

# Barataria-Terrebonne National Estuary Program



## 2009 Tidal Graph Calendar *Invasive Species*





# Barataria-Terrebonne National Estuary Program



No other place on Earth is disappearing as quickly as the Barataria-Terrebonne estuarine system. In the process, we are losing not only valuable resources, but also a natural flood-protection system that absorbs storm water before it can harm our low-lying communities. Many of us have heard about the alarming land loss rates so many times that we have begun to take them for granted, even as we worry every year about flooding. Fortunately, we can save our “terre bonne,” or “good earth,” and our ways of life if we work together and make smart choices. The Barataria-Terrebonne National Estuary Program invites you to join this effort now while we still have time to make a difference.

In order to maintain the way of life of people in Louisiana and to still provide the economic and natural resources the rest of the nation relies on every day, a holistic approach to coastal restoration must be taken like BTNEP took in the development of its restoration plan. Within this plan, small to medium water diversions are recommended, along with pipeline sediment delivery. The later technique is proven to work and should be at the top of the restoration “tool box” as one of the very few available tools that can be used to create wetlands from open water areas. It is a process that moves sediments harvested from existing deposits in river beds and offshore areas through an infrastructure of pipelines to rebuild and nourish wetlands and natural ridges. Adding freshwater will protect the marshes we have now, but this is not enough to allow for a sustainable human ecosystem. Our current condition calls for an urgent response to rebuilding our coastal landscape and that goes beyond merely sustaining what we have left.

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Established in 1991, the mission of the Barataria-Terrebonne National Estuary Program (BTNEP) is the preservation and restoration of the Barataria-Terrebonne estuarine system, the 4.2 million acre region between the Atchafalaya and Mississippi Rivers. BTNEP strives to rebuild and protect the estuary for future generations through the implementation of a science-based, consensus-driven plan that utilizes partnerships focused on the estuary's rich cultural, economic, and natural resources.







# Alien Invaders

**It is the nature of human beings to travel. Whether it is for business, trade, immigration, or recreation, we are constantly moving around the globe, transporting ourselves and our goods from place to place. The human need for travel and trade has resulted in a very serious unintended consequence – invasive species.**

In 1999, the federal government released Executive Order 13112 establishing the National Invasive Species Council. Section 1(f) of that order states: "*Invasive species* means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health."

Scientists who study invasive species use terminology that can be confusing. Words like indigenous or alien are relative to a specific location, so it is important to clarify the terms. Species normally found in a given location are *native*, or *indigenous*, to that location if they have always existed there. If, on the other hand, evidence shows that the species were introduced to the location from somewhere else at some point in the past, then the species are considered *exotic*, *alien*, *non-native*, or *non-indigenous*.

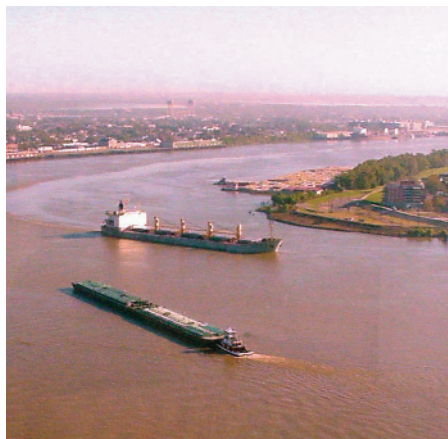
Most exotic species that are introduced to a new location have difficulty surviving because they evolved elsewhere and are not well-adapted to the new conditions. Consider, for example, a tropical species introduced to a more temperate climate where winters could be deadly. Other exotic species manage to survive in the new location without causing much of a stir. But occasionally an exotic species thrives in its new location, and is able to reproduce explosively by exploiting the resources available in the environment. Often when an organism is moved from one place to another, it is freed from the natural system of checks and balances that were in place in its old, native location. Its new location may not have the predators, diseases, or other limiting environmental factors that previously controlled its spread. Once the expansion of an exotic species begins to harm the ecology, economy, or human health of a region, it is then said to be *invasive*.

Many invasive species were introduced purposefully, often because of some useful or desirable characteristic. Some livestock, agricultural crops, and aquaculture species are examples. The international trade in exotic plants and pets is also a significant source of introductions. Other invasives arrived by accident, usually as a by-product of international trade. The shipping business is a major pathway of invasive species introductions. Plant matter is often used as cargo packing material, then discarded at foreign ports. This was the case with the nasty invasive cogon grass. Seeds or other viable plant parts can hide in the sediment often present in cargo holds or ballast water tanks. Live animals or their larvae can also be found in ballast water which is frequently picked up in one waterbody and discharged in another, and ships' hulls are constantly fouled with clinging organisms hitching a ride to exotic waters.

The Barataria-Terrebonne Estuary and the rest of southern Louisiana are particularly susceptible to biological invasions. The region has some of the busiest international shipping ports in the world, so the possibilities for exotic species introductions are nearly endless. We have a mild climate and abundant rainfall, giving many exotics a greater chance to thrive and become invasive. The diversity of habitats in the estuary offer opportunity to a wide range of species, and the interconnectedness of our waterways allow for virtually unlimited spread.



The pernicious zebra mussel from the Black Sea arrived in US waters as the result of ballast water discharges.



A ship and barge round Algiers Point. International shipping is a major vector for the introduction of invasive species.

## Plant Diversity

Louisiana is home to some 3200 different species of plants, but only 2400 are native to the region. The other 800 species are exotic, and of those, roughly 80 are considered invasive.



Sugarcane is a familiar sight in the Barataria-Terrebonne region. Native to South Asia, it has been transported around the world for its agricultural value, and is a good example of an exotic species that is not invasive.





In August 2008, BTNEP conducted the state's first Rapid Assessment Project for invasive species. Dubbed BTRAP, this was a week-long intensive field survey for invasive plants, fish, and invertebrates in the estuary.

Over 80 scientists like the Nicholls State University biologists above, students, and field agents participated in the survey, the purpose of which was to establish a snapshot of the presence or absence of invasive species at selected sites throughout the Barataria and Terrebonne systems.

This information will form a baseline critical to future tracking, control, and management of invasive species.

Compared to healthy habitats, degraded habitats are especially prone to invasion. These could be forests cleared by logging, lots leveled for development, or sinking marshes laid bare. Invasive species are opportunistic and quickly take advantage of niche space exposed by habitat degradation. Many biologists believe in the concept of invasional meltdown; that invasive species themselves degrade habitats, rendering them more susceptible to further invasions. This circular process does not bode well for a region like ours that is simultaneously degraded and ecologically rich.

The destructive impacts of invasive species are many and varied. Ecologically, they are a threat to native species biodiversity, habitat quality, predator-prey relationships, food web interactions, and many other aspects of environmental quality. Economically, they do millions of dollars of damage to agriculture, forestry, fisheries, and infrastructure. Combined expenditures to combat invasive species in the US are near \$150 billion annually!

But perhaps the gravest threat here in the Barataria-Terrebonne estuary system is to our culture. The native plants and animals of southern Louisiana define our sense of place. They are the food we eat, and the materials we use for building houses and boats. They are the backdrop to our cultural identity. But as habitat goes, so do fisheries. As nutria devour the marsh and Chinese tallow trees invade the swamps, we stand to lose our sense of place.

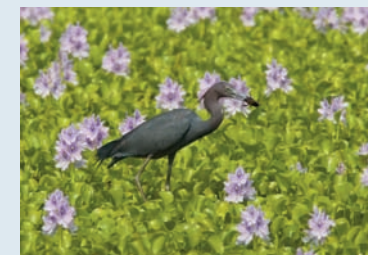
Good stewards of the estuary can keep in mind the following suggestions to help minimize the risk from invasive species:

- Never release ANY non-native plant or animal into the local environment
- Remove aquatic plants from boats and trailers before launching in a new area
- Get to know native plants and use them in gardening and landscaping
- Spread the word about invaders. Education is our best weapon in the fight to preserve native species and habitats.

Every region has its own invasive species. Some, like zebra mussels and kudzu, have been known nationwide for some time. Others are only now getting noticed.

Louisiana now has a multi-agency Invasive Species Council and Task Force headed by the Department of Wildlife & Fisheries. In support of the council's management plan for invasives, BTNEP is helping to develop an Early Detection and Rapid Response Program. The idea is to attack invasive species before they become widely established – the field biologist's "preemptive strike."

Invasions are relative to location. Our own crawfish, a native species that we love, eat, promote, and protect, has become a problem in France and Spain where it was an exotic introduction and is now invasive. Here in Louisiana, native species like the little blue heron (coincidentally shown foraging in a field of invasive water hyacinth) have evolved a taste for crawfish and the ability to prey on them, helping to keep their numbers in check. In Europe, the native predators are not adapted to prey on American crawfish. Predation cannot keep up with the expanding population. The smaller European crawfish are out-competed for space and resources. Adding insult to injury, the invaders have brought with them a fungal disease that is further decimating the native white-legged crawfish population. Considering the locations, this is truly an ironic ecological twist.



A little blue heron eating a crawfish.  
Photo by David Chauvin

Kudzu is particularly troublesome in Mississippi, Alabama, and Georgia where it is known as "the vine that ate the south."





# The Mighty Moon

**There is not one drop of water in the ocean, not even in the deepest parts of the abyss, that does not respond to the mysterious forces that create the tide. No other force that affects the sea is so strong. Compared with the tide, wind-created waves are surface movements which are felt, at the most, no more than a hundred fathoms below the surface. To help you comprehend the enormous masses of water affected by tidal movement, consider the following example. Into one small bay on the east coast of North America - Passamaquoddy - two billion tons of water are carried by the tidal current twice each day; into the whole Bay of Fundy, 100 billion tons!**

## Response to "Pull" of the Moon

The tides are a response of the waters of the ocean to the gravitational "pull" of the moon and the more distant sun. Folks who live along the Louisiana coast know that the moon, far more than the sun, controls the tides. Why is this? Should not the sun, with a mass 27 million times that of the moon, have the great influence? No. Because in the mechanics of the universe, nearness counts far more than distant mass, and when all the mathematical calculations have been made, we find that the moon's power over the tides is more than twice that of the sun.

## Moon Deciding Factor

Here's how it works - twice each month, when the moon is a mere thread of silver in the sky, and again when it is full, we have the strongest tidal movements - the highest flood tides and lowest ebb tides of the lunar month. These are called the spring tides. At these times the sun, moon, and earth are directly in line and the pull of the two heavenly bodies is added together to bring the water high on the beaches and draw a brimming tide into the bays so that boats float high beside their wharfs.

Likewise, twice each month at the quarters of the moon, when sun, moon, and earth lie at the apexes of a triangle and the pull of the sun and the moon are opposed, we have the moderate tidal movements called the neap tides. At this time the difference between high and low water is less than at any other time during the month. A simple way to explain or remember tidal rhythm is to think of it as twice-daily waves that move like the hour hand of a clock about a central point - mid ocean. These waves run 12 hours and 25 minutes apart; their crests are high tides and the troughs are low tides.

