Objective 4. Control the spread of established invasive species through cooperative management activities designed to minimize impacts when eradication is impossible.
Objective 5. Prevent the introduction of non-native species, or the spread of existing ones, through legislation and regulation.

Tasks/Actions		Current Status	Objective Addressed	Fund Source	Implementing Entity	Cooperating Organizations	Recent Efforts						Planned Efforts (FY05 - FY06)			
							FY02		FY03		FY04		DEDICATED		REQUESTED	
Number	Title/Summary						$000	FTE	$000	FTE	$000	FTE	$000	FTE	$000	FTE
7.A.1	Form a Permanent Louisiana Aquatic Invasive Species Council	Unfunded	1, 2, 3, 4, 5			LAISTF Members										
7.A.2	Establish Memorandum of Understanding to Address Overlapping Jurisdictions	Unfunded	1, 2, 3, 4, 5			LAISTF Members	--	--	--	--	--	--				
7.A.3	Hire Statewide Louisiana Aquatic Invasive Species Coordinator	Unfunded	1, 2, 3, 4, 5			LAISTF Members	--	--	--	--	--	--			75	1
7.B.1	BTNEP Invasive Species Coordinator	Funded	2	BTNEP	BTNEP		--	--	25	1	25	1				
7.B.2	Citizen's Guide to Invasive Species for Outdoor Recreationists	Funded	2	CBR-ISI/Coypu Foundation	CBR-ISI	LDWF	--	--	35	1.25	5.75	1.25	0	0		
7.B.3	Citizen's Guide to Invasive Species for Teachers and Students	Unfunded	2	CBR-ISI/Coypu Foundation	CBR-ISI	LSG, Others	--	--	--	--	--	--		1.25		
7.B.4	Citizen's Guides and Invasive Species Pamphlets on the World Wide Web	Unfunded	2	CBR-ISI/Coypu Foundation	CBR-ISI		--	--	--	--	--	--		1.5		

Tasks/Actions		Current Status	Objective Addressed	Fund Source	Implementing Entity	Cooperating Organizations	Recent Efforts						Planned Efforts (FY05 - FY06)			
							FY02		FY03		FY04		DEDICATED		REQUESTED	
Number	Title/Summary						$000	FTE	$000	FTE	$000	FTE	$000	FTE	$000	FTE
7.B.5	Louisiana Invasive Species Symbol and/or Slogan for Management/Education	Unfunded	2				--	0	0	0	0	0				
7.B.6	Develop Statewide Invasive Species Educational and Informational Website	Unfunded	2		LSG	LDWF	--	--	--	--	--	--				
7.B.7	Education of Aquarium and Koi Fishpond Industries	Unfunded	2		LDWF	LDAF, Academia, Industry	--	--	--	--	--	--				
7.B.8	Education of Bait Industry	Unfunded	2		LDWF	Industry, Academia	--	--	--	--	--	--				
7.B.9	Education of Boaters and Fishermen	Unfunded	2		LDWF											
7.B.10	Education of Commercial Vectors for Invasive Species Introduction and Transport	Unfunded; Funding Pending, Proposal Submitted	2	BTNEP, CBR-ISI/Coypu Foundation	BTNEP, CBR-ISI, LDWF	LSG, Others	--	--	--	--	20	1		1.25		
7.B.11	GIS Vulnerability Index for Invasive Species in Southeastern Louisiana	Funded	2	CBR-ISI/Coypu Foundation	CBR-ISI		52	0.50	10	0.50	22	0.50				
7.B.12	Invasive Species Educational Video	Funding Pending, Proposal Submitted	2	BTNEP	BTNEP		--	--	--	--	45	1				
7.B.13	Louisiana Invasive Species Training Workshop for State/Federal Workers	Unfunded	2			CBR-ISI, LSG, LDWF, Port of NO, Others	--	--	--	--	--	--				
7.B.14	Invasive Species Symposium	Funding Pending, Proposal Submitted	2	GoMP	BTNEP		--	--	--	--	--	--	50	1		
7.B.15	Partnership with Aquaculture Industry	Unfunded	2		LDWF, LDAF	Industry Members, LSU AgCenter	--	--	--	--	--	--				
7.B.16	Portals and Pathways Poster Map and Companion Website	Funded	2	CBR-ISI/Coypu Foundation	CBR-ISI	LSG	25	1.25	5	1.25	2	1.25	5	1.25		

Tasks/Actions		Current Status	Objective Addressed	Fund Source	Implementing Entity	Cooperating Organizations	Recent Efforts						Planned Efforts (FY05 - FY06)			
							FY02		FY03		FY04		DEDICATED		REQUESTED	
Number	Title/Summary						$000	FTE	$000	FTE	$000	FTE	$000	FTE	$000	FTE
7.B.17	Public Perceptions of Invasive Species in the Media	Funded	2	CBR-ISI/Coypu Foundation	CBR-ISI		--	--	20	1.25	5.75	1.25	0	0		
7.B.18	School Curriculum on Invasive Species	Funded	2	LSG	LSG	LDWF, LDNR, LPB, GoMP, LCES		2		2		2		2		
7.C.1	Develop Rapid Response and Early Eradication Plan	Unfunded	3			LDWF, LDAF	--	--	--	--	--	--			75	
7.C.2	Asian/European Gypsy Moth Detection	Funded	3	USDA	USDA, USDHS	LDAF, USDA	60		60		60					
7.C.3	"Big River" Monitoring Program	Unfunded	3		LDWF	USGS, Regional Panel, UNO, Tulane, ULL, LSU	--	--	--	--	--	--				
7.C.4	Black Carp Surveys	Funded	3	USFWS	USFWS	LDWF	--	--	--	--	25					
7.C.5	Channeled Apple Snail Detection	Unfunded?	3			USDA, LDAF	--	--	--	--	--	--				
7.C.6	Chinese Tallow Trees and Resident Arthropod Populations	Funded	3	CBR-ISI/Coypu Foundation	Tulane EEB	CBR-ISI	--	--	11	0.75	0	0	0	0		
7.C.7	Comprehensive Coast Wide Survey for Invasive Species	Unfunded	3		LDWF		--	--	--	--	--	--				
7.C.8	Develop and Maintain Public Database of Collected and Identified [Plant & Animal] Specimens	Unfunded?	3			USDA, LDAF, LSU	--	--	--	--	--	--				
7.C.9	Develop GIS Maps for Louisiana Invasive Species	Unfunded	3		LDWF		--	--	--	--	--	--				
7.C.10	DNA Tracking of Invasive Amphibians and Salamanders	Funded	3	CBR-ISI/Coypu Foundation	Tulane EEB, Tulane SPHTM	CBR-ISI	105	1.25	29	1.25	1.5	1.25	0	0		
7.C.11	Environmental Assessment of Major Mississippi River Ports and Inland Waterbodies in Louisiana	Unfunded	3			LDWF, UNO, LSU, Tulane, EPA, LUMCON, LSG	--	--	--	--	--	--			149	

Tasks/Actions		Current Status	Objective Addressed	Fund Source	Implementing Entity	Cooperating Organizations	Recent Efforts						Planned Efforts (FY05 - FY06)			
							FY02		FY03		FY04		DEDICATED		REQUESTED	
Number	Title/Summary						$000	FTE	$000	FTE	$000	FTE	$000	FTE	$000	FTE
7.C.12	Establish Database for Marine Invasive Species in Louisiana	Unfunded	3		LDWF		--	--	--	--	--	--				
7.C.13	Exotic Fruitfly Detection	Funded	3	USDA	USDA	LDAF?	100		100		100					
7.C.14	Guide to Marine Invasive Species	Unfunded	3			LDWF, CBR-ISI, LSU, ULL, UNO	--	--	--	--	--	--				
7.C.15	Inspections of Ships and Cargo	Funded	3		Port of NO	USDA, USCG										
7.C.16	Invasive Spider Populations in Fragmented Bottomland Hardwood Forests	Funded	3	CBR-ISI/Coypu Foundation	Tulane EEB	CBR-ISI	5.1		--	--	--	--	--	--		
7.C.17	Louisiana Species Database	Funded	3	LSG	LSG		3.06	1	--	--	--	--				
7.C.18	Model-Predicted Movement of Rio Grande Cichlid on South Shore of Lake Pontchartrain	Funded	3	UNO/Amer. Cichlid Assoc.	UNO	PIES	0.7		0		0		0			
7.C.19	Monitor for Invasive "Cylindro" Blue-Green Algae	Unfunded	3		ULL	LDWF, LOPH	--	--	--	--	--	--				
7.C.20	Monitoring and Predictive Modeling of the Invasive Asian Carp in the Mississippi River	Funded	3	CBR-ISI/Coypu Foundation	Tulane EEB	CBR-ISI, KU, CSC	--	--	32.5	1.50	1.5	1.50	0	0		
7.C.21	Monitoring for Asian Carp in the Mississippi River and Studying Impacts on Native Fish Species	Funded	3	USGS	UNO	MDC, LDWF, PIES	--	--	--	--	22.68	1				
7.C.22	Monitoring of Invasive Mosquitoes and Mosquito-Borne Diseases	Funded	3	CBR-ISI/Coypu Foundation	Tulane SPHTM	CBR-ISI	30		15		1.5					
7.C.23	New Orleans District Invasive Species Program	Funded	3	USACE	USACE			0.1		0.1		0.1				
7.C.24	Seasonal Feeding Preferences of Nutria	Funded	3	CBR-ISI/Coypu Foundation	Tulane EEB	CBR-ISI, JLNP	--	--	10		0	0	0	0		
7.C.25	Treatment of Contaminated Cargo and Packaging	Funded	3		Port of NO	USDA										

Tasks/Actions		Current Status	Objective Addressed	Fund Source	Implementing Entity	Cooperating Organizations	Recent Efforts						Planned Efforts (FY05 - FY06)			
							FY02		FY03		FY04		DEDICATED		REQUESTED	
Number	Title/Summary						$000	FTE	$000	FTE	$000	FTE	$000	FTE	$000	FTE
7.D.1	Aquatic Plant Control Program	Established, but no funding available	4	USACE	USACE, LDWF		0	0	0	0	0	0	0	0		
7.D.2	Biological Control of Common Salvinia in Louisiana	Unfunded?	4			USDA, LDWF, LSU AgCenter	--	--	--	--	--	--				
7.D.3	Biological Control of Formosan Termites	Funded	4	CBR-ISI/Coypu Foundation	Tulane SPHTM	CBR-ISI, USDA	--	--	43	1.25	1.5	1.25				
7.D.4	Biological Control of Giant Salvinia in Louisiana	Funded	4	USDA	USDA	LDWF, LSU AgCenter										
7.D.5	Biological Control of Red Imported Fire Ant	Funded	4	USDA	USDA	LSU			5							
7.D.6	Chinese Tallow Tree Impact on Native Food Webs	Funding Pending, Proposal Submitted	4		UNO	USFWS	--	--	--	--	--	--				
7.D.7	Chinese Tallow Tree Invasion Process in Bottomland Hardwood Forests	Funding Pending, Proposal Submitted	4		UNO	USFWS	--	--	--	--	--	--				
7.D.8	Coast Wide Nutria Control Program	Funded	4	CWPPRA	LDWF	LDNR, NRCS	2,500		2,500		2,500		5,000			
7.D.9	Entergy Zebra Mussel Monitoring and Control Program	Funded	4	LSG/Entergy	Entergy	LSU	0	0	0	0	0	0				
7.D.10	Henderson Lake Hydrilla Control Project	Funded	4	USACE	LDNR, LDWF	USACE, LSU AgCenter	50	0.5	50	0.5	50	0.5				
7.D.11	Invasive Plant Control at Various National Wildlife Refuges in Louisiana	Funded	4	USFWS	NWRP	LDWF	370		369.4		369.4					
7.D.12	Nuisance Aquatic Plant Control	Funded	4	State	LDWF	USDA, LSU AgCenter	2,500	46	2,500	46	2,500	46	2,500	46		

Tasks/Actions		Current Status	Objective Addressed	Fund Source	Implementing Entity	Cooperating Organizations	Recent Efforts						Planned Efforts (FY05 - FY06)			
							FY02		FY03		FY04		DEDICATED		REQUESTED	
Number	Title/Summary						$000	FTE	$000	FTE	$000	FTE	$000	FTE	$000	FTE
7.D.13	Nutria Population Modeling	Funding Pending, Proposal Submitted	4		UNO	LDWF										
7.D.14	Prevent Illegal Discharges and Improper Disposal of Organic Materials	Funded	4		Port of NO											
7.D.15	Removal of Aquatic Growth from Federally Maintained Waterways	Funded	4	USACE	USACE, LDWF??		2,000	4	2,000	4	2,000	4	2,000	4		
7.E.1	Federal Agriculture Quarantine Inspection	Funded	5	Congress, User Fees	USDA, USDHS	Port of NO	2,200		2,200		2,200					
7.E.2	Strengthen Laws on Importation and Sale of Invasive Plant / Animal Species through Nursery and Pet Trades	Unfunded	5			LDAF, LDWF	--	--	--	--	--	--				
7.E.3	Voluntary/Mandatory Ballast Water Exchange	Funded	5	USCG	USCG	NBWC, USDHS	880	4	880	4	880	4				
	Approximate Total Funding and FTEs						**10,881**	**61**	**10,900**	**67**	**10,839**	**69**	**9,555**	**58**	**299**	**1**

Key to Abbreviations:			
BTNEP	Barataria-Terrebonne National Estuary Program	MDC	Missouri Department of Conservation
CBR-ISI	Invasive Species Initiative at the Center for Bioenvironmental Research at Tulane and Xavier Universities	NBWC	National Ballast Water Clearinghouse at the Smithsonian Institute
CSC	Caribbean Science Center, Gainesville, FL	NRCS	Natural Resources Conservation Service
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act	NWRP	National Wildlife Refuge Program (USFWS)
Entergy	Entergy Corporation	PIES	Pontchartrain Institute for Environmental Sciences at the University of New Orleans
EPA	Environmental Protection Agency	Port of NO	Port of New Orleans
GoMP	Gulf of Mexico Program (EPA)	Tulane	Tulane University
JLNP	Jean Lafitte National Park	Tulane EEB	Tulane University Department of Ecology and Evolutionary Biology
KU	University of Kansas	Tulane SPHTM	Tulane University School of Public Health and Tropical Medicine
LAISC	Louisiana Aquatic Invasive Species Council	ULL	University of Louisiana at Lafayette
LAISTF	Louisiana Aquatic Invasive Species Task Force	UNO	University of New Orleans
LCES	Louisiana Cooperative Extension Service	USACE	United States Army Corps of Engineers
LDAF	Louisiana Department of Agriculture and Forestry	USCG	United States Coast Guard
LDNR	Louisiana Department of Natural Resources	USDA	United States Department of Agriculture
LDWF	Louisiana Department of Wildlife and Fisheries	USDHS	United States Department of Homeland Security
LOPH	Louisiana Office of Public Health	USFWS	United States Fish and Wildlife Service
LPB	Louisiana Public Broadcasting	USGS	United States Geological Survey
LSG	Louisiana Sea Grant		
LSU	Louisiana State University		
LSU AgCenter	Louisiana State University Agricultural Extension		
LUMCON	Louisiana Universities Marine Consortium		

9 Program Monitoring and Evaluation

This section lays out a strategy to monitor and evaluate the success of management plan execution over the next five years. Three questions emerge: *who* should do the evaluation, *how*, and *when*.

Who should do the evaluation? The Task Force decided to create an internal oversight board (or possibly a working group) within the to-be-established Council. This board would include at least one out-of-state, qualified professional to participate in the monitoring and evaluation. More external participants would be welcome but could be costly.

