

Communicating with the Public on Aquatic Nuisance Species (ANS)

An ANS Communications Strategy For the State of South Carolina

March 2006



**South Carolina Department of Natural Resources
International Association of Fish and Wildlife Agencies**



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Introduction

Information provided in the Situation Assessment was formulated from interviews with team members to describe the status of ANS issues and resources in the state. The Marketing Plan was developed through additional staff interviews, discussions at a meeting in Columbia, South Carolina, on February 23, 2004, and input from Planning Team assignments. The process used to develop and implement this document is described in the *IAFWA ANS Pilot State Project: Process Outline*.

Planning Team

South Carolina Planning Team

South Carolina Department of Natural Resources (SCDNR) leaders assembled a team of individuals to guide the project. The in-state team includes:

- **Steven de Kozlowski**, Chief, Environmental Conservation Section, SCDNR, Columbia
- **Rick DeVoe**, Executive Director, South Carolina Sea Grant Consortium, Charleston
- **Ed EuDaly**, Biologist, and **Jennifer M. Koches**, Public Affairs, Education and Outreach, U.S. Fish and Wildlife Service, Charleston
- **Sandy Friedman**, and **Gilbert Rowe**, USDA-APHIS, Columbia and Conway, SC (respectively)
- **Ken Glenn**, State Plant Regulatory Official, Department of Plant Industry, Clemson University, Clemson
- **Robin Socha**, Biologist, U.S. Army Corps of Engineers, Charleston District, Charleston
- **Jamie Sykes**, District Fisheries Biologist, U.S. Army Corps of Engineers, Savannah District, Savannah
- **Dale Theiling**, Assistant Director of Office of Fisheries Management, SCDNR Marine Resources Division, Charleston
- **Chris Thomason**, Regional Fisheries Biologist, SCDNR Wildlife and Freshwater Fisheries Division, Barnwell
- **David Tompkins**, South Carolina Department of Agriculture, Columbia
- **Sara Tuttle**, Clean Vessel Act Education Coordinator, SCDNR, Conservation Education and Communications Division, Charleston
- **Jack Whetstone**, Extension Aquaculture Specialist, Sea Grant and Clemson University, Charleston

IAFWA Project Team

An outside team hired by IAFWA was contracted to work with South Carolina:

- **Gwen White**, Project Manager, D.J. Case and Associates, Indianapolis, IN
- **Phil Seng**, Vice President, D. J. Case & Associates, Mishawaka, IN
- **Sharon Rushton**, President, SR Enterprises, Kimberling City, MO
- **Rob Southwick**, President, Southwick Associates, Fernandina Beach, FL
- **Jim Wentz**, President, Silvertip Productions, Canal Winchester, OH

U.S. Fish and Wildlife Service

Providing oversight from the federal branch is:

- **Joe Starinchak**, Outreach Coordinator, U.S. Fish and Wildlife Service, Arlington, VA

Process Steps

An overview for the process to develop this communications plan is contained in the SC ANS Final Report and *IAFWA ANS Pilot State Project: Process Outline*. It is helpful to review these documents prior to reading the South Carolina ANS Communication Strategy.

Goal

The goal of the South Carolina ANS Communications Strategy is to increase the level of awareness and action to address aquatic invasive species problems. This would be done by communicating the significance of problems, current and potential dangers, and potential solutions to mitigate negative impacts on South Carolina's natural resources, human health and safety, and economic environment.

Project Outcomes

Action items pursued as part of this communication plan are:

1. Identify target audiences for freshwater (recreational users) and marine (seafood businesses).
2. Establish baseline data on awareness of ANS issues among participants at the Palmetto Sportsman's Classic (large sport show).
3. Conduct a direct mail information campaign to drive people to the SCDNR website on ANS issues. Conduct a follow-up survey to see if it worked.
4. Create an ANS information page in the 2004-2005 SCDNR Rules and Regulations Publication.
5. Incorporate the *Stop Aquatic Hitchhikers* logo and links on SCDNR Aquatic Invasive Species website and in educational materials.
6. Develop a South Carolina ANS page for the *Stop Aquatic Hitchhikers* site that identifies actions to reduce the likelihood of transferring aquatic invasive species from one water body to another and protecting estuarine waters from shellfish disease contamination.
7. Develop a pledge card for use at trade shows and possible distribution to boat registrants that encourages them to conduct boat cleaning behaviors to minimize the spread of ANS from one water body to another.
8. Join the newly formed Gulf and South Atlantic Regional Panel on Aquatic Invasive Species.
9. Work toward development of a statewide ANS Task Force and a South Carolina ANS management plan.

Part 1. Situation Assessment: ANS Issues in South Carolina

I. Scope of ANS in the state

The natural features of South Carolina, while diverse and striking, provide a potential “welcome mat” for the permanent residence of freshwater and marine aquatic nuisance species.

Resources description:

Five main estuaries drain major watersheds originating from as far away as western North Carolina. South Carolina boasts 750,000 acres of estuaries, which comprise almost 10 percent of the southeast U.S. coast’s estuarine system. When these freshwater inland rivers meet the coastal plain, they mix with ocean water to form brackish water estuaries and tidal mouths. These environmental variations invite a wide assortment of both fresh water and marine aquatic nuisance species to make their homes here.

In addition to estuarine waters, South Carolina has 750,000 surface acres of freshwater, some 1,617 lakes greater than 10 acres, 50,000 farm ponds, and 11,000 miles of rivers and creeks. More than 450 industries, public water suppliers, power generator facilities, aquaculture operations, and golf courses withdraw 5 billion gallons of water per day from the state’s surface waters.

South Carolina’s water resources also support an abundance of flora and fauna. Nearly one-quarter of the state is classified as wetlands, which provide critical habitat for a number of threatened and endangered species of fish, shellfish, birds and mammals. The great diversity of wildlife inhabiting the state’s coastal region includes notable populations of striped bass, sturgeon, bald eagles, ospreys, alligators, and wood storks.

The Port of Charleston is ranked as the second largest container port of the East and Gulf coasts, the largest on the Gulf and Southeast coasts, fourth in the nation, and thirteenth in the world.

Resources threats:

Sportfishing: Surface waters support an active sportfishery in South Carolina. More than one million anglers participate with a total economic impact of over \$398 million annually. Many of the lakes in South Carolina are home to a host of fishing tournaments, which attract anglers from throughout the country. Anglers trailer their boats into the state. In 1997, \$14.4 billion was expended for recreation and tourism statewide.

Visiting anglers from states that have already established ANS populations represent a likely source of invasion into South Carolina. In 1993, concerns about introduction of zebra mussels led to the formation of the South Carolina Zebra Mussel Task Force, which worked to develop a statewide management and outreach strategy for zebra mussel prevention. South Carolina has been more fortunate than other states, so far, in not having a problem with zebra mussels.

Ballast water: There have been numerous opportunities for aquatic aliens to enter estuaries through ship ballast water at the Port of Charleston. Every day, large quantities of ballast water

from all over the world are discharged into U.S. waters. Carried in this water are plants, animals, bacteria, and pathogens. These organisms range in size from microscopic to large plants and free-swimming fish. These organisms have the potential to become ANS. ANS may displace native species, degrade native habitats, spread disease, and disrupt human social and economic activities that depend on water resources. Any ship carrying ballast water is a potential invasion source. Ballast water issues generally fall under the authority of the U.S. Coast Guard.

Aquatic weeds/landscaping: The problem of alien weeds continues to grow in South Carolina as landowners plant exotic plants for aquatic landscaping, affecting fish habitat, flow of irrigation water and boating access. Hydrilla, water hyacinths, and other aquatic nuisance species pose huge economic and ecological threats. The state recently fought off an outbreak of giant salvinia (*Salvinia molesta*), an aquatic weed native to Brazil that has spread rapidly in Louisiana and Texas.

Shrimp growing, non-native shellfish introductions and shell recycling: These are key concerns for the Marine Resources Division. Before the ANS project started, the division already worked closely with shrimp growers, who are required to obtain a permit and maintain disease-free stocks. The division worked with this group, which did not involve the public at large.

Another concern is non-native shellfish (oysters and clams), the shells of which could be introduced from other states for seed for mariculture. There is great concern over the possibility of pathogens or other ANS hitch-hiking into South Carolina on shellfish from other states.

The Marine Resources Division has a program in place to notify the public about the hazards of placing oysters harvested out of state into South Carolina waters. The division has developed a program of recycling shells and encouraging people not to put shells in water.

Aquaculture industry: South Carolina has a diverse aquaculture industry, but it is not a large industry compared with other southeast states. The industry generates \$10 to 15 million annually. There is a small amount of rainbow trout farming in upper regions. (Rainbow trout are not native but not considered invasive.)

The first breeding of hybrid striped bass was conducted in South Carolina. As a cross between two species, it is also nonnative but not invasive. Native clams (*Mercenaria mercenaria*) are cultivated in coastal areas, as are saltwater shrimp, which are mostly nonnatives (e.g., Pacific white shrimp). The industry sells triploid grass carp. One business in South Carolina produces them from diploids.

Other species raised include: crayfish *Procambarus clarkii* (not native) and *Procambarus acutus* (native); the freshwater prawn *Macrobrachium rosambergii* (not native) and channel catfish (argument as to whether it is native).

A few production facilities raise baitfish, some saltwater, but on a small scale. Large baitfish producers in South Carolina have problems maintaining stable markets. The industry also raises golden shiners; these are not considered invasive except in small ponds where they can interfere with pond management.

Conclusion:

The state is seeing more problems with aquatic nuisance species because there are greater interactions among regions and nations, with people and goods moving throughout the world.

II. Jurisdiction of agencies involved in ANS Issues in the state

A. Entities

1. South Carolina Department of Natural Resources (SCDNR)

- *Land, Water and Conservation Division, Environmental Conservation Section* – The division administers the Aquatic Plant Management Program, responsible for statewide management of invasive aquatic plants in public waters. It develops annual statewide aquatic plant management plans, coordinates control activities, implements prevention/public education efforts and identifies research needs.
- *Wildlife and Freshwater Fisheries Division, Freshwater Fisheries Section* – The division administers programs such as the Sterile Grass Carp Permit program that restrict the importation and aquaculture of freshwater fish species.
- *Marine Resources Division* – The division administers programs that regulate the importation and aquaculture of certain marine organisms. The program is responsible for commercial fisheries in saltwaters of South Carolina, including permitting, scientific collection permits, nonindigenous importation, legislation and policy. Outreach is provided regarding regulatory responsibilities, data collection and survey. The fisheries management program does fishery-dependent data gathering. No formal surveys of satisfaction in the commercial fishing industry have been conducted, but they are considering this possibility.
- *Law Enforcement Division* – Conservation officers enforce game and fish laws and are authorized to enforce all state laws including those by other state agencies.
- *Conservation, Education and Communications Division* – The division administers boater and hunter education programs, teacher workshops and agency communications.

2. Aquatic Plant Management Council

This 10-member board was established by law to provide interagency coordination and serve as the principal advisory body to the SCDNR on aquatic plant management and research. The council establishes management policies, approves all management plans and advises SCDNR on research priorities.

3. South Carolina Department of Agriculture

The department administers the State Noxious Weed Act, including enforcement of the State Noxious Weed List that features several invasive aquatic plant species. It has a limited role in resource management, with more activities focused on agricultural marketing, promotion and regulation. The department has authority to stop movement of materials through commercial channels, including sale of plants by pet stores and water garden distributors. It can place quarantines through the Commissioner of Agriculture. The department can use regulatory power to help resource managers control ANS.

4. Department of Plant Industry, Clemson University

The Clemson department has plant pest regulatory duties throughout the state. Plant Industry inspects nursery stock held by nurseries and plant dealers. It administers the State Crop Pest Act, including inspection of plant nurseries and enforcement of the State Crop Pest List. (State Crop Pest List covers all state and federal listed species of concern including several invasive aquatic plant species.)

Plant Industry provides inspection and certification services to nurseries and agricultural producers to meet the pest freedom requirements for sales, movement, distribution and export of plant products.

It has authority over designated pest plants, including aquatic species. A memorandum of understanding with SCDNR encourages greater focus on aquatic plant species. The State Plant Regulatory Office follows up on reports of pest plants.

Plant Industry tries to educate people on perils of plant pests. It works to prevent exotic or invasive pest introductions. The department conducted an extensive survey regarding *Salvinia molesta* and helped eradicate an infestation a few years ago (dpi.clemson.edu)

The South Carolina state plant regulatory official is based at Clemson and cooperates with the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine (PPQ) and SCDNR.

5. Cooperative Agricultural Pest Survey (CAPS) State Survey Committee

USDA APHIS PPQ manages the CAPS program. The CAPS State Survey Committee serves as an advisory group for CAPS activities to detect or delimit exotic pests. Committee members provide input on upcoming exotic pest surveys, discuss survey results and share relevant information on pest occurrences. Pest distribution data from surveys and other sources provided by State Survey Committee members is submitted to a national database.

CAPS surveys and other monitoring activities strive to protect agriculture and natural resources and to prevent economic losses. Several years ago, the committee involved a diverse cross section of agencies, private citizens and companies to create awareness about CAPS activities regarding invasive pests.

6. South Carolina Sea Grant Consortium (SCSGC) and Extension Program (SCSGEP)

The consortium is a university/laboratory-based state agency charged with supporting research, education, training and technical assistance programs to enhance economic opportunities and conserve marine and coastal resources.

The agency's primary federal sponsor, the National Oceanic and Atmospheric Administration (NOAA) National Sea Grant College Program, supports ANS research, education and outreach activities around the country with emphasis on marine and Great Lakes environments.

The staff includes six extension specialists who focus on aquaculture, fisheries, coastal hazards, ocean observations, coastal communities and coastal economics/business. It has four communications staff in graphic design, technical writing, web design/management and public information.

The extension program's aquaculture program helps develop an economically viable and natural resource-friendly aquaculture industry. South Carolina's aquaculture industry has grown dramatically in the last 10 years, and this agency has played a leading role in support of that growth. It also is heavily involved in zebra mussel research and outreach awareness.

7. USGS Biological Resources Division (BRD) and South Carolina Cooperative Fish and Wildlife Research Unit, Clemson University

The USGS Biological Resources Division (formerly the National Biological Service) conducts research on many aspects of South Carolina's ecosystems. Much of this research is conducted through the South Carolina Cooperative Fish and Wildlife Research Unit, on the Clemson University campus. The research unit cooperates with state agencies and the U.S. Fish and Wildlife Service.

USGS develops techniques for restoring forested wetlands along the Coosawhatchie River; conducting contaminant studies to assess the quality of water and sediment in the lower Savannah River and Charleston Harbor; and evaluates the effects of water-level changes on migratory bird habitat in national wildlife refuges and state wildlife management areas.

8. U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA APHIS)

USDA APHIS administers and enforces the Federal Noxious Weed Act prohibiting the importation of certain plant and animal species to the U.S., including aquatic noxious species. There are three regional APHIS field offices and a section that deals with inspecting stores and nurseries to confiscate and destroy noxious weeds. APHIS joins the Department of Plant Industry, based at Clemson University, in this effort.

APHIS' main aquatic nuisance species control project has been for *Salvinia molesta*. Department of Plant Industry and SCDNR do most control work with some APHIS funding. Most information on illegal imports comes from the Smuggling, Interdiction and Trade Compliance section of the USDA APHIS Plant Protection and Quarantine (PPQ) program. The USDA reviews manifests and articles coming into the country and does inspections.

9. U.S. Coast Guard (USCG), Ballast Water Management (BWM) Program

USCG is responsible for enforcing ballast water regulations. In recent years there has been increased international focus on ballast water management due to the ecological, economic, and potential health threats caused by the spread of ANS from ballast

water. USCG is responding to these concerns through a comprehensive national BWM program.

This program applies to all vessels equipped with ballast water tanks that operate in U.S. waters and are bound for ports or places in the U.S. Highlights of the program are: 1) mandatory ballast water management practices for all vessels that operate in U.S. waters; 2) additional practices for vessels entering U.S. waters after operating beyond the Exclusive Economic Zone, and 3) reporting and recordkeeping of ballasting operations by all vessels.

10. U.S. Army Corps of Engineers (USACOE), Charleston District
USACOE, Charleston District is involved in dredging and storm damage reduction projects. It also coordinates ecosystem restoration projects, flood control projects, emergency stream bank protection projects and bioengineering projects.

The Charleston District's involvement in ANS is limited. It works closely with SCDNR to provide funding for aquatic plant control efforts in the state. Charleston District does not manage any USACOE reservoirs. Federal APC funding can only be used on public waters with public access, so USACOE's involvement is limited to public water bodies. USACOE requires that public access sites and boat landings post ANS signs.

11. U.S. Army Corps of Engineers, Savannah District
USACOE, Savannah District (located in Georgia) is responsible for maintaining Savannah and Brunswick Harbors, the Intracoastal Waterway along Georgia's coastline and the Savannah River. The Savannah Harbor is a major foreign-trade and general cargo port that has great economic and strategic importance.

Savannah District also is a leading producer of hydroelectric power, operating three major multi-purpose dam and lake facilities along the Upper Savannah River along the Georgia/South Carolina border: J. Strom Thurmond, Richard B. Russell and Hartwell.

Hydrilla was first discovered in J. Strom Thurmond Lake in 1995. It now covers about 5,000 acres along 305 miles of shoreline in Georgia and 105 miles of shoreline in South Carolina. Hydrilla can be found in areas of suitable substrate throughout Little River, Georgia, from the confluence of the Savannah River to upstream of Raysville Campground, including most tributaries. Along the Savannah River portion of the lake, hydrilla is present from Thurmond Dam to Elijah Clark State Park in Georgia and from the dam to Plum Branch Yacht Club in South Carolina.

The Savannah District's Aquatic Plant Management Plan was prepared in 1998 in response to the presence of hydrilla in Thurmond Lake as well as other aquatic plants of concern in Hartwell Lake, Richard B. Russell Lake, and the New Savannah Bluff Lock and Dam. The plan establishes treatment priorities based on impacts to authorized project purposes, funding, treatments by others and environmental impacts.

The Savannah District anticipates the spreading of ANS. ACOE has aquatic plant management programs to treat *nonfederal* bodies of water. ACOE cannot provide Georgia funds to treat Thurmond Lake, because it is a federal water body.

Savannah District interacts with public through numerous boating facilities at all three reservoirs, and through public visitors at ACOE offices. The district also educates and informs marina employees, boaters and general public about problems associated with improper sewage disposal and encourages the use of pump out stations. It uses displays, publications, workshops, promotional items, education programs and websites to reach target audiences. It helps coordinate the Clean Vessel/Clean Marina Program. The target audience and methods of reaching audiences are similar to ANS issues.

12. Clean Vessel/Clean Marina Program

Clean Vessel/Clean Marina Program is funded through a grant from the U.S. Fish and Wildlife Service and the Department of Interior under the Clean Vessel Act of 1992. The program's goal is to provide adequate pump out facilities in the eight-county coastal zone area, with expansion to inland marinas. This program is sponsored through South Carolina Department of Health and Environmental Control's Ocean and Coastal Resource Management (SCDHEC OCRM). OCRM developed the Clean Vessel/Clean Marina Program through close coordination with SCDNR and SCDHEC's Office of Water Pollution Control, as well as the South Carolina Marina Association, a private association of marina owners and operators.

13. Natural Resources Conservation Service (NRCS)

NRCS provides technical and financial assistance to conserve South Carolina's natural resources. While much of the technical assistance helps farmers develop conservation systems suited to their land, the agency also provides assistance to other private landowners and communities to reduce erosion, conserve and protect water, and address other resource concerns. NRCS provides the National Invasive Species Information Center (www.invasivespeciesinfo.gov). NRCS sits on the National Invasive Species Council, Invasive Species Advisory Committee and Aquatic Nuisance Species Task Force.

14. Electric power companies

Entities that control various lakes for electrical power all have a stake in the jurisdiction and control of ANS in South Carolina lakes under their ownership or responsibility.

