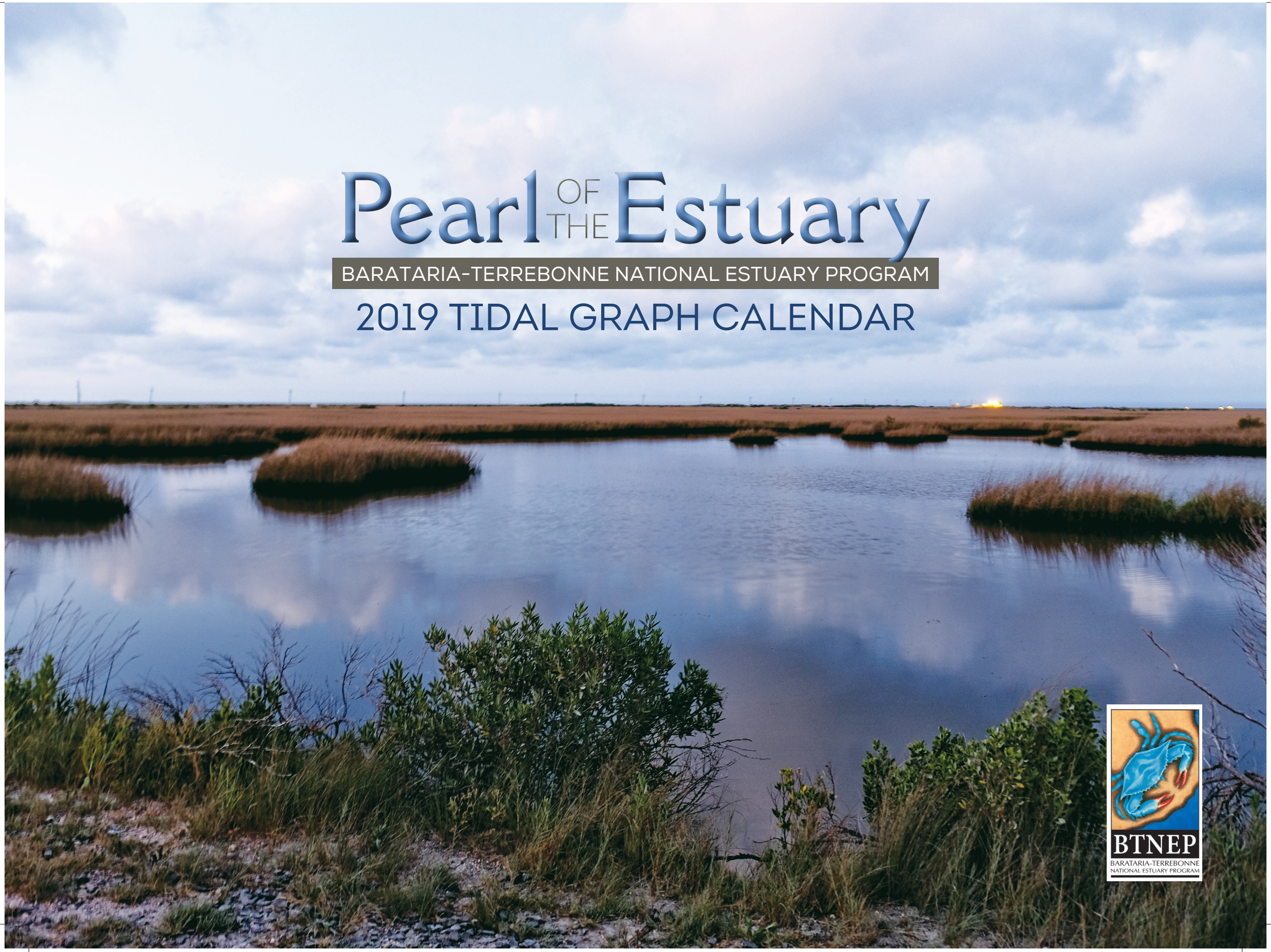


Established in 1991, the mission of the Barataria–Terrebonne National Estuary Program (BTNEP) is the preservation and restoration of the Barataria-Terrebonne estuarine system, the 4.2 million-acre region between the Atchafalaya and Mississippi River basins. BTNEP strives to rebuild and protect the estuary 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.

BTNEP
BARATARIA-TERREBONNE
NATIONAL ESTUARY PROGRAM

Photo by Seth Moncrief

History of the Oyster Boats

The "Creole skiff" was a flat-bottomed boat with a squared-off transom and a pointed bow. While the skiff was most families' preferred method of travel in the late 1800s, in the colder months oystermen used their skiffs to harvest oysters using the "tong" method. At the time, the hardest part of the oyster fishery was transporting the harvest back to the dock. Oystermen would bring in tow as many boats as they could and load them to the gunwales with oysters before returning.

To increase harvest and decrease time spent fishing, a lugsail was added to the skiff, donning the name "lugger". By the late 1800s, fishermen navigated shallow lakes, bays, and bayous with ease with the use of sail-powered luggers. Some local areas referred to these sailing vessels as canots, meaning a small boat with a rounded hull and shallow keel. These boats would be loaded to the brim with handwoven baskets filled with a harvest of crabs, fish, shrimp, or oysters.

Croatian oyster fishermen in Louisiana were primarily responsible for developing the now famous "New Orleans oyster lugger." The flat broad bottom enabled the lugger to navigate the shallow inland waters, where oyster reefs are located. The oyster lugger of today is powered by a diesel engine and computerized navigation for efficient harvest of oyster plots.

In the early 1900s, fishing villages spread out across coastal Louisiana serving as nodes of life, safe havens for fishermen and trappers to have a spot to dock their boats and unload their catch. Fleets of boats across the coastal zone harvested tons of seafood annually including oysters, blue crab, white and brown shrimp, redfish, speckled trout, and many others. Nationwide demand for seafood and bountiful harvest by Louisiana fishermen over many decades provided enough economic development to support growing communities across coastal Louisiana.

Davis, D. W. 2010. Washed away? The invisible peoples of Louisiana's wetlands. Book. ULL Press.

Images courtesy of the Library of Congress digital library. (a) Oyster luggers, New Orleans, La in 1906, Detroit Publishing Co., (b) Unloading oysters in Olga, La, Russell Lee 1938, (c) Unloading oysters in Olga, La, Russell Lee 1938, (d) Oyster loading, headed to New Orleans, La, Russell Lee 1938.

Lee Russell, Library of Congress

Oyster Biology

© drawnbydawn

Times-Picayune

The Louisiana commercial oyster fishery is regulated by the Louisiana Department of Wildlife and Fisheries. Commercial harvesting of oysters in Louisiana began in the mid-1800s, and is still a very important and valuable economic resource today.

EASTERN OYSTER QUICK FACTS:

The maximum size is approximately 12 inches long.
The maximum age is thought to be 30 years.
Louisiana is number one in commercial oyster production in the USA.
Nearly 13 million pounds of oysters were harvested in Louisiana in 2014.

Louisiana Department of Wildlife and Fisheries
2000 Quail Drive
Baton Rouge, LA 70808
225-765-2800
www.wlf.louisiana.gov

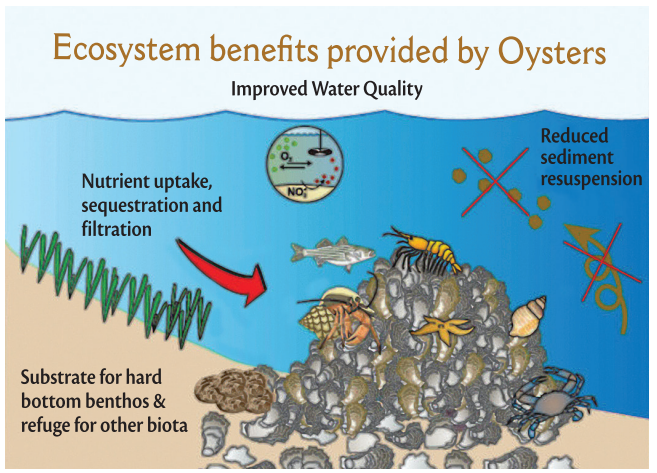
Eastern oysters, *Crassostrea virginica*, are responsible for vast reef formations along the eastern coast of North America, from Canada's Gulf of St. Lawrence to the Central American coast of the Gulf of Mexico. Oysters consist of a hard outer shell that protects their soft body. The shell is comprised of two halves, which are opened at the hinge by ligaments to feed, intake water and oxygen, and to release gametes. The oysters can close their shells when necessary using the adductor muscle located inside the shell.

Oysters are filter feeders, feeding on microscopic plants and animals. They siphon in water past their gills, passing over millions of tiny cilia (hair-like structures serving as a filter) and expel the filtered water back out. While filtering the water, they are exchanging oxygen as well as feeding on microscopic plankton. These microscopic planktons include diatoms, dinoflagellates, phytoplankton and zooplankton, bacteria, organic detritus, and mineral salts. On average, oysters have the capacity to filter 50 gallons of water each day, making them extremely valuable as a way to enhance water quality and to turn the most basic life forms (plankton) in the estuary into a source of usable protein for other species including humans.

Oysters are euryhaline, meaning they can live in salinities ranging from 5 to 40 parts per thousand (ppt). However, the best salinities for oyster growth and reproduction fall between 10 to 15 ppt (Galstsoff 1964). Oysters have the ability to tightly close their shells in order to survive adverse conditions, including high or low salinities or exposure to air, for short periods of time.

Oftentimes, fishermen will target oyster reefs when searching for places to wet a line. This is because there are 13 species of fish that have a reported relationship with oyster reefs, including sheepshead (*Archosargus probatocephalus*) and black drum (*Pogonias cromis*).

Kilgen, R.H., and R.J. Dugas. 1989. The ecology of oyster reefs of the northern Gulf of Mexico: an open file report. NWRC-open file report 89-03



chesapeakebay.noaa.gov oystersoyster-reefs

January 2019

DECEMBER 2018

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23	24	25	26	27	28	29
30	31					

FEBRUARY 2019

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
		1 6:01a -0.3 7:04p 0.8 New Year's Day	**2** 6:32a -0.5 7:37p 0.9	**3** 7:10a -0.5 8:16p 0.9	**4** 7:50a -0.6 8:58p 0.9	**5** 8:30a -0.6 9:40p 0.9
6 9:08a -0.6 10:21p 0.8	**7** 9:44a -0.5 11:00p 0.8	**8** 10:16a -0.5 11:36p 0.7	**9** 10:43a -0.4	**10** 11:06a -0.3 12:09a 0.6	**11** 11:20a -0.2 12:39a 0.5	**12** 11:19a -0.1 12:58a 0.4 9:17p 0.2
13 10:37a 0.0 6:43p 0.3	**14** 4:46a 0.0 5:59p 0.4	**15** 4:15a -0.2 5:56p 0.5	**16** 4:51a -0.4 6:18p 0.7	**17** 5:37a -0.5 6:55p 0.9	**18** 6:27a -0.7 7:41p 1.0 Louisiana Arbor Day	**19** 7:20a -0.8 8:30p 1.0
20 8:12a -0.8 9:22p 1.0	**21** 9:03a -0.8 10:14p 1.0 Martin Luther King Day	**22** 9:49a -0.7 11:04p 0.9	**23** 10:27a -0.5 11:51p 0.7	**24** 10:50a -0.3	**25** 10:39a -0.1 12:31a 0.5	**26** 9:25a 0.0 12:26a 0.2 5:21p 0.3
27 5:15a 0.0 4:55p 0.5	**28** 3:59a -0.2 5:13p 0.6	**29** 4:35a -0.4 5:48p 0.8	**30** 5:18a -0.4 6:30p 0.8	**31** 6:05a -0.5 7:16p 0.9		

ft: 1.2, 0.8, 0.4, -0.0, -0.4, -0.8

Tide adjustment table can be found on the back cover

Shutterstock photo by Jiang Hongyan

High Tide:
January 20
9:22 p.m. • 1.0 ft.