## Tides More Complicated

However, the tides are enormously more complicated than all of this would suggest. The influence of sun and moon constantly

changes with the phases of the moon, with the distance of moon and sun from the earth, and with position of each in relation to its position north or south of the equator.

The declination of the moon (its position north or south of the equator) is one of the most important factors affecting Louisiana tides. As the moon revolves around the earth from east to west, it also has a north-south movement. The declination is the distance in degrees of latitude that the moon is north or south of the equator. The plane of the moon's orbit is not in the same plane as the equator; therefore, the declination of the moon is constantly changing. In the moon's fortnightly change from maximum northerly to maximum southerly declination, the difference between morning and afternoon tides are greatest near the times the moon is over the equator.

## Power of Oscillation

Tides are further complicated by the fact that every body of water, whether natural or artificial, has its own period of oscillation. If disturbed, its waters will move with a seesaw or rocking motion with the most pronounced movement at the ends of the container and the least motion in the center. The truth of the matter is that local topography is all-important in determining the features that, to our minds, make "the tide." The attractive force of the heavenly bodies sets the water in motion, but how, and how far, and how strongly it will rise depends on such things as the slope of the bottom, the depth of the channel, or the width of the bay's entrance.

When we spend a holiday or weekend at Venice, Grand Isle, or Cocodrie, the ebbing and flowing of the tide may not leave much of an impression on our minds because in that great inland sea of the Atlantic - the Gulf of Mexico - the tidal rise is but a slight movement of no more than a foot or two.

On the shores of Louisiana the tide is long, deliberate undulation

- one rise and one fall in the lunar day of 24 hours plus 50 minutes - resembling the untroubled breathing of that earth monster to whom the ancient Indians attributed all tides. In contrast, if you ever have the chance to summer on the Gulf of Maine around the Bay of Fundy, the rise and fall of the tide would be something you would never forget. You would have to accommodate your boating and swimming activities to a tide that rises and falls 40 to 50 feet a day! Although all earth lies under the same moon and sun, the above contrast shows us how much the topography, or shape of a basin in a certain location, affects the tide.

## Tides Growing Weaker

The tides are slowly growing weaker and weaker. Tidal friction is constantly pushing the moon farther and farther away. As the moon recedes, it will have less power over the tides, and it will also take the moon longer to complete its orbit around the earth. When finally the length of the day and month coincide, the moon will no longer rotate relatively to the earth and there will be no lunar tides.

If the history of the earth's tides should one day be written by some observer of the universe, it would no doubt be said that they reached their greatest grandeur and power in the younger days of Earth, and that they slowly grew feebler and less imposing until one day they ceased to be.

## Tides affect people, fish

The lives of coastal Louisianians are affected daily by the tides and of even greater importance is the effect the rise and fall of the tides has on the lives of fish and shellfish we call "seafood." The tidal flooding of the coastal marshes - the estuaries - is a vital factor that accounts for the fertility that enables us to enjoy the fishing and fine seafood that we sometimes take for granted.

Framed by the Earth's horizon and airglow, the full moon floats in the blackness of space in this photo from the Expedition 10 on board the International Space Station. (Image and caption by NASA).



# Control Efforts

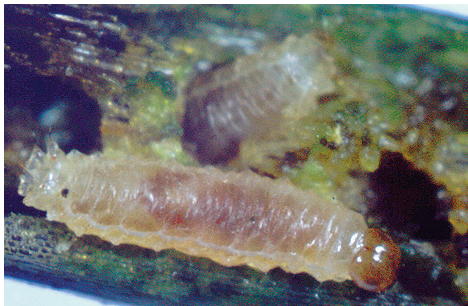
*Giant Salvinia*  
Michael Massimi



Mechanical Control  
Chemical Control  
Biocontrol  
Educational Outreach



Google Images



USDA



Michael Massimi

A hydrilla harvester in Bayou Lafourche (inset)  
A chlorine generator (top)  
Hydrilla tuber weevil larvae (middle)  
Salvinia weevil (above)

Once invasive species become established in the environment, they are nearly impossible to eradicate. Fish and invertebrates invariably find places to hide and escape detection, and plants usually manage to have at least a few individuals survive herbicidal spraying efforts. Even a relatively large and conspicuous mammal like the nutria becomes so thoroughly ensconced in its new environment that eradication efforts are futile. But much can be done to manage the spread of invasive species, control their populations, and minimize the impacts of invasions.

Physical or mechanical control is simply removing the offending organisms by hand or machine. This may be as simple as pulling weeds or cutting down trees, but might also include hunting, trapping, or fishing for invasives. A vessel called a hydrilla harvester, shown above, operates on Bayou Lafourche to remove the troublesome plant and is a good example of mechanical control. This type of control activity has low environmental impact and works well if there is a large labor force or an efficient machine, but is not effective in the long term on widespread or persistent infestations.

Chemical control is the use of baits, herbicides, pesticides, or other poisons to control invasives. The Louisiana Department of Wildlife & Fisheries has an aggressive aquatic nuisance plant spraying program, as do other state and federal agencies. Millions have been spent on complex machines like chlorine generators that control the growth of zebra mussels on industrial intake pipes. Chemical control can be effective over a large area, and manufacturers continue to develop formulations that are safer and more target-specific, but the potential environmental hazards of adding chemicals to the environment year after year make chemical control questionable as a long-term policy.

Biological control, or biocontrol, is the importation of one species to attempt to control another, invasive species. This may seem like "monkeying with nature," but it is more like re-establishing nature's system of checks and balances. Most invasives spread rapidly in their new environments due largely to the absence of predators, pests, or diseases. Biocontrol scientists look for those species that control the organism in its native range and, after much laboratory study to be sure the introduction of the species is safe, import it and release it upon the invasive species. Many important lessons have been learned over the years, and biocontrol efforts are now strictly managed by the USDA and other regulatory agencies. The effectiveness of biocontrol programs vary widely, but it is nonetheless perhaps the most promising and sustainable long-term strategy against well-established invasives.

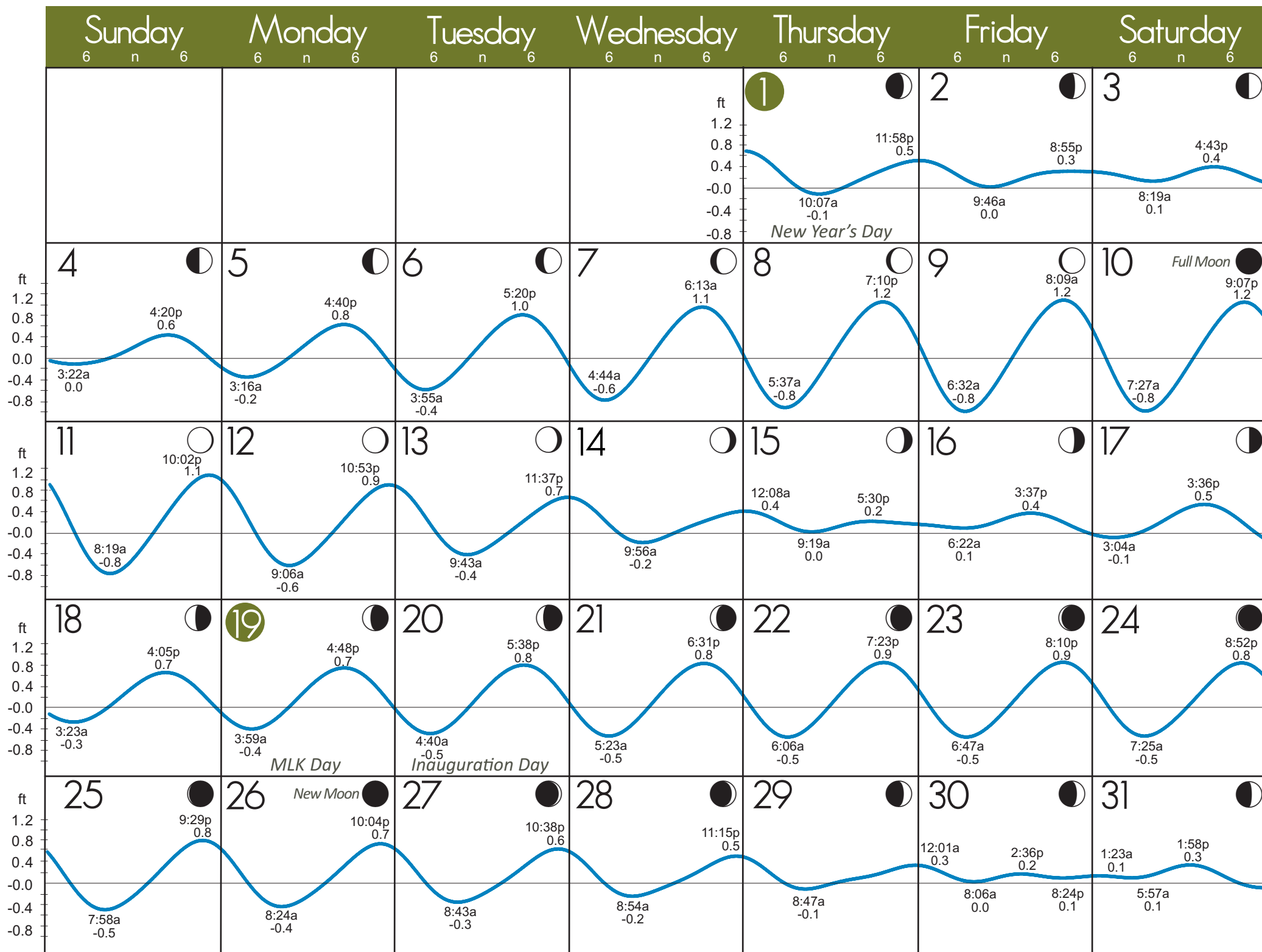
Educational outreach is perhaps our best weapon. Public awareness, vigilance, and stewardship of the environment mean many eyes in the field and many boots on the ground. Education may mean changes in behavior or consumer habits, or legislative changes in shipping or importation rules. When people are fully informed of the risks and impacts of exotic and invasive species, they tend to make the right choices.



# January 2009

Low Tide:  
January 9  
6:32a  
-0.8 ft

High Tide:  
January 9  
8:09p  
1.2 ft





# Asian Carp



Bighead carp  
LDWF



Jody David - LDWF

Five species of non-native carp currently live in Louisiana  
Some introduced for aquaculture industry  
Silver carp have caused injuries to boaters  
by leaping out of the water when disturbed

There are at least five species of non-native carp in the waters of the Barataria-Terrebonne estuary. The common carp (*Cyprinus carpio*) has been here the longest. It was deliberately introduced to the US in the 19th century by immigrants who intended to recreate one of Europe's favorite fisheries in their new land. Since the common carp has been so well-established for so long here, it is impossible to measure the full scope of ecological impacts from its invasion. Scientists call such species "naturalized."