- *Santee Cooper*: Lakes Marion and Moultrie
- *South Carolina Electric and Gas*: Lake Murray, Lake Monticello
- *Duke Power*: Cedar Creek (Stumpy Pond), Fishing Creek, Gaston Shoals, Great Falls, Greenwood, Jocassee, Keowee, Ninety-nine Islands, Wateree, Wylie

B. Regulations

Selected South Carolina Statutes that establish state agency authorities regarding ANS are as follows:

1. State code of laws

Title 46, Chapter 23 - South Carolina Noxious Weed Act (SC Department of Agriculture)

The act provides far-reaching powers to seize, quarantine, treat, destroy, apply other remedial measures, to export, return to shipping point, or otherwise dispose of in such a manner as (it) deems appropriate, any noxious weed or any product or article of any character whatsoever or any means of conveyance which (it) has reason to believe contains or is contaminated with any noxious weed, offered for movement, moving, or has moved into or through the state or intrastate. To further deter persons from spreading nuisance aquatic weeds the law includes fines not exceeding \$500 and/or imprisonment not exceeding one year.

Title 46, Chapter 9 - State Crop Pest Act (State Crop Pest Commission)

The State Crop Pest Commission is authorized by law (Section 46-9-40) to promulgate and enforce reasonable regulations to eradicate or prevent the introduction, spread or dissemination of plant pests. Plant pests are by definition (Section 46-9-15(5)) any living state of insects, mites, nematodes, slugs, animals, protozoa, snails or other invertebrate animals, bacteria, weeds, fungi, other parasitic plants...which directly or indirectly may injure or cause disease or damage in plants...and which may be a serious agricultural threat to the State, as determined by the Director.

The State Crop Pest Commission is responsible for control of plant pests which constitute a threat to production agriculture. In so doing, the Commission is the primary contact point for cooperation with the Animal and Plant Health Inspection Service (APHIS), U. S. Department of Agriculture.

The Commission has designated certain organisms as plant pests. These organisms are already designated as noxious weeds by state and/or federal authorities or are under domestic federal quarantine. Once a plant pest has been designated, the Commission has the authority to impose control measures, up to and including, quarantine of the premises. However, the Director, as the Commission's designee, retains the discretion to determine that a plant pest has become so widespread that further control measures are not warranted.

Title 49, Chapter 6 - Aquatic Plant Management Act (SCDNR)

SECTION 49-6-10. Purpose; administering agency

There is hereby created the South Carolina Aquatic Plant Management Program for the purpose of preventing, identifying, investigating, managing, and monitoring aquatic plant problems in public waters of South Carolina. The program will coordinate the receipt and distribution of available federal, state, and local funds for aquatic plant management activities and research in public waters.

The Department of Natural Resources (department) is designated as the state agency to administer the Aquatic Plant Management Program and to apply for and receive grants and loans from the federal government or such other public and private sources as may be available for the Aquatic Plant Management Program and to coordinate the expenditure of such funds.

SECTION 49-6-20. Aquatic Plant Management Trust Fund

There is created the South Carolina Aquatic Plant Management Trust Fund which must be kept separate from other funds of the State. The fund must be administered by the department for the purpose of receiving and expending funds for the prevention, management, and research of aquatic plant problems in public waters of South Carolina. Unexpended balances, including interest derived from the fund, must be carried forward each year and used for the purposes specified above. The fund shall be subject to annual audit by the Office of the State Auditor.

The fund is eligible to receive appropriations of state general funds, federal funds, local government funds, and funds from private entities including donations, grants, loans, gifts, bond issues, receipts, securities, and other monetary instruments of value. All reimbursements for monies expended from this fund must be deposited in this fund.

SECTION 49-6-30. Aquatic Plant Management Council; membership; duties

There is hereby established the South Carolina Aquatic Plant Management Council, hereinafter referred to as the council, which shall be composed of ten members as follows:

- a. The council shall include one representative from each of the following agencies, to be appointed by the chief executive officer of each agency:
 - i. Water Resources Division of the Department of Natural Resources;
 - ii. South Carolina Department of Health and Environmental Control;
 - iii. Wildlife and Freshwater Fish Division of the Department of Natural Resources;
 - iv. South Carolina Department of Agriculture;
 - v. Coastal Division of the Department of Health and Environmental Control;
 - vi. South Carolina Public Service Authority;
 - vii. Land Resources and Conservation Districts Division of the Department of Natural Resources;
 - viii. South Carolina Department of Parks, Recreation and Tourism;
 - ix. Clemson University, Department of Fertilizer and Pesticide Control.
- b. The council shall include one representative from the Governor's Office, to be appointed by the Governor.
- c. The representative of the Water Resources Division of the Department of Natural Resources shall serve as chairman of the council and shall be a voting member of the council.

The council shall provide interagency coordination and serve as the principal advisory body to the department on all aspects of aquatic plant management and research. The

council shall establish management policies, approve all management plans, and advise the department on research priorities.

SECTION 49-6-40. Aquatic Plant Management Plan

The department, with advice and assistance from the council, shall develop an Aquatic Plant Management Plan for the State of South Carolina. The plan shall describe the procedures for problem site identification and analysis, selection of control methods, operational program development, and implementation of operational strategies. The plan shall also identify problem areas, prescribe management practices, and set management priorities. The plan shall be updated and amended at appropriate intervals as necessary; provided, however, problem site identification and allocation of funding shall be conducted annually. In addition, the department shall establish procedures for public input into the plan and its amendments and priorities. The public review procedures shall be an integral part of the plan development process. When deemed appropriate, the department may seek the advice and counsel of persons and organizations from the private, public, or academic sectors.

The council shall review and approve all plans and amendments. Approval shall consist of a two-thirds vote of the members present. The department shall have final approval authority over those sections that do not receive two-thirds approval of the council.

SECTION 50-13-1415. Importation, possession, or placing water hyacinth and hydrilla in waters of the state (SCDNR)

No person shall possess, sell, offer for sale, import, bring, or cause to be brought or imported into this state, or release or place into any waters of this state any of the following plants:

- a. Water hyacinth
- b. Hydrilla

Provided, however, that the department may issue special import permits to qualified persons for research purposes only.

The department shall prescribe the methods, control, and restrictions which are to be adhered to by any person or his agent to whom a special permit under the provisions of this section is issued. The department is authorized to promulgate such regulations as may be necessary to effectuate the provisions of this section and the department, by regulation, is specifically authorized to prohibit additional species of plants from being imported, possessed, or sold in this State when, in the discretion of the department, such species of plants are potentially dangerous.

SECTION 50-13-1630. Importing, possessing or selling certain fish unlawful; special permits for research; Department shall issue rules and regulations (SCDNR)

- a. No person may possess, sell, offer for sale, import, bring or cause to be brought or imported into this State or release into the waters of this State the following fish:

- i. Carnero or candiru catfish (*Vandellia cirrhosa*);
 - ii. Freshwater electric eel (*Electrophorus electricus*);
 - iii. White amur or grass carp (*Ctenopharyngodon idella*);
 - iv. Walking catfish or a member of the clariidae family (*Clarias*, *Heteropneustea*, *Gymnallabes*, *Channallabes*, or *Heterobranchus genera*);
 - v. Piranha (all members of *Serrasalmus*, *Rooseveltiella*, and *Pygocentrus genera*);
 - vi. Stickleback;
 - vii. Mexican banded tetra;
 - viii. Sea lamprey;
 - ix. Rudd (*Scardinius erythrophthalmu-Linneaus*).
- b. The department may issue special import permits to qualified persons for research and education only.
 - c. The department may issue special permits for the stocking of non-reproducing white amur or grass carp hybrids in the waters of this State.
 - d. It is unlawful to take grass carp from waters stocked as permitted by this section. Grass carp caught must be returned to the water from which it was taken immediately.
 - e. The department must prescribe the qualifications, methods, controls, and restrictions required of a person or his agent to whom a special permit is issued. The department must condition all permits issued under this section to safeguard public safety and welfare and prevent the introduction into the wild or release of nonnative species of fish or other organisms into the waters of this State.
 - f. The department may promulgate regulations necessary to effectuate this section and specifically to prohibit additional species of fish from being imported, possessed, or sold in this State when the department determines the species of fish are potentially dangerous.

2. Federal regulations

Some federal ANS regulations are listed at www.dnr.sc.gov/water/envaff/aquatic/aquaticclaws2.html

P.L. 104-332: National Invasive Species Act of 1996

This act reauthorizes and amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (P.L. 101-646). It provides ballast management programs and research. The act also enacts and amends development of task forces, zebra mussel management programs, regional coordination in ANS issues, and state invasive species management plans.

Title 7, Chapter 61: Federal Noxious Weed Act

This U.S. code expressly prohibits the interstate commerce of noxious weeds and allows for the warrant less search and seizure of said weeds. This law also deals with the required management of noxious weeds on Federal lands. This US code expressly prohibits the interstate commerce of noxious weeds and allows for the warrant less search and seizure of said weeds. This law also deals with the required management of noxious weeds on Federal lands.

Title 18, Part 1, Chapter 3, Section 46: Transportation of Water Hyacinths

- a. Whoever knowingly delivers or receives for transportation, or transports, in interstate commerce, alligator grass (*alternanthera philoxeroides*), or water chestnut plants (*trapa natans*) or water hyacinth plants (*eichhornia crassipes*) or the seeds of such grass or plants; or
- b. Whoever knowingly sells, purchases, barter, exchanges, gives, or receives any grass, plant, or seed which has been transported in violation of subsection (a); or
- c. Whoever knowingly delivers or receives for transportation, or transports, in interstate commerce, an advertisement, to sell, purchase, barter, exchange, give, or receive alligator grass or water chestnut plants or water hyacinth plants or the seeds of such grass or plants - Shall be fined under this title, or imprisoned not more than six months, or both.

Executive Order 13112:

On February 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council. The executive order requires that a council of departments dealing with invasive species be created. Currently there are 10 departments and agencies on the council.

III. Priority ANS Issues

SCDNR has identified the following as high priority ANS species and pathways for developing strategies for communicating with the public. The lists are *not* in priority order.

A. Species

1. Aquatic plants
 - a. Hydrilla
 - b. Water hyacinth
 - c. Water lettuce
 - d. Giant salvinia (*Salvinia molesta*)
 - e. Common reed (*Phragmites*)
 - f. Alligatorweed
 - g. Brazilian elodea
 - h. Water primrose
 - i. Other species on the illegal possession list
2. Avian Vacuolar Myelinopathy (AVM)
3. Zebra mussels
4. Rapana whelk
5. Green mussel
6. Aquarium pets
7. Ornamental pond species
8. Invasive fish
 - a. Spotted bass
 - b. Flathead catfish
 - c. Blue catfish
 - d. White perch
 - e. Green sunfish

9. Fish, shellfish and shrimp diseases
10. Invasive bait fish and shrimp
11. Grass carp
12. Invasive aquaculture species
 - a. Oysters (*Crassostrea ariakensis*)
 - b. Non-native shrimp (Pacific white shrimp and freshwater prawn) and shrimp larvae
 - c. Freshwater and marine baitfish
 - d. Silver, bighead and black carp
 - e. Non-native crayfish (Australia (red claw) crayfish)
13. Beach vitex (*Vitex rotundifolia*)

B. Pathways (audiences)

1. Ports and shipping (ballast water)
2. Plant nursery trade
3. Recreational boaters
4. Aquarium pet stores, Internet sales of invasive plants and animals, and aquarium owners
5. Commercial aquaculture
6. Recreational anglers
7. Bait dealers
8. Food products
9. Public zoos, aquariums and botanical gardens

IV. Original pathway and location of ANS in the state

The following describe pathways and other pertinent facts:

A. Aquatic plants

Aquatic plants could be transferred through boat traffic or sales and distribution by wholesale and retail dealers or individual landowners.

1. Hydrilla
 - a. *Dioecious hydrilla* was first found in 1982 in Lake Marion near a fishing camp. It has spread to 11 public waterbodies and over 55,000 acres throughout the state.
 - b. *Monoecious hydrilla* in J. Strom Thurmond Reservoir on the South Carolina/Georgia border and North Carolina reservoirs near Charlotte threatens to spread to South Carolina waters.
 - c. Hydrilla has been in USACOE reservoirs for six years. Both forms most likely were introduced inadvertently by boaters or anglers from out of state (*Dioecious* from Florida and *Monoecious* from North Carolina).
2. Water hyacinth
 - a. Water hyacinths have been in the state prior to 1980 with the largest concentration in water bodies near Charleston such as Back River Reservoir, Cooper River and Goose Creek Reservoir.
 - b. Water hyacinths have spread south to the Ashepoo River and Savannah River, north to the Waccamaw River and PeeDee River, and northwest to upper Lake Marion.
 - c. Infestations have been found in small private ponds in Lexington County near Columbia.

- d. Water hyacinth possibly was introduced by homeowners discarding water garden plants.
3. Water lettuce
 - a. Water lettuce was first found on the Waccamaw River near Brookgreen Garden in 1991; however, cold winter temperatures apparently eliminated that population.
 - b. First occurrence in Waccamaw River is thought to originate from Brookgreen Garden population.
 - c. Water lettuce seems to come and go as a problem; it currently is present in Goose Creek Reservoir.
 - d. Goose Creek Reservoir population likely came from infestation of an upstream subdivision lake, the infestation of which probably came from homeowner introduction from a water garden.
4. Giant salvinia
 - a. Giant salvinia was first found in South Carolina in 1995 in a private pond in Colleton County. The introduction originated from contaminated shipment of water garden plants from California. Close coordination and rapid response between SCDNR, Clemson Extension Service, and USDA resulted in successful eradication in 1995.
 - b. New population was found in 2004 in a Jasper County plantation pond. The introduction again originated from contaminated water garden plants purchased in Georgia.
 - c. Populations of giant salvinia in North Carolina and Georgia provide a close source for new infestations in South Carolina. Distribution is localized currently.
5. Common reed (*Phragmites*)
 - a. Phragmites was first noticed in the 1970s in waters near Georgetown; it is still most problematic in this area.
 - b. Original introduction to South Carolina is rumored to come from contractors' contaminated dredge equipment from northern states who were working on USACOE projects.
 - c. Phragmites populations are increasing in South Carolina. The coverage of this plant is not fully known in South Carolina, but it is spreading. It is more commonly found in freshwater impoundments for waterfowl.
 - d. Phragmites is not a problem in major reservoirs.
6. Alligatorweed
 - a. Alligatorweed is found throughout South Carolina but is most problematic in waters in the northern Pee Dee Basin.
 - b. Biological control agents introduced many years ago, such as alligatorweed fleabeetles and stem borer moths, keep populations in most of the state under control.
 - c. Original pathway of introduction is unknown, but likely originated from aquarium disposals
7. Brazilian elodea
 - a. Small amount of Brazilian elodea is in Richard B. Russell Lake managed by USACOE.
 - b. Brazilian elodea was the most problematic submersed aquatic plant in South Carolina prior to the introduction of hydrilla in 1982.

- c. Populations have been identified in the Saluda River below Lake Murray, Savannah River near Augusta, Waccamaw River and small ponds upstate.
 - d. Original pathway of introduction is unknown.
 - 8. Water primrose
 - a. Water primrose is found throughout the state in man-made impoundments but is most problematic from the fall line to the coast.
 - b. Populations in Back River Reservoir, Goose Creek Reservoir, the Santee Cooper lakes.
 - c. Original pathway of introduction unknown.
- B. Avian Vacuolar Myelinopathy (AVM)
 - 1. AVM was diagnosed in Arkansas in the winter of 1994 to 1995 and in South Carolina four years later. The disease has been confirmed every year since 1995 at four South Carolina reservoirs: J. Strom Thurmond Lake, Lake Murray and Par Pond, and L Lake on the Savannah River Site.
 - 2. Probable cause is a toxic algae that seems to prefer hydrilla as a substrate to grow. AVM occurred at Grey Lake in Arkansas on elodea. So it probably is not specific to hydrilla.
 - 3. Original pathway of introduction is unknown.
- C. Zebra mussels
 - 1. While zebra mussels have not yet been found in South Carolina, they occur nearby (near Knoxville, Tennessee) and threaten to invade the state's waterways.
 - 2. A statewide zebra mussel risk assessment indicated that water quality conditions (soft water) should inhibit the growth and reproduction of zebra mussels in most of the state; however, water quality conditions are more favorable in the middle Piedmont region from York County to McCormick County, the Intracoastal Waterway near Georgetown, portions of the Cooper and Ashley rivers near Charleston, and the Savannah River near Savannah, Georgia.
 - 3. No zebra mussels have occurred in the boundary waters of the USACOE reservoirs.
- D. Rapana whelk
 - 1. It was found in 1998 in Virginia waters, where the state is conducting much research on it. May expand to South Carolina.
- E. Green mussel
 - 1. An introduced marine species, it possibly is invading the Savannah River.
- F. Aquarium pets
 - 1. Aquarium pets have been released by owners in other parts of the country, notably the discovery of reproducing snakehead fish in waters of Maryland and other states.
 - 2. Many pets are tropical or subtropical species and may survive South Carolina winters. Some species may survive the winter in temperate climates by taking refuge in spring-fed waters that do not get as cold in the winter or in thermal effluents of power plants or other industrial facilities.

3. No comprehensive information is available on the distribution of aquarium fish or other pets in South Carolina.

G. Ornamental pond species

Location:

1. There are an estimated 70,000 private ponds in South Carolina. Ornamental pond owners can go on the Internet and find nonnative species of fish, other animals and plants that they import. Pond owners may be putting fish and other species in ponds where they can escape.

Location of ornamental mollusks:

1. Sandy beaches of Lake Marion, a large impoundment of the Santee River about 50 to 60 miles west of Charleston, have been covered by wracks composed almost entirely of millions of viviparid shells. The shells were a mixture of approximately 95 percent *Viviparus subpurpureus* and 5 percent *V. georgianus*. This is the first known report of *V. subpurpureus* in an Atlantic drainage, as well as the first report that this species can be invasive.

Native to Southeast Asia, *Bellamyia japonica* were first introduced to North America in the late 1890s and have now become firmly established in the United States and healthy populations have become established in South Carolina (Jonesville Reservoir, Lake Greenwood, Lake Marion). It was spread by water garden hobbyists.

H. Invasive fish

1. *Spotted bass* are not native to South Carolina. They are found in the Tennessee drainage, Lake Lanier in Georgia and parts of Alabama. They appear to have been illegally introduced into South Carolina waters by anglers. They are now found in lakes Jocassee, Keowee, Hartwell and Russell. Spotted bass are competing and hybridizing with native redeye bass. They appear to correlate with declines in crappie fisheries in some areas.
2. *Flathead and blue catfish* are native to the Mississippi River drainage. They were introduced into South Carolina during the 1960s into J. Strom Thurmond Lake and Santee Cooper lakes. They have become a popular fishery in the Santee Cooper system. These catfish species have become established in a number of coastal rivers and upstate lakes never intended for introduction. The Edisto, a blackwater river, has seen a decline in native catfish species and redbreast sunfish after the unauthorized introduction of flathead catfish.
3. *White perch* have become established throughout the state and have competed against white bass. White perch are native to coastal rivers but have been moved to upstate reservoirs and may be competing with the crappie fishery.
4. *Green sunfish* are nonnative and has been introduced in Piedmont rivers and streams where it could be having an effect on native species of warmwater streams.

I. Fish, shellfish and shrimp diseases

1. The main risk of bringing in *disease* relates to saltwater shrimp. Health certification is only required for shrimp and shellfish (clams).