Low Tide:
January 20
8:12 a.m. • -0.8 ft.

DID YOU KNOW:

BTNEP collects the seed of native woody species for propagation, grow out and planting for the benefit of the millions of Neotropical migratory birds that pass through or reside in our estuary. https://plantmaterials.btnep.org/species-selection

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Barataria-Terrebonne National Estuary Program
P.O. Box 2663, Nicholls State University,
N. Babington Hall, Thibodaux, LA 70310
800.259.0869 • www.BTNEP.org

Oyster Reproduction AND Reef Building

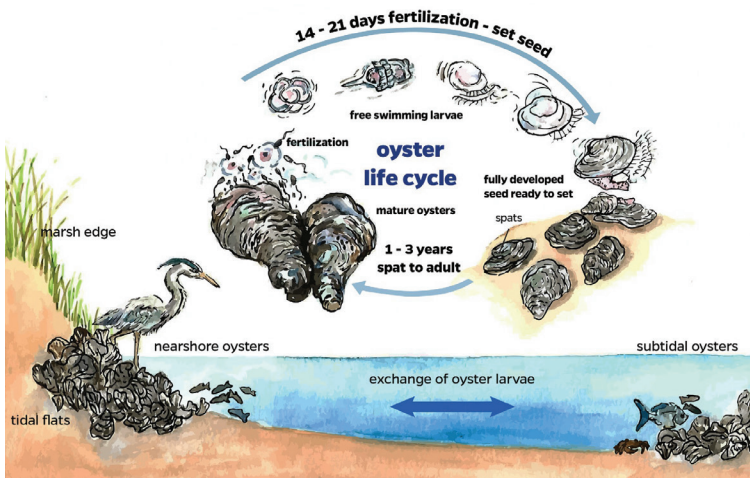
© drawnbydawn

The height of restored oyster reefs in coastal estuaries significantly affects the growth and survival of the oysters and the abundance and diversity of associated fish and invertebrates. Reestablishing the role of foundation species is key to restoring characteristics and functions of the original system.

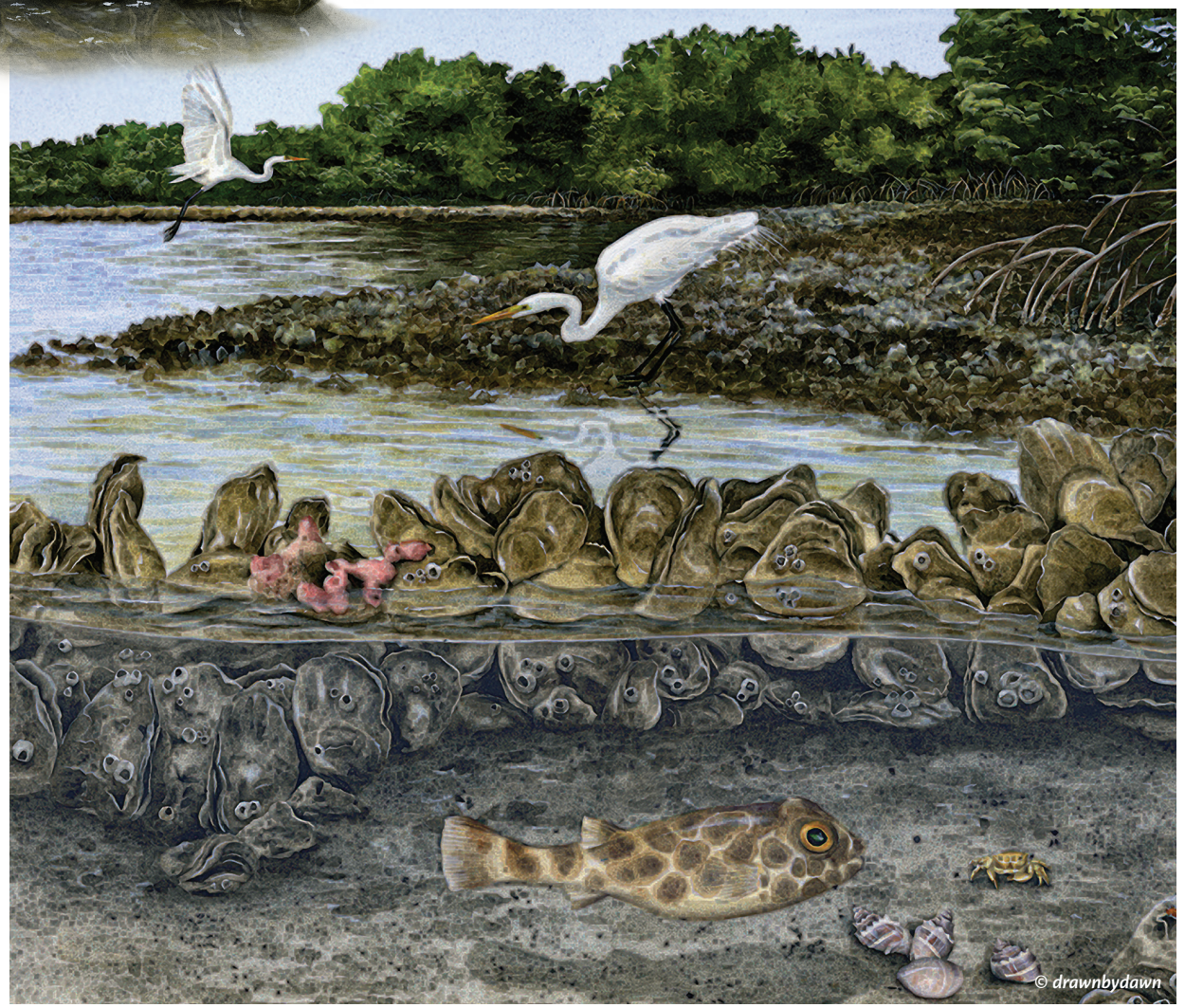
Oysters usually reach maturity in one year after settling onto a hard substrate, either nearshore or subtidal. Oysters are protandric; meaning that during their first year, they spawn as males releasing sperm into the water. As they grow over the next two or three years and develop greater energy reserves, they spawn as females by releasing eggs. Additionally, adult oysters in nearshore areas exchange larvae and reproductive material with oysters in subtidal areas. Young oyster larvae float in the water until they settle on and attach to shells of older, well established oysters. At this stage, the tiny oyster is considered spat, cementing in to its forever home where it will grow and become part of the community in which it settled. When old enough to reproduce, the oyster will release sperm or egg simultaneously with other mature oysters, into the water column for successful reproduction continuing the cycle.

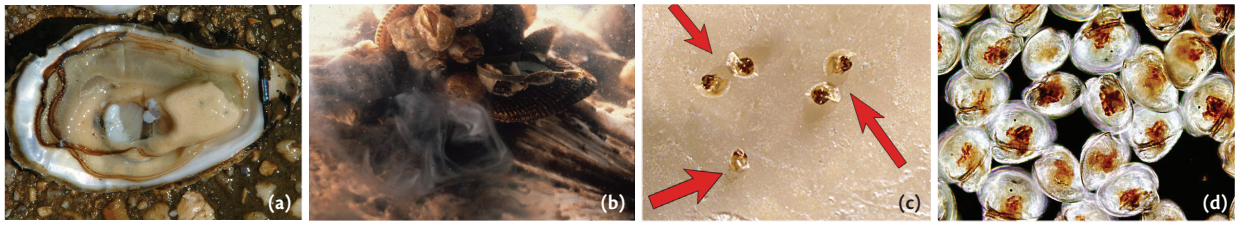
This cycle builds the oyster reefs' stout structures that are vital for that population of oysters and supports diverse wetland ecosystems. While oyster reefs provide a home and food source for various other marine species, oyster reefs also provide shoreline stabilization by trapping sediment around marsh edges and also serving as a physical barrier to wave erosion. Additionally, vast expanses of oyster reefs serve as a buffer to coastal communities from storm surge by the spreading and slowing down of wave energy created by tropical weather.

Most natural communities are characterized by a single or functional group of habitat-forming foundation species providing the building blocks for the young community. In Louisiana estuaries, oyster reefs serve as the foundation species for diverse communities in what would otherwise be open water lacking in species diversity. Oysters can also be considered keystone species, meaning the surrounding community is largely dependent on the shelter, water quality, and food web dynamics maintained by oyster reefs. When considering conservation and restoration, the preservation of foundation and keystone species like oyster reefs should be a primary focus.



Oyster life cycle image reprinted with permission from the Sea Grant oil spill science outreach team, illustrated by Anna Hinkeldey





i.Life cycle images by University of Maryland Center for Environmental Science: (a) adult, (b) male spawning, (c) oyster spat, (d) oyster larvae

February 2019

JANUARY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
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27	28	29	30	31		

MARCH

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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

1
6:51a -0.5
8:03p 0.9

2
7:37a -0.5
8:49p 0.8
World Wetlands Day

3
8:18a -0.5
9:33p 0.8

4
8:54a -0.4
10:14p 0.8

5
9:25a -0.4
10:53p 0.7

6
9:51a -0.3
11:32p 0.6

7
10:12a -0.2

8
10:26a -0.1
12:13a 0.5

9
10:20a 0.0
1:07a 0.4
6:16p 0.2
10:08p 0.2

10
9:17a 0.2
3:04a 0.2
4:23p 0.3

11
1:00a 0.1
4:00p 0.5

12
2:12a -0.1
4:15p 0.6

13
3:10a -0.3
4:51p 0.8

14
4:09a -0.4
5:37p 0.9
Valentine's Day

15
5:07a -0.5
6:29p 1.0

16
6:06a -0.6
7:25p 1.1

17
7:04a -0.6
8:22p 1.1

18
7:59a -0.5
9:19p 1.0
President's Day

19
8:50a -0.4
10:18p 0.9

20
9:33a -0.2
11:20p 0.7

21
9:57a 0.0

22
9:27a 0.2
12:38a 0.5
3:25p 0.3
8:39p 0.2

23
6:23a 0.3
3:42a 0.3
2:17p 0.5

24
12:00a 0.1
2:37p 0.7

25
1:26a -0.1
3:18p 0.8

26
2:32a -0.2
4:07p 0.9

27
3:31a -0.2
5:00p 1.0

28
4:30a -0.2
5:55p 1.0

Tide adjustment table can be found on the back cover

High Tide:
February 16
7:25 p.m. · 1.1 ft.