How should the evaluation be done? Recognizing the potentially high cost of a thorough assessment, the Task Force plans a three-fold approach to monitoring and evaluating the actions listed in this plan. The internal oversight board will be responsible for selecting and combining these three methods and applying them to specific goals and objectives.

a. Through the use of "**indicator actions**." In this approach, evaluators select a representative group of actions as indicative of management plan progress. The degree to which those "indicator actions" acquire funding and are executed in their entirety is the degree to which success is declared. Advantages of this approach are that it is straightforward, inexpensive, and may be implemented in the early years of plan execution. The disadvantages are that it is based upon a small sample, does not address the larger issue of invasive species spread, and may not satisfy the public's right to know the "bottom line:" are we better off now than when this effort commenced?
b. Through **quantitative biological measures**. In this approach, field work is conducted to answer questions such as:
   - Has the range of a particular species expanded?
   - Have new invasive species arrived?
   - Have ecological costs of the impact of certain species increased or spread?
   - Biologically speaking, is this problem greater than it was five years ago?

   Advantages of this approach include its scientific and quantitative nature, and it addresses fundamental questions rather than bureaucratic ones. Disadvantages include its costliness, its highly focused nature (one species may contract in range while another may expand), and the need to wait until the end of the five-year cycle for actions to take potential effect. It may also be "setting the bar too high" to expect to control or eliminate certain species. Several monitoring programs are already in existence in Louisiana and may be considered by the internal oversight board as a method of gathering evaluation data. (See section 7, "Management Actions.")
c. Through **quantitative social measures**. In this approach, surveys are conducted among stakeholders to answer such questions as:
   - Can you define the term "invasive species?"
   - Have you seen posted signs about invasive species at boat ramps and docks?
   - Do you wipe off your outboard motor and hull upon extracting it from the water?

For sections b and c above, graduate students should be encouraged to conduct these evaluations whenever possible.

When should the evaluation be done? Initial evaluations should be submitted at the end of years 1 and 2, and will probably be limited to the "indicator actions" approach. Deeper assessments should occur in the latter three years of the plan, when the biological and social quantitative methods should be employed, provided baseline data and funding are available. The Task Force may develop a "Performance Budget" funding request through the Louisiana Cooperative Extension Service or encourage universities in the state to develop research projects evaluating Task Force actions.

Details and the actual execution of program monitoring and evaluation will be left up to the internal oversight board, which will be responsible for a report to the Louisiana legislature every two years on progress, problems, and recommendations for plan improvement.

10 Glossary of Terms

Acclimatization — the process by which an introduced species and resulting offspring adapt to a new environment.

Aquatic species — all organisms living at least partially in a water environment. Usage commonly refers to aquatic plants such as water hyacinth and salvinia, fish, and invertebrates, but also includes mammals such as nutria. For purposes of the management plan, species that arrived through aquatic pathways (such as the Formosan termite) are considered aquatic species.

Baitfish — any species (fish, insect, invertebrate) sold for use as bait for recreational fishing.

Ballast — water or other matter placed in specific areas of the hull of a vessel for navigation stability. Species are often inadvertently transported in ballast water when it is released in another water body. In earlier years, rocks and metal bars were used as ballast material. In all cases, species can be transported inadvertently or purposefully in or on ballast material.

Ballast tank sediment — particles suspended in water pumped into ships for ballast that have settled to the bottom of the ballast tank. This sediment can harbor bottom-dwelling species that might be accidentally carried in a ship's ballast water and subsequently released in a new environment.

Biocontrol — the use of living organisms to control other living organisms. It frequently involves the introduction of a non-native predator, herbivore, pathogen or parasite that interacts with the invasive species in its natural geographic range. An element of risk is associated with biocontrol methods. All possible impacts should be tested before adding a biocontrol agent to an ecosystem because the agent can produce a new economic or ecological problem. For example, introduction of grass carp to control aquatic weeds was too successful and the carp ate the native vegetation as well.

Control methods — chemical, mechanical, or biological methods to reduce the impact of invasive species. These methods may also be used to contain a species to stop its further spread.

Cryptogenic species — a species of questionable origin; can be native or non-native. Because humans have not kept a complete list of species by geographic location from the beginning of human life on the planet, there is no continuous, scientific record of all species and their original location(s) on earth. Those species for which the record of origin is questionable or unclear are labeled as cryptogenic.

Drainage basin — the catchment basin from which the waters of a stream, marsh, river, lake, or groundwater system are drawn. Smaller basins (such as Tangipahoa Basin) are nested with larger basins (such as the Pontchartrain Basin). In the deltaic portion of Louisiana, waterways such as the Mississippi River divide drainage basins, because their natural levees form the highest land in the area.

Dunnage — any packing material used to protect cargo from movement, moisture, contamination, or other damage. Dunnage such as straw and wood has sometimes served as media for species introduction in shipping.

Early eradication — the complete elimination of an invasive species from a specific geographic area at the beginning of the species' colonization of that area. Early eradication is most likely to occur when the species is locally established and fairly contained.

Ecosystem — a community of organisms and their surrounding abiota functioning as one unit.

Established species — a non-native species with a permanent, reproducing population that is unlikely to be easily eliminated through human action or natural causes. Established species may or may not be invasive (environmentally or economically problematic).

Exotic species — a species that is not native to a designated ecosystem or geographic area. Synonyms include nonindigenous, non-native, foreign, and alien species. Because some exotic species may be harmful or invasive while others are not, this term should be used with great care.

Freshwater species — aquatic species native to freshwater.

Indigenous species — organisms naturally occurring in a specific geographic area or ecosystem. Synonym includes native species.

Introduced species — an organism that is not native to a designated ecosystem or geographic area.

Invasive species — non-native organisms whose introductions cause or are likely to cause adverse environmental, economic, and/or human health impacts. For purposes of the management plan, synonym is nuisance species.

Habitat — area where a species has the necessary food, water, shelter, and space to live and reproduce.

Localized population — a reproducing population of introduced organisms that is confined to a particular area. Possibility for eradication is increased when the organism is contained.

Locally established species — a number of localized populations; that is, a non-native organism with one or more reproducing populations within a limited range, with no geographic expansion yet. An example would be the Rio Grande cichlid. It is locally established on the south shore of Lake Pontchartrain and in the connecting drainage canals.

Marine species — aquatic species native to saline waters.

Media — natural and man-made materials infested or utilized by species as they are transported (accidentally or deliberately) to new locations. Media might include ballast water, shipping/packing materials, wholesale products, cargo, equipment, people, parts of railroads, airlines, ships, outboard motors, runoff and effluent.

Monitor — to watch, observe, or check for a special purpose. For purposes of the management plan, observing or checking activities based upon scientific method to accumulate data about aquatic invasive species and their environs.

Native species — synonym of indigenous species.

Naturalization — the creation or occupation of an ecological niche by an introduced species; occurs after acclimatization.

Nuisance species — a plant or animal pest. For purposes of the management plan, these are non-native species that threaten the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters.

Parasite — an organism living in or on another organism.

Pathogen — a specific agent causing disease. May be a bacteria, virus, or fungus.

Pathway — geographical features or patterns by which species are physically transported to new areas. A pathway might be a shipping lane, highway, river, current, wind, trade route, or waterway. Pathway combined with media result in a vector.

Pioneer infestation — a small colony of an invasive species that has spread to a new geographic area from an established population.

Rapid response — fast containment, control and eradication of an initial invasion.

Regulation — a rule or order having to do with details or procedures and having the force of law.

Screening — process for examining imported cargo/products and deliberately transported species to prevent transport of invasive species.

Species — a fundamental category of taxonomy, ranking below genus and subgenus, consisting of related organisms capable of inbreeding.

Terrestrial species — organisms living primarily on land.

Vector — transportation of a species on or in a media through a pathway. Vector is a combination of the concepts of “media” and “pathway.”

Veliger — larval form of some mollusks, including the invasive species zebra mussels.

Watershed — according to the USGS, “watershed” refers to the dividing ridges separating drainage basins, but recent usage has made it practically synonymous with drainage basin.

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12 Appendices

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12.B Appendix B. Invasive Species in Louisiana

Invasive Species Reported, Introduced, and/or Established in Louisiana[1]

Group	Scientific Name	Common Name
Amphibians	*Eleutherodactylus coqui*	Coqui
Amphibians	*Eleutherodactylus planirostris*	Greenhouse frog
Coelenterates	*Phyllohiza punctata*	Australian spotted jellyfish
Crustaceans	*Daphnia lumholzi*	Water flea
Fish	*Astronotus ocellatus*	Oscar
Fish	*Cichlasoma cyanoguttatum*	Rio Grande cichlid
Fish	*Colossoma or Piaractus sp.*	Unidentified pacu
Fish	*Ctenopharyngodon idella*	Grass carp
Fish	*Cyprinus carpio*	Common carp
Fish	*Hypophthalmichthys molitrix*	Silver carp
Fish	*Hypophthalmichthys nobilis*	Bighead carp
Fish	*Hypostomus sp.*	Suckermouth catfish
Fish	*Macropodus opercularis*	Paradisefish
Fish	*Mylopharyngodon piceus*	Black carp
Fish	*Oreochromus, Sarotherodon, or Tilapia*	Tilapia
Fish	*Tinca tinca*	Tench
Mammals	*Myocastor coypus*	Nutria
Mammals	*Sus scrofa*	Feral hog
Mollusks	*Corbicula fluminea*	Asian clam
Mollusks	*Dreissena polymorpha*	Zebra mussel
Plants	*Alternanthera philoxeroides*	Alligatorweed
Plants	*Bacopa egensis*	Brazilian water-hyssop
Plants	*Blyxa aubertii*	Blyxa
Plants	*Ceratopteris thalictroides*	Water sprite
Plants	*Colocasia esculenta*	Wild taro or Coco yam
Plants	*Dopatrium junceum*	Dopatrium
Plants	*Egeria densa*	Brazilian waterweed
Plants	*Eichhornia crassipes*	Water hyacinth
Plants	*Hydrilla verticillata*	Hydrilla or Waterthyme
Plants	*Imperata cylindrica*	Cogongrass
Plants	*Ipomoea cairica*	Mile-a-minute vine
Plants	*Iris pseudacorus*	Yellow iris
Plants	*Landoltia (Spirodela) punctata*	Dotted duckweed
Plants	*Lantana camera*	Lantana
Plants	*Ligustrum japonicum*	Japanese privet
Plants	*Ligustrum sinense*	Chinese privet
Plants	*Limnophila indica*	Indian marshweed
Plants	*Lonicera japonica*	Japanese honeysuckle
Plants	*Ludwigia hexapetala*	Uruguay seedbox
Plants	*Luziola peruviana*	Peruvian watergrass
Plants	*Lythrum salicaria*	Purple loosestrife

[1] Excludes insects. Data in this table is a compilation of USGS species reports (http://nas.er.usgs.gov); and Evers and Barrett-O'Leary 2002.

Group	Scientific Name	Common Name
Plants	*Macfadyena unguis-cati*	Catclawvine
Plants	*Marsilea macropoda*	Big-foot water clover
Plants	*Murdannia keisak*	Marsh dewflower
Plants	*Myriophyllum aquaticum*	Parrot feather
Plants	*Myriophyllum spicatum*	Eurasian watermilfoil or Spike watermilfoil
Plants	*Najas minor*	Brittle naiad or Brittle waternymph
Plants	*Nasturtium officinale*	Watercress
Plants	*Nelumbo nucifera*	Sacred lotus
Plants	*Nymphaea lotus*	White Egyptian lotus
Plants	*Nymphoides pelata*	Yellow floating heart
Plants	*Ottelia alismoides*	Duck lettuce
Plants	*Panicum repens*	Torpedo grass
Plants	*Pistia stratiotes*	Water lettuce
Plants	*Polygonum cuspidatum*	Japanese knotweed
Plants	*Potamogeton crispus*	Curly pondweed
Plants	*Pueraria montana*	Kudzu
Plants	*Rotala indica*	Indian toothcup
Plants	*Sagittaria guyanensis guyanensis*	Guyana arrow head
Plants	*Salvinia minima*	Common salvinia or Water spangles
Plants	*Salvinia molesta*	Giant salvinia
Plants	*Sapium sebiferum*	Chinese tallow tree or Popcorn tree
Plants	*Sorghum halepense*	Johnsongrass
Plants	*Tamarix ramosissima*	Saltcedar

Potential Invasive Species Threats to Louisiana[2]

Group	Scientific Name	Common Name
Crustaceans	*Eriocheir sinensis*	Chinese mitten crab
Mollusks	*Perna perna*	Brown (Mexihalo) mussel
Mollusks	*Perna viridis*	(Asian) green mussel
Plants	*Cylindrospermopsis raciborskii*	Toxic blue-green algae

[2] Excludes insects.

12.C Appendix C. Summary of Louisiana State Laws, Programs, and Regulations Relevant to Aquatic Invasive Species

12.C.1 Louisiana Laws

12.C.1.a La. R.S. Title 3: Agriculture and Forestry

The Louisiana Department of Agriculture and Forestry (LDAF) generally has jurisdiction over farm-raised animals and animals raised in captivity, forestry and plants; plant and animal diseases and quarantines, agricultural professions, plant and animal pests, and soil and water conservation. LDAF can either prohibit or regulate the shipment into the state any plants, farm products, or other articles of any nature from any other state or any territory or foreign country when such prohibition or regulation is necessary.[1] LDAF also has the power to prevent, control, or eradicate contagious and infectious crop and fruit diseases in order to prevent the introduction, spread, or dissemination of all crop and fruit pests and diseases.[2] LDAF also may prevent, control, or eradicate all crop and fruit pests, contagions, and diseases.[3]

In addition, Title 3 declares the Chinese tallow (*Sapium sebiferum*) a "noxious plant harmful to growth and development of other plants and pasture and may be destroyed wherever found in this state."[4]

12.C.1.b La. R.S. Title 56: Wildlife and Fisheries

The Louisiana Department of Wildlife and Fisheries (LDWF) generally has jurisdiction over animal species in the wild. In addition, Title 56 creates the Aquatic Plant Control Fund.[5] The purpose of the Fund is aquatic weed control and eradication.[6] The Fund, subject to annual appropriation by the legislature, is to be used solely by the LDWF's Office of Fisheries for the aquatic plant control program and cooperative research and public education by LDWF and the LSU Agricultural Center.[7]

Title 56 prohibits the import, export, transport, sale, receipt, acquirement, or purchase in interstate commerce of "any fish or wildlife taken, possessed, transported, or sold in violation of any law or regulation" of Louisiana, any other state, or the Federal government.[8] Any attempt to commit any of the aforementioned acts is also unlawful.[9] Furthermore, any person who knowingly engages in such conduct is subject to penalties defined in La. R.S. 56:36.[10]

Title 56 also prohibits the transport of wild animal or fowl of any species for restocking purposes from a site within the state, except in accordance with regulations adopted by the Louisiana Wildlife and Fisheries Commission.[11]

Title 56 limits the importation, sale, and possession of specific exotic species. It is LDWF that has the authority to regulate or prohibit the possession, sale, or transport of any fish into Louisiana.[12] No person, firm, or corporation shall possess, sell, or cause any fish to be transported into this state by another person, firm, or corporation without written permission from the Secretary of LDWF.[13] However, this statute is limited to certain fish species, such as carnero catfish (*Clarias batrachus*)

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[1] *See* La. R.S. § 3:1652.
[2] *See id*.
[3] *See id*.
[4] La. R.S. § 3:1791.
[5] *See* La. R.S. § 56:10.1.
[6] *See* La. R.S. § 56:10.1(c).
[7] *See id*.
[8] La. R.S. § 56:15(B)(1).
[9] *See* La. R.S. § 56:15(B)(2).
[10] *See* La. R.S. § 56:15(C).
[11] *See* La. R.S. § 56:20(B).
[12] *See* La. R.S. § 56:319.1.
[13] *See* La. R.S. § 56:319(A).