2. There is a large industry of *hard clams* being shipped as small seed from hatcheries in Maine and New Jersey, then are grown out and shipped back from South Carolina.
 3. There have been some issues recently in Virginia and South Carolina about concerns related to *southern clams*, which are more susceptible to *disease* (specifically QPX or Quahog parasite unknown).
 4. *Largemouth bass virus* (LMBV) is not confirmed in any USACOE reservoirs. The Santee Cooper lakes are the first location where LMBV was found in the U.S.
 5. *Nonindigenous shrimp* are in the markets for consumption. Consumers buy live shellfish for consumption from out-of-state sources. On occasion, they dispose of live leftover shellfish or shells and heads into the waters. In doing so, they are creating pathways for disease introduction.
 6. *Shrimp* used for bait could be carrying disease, even in dead form.
- J. Invasive bait fish and shrimp
1. Bait fish introduction of *blue-backed herring* occurred in late 1970s to early 1980s.
 2. A number of dealers sell fish for private pond stocking and are restricted to use of approved species.
 3. There is interest in raising *rudd* for bait, but it is illegal currently.
 4. Nonnative *fathead minnows* are used for bait or forage.
 5. *Threadfin shad* are established and not a big concern; they can be used as bait. Anglers use shad and herring as bait for striped bass and catfish fishery.
 6. *Shrimp* used for bait could be carrying disease, even in the dead form.
- K. Grass carp
1. *Triploid (sterile) grass carp* have been used since 1985 to control invasive hydrilla in some public reservoirs and other nuisance aquatic vegetation in numerous private ponds.
 2. Diploid grass carp are illegal to import and stock in South Carolina.
 3. One facility uses *diploids* for triploid production under special permit.
- L. Invasive aquaculture species
1. There is an aquaculture interest in using *non-native clams, shrimp, fish* and *oysters* such as *Crassostrea ariakensis* (introduced in Chesapeake Bay) for bottom culture or cages along coastal and offshore areas.
 2. Saltwater aquaculture facilities raise nonnative shrimp, mostly *Pacific white shrimp* (*Litopenaeus vannamei*) and *some freshwater prawn* (*Macrobrachium*) for aquaculture.
 3. *Shrimp larvae* are imported from hatcheries elsewhere in the country, mostly from Texas and Florida.
 4. Nonindigenous *Australian (red claw) crayfish* is under consideration for aquaculture use in South Carolina.
 5. Use of *triploid grass carp* in private ponds is permitted, which is the majority use for grass carp. Most grass carp are spawned and reared out-of-state, then sold directly by the dealer or grown out before selling.

M. Beach vitex (*Vitex rotundifolia*)

1. Beach vitex is used for sand dune stabilization along the coast; this is a terrestrial species that is impacting marine turtle nesting in beach dunes.

V. Current and potential damages of high priority species

The cost of controlling exotic species in the United States increases every year. Consumers pay for this cost through higher water and electric bills. A Cornell University study suggests that exotic species cost the U.S. about \$148 billion annually. Many costs are concentrated around the Great Lakes and in Florida, which have had a variety of exotic species (e.g., zebra mussels, round gobies, ruffe, sea lampreys, spiny water fleas) for a much longer period of time than South Carolina waters have experienced. Those exotics are coming to South Carolina, however. South Carolina already has a number of aquatic invasive plants and a variety of other exotic organisms for which control costs increase daily.

South Carolina has a number of species of exotic plants and animals, most of which have had negative impacts on native animals and plants, ecosystem health and the economy.

Some negative impacts of high priority species are outlined below. In some cases, impacts of invasive species may be difficult to predict and measure.

A. Aquatic plants

1. Hydrilla

Damages caused:

- a. Hydrilla is the most problematic aquatic plant in the state with over \$14 million spent since 1982 in controlling 58,000 acres statewide.
- b. In 1991, hydrilla was responsible for impinging and shutting down the St. Stephen Hydroelectric Project on Lake Moultrie, leading to \$4 million in lost electric power and associated costs, as well as the largest fish kill in South Carolina history with \$525,000 in lost game fish.
- c. Hydrilla reproduces primarily by tubers and fragmentation. It forms a canopy over the surface of the water, which may result in shading of beneficial plant beds. This decreases plant diversity by displacing beneficial native submersed species and forming monocultures.
- d. It impedes public access and use of public waters by blocking boat ramps and marinas.
- e. It creates mosquito breeding sites by growing to water surfaces.
- f. Hydrilla impairs boating activities (sailing, motor boats and jet skies) in infested areas.
- g. Lakefront residents have limited access to open water and complain of decreased property value due to hydrilla infestations.
- h. It clogs municipal and industrial water intakes, as well as cooling water intakes for electric power plants.

Potential benefits:

- a. Hydrilla grows prolifically and establishes large weed beds fairly quickly, providing habitat for freshwater game fish. These benefits vary according to the degree of infestation in a lake system.

- b. Some waterfowl hunters and anglers oppose the control of hydrilla because it eliminates what they perceive as good habitat; they can more easily harvest fish and waterfowl near hydrilla beds.
2. Water hyacinth (*Eichhornia crassipes*)
 - a. Water hyacinth is the second most problematic invasive aquatic plant in South Carolina with about \$1 million spent on control since 1980. Annual treatments help keep this prolific plant in check in most areas.
 - b. Its floating mats block public access and use of lakes at boat ramps; it also covers coves and shoreline areas.
 - c. Floating mats clog industrial, municipal and electric power plant water intakes.
 - d. Large infestations inhibit water flow causing upstream flooding during heavy rain events.
 - e. By forming new plantlets, a population can completely dominate and obstruct a body of water in a short period of time. Native species are excluded, and large populations may affect water quality.
3. Water lettuce (*Pistia stratioides*)
 - a. Water lettuce forms large floating mats that impair water flow, public access and use of waterways, and clog water intakes.
 - b. Large populations can completely cover the water surface in small lakes and small coves of large lakes and degrade water quality and impact native plants and animals.
 - c. This species reproduces rapidly from a single plant and is easily spread to other water bodies by man.
4. Giant salvinia (*Salvinia molesta*)
 - a. Giant salvinia can impact irrigation systems, navigable waters, fisheries, electric power production, and municipal and industrial water intakes.
 - b. Giant mats reduce light penetration and result in oxygen depletion. As light becomes limiting, it affects the growth and survival of phytoplankton and vascular plants. Oxygen depletion may be so severely reduced beneath a mat that it influences fish survival. Extensive mats may exacerbate a situation because they prevent water circulation and mixing.
5. Common reed (*Phragmites*)
 - a. *Phragmites* populations are encroaching on waterfowl habitat along the coast. It is not a good waterfowl food and it outcompetes native plants that provide food and habitat for waterfowl.
 - b. *Phragmites* has become a problem in estuaries and marsh ecosystems.
 - c. *Phragmites* resembles marsh grass but is taller and outgrows the native aquatic plants. It grows up to 10 feet tall and forms a monoculture, where other plants cannot compete.
 - d. *Phragmites* can block drainage.
6. Alligatorweed
 - a. Alligatorweed displaces of native vegetation.
 - b. It disrupts navigation and recreation by the formation of impenetrable mats.
 - c. It decreases water flow and uptake for agricultural, municipal and industrial purposes.
 - d. It expands of human health risks with increases in mosquito breeding habitats.

7. Brazilian elodea
 - a. After Brazilian elodea has been introduced into a lake it grows rapidly and creates dense mats on the waters surface. These mats will choke out native plants that don't grow as quickly.
 - b. It impedes boating, fishing, swimming, water skiing and other aquatic activities.
 - c. The mats are unsightly and provide poor habitat for fish.
 - d. It will form a monotypic stand that can become so dense that water movement is restricted.
 - e. The fragmented pieces can clog water intake pipes.
 - f. It will cause fluctuations in water quality, and it traps sediment.
 8. Water primrose (*Ludwigia hexapetala*)
 - a. This shoreline plant is very difficult to control due to extensive underground rhizomes.
 - b. Unlike most shoreline species new shoots can float on the water surface and extend far from shore.
 - c. Adverse impacts include restricted public access to waterways and use of shoreline areas, impaired navigation in small channels, restricted water flow, formation of free-floating mats, and clogging of water intakes.
- B. Avian Vacuolar Myelinopathy (AVM)
1. AVM breaks down the central nervous system and causes brain lesions in birds. So far, eight species of birds ranging from waterfowl to great horned owls and eagles to killdeer have been confirmed as victims of AVM, but it has not been found in mammals or fish.
 2. A bird develops symptoms five days after being introduced to an AVM site and is dead within seven days. Of Savannah River Site coots sampled in 2004, 95 percent had brain lesions even if they didn't show symptoms.
 3. University of South Carolina, Clemson University, Southeastern Cooperative Wildlife Disease Study and SCDNR are studying AVM. It is believed a blue green algae attaches to the leaves of hydrilla or other water weeds, which are eaten by birds. The blue green algae might be a new species. Waterfowl contract AVM by eating infected plants.
 4. Waterfowl with AVM are consumed by bald eagles and other raptors, which also contract AVM and die. In 2002, six of 11 breeding pairs of eagles on J. Strom Thurmond Lake died due to AVM. Nesting there plummeted from 11 territories to one in just two years.
- C. Zebra mussels
1. Statewide risk assessment indicates that water quality is generally not suitable for growth and reproduction of zebra mussels. However, a few locations along the coast near ports may support zebra mussel growth.
 2. Recreation would be negatively impacted by zebra mussels. Unprotected docks, breakwalls, boat bottoms and engine outdrives can be rapidly colonized.
 3. Beaches are also affected by zebra mussels. The sharp-edged mussel shells along swimming beaches can be a hazard to unprotected feet.

4. The growth of zebra mussel populations can cause ecological consequences throughout an aquatic community, especially because they remove large percentages of primary producers, which may reduce the energy available to food webs.
5. When zebra mussels impact aquatic communities, recreational angling will suffer.
6. Another negative impact of the zebra mussel is its ability to remove contaminants from the water and concentrate them on the lake floors and shorelines.
7. Zebra mussels can colonize on all species of clams and mussels. Clams covered with zebra mussels cannot open their valves and as a result are smothered. As a result of zebra mussel invasions, the rich diversity of the mussel and clam community can be reduced because of the extinction of some native species.
8. Industries, including hydropower, production facilities and water utilities that take water from inland waters, would incur costs of removing zebra mussels from clogged intake pipes.

D. *Rapana* whelk

1. *Rapana* whelk is a mollusk native to Japan. It is very fertile and tolerant of low salinities and poor water quality. It grows up to 7.2 inches.
2. It has as a potential of causing harm. It is carnivorous, devouring shellfish; it affects hard clams offshore.

E. Green mussel

1. The green mussel competes against native mussels in terms of habitat.
2. Not much is known about it yet.

F. Aquarium pets

1. Aquarium pets have been found reproducing in waters of other states and may compete with desirable species for food or space.
2. People catch *pacu* and *piranha* occasionally in public waters, but aquarium species have not become established anywhere in South Carolina.
3. These animals may carry diseases or parasites that affect native species.

G. Ornamental pond species

1. Private pond and aquarium owners can go on the Internet and find nonnative species of fish, other animals and plants that they can import for ornamental ponds and aquaria.
2. There is not as much control on ornamental pond species as there is on plants produced for food consumption.
3. Owners can put fish and other animals in ponds where they can escape during flood events or by natural dispersal.
4. Potential damages have not been assessed.

H. Invasive fish

1. Spotted bass:
 - a. Spotted bass populations are not native to South Carolina. They are found in the Tennessee drainage not far away and were probably illegally introduced by anglers. They are quite prolific where they have established themselves and may

be competitively displacing largemouth populations in upstate Piedmont and mountain lakes, as they are in Lake Lanier in Georgia.

- b. Spotted bass seem to dominate the fishery in good largemouth bass lakes. Bass anglers are catching them in good numbers because of their relatively large population size. They seemed to be easier to catch, but the populations are so great that average size is going down compared to largemouth bass.
 - c. Spotted bass are hybridizing with red-eye bass (*Micropterus coosae*), which is a native Piedmont mountain bass. The red-eye bass does not attain a large size like largemouth bass or support a large fishery, but hybridization may be eliminating this native bass species.
2. Flathead and blue catfish:
 - a. Flathead catfish and blue catfish are native to the Mississippi drainage and were introduced into lake systems in South Carolina during the 1960s. They thrived and became popular in lakes, especially in the Santee Cooper system. Flathead and blue catfish now support a large recreational and commercial fishery. These top predators are not native. They are now found in the Edisto River and several coastal plain rivers, where they have negatively affected a previously popular fishery for native catfish and redbreast sunfish. These species would be able to survive in any water in the state.
 3. White perch:
 - a. White perch have displaced white bass, which aren't native to the state but were managed as a sport fishery in upstate reservoirs.
 4. Green sunfish:
 - a. No information is available on how green sunfish have affected native fish fauna in Piedmont rivers and streams.
 5. General information:
 - a. At the present, there is no strict law against moving fish that are established in the state. One can move fish without a stocking permit into ponds. Fish can escape from their ponds and become established in public waters.
- I. Fish, shellfish, and shrimp diseases
 1. A primary concern for nonindigenous *shrimp* farming is disease amplification and release.
 2. Aquaculture producers are very concerned about all other unregulated pathways for introducing *disease*. There are five saltwater aquaculture production facilities, which are competing economically with local shrimp boats and imported shrimp.
 3. There is a large industry of *hard clams* shipped as small seed from hatcheries in Maine and New Jersey, grown out and shipped back. There have been some issues with Virginia and South Carolina producers concerning bringing in *southern clams*, which are more susceptible to disease (QPX).
 4. *Taura syndrome*, *yellow head* and *white spot* disease can be transmitted by disposal of body parts, either after human consumption or when used as bait. There is evidence of disease transmission from dead to live shrimp or other native crustaceans.

J. Bait fish and shrimp

1. *Blueback herring* are native to the basin in South Carolina, but are causing problems in oligotrophic lakes inland in Georgia.
2. There is the potential for *zebra mussels*, *invasive plants or animals*, *associated diseases* and *parasites* to transfer into South Carolina waters on bait.
3. Dead or live *shrimp* used for bait can carry disease.
4. South Carolina has not had a problem with other species of bait to date.

K. Grass carp

1. Grass carp can impact the plant community structure. Grass carp consume only preferred aquatic vegetation as long as these species of plants are available.

L. Invasive aquaculture species

1. Aquaculture producers are interested in bringing in the oyster *Crassostrea ariakensis*, which has been introduced in the Chesapeake Bay for bottom culture or cages. The potential for invasiveness and disease introduction is under consideration.
2. Primary impacts of *nonindigenous shrimp farming* on existing aquaculture and native crustacean populations could arise from unintentional release and genetic mixing.
3. Native shrimp provide an important capture fishery along the coast and may be damaged due to importation of nonnative competitive species, genetic mixing with highly inbred production stocks, and introduction of associated diseases.
4. People raise freshwater and saltwater baitfish, but on a small scale.
5. Known high-risk species are *rudd*, *walking catfish*, *diploid grass carp*, *freshwater electric eel*, and *piranha*. Many others are available that are known to be a problem from the experiences in other states. All proposed introductions have to go through the review system for use in research, education, aquaculture and other uses.
6. *Silver*, *bighead* and *black carp* have been a problem in other areas.
7. Use of *sturgeon* in aquaculture may become an issue. South Carolina has the endangered short nose sturgeon and Atlantic sturgeon.
8. South Carolina permits raising nonnative *Macrobrachium* crayfish for food. There is no information on what their effects could be on native fauna or on potential transfer of disease to saltwater shrimp industry. Most of the crawfish raised in the state for food are native species, such as red crayfish.

M. Beach vitex

1. Problems on the coast are still being investigated with this plant, which is used for sand dune stabilization.
2. The plant crowds out beneficial species such as American beach grass and sea oats.
3. The plant interferes with nesting of sea turtles, a protected aquatic species.

VI. Potential actions needed to reduce the negative impacts of ANS

Specific actions by target audiences are outlined for each of the high priority species.

A. Audience: Ports and shipping (ballast water)

1. Risk of transferring:

- Zebra mussels and Asian clams
- Rapana whelk
- Green mussel
- Fish, shellfish, and shrimp diseases

2. Desired actions (general):

- Recognize potential for problems, but SCDNR is not in regulatory position to do anything. If federal controls were put into place, South Carolina would be expected to take an enforcement role.
- Look for and report spread or locations of new introductions.
- USCG and South Carolina Ports Authority should enforce ballast water regulations to minimize potential introductions of ANS.

3. For zebra mussels:

- Private sector members (power companies, water treatment facilities) should monitor for settlement of zebra mussels.
- Implement recommendations in 2002 State Zebra Mussel Risk Assessment:
 - Implement prevention measures focused on public education and awareness; include brochures, public service announcements and trade show presentations.
 - Post signs at boat launch sites on public waterways instructing boaters to take precautions to prevent introduction and transport of zebra mussels.
 - Water dependent industries in high risk areas of the state should monitor for zebra mussels and prepare management plans.
 - Commercial vessels should prevent ballast water discharges at ports of Georgetown, Charleston and Savannah.
 - State Zebra Mussel Task Force should continue to meet periodically to maintain effective network of interested parties and keep current on zebra mussel status.

B. Audience: Plant nursery trade (aquatic and wetland plants)

1. Risk of transferring:

- Aquatic plants
- Ornamental pond species
- Beach vitex

2. Desired actions (general):

- SCDNR and Clemson Dept. of Plant Industry should work with the South Carolina Nursery and Landscape Association for education and self-enforcement of the major nurseries.
- Work with association regarding how to prevent spread of zebra mussels that can attach to aquatic plants or associated equipment.

- Prevent infestation of unconnected waters through human dispersal, such as transporting with container stock.
 - Landowners and water users search for, identify, detect and report early infestations.
 - Comply with state laws on possession and distribution of invasive plants.
 - Eradicate small infestations with appropriate control methods.
 - Foster interagency network and response plans for quick response to new infestations.
3. For giant salvinia:
 - Resource managers need to know what kinds of infestations may be occurring in waterways and plantations.
 - SCDNR and USDA need quick strike capability before a new infestation gets too big to control.
 - State and federal agencies need to network and cooperate with partners.
 4. For AVM:
 - State and federal agencies need to support on-going research to get conclusive results to identify precise species and causes of death as soon as possible.
 5. For common reed (*Phragmites*):
[Note: Where there is no public access, federal funding cannot be used for control.]
 - SCDNR should work on *Phragmites* control in the Santee Coastal Reserve and other state-owned areas.
 - Need to conduct statewide *Phragmites* survey to document extent of problem and develop and implement management plan.
 6. For salt marsh grass (*Spartina*):
 - Avoid transfer of native plants from South Carolina to other states where they are a nuisance or illegal to possess.
 7. For beach vitex:
 - Consider risks and avoid using invasive plants for erosion control.

C. Audience: Recreational boaters

1. Risk of transferring:
 - Aquatic plants
 - Avian Vacuolar Myelinopathy (AVM)
 - Zebra mussels
2. Desired actions:
 - Boaters should prevent infestation of unconnected waters through human dispersal, such as transporting boat trailers.
 - Natural resource professionals using electro-shocking boats and commercial fishers should use the Hazard Analysis and Critical Control Point (HACCP) process to prevent transfer of invasives between waters.
 - Inspect motorized boats and trailers at public launches.
 - Post boat ramp signs reminding boaters to remove plants and animals prior to launching and leaving the ramp. Include invasive species warning/reminder in boat and fishing licensing material.

D. Audience: Aquarium pet stores, including internet sales of invasive plants and animals, and aquarium owners

1. Risk of transferring:

- Aquatic plants
- Zebra mussels
- Aquarium pets
- Ornamental pond species

2. Desired actions:

- Comply with regulations against stocking any animals into South Carolina waters without a permit, including snakehead fish.
- Suppliers should comply with regulations regarding species that are on state or federal lists as illegal to possess or sell.
- Avoid transfer of native plants from South Carolina to other states where they are a nuisance or illegal to possess.
- Pet owners should take responsibility to understand the size and feeding requirements prior to purchasing a pet.
- Pet owners should dispose of unwanted pets by legitimate means.
- Report illegal sales or release of aquarium species.
- Report discovery of new introductions.

E. Audience: Commercial aquaculture

This audience includes aquaculture producers, fish suppliers, lake associations and private pond owners that purchase grass carp or other fish for vegetation control and recreational use.