Low Tide:
February 17
7:04 a.m. · -0.6 ft.

DID YOU KNOW:

You can join BTNEP's volunteers to become actively engaged in the efforts to save various habitats in the estuary.

https://volunteer.btnep.org

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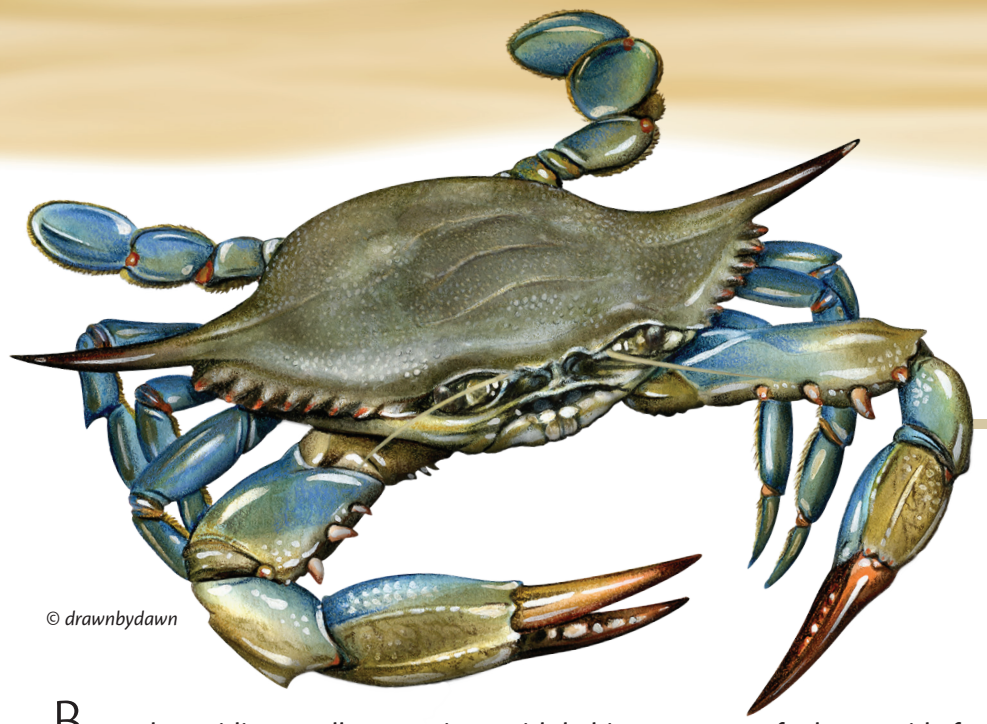
Blue Crab

CALLINECTES SAPIDUS



© drawnbydawn

Beyond providing smaller organisms with habitat, oyster reefs also provide food to a variety of secondary consumers. The blue crab, *Callinectes sapidus*, is a decapod crustacean of ecological, culinary, and economic importance in the United States, particularly in Louisiana. Blue crabs are in the *Portunidae* family, which includes all of the swimming crabs. Adult blue crabs are mostly green with a shade of blue in their extremities. Females have red claws and a "V or semicircular" abdomen, with males having blue claws and a "T-shaped" abdomen.

Unknown source

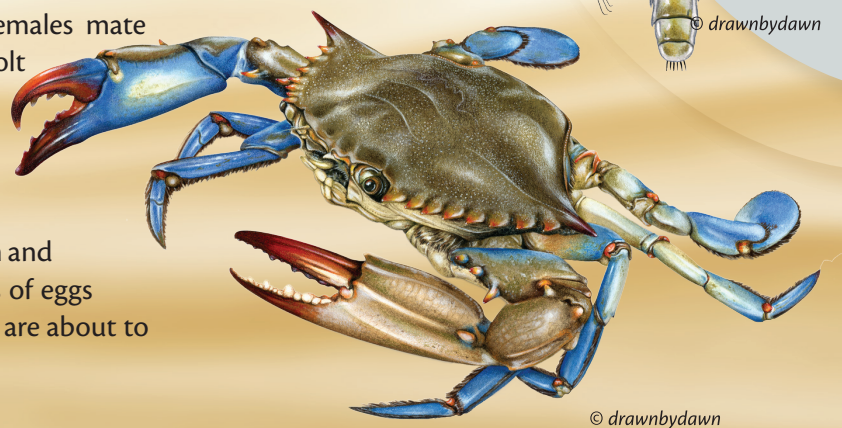
Blue crabs range from Massachusetts to Argentina and consume a wide variety of live and dead plants and animals. As a common inhabitant of oyster reefs, blue crabs are also common prey for the predators including the black drum, red drum, sheepshead, and many others.

Blue crabs have a hard exoskeleton which they have to shed to grow. The old, smaller shell is shed and a new, larger shell hardens in its place. "Soft shelled" crabs are harvested as a special culinary delicacy in Louisiana. Male blue crabs can mate several times during their lifetime, whereas females mate only once during their last molt when the abdomen changes to a semicircular shape. Immature females migrate to the fresher upper estuaries during the summer where the males reside. Males seek out receptive females, guard them until they molt, and then inseminate them. The male guards the female until her shell hardens. Females transport sperm and egg to tidal passes where they have multiple spawnings, releasing millions of eggs to outflowing tides and Gulf waters. It is illegal to harvest female crabs that are about to release eggs.

© drawnbydawn

© drawnbydawn

Blue crab larvae go through eight zoea stages, floating near the surface and feeding on other plankton. They then molt into megalops larvae, which are free swimming and clawed. In this stage, they move with tides into estuaries looking for protection among oyster reefs. The salinity and chemistry of brackish waters cause larvae to change from the megalops to the juvenile form. Blue crabs spend the remainder of their lives in the estuary, becoming adults and beginning the cycle over again.



© drawnbydawn

March 2019

FEBRUARY

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17	18	19	20	21	22	23
24	25	26	27	28		

APRIL

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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
					1 5:27a -0.2 6:51p 1.0	**2** 6:20a -0.2 7:45p 1.0
3 7:08a -0.1 8:35p 0.9	**4** 7:49a -0.1 9:23p 0.9	**5** 8:23a 0.0 10:11p 0.8 Mardi Gras	**6** 8:52a 0.1 11:06p 0.7 Ash Wednesday	**7** 9:14a 0.2	**8** 9:25a 0.3 12:18a 0.6 3:31p 0.4 5:35p 0.4	**9** 8:53a 0.4 2:21a 0.5 1:19p 0.5 9:11p 0.3
10 2:00p 0.6 11:54p 0.2 Daylight Savings Time Begins	**11** 1:10a 0.0 2:25p 0.8	**12** 2:18a -0.1 3:08p 0.9	**13** 3:24a -0.2 4:00p 1.0	**14** 4:29a -0.2 4:57p 1.1	**15** 5:32a -0.2 5:58p 1.2	**16** 6:15a 0.2 7:01p 1.2
17 6:33a -0.2 8:04p 1.2 St. Patrick's Day	**18** 7:32a -0.1 9:11p 1.1	**19** 8:27a 0.0 10:25p 0.9	**20** 9:15a 0.2 First Day of Spring	**21** 9:32a 0.4 12:03a 0.8 1:13p 0.5 6:15p 0.4	**22** 6:40a 0.6 3:35a 0.6 11:57a 0.7 9:34p 0.3 World Water Day	**23** 11:15p 0.1 12:33p 0.9
24 12:28a 0.0 1:21p 1.0	**25** 1:32a 0.0 2:14p 1.1	**26** 2:32a 0.0 3:10p 1.2	**27** 3:32a 0.0 4:09p 1.2	**28** 4:30a 0.0 5:10p 1.1	**29** 5:25a 0.1 6:12p 1.1	**30** 6:15a 0.2 7:12p 1.1
31 8:10p 1.0						

Tide adjustment table can be found on the back cover

High Tide:
March 16
7:01 p.m. • 1.2 ft.

Courtesy of School Photo Project

Low Tide:
March 16
5:32 a.m. • -0.2 ft.

DID YOU KNOW:

BTNEP hosts an annual Bayou Lafourche Cleanup in an effort to educate on the importance of trash free waters since our drinking water comes from the surface water that flows on our lands into our bayous. https://volunteer.btnep.org/projects/bayou-lafourche-cleanup

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Benefits of Oyster Reefs

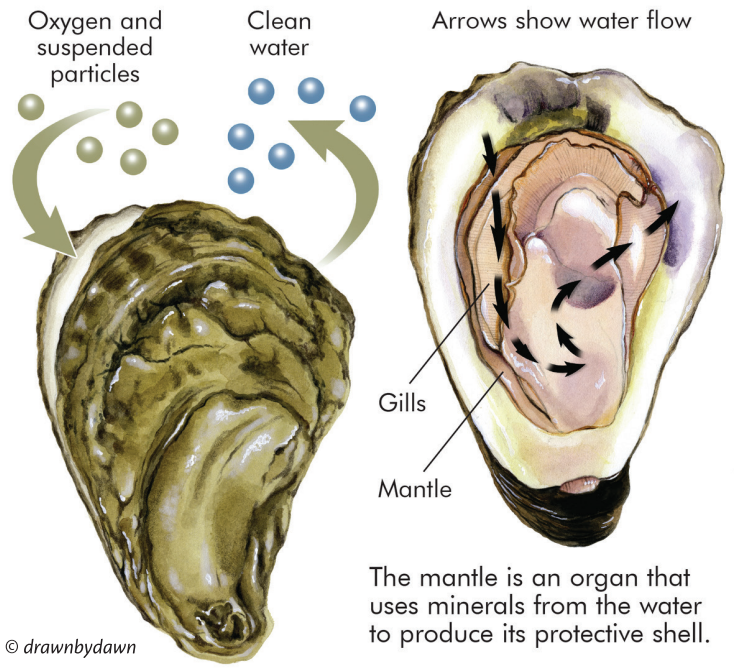
In order to grow, oysters must consume large quantities of microscopic phytoplankton, zooplankton, and algae. To consume their food, oysters filter upwards of 50 gallons of water each day that they are able to be open and feeding. By filtering such large quantities of water, oysters improve the water quality within the estuary.

Part of an oyster's water quality improvement capacity comes from their ability to remove nitrogen and other nutrients from the water. Nitrogen is an important element for the growth of plants and animals. However, many estuaries are receiving higher levels of nitrogen inputs, causing eutrophication of the affected areas. Eutrophication can cause poor water quality, low dissolved oxygen, and algae blooms which may be toxic.