and all species of tilapia.[14] Furthermore, only the Aquarium of the Americas, Audubon Institute, New Orleans, can be authorized by special permit from LDWF to possess and display piranha and Rio Grande tetra.[15]

Also, no person shall knowingly import or cause to be transported into Louisiana, from any other state or country without permission from the Wildlife and Fisheries Commission, certain noxious aquatic plants which "are or can be grown or submerged or partly submerged or floating in the water."[16] The aquatic plant species that fall under this statute are:

- Rooting or anchoring hyacinth (*Eichhornia azurea*)
- Elodea (*Elodea canadensis*)
- Hydrilla (*Hydrilla spp.*)
- African elodea (*Lagarosiphon muscoides* and *Lagarosiphon major*)
- Eurasian watermilfoil (*Myriophyllum spicatum*)
- Marine naiad (*Najas marina*)
- Torpedograss (*Panicum repens*)
- Pickerelweed (*Pontederia spp.*)
- Giant duckweed (*Spirodela oligorrhiza*)
- Waterchestnut (*Trapa spp.*)
- Kapok tree (*Melaleuca quinquenvia*)
- Water lettuce (*Pistia stratiotes*)
- Salvinia (*Salvinia spp.*)
- Purple loosestrife (*Lythrum salicaria*)
- Water hyacinth (*Eichhornia crassipes*)[17]

The Wildlife and Fisheries Commission may issue permits for the importation of any of these noxious aquatic plants for scientific research.[18]

12.C.2 Louisiana Programs and Rules

12.C.2.a Coastwide Nutria Control Program

Title 56 of Louisiana's Revised Statutes recognizes both the deterioration of the state's coastal wetlands due to the overpopulation of nutria and the economic importance of nutria to Louisiana's fur industry.[19] Therefore, the LDWF, in accordance with the Wetlands Conservation and Restoration Plan, is authorized to enter into cooperative agreements that establish a cost-sharing program as an economic incentive to trappers and coastal landowners experiencing the adverse effects of the nutria overpopulation.[20] Not only can the Secretary of the LDWF enter into cooperative agreements with coastal landowners for trapping nutria on land owned by them, but the Secretary also has the responsibility for planning, administering, and managing the program and for monitoring the results.[21]

The program is limited to coastal Louisiana. The economic incentive payment for each nutria that is trapped is $4 per tail delivered by registered participants to collections centers throughout coastal Louisiana. The goal of the program is to harvest up to 400,000 nutria annually from the coast. Participants are required to obtain a valid Louisiana trapping license and also must obtain permission to trap/hunt in the Program area from an appropriate private, State, or Federal landowner.

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[14] *See id*.
[15] *See* La. R.S. § 56:319(D).
[16] La. R.S. § 56:328(B).
[17] *See id*.
[18] *See* La. R.S. § 56:328(C).
[19] *See* La. R.S. § 56:281.
[20] *See id*.
[21] *See* La. R.S. § 56:282(1). *See also* La. R.S. § 56:282(3).

12.C.2.b Nuisance Animal Control Rule

The Louisiana Wildlife and Fisheries Commission ratified the Nuisance Animal Control Rule. This rule authorizes landowners or their designees to take specified nuisance animals, such as nutria, year round without a permit. However, the animals may only be taken by trapping or shooting during legal hours. The rule only authorizes take when the animals have proven to create a nuisance or damage to property. The burden of proof that the animals are creating a nuisance or damaging property rests with the landowner.

12.C.3 Additional State Jurisdiction Information

12.C.3.a Louisiana Air Quality Program

LDEQ has jurisdiction over the administration of Louisiana's Air Quality Program.[22] Pursuant to La. R.S. § 30:2055, no person shall conduct any activity that results in the discharge of air contaminants without the appropriate permit or license as required under LDEQ regulations. LDEQ has jurisdiction over the permitting process for owners and operators of sources of air contaminant emissions in the state[23] as well as volatile organic compound emissions from industrial wastewater,[24] biomedical waste incinerators,[25] and refuse incinerators.[26] LDEQ also conducts investigations[27] and assesses penalties for violations.[28]

12.C.3.b Emergency Response to Release of Pollutants

LDEQ regulates emergency response to the release of pollutants. The Secretary of LDEQ has the power to declare that an emergency exists upon receipt of evidence of an incident that requires immediate action "to prevent irreparable damage to the environment or a serious threat to life or safety based on recognized criteria or standards or both."[29] In response to such an emergency, LDEQ may issue permits, variances, or other orders that are necessary to respond to the emergency, which shall be effective immediately upon issuance, and any appeal or request for review shall not suspend the implementation of the action ordered.[30] Specifically, LDEQ has jurisdiction over the release or potential release of a pollutant resulting from an off-site emergency condition; any incident that has been declared an emergency by the Secretary of Environmental Quality in accordance with La. R.S. § 30:2033; and the transportation, receipt, and storage of material resulting from the cleanup and/or abatement of an off-site[31] emergency situation.[32] In addition, La. R.S. § 30:2035 created the Environmental Emergency Response Training Program. The purpose of this program is to provide or secure training "designed to instruct emergency response personnel to quickly, efficiently, and effectively respond to and address environmental problems and emergencies occurring within the area of their jurisdiction and to assist in addressing, when necessary, environmental emergencies occurring regionally."[33]

12.C.3.c Hazardous Waste Control Law

LDEQ administers the Louisiana Hazardous Waste Control Law.[34] LDEQ has jurisdiction over the development, implementation, and enforcement of a comprehensive state hazardous waste control

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[22] *See* La. R.S. § 30:2011. *See also* La. R.S. § 30:2054 and LA. ADMIN. CODE Tit. 33, § 3:101.
[23] *See* LA. ADMIN. CODE Tit. 33, § 3:501-551.
[24] *See* LA. ADMIN. CODE Tit. 33, § 3:2153.
[25] *See* LA. ADMIN. CODE Tit. 33, § 3:2511.
[26] *See* LA. ADMIN. CODE Tit. 33, § 3:2521.
[27] *See* LA. ADMIN. CODE Tit. 33, §3:107.
[28] *See* LA. ADMIN. CODE Tit. 33, § 1:701-705.
[29] La. R.S. § 30:2033. An "emergency" means "any condition that reasonably could be expected to endanger the health and safety of the public, cause significant adverse impacts to the land, water, or air environment, or cause severe property damage. This definition includes transportation-related events, abandoned containers, barrels, and other receptacles." LA. ADMIN. CODE Tit. 33, § 69:6905(A).
[30] *See* La. R.S. § 30:2033.
[31] "Off-site" means "areas beyond the property boundary of the facility, and areas within the property boundary to which the public has routine and unrestricted access during or outside business hours." LA. ADMIN. CODE Tit. 33, § 69:6905(A).
[32] *See* LA. ADMIN. CODE Tit. 33, 69:6901.
[33] La. R.S. § 30:2035.
[34] *See* La. R.S. § 30:2171 et seq. "Hazardous waste" means "any waste, or combination of wastes, which because of its quantity, concentration, physical, or chemical characteristics may cause or significantly contribute to an increase in mortality or an increase in

program consistent with the Louisiana Hazardous Waste Control Law and applicable federal laws and regulations.[35] Furthermore, LDEQ has the authority to issue, continue in effect, revoke, modify, or deny hazardous waste transporter licenses and hazardous waste treatment, storage, and disposal facility permits and schedules of compliance.[36] The authority to execute minor permit actions and to issue registrations, certifications, notices of deficiency, and notification of inclusion under a general permit may be delegated by the Secretary or the appropriate Assistant Secretary to an authorized representative, notwithstanding the provisions of La. R.S. § 30:2050.26.[37] Although LDEQ regulates hazardous wastes generated, transported, treated, stored, and/or disposed in the state, the agency's regulations do not limit the authority granted to the Department of Natural Resources in Title 30 of the Louisiana Revised Statutes.[38] LDEQ regulates the discharge and reporting of point source hazardous waste, which includes water discharges, air emissions, offsite surface shipments, and spills.[39] The Department of Public Safety and Corrections (DPS) is authorized to promulgate regulations and oversee compliance regarding the transportation of hazardous wastes by any means of commercial or private transport.[40] By law, LDEQ advises and cooperates in the promulgation of regulations.[41] If a spill occurs on the site of a generator or Treatment, Storage, and Disposal (TSD) facility, and if that spill could endanger the public health or affect the environment off-site, then LDEQ and DPS have the authority to enter the site and investigate the spill.[42] LDEQ and DPS also work together to provide for the control and cleanup of accidental spills and other emergency situations involving hazardous waste.[43] LDEQ, with the advice and cooperation of the Department of Health and Human Resources and the Department of Wildlife and Fisheries, promulgates regulations providing for the identification and regulation of all hazardous waste TSD facilities.[44]

12.C.3.d Louisiana Inactive and Abandoned Hazardous Waste Site Law

LDEQ administers the Louisiana Inactive and Abandoned Hazardous Waste Site Law.[45] It is within the agency's authority to develop contingency plans and adopt guidelines for the containment, closure, and post-closure maintenance of inactive and abandoned hazardous waste sites.[46] LDEQ also has the authority to develop and periodically revise cooperative agreements with LDWF, DPS, the Military Department, U.S. Environmental Protection Agency, U.S. Coast Guard, and all other appropriate local, state, and federal agencies so that personnel, equipment, and materials in possession or under control of these departments and agencies may be diverted and utilized to address inactive or abandoned hazardous waste sites under certain conditions.[47] LDEQ has the authority to coordinate the state response to a waste site with any on-scene coordinator designated by federal law.[48] However, this law does not prevent LDEQ from responding independently to an inactive or abandoned waste site where no on-scene coordinator is present or no action is being taken by the federal government.[49] In appropriate cases, LDEQ shall seek reimbursement from the designated agencies of the federal government for all costs incurred in addressing inactive or abandoned hazardous waste sites including but not limited to costs of personnel, equipment, use of equipment, and supplies.[50]

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serious irreversible or incapacitating reversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed." La. R.S. § 30:2173.

[35] La. R.S. § 30:2174.
[36] La. R.S. § 30:2180.
[37] *Id*.
[38] *See* LA. ADMIN. CODE Tit. 33, § 5:105.
[39] *See* LA. ADMIN. CODE Tit. 33, § 5:1505.
[40] La. R.S. § 30:2189.
[41] *Id*.
[42] *See* LA. ADMIN. CODE Tit. 33, § 5:1505(C)(2).
[43] *See* LA. ADMIN. CODE Tit. 33, § 5:1525.
[44] La. R.S. § 30:2192.
[45] *See* La. R.S. § 30:2221.
[46] La. R.S. § 30:2224.
[47] *Id*.
[48] *Id.*
[49] *Id*.
[50] *Id.*

12.C.3.e Louisiana Waste Reduction Law

LDEQ administers the Louisiana Waste Reduction Law.[51] Under this law, the agency's jurisdiction includes but is not limited to:

- Preparation and development of a general plan for the comprehensive, omnimedia, reduction of hazardous and non-hazardous waste generation in Louisiana;
- Providing technical assistance to generators of waste, to act as a clearinghouse for information concerning waste reduction, and to identify sources of outside assistance including other state programs, universities, and professional consultants;
- Adoption and promulgation of rules and regulations consistent with applicable state and federal law for the reduction of the amount of waste generation in Louisiana, or for any programs or activities authorized by this law; and
- Development of any necessary procedures and regulations conforming to applicable state and federal laws to amend existing permits, licenses, variances, or compliance schedules necessary for the proper administration and control of waste reduction law programs.[52]

12.C.3.f Hazardous Materials Information, Development, Preparedness, and Response Act

DPS administers the Hazardous Materials Information Development, Preparedness, and Response Act (also known as the "Right-to-Know" Law).[53] Louisiana policy states that its citizens have the right and responsibility to know about and protect themselves from the risks and effects of hazardous materials in their environment. State and local agencies have the information to both respond to citizen inquiries and to protect residents by:

- Providing information to physicians for emergency medical diagnosis;
- Adequately preparing for disasters;
- Centralizing and coordinating regional and local long-range planning concerning the environmental hazards in various localities; and
- Developing information on chronic health risks that may appear as the result of the presence of hazardous materials.[54]

DPS' jurisdiction includes but is not limited to: the development of rules and regulations governing criteria for defining a substance as a hazardous material; the development, implementation, compilation, supervision, and management of an information system for hazardous materials; and the development of a centralized inventory reporting and notification system that allows for standardized reporting at the state, parish, and local government levels.[55] Furthermore, DPS consults with the Emergency Response Commission in developing rules and regulations for the implementation of this law.[56] It is the responsibility of the state agencies to coordinate and cooperate to further the purpose of this law. The following are relevant cooperating responsibilities for state agencies:

- The Departments of Agriculture and Environmental Quality are required to consult and coordinate with DPS regarding implementation of this law. These agencies shall, "whenever practical and feasible, coordinate reporting efforts and requirements with the department [DPS] through representation on the [Emergency Response] commission and through any established or created methods of cooperation and coordination among agencies;"
- DPS is required to forward information regarding long-term toxic effects of hazardous materials to the Department of Health and Hospitals, which coordinates such information with the Louisiana Regional Poison Control Center;

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[51] *See* La. R.S. § 30:2291 et seq.
[52] La. R.S. § 30:2294.
[53] *See* La. R.S. § 30:2361 et seq.
[54] La. R.S. § 30:2362.
[55] La. R.S. § 30:2365.
[56] *See id*.

- DPS is required to communicate these laws and regulations to all state departments. DPS coordinates its efforts in developing a one-call notification system with all departments of state government. All departments of the state are required to adjust the reporting requirements to allow for the development of the one-call state notification system for emergency release notifications; and
- Per the one-call state notification system for emergency release notifications, proper notification of a release to DPS satisfies all emergency reporting obligations of the person making the notification, including all emergency reporting obligations of such person to the Department of Environmental Quality, other state agencies, and local response agencies.[57]

12.C.3.g Oil Spill Coordinator and Oil Spill Prevention and Response Act

The Office of the Oil Spill Coordinator within the Governor's Office administers the Oil Spill Prevention and Response Act.[58] The Oil Spill Coordinator's jurisdiction includes:

- Development of a statewide oil spill prevention and response plan;
- Coordination of a response effort from all appropriate state agencies in the event of an unauthorized or threatened discharge of oil affecting or potentially affecting the land, coastal waters, or any other waters of the state;
- Coordination of operational implementation and maintenance of the oil spill prevention program;
- Administering a fund to provide to fund these activities; and
- Providing clear delineation for state coordinated response efforts in relation to jurisdictional authorities and use of state and federal funds for removal costs.[59]

The Oil Spill Coordinator also, in consultation with an interagency council, adopts and promulgates rules necessary and convenient to the administration of the Oil Spill Prevention and Response Act.[60] The interagency council considers matters relating to the coordination of state prevention, response, and cleanup operations related to unauthorized discharges of oil, which include but are not limited to:

- Assisting the coordinator in the development of a statewide oil spill prevention and contingency plan;
- Assisting the coordinator in preparing an annual work plan, identifying state agency needs that must be met in order to comply with the state oil spill contingency plan;
- Developing recommendations for additional legislation; and
- Assisting the coordinator in preparing a budget necessary to implement the provisions of this Chapter.[61]

[57] La. R.S. § 30:2366.
[58] La. R.S. § 30:2451 et seq.
[59] La. R.S. § 30:2456.
[60] *Id*.
[61] La. R.S. § 30:2458.

