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Testimony for Oversight Hearing on Efforts to Control and Eradicate Giant Salvinia

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To Mr. John Fleming, M.D., Chairman, and the Honorable Members of the Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs:

The invasive floating fern giant salvinia (*Salvinia molesta*) is possibly the most noxious of all aquatic weeds. It is native to southern Brazil where, ironically, it is not particularly abundant or troublesome. Freed from the natural system of checks and balances in its native range, however, giant salvinia has become one of the world's most destructive invaders. Introduced and spread mainly as an ornamental by the horticulture and pond garden trade, it has become established in tropical and subtropical regions on four continents. In the US, giant salvinia is established in at least 11 states, and if current trends hold, it has the potential to devastate freshwater habitats in as many as 20 states.

In Louisiana, giant salvinia first became established in the Toledo Bend Reservoir in 1998. By 2004 it had spread to Terrebonne, Cameron, Lafayette, Jefferson Davis, and Lafourche Parishes. Then came the hurricane season of 2005. While salty storm surge from Hurricane Rita apparently helped wipe away the infestation in Cameron Parish, Katrina did no such favors in the southeastern portion of the state. The widespread flooding and high winds had the opposite effect. Giant salvinia was soon found in the Gulf Intracoastal Waterway, where it was then able to spread into many waterbodies throughout the coastal zone. Boating activity no doubt contributed to the accelerated spread, both along the coast and in the lakes of northern Louisiana. Giant salvinia is currently considered established in at least 15 parishes, mostly in the southeast and northwest of the state, and the river flooding of 2011 will most certainly result in additional introductions. Giant salvinia can thrive in any freshwater area of the state, and I believe that we are, unfortunately, only on the leading edge of the giant salvinia invasion.

The growth rate of giant salvinia is exponential. It doubles its coverage area in as little as a week under good growing conditions. A single plant could cover 40 square miles in three months. Waters infested with giant salvinia quickly become covered by a thick mat of vegetation. The mat can be up to three feet thick at the surface, making navigation impossible, even for relatively large boats. The mat is also much denser than other floating plants, blocking sunlight almost completely and greatly inhibiting oxygen exchange at the surface. The decay of plant masses further deoxygenates the water. The result is catastrophe for native flora and fauna. Hypoxic waters can cause fish kills. Submersed native aquatic plants are shaded out and they die. Habitat is destroyed for air-breathing animals like otters, diving birds, turtles and frogs, which cannot penetrate the mat. Ducks, which relish surfaces covered with the much thinner native duckweed, will completely avoid surfaces covered with salvinia. There is also evidence that prolonged presence of salvinia mats causes gradual acidification of lakes and ponds.

Giant salvinia infestations have severe human impacts too. Water management structures are damaged or rendered useless, boating and commercial navigation is impeded, intakes for municipal drinking water or industrial facilities are clogged, and recreational uses such as fishing, waterfowl hunting, paddling, or swimming are stopped.

Expensive and laborious efforts across the globe to control giant salvinia have seen mixed results. Chemical herbicides offer some control, but certain characteristics of the plant and its growth present challenges to chemical control. Contact spray herbicides can miss plants and plant parts under the waterline, and the thick mats serve to cover and protect plants buried within them. Systemic herbicides can be difficult to maintain at sufficient concentrations in large or flowing waterbodies. Also, frequent use of herbicides in aquatic settings present environmental and human health concerns.

Harvesting salvinia mechanically can be effective only in very small infestations; otherwise the sheer weight and volume of the wet plants are unmanageable. Booms and other structures to prevent the movement of salvinia can protect small areas, but often get overwhelmed by the massive mats when pushed by wind or current.

Currently, though, there is promise with biological control. A small South American insect known as the salvinia weevil (*Cyrtobagous salviniae*) has been approved for use by the USDA's Animal and Plant Health Inspection Service. The salvinia weevil appears to be completely host-specific, meaning that is cannot survive on plants other than salvinia. It is thus an ideal biocontrol agent. It feeds primarily on the buds, but also the leaves of the plant. Its larvae hatch on the plant and feed on buds and rhizomes. Plants develop brown lesions at the feeding sites that quickly grow and merge. Entire mats can brown over and the plants die and sink. Under the right conditions, salvinia weevils can be extremely effective at controlling giant salvinia.