Grass carp (*Ctenopharyngodon idella*) are also commonly found in our waters. They were introduced to help the aquaculture industry, as they are good at controlling aquatic plant growth in catfish ponds. In Louisiana, the importation of grass carp is limited to specimens that are genetically screened to ensure that they cannot reproduce, but these regulations do not apply to neighboring states, nor is the process fool-proof. The result has been numerous escapes from aquaculture facilities in several states, leading to large reproducing populations in the wild.

The silver carp (*Hypophthalmichthys molitrix*) is a relative newcomer to the area. Also introduced by the aquaculture industry, it escaped into the upper Mississippi River system and has been slowly making its way downstream over the last 20 years. River diversions and spillway openings have further spread this species through the estuary. The silver carp can grow very large - up to 50 pounds - and is a filter feeder, meaning that it consumes large quantities of plankton and tiny larval fish. This is a double-whammy; not only is the carp removing the plankton that our tiny native fish need to feed on, but it is eating the larval fish themselves as well! This invasive species is sure to have a significant impact on local fisheries in the future. And if that weren't bad enough, the silver carp has the dangerous habit of leaping out of the water when startled. Large adults have caused serious injuries to boaters, and even a few fatalities.

The bighead carp (*Hypophthalmichthys nobilis*) is very similar to the silver carp, and has also recently arrived here via the aquaculture industry. It, too, grows very large, feeds on plankton and larval organisms, and is likely to have negative fisheries impacts. The native species most likely to experience impacts from competition with carp are the paddlefish, buffalo, and gizzard shad.

Black carp (*Mylopharyngodon piceus*) are as yet much less widespread than the other Asian carp species, but have been recently documented in the Atchafalaya and lower Mississippi Rivers. They feed on snails and other mollusks, and so have the potential to steal resources away from native fish and alter food webs.



Brac Salyers - LDWF

A hoop net full of silver carp near the Atchafalaya River (inset).  
Common, grass, silver, and bighead carp were all found in the Barataria system in 2008 (above).



LDWF

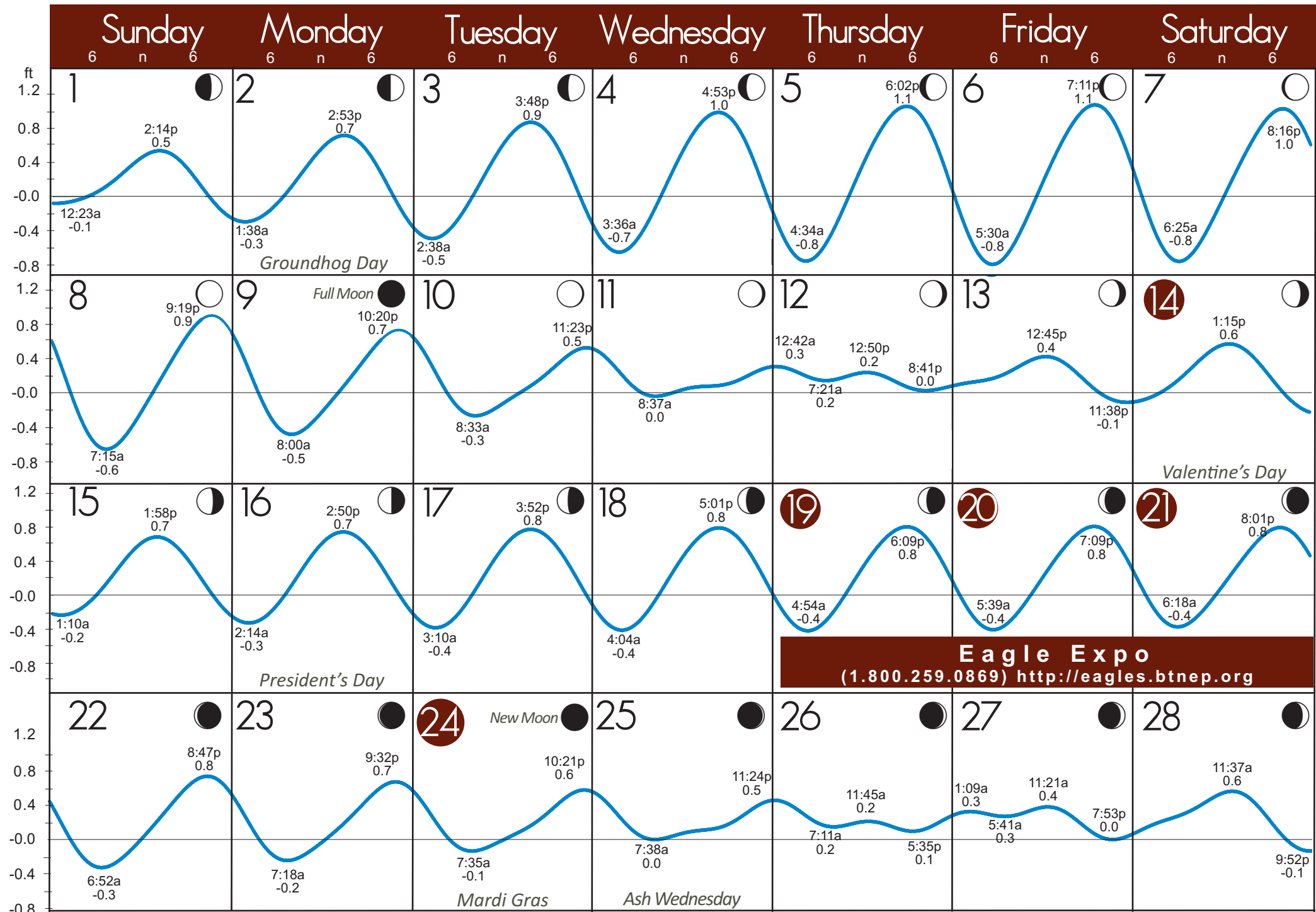
Fisheries Biologist Brac Salyers shows a 60 pound bighead carp caught in the Davis Pond diversion channel.



# February 2009

Low Tide:  
February 6  
5:30a  
-0.8 ft

High Tide:  
February 6  
7:11 p  
1.1 ft





# Apple Snail

Apple Snail  
Michael Massimi

Apple Snail - LDWF

One of the largest species of freshwater snail  
First found in Louisiana in 2006  
Lays bright pink egg masses above the water line  
Adults can grow to the size of a baseball



Michael Massimi



Michael Massimi

An apple Snail shows its large muscular foot. (top)  
Snail eggs on a cypress tree in the  
Chacahoula swamp. (above)

The apple snail is an invasive aquatic snail from South America. Its first recorded appearance in Louisiana was in a drainage basin near Gretna in 2006, and it has since been found in several different water bodies within the Barataria-Terrebonne Estuary. Apple snails are popular in the aquarium trade for their large size and handsome shells, and their presence here is most likely due to irresponsible aquarium releases. The apple snail is also an invasive species in Florida, Texas, and throughout Southeast Asia where they have become a serious rice crop pest. In addition to causing agricultural and ecological damage, these snails also threaten human health. If eaten raw, they can transmit a harmful parasite called rat lungworm to humans and other mammals.

In Florida where apple snails have been present for many years, the ecological impacts are highly variable. The snails slowly graze on aquatic plants, but grow very large, very numerous, and have voracious appetites. Thus they remove large quantities of plants from waterbodies. Sometimes the impacts of this are minimal, but often the result is a much muddier waterbody dominated by algae instead of healthy marsh vegetation. Fewer plants mean poorer water quality and a lower habitat value as grass beds that serve as nurseries for important fisheries are removed. And on top of the ecological impacts, the impacts to the aesthetic quality of the area can be startling. Impacts here in Louisiana have yet to be fully realized, but could be severe as the snails spread and become established.

There is no pesticide that will selectively target apple snails, but scientists with the US Geologic Survey at the National Wetlands Research Center in Lafayette are currently testing various chemicals for their effectiveness on apple snails in an attempt to minimize the harm to non-target species like crawfish. But for now, hand removal of the snails and their highly visible, bright pink egg masses above the waterline is the only reliable way to effectively reduce their numbers.



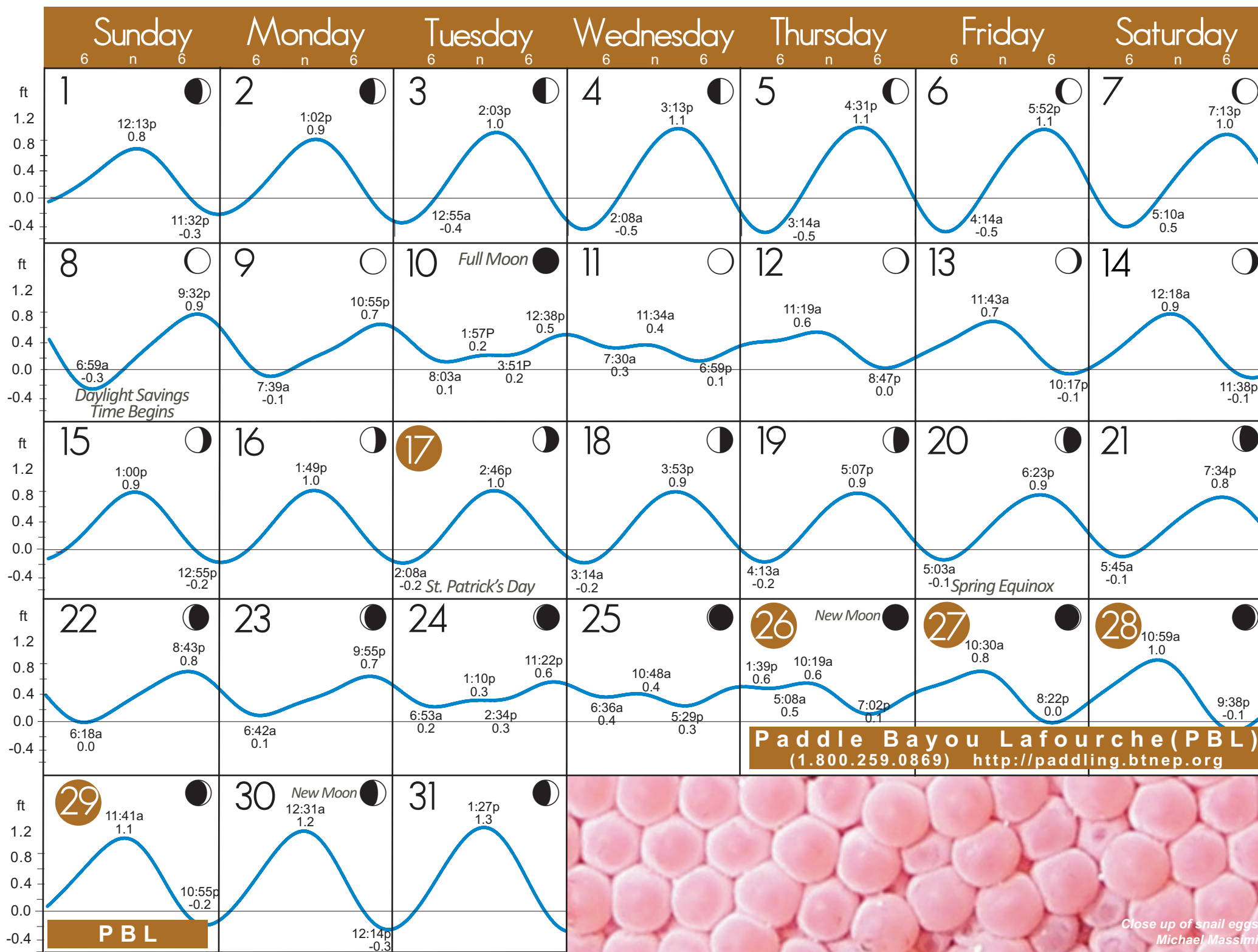
snail shell - USGS



# March 2009

Low Tide:  
March 5  
3:14 a  
-0.5 ft

High Tide:  
March 31  
12:27 p  
1.3 ft





# Water Hyacinth

Water Hyacinth  
Michael Massimi



Introduced in New Orleans in 1884  
Rapid growth  
Clogs waterways  
Impedes boat traffic