12.D Appendix D. Executive Order MJF 02-11: Louisiana Non-Indigenous Aquatic Species Advisory Task Force

WHEREAS, certain aquatic plant and animal species which are non-indigenous to the United States have invasively infested the waters of the state of Louisiana and/or the United States (hereafter "non-indigenous aquatic species"), posing a threat to the state of Louisiana's indigenous aquatic species and native ecosystems;

WHEREAS, non-indigenous aquatic species continue to be unintentionally introduced into non-infested waters of the state of Louisiana by operators of recreational and commercial vessels, through aquaculture, and by aquarium owners, suppliers and retailers; and

WHEREAS, the state of Louisiana and its citizens will be best served by public and private scientific communities partnering with federal agencies and the state of Louisiana through the Department of Wildlife and Fisheries to develop an environmentally compatible means to contain, control, eradicate, and/or prevent the introduction of non-indigenous aquatic species in the waters of the state of Louisiana and through an advisory task force charged with: compiling information on non-indigenous aquatic species; providing a forum for the scientific community for coordination and creation of methods, actions, plans, programs, and/or technology to prevent, contain, control, and/or eradicate infestations of non-indigenous aquatic species; minimizing the impact of non-indigenous species on native ecosystems; and recommending a management plan to contain, control, eradicate, and/or prevent the introduction of non-indigenous aquatic species while preserving and/or restoring native ecosystems;

NOW THEREFORE, I, M.J. "MIKE" FOSTER, JR., Governor of the state of Louisiana, by virtue of the authority vested by the Constitution and laws of the state of Louisiana, do hereby order and direct as follows:

SECTION 1: The Louisiana Non-Indigenous Aquatic Species Advisory Task Force (hereafter "Task Force") is established within the Department of Wildlife and Fisheries.

SECTION 2: The duties of the Task Force shall include, but are not limited to, the following:

A. compiling information, data, methods, actions, programs, and/or technologies on or related to aquatic plant and animal species non-indigenous to the state of Louisiana and/or the United States which invasively infest the waters of the state of Louisiana and/or the United States (hereafter "non-indigenous aquatic species"), including hydrilla, salvinia, water hyacinth, zebra mussels and Asian carp, particularly on issues related to the prevention, containment, control and/or eradication of non-indigenous aquatic species in a manner that protects, preserves and/or restores native ecosystems and indigenous aquatic species;
B. identifying all agencies of and entities in the state of Louisiana which have interaction or contact with, or encompass, address, investigate, and/or study nonindigenous aquatic species, or nuisance and/or invasive aquatic plants and/or animals; identifying the purpose, duties, and functions of each agency and/or entity; and identifying a means to coordinate the efforts, functions and/or resources of each agency and/or entity with the Task Force and/or with other agencies and/or entities;
C. recommending a management plan for the prevention, control, containment, and/or eradication of nonindigenous aquatic species in a manner that protects, preserves and/or restores native ecosystems and indigenous aquatic species, particularly addressing the prevention of the unintentional spread of non-indigenous aquatic species to uninfested fresh, salt, and brackish waters within the state of Louisiana;
D. identifying and analyzing potential commercial and/or productive uses of non-indigenous aquatic species;
E. if needed, recommending legislation to address issues related to the prevention, control, containment and/or eradication of non-indigenous aquatic species in a manner that protects, preserves, and/or restores native ecosystems and indigenous aquatic species; and

F. identifying all relevant federal, state, and private funding sources that may be used to control, contain, eradicate, and/or prevent the introduction of non-indigenous aquatic species in a manner that protects, preserves and/or restores native ecosystems and indigenous aquatic species.

SECTION 3: By July 1, 2003, the Task Force shall submit a final report to the governor on the issues set forth in Section 2 of this Order. A preliminary report on the issues, including recommended legislation, shall be submitted to the governor by December 31, 2002.

SECTION 4: The Task Force shall be composed of a maximum of twenty-nine (29) members selected as follows:

A. the governor, or the governor designee;
B. the secretary of the Department of Wildlife and Fisheries, or the secretary's designee;
C. the secretary of the Department of Natural Resources, or the secretary's designee;
D. the secretary of the Department of Environmental Quality, or the secretary's designee;
E. the commissioner of the Department of Agriculture and Forestry, or the commissioner's designee;
F. the president of the Louisiana Senate, or the president's designee;
G. the speaker of the House of Representatives, or the speaker's designee;
H. the district commander of the Eighth Coast Guard District, or the district commander's designee;
I. the district engineer of the United States Army Corps of Engineers, New Orleans District, or the district engineer's designee;
J. the district chief, United States Geological Survey, Water Resources Division, or the district chief's designee;
K. the region supervisor, United States Fish and Wildlife Service, Lafayette Office, or the region supervisor's designee;
L. the state plant pest director, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, or the state plant pest director's designee;
M. the chancellor of the Louisiana State University, College of Agriculture, or the chancellor's designee;
N. the chancellor of the University of New Orleans, or the chancellor's designee;
O. the director of the Center for Bioenvironmental Research, Xavier University, or the director's designee;
P. the director of the Center for Bioenvironmental Research, Tulane University, or the director's designee;
Q. the chancellor of the University of Louisiana at Lafayette, or the chancellor's designee;
R. the executive director of the Louisiana Wildlife Federation, or the executive director's designee;
S. the president of the Louisiana Farm Bureau Association, or the president's designee;
T. the president of the Louisiana Nursery and Landscape Association, or the president's designee;
U. the president of the Louisiana Marine and Motorcycle Trades Association, or the president's designee;
V. the executive director of Louisiana Sea Grant Program, or the executive director's designee;
W. the director of the Barataria-Terrebonne National Estuary Program, or the director's designee;
X. five (5) representatives of businesses and industries located in the state of Louisiana that may be adversely affected by the spread or existence of non-indigenous aquatic species; and
Y. one (1) member at-large.

SECTION 5: The chair of the Task Force shall be appointed by the governor from the membership of the Task Force.

SECTION 6: The Task Force shall meet at regularly scheduled intervals and at the call of the chair.

SECTION 7:

A. Task Force members shall not receive additional compensation or a per diem from the Office of the Governor for serving on the Task Force.
B. Task Force members who are an employee or an elected public official of the state of Louisiana or a political subdivision of the state of Louisiana may seek reimbursement of travel expenses, in accordance with PPM 49, from their employing and/or elected department, agency and/or office.

C. Task Force members who are also a member of the Louisiana Legislature may seek a per diem from the Louisiana Senate or House of Representatives, as appropriate, for their attendance at Task Force meetings and/or service on the Task Force.

SECTION 8: Support staff, facilities, and resources for the Task Force shall be provided by the Department of Wildlife and Fisheries.

SECTION 9: All departments, commissions, boards, agencies, and officers of the state, or any political subdivision thereof, are authorized and directed to cooperate with the Task Force in implementing the provisions of this Order.

SECTION 10: This Order is effective upon signature and shall continue in effect until amended, modified, terminated, or rescinded by the governor, or terminated by operation of law.

IN WITNESS WHEREOF, I have set my hand officially and caused to be affixed the Great Seal of Louisiana, at the Capitol, in the city of Baton Rouge, on this 4th day of June, 2002.

M.J. "Mike" Foster, Jr.
Governor

ATTEST BY
THE GOVERNOR
Fox McKeithen
Secretary of State
0205#001

12.E Appendix E. Louisiana Aquatic Invasive Species Council Act

ENROLLED

Regular Session, 2004

ACT NO. 185

SENATE BILL NO. 433
BY SENATOR THEUNISSEN AND REPRESENTATIVE PIERRE

AN ACT

To enact R.S. 36:610(J) and Subpart A-1 of Part VII of Chapter 1 of Title 56 of the Louisiana Revised Statutes of 1950, comprised of R.S. 56:360.1 through 360.3, relative to non-indigenous aquatic species; to create the Louisiana Aquatic Invasive Species Council and the Louisiana Aquatic Invasive Species Advisory Task Force; to provide for their powers, duties, functions, and responsibilities; and to provide for related matters.

Be it enacted by the Legislature of Louisiana:
Section 1. R.S. 36:610(J) is hereby enacted to read as follows:
§610. Transfer of agencies to Department of Wildlife and Fisheries

R.S. 36:610(J) is all new law.
J. The Louisiana Aquatic Invasive Species Council and the Louisiana Aquatic Invasive Species Advisory Task Force (R.S. 56:360.1 et seq.) are placed within the Department of Wildlife and Fisheries and shall exercise and perform their powers, duties, functions, and responsibilities in the manner provided for agencies transferred in accordance with Part III of Chapter 22 of this Title. 17

Section 2. Subpart A-1 of Part VII of Chapter 1 of Title 56 of the Louisiana Revised Statutes of 1950, comprised of R.S. 56:360.1 through 360.3, is hereby enacted to read as follows:

SUBPART A-1. AQUATIC INVASIVE SPECIES 21

Subpart A-1 is all new law.

§360.1. Louisiana Aquatic Invasive Species Council

R.S. 56:360.1 is all new law.

A. The Louisiana Aquatic Invasive Species Council is hereby created and shall be composed of the following members or their designees:
(1) The governor.
(2) The secretary of the Department of Wildlife and Fisheries.
(3) The secretary of the Department of Natural Resources.
(4) The secretary of the Department of Environmental Quality.
(5) The commissioner of agriculture.
(6) The secretary of the Department of Transportation and Development.
(7) The secretary of the Department of Health and Hospitals.
(8) The state superintendent of education.
(9) The secretary of the Department of Culture, Recreation and Tourism.

B. The council shall be chaired by the secretary of the Department of Wildlife and Fisheries or his designee. The council shall elect a vice chair who shall not be an employee of the Department of Wildlife and Fisheries. In addition, the council shall elect other officers as the council deems necessary. The Department of Wildlife and Fisheries shall provide staff necessary for the council.

C. The council shall meet at least once per quarter, but may meet more often as necessary. The members of the council shall not be compensated for their services but may seek travel reimbursements from their respective agencies under the guidelines for state employees provided by the division of administration. Meetings of the council shall be subject to laws regarding open meetings, R.S. 42:4.1 et seq., and records kept by the council shall be subject to laws regarding public records, R.S. 44:1 et seq.

§360.2. The Louisiana Aquatic Invasive Species Task Force 24

R.S. 56:360.2 is all new law. 25

A. In addition to the Louisiana Aquatic Invasive Species Council, there is hereby created the Louisiana Aquatic Invasive Species Task Force to serve in an advisory capacity to the council. The task force shall be composed of members or their designees as follows:

(1) The district commander of the Eighth Coast Guard District.
(2) The district engineer of the U.S. Army Corps of Engineers, New Orleans District.
(3) The district chief for the Water Resources Division of the U.S. Geological Survey, Louisiana district.
(4) The Region 4 director of the U.S. Fish and Wildlife Service, Atlanta office.
(5) The state plant health director for the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine.
(6) The chancellor of the Louisiana State University Agricultural Center.
(7) The chancellor of the University of New Orleans.
(8) The director of the Center for Bioenvironmental Research, Tulane University and Xavier University.
(9) The president of the University of Louisiana at Lafayette.
(10) The executive director of the Louisiana Wildlife Federation.
(11) The regional administrator of the National Park Service, U.S. Department of Interior.
(12) The president of the Louisiana Farm Bureau Association.
(13) The president of the Louisiana Marine and Motorcycle Trades Association.
(14) The executive director of the Louisiana Sea Grant Program.
(15) The director of the Barataria-Terrebonne National Estuary Program.
(16) The executive director of the Louisiana Landowners Association.
(17) The executive director of the Louisiana Nursery and Landscape Association.
(18) The executive director of the Louisiana Forestry Association.
(19) The president of the Ports Association of Louisiana.
(20) The executive director of the Gulf States Marine Fisheries Commission.
(21) The president of the Louisiana Chemical Association.
(22) The executive director of the Steamship Association of Louisiana.
(23) A representative of the electrical utility industry in Louisiana appointed by the Louisiana Electric Utilities Association.
(24) The president of Louisiana Mid-Continent Oil and Gas Association.
(25) The chairman of the Louisiana Aquaculture Advisory Task Force.
(26) The chief of the National Oceanographic and Atmospheric Administration Habitat Conservation Division Office in Louisiana.
(27) The state veterinarian employed by the Department of Agriculture and Forestry.
(28) The state entomologist appointed by the commissioner of the Department of Agriculture and Forestry.
(29) The executive director of the State Soil and Water Conservation Committee.
(30) The director of horticulture and quarantine programs for the Department of Agriculture and Forestry.
(31) An Oyster Task Force member appointed by the chairman of the Oyster Task Force.

B. The task force shall be chaired by the chair of the council and shall meet at the call of the chair. The members of the task force shall not be compensated for their services on the task force but may seek travel reimbursements from their respective agencies under the guidelines for state employees provided by the division of administration. Meetings of the task force shall be subject to laws regarding open meetings, R.S. 42:4.1 et seq., and records of the task force shall be subject to laws regarding public records, R.S. 44:1 et seq. 24

C. The chair of the council may appoint committees of the task force. The chair of the council shall appoint the chair of any committee and shall designate the functions and responsibilities of each committee appointed. The chair may appoint on an ad hoc basis committee members who are not members of either the council or the advisory task force.

§360.3. Powers, duties, functions, and responsibilities of the Louisiana Aquatic Invasive Species Council and Task Force

R.S. 56:360.3 is all new law.

A. The council, with the advice and assistance of the task force, shall do the following things:

(1) Coordinate the implementation of Louisiana Invasive Aquatic Species Management Plan, which was adopted by the Louisiana Non-Indigenous Aquatic Species Advisory Task Force created by Executive Order MJF 02-11.

(2) Coordinate and support through collaboration and full communication all efforts in the state, the region, and the nation, as appropriate, to control, prevent or eradicate invasive or potentially invasive aquatic species.

(3) Coordinate the implementation of the management plan's goals to prevent and control the introduction of new non-indigenous aquatic species into Louisiana; to control the spread and impact of existing invasive aquatic species; and to eradicate already established invasive aquatic species through the development of policies to achieve the following four objectives:

(a) Prevent and control the introduction or re-introduction of invasive or potentially invasive non-indigenous aquatic species through education about species and pathways of introduction, targeting the general public, schools, industries, government agencies, and other organizations.

(b) Eliminate established invasive aquatic species through monitoring, early detection, rapid response, and early eradication.

(c) Control the spread of established invasive aquatic species through cooperative management activities designed to minimize impact where eradication is impossible.

(d) Prevent the introduction of invasive or potentially invasive non-indigenous aquatic species or the spread of existing invasive or potentially invasive non-indigenous aquatic species.

(4) Identify all funding sources which may be available for use by the council or the task force to control, contain, eradicate, or prevent the introduction or spread of invasive or potentially invasive non-indigenous aquatic species in an effort to preserve and protect our native ecosystems and indigenous aquatic species.

(5) Submit to the legislature every two years a status report on the management plan and its implementation. Such report shall be submitted prior to the opening day of the regular session in even-numbered years and shall comply with the requirements of R.S. 24:772. Any changes to the plan shall be adopted and promulgated under the provisions of the Administrative Procedure Act and shall be subject to oversight by the House Committee on Natural Resources and the Senate Committee on Natural Resources.

B. The task force shall act in an advisory capacity to the council in the development of data and information relative to non-indigenous aquatic species and the implementation and revision of the management plan. The task force shall meet with the council at the call of the chair of the council. The task force shall seek the advice and consultation of tribal entities when appropriate.

Section 3. This Act shall become effective upon signature by the governor or, if not signed by the governor, upon expiration of the time for bills to become law without signature by the governor, as provided in Article III, Section 18 of the Constitution of Louisiana. If vetoed by the governor and

subsequently approved by the legislature, this Act shall become effective on the day following such approval.