1. Risk of transferring:

- Aquatic plants
- Zebra mussels
- Fish, shellfish, and shrimp diseases
- Bait fish
Grass carp
- Invasive aquaculture species

2. Desired actions:

- Increase public understanding of the risks associated with diploid grass carp stocking.
- Report illegal sales or distribution of diploid grass carp.
- Use alternative means for vegetation control.
- Prevent plant infestations to avoid need for vegetation control by carp or other means.
- Continue and adequately support DNR's sterile grass carp inspection program.
- Risks associated with bringing in *Crassostrea ariakensis* (introduced in Chesapeake Bay) for bottom culture or cages are under investigation and will be addressed through the regulatory system.

F. Audience: Recreational anglers

Recreational anglers introduction of fish species, invasive plants, or associated diseases and parasites by releasing baitfish, sport and rough fish, and illegal plants into public waters.

1. Risk of transferring:

- Aquatic plants
- Avian Vacuolar Myelinopathy (AVM)
- Zebra mussels
- Invasive fish (spotted bass, flathead catfish, blue catfish)
- Invasive bait fish and shrimp

2. Desired actions:

- Recreational anglers should prevent transfer of fish and illegal invasive plants into lakes and waters.
- Anglers should comply with rules that do not allow the import and release of fish or bait without a permit.
- Anglers should comply with administrative rule listing approved fish species.
- Anglers should avoid use of live bait.
- Anglers should dump bait on land or in the trash when finished fishing.
- Anglers should not use shrimp as bait unless it comes from South Carolina.

G. Audience: Bait dealers

1. Risk of transferring:

- Invasive bait fish and shrimp
- Aquatic plants
- Zebra mussels

2. Desired actions:

- Dealers should purchase species that are native or naturalized in South Carolina.
- Use HACCP procedures to look for unauthorized bait species in their stocks.
- Use HACCP procedures to check stock tanks for invasive plant fragments and zebra mussels.

H. Audience: Food retailers

1. Risk of transferring:

- Fish, shellfish and shrimp diseases

2. Desired actions:

- Buyers should not dispose of shrimp body parts when heading or peeling shrimp by throwing it overboard, as it can be a pathway for disease introduction.

I. Audience: Public zoos, aquariums, and botanical gardens

1. Risk of transferring:

- Aquatic plants
- Zebra mussels
- Aquarium pets
- Ornamental pond species
- Fish, shellfish and shrimp diseases

2. Desired actions:

- Facilities should contain exotic and potentially invasive species that are on display or in the facility.
- Facilities should promote owner responsibility for any sales or plants or animals associated with the institution.
- Facilities should consider providing a means of or information on disposal for unwanted aquarium pets or invasive aquatic plants as a service to the public.
- Facilities should properly dispose body parts and treat wastewater from the facility that may transmit diseases.

VII. General stakeholders in ANS issues

- Recreational fishing clubs
- Commercial fishing
- Aquaculture organizations
- Boat dealers
- Tackle and fly shops
- Boating or yacht clubs
- Voluntary water monitoring or cleanup groups
- Canoe liveries
- Marinas
- Bait dealers
- Waterfront property owners associations
- Duck or waterfowl hunting clubs
- State and local chapters of environmental organizations
- School biology programs
- University researchers
- Municipal Water Suppliers
- Electric Power Companies
- Zoos and Aquariums

VIII. Potential messages for target audiences and existing promotional tools for each ANS

General messages:

- The overriding message needs to be that non-native invasive aquatic species are not welcome in South Carolina waterways.
- The public and commerce representatives need to assist in keeping them out of the state.
- Once ANS are here, we need to aggressively control their growth and spread.

A. Audience: Ports and shipping (ballast water)

Potential new messages:

- Exchange ballast water offshore.

Existing promotional tools:

- Sea Grant publications on invasive species and proceedings from related conferences is available at <http://web.mit.edu/SEAGRANT/pubs/>
- Sea Grant holds the International Conference on Marine Bioinvasions every two years. The last event was held in 2003. Proceedings is available at link above.
- In April 2003, the director of NOAA's Great Lakes Environmental Research Lab told Congress that the invasion of alien species via ballast water "represents the greatest immediate threat to most coastal state ecosystems." He said over 2/3 of the recent introductions of non-native species to marine and coastal areas are likely from ships <http://www.legislative.noaa.gov/Testimony/042903brandt.pdf>
- Information on replacing coastal water with open-ocean water during a voyage as the only effective way to mitigate the problem:
http://invasions.si.edu/NBIC/nbic_mgmt.htm

For rapana whelk:

- Sea Grant has a fact sheet on Rapana whelk (http://www.aquaticinvaders.org/nan_ld.cfm)

For zebra mussels:

- *Zebra Mussels in South Carolina: The Potential Risk of Infestation*. S. de Kozlowski, C. Page, and J. Whetstone. SC Zebra Mussel Task Force, SCDNR, SC Sea Grant, Clemson University. 2002. Includes map indicating colonization risk of waterways. 14 pages.
- *Zebra Mussel Watch Card*. University of Wisconsin Sea Grant.
- *Zebra Mussels: Holding Back the Tide*. Coastal Heritage 11(4):10-12.
- *Aquatic Exotic: Sea Grant Resources on Zebra Mussels*. University of Wisconsin Sea Grant. 23 pages.
- *Don't Pick up Hitchhikers! Slow the Spread of Zebra Mussel*. Pamphlet.
- Zebra mussels <http://water.dnr.state.sc.us/water/envaff/aquatic/zebra.html>

B. Audience: Plant nursery trade (aquatic and wetland plants)

Existing messages:

- Prevent infestation of waters through human dispersal, such as transporting with container stock.
- Landowners and water users search for, identify, detect and report early infestations.
- Comply with state laws on possession, sale, and distribution of invasive plants.
- Eradicate small infestations with appropriate control methods.

Potential new messages:

- Beneficial native plants in South Carolina may be a nuisance in other states (e.g., salt marsh grass in the state of Washington) and should not be transported out of the state.

Existing promotional tools:

- *Anacharis – Warning!* pamphlet from SCDNR
- *Special Salvinia Alert!* pamphlet from SCDNR
- *Aquatic Plant Management in South Carolina* pamphlet from SCDNR

- *Aquatic & Wetland Plants of South Carolina* by C.A. Aulbach-Smith, S.J. de Kozlowski, and L.A. Dyck. June 1996. SCDNR. Color photos and line drawings. 128 pages.
- *Triumph of the Weed*. Coastal Heritage 16(3), Winter 2001. SC Sea Grant Consortium. Articles in 13 pages on invasive aquatic plants and animals, including *Phragmites*.
- *Phragmites: Native or Introduced?* University of Maryland Center for Environmental Science. 4 page 8.5"x11" brochure.
- *Phragmites australis Reaches Lofty Heights During Jewish Holiday*. 4 page 8.5"x11" brochure. Michael P. Weinstein.
- *Phragmites australis: A Sheep in Wolf's Clothing?* Proceedings from the Technical Forum & Workshop, 6-9 January 2002, Cumberland County College, Vineland, NJ. 62 pages.
- Illegal aquatic plants of South Carolina (booklet and website)
<http://water.dnr.state.sc.us/water/envaff/aquatic/illegal1.html>
- Illegal aquatic plant species list
<http://water.dnr.state.sc.us/water/envaff/aquatic/img/illegal.pdf>
- *Salvinia molesta*, possibly the world's worst weed
<http://www.saj.usace.army.mil/conops/apc/salvinia.pdf>
- Giant Salivina Task Force <http://www.scapms.org/scapmssalvinia1.html>
- Hydrilla coverage map for Lake Murray
<http://water.dnr.state.sc.us/water/envaff/aquatic/img/2002coverage.pdf>
- Avian Vacuolar Myelinopathy: Eagles suffer from brain disease caused by toxic algae <http://www.scapms.org/eagleavm.html>
- Anacharis <http://water.dnr.state.sc.us/water/envaff/aquatic/img/anacharisalert.pdf>
- Water chestnut <http://www.iisgcp.org/EXOTICSP/waterchestnut.htm>
- Regulatory information <http://dpi.clemson.edu>
- 2003 SC Aquatic Plant Management Plan. 145 pages. (hard copy and website)
<http://water.dnr.state.sc.us/water/envaff/aquatic/plan.html>
- South Carolina Aquatic Plant Management Society <http://www.scapms.org/>
- Grass carp stocking
<http://water.dnr.state.sc.us/water/envaff/aquatic/lkmurraycarp.html>
- Aquatic Plant Management Society grade school workbook
- Sea Grant hosted workshop on *Phragmites* in New Jersey with significant participation from the East coast.
- See zebra mussel materials under Ballast Water.

C. Audience: Recreational boaters

Existing messages:

- Information on AVM, causes, birds affected, research and who to call.
- Report birds displaying signs of AVM during the winter on inland reservoirs.
- Remove all plant material from boat motor and trailer before entering and leaving a water body.
- Do not introduce hydrilla and other invasive aquatic plants to public waters; it is illegal and harmful to the aquatic environment.

Potential new messages:

- Do not transfer game fish between waters.
- Transferred fish may become invasive, introduce diseases or eliminate native fish by hybridizing with them.

Existing promotional tools:

- Sea Grant produced a booklet and fact sheet (somewhat dated) about zebra mussels.
- 250 zebra mussel warning signs posted at South Carolina boat ramps.
- More than 20,000 zebra mussel identification cards have been distributed.
- Established South Carolina Zebra Mussel Outreach Program and Task Force.
- See zebra mussel materials under Ballast Water.
- See aquatic plant materials under Plant Nursery Trade.
- *Experts home in on eagle disease*, Sun News, Dec 28, 2003.
- *Why are the eagles dying?* South Carolina Task Group on Harmful Algae, Volume 4(3). Spring 2003. 4 pages with website listing.

D. Audience: Aquarium pet stores, including Internet sales and aquarium owners

Potential new messages:

- Stocking any animals into South Carolina waters without a permit is illegal.
- Dealers must comply with regulations regarding species that are on state or federal lists as illegal to possess or sell.
- Pet owners must take the responsibility of understanding the size and feeding requirements prior to purchasing a pet.
- Pet owners must dispose of unwanted pets by legitimate means.
- Landowners should ensure containment of species in ornamental ponds.

Existing promotional tools:

- Viviparid gastropods: <http://www.cofc.edu/~dillonr/29Oct03.html>.
- *About Nonnative Species of the Gulf of Mexico: Cipangopaludina chinensis*. Fact Sheet. Gulf of Mexico ANS Panel.
http://nis.gsmfc.org/nis_factsheet.php?toc_id=125.

E. Audience: Commercial aquaculture

Existing messages:

- Inspection requirements were instituted in 1996 for importing domestic species of clams.
- Shippers must sign a certification that the shipment of clams is disease free.
- If a shipment fails inspection, it is sent to a landfill, cleaned up by the shipper or sent back.
- In cold weather, South Carolina clam farmers frequently ship seed stock to Florida's waters, where the tiny clams grow for a few months before being brought home. They can bring unwanted aquatic hitchhikers back with them.
- New England clam farmers ship their tiny clams to South Carolina's estuaries to grow out during the winter. They can bring unwanted aquatic hitchhikers back with them.

- Problems can occur when aquaculture stock is moved from one region to another and back again.
- Exotic species and bivalve diseases may hitchhike with transported bivalve stock.

Potential new messages:

- Comply with the fish importation laws.
- Comply with health certification for shrimp and shellfish.
- Recognize the potential risks associated with new aquaculture species.
- Report illegal sales or distribution of grass carp or other species on the illegal possession list.
- Use alternative means for vegetation control.
- Preventing plant infestations is less costly and less risky than use of grass carp.
- Prevention of disease and containment may be the only method of control. Once diseases and fish, shrimp or other invasive aquaculture species escape, eradication or control may be difficult or impossible.
- Aquaculture has a lot to lose if diseases or invasive species are introduced that affect production.

Existing promotional tools:

- *Introductions & Transfers of Marine Species: Achieving a Balance Between Economic Development and Resource Protection.* Proceedings of the Conference and Workshop. October 30-November 2, 1991. Hilton Head Island, South Carolina. South Carolina Sea Grant Consortium. 192 pages.
- *Worries About Clams.* Coastal Heritage 11(4):11.
- *About Nonnative Species of the Gulf of Mexico: Litopenaeus vannamei* (Boone, 1931). Fact Sheet. Gulf of Mexico ANS Panel. http://nis.gsmfc.org/nis_factsheet.php?toc_id=141.
- Public information on use of grass carp to control hydrilla.
- *About Nonnative Species of the Gulf of Mexico: Taura syndrome virus.* Fact Sheet. Gulf of Mexico ANS Panel. http://nis.gsmfc.org/nis_factsheet.php?toc_id=6.
- *About Nonnative Species of the Gulf of Mexico: White spot syndrome baculovirus complex (WSBV).* Fact Sheet. Gulf of Mexico ANS Panel. http://nis.gsmfc.org/nis_factsheet.php?toc_id=7
- *About Nonnative Species of the Gulf of Mexico: Yellow head virus (YHV).* Fact Sheet. Gulf of Mexico ANS Panel. http://nis.gsmfc.org/nis_factsheet.php?toc_id=119.
- *About Nonnative Species of the Gulf of Mexico: Macrobrachium olfersii.* Fact Sheet. Gulf of Mexico ANS Panel. http://nis.gsmfc.org/nis_factsheet.php?toc_id=142
- *Zebra Mussels and Aquaculture: What You Should Know, A Blueprint for Success.* North Carolina Sea Grant. 4 pages.
- See zebra mussel materials under Ballast Water above.

F. Audience: Recreational anglers

Existing messages:

- Remove plant and animal material from boat, motor and trailers.
- Do not introduce hydrilla and other invasive aquatic plants to public waters; it is illegal and harmful to the aquatic environment.

Potential new messages:

- Identify, detect and report new locations.
- It is no longer possible to eradicate the blue-backed herring.

Existing promotional tools:

- Sale and possession of prohibited fish or eggs (SECTION 50-13-1630), http://www.lpittr.state.sc.us/sess115_2003-2004/bills/361.doc.
- Freshwater fishing regulations <http://www.dnr.state.sc.us/etc/rulesregs/img/freshfishing.pdf>.
- See zebra mussel materials under Ballast Water above.
- 250 aquatic plant and zebra mussel warning signs posted at boat ramps.

G. Audience: Bait dealers

Potential new messages:

- Dealers should purchase species that are native or naturalized in South Carolina.
- Dealers should use HACCP procedures to look for unauthorized bait species in their stocks.
- Dealers should use HACCP procedures to check stock tanks for invasive plant fragments and zebra mussels.
- It is no longer possible to eradicate the blue-backed herring.
- Not much can be done to control populations of introduced fish once they are established and having a negative impact, so the risk of irreversible impacts from illegal stocking is significant.

Existing promotional tools:

- See zebra mussel materials under Ballast Water above.

H. Audience: Food retailers

Potential new messages:

- Properly dispose of body parts to avoid disease transmission to public waters; this is critical when seafood dealers buy shrimp that still have heads on from dealers outside the state.
- Do not dispose shrimp body parts when heading or peeling shrimp by throwing it overboard, as it can be a pathway for disease introduction.

Existing promotional tools:

- *About Nonnative Species of the Gulf of Mexico: Taura syndrome virus.* Fact Sheet. Gulf of Mexico ANS Panel. http://nis.gsmfc.org/nis_factsheet.php?toc_id=6.

I. Audience: Public zoos, aquariums, and botanical gardens

Potential new messages:

- Effectively contain exotic and potentially invasive species that are on display or in the facility.
- Promote owner responsibility in exhibit areas or for any sales of plants or animals in the gift shop.
- Provide information on disposal for unwanted aquarium pets or invasive aquatic plants as a service to the public.
- Properly dispose body parts and treat wastewater from the institution that may transmit diseases.

Existing promotional tools:

- *About Nonnative Species of the Gulf of Mexico: Taura syndrome virus.* Fact Sheet. Gulf of Mexico ANS Panel. http://nis.gsmfc.org/nis_factsheet.php?toc_id=6.

IX. Top four target audiences that can have the greatest impact

All of the audiences that impact ANS are identified above. Out of that list, the South Carolina Team has selected the top four target audiences that are most important, listed from highest to lowest priority.

- A. Recreational boaters, anglers, and duck hunters.
- B. Retail and wholesale aquarium pet stores, including internet sales, and pet owners.
- C. Plant nursery trade, including internet sales, greenhouses, and farmers.
- D. Public zoos, aquariums and botanical gardens.

X. Obstacles for reducing the impact of ANS

Obstacles to implementation are provided, grouped by barriers created by lack of resources and those stemming from relationship and communication issues.

- A. South Carolina multi-agency team members and partner/user group constituents might disagree on messages, species of concern and management approaches:
 1. Some waterfowl hunters want anything that attracts ducks, even hydrilla; some anglers believe that hydrilla is necessary for a good fishery.
 2. Audiences who don't believe or like the information they are receiving through the communication strategy might undermine or not help with ANS communication and management. Some members of user groups might intentionally introduce invasive species in public waters because they think it is a good thing.
 3. Media can arbitrarily use information and news releases how they choose; it might not always be accurate or further ANS communication goals.
 4. There is controversy about hydrilla control in lakes Marion and Moultrie, operated by Santee Cooper (South Carolina Public Service Authority). Hunting clubs and some fishing clubs are concerned about using grass carp to control hydrilla. The grass carp do a thorough job of controlling plants, and some clubs have expressed concern about impacts on waterfowl and game fish.
 5. Homeowners and power companies may be in conflict with hunters and anglers over control of hydrilla in lakes.
 6. All three USACOE reservoirs are boundary waters where Georgia and South Carolina share reciprocal fishing. States stock the fish between the two states. Georgia DNR

- has opposed introduction of grass carp. SCDNR has used them extensively at the Santee Cooper Lakes and Lake Murray. The USACOE doesn't control what the states stock, but may have to balance wishes of the two states.
7. Inconsistent messages might be presented to the public via educational materials about hydrilla management. There are potential differences in approach between state and federal agencies.
 8. Occasionally politicians are contacted by certain user groups and requested to assist in some way.
 9. There are disagreements among agencies over management strategies, target species and funding targets. There are challenges to developing a cooperative effort. Different people on the Planning Team are with different agencies and levels of state government. Some concerns are not concerns to others. Marine issues are generally totally separate from freshwater issues.
- B. There is lack of funding, budgeting priority throughout the state, resources and people to carry out ANS communications goals:
1. Funding might be weak for publications or producing signs.
 2. Funding might be an issue to get information into the smaller magazines.
 3. Public meetings and outreach can be difficult because of decreased funding.
 4. DNR staff that manage public waters are strapped for funding to control ANS.
 5. Along the coast, population pressures and economic boom continue, creating opportunities and issues that need to be addressed. This effort may raise the ANS issue higher on the priority list, but it will take resources.
 6. Team needs to be sensitive to developing an efficient means to deliver key messages without burdening overworked and understaffed agencies.
 7. Disagreements exist with federal government to get state funding for ANS. State budgets have been so low that South Carolina needs federal funding. Funding has been received by the Charleston District, USACOE, but cannot be sent to the state without a signed annual agreement. The funding is a 50-50 cost share. In 2004, South Carolina requested \$300,000 but will receive less than requested. The state has some issues with the agreement. Funding will be returned if the agreement is not signed.
- C. Changing roles: DNR has removed itself from working with private ponds. If Clemson University is removed from environmental conservation/outreach, there could be a huge gap on private ponds (70,000 ponds in South Carolina with no state agency serving them). SCDNR freshwater fisheries biologists and Clemson Extension county agents are trained in ANS outreach issues, but may be affected by budget cuts.
- D. Ballast water issues: Ballast water issue may be a problem, but it is beyond state purview.
- E. General communication considerations:
1. Team must communicate with all groups such as the Native Plant Society.
 2. Team must communicate in a way that promotes positive action and not alarm or fear.
 3. Team lacks knowledge about how much audiences really know about these issues and where they can find more information.