The beautiful but troublesome water hyacinth has long been the poster child for aquatic plant invasions in Louisiana. Ground zero for the invasion is thought to have been New Orleans, when it hosted the Centennial Cotton Exposition on the grounds of Audubon Park in 1884. Water hyacinths were allegedly brought from South America to showcase in the enormous Horticultural Hall and to decorate the lagoons of the park for the fair. In Florida, a well-known tale reports that one Mrs. W. F. Fuller brought some of the plants back from the fair in New Orleans and released them into the St. Johns River near her home, thus accelerating the invasion. Water hyacinth has now spread throughout the southern states.

The problem with water hyacinth is that it reproduces so quickly – it can double its population in as little as six days. It grows so thick on the water that light cannot penetrate the surface. Plants and algae below cannot photosynthesize. This lowers the amount of oxygen dissolved in the water, making it more difficult for fish to breathe. Additionally, air-breathing aquatic animals like turtles and frogs find it harder to grab a breath at the surface when it is covered with water hyacinth. Large populations of the plant degrade both water quality and overall habitat quality.

Mats of water hyacinth also block navigation, impede water flow, and clog intake pipes for industrial or municipal water. The state has spent millions on water hyacinth control efforts over the years, including harvesting with mowers, herbicidal spraying, and releases of various biocontrol insects. As bad as the problem still seems, it was much worse in decades past. Water hyacinth will probably never be completely eliminated, but steady progress is being made in managing the problem.



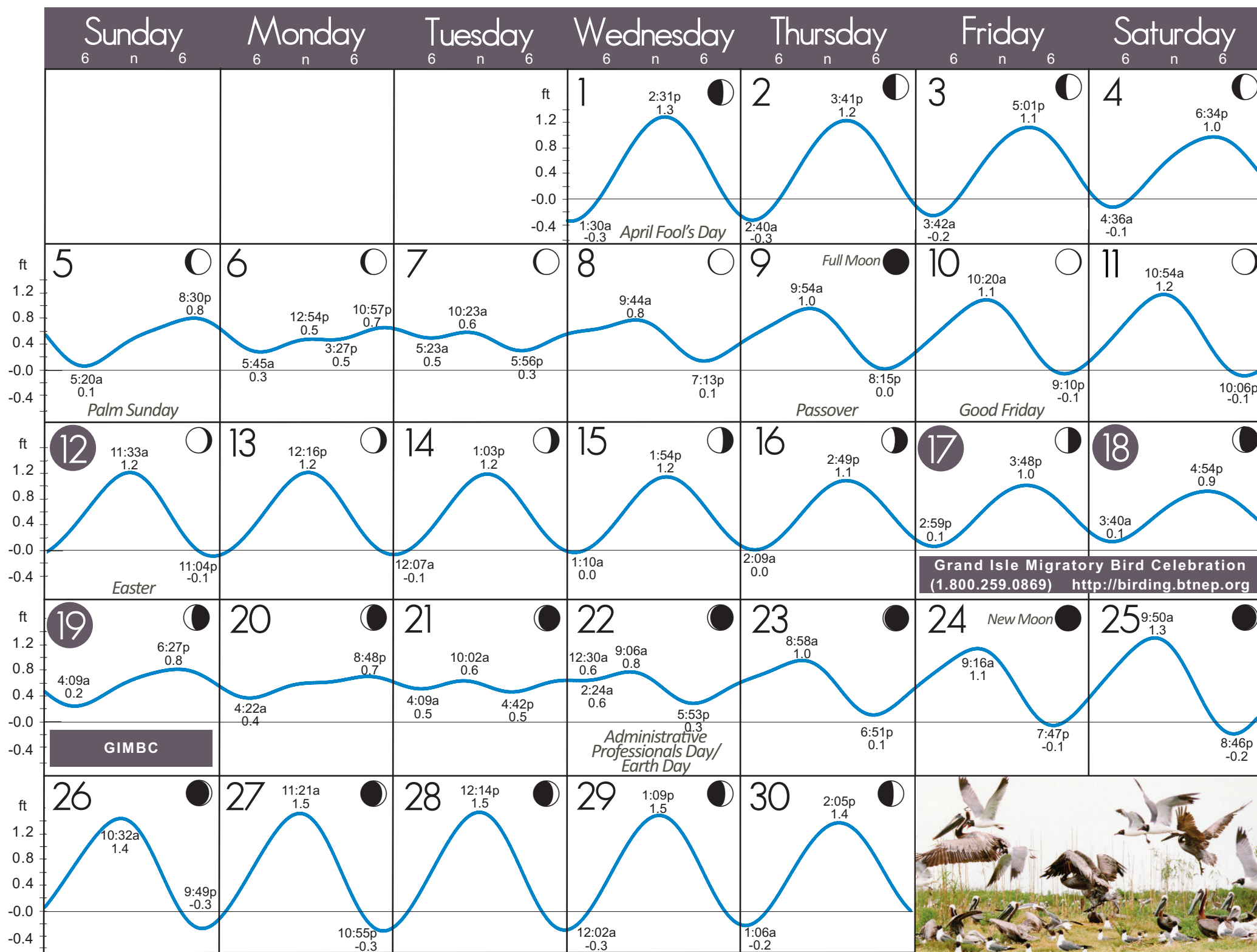
Audubon Park as it appeared for the 1884 World Cotton Exposition (inset)  
Artist's rendering of the massive Horticultural Hall at the exposition in New Orleans (above)  
Water hyacinth covers the Lake Cataouatche shoreline (left)



# April 2009

Low Tide:  
April 2  
1:40a  
-0.3 ft

High Tide:  
April 28  
12:14p  
1.5 ft





# Nutria



Semi-aquatic rodent  
First introduced for fur trade  
Can grow up to 20 pounds and 2 feet long  
Control program introduced in 2002

The nutria is perhaps the most well-known and charismatic invasive species in Louisiana and stories of its introduction are no less colorful. Some tales attribute the source of the invasion of these large semi-aquatic rodents to E. A. McIlhenny, former President of the Tabasco pepper sauce company. This rumor is only partly true. McIlhenny did open a nutria farm on Avery Island, Louisiana in 1938, where he bred, sold, and occasionally allowed nutria to escape into the wetlands, but he was not the first to do so. Indeed, nutria at the time were being actively imported from South America to bolster the fur trade in several states. The industry was encouraged and promoted, even by some state governments. This, plus the unfounded belief that nutria could help control aquatic weeds, led to countless releases, both intentional and accidental. Nutria have now been reported from 30 states and are considered established in 15 of them. But they particularly thrive in the wetlands of coastal Louisiana, where the population now numbers in the millions and in some areas up to 18 individuals per acre. At such population densities, nutria do tremendous damage to the wetlands where they live.

Overgrazing is the main problem. Unlike the native muskrat, nutria prefer to consume the lower portions of marsh plants, often damaging the roots and killing the plants. Known as an "eat-out", excessive nutria herbivory exposes the delicate marsh soils to erosion, causing widespread and highly visible marsh damage and wetland loss. They gnaw on young cypress trees as well, causing damage to cypress swamps and planting projects. Also, nutria like to burrow into stream banks and levees, destabilizing them and increasing the likelihood of breaches. These habits also cause agricultural damage as the nutria clip sugar cane stalks and destabilize rice field levees.

Over the years the nutria fur industry has had its ups and downs. Demand peaked in the 1970s when over a million nutria each year were harvested and sent to market, mostly in Russia and Eastern Europe, at up to \$8 per pelt. But a string of warmer winters there, coupled with changing cultural attitudes toward fur in general, caused a total price collapse in the 1980s that has continued to the present. Trapping slowed to a crawl in the 1990s, and the population soared. Aerial wetland damage surveys conducted in the late 1990s and partly funded by BTNEP showed that nutria damage was affecting an estimated 100,000 acres of coastal wetlands, almost entirely within the Barataria and Terrebonne estuaries. This was causing significant stress on an ecosystem already suffering from severe land loss.

Results of studies conducted in 2000 by the Louisiana Department of Natural Resources yielded the same conclusions that biologists from the Department of Wildlife & Fisheries had come to – that trappers were the best control. Something had to replace the lost economic incentive. The Coastwide Nutria Control Program was initiated in 2002 paying a bounty of \$4 per nutria tail to registered trappers out of funds from the Coastal Wetlands Planning, Protection, and Restoration Act. Tails are used so that trappers can still utilize the fur or meat if they can find buyers. The incentive program, which increased to \$5 per tail in 2006, is a success, resulting in nearly 300,000 animals harvested each year, and a decline in marsh acres damaged from 82,080 acres in 2003 to 23,141 acres in 2008.