_____
PRESIDENT OF THE SENATE

_____
SPEAKER OF THE HOUSE OF REPRESENTATIVES

_____
GOVERNOR OF THE STATE OF LOUISIANA

APPROVED: _____

12.F Appendix F. Summary of Federal Laws, Programs, and Regulations Relevant to Aquatic Invasive Species

12.F.1 Federal Laws

12.F.1.a Clean Water Act, 33 U.S.C. § 1251 *et seq.*

The Clean Water Act (CWA) protects the Nation's waters, including lakes, rivers, aquifers, and coastal areas.[1] The CWA includes a framework of standards and requires the development of technology and financial assistance to address the causes of pollution and poor water quality.[2] The CWA provides for a permitting process to protect wetlands and other aquatic habitats in order to ensure environmentally sound development.[3] The Environmental Protection Agency (EPA), the Department of Defense (DOD), and the U.S. Coast Guard share authority to manage incidental liquid discharges, including clean ballast water, from Armed Forces vessels through the Uniform National Discharge Standards.[4]

The CWA's permitting process may provide EPA with some authority to control and manage invasive species. EPA currently is reviewing its authority under the CWA with regard to invasive species.[5]

12.F.1.b Coastal Zone Management Act, 16 U.S.C. § 1451 *et seq.*

The Coastal Zone Management Act (CZMA) is another avenue by which invasive species can be controlled and managed. Under the CZMA, the Federal and State governments work together to "preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations."[6] Specifically, the Federal government is to encourage and assist the States to achieve "wise use" of land and water resources in the coastal zone.[7] Issues surrounding invasive species could be incorporated into States' Coastal Zone Management Plans through modification or amendment, subject to the approval by the Department of Commerce (DOC).[8] Section 1455a(b) allows the DOC to make grants to eligible coastal states to assist them in preserving or restoring specific areas, redevelopment of deteriorating and underutilized urban waterfronts and ports, access to public beaches, or development of a permit process to regulate aquaculture facilities in the coastal zone. The DOC also shall assist States in identifying and obtaining technical assistance and other financial assistance so they may carry out the objectives of the CZMA.[9]

The CZMA calls for coordination and cooperation between the DOC and other interested Federal agencies to the maximum extent practicable.[10] The agency also shall not approve any coastal zone management program submitted by any State pursuant to Section 1455 unless the views of Federal agencies "principally affected" by such program have been considered.[11]

Section 1461 establishes the National Estuarine Research Reserve System. Research in designated national estuarine reserves is to help identify and establish priorities of coastal management issues.[12] This program could sponsor monitoring and other research of invasive species.

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[1] *See* 33 U.S.C. § 1251(a).
[2] *See id*.
[3] *See id*. § 1342.
[4] *See id*. U.S.C. § 1322.
[5] *See* National Agricultural Library for the National Invasive Species Council, National Management Plan: Appendix 3 - Legal Authorities Related to Invasive Species. Retrieved 25 July 2003 from www.invasivespecies.gov/council/appendix3.shtml.
[6] *See* 16 U.S.C. § 1452(1).
[7] *See id.* § 1454(2).
[8] *See id.* §1455(e).
[9] *See id.* § 1455a(f).
[10] *See id.* § 1456(a).
[11] *See id.* § 1456(b).
[12] *See id.* § 1461(c).

12.F.1.c Cooperative Forestry Assistance, 41 U.S.C. § 2104

Under the Cooperative Forestry Assistance (CFA), the Department of Agriculture (USDA) is responsible for protecting the health of the National forests and on other lands in the United States. Protection of forests from invasive species is included in the CFA. The USDA may conduct surveys to "detect and appraise insect infestations and disease conditions ... and establish a monitoring system ... to determine detrimental changes or improvements that occur over time ...."[13] The USDA may also implement the biological, chemical, and mechanical measures necessary "to prevent, retard, control, or suppress incipient, potential, threatening, or emergency insect infestations and disease conditions affecting trees."[14] Furthermore, the USDA is required to provide technical information, advice, and related assistance on available techniques to maintain healthy forests.[15]

Included is the USDA's authority to appropriate funds to implement this policy to other Federal agencies to prevent, retard, control, or suppress insect infestations and diseases affecting trees on said lands.[16] Moreover, the USDA may contract or enter into a cooperative agreement to provide financial assistance to State forestry officials or the equivalent thereof and private forestry and other organizations to monitor forest health and to protect forest lands. Such State officials or private or other organizations shall make contributions in the amount and manner deemed appropriate by the USDA.[17]

However, the CFA only applies to insect infestations and disease conditions affecting trees. There is no authority in the CFA for invasive plant species.

12.F.1.d Endangered Species Act, 16 U.S.C. § 1531 *et seq.*

The U.S. Department of the Interior (DOI) is in charge of implementing The Endangered Species Act (ESA). The ESA relates to invasive species that pose a threat to local endangered species.[18] If invasive species threaten local endangered species, then the ESA could be used as a basis for control and eradication. However, the ESA does not contain specific language that directly relates to invasive species or language that mentions how the DOI could regulate particular pathways by which invasive species may become a threat to endangered species.

12.F.1.e Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. § 136 et seq.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) focuses on Federal control of pesticide distribution, sale, and use. The EPA studies the effects of pesticide use and requires users to register when purchasing certain pesticides. All pesticides used in the United States must be registered with EPA.[19] Registration ensures proper labeling and that if pesticides are used in accordance with specification, then they will not cause unreasonable adverse effects on the environment.[20]

If pesticides are used to control or reduce the impacts of invasive species, then FIFRA will apply. FIFRA also gives EPA review authority for biological control agents when they are used to control invasive pests.[21]

12.F.1.f Federal Noxious Weed Act, 7 U.S.C. § 2801 *et seq.*

The Federal Noxious Weed Act (FNWA) has been replaced by the Plant Protection Act, 7 U.S.C. § 7701 *et seq.,* except for Section 2814.

Section 2814 of the FNWA requires each Federal agency to manage "undesirable plants"[22] on Federal lands. They are to develop and coordinate a management program to control such plants

[13] 16 U.S.C. § 2104(b)(1).
[14] *Id.* § 2104(b)(2), (3).
[15] *See id.* § 2104 (b)(4).
[16] *See id.* § 2104(e).
[17] *See id.* § 2104(g).
[18] *See* 16 U.S.C. § 1533.
[19] *See* 7 U.S.C. § 136a for registration requirements and procedure and classification of pesticides.
[20] *See id*.
[21] *See id*.

on said land and to enter into cooperative agreements with State agencies to implements their management plans. However, a Federal agency is not required to carry out a management plan on Federal lands unless similar programs are being implemented on State or private lands in the same area.

12.F.1.g Federal Seed Act, 7 U.S.C. § 1551 et seq.

The Federal Seed Act (FSA) regulates interstate and foreign commerce in seeds, requires labeling to prevent misrepresentation of seeds in interstate commerce; and requires certain standards with respect to certain imported seeds. The FSA may offer protection against invasive species entering the States because it requires labeling of seeds entering interstate commerce and requires standards for certain imported seeds.

It unlawful for a person to transport or deliver for transportation in interstate commerce any agricultural seeds or mixture thereof unless each container bears a label that includes information in accordance with regulations and prescribed by law under Section 402 of the FSA.[23] One piece of required information on a label is the origin of each agricultural seed, which has been designated by the USDA as one on which knowledge of the origin is important from the standpoint of crop production.[24] This section specifically includes noxious weed seeds in its labeling requirement.

The FSA requires all persons transporting, delivering for transportation, in interstate commerce, agricultural seeds shall keep for three (3) years a complete record of origin, treatment, germination, and purity of each lot of such agricultural seeds. This requirement also applies to all persons transporting or delivering for transportation, in interstate commerce, vegetable seeds.[25]

The FSA lists exemptions to the labeling and recording requirements. The provisions of Sections 201 and 202 do not apply to any carrier in respect to any seed transported or delivered for transportation in the ordinary course of its business as a carrier, provided that such carrier is not engaged in processing or merchandising seed subject to the provisions of this Act.[26] Such provisions also do not apply to seeds produced by any farmer on his own premises and sold by him directly to the consumer, provided that such farmer is not engaged in the business of selling seeds not produced by him.[27] However, such seeds produced or sold when transported or offered for transportation to any State, Territory, or District, shall not be exempted from Sections 201 and 202 unless the seeds are in compliance with the operation and effect of the laws of such State, Territory, or District, which are enacted in the exercise of its police power.[28]

The FSA prohibits the dissemination of any false advertisement concerning seed, by the United State mail or in interstate and foreign commerce, in any manner or by any means, including radio broadcasts.[29]

Finally, the FSA prohibits the importation into the United States of any agricultural or vegetable seeds if any such seeds contain noxious weed seeds or the labeling of which is false or misleading in any respect.[30]

12.F.1.h Fish and Wildlife Coordination Act, 16 U.S.C. § 661 et seq.

One of the purposes of the Fish and Wildlife Coordination Act (FWCA) is to give wildlife conservation equal consideration and coordination with other features of water resource development programs "through the effectual and harmonious planning, development,

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[22] "Undesirable plant species" means "plant species that are classified as undesirable, noxious, harmful, exotic, injurious, or poisonous, pursuant to State or Federal law." 7 U.S.C. § 2814(e)(7).
[23] *See* 7 U.S.C. § 201.
[24] *See id*.
[25] *See id*. § 202.
[26] *See id*. § 203.
[27] *See id*.
[28] *See id*.
[29] *See id*. § 205.
[30] *See id*. § 301.

maintenance, and coordination of wildlife conservation and rehabilitation ..."[31] The FWCA requires the DOI to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations to control, manage, and protect wildlife resources.[32]

The FWCA encourages consultation between agencies. If an impoundment, diversion, or deeper channeling of the waters of any stream or other water body by any Department or agency of the United States or by any public or private agency under Federal permit or license is necessary, then that Department or agency first shall consult with the Fish and Wildlife Service, DOI, and the head of the agency exercising administration over the wildlife resources that may be affected by the action.[33] Furthermore, the DOI shall make reports and recommendations on the wildlife aspects of such projects.[34] Such goals and cooperation between Departments and agencies could encompass control and management of invasive species through research and recommendations.

Projects to control and manage invasive species also may be funded through grants and cooperative agreements.[35]

12.F.1.i Hawaii Tropical Forest Recovery Act, 16 U.S.C. § 4502a et. seq

The Hawaii Tropical Forest Recovery Act (HTFRA), enacted in 1992, largely amended the International Forestry Cooperation Act. (See below.) The HTFRA authorizes the USDA's Forest Service to protect indigenous plants and animals from invasions, establish biological control agents for invasive species that threaten natural ecosystems, establish monitoring systems to identify baseline conditions and determine detrimental changes or improvements over time, provide assistance to States with tropical forests.[36]

12.F.1.j International Forestry Cooperation Act, 16 U.S.C. § 4501 et. seq

The main focus of the International Forestry Cooperation Act (IFCA) is to provide assistance to foreign countries that promotes sustainable development and global environmental stability for the world's forests.[37] The IFCA concentrates on key nations which "could have a substantial impact on emissions of greenhouse gases related to global warming."[38] Under the IFCA the Secretary of the USDA provide assistance in the form of grants, contracts, or cooperative agreements to prevent and control invasions from nonindigenous animals, plants, and pathogens in tropical forests.[39]

Under the authority of the IFCA, the USDA's Forest Service, as part of its Forest Research and Development Program, conducts research and development for management and protection of vegetation, fish, and wildlife and delivers research and development products in water and air sciences, resource valuation and use, and inventory and monitoring.[40] This program addresses all aspects of the USDA's invasive species activities, including prevention, control, rapid response, management, and restoration of areas affected by invasive species.[41]

12.F.1.k National Forest Management Act, 16 U.S.C. § 1604

Congress has required that the USDA develop and maintain forests plans for each administrative unit of the National Forest System.[42] However, site-specific management decisions must be consistent with the relevant forest plan for that site, or the plan itself must be amended to permit the activity.[43] Moreover, each plan must be consistent with the National Environmental Policy Act, the

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[31] 16 U.S.C. § 661.
[32] *See id*. § 661(1).
[33] *See id*. § 662(a).
[34] *See id*. § 662(b).
[35] *See id*. § 663. *See also* §§ 661 and 662.
[36] *See* 16 U.S.C. § 4501a.
[37] *See* 16 U.S.C. § 4501(b).
[38] *Id*. § 4501(a).
[39] *See id*. § 4502a(b).
[40] USDA Forest Service, Research and Development. Retrieved 26 February 2003 from http://www.fs.fed.us/research.
[41] *See id*.
[42] *See* 16 U.S.C. § 1604(f).
[43] *See id*. § 1604(i).

Multiple-Use and Sustained-Yield Act, and other Federal environmental laws.[44] Since forest management is specific to each area, management may relate to invasive species as it becomes an issue in particular forest areas.

12.F.1.l Lacey Act, 18 U.S.C. § 42 *et seq.* and the "Other" Lacey Act, 16 U.S.C. § 3371 *et seq.*

There are two separate Lacey Acts. The Lacey Act, 8 U.S.C. § 42, is a law administered by the U.S. Fish and Wildlife Service that prohibits the importation of into the U.S. or any of its territories certain categories of animal species. The "other" Lacey Act, 16 U.S.C. § 3371 *et seq.*, is a separate provision administered by the DOI, DOC, and USDA. The "other" Lacey Act generally makes it unlawful to import, export, sell, receive, acquire, purchase (or attempt to commit any such act) certain animals and plants in violation of Federal, State, Tribal, or foreign law. Each has common purposes and restrictions, as well as limitations on how they may be utilized to control and manage invasive species.

18 U.S.C. § 42(a)(1) of the Lacey Act prohibits importation of animal species that the Secretary of the Interior has prescribed by regulation as "injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States." However, the Secretary may allow the importation for zoological, educational, medical, and scientific purposes, where such importation would otherwise be prohibited by this Act.[45] Also, the Act does not restrict importation by Federal agencies for their own use.[46]

It is important to note that Section 42 contains restrictions that limit DOI's ability to fully address the control and management of invasive species. First, Section 42 is limited to specific animals. It applies only to those animal species specified in the Act plus mammals, fish, birds, reptiles, amphibians, mollusks, and crustaceans. In addition, the Lacey Act seems to exclude domesticated birds and mammals because only "wild"[47] birds and mammals are specified in the Act. Finally, the Act excludes from regulation under the Lacey Act species already regulated under the Plant Pest Act. The Act specifically states that § 42 does not authorize "any action with respect to the importation of any plant pest as defined by the FPPA, insofar as such importation is subject to regulation under that Act."[48]

16 U.S.C. § 3372(a)(1) (i.e., the "other" Lacey Act) prohibits the import, export, sale, receipt, acquirement, or purchase of any wildlife, fish, or plant "taken, possessed, transported, or sold in violation of any law, treaty, or regulation of the United States or in violation of any Indian tribal law." This section also prohibits the import, export, or transport in interstate commerce any container or package containing any fish or wildlife unless it has been previously marked, labeled, or tagged in accordance with regulations issued pursuant to the "other" Lacey Act (OLA).

Sale or purchase of fish or wildlife for the illegal taking, acquiring, receiving, transport, or possession of fish or wildlife is prohibited by the OLA.[49] It is also unlawful for a person to make or submit a false record, account, label for, or any false identification of any fish, wildlife, or plant which has been, or is intended to be, imported, exported, sold, purchased, or received from any foreign country; or transported in interstate or foreign commerce.[50]

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[44] *See id*. § 1604(e), (g)(1).
[45] *See id*. § 42(3).
[46] *See id*.
[47] According to 16 U.S.C. § 42(a)(1), "wild" refers to "any creatures that, whether or not raised in captivity, normally are found in a wild state."
[48] *See id*. § 42(a)(1).
[49] "Sale" of fish or wildlife in violation of this Act means a person for money or other consideration who offers or provides guiding, outfitting, or other services or a hunting or fishing license or permit. 16 U.S.C. § 3372(c)(1)(A)-(B). "Purchase" of fish or wildlife in violation of this Act means a person who obtains for money or other consideration guiding, outfitting, or other services or a hunting or fishing license or permit. 16 U.S.C. § 3372(c)(2)(A)-(B).
[50] 16 U.S.C. § 3372(d)(1)-(2).