F. Enforcement and regulatory challenges involving multi states:

1. State has problems with large-scale, multi-state groups selling plants that aren't legal. Half of fish vendors are out-of-state and bringing in species that may be inadequately regulated.
2. Plant dealers and large store chains like Wal-Mart, Lowes, Home Depot and aquarium industry reach beyond the borders of South Carolina.
3. It could be difficult to obligate retailers of food products to put a warning notice with consumables regarding the spread of diseases through disposal of body parts (e.g., shrimp). People would be less interested in the product if there were a point-of-sale notification.
4. Enforcement is difficult because bait dealers arrive from out-of-state to sell baitfish.
5. South Carolina is connected by borders, waters and commerce to other states. Species coming in from out of state that could be a concern, but state doesn't have a handle on what all is being shipped into South Carolina. Communicating within South Carolina's borders is not sufficient.
6. South Carolina doesn't have the sufficient enforcement personnel or staff to keep on top of ANS issues.

G. Policy and politics:

1. State needs to address political elements regarding controlling or handling ANS or listening to professionals that are managing the fisheries. Some leaders may be against regulation and want free use of species for commerce. State should make efforts to reach people who want lax permitting processes.
2. State currently is changing permitting processes for aquaculture and who is in charge of permitting.
3. Policy can change from one administration to the next.

XI. Opportunities for reducing the impact of ANS

A. Existing communication needs

- Freshwater fisheries concerns
- Marine organism concerns
- Aquaculture concerns
- Law enforcement education and implementation
- Grade school curriculum
- State doesn't have a coordinated communications strategy for ANS. Everyone does their own thing unless something like the Zebra Mussel Task Force is formed.
- State doesn't have a good handle on what ANS are in South Carolina. We need to extract this information and make it available.
- Very little information exists on ANS at Santee Coastal Reserve.
- Signs at public access points lack an image to show people how to identify hydrilla. The public thinks that all plants they see are hydrilla.
- State needs outreach to nursery owners and those involved in water gardening. Nurseries should be aware of ANS.
- Aquarium pet dealers need more education.

- Sea Grant's communications department produces fact sheets and brochures. It is affiliated with Clemson University. Clemson extension agents (Jack Whetstone) can help with outreach, holding meetings or workshops.
- State would be in favor of more ANS monitoring, but it doesn't have resources to address those issues. A big concern is to make sure that monitoring is done to determine impacts.
- State needs to manage ANS problems by prioritization.
- Public might not understand different levels of ANS management by agencies.
- Concerns exist about providing habitat (aquatic plant cover) if invasives are removed.
- It is expensive to control hydrilla in the USACOE reservoirs. If public pressure increases such that it becomes a political issue, hydrilla management may require more money than is currently being spent.
- There are fisheries management concerns about introduction of grass carp in reservoirs. Some debate exists about whether to label grass carp as an ANS.
- It is important to address management issues. Some believe management is adequate. Others might think it is not enough. We need to define the desired level of management.
- More outreach is needed to coastal boaters and marinas, who haven't heard enough about ANS issues.
- Establishing a comprehensive clean boating program could include ANS topics.
- Ballast water is an issue that will have to be addressed on an international scale with U.S. Coast Guard.
- More work is needed in education and regulation for the Department of Agriculture and general public through extension or master gardeners, especially regarding ornamental ponds.
- Agencies should educate anglers about not transferring flathead catfish and spotted bass among waterbodies.
- Agencies should reach aquaculture, fish dealers and baitfish industry to deal with species brought in for food or weed control. Outreach might require more education or enforcement to communicate about ANS species and issues.
- Agencies need to communicate with aquatic landscaping and aquarium industry, vendors and general public to prevent transport of water hyacinth, water lettuce and other ANS.
- More efforts are needed to communicate with boaters and transferring ANS species.
- More regulation and enforcement is needed for vendors.
- The state has a single article of laws that controls the importation and possession of nonindigenous species, which includes everything from furbearers to shrimp and is very outdated. There is a need to rewrite chapter on nonindigenous importations in South Carolina as a department-wide effort that would have to include all kinds of stakeholders. The project would extend far beyond aquatic species to include other organisms.
- There is a need to get more information out to the general public in ways easy for them to find and use. Individuals have to hunt for information on websites.

- B. Working relationships that provide opportunity to address needs
- Neighboring states share South Carolina's concern and efforts in controlling ANS because we share river basins.
 - Better communication is needed with stakeholders, internally and externally. There is a lot of interest and expertise that can be tapped. As they look at protecting the environment and waterways, they have to work together, coordinate, and have as many people out looking and aware as possible. Even sister agencies don't always communicate as well as they should. Education and outreach should be done in a way that promotes positive action and doesn't create additional concerns, raise fears or create undue controversy.
 - Aquatic Plant Management Council is a mechanism for interagency coordination and policy analysis.
 - CAPS State Survey Committee has provided structure that will be helpful in this endeavor. It has tried to link folks together. Communication doesn't always work, but this project may rekindle interest.
 - Good interactions exist between people through aquatic nuisance weed enforcement, which has done training with people who inspect nurseries largely for terrestrial pest and invasive problems.
 - There is some public awareness of ANS due to hydrilla concerns. People who are most affected have reached out to different groups (i.e., dealing with grass carp in Lake Murray). There is much opportunity to involve constituents.

XII. Potential partners for delivering messages

A list of potential partners has been generated from interviews with the South Carolina Planning Team and a review of websites and other documents. When target audiences and messages have been created for marketing purposes, appropriate partners will be determined for assistance in delivering messages.

A. General partners and delivery mechanisms

1. U.S. Army Corps of Engineers
 - News releases
 - Signs at every public access point on USACOE reservoirs; it controls 80 percent or more of access points to the reservoirs. USACOE agreed that a need exists to put invasive species signs up at all boat ramps and at Russell and Thurman lakes.
 - Property managers
 - Visitors centers at all three reservoirs. (Most visitors come through either the access points or visit information centers on the properties.)
 - Pamphlets.
 - USACOE updates aquatic plant management plan every year, which the Savannah District office sends to homeowners in associations around the reservoirs.
2. Lake associations
 - Newsletters and annual meetings
3. South Carolina Department of Natural Resources
 - CEC Division has active public education programs
 - State magazine

- State TV show
 - Boat ramp signs at public ramps
 - Boating and fishing license info packets
 - Agency websites
 - Printed info and presentations to target audiences.
 - Palmetto Sportsman's Classic
 - Southeastern Wildlife Expo
 - When there is a need for technical information for aquaculture producers, the Marine Fisheries Division provides information, which also is delivered through the marine extension program in the state.
4. South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management
 - Agency website
 - Newsletters
 5. Entities that have control of lakes and reservoirs for power generation
 - Major electric power companies, such as SCE&G, Duke Energy and Santee Cooper can help communicate with property owners and recreational users.
 6. State and federal parks
 - Sites for distributing brochures and posting signs
 7. South Carolina Aquarium
 - Provide educational programs and info on ANS issues
 8. Riverbanks Zoo, Columbia
 - Provide educational programs and info on ANS issues.
 9. State and local chapters of environmental organizations
 10. School biology programs
 11. University researchers
 12. Aquatic resource education
 13. BOW programs
 14. Hunter education
 15. Boater education
 16. Sea Grant Aquaculture Program
 - Spoke with the state science coordinators of all school districts in February to March, 2004, to educate youths on aquatic invasive plants.
 17. South Carolina Nursery and Landscape Association
 - Newsletter
 - Annual meeting of nursery owners/operators
- B. Audience-specific partners and delivery mechanisms
1. Ports and shipping (ballast water)
 - Electric power companies
 - Municipal water suppliers
 - Shellfish harvesters (whelk impacts on clams)
 - Legislators and congressional delegates
 - Marina owners
 - State and local chapters of environmental organizations
 - University researchers

- State Ports Authority
 - U.S. Coast Guard
 - DNR Law Enforcement
2. Plant nursery trade
- Waterfront property owners associations
 - Lake Murray Association
 - Lake Marion Association
 - Friends of Lake Keowee
 - Wateree Homeowners Association
 - Homeowners and homeowner associations on lakes with aquatic weed problems
 - Local communities that have been involved in *Phragmites* as it affects shoreline and private property owners
 - Commercial plant nurseries and suppliers:
 - Primary contacts with nurseries and plant dealers regarding regulation and sales
 - Nursery and landscape associations; turf grass associations
 - South Carolina Exotic Pest Plant Council (SCEPPC) will organize and develop pest plant lists. Their primary concern is terrestrial but they could get involved in aquatics. (Department of Plant Industry would have mailing lists.)
 - Master Gardeners: An active Master Gardener group meets at least annually and is a front-line communicator with the public. They should be involved in ANS and opportunities for information exchange. They could monitor ANS and increase awareness about pest lists concerning agriculture and aquaculture. (Department of Plant Industry would have mailing lists.)
 - County extension (Department of Plant Industry would have mailing lists.)
 - USDA APHIS websites with information on noxious species
 - USDA APHIS has done mass mailings to all farmers in state to look for particular pests. It can be very expensive and time-consuming, especially in dealing with replies
 - Trade shows for nurseries and plant dealers where USDA APHIS has set up booths in Columbia area and on the coast
 - County agriculture fairs
 - Farm Services Agency and extension service through mailing lists and newsletters
 - Organizations that can provide outreach to water gardens and landscapers. (South Carolina Department of Agriculture does have contacts for nursery industry.)
 - Cooperative Agricultural Pest Survey: As a regulatory agency concerned with new pests coming into the state, CAPS is receiving funds to support target pest survey activities. Pests are selected based on risk assessment for certain regions of the country (specific to area). It includes pests that could cause a problem and would have a likely pathway, as well as aquatic pests that have an agricultural impact. (Department of Plant Industry would have mailing lists.)
 - Birdwatchers could be a concerned from habitat aspect
 - South Carolina Nursery and Landscape Association
 - Land managers, including state and federal land management agencies and private owners of large plantations. Problems on Cooper River may be of concern

to large plantation owners. Large plantations are not used for crops now; most are bought by people from the north and managed for waterfowl, hunting, fishing and as second homes. Big holdings that could be many thousands of acres. Plantations are good for preserving land, but nuisance species may need to be controlled

- South Carolina Aquatic Plant Management Society: Formed in March 1979. The society is an official chapter of the national Aquatic Plant Management Society
 - Duck and waterfowl hunters, such as Ducks Unlimited (DU) chapters
 - Legislators and congressional delegates
 - State and local chapters of environmental organizations
 - University researchers
3. Recreational boaters
- Boating and yacht clubs
 - Waterway users
 - Canoe liveries
 - Clean Vessel Act Education Program: The program can include ANS information as part of a proposed comprehensive clean boating initiative. It can share methods the SCDNR has used with the Clean Vessel Act Awareness Campaign and the South Carolina Clean Marina Program
 - Tackle shops
 - Duck and waterfowl hunters, such as Ducks Unlimited (DU) chapters
 - Educators who address boaters
 - Boat shows and trade shows
 - Wildlife expositions
 - PSAs through Clean Vessel Act program
 - Press releases through Clean Vessel Act program
 - State Ports Authority in Charleston
 - U.S. Coast Guard
 - Marina operators (Database available from Clean Vessel Act program)
 - Voluntary water monitoring or cleanup groups
 - Welcome centers (literature)
 - Workshops and seminars (Workshops for boaters and marinas might be held by the Clean Vessel program)
 - Work with the people who come into contact with boaters.
4. Internet sales
- Commercial aquarium stores and suppliers
 - Aquarium owners
 - Fish dealers
 - South Carolina Nursery and Landscape Association
5. Commercial aquaculture
- Aquaculture organizations
 - Aquaculture extension
 - DNR law enforcement
 - American Fisheries Society, state chapters

- Coastal groups that would be very important: Coastal Conservation League, The Nature Conservancy, Audubon Society, Master Gardener program
 - Most aquaculture outreach happens through SCDNR and Clemson University. They meet with South Carolina Shrimp Growers' Association, South Carolina Aquaculture Association, clam growing industry
 - The primary means of notification for marine aquaculture and fisheries is through public news releases. For official efforts, the DNR Marine Fisheries Division will send notices to 3,000 license holders for commercial fishers, shellfish harvesters, offshore, a few gill-netters, horseshoe crab harvesters and others
 - Minor involvement through Sea Grant with commercial fishing. Just hired an extension specialist with commercial fishing expertise. DNR also has good contacts.
 - Clemson University Aquaculture is the lead agency in South Carolina for a Department of Commerce grant to manage a trade adjustment assistance program where shrimp boats and farms can receive price supports. Grant can provide two hours of extension training regarding shrimp boats and farms. It could be an opportunity to address ANS issues.
 - Sea Grant has contacts within the multimedia groups.
6. Recreational anglers
- Outdoor recreation/fishing clubs
 - Palmetto Sportsmen's Classic
 - Tournament bass anglers, such as BASS
 - Trout Unlimited
 - Tackle and fly shops
 - Commercial fishers
 - DNR law enforcement booths at wildlife expos
 - DNR fisheries biologists will emphasize more outreach. They are working more with outreach programs for groups for bass fishing, striper fishing, coastal fishing, Trout Unlimited and other fishing clubs.
 - Certain waterbodies have organized "Friends of" groups around a lake or river; these can help organize outreach to people who fish a particular lake.
 - Popular publications can print news releases and articles. South Carolina Game and Fish magazine is published monthly.
 - Some anglers are reading free publications and handouts in bait-and-tackle stores, which cover fishing reports from each region of the state. Publications show fishing reports in each region. They are fairly popular, but DNR hasn't tried to get information into them.
 - Signs at public waters, marinas and boat landings about not transporting fish and vegetation.
7. Bait dealers
- Aquaculture organizations
 - Aquaculture extension
 - DNR law enforcement
 - American Fisheries Society, state chapters

- C. Species-specific partners
 - 1. Zebra mussels
 - 2. Aquatic invasive plants
 - 3. Non-naturalized bait fish
 - Bait dealers who purchase from out-of-state wholesalers
 - Bait dealers selling wild-capture bait
 - Tackle and fly shops
 - Aquaculture organizations in South Carolina and bait source states
 - 4. Non-naturalized game fish (e.g., spotted bass)
 - Commercial fishing organizations
 - Recreational fishing clubs
 - Recreational anglers using bait fish
 - Recreational anglers fishing for warm water species (bass anglers)
 - Tackle and fly shops
 - 5. Grass carp
 - Lake associations interested in using grass carp for vegetation control
 - Aquaculture organizations

Part 2. Marketing plan

I. Mission of marketing plan

The marketing plan will increase the level of awareness among target audiences of actions needed to effectively address ANS problems by communicating: 1) the significance of the aquatic invasive species problem, 2) current and potential dangers, and 3) potential solutions or actions to mitigate negative impacts of ANS on South Carolina's natural resources, human health and safety and economy.

II. Goals, issues, audiences

- A. Goals
 - 1. Formalize the ANS interagency group and work towards a *South Carolina ANS Management Plan*
 - 2. Reach the target audiences with the ANS message, such that they:
 - a. are aware of ANS problems
 - b. understand what they must do to prevent the spread of ANS
 - c. exercise the desired actions on a trial and progressive basis
 - d. adopt desired actions as permanent practices
 - e. reinforces desired actions
 - 3. Among the target audiences, increase the recognition that:
 - a. a single noncompliant individual can have a disproportionate negative impact by introducing an ANS
 - b. personal actions have an impact on others using the waters of the state
 - c. ANS prevention is for the common good
 - d. there are legal consequences for failure to comply with ANS laws

4. Mobilize the target audiences to support policy and legislative ANS solutions

B. Top ANS issues

This list of high priority species are to be addressed in the implementation stage of this project. Note that the numbering provided below is not the original numbering from the complete list of priority ANS found in earlier sections of the document. This list include the top ANS species to be addressed, based on priority, resources, time and funding available.

1. Aquatic plants
 - a. Hydrilla
 - b. Water hyacinth
 - c. Water lettuce
 - d. Giant salvinia
 - e. Common reed (*Phragmites*)
2. Zebra mussels
3. Aquarium pets
4. Ornamental pond species (may be addressed by other plant and animal categories)
5. Invasive fish
 - a. Flathead catfish
 - b. Spotted bass
 - c. Asian carp
 - d. Lionfish
6. Fish, shellfish, shrimp and associated pathogens and diseases
7. Invasive bait fish and crayfish
8. Invasive aquaculture species

C. Prioritized target audiences

This list of high priority audiences is to be the target for the implementation stage of this project. It is a reduced list compared to the overall list of target audiences.

1. Freshwater
 - a. Top priority audience: Recreational boaters, anglers and duck hunters
 - b. Retail and wholesale aquarium pet stores, including Internet sales and pet owners
 - c. Plant nursery trade, greenhouses.
 - d. K-12 education
 - e. Pond owners, recreational and aquaculture
 - f. Power companies and water utilities
 - g. Public zoos, aquaria (Myrtle Beach Aquarium and Charleston Aquarium) and botanical gardens
2. Marine
 - a. Top priority audience: Seafood business including dealers, aquaculture and consumers
 - b. Ports (ballast water)
 - c. Recreational boaters, anglers and duck hunters
 - d. Commercial fishermen: as observers
 - e. Aquaria (Myrtle Beach Aquarium and Charleston Aquarium)
3. Policy makers and advisors, including legislators and agency administrators

III. Underlying principles

These are principles or values that apply universally to the design or actions taken by the project developers. Some also could be strategies or tactics, but if they apply across the board in everything that the Planning Team does, they belong here. They provide the foundation for all actions taken by the project.

- Inform internal audiences before external audiences. Internal audiences include, but are not limited to:
 - State agency administrators
 - State agency staff
 - Organization leaders
- Speak in a single, consistent voice.
- Reinforce messages for audiences that have already been reached.
- Establish and maintain a cohesive, consistent graphic identity.
- Everything is tied to and contains a logo or theme.
- Keep general message basic and lead target audience to find additional information
- Lead public to the ANS website whenever possible
- Include Website address on all printed materials.
- Do not use government jargon and abbreviations when communicating to the public; write out/verbalize names in full the first time they are used followed by the abbreviation.

IV. Freshwater: recreational boaters, anglers and duck hunters

A. Program positioning

Program position outlines how to position the goals/message. This depends partially on an understanding of audience values and program goals. Program positioning presents:

1. a clear call to action, which should be a top-of-mind fishing and boating stewardship behavior
2. the ANS prevention processes for water-based activities

B. Program characteristics

Program characteristics focus on questions such as: How does the program operate? What is the reach of the program? What is the primary function of the program? During what time period does it operate? Characteristics should be developed for each target audience. Examples are:

1. Statewide or regional
2. Public outreach
3. Partnerships
4. Includes community based solutions
5. Seasonal

C. Objectives

1. Short-term objectives
 - a. Establish baseline data on awareness of ANS issues (add questions to freshwater angler survey; survey freshwater anglers, hunters, and boaters at the door at the Palmetto Sportsman's Classic).

- Need to identify specific survey questions
 - Break down by freshwater/saltwater/boater.
 - Do you consider flathead catfish, hydrilla beneficial or nuisance?
 - General awareness of ANS in state.
 - Awareness of which agencies are responsible for ANS management.
 - Where they've gotten information from on ANS.
 - Include saltwater recycling question: Should an oyster shell be thrown away or placed back in salt waters? Can an oyster shell be recycled?
 - Create a longer list of questions that may be used on future surveys.
 - Survey of legislators, department board, advisory committees, policy advisors.
 - Southeastern Wildlife Expo
 - Charleston boat show may draw more saltwater anglers
- b. Direct contact with 25 percent of the audience by June 2006.
- Currently use number of hits on the website; estimates of visitors to booth at Palmetto Sportsman's Classic.
 - Number of boat registrants, licensed anglers (saltwater or freshwater).
 - Don't currently know who the information is going to, know numbers of brochures distributed; broadcasters estimated the reach of PSAs.
 - Low awareness of SC DNR as an agency, biologists, biological work among anglers (everyone is a game warden) on prior angler surveys.
 - Regulations are set by the legislature. Water recreational resource funds, game and fish funds.
- c. Launch a public outreach campaign to anglers and hunters (at the Palmetto Sportsman's Classic, Charleston and Columbia boat shows) that results in 50 percent reporting awareness of ANS threats and prevention methods by June 2006.
2. Long-term objectives
- Long-term objectives extend beyond the pilot project implementation; they include:*
- a. Measurable behavior change
- D. Prioritized messages by audience
- Messages are the specific things the South Carolina Team and its partners should communicate to stakeholders throughout implementation of the ANS communication strategies. Messages are defined first by actions the team wants the audience to take and secondly, by benefits to the target audience for taking that action. Messages are in priority order under each section.*
1. Action messages
- a. Existing action messages:
- Do not introduce hydrilla, water hyacinth, zebra mussels, or other invasive plants and animals into public and private waters.
- b. New action messages:
- Do not transfer fish between waters, even if they may support a viable fishery.
 - Clean your boat (equipment) every time you leave a water body.
 - Protect your waters.
 - Stop aquatic hitchhikers.