Oysters are able to remove nitrogen from the water in one of two ways. While filter feeding, oysters can incorporate nitrogen from their food into their shell and body tissue as they grow. A 2018 study by La Peyre, Westbrook, and Heffner of Louisiana State University suggest that 48 percent of an oyster's shell and 52 percent of their bodies are nitrogen. The consumed nitrogen that is not absorbed into their shell or body is excreted as "pseudo-feces". In this way, the nitrogen can be covered by and trapped by sediments or continue through a process known as denitrification. Denitrification allows microbes to process the excreted nitrogen, which can then be volatilized and returned to the atmosphere, thereby reducing the amount of nitrogen in the water.

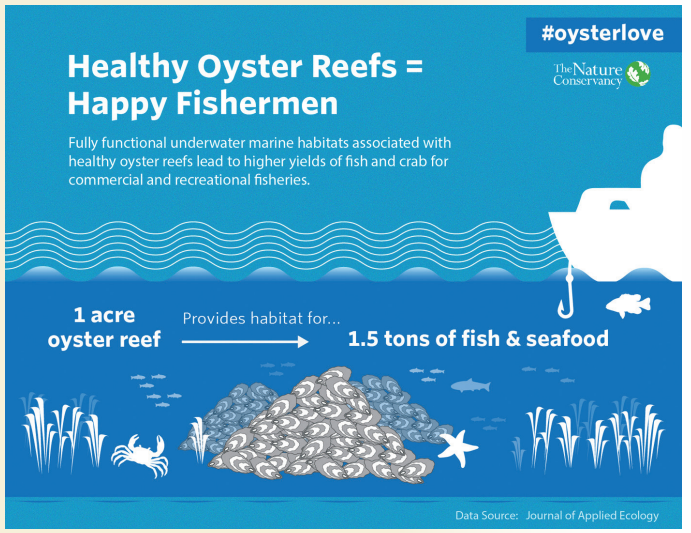
In addition to protecting and cleaning the water, oysters provide habitat to around 300 species of fish, crustaceans, and mollusks, among others. Oyster reefs provide food and shelter that creates an abundance of resources for other species. One study by Grabowski and Peterson (2007) estimated that an acre of oyster reef has a value of ~$40,000 to commercial finfish and crustacean fisheries.

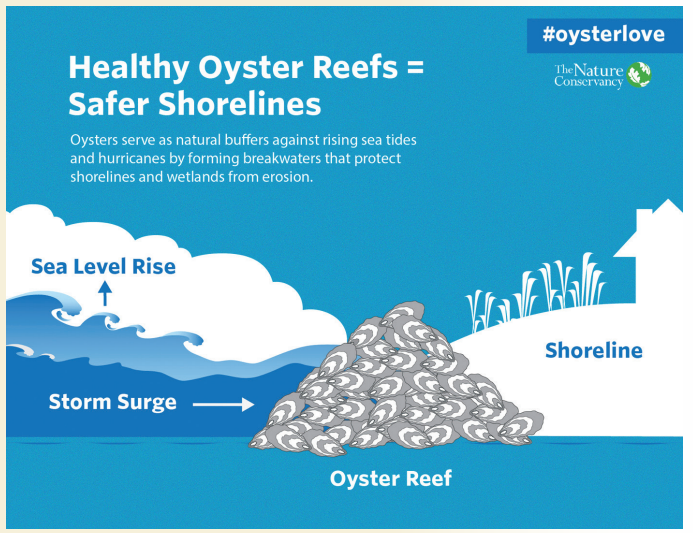
The positive impacts of oysters doesn't stop there. During storm events the oyster reefs are valuable infrastructure for storm protection. As the hurricanes push waves and storm surge towards the coast, the oyster reefs act as natural breakwaters. Oyster reefs absorb some of the wave energy before it reaches the shore, which reduces the intensity of the waves. Reduced wave intensity protects the shoreline from erosion and can also help protect coastal homes, businesses and other infrastructure from the effects of large storms.



© *drawnbydawn*

The mantle is an organ that uses minerals from the water to produce its protective shell.





Images created by Erica Simek Sloniker, Visual Communications for The Nature Conservancy. The mission of The Nature Conservancy is to conserve the lands and waters on which all life depends. The vision of The Nature Conservancy is a world where the diversity of life thrives, and people act to conserve nature for its own sake and its ability to fulfill our needs and enrich our lives. www.nature.org.

April 2019

MARCH

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31						

MAY

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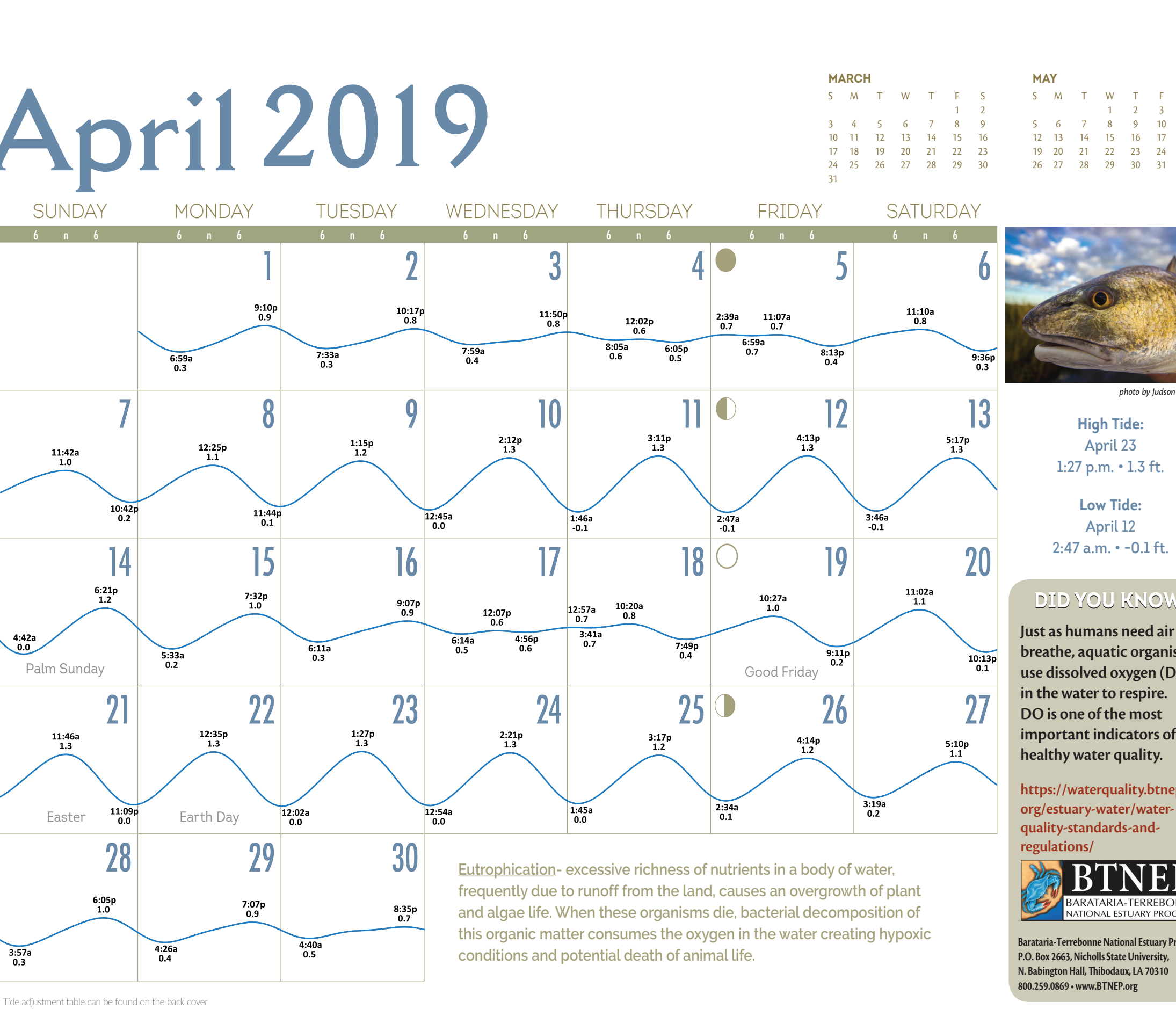

Tide adjustment table can be found on the back cover

photo by Judson Patterson

High Tide:
April 23
1:27 p.m. • 1.3 ft.

Low Tide:
April 12
2:47 a.m. • -0.1 ft.

DID YOU KNOW:

Just as humans need air to breathe, aquatic organisms use dissolved oxygen (DO) in the water to respire. DO is one of the most important indicators of healthy water quality.

https://waterquality.btnep.org/estuary-water/water-quality-standards-and-regulations/

Eutrophication- excessive richness of nutrients in a body of water, frequently due to runoff from the land, causes an overgrowth of plant and algae life. When these organisms die, bacterial decomposition of this organic matter consumes the oxygen in the water creating hypoxic conditions and potential death of animal life.

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FROM Harvest TO Market

In Louisiana, commercial harvest of oysters may only legally happen by an oysterman who holds a private lease with the Louisiana Department of Wildlife and Fisheries or written permission from a leaseholder and who has the proper license to commercially fish. The harvest and sale of oysters is one of the most highly regulated industries due to the nature of preserving the quality of a seafood product that might be eaten raw. Oysters are harvested, by way of an oyster dredge or oyster tongs. Oyster tongs are used to pick up individual clumps of oysters from the bottom. Tonging for oysters is time and labor intensive. With the advent of the oyster dredge in the early 1900's, more oysters could be harvested in less time. Dragged behind a power vessel, the dredge drags the water bottom using its teeth to break the oysters free from the reef and to knock the oysters into the collection bag. The oyster filled dredge is hoisted back onto the vessel, dumped out, and sorted for size. Marketable sized oysters are sacked and undersized oysters are returned to the reef.

Once a sack is full, the oysterman affixes a tag with required identification on each sack of oysters. Tags can be white, pink, or green signifying the intended end use for each sack of oysters. White tags indicate a sack destined for raw consumption within and outside of Louisiana. Pink tags indicate oysters for raw consumption within the State of Louisiana. A green tag indicates oysters that are to be shucked or processed in some way post-harvest. For oysters, time and temperatures after harvest are strictly regulated and monitored for seafood safety. The oysters must then be placed under refrigeration within two hours of the vessel returning to dock and maintained at a temperature of 45°F. The advent and subsequent use of mechanical refrigeration in the mid-1900s changed the way oysters were marketed and sold. Without refrigeration, raw oysters were considered a local delicacy due to the constraints on transporting a perishable product. Cooling and refrigerating oysters in a timely manner allows oysters now to be shipped and sold to destinations farther from the coast and during the warmer summer months.