All fish, wildlife, or plants imported, exported, transported, sold, received, acquired, or purchased in violation of the OLA or any regulation thereto shall be subject to forfeiture to the United State as well as any civil or criminal penalties that may be assessed.[51] In addition, all vessels, vehicles, aircraft, or other equipment used to aid in the violation shall be subject to forfeiture to the United States if the facts meet certain criteria. If the owner at the time of the alleged violation was a consenting party or privy thereto or in the exercise of due care should have known his property would be used in a criminal violation of the OLA, and the violation involved the sale or purchase of or the offer or intent to sell or purchase fish, wildlife, or plants, then his property shall be subject to forfeiture.[52]

The OLA has restrictions similar to those in 18 U.S.C. § 42. The definition of "fish or wildlife" is also limited to wild animals, though it is broader than the one in Section 42.[53] What the OLA includes that Section 42 does not include is plant species. However, the definition of "plant" is limited to "any wild member of the plant kingdom, including roots, seeds, and other parts thereof (but excluding common food crops and cultivars), which is indigenous to any State and which is either listed on an appendix to the Convention on International Trade in Endangered Species of Wild Flora and Fauna or listed pursuant to any State law that provides for the conservation of species threatened with extinction."[54] This means that any plant that falls outside of this definition is not covered, and some plant species that are not covered may be invasive plant species in Louisiana that need to be controlled and managed.

There are exceptions to prohibitions under the OLA. For instance, the prohibitions of the OLA do not apply to activities regulated by plan under the Magnuson-Stevenson Fishery Management and Conservation Act. Second, the provisions of paragraph 1 of subsection 3(a) of the OLA do not apply to any activity regulated by a fishery management plan in effect under the Magnuson-Stevenson Fishery Management and Conservation Act. Also, the OLA does not prevent the States or Indian tribes from making or enforcing laws or regulations as long as they are consistent with the OLA.[55]

12.F.1.m Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 *et seq.*

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson Act) may apply to invasive species and their pathways through Section 1855(b). The Essential Fish Habitat (EFH) provisions allow for review of Federal and/or other actions that could affect EFH with authority to make recommendations for conservation of EFH.

Specifically, the DOC, in consultation with participants in the fishery, shall provide each Fishery Management Council with recommendations and information regarding each fishery under that Council's authority.[56] The purpose is to assist the Councils in identification of essential fish habitat, the adverse impacts on that habitat, and the actions that should be considered to ensure the conservation and enhancement of that habitat.[57] Also, the DOC shall review programs it administers and ensure that any relevant programs further the conservation and enhancement of essential fish habitat.[58] Finally, the DOC shall coordinate with and provide information to other Federal agencies to further the conservation and enhancement of essential fish habitat.[59]

In a similar regard, each Federal agency shall consult with the DOC with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such

[51] *See* 16 U.S.C. § 3374(1).
[52] 16 U.S.C. § 3374(a)(2)
[53] The definition of "fish and wildlife" in 16 U.S.C. § 3371(a) includes "any wild animal, whether alive or dead, including without limitation any wild mammal, bird, reptile, amphibian, fish, mollusk other invertebrate."
[54] 16 U.S.C. § 3371(f).
[55] 16 U.S.C. § 3378(a)
[56] *See* 16 U.S.C. § 1855(b)(1)(B).
[57] *See id*.
[58] *See* 16 U.S.C. § 1855(b)(1)(C).
[59] *See* 16 U.S.C. § 1855(b)(1)(D).

agency that may adversely affect any EFH identified under this Act.[60]

Each Council may comment on and make recommendations to the DOC and any Federal or State agency concerning any activity authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by any Federal or State agency that may affect habitat, including EFH, of a fishery resource under its authority.[61] The Council shall comment on and make recommendations to the DOC and any other Federal or State agency concerning activity that, in the view of the Council, is likely to substantially affect the habitat, including EFH, of an anadromous fishery resource under its authority.[62]

12.F.1.n Multiple-Use Sustained-Yield Act, 16 U.S.C. § 528 et seq.

The policy behind the Multiple-Use Sustained-Yield Act (MUSY) is that the "national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes."[63] The MUSY authorizes the USDA to develop and administer renewable surface resources of the national forests and to cooperate with interested State and local government agencies and others in the development and management of national forests.[64]

Therefore, the MUSY may be a possible source of authority if invasive species threaten threatens the vitality of national forests and their ability to produce a sustained yield of products and services under the principles of multiple use.[65]

12.F.1.o National Environmental Policy Act, 42 U.S.C. § 4321 et seq.

The National Environmental Policy Act (NEPA) applies to all departments and agencies. The purposes of NEPA that are relevant here are: to declare a national policy that will encourage productive and enjoyable harmony between man and his environment; to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and to enrich the understanding of the ecological systems and natural resources important to the nation.[66] NEPA calls for cooperation between agencies to share information and coordinate efforts in order to administer NEPA to the fullest extent possible.[67] If invasive species pose a threat to the environment through intentional introductions related to major Federal actions, then NEPA requires the Federal government agencies to consider the effects of their actions by preparing Environmental Impact Statements (EIS).[68] That is, the effects of invasive species, if they would be harmful to the environment, must be included in the EIS. However, the Animal and Plant Heath Inspection Service (APHIS) may approve and issue permits for importing invasive species after the preparation of an Environmental Assessment (EA).[69] Permits for importing invasive

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[60] *See* 16 U.S.C. § 1855(b)(2).
[61] 16 U.S.C. § 1855(b)(3)(A).
[62] *See* 16 U.S.C. § 1855(b)(3)(B).
[63] 16 U.S.C. § 528.
[64] *See id*. § 529.
[65] *Id*. "Multiple use" means the management of all the various renewable surface resources of the national forests so that they are used in the combination that best meets the needs of the American people. *See id*. § 531(a). "Sustained yield" means the achievement and maintenance "in perpetuity" (i.e., forever) of a high level annual or regular periodic output of resources without impairment of the productivity of the lands of the national forests. *See id*. § 531(b).
[66] 42 U.S..C. § 4321
[67] 42 U.S.C. § 4332
[68] An EIS is a document that describes the effects on the environment as a result of a proposed Federal action. *See* 40 C.F.R. § 1508.11. It also describes impacts of alternatives as well as plans to mitigate impacts. "Environment" means "the natural and physical environment, and the relationship of people with that environment." 40 C.F.R. § 1508.14. The "environment" considered in an EIS includes land, water, air, structures, living organisms, environmental values at the site, and the social, cultural, and economic aspects. *See id*. "Effect" means a change in consequence that results from an activity. 40 C.F.R. § 1508.8. Impacts can be positive, negative, or both. *See id.* An EIS describes impacts, as well as ways to mitigate impacts. "Mitigate" means "to lessen or remove negative impacts." 40 C.F.R. § 1508.20.
[69] An EA is a concise public document, for which a Federal agency is responsible, that briefly provides sufficient evidence and analysis for determining whether there is a need to prepare an EIS or a Finding of No Significant Impact. It also aids in an agency's compliance with the Act when no EIS is necessary and facilitates preparation of a statement when one is necessary. An EA shall include brief discussions of the need for the proposal, of alternatives as required by 42 U.S.C. § 4332 (2)(E), of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted. *See* 40 C.F.R. § 1508.9.

species into containment facilities or interstate movement between containment facilities are excluded from NEPA regulations.

12.F.1.p National Invasive Species Act, 16 U.S.C. § 4701 *et seq.*

The National Invasive Species Act (NISA) reauthorized and amended the Non-Indigenous Aquatic Nuisance Prevention and Control Act (NANPCA). The focus of NISA is on the spread of aquatic nuisance species through ballast water releases. NISA created a national Task Force co-chaired by the Director of the U.S. Fish and Wildlife Service and the Undersecretary of Commerce for Oceans and Atmosphere.[70] This Task Force was charged with developing and implementing a program to prevent the unintentional introduction and dispersal of aquatic nuisance species[71] through ballast water management.[72]

NISA requires the development of voluntary national guidelines to prevent the introduction and spread of nonindigenous species into U.S. waters via ballast water of commercial vessels.[73] The guidelines apply to vessels equipped with ballast water tanks and directs vessels that enter U.S. waters after operating beyond the EEZ to undertake ballast exchange in the seas.[74] The Secretary[75] is also required to establish record keeping and reporting procedures and sampling techniques, based on the best available science, to monitor compliance.[76] However, a vessel is not required to conduct ballast water exchange if the exchange would threaten the safety or stability of the vessel, its crew, or its passengers.[77]

Furthermore, the Secretary and Task Force are required to conduct ecological and ballast discharge studies and surveys in waters highly susceptible to invasion or requiring further study.[78] The purpose of conducting these surveys is to examine invasions and the effectiveness of ballast management and its guidelines.[79]

States, through their respective Governors, may submit their own comprehensive management plans to the Task Force for approval.[80] These management plans identify areas or activities within each State or the surrounding region, except for those related to public facilities, for technical, enforcement, or financial assistance (or any combination thereof) to reduce or eliminate the risks associated with aquatic nuisance species.[81]

NISA promotes research on species that fall under the definition "aquatic nuisance species" through competitive research grants, educational programs, and technical assistance to State and local governments and persons.[82] Such research may include the environmental and economic risks associated with the introduction of such species, the pathways by which such species are introduced and dispersed, possible methods for prevention, monitoring, and control, and assessment of the effectiveness of such methods.[83]

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[70] *See* 16 U.S.C. § 4721(a).
[71] Under NISA, "aquatic nuisance species" means "a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters." *Id*. § 4702(1). "Nonindigenous species" means "any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country to another." *Id*. § 4702(11).
[72] *See id*. § 4722(a).
[73] *See id*. § 4711.
[74] *See id*.
[75] Under the NISA, "Secretary" means the Secretary of the Department in which the U.S. Coast Guard is operating. *See* 16 U.S.C. § 4702(12).
[76] 16 U.S.C. § 4711(2)(F)(i), (G), and (I).
[77] *See id*. § 4711(c)(2).
[78] 16 U.S.C. § 4712(a).
[79] *See id*.
[80] *See id*. § 4724.
[81] *See id*.
[82] *See id*. § 4722(f).
[83] *See id*.

12.F.1.q National Marine Sanctuary Act, 16 U.S.C. § 1431 et seq.

The National Marine Sanctuary Act (NMSA) established the National Marine Sanctuary System, the purpose of which is to "improve the conservation, understanding, management, and wise and sustainable use of marine resources; enhance public awareness, understanding, and appreciation of the marine environment; and maintain for future generations the habitat and ecological services of the natural assemblage of living resources that inhabit these areas."[84]

Some of the major goals of the NMSA include research, monitoring, and education.[85] The DOC is to coordinate and promote the use of sanctuaries for such purposes. In addition, the DOC may issue special use permits for specific activities, if necessary, to "establish conditions of access and use of any sanctuary resources or to promote public use and understanding of a sanctuary resource."[86] The DOC may enter into cooperative agreements, contracts, or other agreements with States, local governments, regional agencies, interstate agencies, or other persons in order to carry out the purposes and policies of the NMSA.[87]

Grant and contract funds are available for research, monitoring, and education for conservation and management purposes.[88] Such purposes could include control and management of any invasive species that is or may be in the future in a particular Sanctuary.

Under the NMSA, it is unlawful for any person to "destroy, cause the loss, or injure any sanctuary resource managed under law or regulations for the sanctuary."[89] Therefore, regulations for particular Sanctuaries could prohibit the introduction of invasive species into the Sanctuaries. For example, the Florida Keys National Marine Sanctuary's management plan explicitly prohibits the introduction of invasive species into the Sanctuary.[90]

12.F.1.r Plant Protection Act, 7 U.S.C. § 7701 *et seq.*

The underlying policy of the Plant Protection Act (PPA) is to prevent the introduction or dissemination of plant pests[91] into the United States.[92] With certain exceptions, no person is authorized to import, enter, export, or move in interstate commerce any plant pest, unless such importation, entry, exportation, or movement is authorized under a general or specific permit and is in accordance with USDA regulations.[93]

As previously noted, there are exceptions to the rule. The USDA may allow the importation, entry, exportation, or movement in interstate commerce of specified plant pests without further restriction if the USDA finds that a permit is not necessary.[94] Any person may petition the USDA to add or remove a plant pest from the regulations.[95]

The PPA prohibits unauthorized mailing of plant pests.[96] "Any letter, parcel, box, or other package containing any plant pest, whether sealed as letter-rate postal matter or not, is not mailable and shall not be knowingly conveyed in the mail or delivered from any post office or by any mail carrier unless it is mailed in compliance with regulations to prevent the dissemination of plant pests into the

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[84] 16 U.S.C. § 1431(a)(4).
[85] *See id*. § 1440.
[86] *See id.* § 1441(a).
[87] *See id*. § 1442(a).
[88] *See id*. § 1440(b)(1).
[89] *Id*. § 1436(1).
[90] *See* National Agricultural Library for the National Invasive Species Council, National Management Plan: Appendix 3 - Legal Authorities Related to Invasive Species. Retrieved 25 July 2003 from http://www.invasivespecies.gov/council/appendix3.shtml.
[91] *See* 7 U.S.C. § 403(14) for a definition of "plant pest."
[92] *See id*. § 411(a).
[93] *See id*.
[94] *See id*. § 411(c).
[95] *See id*.
[96] *See id*. § 411(d).

United States or interstate."[97] Moreover, no person is authorized to open any mailed letter or other mailed sealed matter except in accordance with the postal laws and regulations.[98]

The movement of plants, plant products, biological control organisms, noxious weeds, articles, and means of conveyance are also regulated.[99] The USDA may prohibit or restrict the importation, entry, exportation, or movement of the aforementioned in interstate commerce if it determines that prohibition or restriction is necessary to prevent the introduction into the United States or the dissemination of a plant pest or noxious weed within the United States.[100] The USDA may publish, by regulation, a list of noxious weeds that are prohibited or restricted in interstate commerce.[101] Likewise, the USDA may publish, by regulation, a list of organisms that are not prohibited or restricted in interstate commerce.[102] However, lists may take into account distinctions between organisms such as "indigenous," "invasive," "newly introduced," or "commercially raised."[103]

The PPA includes notification and holding requirements upon arrival. The Department of the Treasury (the Treasury) is required to promptly notify the USDA of the arrival of any plant, plant product, biological control organism, plant pest, or noxious weed at a port of entry.[104] Then the Treasury is required to hold the plant, plant product, biological control organism, plant pest, or noxious weed until it has been inspected and authorized for entry into or transit movement through the United States or is otherwise released by the USDA.[105] However, these requirements do not apply to any plant, plant product, biological control organism, plant pest, or noxious weed that is imported from a country or region of a country designated as exempt by the USDA.[106]

Parties who are responsible for any such plants, biological organisms or means of conveyance have certain duties under the PPA. Parties are required to have a permit under Sections 411 or 412 and shall notify the USDA "as soon as possible" after the arrival of the plant, biological organism, or the means of conveyance at the port of entry and before it is moved from the port of entry.[107] No person is to move from a port of entry or interstate any plant, biological organism, or means of conveyance unless it is inspected and authorized for entry into or transit movement through the United States or otherwise released by the USDA.[108]

The PPA authorizes the USDA to hold, treat, or destroy items if necessary to prevent dissemination of a plant pest or noxious weed that is "new or not known to be widely prevalent or distributed within and throughout the United States."[109] Likewise, the USDA may order the owner of any plant, biological organism, or means of conveyance subject to action under Section 414(a), or the owner's agent, to treat, apply other remedial measures to, destroy, or otherwise dispose of it without cost to the Federal government.[110]

The PPA encourages cooperation between the USDA and other Federal agencies or entities, States or political subdivisions of States, national governments, local governments of other nations, domestic or international organizations, domestic or international associations, and other persons to carry out this law.[111]

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[97] *Id*.
[98] *See id*.
[99] *See id*. § 412.
[100] *See id*.
[101] *See id*. §12(f)(1).
[102] *See id*.
[103] *See id*. § 412(g).
[104] *See id*. § 413.
[105] *See id*.
[106] *See id*.
[107] *See id*. § 413(b).
[108] *See id*.
[109] *Id*. § 414(a).
[110] *See id*.
[111] *See id*. § 431.