- Keep plants and animals where you find them.
- Reporting – if you see something unusual, report to the SC DNR.
- 2. Benefits or motivation messages
 - Benefits or motivations that will entice the audience to accomplish the desired action.*
 - Protect our future. Thank you for helping protect South Carolina waterways.
- 3. Educational messages
 - Includes information such as identification, life histories, impacts, regulation, and control methods for the invasive species.*
 - It is illegal and harmful to introduce species to the aquatic environment.
- 4. Overriding message for each target audience
 - Working together naturally (DNR phrase). Keep South Carolina natural.

Barriers

A very important element to changing behavior is to define and provide solutions to the barriers to the actions you want the target audience to take. Barriers in South Carolina include:

- People think they are doing enough already.
- Don't want to take time.
- Perceived that they are doing more good than harm.
- Unaware of problem (ignorance).
- Don't care. Apathy.
- Money, staff, resources to get message out.
- Size of the audience.
- Gets lost in all the other noise. Already too many signs.
- Audience is always changing, different people coming and going.
- Government telling you what to do.
- Too many messages. Just one more message about the sky falling.
- Examples of areas where fishing has declined due to invasive species.
- Use of pictures to show before and after status of invasion.
- Perception of impact of an invasive changes over time. Get used to an invasive.
- People differ on perception of whether the invasive is bad or good.

E. Obstacles to implementation

Obstacles to implementation are obstacles the Planning Team knows they have to overcome in order to implement their plan.

- Staff time to compile information and write text.
- Changing the content of established agency publications, like the Rules and Regulations booklet, fishing and hunting license mail-outs, surveys, etc.
- Meeting deadlines for media outlets.
- Opposition from agency staff to the ANS message.
- Opposition to the message by private sector businesses and manufacturers.
- Effectively getting the message out to the target audience.

F. Opportunities for implementation

These are opportunities or things that will make it easier for the Planning Team to implement their plan. Include specific opportunities, such as related campaigns, events or conferences. South Carolina's opportunities include:

- Next printing of *Illegal Aquatic Plants of South Carolina* (July).
- Outdoor writers. State paper, SC DNR press releases.
- Existing freshwater fisheries, duck hunting, registered boater surveys.
- Provide information with water or power bills.
- Utilize SAH! materials and website.
- Add information in Fishing Regulations booklet.
- Information with hunting and fishing license applications.
- Boaters at the annual Charleston boat show (April), Columbia boat show (mid-February).
- Palmetto Sportsman's Classic booth (March 26-28).
- New boat registrants.
- Website; online fishing license purchase (SC DNR contact?).
- Boat and fishing tackle manufacturers.
- Bass Pro Shops partnered with Waccamaw National Wildlife Refuge; opening shops in Savannah and Myrtle Beach.

G. Delivery mechanisms

Identifying best delivery mechanisms/venues for each target audience helps the team to develop strategies and tactics below. Includes how the message gets to the audience as well as format or medium for the message. Delivery mechanisms include:

- Announcement on the ANS Group and IAFWA projects in the "Roundtable" section of DNR magazine (published every two months). Use Roundtable article as a teaser for upcoming full feature article.
- News release on ANS Group and IAFWA project.
- Feature piece in DNR magazine (propose up to one year ahead of publication).
- Put all ANS-related regulations and education on one page of the *SC Rules & Regulations* booklet (July), including SAH! campaign information and shell recycling information. Develop text on the page that could also be used for ANS website. Consider either single page or multiple exposures throughout the book. Put short message on each page, then use SAH! logo throughout the book to direct people to the ANS page ("Stop! You could be transporting ANS, go to page X for more information."). Find out how much it would cost to buy a page for ANS this year.
- Expand ANS information on SC DNR website as a comprehensive ANS website with links to plants, fish, shellfish, shrimp, ANS page in *Rules & Regs* book, etc. Put a specific link on the home page. (Could track hits to ANS web page).
- SC DNR has a TV show. Co-host Jean Leitner is a freshwater fisheries biologist. Broadcasters will know what the audience is for the TV show; could use the Palmetto survey to get a sense of number of people who saw the show. PSA should be in support of message that is going out through other mechanisms.
- Incorporate the Stop Aquatic Hitchhiker campaign into ANS plant materials.
- Next printing of *Illegal Aquatic Plants of South Carolina*

- Next printing of annual Fishing Regulations (July).
- South Carolina AFS page. Public is not directed to the site currently.
- US Fish & Wildlife Service news releases locally, Sun News.
- Boat ramp signs, trade shows, law enforcement officers, boat registration and fishing license inserts, group presentations, boating and hunting courses, DNR rules and regulations publication, PSA's during sportsman's shows, sportsman's magazines, booth at boat shows.
- Partners: boat manufacturers and dealers, game and/or fish organizations.
- DNR magazine every two months

H. Strategies for delivering messages

The first go-around on strategies should not be concerned with how much time or money it will take, but rather strategies that will make a difference. Later a state can prioritize strategies according to what is practical. Without taking the broader step first, one miss seeing the entire picture. When groups have a well laid-out plan, it is amazing to watch them accomplish far more than they originally thought possible. The team will discuss strategies for the Marketing Plan. Also each agency/organization on the team can develop strategies and tactics (ones each organization/agency can implement). These can then be incorporate and coordinated through the plan.

1. Establish baseline data on awareness of ANS issues for freshwater anglers, hunters, and boaters through surveys at outdoor sport shows.
2. Test the effectiveness of information delivery through surveys and direct mail-outs.
3. Develop statewide communications efforts using Stop Aquatic Hitchhiker (SAH) logo to increase awareness through common message at multiple sites, i.e. web sites, agency brochures, boat ramps, Rules and Regulations publication, etc.
4. Focus ANS communication to anglers and hunters by including information in the Annual South Carolina Rules and Regulations for Hunting and Fishing publication.
5. Use the DNR's South Carolina Wildlife Magazine and TV show to inform audience on ANS concerns.
6. Create an ANS group out of the former Zebra Mussel Task Force.

I. Tactics for each strategy

1. Establish baseline data on awareness of ANS issues for freshwater anglers, hunters and boaters through surveys at outdoor sport shows.
 - a. Tactic 1: Identify specific survey questions that touch on most important ANS issues in South Carolina.
 - Identify topic categories of questions, i.e. fish, plants, marine, sources of ANS information.
 - Determine correct wording of questions so not to lead responder.
 - b. Tactic 2: Identify best location of to conduct surveys on site.
 - Locate location within the venue to conduct survey; should be conducted before exposure to ANS display.
 - c. Tactic 3: Conduct surveys at several outdoor sport shows: boat show, Southeastern Wildlife Expo, Palmetto Sportsmen's Classic or just one.
 - Focus effort at one show with best target audience, such as Palmetto Sportsmen's Classic.

- Develop larger database by conducting survey at several shows during the year.
- 2. Test the effectiveness of information delivery through surveys and direct mail-outs.
 - a. Tactic: Use baseline survey respondents to test most effective means of educating target audience by sending information in two forms and resurveying.
- 3. Develop statewide communications efforts using Stop Aquatic Hitchhiker (SAH) logo to increase awareness through common message at multiple sites, i.e. web sites, agency brochures, boat ramps, Rules and Regulations publication, etc.
 - a. Tactic 1: Develop South Carolina ANS web page at SAH site
 - b. Tactic 2: Use SAH logo in aquatic plant management publications
 - c. Tactic 3: Use SAH logo on DNR ANS Program web site.
 - d. Tactic 4: Use SAH logo in DNR Rules and Regulations publication.
- 4. Focus ANS communication to anglers and hunters by including information in the Annual South Carolina Rules and Regulations for Hunting and Fishing publication.
 - a. Tactic 1: Put all information on one page dedicated to ANS.
 - b. Tactic 2: Scatter ANS information throughout publication that pertains to specific audience (hunters, anglers, boaters).
 - c. Tactic 3: Do both above.
- 5. Use the DNR's South Carolina Wildlife Magazine and TV show to inform audience on ANS concerns.
 - a. Tactic 1: Write short articles for Roundtable section of magazine.
 - b. Tactic 2: Discuss feature article with magazine staff.
 - c. Tactic 3: Talk to TV producers about segment on ANS.
- 6. Create an ANS group out of the former Zebra Mussel Task Force.
 - a. Tactic: Identify, recruit, and utilize partners for delivering messages and creating action.

V. Marine issue: seafood business

A. Program positioning

Positioning focuses on how to position goals/message. This depends partially on an understanding of the values of the audiences and the goals of the program. Positioning includes:

1. Call to action
2. Action should be in the code of ethics when acquiring or selling material – part of everyday industry behavior.
3. Prevention process necessary to avoid further regulation

B. Program characteristics

Characteristics cover areas such as: How does the program operate? What is the reach of the program? What is the primary function of the program? During what time period does it operate? Develop for each target audience. Examples provided below:

1. Statewide, but concentrating on coastal areas
2. Direct communication to industry and public outreach
3. Partnerships
4. Includes community based solutions
5. Year-round

C. Objectives

1. Short-term objectives
 - a. Establish baseline data on awareness of ANS issues.
 - b. Launch a public outreach campaign to seafood businesses that results in 25 percent reporting awareness of threats of disposing of shrimp heads and oyster shells in waters by June 2006.
 - c. Launch a public outreach campaign to seafood businesses that results in 25 percent reporting awareness of threats of using shrimp for bait in waters by June 2006.
 - d. No incidence of shrimp farm disease outbreak attributable to introduction.
2. Long-term objectives

Long-term objectives extend beyond the pilot project implementation.

 - a. Measurable behavior change

D. Prioritized messages by audience

Messages are the specific things that the South Carolina Planning Team and its partners should communicate to stakeholders and end users throughout the implementation of the ANS communication strategies. The messages are defined first by the actions the team wants the target audience to take and secondly, the benefits to the target audience for taking that action. Messages are in priority order under each section. An overriding message for each category is also defined.

1. Action messages

Desired actions for audience:

 - a. Know where your seafood originates.
 - b. Don't litter.
 - c. Recycle oyster, conch, and clam shells.
 - d. Don't use wet storage of product, especially molluscan shellfish (industry).
 - e. Don't place nonindigenous shrimp remains in state waters.
 - f. Adopt environmentally sustainable business practices.
 - g. Don't use shrimp sold for food as bait.
2. Benefits or motivation messages

Benefits or motivations that will entice the Audience to accomplish the desired action.

 - a. Support your local industry (eat South Carolina seafood).
 - b. Industry wants consumers to ask the retailer whether the origin is South Carolina.
 - c. Due to concern about transmission of virus and other hitchhikers that may affect native shrimp and shrimp growers.
3. Education messages

Includes information such as identification, life histories, impacts, regulation and control methods for the invasive species. Messages include:

- a. If the food originates in South Carolina, it is less likely to carry ANS.
 - b. Everything in the seafood industry is accompanied with paperwork as to where it comes from.
 - c. The SCDNR has recycling drop-offs, provides an automatic six-month quarantine period for out-of-state shells, and puts shell out to provide substrate for oyster seed.
 - d. Commercial operators required to plant 50 bushels per acre.
 - e. Wet storage of the product is illegal.
4. Overriding message
- a. Keep South Carolina natural...eat South Carolina grown seafood.

E. Barriers

A very important element to changing behavior is to define and provide solutions to the barriers to the actions you want the target audience to take. Review desired Actions within the Message section above.

- Commercial motivation to advertise something that could go wrong with their product.
- Practice may cost them more.
- Resistance to regulation and working with government.
- Bringing in foreign products. Most seafood from out of state producers.

F. Delivery mechanisms

Identifying best delivery mechanisms/venues for each target audience helps the Team to develop strategies and tactics below. Includes how the message gets to the audience as well as format or medium for the message.

- Keep message simple (don't throw shrimp heads in marsh; recycle shells).
- Promote ongoing shell recycling program.
- Use logo for oyster shell drop-off locations in Regs book. List of locations.
- Meetings of the South Carolina Shrimp Growers Association, SC Seafood Alliance, SC Shrimpers Association, SC Shellfish Association (generally dormant until there is a problem)
- Include shell recycling in HACCP plans.
- Make sure messages are not threatening to imported products industry.
- Put all ANS-related regulations and education on one page of the *SC Rules & Regulations* booklet (July), including SAH! campaign information and shell recycling information. Develop text on the page that could also be used for ANS website. Consider either single page or multiple exposures throughout the book. Put short message on each page, then use SAH! logo throughout the book to direct people to the ANS page ("Stop! You could be transporting ANS, go to page X for more information."). Find out how much it would cost to buy a page for ANS this year.
- Expand ANS information on SC DNR website as a comprehensive ANS website with links to plants, fish, shellfish, shrimp, ANS page in *Rules & Regs* book, etc. Put a specific link on the home page. (Could track hits to ANS web page).
- SC DNR has a TV show. Chad Hayes who hosts the TV show works for the shellfish industry. Broadcasters will know what the audience is for the TV show; could use the

Palmetto survey to get a sense of number of people who saw the show. PSA should be in support of message that is going out through other mechanisms.

- Incorporate the Stop Aquatic Hitchhikers campaign.
- Links on South Carolina AFS page. Public is not directed to the site currently.
- DNR news, US Fish & Wildlife Service news releases locally, Sun News.
- Recycling signs at boat ramps, point of sale has drop-off location lists (existing).
- Trade shows, law enforcement officers, boat registration and fishing license inserts, group presentations, boating and hunting courses, PSA's during sportsman's shows, sportsman's magazines, booth at boat shows.
- Partners: seafood sellers, saltwater fishing organizations.

G. Strategies for delivering messages

The first go-around on strategies should not be concerned with how much time or money it will take, but rather strategies that will make a difference. Later a state can prioritize strategies according to what is practical. Without taking the broader step first, one miss seeing the entire picture. When groups have a well laid-out plan, it is amazing to watch them accomplish far more than they originally thought possible. The team will discuss strategies for the Marketing Plan. Also each agency/organization on the team can develop strategies and tactics (ones each organization/agency can implement). These can then be incorporate and coordinated through the plan.

1. Strategy: Create an ANS group out of the former Zebra Mussel Task Force.
2. Strategy: Create collective messages that are coordinated between organizations

H. Tactics for each strategy

The following are two examples of developing tactics for a strategy. Tactics need to be developed for each strategy.

1. Strategy: Identify, recruit and utilize partners for delivering messages and creating action.
 - Tactic 1: Identify potential partners
2. Strategy: Create collective messages that are coordinated between organizations.
 - Send same message from different sources and joint press releases from agencies represented on the ANS group, as appropriate.
 - Spread workload among multiple agencies.
 - Invite outdoor writers to engage in discussion on ANS issues.

Part 3. Evaluation Process

Note: Identify sources of baseline data for pre-project evaluation. Evaluation procedures must measure a specific objective.

- Can measure:
 - Awareness
 - Actions (better measure but more expensive)
- Where is the audience, can you get to them (shows, lists)
- Do they really know the answer (pre-evaluation)
- Are they giving you the answer that you want to hear (strategic bias)
- Can we afford it? Focus to geographical area or limited audience.
- Mechanism: telephone interviews, in person
- Make sure you don't have other variables on the outside that may cloud your measurements.

I. Potential sources of baseline data

A. Measure:

- Trend in amount of oysters recycled.
- Phone calls to agencies in response to materials
- Document actions in industry: engaged in recycling, monitoring activities (zebra mussel example)
- Survey of lake associations for awareness

B. Survey questions with:

- hunting and fishing license applications
- creel surveys at Lake Murray
- boaters at the annual Charleston boat show (April), Columbia boat show (mid-February)
- Palmetto Sportsmen's Classic booth (March 26-28)
- new boat registrants
- website; online fishing license purchase (SC DNR contact?)
- boat and fishing tackle manufacturers

Part 4. Action Plan

Note: Based on the meetings in South Carolina on 3/23-3/24/2004 plus follow-up discussions, the following plan was updated on 1/4/2005. The mission, or overall goal, has been adjusted to best reflect the topics that can be realistically evaluated.

I. Objectives for the freshwater and saltwater audiences:

- Reduce the spread of ANS that might be caused by:
 - recreational boating, fishing, and hunting activities; and
 - consumers and industry to prevent discarding of seafood remains in waters.
- Achieve direct contact with 25 percent of the audience by June 2006 including enhanced general ANS outreach and promotion of proper disposal of seafood waste products.
- Test the effectiveness of direct (in-person) and indirect (mail) contact with key audiences when trying to increase awareness and actions regarding ANS issues.

II. Target audiences:

- Recreational boaters, anglers, and duck hunters
- Seafood business, including consumers and industry
- Policymakers, internal and external to the SC DNR

III. Strategies:

- Recreational Users:
 - Strategy 1. Establish baseline data on awareness of ANS issues for freshwater anglers, hunters, and boaters through surveys at outdoor sport shows.
 - Strategy 2. Test the effectiveness of information delivery through surveys and direct mail-outs.
 - Strategy 3. Develop statewide communications efforts using Stop Aquatic Hitchhiker (SAH) logo to increase awareness through common message at multiple sites, i.e. web sites, agency brochures, boat ramps, Rules and Regulations publication, etc.
 - Strategy 4. Focus ANS communication to anglers and hunters by including information in the Annual South Carolina Rules and Regulations for Hunting and Fishing publication.
 - Strategy 5. Use the DNR's South Carolina Wildlife Magazine and TV show to inform audience on ANS concerns.
- Seafood Business Actions:
 - Strategy 1. Expand existing outreach to encourage shell recycling
 - Strategy 2. Develop voluntary partnerships with the seafood industry.
- Policymakers:
 - Strategy 1. Increase institutional capacity.

A. Actions for Recreational Users

1. Strategies 1 and 2: Establish baseline data on awareness of ANS issues and test the effectiveness of information delivery through surveys and direct mail-outs.

Process:

- a. An initial survey will be conducted to develop baseline information regarding show attendee's understanding of ANS in South Carolina, followed by a one-year education process and later, a post-project evaluation. The survey and information may be delivered through a variety of groups, but it needs to be orchestrated so that two groups are not conducting a survey in the same area.

Potential groups include participants at the following events:

- Palmetto Sportsmen's Classic, March 26-28, 2004
- Other boating and sporting shows, including shows in Columbia (February '05) and Charleston (April '05) and/or the Southeastern Wildlife Expo (February '05).