Unshucked oysters may be legally sold in one of three ways: dry volume, net weight, or count. The amount in each sack must be accurately labeled in the quantity field on the harvest tag. The dry volume can be legally measured by barrel (3 bushels), by sack (1.5 bushels), or by minisack, which contains 0.5 bushels of unshucked oysters. To sell oysters using net weight, the oysters must be taken out of the sack and weighed using a scale certified by the Louisiana Department of Agriculture & Forestry. To sell oysters using the count method, one must provide an actual count of oysters in the chosen container. More information regarding the methods of sale can be found at *www.lafisheriesforward.org*.

Image by Russell Lee, 1938.
Courtesy of the Library of Congress digital library

May 2019

APRIL

S	M	T	W	T	F	S
	1	2	3	4	5	6
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JUNE

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9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Oyster dredging, Library of Congress digital library

High Tide:
May 9
1:44 p.m. • 1.4 ft.

Low Tide:
May 20
10:57 p.m. • -0.2 ft.

DID YOU KNOW:

Each month BTNEP scientists test water quality in local waterways. Water is tested for fecal coliform bacteria, dissolved oxygen, pH, water clarity, and salinity.

https://waterquality.btnep.org

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
			1 4:28a 0.6 10:54a 0.7 5:28p 0.6	2 12:19a 0.6 2:33a 0.6 10:03a 0.8 7:07p 0.4	3 9:51a 0.9 8:08p 0.3	4 10:04a 1.0 9:00p 0.1
5 10:33a 1.2 9:51p 0.0 Cinco De Mayo	6 11:12a 1.3 10:43p -0.1	7 11:59a 1.3 11:36p -0.2	8 12:50p 1.4	9 1:44p 1.4 12:29a -0.2	10 2:38p 1.3 1:22a -0.2	11 3:32p 1.2 2:11a -0.1
12 4:22p 1.1 2:54a 0.0 Mother's Day	13 5:08p 0.9 3:24a 0.2	14 1:02p 0.7 3:24a 0.4	15 9:54a 0.7 2:11a 0.5 7:23p 0.4	16 9:22a 0.9 7:58p 0.2	17 9:33a 1.1 8:41p 0.0	18 10:03a 1.2 9:26p -0.1
19 10:42a 1.3 10:11p -0.2	20 11:25a 1.4 10:57p -0.2	21 12:11p 1.3 11:42p -0.2	22 12:59p 1.3 Biological Diversity Day	23 1:46p 1.2 12:25a -0.1	24 2:32p 1.1 1:06a 0.0	25 3:13p 1.0 1:40a 0.0
26 3:50p 0.9 2:07a 0.1	27 4:12p 0.8 2:23a 0.2 Memorial Day	28 11:30a 0.6 2:21a 0.3	29 9:41a 0.7 1:41a 0.4 7:03p 0.4	30 9:04a 0.8 7:05p 0.3	31 8:57a 0.9 7:38p 0.1	

Tide adjustment table can be found on the back cover

Besides Humans, WHAT EATS Oysters?

photo by donyanedomam, 123rf.com

According to Texas Parks and Wildlife, "Living conditions in an estuary undergo continual and often harsh changes, but the oyster is highly adaptable. It tolerates siltation, wide temperature ranges, near-fresh to very salty water, extreme tidal fluctuations and many other environmental changes. By tightly closing its shell, it can avoid contact with the harmful environment for some time. However, when its muscle tires, the shell must open and, if conditions have not improved, the oyster will die. The oyster must also contend with many predators and parasites. Several types of crabs can crack the shell and feed upon the oyster."

The Southern oyster drill, *Stramonita haemastoma*, is a gastropod that uses a small tooth-like appendage called a radula to drill through the oysters shell and eat the oyster. They can consume one large oyster every few days. That may seem slow but in large numbers, oyster drills can cause serious damage to an oyster reef. Oyster drills lay their eggs inside yellow casings attached to the shell of an oyster, and each casing can contain up to 900 embryo. The oyster drill is particularly efficient at attacking an oyster reef because they also eat the spat (larvae) of oysters in the water column.

In addition to oyster drills, Annelid worms (*Polydora*), boring sponges (*Cliona*) or burrowing clams (*Diplothyra*) will predate on oysters. This can, in some ways, be an indirect form of predation, because they burrow into the oyster valves for their own protection but may riddle the valves with extensive burrows. This weakens the shell and makes the oyster more vulnerable to predation. Organisms such as mussels and other encrusting colonial animals may crowd the oysters, interfere with feeding, smother young oysters and hinder spat from setting.

The American oystercatcher is a species of bird regularly found near intertidal oyster beds. The American oystercatcher, *Haematopus palliatus*, is one of the few species of birds known to feed on oysters. Additionally they feed on crabs, sea stars, clams, barnacles and others marine invertebrates making oyster reefs attractive hunting grounds for the birds.

https://tpwd.texas.gov/huntwild/wild/species/easternoyster/

American Oystercatchers by Delaina LeBlanc

June 2019

MAY

S	M	T	W	T	F	S
			1	2	3	4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
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JULY

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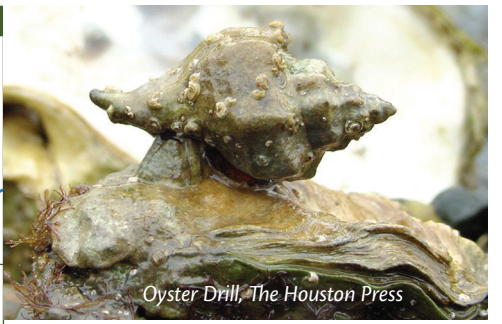
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
						1 9:11a 1.1 · 8:19p -0.1
2 9:39a 1.2 · 9:04p -0.2	**3** 10:17a 1.3 · 9:51p -0.3	**4** 11:02a 1.4 · 10:41p -0.4	**5** 11:50a 1.4 · 11:30p -0.4	**6** 12:38p 1.4	**7** 1:26p 1.3 · 12:16a -0.3	**8** 12:58a -0.2 · 2:10p 1.1 · World Oceans Day
9 2:45p 1.0 · 1:29a -0.1	**10** 2:34p 0.7 · 1:41a 0.1	**11** 10:04a 0.6 · 1:13a 0.3 · 11:17p 0.4	**12** 8:37a 0.8 · 7:31p 0.2	**13** 8:23a 0.9 · 7:31p 0.0	**14** 8:40a 1.1 · 8:02p -0.2	**15** 9:11a 1.2 · 8:41p -0.3
16 9:49a 1.3 · Father's Day · 9:22p -0.3	**17** 10:31a 1.3 · 10:05p -0.3	**18** 11:15a 1.3 · 10:46p -0.3	**19** 11:59a 1.2 · 11:25p -0.2	**20** 12:41p 1.2	**21** 1:20p 1.1 · 12:00a -0.2 · First Day of Summer	**22** 1:54p 1.0 · 12:29a -0.1
23 2:20p 0.8 · 12:50a 0.0	**24** 2:22p 0.7 · 1:01a 0.1	**25** 10:25a 0.6 · 12:55a 0.2	**26** 8:38a 0.6 · 12:10a 0.3 · 7:49p 0.3	**27** 8:02a 0.8 · 6:23p 0.2	**28** 7:57a 0.9 · 6:48p 0.0	**29** 8:14a 1.0 · 7:26p -0.2
30 8:44a 1.2 · 8:11p -0.3						


Oyster Drill, The Houston Press

High Tide:
June 5
11:50 a.m. • 1.4 ft.

Low Tide:
June 5
11:30 p.m. • -0.4 ft.

DID YOU KNOW:

BTNEP hosts annual paddling events to help create a sense of stewardship for our coastal ecosystem. The event highlights the ecological, cultural, and historical value of the estuary. https://outreach.btnep.org/events/paddle-bayou-lafourche


Fossilized oyster drills from the Gulf of Mexico by James St John

Tide adjustment table can be found on the back cover

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Predator Fish SPECIES

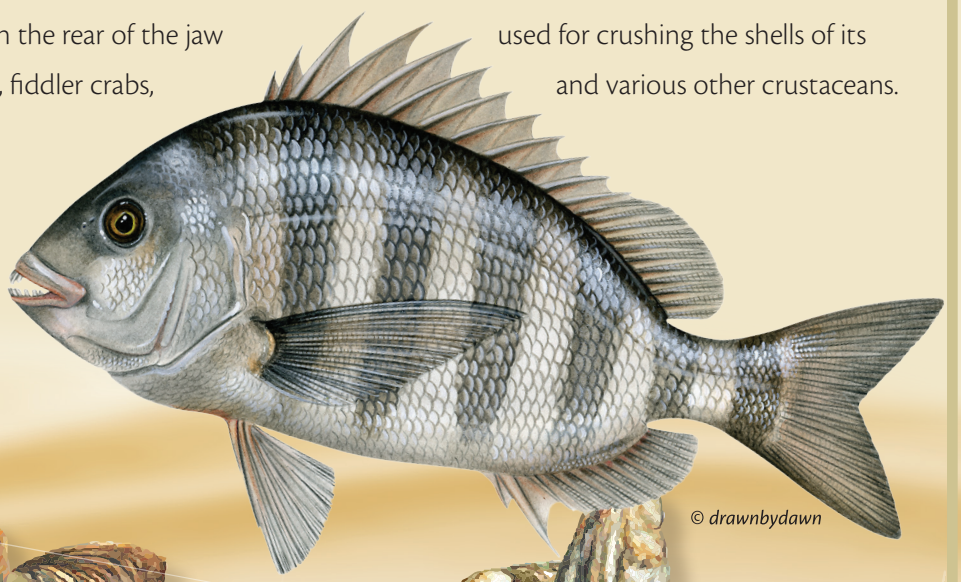
© drawnbydawn

In an oyster reef, the black drum (*Pogonias cromis*) is an important predator species, as they can negatively affect oyster harvests from leases and are able to eat one to two commercial-sized oysters per pound of their own body weight each day. They possess a downward-placed mouth, making hunting for food along water bottoms and oyster beds easy. With strong jaws and pharyngeal teeth, they easily crush mollusks, crabs and oysters. When feeding, black drum swim with their heads slightly tilted downward skimming their barbels (chin whiskers) over possible prey items. When prey is found, the drum creates a rapid and powerful suction with its mouth and gill covers, inhaling the prey and crushing it with its pharyngeal teeth. Small pieces of shell fall out through the gills, but the most of the prey's shell are spit out through the mouth when the black drum is finished eating. Drum mainly select single oysters to feed on but can break apart and crush oyster clusters when necessary.

In addition to the black drum, there are other species that feed on oysters heavily, one being the sheepshead, *Archosargus probatocephalus*. The sheepshead is a marine fish with five or six dark bars on the side of the body. With the dark bars and a propensity for stealing anglers bait, the fish is sometimes called the convict fish. Sheepshead are probably best known for their human-looking teeth. A fully-grown adult sheepshead will have well-defined incisors that sit at the front of the mouth and multiple sets of molars in the upper and lower jaw. It also has strong heavy grinders set in the rear of the jaw used for crushing the shells of its prey. The sheepshead diet consists of sessile invertebrates including oysters, clams, other bivalves, barnacles, fiddler crabs, and various other crustaceans.