**NUTRIA . . . NEWEST OPPORTUNITY**

New fur-bearing animal now being bred in U.S. Offers huge profits to breeders. This fur is next to Mink NOW in price and will soon surpass it. 15 to 20 young per year. Most easily and economically raised animal known. 1½¢ per day to feed, ANY CLIMATE, disease resistant. The Cabana Marrone strain is obtainable ONLY through Cabana Nutria, Inc. and its authorized dealers and distributors. For free booklet and address of Cabana ranch nearest you write:

**CABANA NUTRIA, INC. Dept. 27**  
636 West Lemon Avenue, Arcadia, California

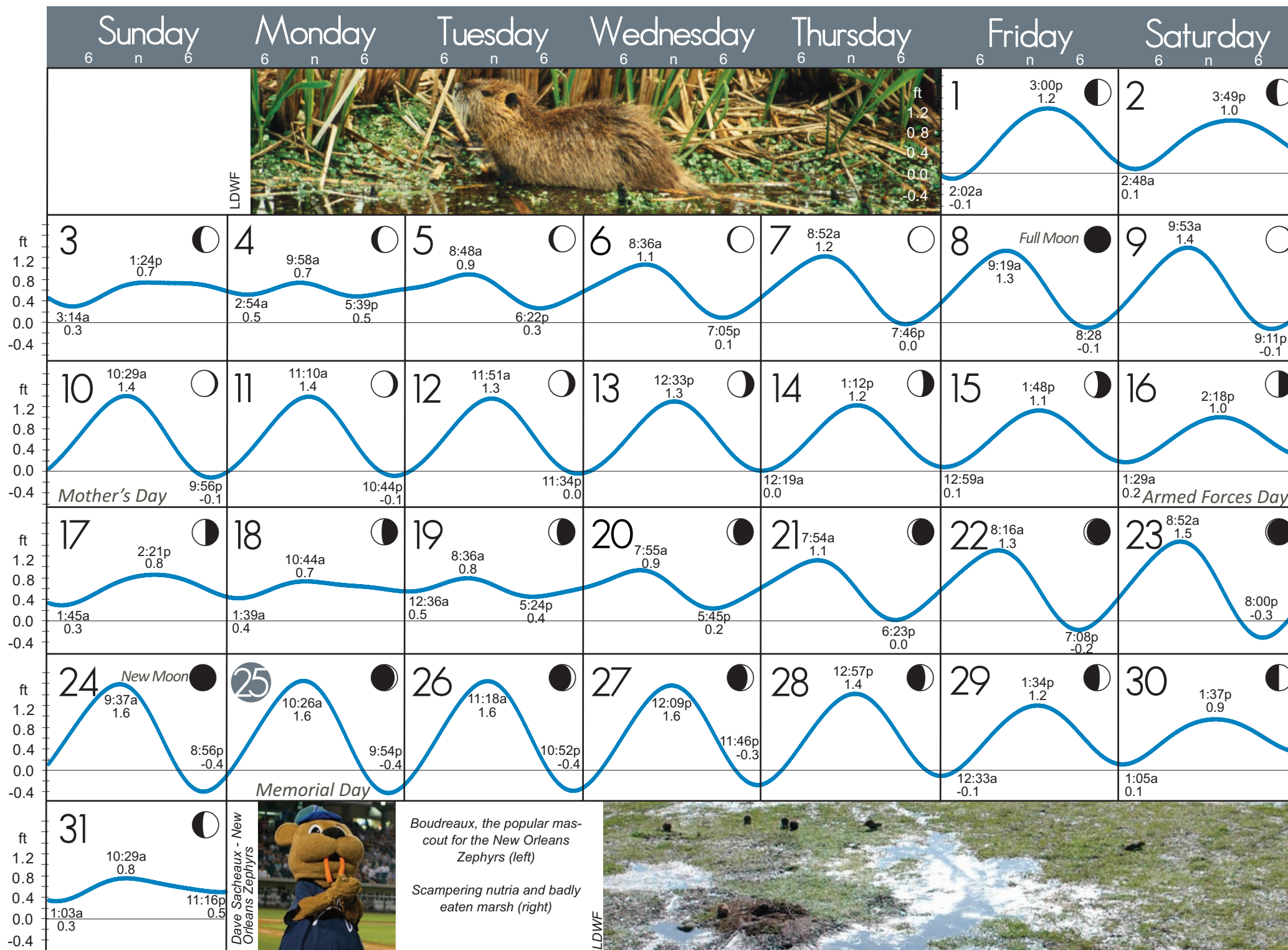
An ad in the April 1958 issue of Popular Science (above)  
Nutria tails are counted at a collection site for \$5.00 apiece (inset)



# May 2009

Low Tide:  
May 25  
9:54p  
-0.4ft

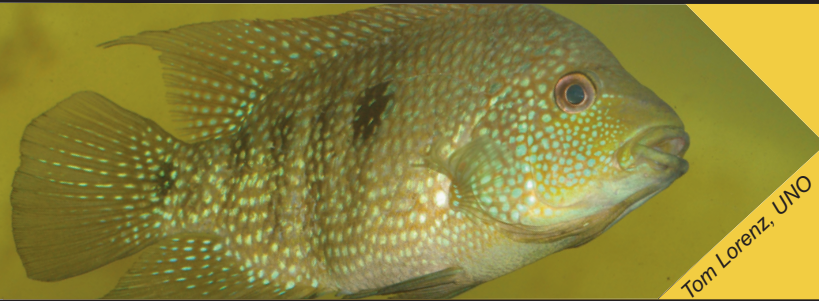
High Tide:  
May 25  
10:26a  
1.6ft





# Rio Grande Cichlid

*Rio Grande Cichlid*  
Tom Lorenz, UNO



Tom Lorenz, UNO

First seen in Louisiana around 1990

Omnivore

Native to Mexico and South Texas

Popular aquarium fish

Sometime around 1990, anglers on the east bank of Jefferson Parish began finding an unusual fish at the end of their lines. Home aquarium hobbyists recognized the blue-green speckled fish immediately. It was the Rio Grande cichlid, formerly found only in pet store aquariums, now swimming free in the canals of metro New Orleans. By the year 2000, this exotic freshwater fish had spread its range from the LaBranch wetlands in St. Charles Parish to the far end of New Orleans East, and even into Lake Pontchartrain. The species has now invaded the Barataria estuary, having been found in the Harvey Canal which leads directly to the Gulf Intracoastal Waterway. Further spread throughout southern Louisiana seems inevitable.

Cichlids (pronounced SICK-lids) are a large and diverse family of mostly freshwater fishes, containing at least 1300 known species. The majority are tropical species native to Africa and South America. Many cichlids such as the tiger oscar and the Jack Dempsey are popular home aquarium fish. Others such as the tilapia are farmed for food in the aquaculture trade. The Rio Grande cichlid is the northernmost species, and the only one native to US waters. Its indigenous range, as the name suggests, is the Rio Grande basin of northeastern Mexico and extreme southern Texas. But its popularity as both a sport fish and aquarium pet has led to releases in central Texas, peninsular Florida, and now Louisiana.

Rio Grande cichlids are similar in size and habit to Louisiana's native sunfishes like bluegill, redear, and crappie, and they compete with some of them directly for food and nesting space. They are generally more aggressive and will tenaciously defend their turf. Like many invasive species, Rio Grande cichlids are good generalists. That is, they are more capable of surviving in different habitats, thriving in poorer water quality, and eating a wider variety of items, even including algae. Rio Grande cichlids also appear to have a much higher tolerance for salinity than was once thought, as evidenced by their presence in the estuarine waters of Lake Pontchartrain. And although they are susceptible to cold temperatures, they seem to have no trouble finding warm refuges during winter months.

Local fisheries biologists fear that the cichlids will out-compete some native fish species and cause declines in their populations. Anecdotal evidence thus far seems to support this fear. Studies currently underway at the University of New Orleans hope to focus in on exactly what the impacts to native fish might be. Preliminary results show cichlids pushing native fish out of the prime real estate and into marginal habitats. Samples taken at specific sites over time are consistently showing more cichlids and fewer natives. At this point, the long term ecological effects of this invasive species are unknown. But as there is no cichlid-specific control method to combat them, we may have no choice but to accept their presence - and try to enjoy the fishing.



Larry Offner

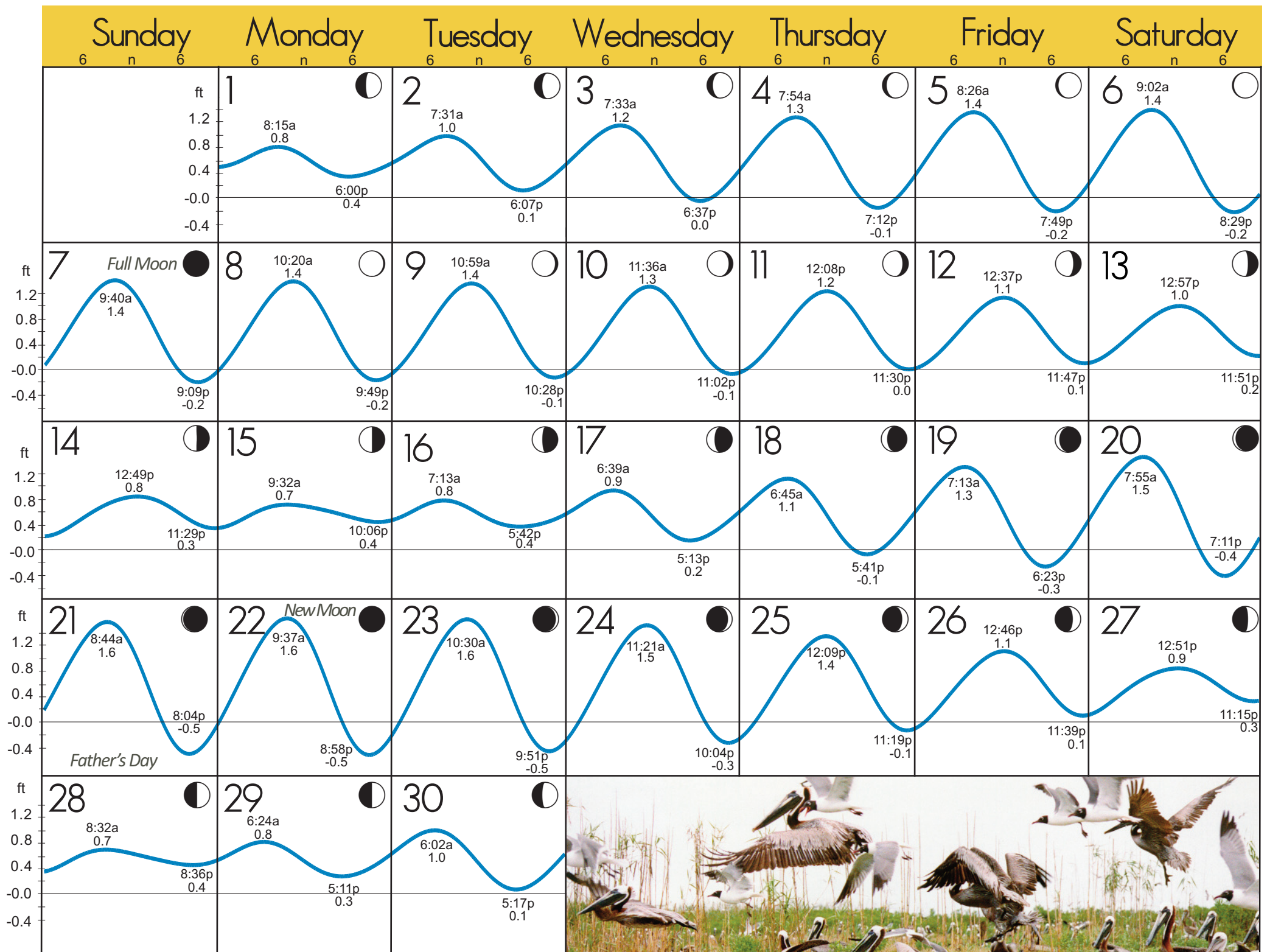
Sport fishermen in Texas have been enjoying Rio Grande cichlid action for decades. It is a fierce fighter for its size (up to 12 inches), and reportedly good to eat, though some locals here dispute that claim. The state record in Texas is 1.59 pounds. This 9.5" specimen was taken out of Bayou St. John in New Orleans.