Evaluation:

- a. Develop a simple survey – (*DONE as of 4/1206*). Questions include:
 - *To test awareness levels*
 - *To determine nuisance perception* – “Do you consider flathead catfish / hydrilla a beneficial or nuisance species?”
 - *To determine awareness of agencies* – “Which agencies are responsible for ANS management?”
 - *To monitor changes in actions*: “Which of the following actions have you engaged in the past year to prevent the spread of [ANS species]: (add about three major actions plus one ‘all’ and one ‘none’ choice).”
 - *To determine information sources* - Where they've gotten information from on ANS.
 - *Name and address* – For the follow-up evaluations.
- b. Surveys will be conducted by college interns and non-ANS Program staff on their off hours and will be reimbursed for their time by the IAFWA grant.
- c. Show visitors will be surveyed as they enter the show only.
- d. Start the educational process. In the months after the survey is complete, half the respondents will be sent a postcard or a longer letter (two rounds) encouraging them to visit the ANS website to learn more about the threats posed by ANS to recreation and a list of basic actions one should take to minimize spread. The postcard should present the four-point "simple procedure" found on the website in addition to the URL. Even if the recipient did not visit the webpage, they would get some information. In contrast, the letter provides more detail on issues and actions, in addition to directing the recipient to the website.
- e. Within six months of the postcard mailing, a follow-up survey will be mailed to those who received the post card, the longer letter, and the control group to measure if the postcard or letter and website effectively raised awareness and to what degree. This survey will present the same questions presented at the sports show to measure differences.
- f. For the 2005 shows, the survey will be replicated. This time, half of the respondents will receive an information packet containing much of the same info as the website. The other half will not be provided an educational packet. This will be

the *control group*. Then, in approximately six months, both groups will be surveyed via mail to see if the handouts were effective and to what degree. It is important that surveyors record which interviewees received the educational packet at the shows and which ones did not. The results can be compared to the mailer/website approach in 2004 to help the agency understand which methods are more effective in raising awareness regarding ANS.

2. Strategy: Develop statewide communications efforts using Stop Aquatic Hitchhiker (SAH) logo to increase awareness through common message at multiple sites, i.e. web sites, agency brochures, boat ramps, Rules and Regulations publication, etc.

Process:

- a. Include the SAH! logo in all appropriate SCDNR materials and web pages.
- b. Add the SAH logo to the ANS pages and specialized downloadable brochures
- c. Add links to DNR web site to SAH site
<http://water.dnr.state.sc.us/water/envaff/aquatic/index.html> Develop a page on www.protectyourwaters.net that would be South Carolina specific. Many of the materials that boaters, anglers, and seafood consumers will receive will include the *Stop Aquatic Hitchhikers!* (SAH!) www.protectyourwaters.net web site. A unique South Carolina page will be developed to address South Carolina specific issues.

3. Strategy: Focus ANS communication to anglers and hunters by including information in the Annual South Carolina Rules and Regulations for Hunting and Fishing publication.

Process:

- a. Develop an ANS page in the annual hunting, boating, and fishing *Rules & Regulations* book with abbreviated specific ANS actions scattered throughout the document in appropriate places (e.g., "Stop! You may be spreading ANS, go to page X for more details." possibly along with more detailed information such as boat washing on the boat page, don't dump bait on fishing page). Find out how much it would cost to buy a page for ANS this year.
- b. Pursue other direct information outlets such as provide information with hunting and fishing license applications, at trade shows, with law enforcement officers, boat registration and fishing license inserts, group presentations, boating and hunting courses, PSA's during sportsman's shows, sportsman's magazines, and a booth at boat shows.

4. Strategy: Use the DNR's South Carolina Wildlife Magazine and TV show to inform audience on ANS concerns.

Process:

- a. Pursue an SCDNR TV show on ANS issues. Chad Hayes who hosts the TV show works for the shellfish industry. Broadcasters will know what the audience is for the TV show; could use the Palmetto survey to get a sense of number of people who saw the show. PSA should be in support of message that is going out through other mechanisms.

Evaluation:

- a. Track the number of materials distributed.
- b. Estimate number of visitors to the ANS booth at Palmetto Sportsman's Classic.

- c. Track the number of hits on the SC SAH! web page compared to prior years' hits on the ANS plant web site.
- d. The South Carolina page should have a pop-up question or similar format where users are asked a simple question about where they first learned of the site (brochures, sport shows, seafood industry, a friend, random internet search, other, etc.). This will help us learn which methods generated greater traffic and may be of help for future website and communication efforts.
- e. Track number of phone calls to agencies in response to materials.

B. Actions for Seafood Businesses

1. Strategy: Expand existing outreach to encourage shell recycling

Process:

- a. Keep message simple (don't throw shrimp heads in marsh; recycle shells).
- b. Make sure messages are not threatening to imported products industry.
- c. Increase number of recycling signs at boat ramps, point of sale vendors, and other locations.
- d. Provide shell recycling rationale and drop-off location lists in publications listed above.

Evaluation:

- a. Trend the volume of shells in the recycling program.
- b. Track the number of materials distributed.
- c. Estimate number of visitors to the ANS and/or shell recycling booth at Charleston boat show.
- d. Track the number of hits on the SC SAH! web page compared to prior years' hits on any existing web sites that provide shell recycling information.

2. Strategy: Develop voluntary partnerships with the seafood industry.

Process:

- a. Develop a Partnership Agreement with seafood dealers, industry, saltwater fishing organizations, and aquaculture to promote proper disposal of seafood products.

Actions may include:

- Incorporate shell recycling and seafood waste disposal into industry HACCP (food handling) plans.
- Engages in recycling waste products.
- Monitors for ANS in product or waters contacted by the industry.
- Refers customers to the SC DNR for further information on ANS.
- Distributes ANS information to customers and association members.

- b. Provide information at meetings of the South Carolina Shrimp Growers Association, SC Seafood Alliance, SC Shrimpers Association, and the SC Shellfish Association.

Evaluation:

- a. Measure trends in actions taken by the seafood industry to inform their customers of proper waste disposal procedures.
 - Track SAH! and SCDNR ANS web site hits originating from contacts with the seafood industry.

C. Actions for Policymakers

1. Strategy: Increase institutional capacity.

Process:

- a. Formalize the multi-agency ANS Task Force.
- b. Pursue partnerships with industry and other organizations.
 - Provide information to outdoor writers.
 - Prepare joint and complementary press releases from multiple agencies.
 - Provide information with water or power bills.
 - Provide links on ANS issues on the South Carolina AFS Chapter web page.
 - Provide information through boat and clamming equipment manufacturers and dealers.
 - Develop voluntary partnerships with the seafood industry. *See Seafood Business Actions, Strategy 2.*
- c. Develop and implement a *South Carolina ANS Management Plan*.
- d. Review and update statutory authority to regulate importation and possession of nonindigenous aquatic nuisance species.
- e. Explore joining the expanded Gulf and South Atlantic ANS Panel

IV. Implementation table

Listed for each action are:

- Assignments: Who will be responsible for implementing (or overseeing implementation) of the action item. “IAFWA” indicates responsibilities of the contractors. “SCDNR” indicates staff from the South Carolina Department of Natural Resources and its partners.
- Dates for completion of various tasks.
- Budget: The source of funds for this action. Where an agency or organization is noted, it means that costs will be covered by existing operations budgets of that organization.

TBD = To Be Determined

Action:	Assignment	Date	Budget
1. Select SC work team	SCDNR	DONE	SCDNR
2. Interview South Carolina team and prepare summary, 1/30/04	IAFWA	DONE	IAFWA
3. Prepare draft <i>ANS Situation Assessment</i> based on interviews for internal review, 2/2/04	IAFWA	DONE	IAFWA
4. Hold meeting in pilot state, 2/23/04	IAFWA, SCDNR	DONE	IAFWA, SCDNR
5. Return ANS Issues review information to DJCA, 2/15/04	SCDNR	DONE	SCDNR
6. Return draft strategy from instate meeting for state review	IAFWA	3/1/04	IAFWA
7. Return messages, strategies, partners to DJCA after review of draft	SC Team	4/1/04	SCDNR
8. Complete communications strategy	IAFWA	TBD	IAFWA
9. Select priority and feasible messages	SCDNR	5/1/04	SCDNR

for implementation			
10. Develop tools and products	IAFWA, SCDNR	May 04	IAFWA, SCDNR
11. Conduct pre-project evaluation	IAFWA	June 04	IAFWA
12. Implement communications strategy	SCDNR	June 04	SCDNR
13. Formalize the ANS Task Force	SCDNR	May 04	SCDNR
14. Conduct post-implementation evaluation	IAFWA	June 06	IAFWA
15. Project completion and final report to IAFWA	IAFWA	March 06	IAFWA

Part 5. Results

The agency has prepared a final report describing the situation, approach, accomplishments, and learning process from the state fish and wildlife agency's perspective. The information below represents a portion of the raw material used to develop that report.

I. Proposed contents of the report

- Description of priority ANS issues.
- Previous communications capacity and approaches.
- Criteria used to select highest priority target audiences, messages, and implementation actions.
- Outcomes of the implementation actions.
- Successes, conflicts, and obstacles to implementation.
- Modifications made or desired.
- Interactions with partners and advice on facilitating cooperative efforts.

II. Instate meeting process feedback

State ANS team members provided feedback after their February 23 meeting.

- Overwhelming, fast, a lot in a day to get done.
- Do one example, show what you want on that one example, then let the group flesh out more.
- Show a case study of something that worked.
- Start with specifics and work to general. Start with afternoon implementation discussion then work back to the goals.
- Work from the issue then talk about target audiences and message. May not be a particular species, but a general issue. Prioritized audiences before the issues were clearly identified.
- Good to meet some new faces. Forming a state group to handle these issues was a big deal in itself. The process is the beginning of an ANS Task Force, information force for each other, to hear what others are doing in the state and know what others are doing is valuable.

III. Potential actions for South Carolina pilot project

Below are the actions that were identified in a follow-up meeting with SC DNR staff in order to implement the ANS communications strategy for the top two audiences selected by South Carolina. *Actions and Timeline:*

A. General

- May evaluate how effective is South Carolina as a state in working collectively on these issues.
- Group provides strength to issue as multi-agency task force
- Potential to bring in private sector.
- Freshwater issues may be able to move faster as there is already some information developed. Marine issues may need to move more slowly to ensure a proper approach to the issues and industry.
- Meet as subgroups to work through strategies on recreational boaters (freshwater) and seafood businesses (marine), pull it back together as a larger group.
- Formalize the group further and invite additional partners as needed.
- IAFWA will send updated ANS Communications Strategy to SC team by March 1.
- IAFWA will develop list of survey questions, SCDNR will pick freshwater (and shellfish) questions for Palmetto Sportsman's Classic in March 5.
- IAFWA will develop a Fact Sheet on the SC project and progress by March 10. Send to state for review prior to North American meeting.
- Next meeting of ANS Task Force within the next few months.

B. Recreational boaters, anglers, and hunters

- Determine who will deliver the survey and where in the building
- Determine submission deadlines for publications
 - Roundtable in South Carolina Wildlife magazine.
 - Feature article in SC Wildlife magazine.
 - TV Show
- Develop page for Regulations publication.
- Develop website.
- Use of SAH! logo in aquatic plant publication reprints.

C. Seafood business

- Develop page for Regulations publication
- Develop website
- Use of SAH! logo on shell recycling new materials and reprints

Part 6. Conclusions and Recommendations

As of January 28, 2005, the pilot project was progressing well and on schedule. The Communications Project has clearly accelerated intra-agency and interagency communication on ANS issues. It has served as a catalyst for staff to discuss and take action on ANS issues. The backing of the IAFWA in the project has been the key to its success by elevating the importance of the project within the SCDNR. As a result, interdivisional cooperation is improved and project initiatives are more readily accepted and approved. Assistance from the project consultants has been invaluable and critical in moving the process along. They have essentially served as project staff in scheduling and facilitating work group meetings, writing the Communication Strategy, developing and analyzing surveys, developing pledge cards, suggesting communication ideas and steadily pushing the process along.

I. Achievements to date

- A. Identified project target groups for freshwater (recreational users) and marine (seafood businesses).
- B. Surveyed over 400 hunters and anglers at annual trade show to determine their awareness of ANS issues.
- C. Prepared to mail ANS information packet to each survey applicant to help determine the best source of information, reference to web site or direct mail. Follow-up survey will determine the answer.
- D. Developed and included an ANS information page in the 2004-05 SCDNR Rules and Regulations Publication.
- E. Incorporated the Stop Aquatic Hitchhikers logo and links on SCDNR Aquatic Invasive Species web site and educational material.
- F. Developed a South Carolina ANS page for the Stop Aquatic Hitchhikers site that identifies actions to reduce the likelihood of transferring aquatic invasive species from one water body to another and protecting estuarine waters from shellfish disease contamination. Page is cross-linked to SC ANS Program web site.

II. Activities in the works

- A. Developing a pledge card for use at trade shows and possible distribution to boat registrants that encourages them to conduct boat cleaning behaviors to minimize the spread of ANS from one water body to another.
- B. Communicating with SCDNR Boater Registration section on ways to provide the 395,000 registered boaters in SC with ANS information and actions to prevent and minimize spread in public waters.
- C. Plan to join the newly formed Gulf and South Atlantic Panel on Aquatic Invasive Species.
- D. Plan to expand ANS Communications Project Work Group to Statewide ANS Task Force.

III. Recommendations to other Southeastern states

- A. Enhance instate communication/coordination by identifying agencies with ANS authority and interest and create ad hoc or permanent work group to begin dialogue on the issue.
- B. Enhance regional (interstate) communication/coordination by joining and participating in the Gulf and South Atlantic Panel on Aquatic Invasive Species.

- C. If possible, hire the consultants (D.J. Case and Associates, Southwick Associates) that are already working on the pilot projects to assist you on your state communication strategy or management plan. They've already gone through the process and they're good. This is especially important if staffing is limited.
- D. If that's not possible, use the model strategies, plans and materials already developed for South Carolina or other states and modify to suit your state's unique needs.
- E. At a minimum, develop state/agency ANS web page that identifies problems and potential problems in your state and actions (behaviors) the public can take to help prevent introduction and spread of ANS.

Appendix I. General resources

Documents

Aquatic Nuisance Species Report: An Update on Sea Grant Research and Outreach Projects 2000—Program Highlights. South Carolina Sea Grant. 2 pages.

Exotic Species: The Aliens Have Landed. Coastal Heritage 11(4):3-9.

Aquatic Nuisance Species Report. ANS: An Update on Sea Grant Research and Outreach Projects 2000. National Sea Grant College Program. 240 pages.

Events

Aquatic Nuisance Species: A Focus on the Southeast. October 12-14, 1999. Sheraton Charleston Hotel, Charleston, S.C.

Aquatic Estuarine Invasive Species in South Carolina: Information, Implications, and Management of Least Wanted Species. Coastal Issue Workshop, June 24, 2003. Marine Resources Division-SCDNR, Ft. Johnson, Charleston, SC.

Websites

SC Laws and regulations: <http://www.invasivespecies.gov/laws/state/sc.shtml>

SC DNR Aquatic Nuisance Species Program: <http://water.dnr.state.sc.us/water/envaff/aquatic/>

SC Sea Grant: <http://www.scseagrant.org/>

Gulf of Mexico ANS Panel: <http://nis.gsmfc.org/>

Appendix II. Glossary of terms

Aquatic Nuisance Species (ANS): For purposes of this project, the contractors recommend use of the definition of aquatic nuisance species (ANS), or invasive species, found in federal Executive Order 13112 as: "An invasive species is one that is non-native to the affected ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health."

Brand: A brand is a symbol that represents values and a lifestyle. To the consumer, a positive brand essentially promises good quality, good value or reliability. In other words it is much more than the name of a product or service. In today's complex marketplace, the power of a brand lies in its ability to influence our attitudes and ultimately affect the decisions we make. The more focused, consistent and tightly defined the brand idea is, the more power it has to attract the attention and hold the loyalty of an audience.

Communication strategy: An introspective process for guiding communications that allows agencies to assess what they want to communicate about, what obstacles and opportunities exist and what their capabilities are to communicate and to set direction for communicating.

Marketing: The sum total of activities that keeps an organization focused on its customers. Cause related marketing as we are doing with the ANS issue uses commercial marketing techniques to promote the adoption of a behavior that will improve the well-being of the target audience or of society as a whole.

Appendix III. List of abbreviations

ANS	Aquatic Nuisance Species
APHIS	Animal and Plant Health Inspection Service (part of U.S. Department of Agriculture)
APMS	Aquatic Plant Management Society
BWM	Ballast Water Management program, coordinated by the U.S. Coast Guard (USCG)
BRD	Biological Resources Division, a branch of U.S. Geological Survey
CAPS	Cooperative Agricultural Pest Survey
HAACP	Hazard Analysis and Critical Control Point process
IAFWA	International Association of Fish and Wildlife Agencies
LMBV	Largemouth bass virus
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
OCRM	Ocean and Coastal Resource Management, a branch of South Carolina Department of Health and Environmental Control
PPQ	Plant Protection and Quarantine, a branch of U.S. Department of Agriculture, Animal and Plant Health Inspection Service
QPX	Quahog parasite unknown, a clam disease
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCE&G	South Carolina Electric and Gas (utility)
SCEPPC	South Carolina Exotic Pest Plant Council
SCSGC	South Carolina Sea Grant Consortium
SCSGEP	South Carolina Sea Grant Extension Program
USACOE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Appendix IV. IAFWA ANS pilot state project process outline

INTRODUCTION

The Fisheries and Water Resources Policy Committee of the IAFWA was awarded a 2003 Multi-state Conservation Grant for a 3-year project to address unwanted aquatic species. To implement the project, the Committee leadership has put together a project implementation team, which is comprised of private contractors (Southwick Associates, Inc. representing D.J. Case and Associates, S.R. Enterprises, and Silvertip Productions), and a liaison for the Fish and Wildlife Service and the national ANS Task Force. The focus of this project is to help states develop comprehensive programs to address Aquatic Nuisance Species (ANS) communication issues. The project is two-fold:

Objective 1) to assist four pilot states in acquiring greater in-state support (e.g., public, media, legislators) to address aquatic invasive species problems by helping them publicly communicate the significance of the aquatic invasive species problem, current and potential damagers, and potential solutions; and

Objective 2) to increase coordination between state fish and wildlife agencies, regional entities and Federal resource management agencies that are responsible for regulating aquatic invasive species. (See “Workshop Process” document for further details on this objective.)

Originally, the IAFWA Fisheries and Water Resources Policy Committee collaborated with the Fish and Wildlife Service to determine how state fish and wildlife agencies addressed this issue through a national survey. This project used the results of this joint IAFWA-USFWS National Aquatic Invasive Species Survey (2002) as the basis for the project.

States that have volunteered to serve as a pilot state are: Arizona (West), Missouri (Midwest), New Hampshire (Northeast), and South Carolina (Southeast). The results of the pilot state effort will be communicated to all states on a regular basis to help states learn which activities work and to help any state who may want to replicate all or parts of the pilot effort.

This document provides a description of the steps involved in fulfilling the first objective (pilot state development of ANS communications strategies).

Pilot State Project Objectives

IAFWA and its project implementation team (IAFWA Project Team) will work with a pilot state from each of the four Regional Associations to help the state acquire greater in-state support (public, media, legislative, etc.) to address aquatic invasive species problems by helping them publicly communicate the significance of the aquatic invasive species problem, current and potential damages, and potential solutions.

Each state will have a different configuration of agencies and organizations that conduct regulation, management, and outreach on invasive species. An overall goal of the IAFWA project is to collectively work with the state fish and wildlife agency to develop more effective communication skills and greater capabilities on state, regional and national ANS issues. Fish and

wildlife agencies are encouraged to identify and engage partners, as appropriate, to maximize effectiveness of these efforts. Recognizing that invasive species are a national problem and that the message goes beyond state borders, states will have the option of tying in with the national *Stop Aquatic Hitchhikers!* campaign and also influencing future efforts of the national campaign.

A major benefit of this project is the creation and testing of pilot efforts that could guide other states in implementing effective ANS communications programs. To help states understand which efforts worked and which ones need improvement, all pilot state efforts will be carefully evaluated. Awareness among target audiences will be evaluated before and after implementation of the communications strategy to help determine how states and federal agencies can best address ANS issues collectively into the future. If states already have baseline information on public awareness or actions related to ANS, those results will be useful in building these evaluation tools.