Black drum by Irina K shutterstock.com

Sheepshead by Irina K shutterstock.com



© drawnbydawn

Oyster Border, CD Breland

July 2019

JUNE

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23	24	25	26	27	28	29
30						

AUGUST

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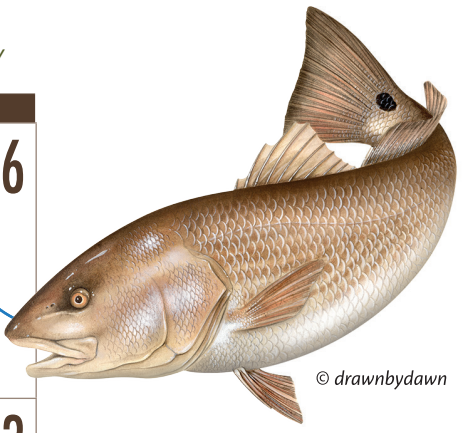
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
	1 9:24a 1.3 / 8:59p -0.4	**2** 10:09a 1.4 / 9:49p -0.4	**3** 10:58a 1.4 / 10:37p -0.4	**4** 11:46a 1.4 / 11:21p -0.4 Independence Day	**5** 12:33p 1.3 / 11:59p -0.2	**6** 1:15p 1.1
7 12:25a -0.1 / 1:47p 0.9	**8** 12:24a 0.1 / 1:12p 0.7 / 11:35p 0.3	**9** 8:06a 0.7 / 9:02p 0.3	**10** 7:09a 0.8 / 6:17p 0.2	**11** 7:11a 1.0 / 6:31p 0.0	**12** 7:36a 1.2 / 7:06p -0.1	**13** 8:13a 1.3 / 7:48p -0.2
14 8:55a 1.3 / 8:32p -0.2	**15** 9:40a 1.3 / 9:16p -0.2	**16** 10:25a 1.3 / 9:57p -0.2	**17** 11:10a 1.3 / 10:35p -0.1	**18** 11:51a 1.2 / 11:06p -0.1	**19** 12:29p 1.1 / 11:32p 0.0	**20** 1:03p 1.0 / 11:50p 0.1
21 1:34p 0.9	**22** 12:00a 0.2 / 1:57p 0.8 / 11:53p 0.3	**23** 9:07a 0.6 / 11:05p 0.5	**24** 7:08a 0.7 / 4:42p 0.4	**25** 6:35a 0.8 / 4:47p 0.3	**26** 6:37a 1.0 / 5:27p 0.1	**27** 7:01a 1.1 / 6:14p 0.0
28 7:38a 1.3 / 7:05p -0.1	**29** 8:23a 1.4 / 7:58p -0.2	**30** 9:13a 1.5 / 8:51p -0.2	**31** 10:04a 1.5 / 9:42p -0.2			

ft: 1.6, 1.2, 0.8, 0.4, -0.0, -0.4

Tide adjustment table can be found on the back cover



© drawnbydawn

High Tide:
July 31
10:04 a.m. • 1.5 ft.

Low Tide:
July 2
9:49 p.m. • -0.4 ft.

DID YOU KNOW:

Exotic invasive plants and animals that are introduced into the local environment, either purposefully or accidentally, pose a serious threat to our estuary's living resources.

https://invasivespecies.btnep.org/

Sheepshead by Dan Thornberg, shutterstock.com

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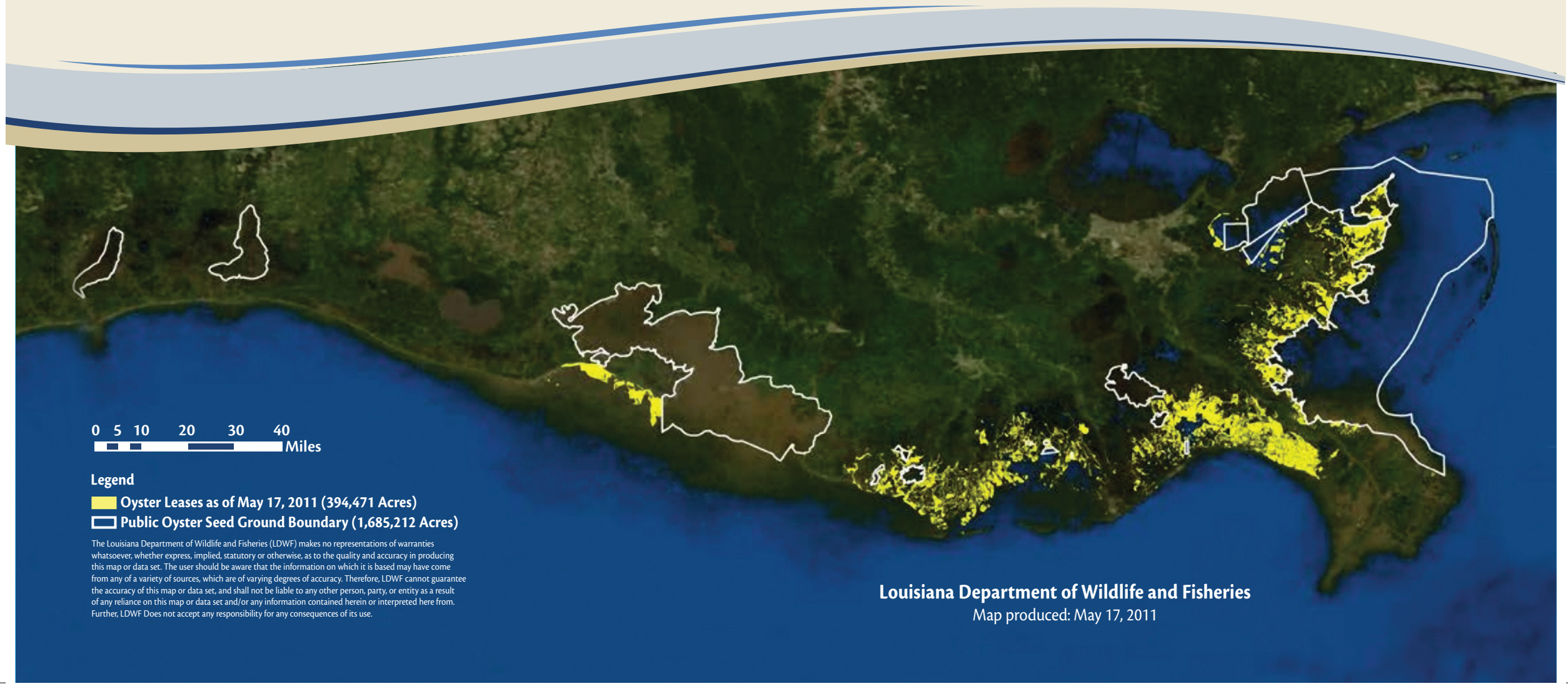
Oysters AND Salinity

Louisiana is No. 1 in U.S. commercial oyster production due to the healthy extensive estuaries and a productive system of public oyster areas and private leases. There are approximately 1.7 million acres of public seed grounds and reservations, as well as nearly 400,000 private leases designated to oysters.

However, there is a looming threat on the horizon for some oystermen in coastal Louisiana, specifically in Barataria Bay. The Coastal Protection and Restoration Authority's State Coastal Master Plan to fight land loss and build land is largely built on freshwater and sediment diversions off of the Mississippi River. The Mid-Barataria Sediment Diversion structure will be located in Plaquemines Parish near Ironton, LA and in the next 50 years, this diversion has been modeled to build land and aid in the protection of existing land. As this moves forward from planning, to engineering and design, to construction, and then finally to operation, an impact on the commercial oyster fishery in Barataria Bay is anticipated due to fresher salinities.

The current salinity condition of brackish waters in Barataria Bay are vital to the survival of the oyster species in the area. Oysters prefer salinities between 5 and 15 parts per thousand. Outside of that range, water that is too fresh or too salty can reduce the ability of oysters in that area to grow and reproduce. There is an ongoing discussion among residents, oystermen, and scientists alike on how to best move forward knowing we need to protect and build land while also continuing to lead the U.S. in oyster production.



August 2019

JULY

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21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER

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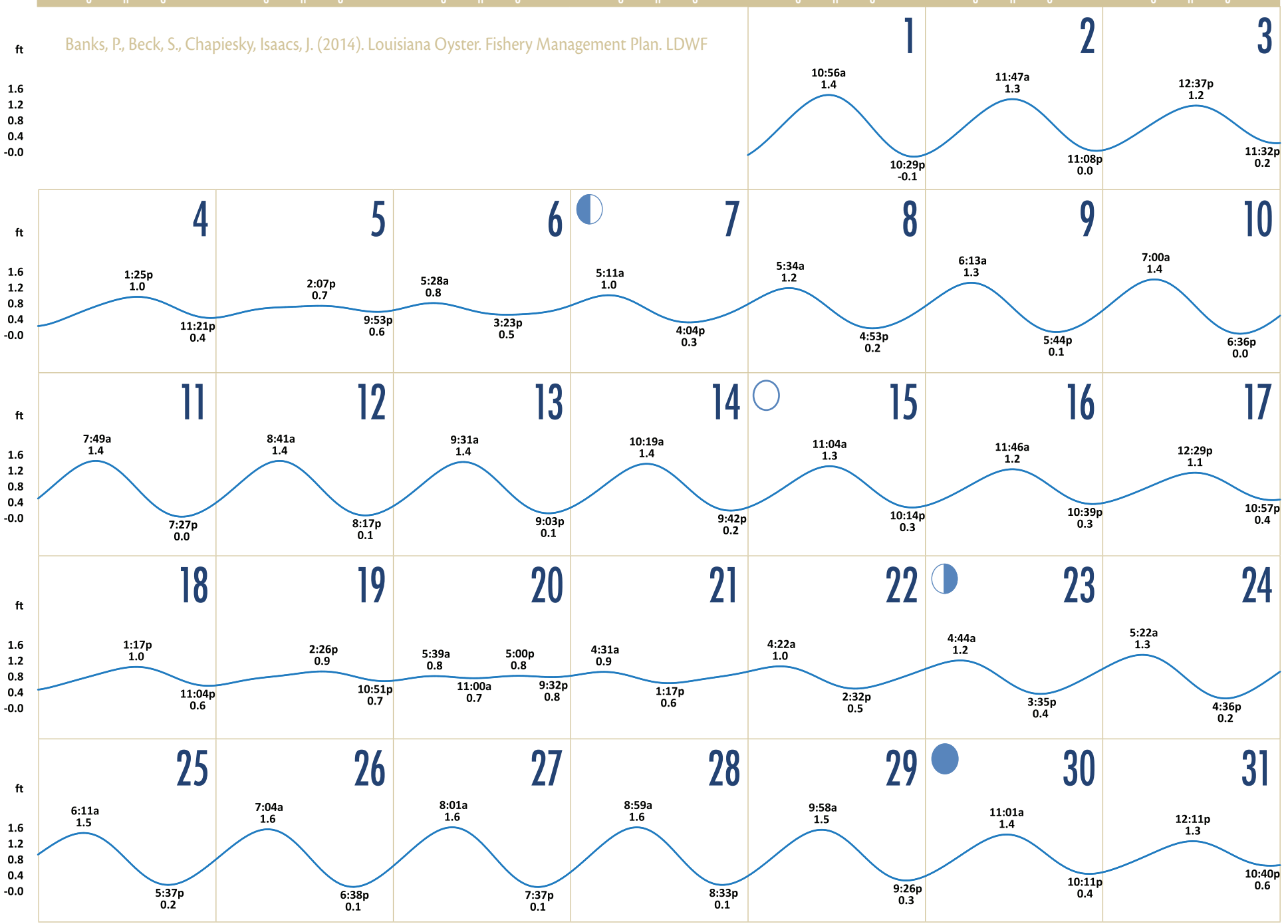
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6

Banks, P., Beck, S., Chapiesky, Isaacs, J. (2014). Louisiana Oyster. Fishery Management Plan. LDWF



Tide adjustment table can be found on the back cover

The ideal salinity range for oysters is 5 to 15 parts per thousand.