Weevils have been released in Louisiana since the mid-2000s, so far without dramatic impact, although tremendous progress has been made in Australia and South Africa using the same insect. One of the limitations here is temperature. The insect appears to be slightly more sensitive to cold than the plant, and both are on the edge of their temperature range in Louisiana. Although weevils have been reported to overwinter in Toledo Bend, weevils released in Lake Bistineau in 2009 did not survive the freeze event in January 2010. But biocontrol is a long-term process, and we should not be discouraged. As we have seen with many introduced species, tolerances for environmental conditions often change over time due to selection. We now have four rearing ponds in the state, growing two strains of the weevil, but an expanded rearing operation would be a big step forward in producing effective weevil population numbers.

The fight against invasive species and salvinia in particular should be multidisciplinary, multijurisdictional, and transpolitical. According to the Gulf and South Atlantic Regional Panel of the Aquatic Nuisance Species Task Force, "Spread will continue until combinations of multiple control methods are established and implemented consistently across states and jurisdictions." I agree with the recommendations of this group's salvinia control team, which include significantly increasing the number of weevils to be released, incorporating technology such as satellite imagery and software development to inform monitoring programs, developing

new funding strategies, and coordinating collaborative control that can strategically integrate weevil release zones with chemical spray zones and other control efforts.

Giant salvinia, like most invasive species, is an aggressive pioneer of disturbed habitats. Physical disturbance of the landscape or water quality problems such as eutrophication can disrupt native succession and open ecological niches to invasion. Thus another important component of a comprehensive salvinia management plan is to restore aquatic habitats by controlling nutrient runoff, curbing water pollution, and maximizing the presence of native vegetation. To use an often quoted phrase, never leave an empty niche!

When giant salvinia is found to have invaded a new site, or when a new invasive species is reported, it is important to have a robust program of early detection and rapid response. My organization, the Barataria-Terrebonne National Estuary Program, is partnering with the University of New Orleans and the Louisiana Department of Wildlife & Fisheries to produce such an ED/RR program. The goal is to have field identification guides of potential invaders for resource agents in the field, and a clear line of communication that can quickly mobilize assets when a sighting is made, before an invasive species becomes widely established. ED/RR programs require resources and funding, but they are critical to successful invasive species management.

The final piece of the management puzzle is education and outreach. Increased attention to invasive species at the local level should be introduced in school science curricula. Plant pest notices should be sent to people with boat registrations and hunting and fishing licenses. Signage should be placed at public boat launches and parks with instructions on how to minimize the spread of aquatic invasive species. Encouraging good public stewardship of the environment pays for itself over time.

Unfortunately, the recurring theme in invasive species management is reaction. We are constantly trying to chase down the best control practices for each new problem species. We scramble to mitigate damages and restore habitats one invasion at a time. Government action, such as the outdated listing procedure for injurious species provided to the US Fish & Wildlife Service by the century-old Lacey Act, has invasive species biologists caught in a permanent reactionary mode. A species' damage to the environment is a necessary condition for it to be declared injurious, so it has already become established and is highly unlikely to be susceptible to eradication. Controlling invasive species to a manageable level is the best we could hope for in such situations.

Many invasions are preventable. Stronger regulations to control the importation and trade of exotic plants and animals could have prevented such environmentally disastrous invasive species as Asian carp, tilapia, red lionfish, nutria, Burmese pythons, catclaw vine, hydrilla, and giant salvinia. Fortunately, there are new regulations being enacted and proposed that will finally move us toward a more proactive, rather than reactive, approach to invasive species. Senator Bill Nelson of Florida is currently intruding a bill, the Invasive Wildlife Prevention Act, which would bring the exotic animal import provisions of the Lacey Act into the 21st century. It would allow the USFWS the flexibility to conduct risk assessments before a new exotic animal is allowed into the country. Also, the USDA has issued action Q-37 to the Animal and Plant

Health Inspection Service similarly allowing them to conduct risk analyses on plants that have shown potential for invasiveness before they are allowed to be imported.

Of all the tools available to combat invasive species, prevention is the only one that definitely works. Proactive approaches like Q-37 and the Invasive Wildlife Prevention Act must replace the old way of doing things. I am certain that giant salvinia would never have been allowed into the country if APHIS had been able to conduct pre-import risk screening. We are stuck with salvinia now, but while the next invasive species could be worse, it can be prevented – if we put the proper rules in place.