General Roles and Responsibilities for the Pilot State

In order for the project to be effective as a pilot effort for other IAFWA member states in the region, the process must be led by the state fish and wildlife agency with support from the IAFWA Project Team. Therefore, the state agency responsibilities will be:

- Each state fish and wildlife agency (Agency) that has agreed to become a pilot state and commits will assume a leadership role within their state for addressing ANS issues within this IAFWA project.
- The Agency will establish a State Project Team (State Team) and determine if and how it wishes to involve other in-state partners with this project.
- The Agency, with the assistance of their State Team and the IAFWA Project Team to facilitate the process, will identify the ANS issues in their state, the actions that they feel are necessary to reduce or eliminate the spread of ANS within their state, and key target audiences and the messages that are important for each audience.
- The Agency will host one meeting for their State Team to meet with the IAFWA Project Team. The Agency will hold as many additional meetings with their State Team as they feel are necessary to complete development and implementation of the *ANS Communications Strategy*.
- After determining the highest priority ANS issues and target audiences, the Agency will work with the IAFWA Project Team to develop the marketing portion of the communications strategy.
- The Agency will serve as the lead to ensure implementation of the communications strategy during the period of the project (approximately one year through June 2005). A budget of \$10,000 is available to each pilot state to assist in developing communication tools or materials within the bounds of items permitted under the grant.
- The Agency will assist with all pre- and post-project evaluation efforts to help identify improvements in the process and the most effective actions states can take to address ANS issues.
- The Agency will work with the IAFWA Project Team to develop a report on Agency activities that will include recommendations for how other state agencies within their region could make progress in addressing ANS communications issues.

PROJECT TEAM

The key to successful completion of this project is for state resource agencies to set direction and make key decisions. Each pilot state must make the decisions regarding which activities will best affect public awareness and actions regarding aquatic nuisance species. Therefore, an IAFWA Project Team will serve a facilitation and support role versus a decision-making role. If other states are to replicate any successful ANS efforts piloted by any state via this project, state agency staff must be the leaders, not a group of contractors. The IAFWA Project Team, organized to lead this effort, understands this important need and has designed this project around a state-led approach.

The team recognizes the limitations that state agencies face in dedicating resources to a wide range of issues and projects. Therefore, we have designed the process to optimize output based on resources available to the project. There will be at least one meeting in your state with the IAFWA Project Team and your staff. Much of the work will be done through telephone and email contact. Documents and other information about the project will be posted to a website for review.

State agency staff and other partners

State fish and wildlife agencies will take the lead on this project within their state and will represent their region as a pilot state to address aquatic invasive species problems by publicly communicating the significance of the aquatic invasive species problem, current and potential damages, and potential solutions.

IAFWA Project Team

Due to the nature of this project and its origin, the IAFWA convened a group of several highly qualified contractors to work alongside a liaison from the Fish and Wildlife Service and the national ANS Task Force to assist with and guide overall project implementation. Collectively, this team has in-depth experience assisting state and federal resource agencies with aquatic nuisance species issues and other similar communications needs. Each has been recruited to handle specific elements of this project based on their expertise and specialties. This group of people has worked together before on a number of projects and their primary roles in this project are:

- Rob Southwick (Southwick Associates, Inc.) will research and develop state-specific information highlighting the need for greater action against aquatic invasive species, and will coordinate evaluation activities.
- Phil Seng and Gwen White (D.J. Case & Associates) will facilitate pilot state meetings, coordinate development of the communications strategies, and lead the evaluation efforts.
- Sharon Rushton (SR Enterprises) will help customize this package for each of the pilot states and assist with the state communication strategies.
- Jim Wentz (Silvertip Productions) will develop and manage the list serve and website for the project.
- Joe Starinchak (U.S. Fish and Wildlife Service/ANS Task Force) will serve in a dual capacity, working for the FWS Branch of Invasive Species and as the Outreach Coordinator for the national ANS Task Force. Recognizing that states work closely with the Federal government on aquatic invasive species issues, this project will involve input and participation from the FWS, the ANS Task Force and key FWS regional and field offices.

IAFWA staff and regional representatives

Given the interest and desire of the IAFWA for this project to succeed and produce results, the organization has identified and created two additional levels of involvement. This involvement will ensure effective coordination and provide direct linkages for the project to the IAFWA leadership. The first level will include the direct involvement of the IAFWA Washington staff. Eric Schwaab, the IAFWA Resource Director, and Jen Mock, the Multi-State Grants Coordinator will be involved in the administrative and content aspects of the project. The second level of involvement directly involves state fish and wildlife agency representatives from each of the four regions. Acting as an Advisory Panel for the project, these individuals will provide important input and direction to ensure that IAFWA member organization issues are addressed. Panel members are: Larry Riley (chair, AZ); Mile Conlin (IL); Doug Hansen (SD); Gary Isbell (OH); Bill Reeves (TN); Judy Stokes (NH); and Mike Stone (WY).

PILOT PROJECT PROCESS

PRIOR TO MEETING WITH PILOT STATE

Step 1: Agency leadership

The state fish and wildlife agency understands the intent of this project, accepts the role as a pilot state, assumes a leadership role for ANS issues within their state for this project and communicates this role to staff selected to be part of this process. The agency leadership will develop a State Project Team (State Team) and will determine their roles and responsibilities. It will be the responsibility of the state team to communicate with their state director regarding progress and decision-making points during the project.

Step 2: Agency identifies their State Project Team

The agency identifies individuals they want on their State Team. Your state has two routes: internal team only within the fish and wildlife agency; or a team composed of internal and external agency and organization representatives. Your State Team must include both outreach and resource management specialists from the state fish and wildlife agency staff, but may also include representatives from other partner agencies and organizations involved in ANS and outreach.

We will send you a form to organize identification of key staff, issues, stakeholders, and resources to start the inventory process. We will ask you to return your responses to the project contact as you generate them, even if they are partial responses. It is especially important to provide contact information for key staff as soon as possible. We will need a brief description of the primary job responsibilities for each team member and how their position interacts with communication or resource management approaches to ANS issues

Agency Staff. The IAFWA Project Team recommends that you consider including staff from: fish, wildlife, and forestry programs; state and federal properties; information and education, aquatic resource education, publications, and outreach; invasive plant or animal control, funding, and

permitting programs; invasive species coordinator and regional ANS panel representatives; and law enforcement.

Partnership Decision. Given the nature of the ANS issue and the variability of how each state addresses the issue, a key decision of the Agency will be how and when it engages its partners with this project. Eventually, the Agency may choose to have many partners involved with this project. However, this decision is critical, as it will affect the process used in the project. Thus, partnership decisions need to be made early in the development of this project. Which external stakeholders are involved will be specific to each state, but may include key leaders from agencies and organizations such as:

- State departments of health, agriculture, plant pathology and pest inspection, homeland security, environmental protection and/or environmental quality, and law enforcement;
- Regional (and possibly field stations) offices of federal agencies, such as the U.S. Fish & Wildlife Service (USFWS), Animal and Plant Health Inspection Service (APHIS), Army Corps of Engineers (USACOE), Environmental Protection Agency (EPA), Coast Guard, and National Marine Fisheries Service (NMFS);
- Sea Grant, university research and extension;
- State chapters of fish, wildlife, forestry, and wetlands professional societies; and
- Statewide umbrella organizations for lake associations, hunting and fishing clubs, retail outlets and/or associations representing marina, boating and water recreation interests, aquaculture and commercial fisheries, and pet industry.

The Agency should fully consider the implications of these decisions in regard to feasibility and ownership in planning and implementation stages. The IAFWA Project Team will discuss these implications with the Agency.

Step 3: Develop a draft of the ANS Communications Strategy

We are defining a communications strategy as follows: *An introspective process for guiding communications that allows Agencies to assess what they want to communicate about, what obstacles and opportunities exist and what their capabilities are to communicate, and to set direction for communicating.* The purpose of the strategic communications process is to fully assess, understand, and leverage the Agency's ability to communicate about ANS issues. During initial contacts with the State Team, the IAFWA Project Team will collect and organize information needed to describe the status of ANS issues in the state and will outline the steps needed for developing the marketing approaches during and after the in-state meeting.

The IAFWA Project Team will use the information collected through interviews to develop a *draft* "Determination of ANS issues within the state" (the first section of the *ANS Communications Strategy*). Depending on the timing of the first meeting, the State Team may have an opportunity to review this part of the strategy prior to the first meeting. Any input received from the Team will be incorporated into a second draft and reviewed at the first meeting.

The following outline lays out the elements of an ANS Communications Strategy. We have included it in this process document to help the pilot state to begin to understand how we are approaching this project. The face-to-face meeting will bridge from the issues assessment stage into the marketing stage as described in the next step.

The ANS Communications Strategy. The document will:

1. Determine the ANS issues within the state.
 - a. Define the scope of ANS problems within the state.
 - b. Identify agencies and organizations that are involved in ANS issues in the state and the roll that each plays.
 - c. Program positioning and underlying principles in regard to agency roles in ANS
 - d. Identify high priority ANS species, areas and pathways.
 - e. Identify the original pathway and location of ANS in the state.
 - f. Identify the current and potential damages of each of these high priority ANS issues.
 - g. Identify the potential solutions and/or actions that need to happen to reduce the negative impact of ANS.
 - h. Identify important messages for target audiences, existing promotional tools, and potential resources for each ANS.
 - i. Determine the target audiences that can have the greatest impact on reducing the negative impact of ANS.
 - j. Identify obstacles for reducing the impact of ANS
 - k. Identify opportunities for reducing the impact of ANS
 - l. Identify potential audiences
 - m. Identify potential partners and their capabilities
 - n. Identify general resources.

2. Develop a marketing approach for each target audience.
 - a. Define the situation (using the information obtained in #1)
 - b. Develop goals and measurable short- and long-term objectives
 - c. Determine target audiences
 - d. Define communications channels and motivations for addressing ANS for each target audience (Some research may be necessary to determine this)
 - e. Define obstacles that will impede the Agency's ability to communicate about the ANS issue
 - i. External
 - ii. Internal
 - f. Define opportunities that will assist in the communication process
 - g. Define underlying principles of the ANS Program and marketing campaign
 - h. Determine program positioning
 - i. Determine program characteristics
 - j. Define the benefits to the target audience for participating (e.g., better fishing, boating)
 - k. Determine the key messages
 - l. Determine secondary messages
 - m. Brand the key message or call to action theme.
 - i. Identify whether existing ANS brands can be used or modified (i.e. *Stop Aquatic Hitchhikers!*).
 - ii. Identify positives and negatives of using an existing brand.

- n. Identify and recruit the involvement of suitable partners
 - o. Develop multiple strategies to reach the highest priority target audiences (e.g., media relations, radio and TV public service announcements (PSA's), passive and active outreach, engaging clubs to pass the word, direct contact at boat ramps, using existing educational programs)
 - p. Identify a system of promotional tools that are needed to obtain maximum visibility and to educate the target audience.
 - i. Compile information on existing resources and communication mechanisms and determine how these can be utilized in the state strategy (e.g., *Stop Aquatic Hitchhikers!*, state agency products, ANS Regional Panels, Sea Grant materials)
 - ii. Identify the need for additional tools/products.
3. Determine the evaluation process
- a. Determine which means are available to track public awareness and action regarding ANS (calls into the agency, web visits, surveys, etc.) that best suit each goal and objective within the marketing section and for each targeted audience. Focus on evaluation methods that permit regular monitoring to permit adjustments to the marketing approach, when needed.
 - b. Develop a baseline estimate of public awareness and action regarding each goal and objective. Such baseline estimates can include current levels of public inquiries or requests, implementation of a survey to measure public understanding of ANS issues, etc. If the evaluation methods permit regular monitoring (i.e. phone calls into the agency, web visits), determine how frequently each information source should be monitored to permit effective and timely adjustments.
 - c. At the end of the project, conduct post-project evaluations to measure how well the project met its goals and objectives. These must be coordinated with the baseline evaluations.
4. Determine roles, responsibilities and timelines
- a. Assignments: who will be responsible for each action item
 - b. Dates for completion of various tasks
 - c. Budget: source of funding for each task and amount needed, as appropriate

INSTATE PILOT MEETING

Step 4: Pilot State Team meeting with IAFWA Project Team

The purpose of the instate meeting may vary from state to state depending upon the status of existing ANS communications actions within the state. It is critical that both biological and outreach expertise be present at the meeting to ensure that the meeting generates information that is ecologically accurate and follows marketing strategies that would be effective in your state. Examples of outcomes from the meeting include:

- 1) briefly review the genesis, purpose, and anticipated outcomes of the pilot state project;

- 2) review the background, issues, audiences, and resources based on the information gleaned from interviews and incorporated into the draft ANS Communications Strategy;
- 3) confirm or modify background, issues, audiences, and resources in the draft strategy based on group discussion;
- 4) identify the actions that the state wishes to elicit in selected audiences;
- 5) group audiences, as appropriate, into similar actions and messages;
- 6) prioritize actions and develop messages that foster desired actions; and
- 7) outline implementation actions, identify roles of participants, and set timelines for implementation.

Further refinement of the state strategy will take place after the meeting through telephone, surface mail, and email interaction between the state team and the contractors.

AFTER MEETING WITH THE PILOT STATE

Step 5: Complete the ANS Communications Strategy document

The State Project Team will complete the Communications Strategy calling on the IAFWA Project Team for guidance. All guidance from the IAFWA Project Team beyond this point must be given by telephone or email, because there is no additional travel budgeted in the grant for IAFWA Project Team personnel. The IAFWA Project Team will send documents to the team by email and will work with the State Team by telephone and email to refine and complete the strategy. As the project leader and in keeping with the goals of the IAFWA as the funding source, the state fish and wildlife agency will have final authority to determine the scope and content of the strategy.

A. Set administrative priorities for implementation and evaluation

Through an ongoing dialogue, the IAFWA Project Team will lead an initial assessment with the State Project Team through interviews prior to the instate meeting. Depending on the decision regarding the makeup of this team, this step will have multiple and different purposes:

- Clarify the leadership role of the state fish and wildlife agency and how the Agency will articulate this role to its partners. State agency staff can use the inventory process to organize and provide us with information on their state's resources and strategies for implementation.
 - The Agency will need to identify the following in order to determine what can feasibly be implemented in regard to communication products and evaluations:
 - agency authorities
 - agency funding
 - agency FTEs
 - state agencies' needs and limitations
 - internal awareness of ANS issues among agency staff
 - external awareness of ANS issues among stakeholders affected by or transmitting invasive species
 - agency infrastructure (programs) that currently or can be used to support ANS outreach

- performance measures, existing or needed to determine impact of communication efforts
- ANS-related outreach products and services, existing and desired
- characteristics of and connections between affected audiences, pathways, and invasive species
- If the Agency engages external partners, you will need to determine the commitment level of these agencies and organizations to work collaboratively with the state fish and wildlife agency on the project.

The Agency will then work with the Project Team to develop action steps in the document that will establish how, when, and by whom the various communication activities will be performed.

B. Determine a process for evaluation before implementation

Based on the evaluation capabilities and resources available in state as determined during the agency interviews and the initial meeting, the IAFWA Project Team will prepare recommendations about the different levels of evaluation that should be implemented. Where opportunities exist to regularly monitor progress, these should begin as well. Specific individuals with access to the monitoring mechanisms (e.g., survey leaders, web masters) will be assigned monitoring tasks.

IMPLEMENTING THE STRATEGY

Step 6. Implement pre-evaluation

Prior to implementation of the marketing actions, pre-project evaluations will be implemented to develop baseline data for use in comparing the results of mid- and post-project evaluations. Pre-project evaluations may be based on questionnaires to agency staff and external partners, or based on data from existing surveys or other sources.

Step 7: Implement the selected marketing actions from the plan

The Agency will take the lead in overseeing the implementation of the marketing actions from the communications strategy with assistance from the appropriate individuals from the project team. Selected actions must be implemented within the one-year implementation period until June 2005, so that evaluation may take place. It is important to evaluate various aspects of the marketing actions and tools throughout the process. If evaluation of the process shows positive results, we anticipate that the Agency will continue implementing the strategy beyond the grant period.

A budget of \$10,000 is provided to each pilot state to assist with implementation of the communications strategy. These funds are reserved for production of communications materials or other items permitted by multi-state grant guidelines. Decisions on how to use these funds will be made by the pilot states and the IAFWA Project Team with approval from the IAFWA.

Step 8: Conduct evaluation after implementation

Near the completion of the project, post-project evaluations will be implemented. These must be closely coordinated with the pre-implementation evaluations if we are to effectively measure success and shortcomings. When evaluations are survey-based, final survey instruments will be developed based on any results from monitoring activities and will include questions to help identify the source or genesis of any problems identified in the project. The goal of the final

evaluations will be to identify how well we met goals and objectives, how future efforts could be implemented more effectively, and to identify other actions that could be taken that were not part of the pilot effort.

Step 9: Compile and analyze results and recommendations

A primary purpose of the project is to provide information to states on effective strategies for communicating on ANS issues. Results of the process will be provided to the states and IAFWA to use as a model for developing strategies each region. Therefore, all procedures will be transparent, documented, and made available for examination by the member states as the project progresses.

The Agency will be responsible for providing a final report describing the situation, approach, accomplishments, and learning process from the state fish and wildlife agency's perspective. This information will be critical to developing a process that can be applied in other states within the region. The report could include the following specific information:

- description of priority ANS issues;
- previous communications capacity and approaches;
- criteria used to select highest priority target audiences, messages, and implementation actions;
- outcomes of the implementation actions;
- successes, conflicts, and obstacles to implementation;
- modifications made or desired; and
- interactions with partners and advice on facilitating cooperative efforts.

The IAFWA Project Team will develop a package of information on the project that will facilitate use of the pilot in other states, including: a description of the purpose and process steps; the ANS communications strategies developed with the four pilot states; and a report on implementation and evaluations summarized from reports produced by each of the four states. The Project Team will work with the IAFWA regional associations, ANS regional panels, ANS Task Force, and others to disseminate the reports for use by other states.

General Project Timeline

The development of ANS communications strategies will take place through June 2004. Implementation actions chosen for evaluation must be completed within one year so that post-project evaluations can take place after June 2005. Project reports will be written and distributed to all states within the region by October 2005.

2003

September	IAFWA Advisory Panel meets to initiate project
October	IAFWA selects four pilot states
November	Instate meeting held in Missouri
December	Draft strategy development for all four states

2004

January	Instate meeting held in New Hampshire
February	Instate meeting held in South Carolina Implementation plans completed for Missouri
March	Instate meeting held in Arizona Implementation plans completed for New Hampshire
April	Implementation plans completed for South Carolina
May	Implementation plans completed for Arizona
June	Benchmark surveys completed for all four states <i>Strategies implemented for all four states (up to one year)</i>

2005

June	Post-implementation surveys completed for all four states
October	All four pilot state reports distributed to their regions

Glossary of terms

Teams within the pilot states will consist of individuals with a diverse set of professional backgrounds, ranging from marketing and outreach professionals to biologists and conservation leaders. It will be essential for the team to use consistent definitions within the context of this project. Definitions for several terms are included below for reference.

IAFWA Project Team: The team of contractors and FWS liaison charged with providing guidance and direction for pilot state communications project.

Agency: The state fish and wildlife agency that has agreed to be the pilot state host for this project.

State Project Team: The team of individuals the Agency has put together to lead the implementation of this project. The composition of this team is one of the key decisions that will be made by the Agency and will have influence on the process that is used by the IAFWA Project Team to engage the pilot state.

Aquatic Nuisance Species (ANS): For purposes of this project, the contractors recommend use of the definition of aquatic nuisance species (ANS), or invasive species, found in federal Executive Order 13112 as: "An invasive species is one that is non-native to the affected ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health."

Communication Strategy: An introspective process for guiding communications that allows Agencies to assess what they want to communicate about, what obstacles and opportunities exist and what their capabilities are to communicate and to set direction for communicating. .

Brand: A brand is a symbol that represents values and a lifestyle. To the consumer, a positive brand essentially promises good quality, good value or reliability. In other words it is much more than the name of a product or service. In today's complex marketplace, the power of a brand lies in its ability to influence our attitudes and ultimately affect the decisions we make. The more focused, consistent and tightly defined the brand idea is, the more power it has to attract the attention and hold the loyalty of an audience.

Marketing: The sum total of activities that keeps an organization focused on its customers. Cause related marketing as we are doing with the ANS issue uses commercial marketing techniques to promote the adoption of a behavior that will improve the well-being of the target audience or of society as a whole.