High Tide:
August 27
8:01 a.m. • 1.6 ft.

Low Tide:
August 1
10:29 p.m. • -0.1 ft.

DID YOU KNOW:

BTNEP has a host of science lessons for all grade levels. All lessons are open access and free. Lessons cover grades K-12.

https://education.btnep.org/k-12-curriculum/

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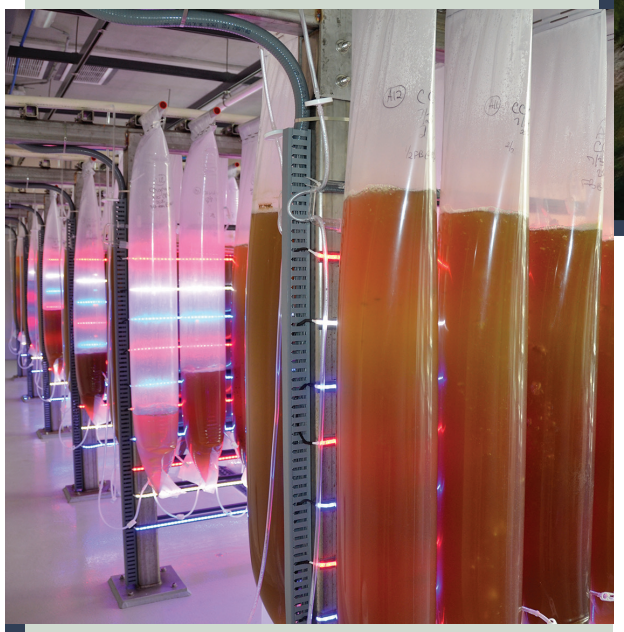
Main Picture: An aerial view of the oyster hatchery in Grand Isle, Louisiana. Image by: Roy Kron, Louisiana Sea Grant

Below: An interior view shows algae is grown in a specially lighted room in the new oyster hatchery. The algae serves as a food source for oysters grown at the facility. Image by: Roy Kron, Louisiana Sea Grant



Remote setting example, photo by Caleb Bourgeois

ALTERNATIVE Oyster Culture

Traditionally, oystermen would cultivate and harvest oysters from naturally occurring or manmade oyster reefs. The oystermen either tong or dredge the oysters off the water bottom. New techniques of growing oysters are similar to the naturally occurring process. The new techniques that have been developed in recent years allow oystermen to overcome environmental challenges, to harvest year round, or to diversify their markets. Single oyster mariculture, off bottom oyster farming, and alternative oyster culture are a variety of ways to describe the recent advances in oyster culture technologies.

Alternative oyster culture is the use of new technology and/or techniques used to produce and harvest oysters, including on bottom bags and cages or off bottom floating bags and cages. Off bottom culture techniques include adjustable long lines and floating cages. Typically, off bottom oyster operations are stocked with triploid oysters. Triploid oysters are oysters with an extra chromosome making them unable to reproduce. Because these oysters are infertile they concentrate their energies on growth and grow faster than the wild type or diploid oysters.

In addition to cultivating oysters from suspended or floating bags or cages, off bottom culture oftentimes utilizes the new technology of remote setting. Remote setting is the practice of spawning and raising larval oysters in a controlled environment before using the resulting spat to seed production oyster reefs. Within Louisiana, the Grand Isle Oyster Hatchery has been refining techniques and producing seed oysters for remote setting operations. Run through a partnership between LDWF and Louisiana Sea Grant, the hatchery produces roughly 1 million seed oysters per season.

September 2019

AUGUST

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18	19	20	21	22	23	24
25	26	27	28	29	30	31

OCTOBER

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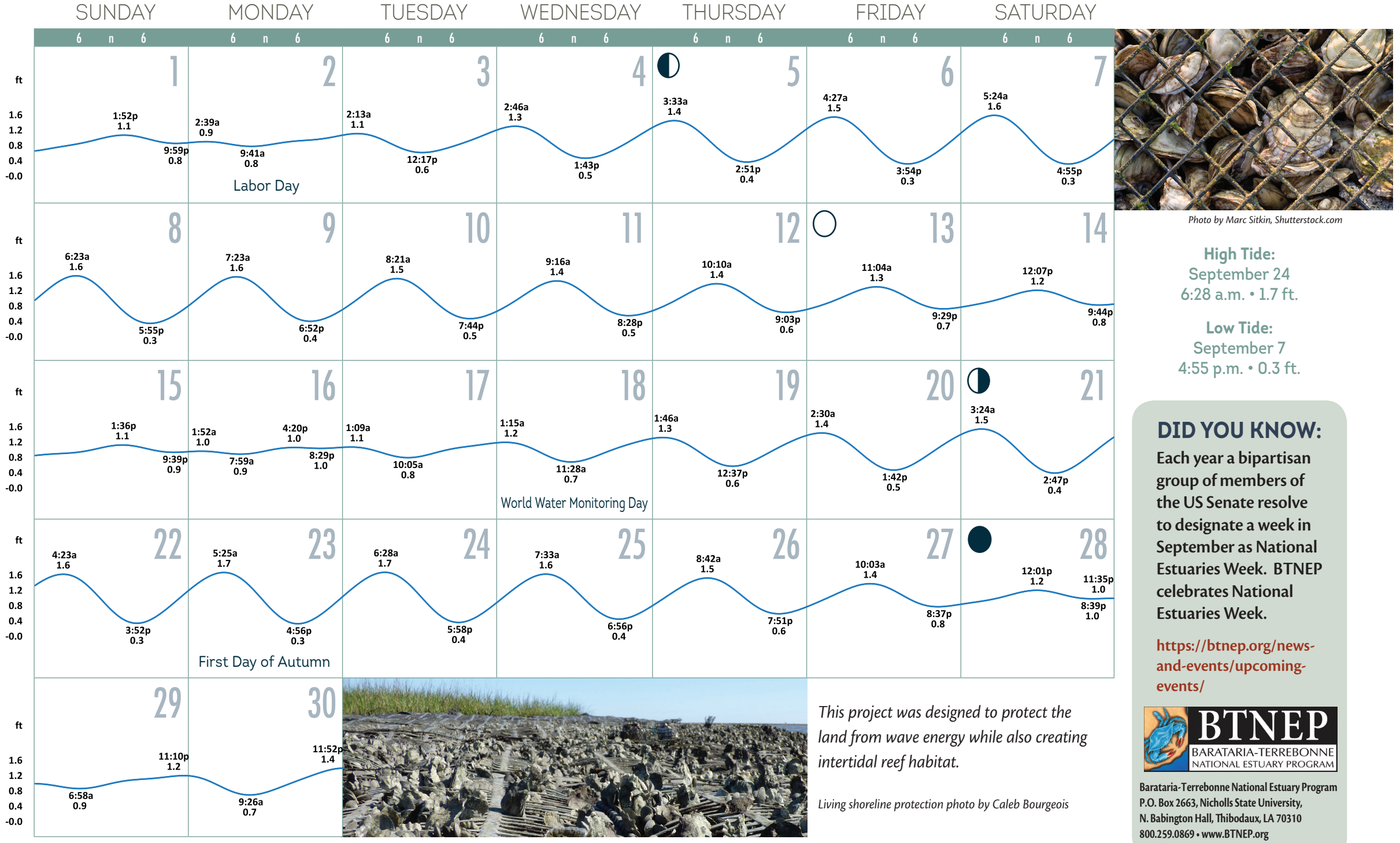
27	28	29	30	31		



Tide adjustment table can be found on the back cover

Photo by Marc Sitkin, Shutterstock.com

High Tide:
September 24
6:28 a.m. • 1.7 ft.

Low Tide:
September 7
4:55 p.m. • 0.3 ft.

DID YOU KNOW:

Each year a bipartisan group of members of the US Senate resolve to designate a week in September as National Estuaries Week. BTNEP celebrates National Estuaries Week.

https://btnep.org/news-and-events/upcoming-events/

This project was designed to protect the land from wave energy while also creating intertidal reef habitat.

Living shoreline protection photo by Caleb Bourgeois

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What is a triploid oyster?

Courtesy of CD Breland

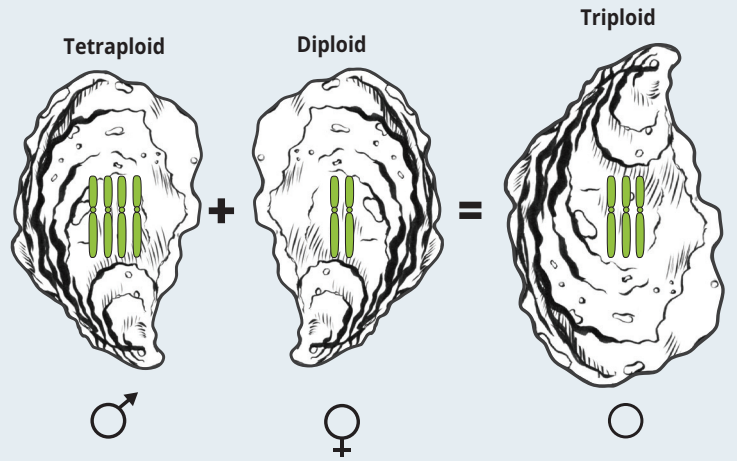
Have you ever heard the old saying "Only eat oysters in months that contain an R"? Have you ever wondered the reasons why that old idiom exists? The answer is rooted in science and history.