12.F.1.s Virus-Serum-Toxin Act, 21 U.S.C. § 151 et seq.

Persons, firms, and corporations are not authorized to deal in any worthless, contaminated, dangerous, or harmful biological product[112] for use in the treatment of domestic animals unless prepared under and in compliance with regulations prescribed by the USDA at an establishment licensed by the USDA.[113] Also, USDA regulates the importation and exportation of any biological product for use in the treatment of domestic animals without a permit from the USDA or, in the case of an article originating from Canada, a permit or certification by Canada.[114]

12.F.2 Federal Programs

12.F.2.a Conservation Technical Assistance

The USDA Natural Resources Conservation Service (NRCS) administers Conservation Technical Assistance (CTA). CTA is a voluntary program for landowners, communities, State and local governments, and other Federal agencies for assistance in "planning and implementing natural resource solutions to reduce soil erosion, improve soil and water quantity and quality, improve and conserve wetlands, enhance fish and wildlife habitat ... and improve woodlands."[115] The CTA program also provides assistance for implementation of programs authorized by the 1996 Farm Bill, such as Highly Erodible Land and wetlands conservation provisions.[116] The CTA program can be utilized for management of invasive species. The NRCS can provide technical assistance in preventing invasions and controlling, managing, and eradication of invasive species. (For more information on this program, visit http://www.nrcs.usda.gov/programs/cta/index.html.)

12.F.2.b Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP), administered by the NRCS, was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill 2002). Both governmental organizations and private landowners that engage in agricultural and livestock production to control and manage invasive species can utilize the EQIP.[117] Participation in the EQIP is voluntary.[118] EQIP activities are implemented according the operation plans developed by both the government and producer.[119] The program provides financial assistance, through incentive payments and cost-shares, to protect against threats to soil, water, and other natural resources.[120] Specifically, the EQIP can provide technical assistance for preventing invasions and the use of cropping systems that discourage the introduction and spread of invasive species.[121] The program also can provide technical, educational, and financial assistance to eradicate/control invasive species and to manage lands to prevent future invasions.[122] Finally, the NRCS also can provide assistance for planning and installation measures, such as structural and land management practices, to protect land from future invasions after eradication.[123] (For more information on this program, visit http://www.nrcs.usda.gov/programs/eqip/.)

12.F.2.c Plant Materials Program

The Plant Materials Program, administered by the NRCS, provides plant recommendations and technology for the Farm Bill 2002 programs, such as EQIP, Wetlands Reserve Program, and the Wildlife Habitat Incentives Program. Plant Materials Centers assemble, test, and release plant species for commercial production and use of plant materials for natural resource conservation and

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[112] The term "biological product" includes, but is not limited to, "vaccines, bacterins, allergens, antibodies, antitoxins, toxoids, immunostimulants, certain cytokines, antigenic or immunizing components of live organisms, and diagnostic components, that are of natural or synthetic origin or that are derived from synthesizing or altering various substances or components of substances ..." 9 C.F.R. § 101.2.
[113] *See* 21 U.S.C. § 151.
[114] *See id*. § 152.
[115] 7 C.F.R. § 601.1(f)(1)(i).
[116] *See id*.
[117] *See* 7 C.F.R. § 1466.4(d).
[118] *See id*. § 1466.4(a).
[119] *See id*. *See also* 7 C.F.R. § 1466.6(a).
[120] *See id*.
[121] *See id*. § 1466.8(a).
[122] *See id*. § 1466.1.
[123] *See id*.

development, including but not limited to soil erosion on all lands, protection of upstream watersheds, and improvement of wildlife food and cover.[124] Plant Materials Centers work in cooperation with other agencies in the USDA and with other Federal and State research agencies to achieve these goals.[125] Plant materials are produced in the quantity required to do a specific conservation job that will serve the public and only if the plant materials are not commercially available.[126] Currently, there are 23 Plant Materials Centers in the United States, not including the National Plant Materials Center in Beltsville, Maryland.[127] (For more information on this program, visit http://plant-materials.nrcs.usda.gov/.)

12.F.2.d Wetlands Reserve Program

Farm Bill 2002 reauthorized the Wetlands Reserve Program (WRP), which is a voluntary program administered by the NRCS. The purpose of the WRP is to "offer landowners the opportunity to protect, restore, and enhance wetlands on their property" in the long term.[128] The WRP provides financial, technical, and educational assistance to landowners through a Wetlands Reserve Plan of Operations in order to maintain healthy wetlands and to manage the hydrological conditions of the soil, native vegetation, and natural topography of eligible lands.[129] The USDA may provide cost-share assistance to landowners, as well as assistance with planning and installing features to restore wetland habitat, which could include wetlands altered by invasive species.[130] (For more information on this program, visit http://www.nrcs.usda.gov/programs/wrp/.)

12.F.2.e Wildlife Habitat Incentives Program

Farm Bill 2002 reauthorized the Wildlife Habitat Incentives Program (WHIP), a voluntary program administered by the NRCS. The purpose of WHIP is to "help participants develop habitat for upland wildlife, wetland wildlife, threatened and endangered species, fish, and other types of wildlife."[131] Protection of wildlife would include protections against the threats to wildlife posed by invasive species, as well as the lands that they inhabit. WHIP provides financial and technical assistance to landowners who develop wildlife habitat through a Wildlife Habitat Development Plan (WHDP).[132] Financial assistance is through cost-share payments and agreements.[133] Technical assistance includes application, assessment, monitoring, enforcement, and other actions necessary to fulfill the goals of the WHIP and the WHDP.[134] (For more information on this program, visit http://www.nrcs.usda.gov/programs/whip/.)

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[124] *See* 7 C.F.R. §§ 613.1, 613.2.
[125] *See id*. § 613.2.
[126] *See id*. § 613.4.
[127] *See id*. § 613.5.
[128] *See* The USDA Natural Resources Conservation Service, Wetlands Reserve Program. Retrieved 28 February 2003 from www.nrcs.usda.gov/programs/wrp/.
[129] *See* 7 C.F.R. § 1467.4(a).
[130] *See id*.
[131] 7 C.F.R. § 636.1(a).
[132] *See id*. § 636.7
[133] *See id*. §§ 636.8, 636.10.
[134] *See id*. § 636.4.

12.F.3 Citations to the Code of Federal Regulations

Clean Water Act
- 7 CFR § 601
- 9 CFR § 590
- 40 CFR § 6, 25, 35, 122, 123, 130, 401

Coastal Zone Management Act
- 49 CFR § 1105

Cooperative Forestry Assistance Act
- 36 CFR § 200, 230

Endangered Species Act
- 7 CFR § 319, 355, 356, 371, 650
- 15 CFR § 904, 922
- 19 CFR § 12, 10
- 21 CFR § 25
- 30 CFR § 773
- 32 CFR § 190
- 36 CFR § 2, 13
- 43 CFR § 414, 8340
- 49 CFR § 1105
- 50 CFR § 10, 14, 17, 23, 81, 222, 402, 424, 453

Federal Agricultural Improvement and Reform Act
- 7 CFR § 12, 1794

Federal Insecticide, Fungicide, and Rodenticide Act
- 7 CFR § 110, 301, 319, 760
- 9 CFR § 71, 85, 121
- 14 CFR § 137
- 19 CFR § 12
- 21 CFR § 211
- 40 CFR § 2, 17, 22, 23, 35, 40, 129, 152, 154, 158, 159, 160, 163, 164, 166, 167, 170-173

Federal Noxious Weed Act
- 7 CFR § 340, 371
- 50 CFR § 24

Federal Plant Pest Act
- 7 CFR § 351
- 50 CFR § 24

Federal Seed Act
- 7 CFR § 97, 201, 371

Fish and Wildlife Coordination Act
- 30 CFR § 773, 736
- 40 CFR § 122
- 43 CFR § 8, 24
- 50 CFR § 10005

Food Security Act
- 7 CFR § 400, 614, 1940
- 9 CFR § 205
- 46 CFR § 381
- 9 CFR § 205
- 46 CFR § 381

The Lacey Act
- 50 CFR § 10, 11, 12, 13, 14, 16

The Lacey Act Amendments of 1981
- 7 CFR § 356, 371
- 15 CFR § 904
- 50 CFR § 10, 11, 12, 14, 300

Magnuson-Stevens Fishery Management and Conservation Act
- 15 CFR § 904, 905
- 50 CFR § 229, 300, 600, 622, 640, 648

Multiple-Use Sustained-Yield Act
- 36 CFR § 200, 219

National Environmental Policy Act
- 7 CFR § 372, 520, 622, 624, 632, 650, 799, 1710, 1780, 1794, 3407
- 10 CFR § 51, 1021
- 12 CFR § 408, 1815
- 14 CFR § 1216
- 16 CFR § 1, 1021
- 18 CFR § 2, 380, 707, 725
- 21 CFR § 25
- 22 CFR § 161
- 23 CFR § 751, 771
- 24 CFR § 50
- 28 CFR § 61
- 29 CFR § 11
- 32 CFR § 775
- 33 CFR § 230
- 36 CFR § 805, 907, 1010
- 38 CFR § 26
- 39 CFR § 775
- 40 CFR § 6, 1500, 1501- 1508, 1515
- 43 CFR §1601, 1610, 3160, 3400, 3430
- 44 CFR § 9, 10
- 46 CFR § 504
- 49 CFR § 80, 260, 520, 622, 1105
- 50 CFR § 402, 530

National Forest Management Act
- 36 CFR § 200, 215, 219

National Invasive Species Act
- 33 CFR § 151

National Marine Sanctuary Act
- 15 CFR § 904, 922

Plant Protection Act
- 7 CFR § 301, 318, 319, 330, 340, 351, 352, 355, 360, 371

Soil Conservation and Domestic Allotment Act
- 7 CFR § 7, 601, 701

Virus-Serum-Toxin Act
- 9 CFR § 101, 102, 105, 114, 115, 116, 121, 123
- 32 CFR § 627

12.G Appendix G. Section 1204 of the National Invasive Species Act of 1996

SECTION 1204. STATE AQUATIC NUISANCE SPECIES MANAGEMENT PLANS

(a) STATE OR INTERSTATE INVASIVE SPECIES MANAGEMENT PLANS —

(1) IN GENERAL – After providing notice and opportunity for public comment, the governor of each State may prepare and submit, or the Governors of the States and the governments of Indian Tribes involved in an interstate organization, may jointly prepare and submit —

(A) a comprehensive management plan to the Task Force for approval which identifies those areas or activities within the State or within the interstate region involved, other than those related to public facilities, for which technical, enforcement, or financial assistance (or any combination thereof) is needed to eliminate or reduce the environmental, public health, and safety risk associated with aquatic nuisance species, particularly the zebra mussel; and

(B) a public facility management plan to the Assistant Secretary for approval which is limited solely to identifying those public facilities within the State or within the interstate region involved for which technical and financial assistance is needed to reduce infestations of zebra mussels.

(2) CONTENT – Each plan shall, to the extent possible, identify the management practices and measures that will be undertaken to reduce infestations of aquatic nuisance species. Each plan shall —

(A) identify and describe State and local programs for environmentally sound prevention and control of the target aquatic nuisance species;

(B) identify Federal activities that may be needed for environmentally sound prevention and control of aquatic nuisance species and a description of the manner in which those activities should be coordinated with State and local government activities;

(C) identify any authority that the State (or any State or Indian Tribe involved in the interstate organization) does not have at the time of the development of the plan that may be necessary for the State (or any State or Indian Tribe involved in the interstate organization) to protect public health, property, and the environment from harm by aquatic nuisance species; and

(D) a schedule of implementing the plan, including a schedule of annual objectives and enabling legislation.

(3) CONSULTATION —

(A) In developing and implementing a management plan, the State or interstate organization should, to the maximum extent practicable, involve local governments and regional entities, Indian Tribes, and public and private organizations that have expertise in the control of aquatic nuisance species.

(B) Upon the request of a State or the appropriate official of an interstate organization, the Task Force or the Assistant Secretary, as appropriate under paragraph (1), may provide technical assistance in developing and implementing a management plan.

(4) PLAN APPROVAL — Within 90 days after the submission of a management plan, the Task Force or the Assistant Secretary in consultation with the Task Force, as appropriate under paragraph (1), shall review the proposed plan and approve it if it meets the requirements of this subsection or return the plan to the Governor or the interstate organization with recommended modifications.

(b) GRANT PROGRAM —

(1) STATE GRANTS — The Director may, at the recommendation of the Task Force, make grants to States with management plans approved under subsection (a) for the implementation of those plans.

(2) APPLICATION — An application for a grant under this subsection shall include an identification and description of the best management practices and measures which the State proposes to utilize in implementing an approved management plan with any Federal assistance to be provided under the grant.

(3) FEDERAL SHARE —

(A) The Federal share of the cost of each comprehensive management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 75 percent of the cost incurred by the State in implementing such management program and the non-Federal share of such costs shall be provided from non-Federal sources.

(B) The Federal share of the cost of each public facility management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 50 percent of the cost incurred by the State in implementing such management programs and the non-Federal share of such costs shall be provided from non-Federal sources.

(4) ADMINISTRATIVE COSTS — For the purposes of this section, administrative costs for activities and programs carried out with a grant in any fiscal year shall not exceed 5 percent of the amount of the grant in that year.

(5) IN-KIND CONTRIBUTIONS — In addition to cash outlays and payments, in-kind contributions of property or personnel services by non-Federal interests for activities under this section may be used for the non-Federal share of the cost of those activities.

(c) ENFORCEMENT ASSISTANCE — Upon request of a State or Indian Tribe, the Director or Under Secretary, to the extent allowable by law and in a manner consistent with section 141 of title 14, United States Code, may provide assistance to a State or Indian Tribe in enforcing an approved State or interstate invasive species management plan.

12.H Appendix H. Executive Order 13112 of February 3, 1999

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq*.), Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 U.S.C. 4701 *et seq*.), Lacey Act, as amended (18 U.S.C. 42), Federal Plant Pest Act (7 U.S.C. 150aa *et seq*.), Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 *et seq*.), Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.), and other pertinent statutes, to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause, it is ordered as follows:

Section 1. Definitions.

(a) ‘‘Alien species’’ means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

(b) ‘‘Control’’ means, as appropriate, eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions.

(c) ‘‘Ecosystem’’ means the complex of a community of organisms and its environment.

(d) ‘‘Federal agency’’ means an executive department or agency, but does not include independent establishments as defined by 5 U.S.C. 104.

(e) ‘‘Introduction’’ means the intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

(f) ‘‘Invasive species’’ means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

(g) ‘‘Native species’’ means, with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

(h) ‘‘Species’’ means a group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms.

(i) ‘‘Stakeholders’’ means, but is not limited to, State, tribal, and local government agencies, academic institutions, the scientific community, nongovernmental entities including environmental, agricultural, and conservation organizations, trade groups, commercial interests, and private landowners.

(j) ‘‘United States’’ means the 50 States, the District of Columbia, Puerto Rico, Guam, and all possessions, territories, and the territorial sea of the United States.

Section 2. Federal Agency Duties.

(a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law;

(1) identify such actions;

(2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and

environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and

(3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

(b) Federal agencies shall pursue the duties set forth in this section in consultation with the Invasive Species Council, consistent with the Invasive Species Management Plan and in cooperation with stakeholders, as appropriate, and, as approved by the Department of State, when Federal agencies are working with international organizations and foreign nations.

