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.