# June 2009

Low Tide:  
June 22  
8:58p  
-0.5 ft

High Tide:  
June 22  
9:37a  
1.6 ft





# Australian Spotted Jellyfish

Australian Spotted Jellyfish in Terrebonne Bay

Michael Massimi



Dockwatch Program,  
Dauphin Island Sea Lab

Native to the Pacific Ocean  
Occasional population blooms  
Grows to basketball size  
Damages shrimp fisheries by clogging nets

Jellyfish are commonly known to be a stinging nuisance to beachgoers, but in the summer of 2000, one particular species of jellyfish became a much more dire threat. A sudden bloom of millions of Australian spotted jellyfish invaded the coastal waters of Louisiana, clogging shrimpers' nets, damaging their boat intakes and other gear, and effectively closing previously productive fishing areas. This caused a significant impact to the local fisheries economy that year, but large blooms such as this can also have serious ecological impacts beyond just the shrimp fishery. To appreciate both the cause and effect of these bloom events, it is important to understand three important aspects of jellyfish biology: their reproduction, locomotion, and their mode of feeding. Jellyfish have a two-stage life cycle, beginning as a tiny attached stalk, or *polyp*, which produces the more familiar, free swimming, umbrella-shaped *medusa* stage by budding when environmental conditions are right. Budding is usually seasonal, but various levels of sunlight, temperature, and food availability can potentially create a "perfect storm" whereby polyps are stimulated to produce many more medusa than usual.

Jellyfish are capable of "swimming" short distances by pulsing their bells, but they rely on winds and ocean currents for long-distance travel. This, too, can lead to huge local population booms when conditions are just right. It is unknown whether the bloom of spotted jellyfish in 2000 was the result of runaway reproduction by a small population known to be in Terrebonne Bay, or the transport here of a distant Caribbean population by the Gulf Stream Loop Current and its eddies. Regardless of the source, Australian spotted jellyfish are now well established in the northern Gulf, and scientists are left to speculate when the next major bloom event might occur.

Jellyfish have no lungs or gills, no blood or heart, and no brain or skeletal structure. They absorb oxygen through their skin, and nutrients through the lining of their internal cavity. They feed with stinging tentacles that can "reel in" food to the mouth, located on the underside of the bell. Australian spotted jellyfish have a very mild sting, but is sufficient to capture their prey: plankton and the eggs and larvae of fish. Dense swarms of jellyfish can remove tremendous quantities of plankton, larvae, and eggs from the water column, practically sucking the life right out of the ocean. Large populations of jellyfish are seen by some as an indication of poor overall habitat quality and ecological health.

Many species of jellyfish have a global oceanic distribution; others have a more local range. The Australian spotted jellyfish, as its name suggests, used to be restricted to the waters of the southwestern Pacific. It began spreading to other regions of the Pacific late in the last century. It is possible that this spread occurred naturally, but its later appearance in Atlantic waters was no doubt caused by man. The exact mode of invasion may never be known, but transoceanic shipping is the most likely culprit. Polyps can cling to ships' hulls or be transported in ballast water tanks. Ballast discharge and hull fouling are two of the most common pathways for invasive species introductions, and neither is likely to end soon



A young Australian Spotted Jellyfish (above)

Alvaro Migotto



The bloom of 2000 in Lake Borgne, LA (above)

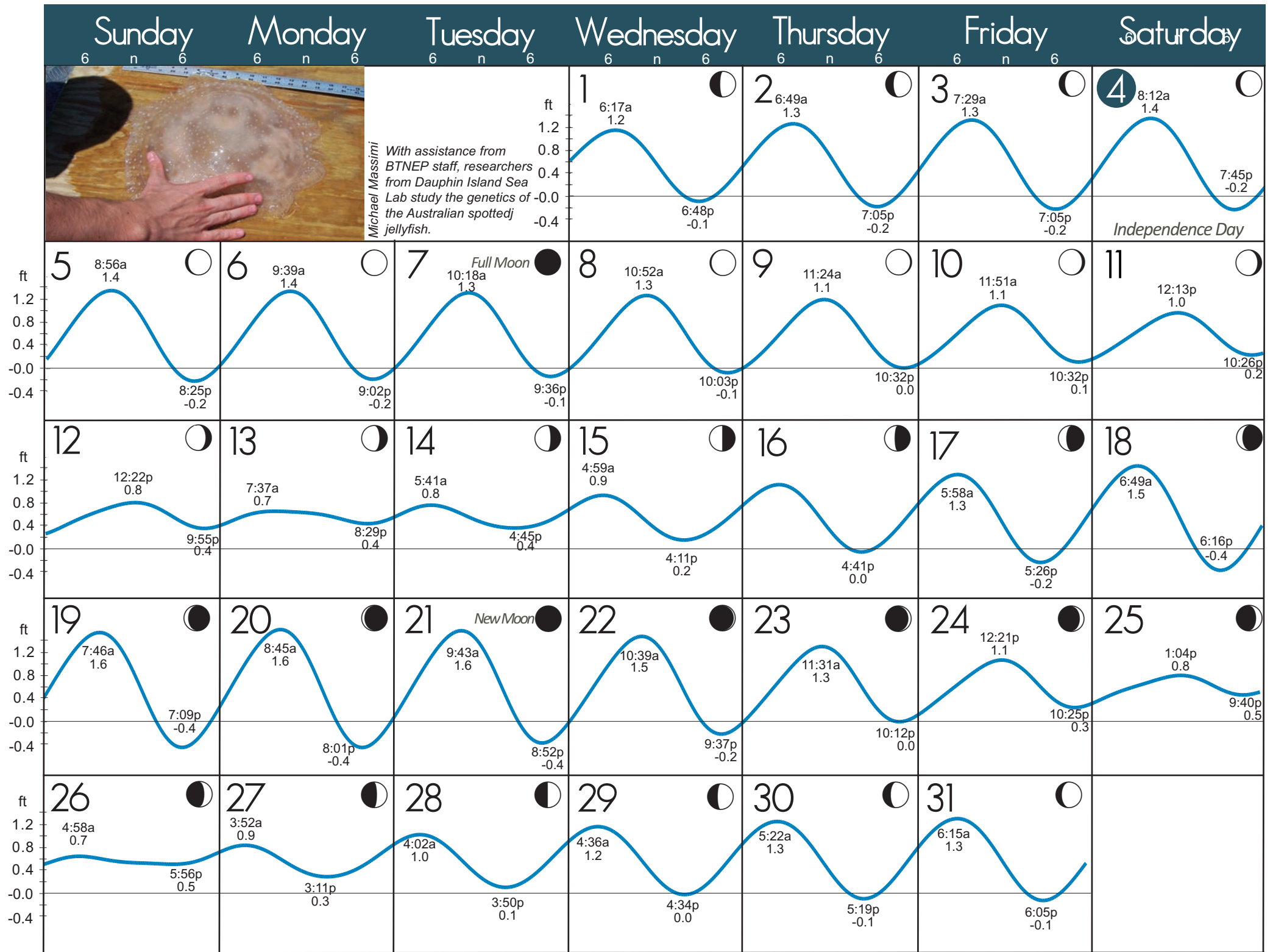
Monty Graham -  
Dauphin Island Sea Lab



# July 2009

Low Tide:  
July 20  
8:01p  
-0.4 ft

High Tide:  
July 20  
8:45a  
1.6 ft



Barataria-Terrebonne National Estuary Program: P.O. Box 2663, NSU Campus, N. Babington Hall, Room 105, Thibodaux, LA 70310 - 1.800.259.0869 - [www.btnep.org](http://www.btnep.org)

Tides from: Barataria Bay, Grand Isle, East Point, 29d 15'48" N 89d 57' 24" W - Tides & Currents by Jeppesen Marine - [www.nobeltec.com](http://www.nobeltec.com)

[TIDE ADJUSTMENT TABLE CAN BE FOUND ON THE INSIDE BACK COVER]





# Hydrilla

*Hydrilla in Bayou Lafourche*  
Michael Massimi



Bayou Lafourche  
Michael Massimi

Submerged aquatic plant  
Invasive throughout Southern US  
Grows rapidly  
Tolerates low light

Hydrilla is a submersed aquatic plant native to Asia and other regions of the Old World. It was imported to the United States for the aquarium and aquatic garden trade, and quickly became popular for its hardiness, rapid growth rate, and ability to tolerate low light. Unfortunately, these are the qualities that make it such a dangerous invasive species now that it has escaped into the wild.

The first reports of hydrilla in the US were from Florida in 1960, but it spread incredibly rapidly from there. Hydrilla now infests water bodies in 20 states from Maine to Texas, plus Washington and California. The northeastern states are infested with a slightly different form of hydrilla, suggesting more than one introduction.

Hydrilla is a plant with several "tricks up its sleeve" that are the secret to its aggressive growth and rapid spread. It can reproduce in four different ways: by flower and seed, by launching buds from the stems, by re-sprouting from tubers, and by vegetative re-growth of small pieces of broken stems and leaves. Hydrilla's tolerance for low light allows it to thrive in waterbodies too shady, murky, or deep to support other plant life. Once established, the plant grows extremely rapidly, tolerates swift or still water, high or low nutrients, tropical or temperate climates, and even high salinities. The result is a plant that out-competes all others in most environments. Its rooted stems can grow up to 40 feet long to reach the surface where the plant then branches out prolifically, forming dense mats over large areas. These mats intercept light that would otherwise be available to important native submersed plants. Hydrilla has been known to shade and kill beds of *Vallisneria*, also known as eelgrass or water celery, a native grass-like plant that provides habitat vital to fisheries.

Dense infestations of hydrilla can alter water chemistry, disrupt food webs, impede boat traffic, reduce stream flow, clog water intakes, and virtually eliminate recreational use. Injecting herbicides into the water or surface-spraying the mats can be effective in the short term, but the tubers tend to survive and sprout new growth. Harvesting the hydrilla mats with boat-mounted machines called "mowers" also has short-term value, but broken pieces of the plant can re-grow, spreading the infestation. A more promising approach is with biological control. Two insects, a weevil that eats hydrilla stems and tubers and a fly whose larvae eat the leaves, have been introduced with some success. These biocontrol insects eat only hydrilla, and represent a way of restoring the natural balance over the long term without chemicals and costly machines.

## Hydrilla in Bayou Lafourche

Hydrilla infests waterways throughout the state, but is a particular problem in Bayou Lafourche where it often grows thick enough to prevent water from efficiently flowing downstream. This creates flooding threats near the headwaters, but the decreased flow may also result in saltwater intrusion near the coast that threatens fresh marsh habitats.