Section 3. Invasive Species Council.

(a) An Invasive Species Council (Council) is hereby established whose members shall include the Secretary of State, the Secretary of the Treasury, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Transportation, and the Administrator of the Environmental Protection Agency. The Council shall be co-chaired by the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce. The Council may invite additional Federal agency representatives to be members, including representatives from subcabinet bureaus or offices with significant responsibilities concerning invasive species, and may prescribe special procedures for their participation. The Secretary of the Interior shall, with concurrence of the Co-Chairs, appoint an Executive Director of the Council and shall provide the staff and administrative support for the Council.

(b) The Secretary of the Interior shall establish an advisory committee under the Federal Advisory Committee Act, 5 U.S.C. App., to provide information and advice for consideration by the Council, and shall, after consultation with other members of the Council, appoint members of the advisory committee representing stakeholders. Among other things, the advisory committee shall recommend plans and actions at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order. The advisory committee shall act in cooperation with stakeholders and existing organizations addressing invasive species. The Department of the Interior shall provide the administrative and financial support for the advisory committee.

Section 4. Duties of the Invasive Species Council.

The Invasive Species Council shall provide national leadership regarding invasive species, and shall:

(a) oversee the implementation of this order and see that the Federal agency activities concerning invasive species are coordinated, complementary, cost-efficient, and effective, relying to the extent feasible and appropriate on existing organizations addressing invasive species, such as the Aquatic Nuisance Species Task Force, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds, and the Committee on Environment and Natural Resources;

(b) encourage planning and action at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order, in cooperation with stakeholders and existing organizations addressing invasive species;

(c) develop recommendations for international cooperation in addressing invasive species;

(d) develop, in consultation with the Council on Environmental Quality, guidance to Federal agencies pursuant to the National Environmental Policy Act on prevention and control of invasive species, including the procurement, use, and maintenance of native species as they affect invasive species;

(e) facilitate development of a coordinated network among Federal agencies to document, evaluate, and monitor impacts from invasive species on the economy, the environment, and human health;

(f) facilitate establishment of a coordinated, up-to-date information-sharing system that utilizes, to the greatest extent practicable, the Internet; this system shall facilitate access to and exchange of information concerning invasive species, including, but not limited to, information on distribution and abundance of invasive species; life histories of such species and invasive characteristics; economic, environmental, and human health impacts; management techniques, and laws and programs for management, research, and public education; and

(g) prepare and issue a national Invasive Species Management Plan as set forth in section 5 of this order.

Section. 5. Invasive Species Management Plan.

(a) Within 18 months after issuance of this order, the Council shall prepare and issue the first edition of a National Invasive Species Management Plan (Management Plan), which shall detail and recommend performance-oriented goals and objectives and specific measures of success for Federal agency efforts concerning invasive species. The Management Plan shall recommend specific objectives and measures for carrying out each of the Federal agency duties established in section 2(a) of this order and shall set forth steps to be taken by the Council to carry out the duties assigned to it under section 4 of this order. The Management Plan shall be developed through a public process and in consultation with Federal agencies and stakeholders.

(b) The first edition of the Management Plan shall include a review of existing and prospective approaches and authorities for preventing the introduction and spread of invasive species, including those for identifying pathways by which invasive species are introduced and for minimizing the risk of introductions via those pathways, and shall identify research needs and recommend measures to minimize the risk that introductions will occur. Such recommended measures shall provide for a science-based process to evaluate risks associated with introduction and spread of invasive species and a coordinated and systematic risk-based process to identify, monitor, and interdict pathways that may be involved in the introduction of invasive species. If recommended measures are not authorized by current law, the Council shall develop and recommend to the President through its Co-Chairs legislative proposals for necessary changes in authority.

(c) The Council shall update the Management Plan biennially and shall concurrently evaluate and report on success in achieving the goals and objectives set forth in the Management Plan. The Management Plan shall identify the personnel, other resources, and additional levels of coordination needed to achieve the Management Plan's identified goals and objectives, and the Council shall provide each edition of the Management Plan and each report on it to the Office of Management and Budget. Within 18 months after measures have been recommended by the Council in any edition of the Management Plan, each Federal agency whose action is required to implement such measures shall either take the action recommended or shall provide the Council with an explanation of why the action is not feasible. The Council shall assess the effectiveness of this order no less than once each 5 years after the order is issued and shall report to the Office of Management and Budget on whether the order should be revised.

Section. 6. Judicial Review and Administration.

(a) This order is intended only to improve the internal management of the executive branch and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any other person.

(b) Executive Order 11987 of May 24, 1977, is hereby revoked.

(c) The requirements of this order do not affect the obligations of Federal agencies under 16 U.S.C. 4713 with respect to ballast water programs.

(d) The requirements of section 2(a)(3) of this order shall not apply to any action of the Department of State or Department of Defense if the Secretary of State or the Secretary of Defense finds that exemption from such requirements is necessary for foreign policy or national security reasons.

WILLIAM J. CLINTON
THE WHITE HOUSE
February 3, 1999

12.I Appendix I. Summary of International Laws and Treaties Relevant to Aquatic Invasive Species

12.I.1 International Laws

12.I.1.a Codex Alimentarius Commission

The United Nations' Food and Agricultural Organization (FAO) and the World Health Organization (WHO) created the Codex Alimentarius Commission (Codex) in 1962.[1] The purpose of the Codex is to encourage fair international trade in food while promoting the health and economic interests of consumers.[2] In the United States, Codex activities are coordinated by the USDA, EPA, and Food and Drug Administration.[3]

Volume 1A of the Codex empowers the Commission to created specialized committees. One such committee that relates to invasive species is the Committee on Import/Export Inspection and Certification Systems.[4] To fulfill its goal of protecting consumer health in the area of food safety, The Codex has formulated standards for specific food commodities, pesticide and drug residues, food contaminants and additives, labeling, and food safety.[5] Invasive species are relevant to the Codex if they threaten food safety or the international food trade.

12.I.1.b Convention on Biological Diversity

The Convention on Biological Diversity (CBD) recognizes the importance of "ecological, genetic, social, economic, scientific, educational, cultural, recreational, and aesthetic" values of biological diversity throughout the world.[6] Countries have rights over their own biological resources, but also have the responsibility of conserving them and using them in a sustainable manner.[7] A fundamental requirement for the conservation of biological diversity is In-Situ conservation.[8] The CBD recognizes the need to "prevent the introduction of and control or eradicate those alien species which threaten ecosystems, habitats, or species."[9] The CDB has a program to target introduction of invasive species.[10] The Global Invasive Species Programme works with the CBD to provide expertise through the CBD's Subsidiary Body on Science, Technology, and Technical Assistance.[11] The United States has not ratified the agreement.

12.I.1.c Convention on International Trade in Endangered Species of Wild Flora and Fauna

The purpose of The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) is to foster international cooperation in order to protect certain species of flora and fauna from over-exploitation through international trade.[12] CITES divides species of wild flora and fauna into three appendices. Trade of any species in Appendices I, II, or III is prohibited, except in accordance with provisions set forth in CITES.[13] Trade of species included in Appendices I, II, and III are regulated through a system of import, export, and re-export permits.[14]

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[1] *See* Food Safety and Inspection Service U.S. Codex Office, Codex Alimentarius Commission. Retrieved 17 February 2003 from www.fsis.usda.gov/OA/codex/.
[2] *See id*.
[3] *See id*.
[4] *See* FAO/WHO Food Standards, Codex Alimentarius. Retrieved 17 February 2003 from www.codexalimentarius.net/.
[5] *See id*.
[6] Convention on Biological Diversity, June 5, 1002, Preamble.
[7] *See id*.
[8] In-Situ conservation means "the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties." *Id*. Article 2.
[9] *Id*. Article 2(h).
[10] *See* Convention on Biological Diversity, Alien Species Introduction. Retrieved 17 February 2003 from www.biodiv.org/programmes/cross-cutting/alien/.
[11] *See* Convention on Biological Diversity, Alien Species Introduction. Retrieved 17 February 2003 from www.biodiv.org/programmes/cross-cutting/alien/gisp.asp.
[12] *See* Convention on International Trade of Endangered Species of Wild Flora and Fauna, March 3, 1973, Preamble.
[13] *See id*. Article II.4.
[14] *See id*. Article III.2, III.3, and III.4. See also Article IV.2, IV.3, IV.4, and IV.5 and Article V.2, V.3, and V.4.

Appendix I includes species threatened with extinction that are or may be affected by trade. Trading members of these species are the most strictly regulated in order not to further endanger their survival.[15] For these species, trade is authorized in only "exceptional" circumstances.[16]

Appendix II includes species that currently are not threatened with extinction, but would become so threatened without strict regulation.[17] Appendix II also recognizes that trade in other species also must be regulated in order to effectively protect species included in Appendix II.[18]

Appendix III includes all species that any Party to CITES declares to be subject to regulation within its jurisdiction to prevent or restrict exploitation, and "as needing cooperation of other parties in the control of trade."[19]

12.I.1.d Office of International Epizootics

The Office of International Epizootics (OIE) is an international organization created by agreement in 1924. Its purposes are to guarantee the transparency of animal diseases worldwide; to collect, analyze, and disseminate veterinary scientific information; to provide expertise and promote international solidarity for the control of animal diseases; and to guarantee the sanitary safety of world trade by developing sanitary rules for international trade in animals and animal products.[20]

The OIE collects and disseminates information through cooperation between Member Countries. Each Member reports to the OIE animal diseases that it identifies within its territory.[21] The OIE thereby disseminates this information to other Members so that each may act upon this information accordingly.[22] The OIE provides technical support to Member Countries that request assistance in controlling and eradicating animal diseases.[23] The OIE also creates "normative documents relating to rules that Member Countries can use to protect themselves from diseases without setting unjustified sanitary barriers."[24] Such normative documents include the International Animal Health Code[25] and Manual Standards for Diagnostic Tests and Vaccines.[26] While the OIE generally focuses on issues such as livestock diseases and developing standards for diagnostic tests and vaccines, it recently has started to focus on diseases affecting wildlife, including aquatic species, by publishing its International Aquatic Animal Health Code.[27]

12.I.1.e International Plant Protection Convention

The purpose of the International Plant Protection Convention (IPPC) is to prevent the introduction and spread of pests of plants and plant products and to promote appropriate control measures.[28] The IPPC was adopted in 1951 and was revised in November 1997. However, the 1997 revision, while adopted, is not yet in force.[29] Under the IPPC, each contracting party agrees to cooperate with each other to prevent the introduction of plant pests and diseases and prevent their spread across national boundaries.[30] The Food and Agriculture Organization of the United Nations

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[15] *See id*. Article II.1.
[16] *Id*.
[17] *See id*. Article II.2(a).
[18] *See id*. Article II.2(b).
[19] *See id*. Article II.3.
[20] *See* Office of International Epizootics, What is the OIE?. Retrieved 17 February 2003 from www.oie.int/eng/OIE/en_oie.htm.
[21] *See id*.
[22] *See id*.
[23] *See id*.
[24] *See id*.
[25] *See* Office of International Epizootics, Terrestrial Animal Health Code 2003. Retrieved 25 July 2003 from www.oie.int/eng/normes/mcode/A_summry.htm.
[26] *See* Office of International Epizootics, Manual Standards for Diagnostic Tests and Vaccines 2000. Retrieved 28 February 2003 from www.oie.int/eng/normes/mmanual/A_summry.htm.
[27] *See* Office of International Epizootics, International Aquatic Animal Health Code 2002. Retrieved 28 February 2003 from www.oie.int/eng/normes/fcode/A_summry.htm.
[28] *See* International Plant Protection Convention, December 6, 1951, current text adopted in 1979, Article I.1.
[29] *See* International Phytosanitary Portal, Documents and Publications. Retrieved 3 March 2003 from www.ippc.int/cds_ippc_prod/IPP/En/publications.htm.
[30] *See* International Plant Protection Convention, December 5, 1951, current text adopted in 1979, Preamble.

disseminates information on import restrictions, requirements, prohibitions, and regulations to all contracting parties and regional plant protection organizations.[31]

Each contracting party is responsible for creating a national plant organization to carry out the provisions of the IPPC, such as inspection of consignments of plants and plant products moving in international traffic that may carry pests and diseases and protecting endangered areas.[32] If necessary for phytosanitary conditions, contracting parties may regulate the entry of plants into their territories by setting requirements of importation; prohibiting importation of specific plants; inspecting and detaining specific plants; and treating, destroying, or refusing entry to specific plants.[33] However, contracting parties shall not take measure more stringent than necessary to accomplish the goals of the IPPC in order to minimize interference with international trade.[34]

12.I.1.f North American Free Trade Agreement

The main objectives of the North American Free Trade Agreement (NAFTA) are to eliminate trade barriers and to promote fair competition between the Parties to the Agreement.[35] NAFTA requires that each Party to the greatest extent practicable, participate in international and North American standardizing organizations, such as the Codex, OIE, IPPC, and North American Plant Protection Organization, to promote the "development and periodic review of international standards, guidelines and recommendations."[36]

Chapter 7 relates to invasive species. It allows each Party to adopt sanitary or phytosanitary measures necessary for the protection of human, animal, or plant life or health in its territory.[37] Such measures may be more stringent than international standards, guidelines, or recommendations.[38] Such measures should be based on research and risk assessment.[39] However, measures should not arbitrarily or unjustifiably discriminate against another Party's goods.[40] Furthermore, in conducting risk assessments in order to determine appropriate measures of protection, one of the factors that the Parties must take into account is "the prevalence of relevant diseases or pests, including the existence of pest-free or disease-free areas or areas of low pest or disease prevalence."[41]

12.I.1.g World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures

The Sanitary and Phytosanitary Measures Agreement (SPS Agreement) is a supplement to the World Trade Organization Agreement. It encourages Members to adopt measures necessary to protect human, animal or plant life or health.[42] However, such measures should not arbitrarily or unjustifiably discriminate against Members that experience the same conditions in their territories or be disguised as a restriction on international trade.[43] The SPS Agreement also encourages Members to use other international guidelines, such as the Codex, OIE, and IPPC[44] to promote within these organizations the development and periodic review of standards, guidelines, and recommendations with respect to all aspects of sanitary and phytosanitary measures.[45] The SPS Agreement Members should conduct scientific research and collect evidence in order to set appropriate levels of sanitary and phytosanitary protection with the least impact on international

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[31] *See id*. Article VI.4.
[32] *See id*. Article IV.1(a)(i), (ii).
[33] *See id*. Article VI.1.
[34] *See id*. Article VI.2.
[35] *See* North American Free Trade Agreement, 17 December 1992, Article 102.
[36] *Id*. Chapter 7, § B, Art. 713(5).
[37] *See id*. Chapter 7, § B, Art. 712(1).
[38] *See id*.
[39] *See id*. Chapter 7, § B, Art. 715(1).
[40] *See id*. Chapter 7, § B, Art. 712(4))
[41] *Id*. Chapter 7, § B, Art.715(1)(e).
[42] *See* Agreement on Sanitary and Phytosanitary Measures, 15 April 1994, Preamble.
[43] *See id*. Article 5.5.
[44] *See id*. Preamble. *See also* Article 3.4.
[45] *See id*. Article 3.4.

trade.[46] Such evidence includes the prevalence of specific diseases or pests, existence of pest-free or disease-free areas, relevant ecological and environmental conditions, and quarantine or other treatment.[47]

[46] *See id*. Article 5.4.
[47] *See id*. Article 5.2.

12.J Appendix J. Public Comments Received and Responses

The public comment period for the *State Management Plan for Aquatic Invasive Species in Louisiana* began December 21, 2004 and closed on January 21, 2005. No public comments were received.