Michael Massimi

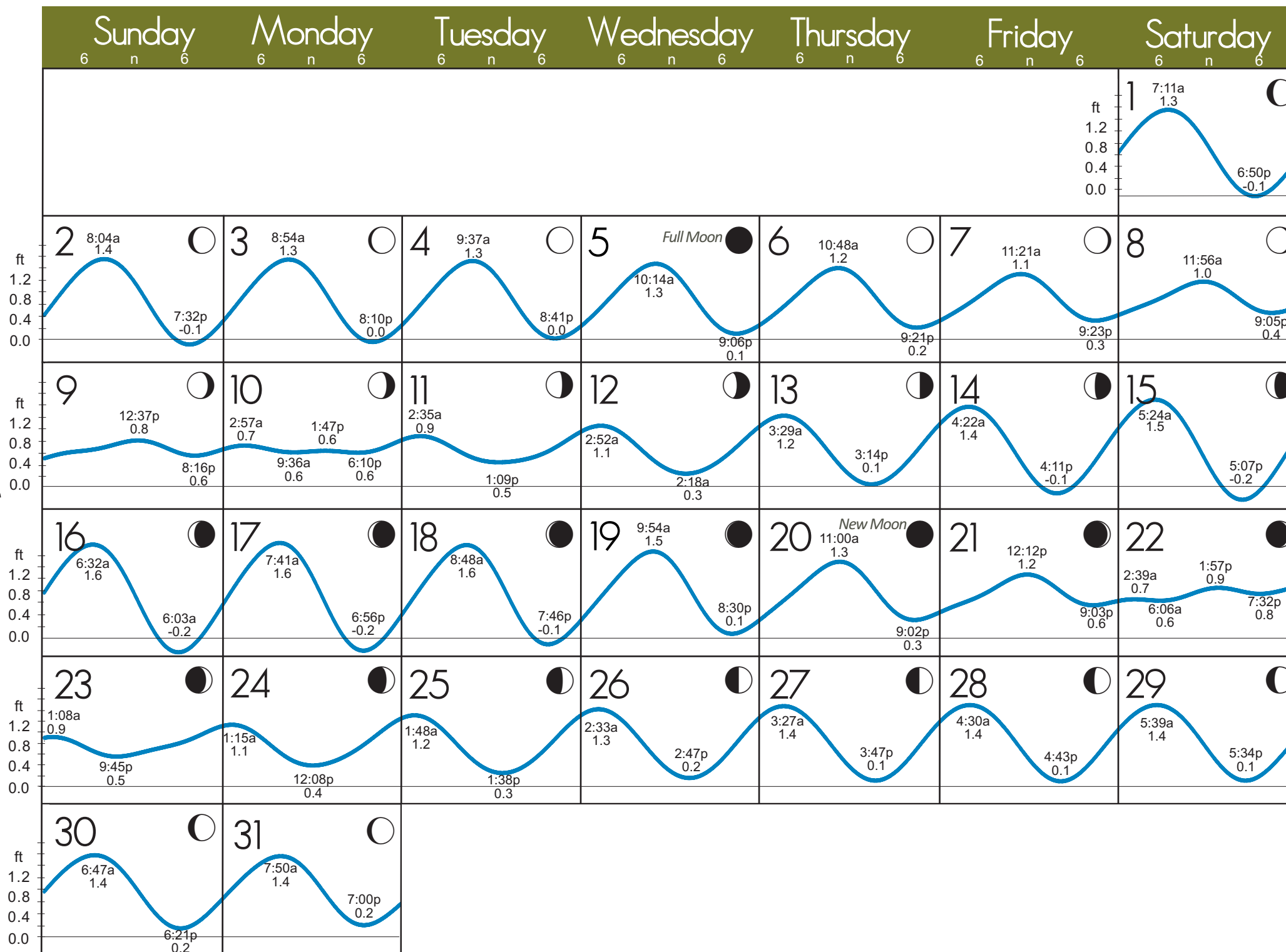
*Hydrilla can grow long distances to reach sunlight, where it then spreads profusely.*



Low Tide:  
August 16  
6:03 p  
-0.2 ft

# August 2009

High Tide:  
August 17  
7:41 a  
1.6 ft





# Insects

Formosan Termites on stained filter paper  
USDA

Michael Massimi

Insect invasions often go unnoticed until it is too late  
Formosan termites cause \$300 million of damage per year in  
New Orleans alone  
Asian tiger mosquitoes carry Dengue fever and encephalitis

While hungry nutria, leaping carp, and marauding snails grab many of the invasive species headlines, hordes of less-visible insects are also invading, resulting in some of the worst local damage to ecology, economy, and human health.

Economically speaking, Formosan termites are one of the worst. They arrived in the US on ships returning from the Pacific after World War II, and quickly spread throughout the southern states from many port cities including New Orleans. Louisiana is home to at least two species of native termites, but this Asian variety has much larger colonies, can infest and ingest a much wider variety of structures and materials, and consumes wood at a much faster rate. The price for control efforts and Formosan termite damage in metro New Orleans alone is estimated at over \$300 million each year.

From time to time the "Killer Bee" invasion makes the news, but the story is usually more hype than fact. These bees are merely strains of common European honeybees that have been hybridized with an African variety. Beekeepers in Brazil accidentally released the hybrid strain in 1957, and descendants of that initial population are now entering the US from Mexico. These Africanized honeybees are definitely more aggressive, and they are more likely to swarm, pursue, and sting in greater numbers. But their venom is no stronger than that of a regular bee sting. Nonetheless, one must use extra caution around Africanized bees. Unfortunately, control efforts also affect populations of the more docile and ecologically beneficial European bees.

The red imported fire ant is a well-known nuisance to any southerner who has ever set foot outdoors. It was introduced from South America to the port of Mobile, Alabama in the 1930s and now infests all of the southern states. The main problem is with its aggressive behavior and painful sting. They attack en masse anything that disturbs their mounds, and can severely injure or kill wild animals, humans, and livestock. The FDA estimates a cost of \$5 billion annually for control, medical treatment, and damage mitigation. Interestingly, a tiny fly that lays its eggs only in the bodies of red imported fire ants, has been used with some success as a biocontrol agent as the hatching eggs eventually decapitate and kill the ants. Research with these flies is currently underway at the LSU AgCenter in Baton Rouge.

Certainly a greater overall threat to human health than both bees and ants is the Asian tiger mosquito. They first arrived in the US in 1985, at the port of Houston, in a shipment of used tires from Japan. They are now found throughout the southeast. More than just a biting nuisance, Asian tiger mosquitoes can carry several dangerous diseases including dengue fever, yellow fever, West Nile virus, and several types of encephalitis. They are also one of the main vectors for dog heartworm. They are well adapted to urban areas, more active during the day than most mosquitoes, and persistent when biting. Asian tiger mosquitoes are not known to travel very far, so if they are present in your yard, chances are they are breeding somewhere nearby. It is best to eliminate unnecessary sources of standing water such as old tires, empty cans, and other debris.



Asian tiger mosquitoes (above) are tiny and quick, but if you look fast you can identify them by the striped legs and back that give them their name .

Sensationalist movies like *The Savage Bees*, set in New Orleans, feed public fear of this aggressive but manageable species. (left and right)

Red imported fire ants (inset) swarming on a mound

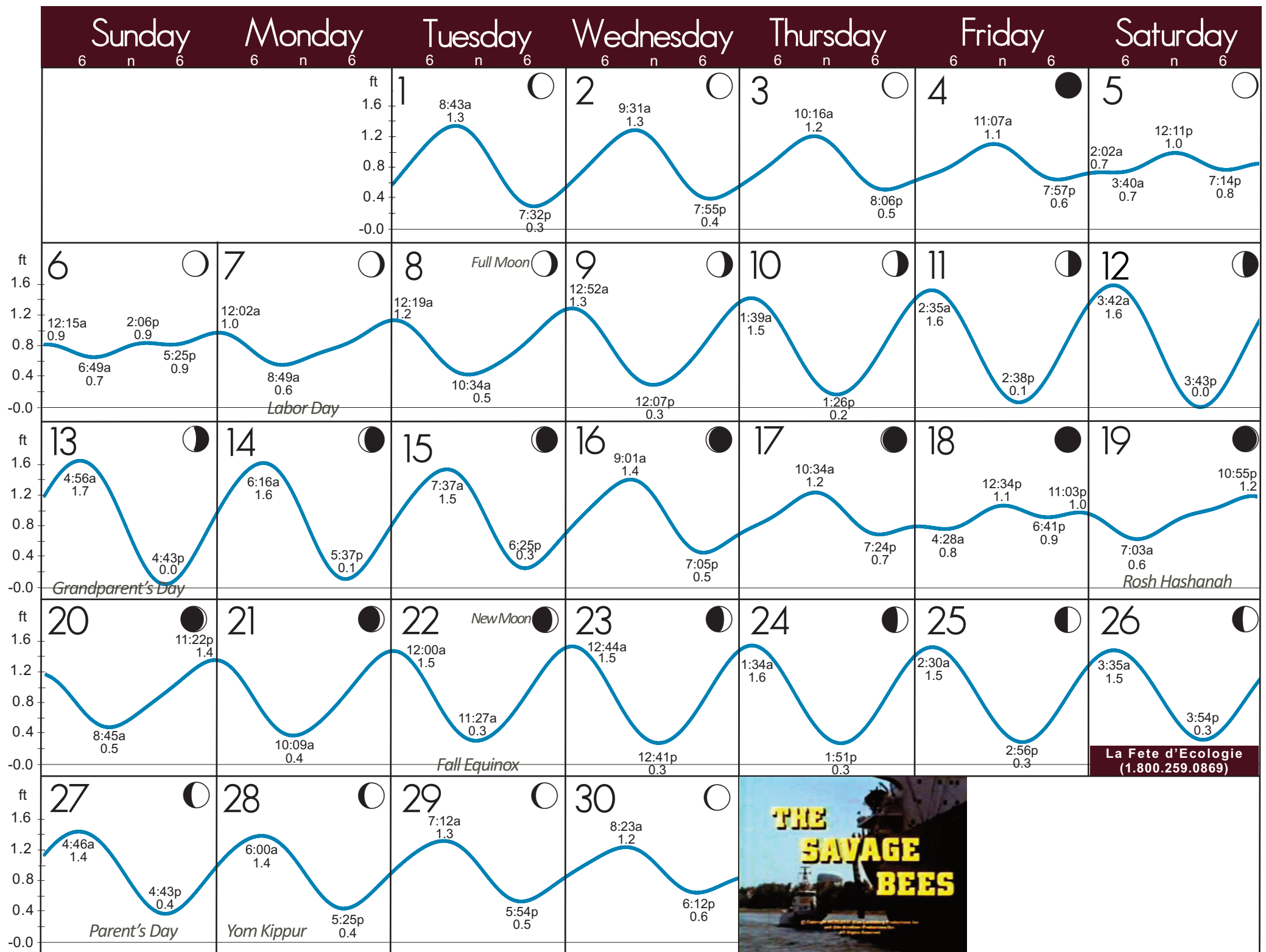


CDC



# September 2009

High Tide: September 13 4:56a 0.0 ft  
Low Tide: September 13 4:43p 0.0 ft



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Tides from: Barataria Bay, Grand Isle, East Point, 29d 15'48" N 89d 57' 24" W - Tides & Currents by Jeppesen Marine - [www.nobeltec.com](http://www.nobeltec.com)  
[TIDE ADJUSTMENT TABLE CAN BE FOUND ON THE INSIDE BACK COVER]





# Salvinia

Common Salvinia on Lake Cataouatche

Michael Massimi

Two species of concern - common and giant  
Giant salvinia is one of the fastest reproducing  
plants known  
Biocontrol efforts underway



Salvinia is a genus of floating freshwater ferns native to South and Central America. There are two species of concern in Louisiana. Common salvinia (*Salvinia minima*) has been imported and exported as a popular plant in private ponds and aquatic gardens for nearly a century. It first appeared in Florida waterways in the late 1920s. It spread rapidly by quick reproduction and unintentional transport by boats and trailers. Common salvinia appeared in Louisiana in the 1970s and has become one of the worst of many aquatic plant pests. Floating on the surface of lakes, ponds, canals, and slow-moving streams, common salvinia reproduces by vegetative growth. Continuous branching and breaking of stems produces daughter plants at an amazing rate. Common salvinia grows exponentially, and can double its coverage area in a matter of a few days. Water surfaces become covered with mats of salvinia up to 10 inches thick that completely shade out other vegetation, remove oxygen from the water, prevent aquatic animals from reaching the surface, and inhibit boating and industrial uses of surface water. Salvinia is a particular menace to waterfowl. It displaces the native floating plant duckweed (*Lemna minor*), an important protein source for aquatic birds, and its tiny leaf hairs are a nuisance as they tend to stick in birds' feathers. Migrating ducks will generally avoid waterbodies with large salvinia infestations.

The second species of concern is the larger and more troublesome giant salvinia (*Salvinia molesta*). It also arrived as a cultivated ornamental in the aquatic garden trade, but much more recently. Louisiana had a few isolated pockets of giant salvinia as early as 1998, but the hurricanes of 2005 and 2008 appear to have spread the infestation widely, including into the Gulf Intracoastal Waterway and several lakes and streams of the Barataria and Terrebonne estuaries. Giant salvinia presents all of the same problems as common salvinia, but its growth is righteously more aggressive. It forms mats up to three feet thick and can double its surface coverage in a mere two days under optimal growing conditions. The destructive potential to habitats from this species is staggering.

## Restoring the Natural Balance

Mechanical removal and chemical spraying have little effect on salvinia, but fortunately there is a biocontrol option. The salvinia weevil (top right) is an insect that has evolved to feed solely on salvinia in its native South American range. Scientists have carefully studied the weevil and determined that it is entirely host-specific; that is, it does not pose a threat to other plant species. The weevil has been exported, cultivated, and released in several locations around the world where salvinia is a problem, with much success. In some cases the weevils have lowered salvinia coverage by 90%. It may take several years for salvinia weevil populations to become established in sufficient numbers to affect salvinia here in Louisiana, but biologists with the Department of Wildlife & Fisheries and the LSU AgCenter (middle and bottom right) are currently working with two strains of the weevil, one adapted to feed on common salvinia, the other adapted to feed on the larger giant salvinia. They are determined to release as many weevils as possible in as many locations as possible over the coming years. Compared to herbicidal sprayings, this is an extremely inexpensive, environmentally friendly, and hopefully effective method of salvinia control.



The salvinia weevil, about 2 mm long, is tiny but effective.

Michael Massimi



Michael Massimi



Michael Massimi

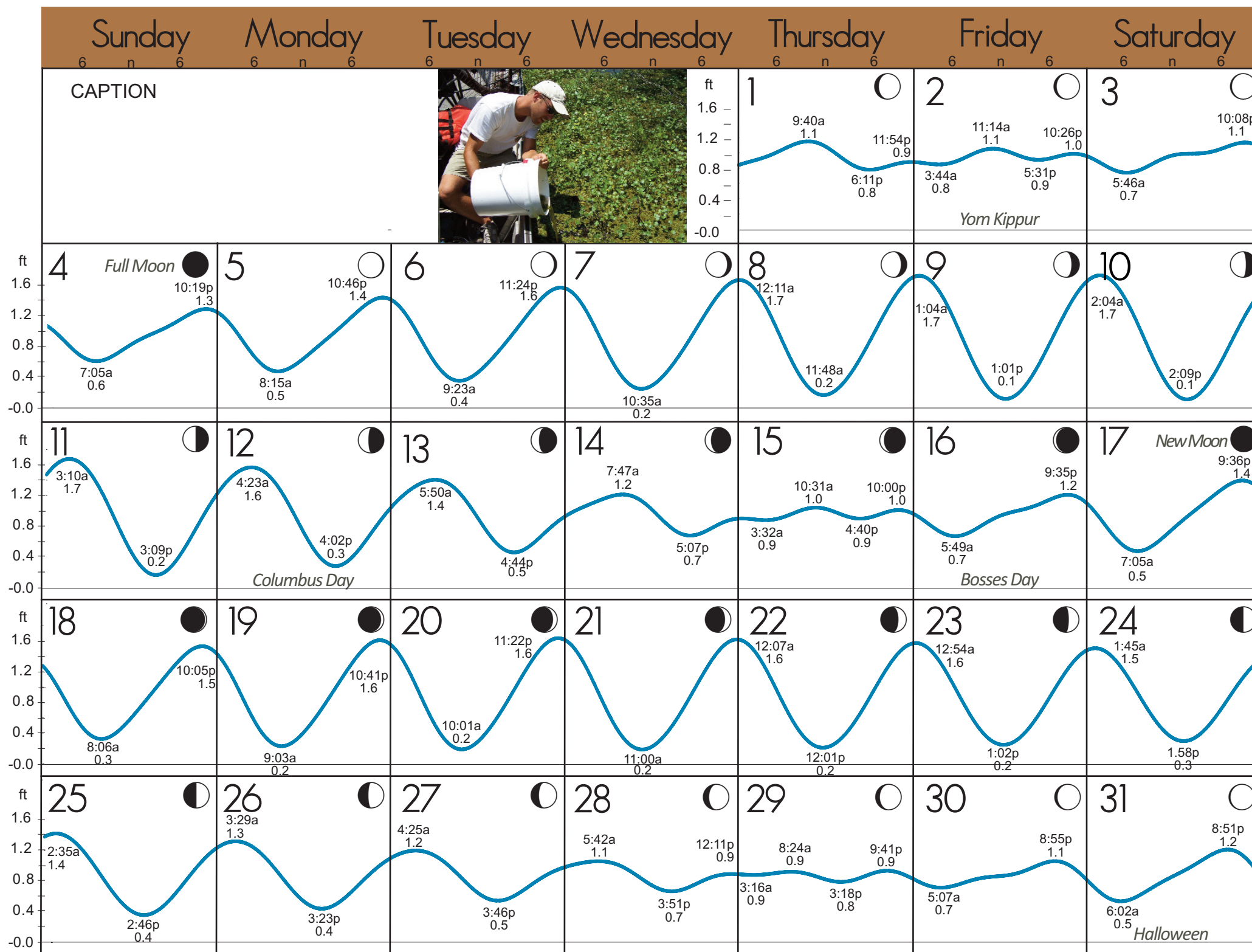
LDWF agents release weevil-laden salvinia near Lac Des Allemands in 2008



# October 2009

Low Tide:  
October 10  
2:04 a  
-0.1 ft

High Tide:  
October 10  
2:04 a  
1.7 ft





# Chinese Tallow Tree

Tallow Tree in Autumn  
Dr. Hallie Dozier - LSU AgCenter

Dr. Hallie Dozier -  
LSU AgCenter

Introduced from Asia in the 18th century  
Very rapid growth, up to 40 feet tall  
Prolific seed producer  
Unfortunately popular in landscapes and urban settings

The Chinese tallow is an invasive tree of the southern US, known by many names: popcorn tree, money tree, chicken tree, Florida aspen, or simply tallow. It is yet another plant on a long list of exotic species that were imported purposefully for some desirable characteristic, only to later become an environmental scourge in need of control. In this case the desirable characteristic is a seed coated with a heavy wax, or tallow, which can be used in the manufacture of candles, soaps, and fuel. Recognized for its industrial value centuries ago in its native Asia, it was imported to this continent in colonial times and promoted by none other than Benjamin Franklin, who was no doubt influenced by his father's profession as a candle maker. In 1772 he wrote to a fellow statesman in Georgia: "I send also a few seeds of the Chinese Tallow Tree, which will I believe grow and thrive with you. 'Tis a most useful plant." Franklin's vision of spurring a candle and soap industry with the plant never fully materialized, but he was correct in assuming that it would thrive. The tree spread rapidly through coastal forests in Georgia and South Carolina. But widespread environmental awareness was yet to mature; the trees' useful properties and the lure of easy cash continued to outweigh any perceived ecological risk. Chinese tallow trees were imported and promoted again and again over the centuries, including to the gulf coast states in the early 1900s by our nation's own Department of Agriculture, ostensibly to advance a soap industry. Eventually it became clear that tallow would never become a successful industrial crop in the US, but it was still promoted as an ornamental landscape tree through the 20th century. Tallow grows quickly, provides good shade, and has spring flowers, fall color, showy seeds, and an attractive leaf shape. These qualities, plus its ability to tolerate a wide range of soil, sunlight, and

moisture conditions have led to widespread marketing and use of Chinese tallow in urban landscapes. Unfortunately, tallow is a prolific seed producer. Mature trees produce an average of 100,000 seeds annually. These seeds, transported mainly by birds or running water, inevitably make it to wild areas where tallow is an aggressive pioneer. Young tallow trees seemingly pop up anywhere, from habitats disturbed by development to the most isolated wilderness. Under certain conditions, tallow trees form dense monocultures, or large stands where tallow trees dominate to the exclusion of other species. This domination is harmful to species diversity and habitat quality, and can lead to large-scale ecosystem modification. With their ability to tolerate wet soils, Chinese tallows can even invade cypress swamps, as many residents of the Barataria-Terrebonne can attest. Beyond the environmental damage to these critical and unique ecosystems, how will our cultural sense of place be affected if Chinese tallow comes to dominate our moss-draped cypress swamps?

With the ecological threat of advancing tallow trees impossible to ignore, resource managers are finally clamping down on the sale and use of these invaders. Chinese tallow is officially listed as a noxious weed species at both the state and federal level, and its sale and interstate transport is now strictly regulated. Homeowners with tallow trees are encouraged to remove them, though this advice is easier to give than to take. But gardeners and landscapers should at least be aware of the many beneficial native tree species that would make a fine substitute for the tallow. These include red maple, dogwood, beech, redbud, green ash, yaupon, red mulberry, and countless others. Contact BTNEP or the LSU AgCenter for more native plant suggestions.



National Park Service



Michael Massimi

A researcher with LSU (top) measures a young tallow in the Barataria Preserve.

Tallow can even sprout in the cracks of a sidewalk.(bottom)



# November 2009

High Tide: November 5 10:56a 1.7 ft  
Low Tide: November 30 5:59a -0.2 ft