One reason for this is that naturally occurring oysters are considered diploid, meaning that they have two sets of chromosomes, one from each parent. These diploid oysters live their lives following the seasons, when the water is cooler, generally in the autumn, winter and spring months, they are happily feeding, and storing all of that energy. Oyster connoisseurs call these "nice fat oysters." As spring turns into summer and our coastal waters begin to warm up, the oysters receive environmental cues that it is time to produce the next generation of oysters. The oysters will begin to use their energy reserves in an effort to produce millions of gametes (i.e. eggs and sperm). Using all of this energy toward reproduction leads to a thinner and more watery oyster, which isn't preferred by consumers or the oyster farmers. Also, in the past, finding proper refrigeration in the warm months was difficult for oystermen in the early days of the fishery.

Consumers can now eat tasty oysters all year long thanks to better refrigeration and the genetic innovation of oysters. In 1989, Standish Allen, current director of the Aquaculture Genetics and Breeding Technology Center at William & Mary's Virginia Institute for Marine Science, patented a method for inducing polyploidy in oysters through the use of hydrostatic pressure. In 1998, Mr. Allen received a patent for creating tetraploid mollusks, meaning creating an oyster, clam, or mussel with four sets of chromosomes. On the same patent, Allen provides a method for mating the tetraploid mollusks with the "natural" diploid mollusk, thereby producing a triploid mollusk.

These "triploid" oysters, unlike their wild diploid brethren, contain an extra set of chromosomes. This genetic difference means that these oysters are infertile. They spend all year, regardless of the seasons, putting all their energies into growing.

How to Make a Better Oyster



The green symbols on the oysters represent sets of chromosomes in each oyster. If you mate an oyster with 4 sets of chromosomes (tetraploid, here shown as male) with a natural oyster with two sets of chromosomes (diploid, here shown as female), a triploid (3 sets of chromosomes, unable to reproduce) oyster is produced. Triploid oysters exhibit favorable characteristics for commercial oyster interests. Image courtesy of Louisiana Sea Grant.

Sea Grant LOUISIANA

October 2019

SEPTEMBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

NOVEMBER

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Photo by Cody Traxler, Shutterstock.com

High Tide:
October 4
2:34 a.m. · 1.7 ft.

Low Tide:
October 31
11:43 a.m. • 0.1 ft.

DID YOU KNOW:

Approximately 400 different species of birds are known to have occurred in the Barataria-Terrebonne system. Many of these birds migrate through the estuary both in the fall and spring.

https://birds.btnep.org/

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
		1 10:52a 0.5 12:42a 1.5	2 12:01p 0.4 1:37a 1.6	3 1:03p 0.3 2:34a 1.7	4 2:03p 0.3 3:34a 1.7	5 3:01p 0.4
6 4:35a 1.6 3:59p 0.4	7 4:54p 0.5 5:38a 1.5	8 5:41p 0.6 6:41a 1.5	9 6:19p 0.7 7:42a 1.4	10 6:43p 0.8 8:46a 1.3	11 6:46p 0.9 10:03a 1.2	12 4:16a 0.9 6:14p 1.0 12:03p 1.1 11:03p 1.0
13 6:57a 0.8 10:47p 1.1	14 8:25a 0.7 10:56p 1.2 Columbus Day	15 9:29a 0.6 11:22p 1.3	16 10:25a 0.5	17 11:20a 0.4 12:00a 1.4	18 12:17p 0.3 12:46a 1.5	19 1:15p 0.2 1:39a 1.6
20 2:13p 0.2 2:37a 1.6	21 3:10p 0.2 3:37a 1.6	22 4:04p 0.3 4:38a 1.5	23 4:50p 0.4 5:41a 1.4	24 5:22p 0.6 6:50a 1.3	25 5:10p 0.8 8:26a 1.1 11:14p 0.9	26 5:47a 0.8 9:54p 1.1
27 7:49a 0.6 10:02p 1.3	28 8:58a 0.4 10:35p 1.4	29 9:56a 0.2 11:20p 1.5	30 10:50a 0.1	31 11:43a 0.1 12:08a 1.6 Halloween		

Tide adjustment table can be found on the back cover

Oysters IN *Oil*

In the early 1900s, human activity in coastal Louisiana evolved the estuary into a "working coast". With the use of advancing technologies, navigable waterways, and ports used for oil and gas activities that started in the 1920s, the landscape changed. Our oil and gas exploits over the last century have been essential for economic development in our region and provided the infrastructure to support many families over the generations. While the oil and gas production has helped the US become more largely more independent, we must be fully aware of the associated risks. The process of oil and gas exploration and production has its' trade-offs, as it can sometimes cause adverse affects to local ecosystems. Following the Deepwater Horizon explosion that killed 11 people, from April through September 2010 an estimated 4.9 million barrels of crude oil was discharged into the Gulf of Mexico 42 miles southwest of the Louisiana coast. A large majority of that oil was discharged upon Louisiana's estuaries, as oil slicks and mats would drift over and settle onto oyster reefs in certain areas. Millions of gallons of oily substances were removed from the beaches and coastal ecosystems across the Gulf coast and the response team also released chemical dispersants in an effort to break up the oil.

Oyster filtering, reprinted with permission from the Sea Grant oil spill science outreach team, illustrated by Anna Hinkeldey, adapted from www.hook.life

As filter feeders, oysters service the aquatic community around them by sifting out natural and foreign materials improving water quality and clarity. Because oysters are sessile, they cannot move away from pollutants such as oil compounds like polycyclic aromatic hydrocarbons (PAHs) or other spill-related substances like dispersants. It is well known that these substances can sometimes build up, or bioaccumulate in an organism's body that encounters the oil or dispersant. Oysters filtering ability make them a useful species for monitoring water quality, and changes in the food web in response to an oil or any other chemical pollution event.

In the aftermath of the Deepwater Horizon oil spill, there were rumors that oysters were filtering oil-contaminated water and bio-accumulating oil making them unsafe to eat. Scientists examined the diet of oysters and other shellfish in oiled and unoiled locations before, during, and after the Deepwater Horizon oil spill. There were multiple scientific studies that sampled surrounding waters as well as shellfish tissues and shells, finding no evidence of oil-related bioaccumulation in shellfish across the coast. After extensive research, the Gulf-wide seafood testing program concluded that Gulf seafood was safe to eat, even oysters. Some think that oysters and other bivalves living in areas where natural seeps occur might be more tolerant of oil.

Hale, C., Graham, L., Maung-Douglass, E., Sempier, S., Skelton, T., Swann, L., Wilson, M. (2018). Oysters and oil spills. GOMSG-G-18-010

A Shoreline Cleanup Assessment Team (SCAT) discovered oil debris attached to an oyster shell on the shoreline of Racoon Island, a protected bird breeding sanctuary in Louisiana. SCAT teams, including the U.S. Coast Guard, British Petroleum (BP), and other agencies, worked together to prevent the spread of oil following the Deepwater Horizon oil spill. (Picture by U.S. Navy Petty Officer 2nd Class Jonathan E. Davis)

Please Visit the Gulf Sea Grant Oil Spill Science Outreach Program website to learn more about oysters and oil spills: gulfseagrant.org/oilspilloutreach/publications.

Oiled marsh and boom, photo by Breck P. Kent on shutterstock.com

November 2019

OCTOBER

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

DECEMBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6

ft: 1.6, 1.2, 0.8, 0.4, -0.0, -0.4

1
1:00a 1.6
12:34p 0.1

2
1:55a 1.5
1:25p 0.1

3
1:50a 1.5
1:13p 0.2
Daylight Saving Time Ends

4
2:45a 1.3
1:54p 0.3

5
3:38a 1.2
2:26p 0.4

6
4:29a 1.1
2:45p 0.5

7
5:22a 0.9
2:42p 0.6
10:55p 0.8

8
2:37a 0.8
6:47a 0.8
2:02p 0.7
9:13p 0.8

9
5:30a 0.6
8:46p 0.9

10
6:28a 0.5
8:44p 1.0

11
7:11a 0.3
8:56p 1.1
Veteran's Day

12
7:53a 0.2
9:21p 1.2

13
8:37a 0.1
9:56p 1.3

14
9:25a 0.0
10:38p 1.4

15
10:14a -0.1
11:26p 1.4
America Recycles Day

16
11:05a -0.1

17
12:17a 1.4
11:55a -0.1

18
1:08a 1.3
12:42p -0.1

19
1:58a 1.2
1:22p 0.0

20
2:44a 1.1
1:49p 0.2

21
3:14a 0.9
1:46p 0.3
11:02p 0.7

22
12:25p 0.5
8:32p 0.7

23
6:28a 0.4
7:59p 0.9

24
6:45a 0.1
8:11p 1.1

25
7:25a -0.1
8:41p 1.2

26
8:09a -0.2
9:20p 1.3

27
8:55a -0.3
10:04p 1.4

28
9:41a -0.3
10:51p 1.3
Thanksgiving Day

29
10:28a -0.3
11:40p 1.3

30
11:12a -0.3

Tide adjustment table can be found on the back cover

Photo by Breck P. Kent on shutterstock.com

High Tide:
November 1
1:00 a.m. • 1.6 ft.

Low Tide:
November 28
9:41 a.m. • -0.3 ft.

DID YOU KNOW:

Residents can plant local native plants to attract wildlife to their own backyards. The BTNEP Residents' Guide series of booklets was developed for local people to promote ecological friendly land use practices.

https://btnep.org/wp-content/uploads/2017/07/Attracting_Wildlife_with_Native_Plants.pdf

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Limestone up close

Oyster Reef Restoration

IN LOUISIANA

Barge dumping cultch material

Across the Louisiana Gulf Coast, many entities are working to rebuild our coastal oyster reefs. One key to restoring oyster reefs is having hard substrate in suitable locations for oyster spat to colonize. Without clean, hard substrate oysters cannot settle or will be smothered by sediments once settled on the soft muddy bottoms in Louisiana. The cultch material (hard substrate), is often limestone, recycled oyster shell, or crushed concrete.

In the past, oystermen dredged up clam shell, *Rangia cuneata*, to use as cultch material. From the early 1960s, clam shells were used because they were available and relatively inexpensive. A large majority of the clam shells were dredged from Mobile Bay, AL and Lake Pontchartrain, LA. In 1982 (AL) and then 1990 (LA), dredging of clam shells ended due to environmental and ecological concerns (Dugas et al. 1991). This led to an increased use of alternative materials to use as cultch. Many oyster shucking plants, where large numbers of oysters are shucked to be shipped out in containers, are easily recycled and used as cultch. However, oysters sold to restaurants then sold on the half shell to eat creates transportation difficulties and more costs. With the start of the oyster shell recycling program from the Coalition to Restore Coastal Louisiana, restaurants that serve oysters on the half shell separate shells out to be returned to the water.

One group of stakeholders who may often not be recognized for their contributions to oyster reef restoration are the commercial oystermen. Within Louisiana, commercial oystermen will invest in putting down literally tons of cultch material on their oyster leases improving conditions for spat settlement and reef development. Improving the reef habitat on these leases has an added benefit of improving species diversity, fishing, and storm protections for the estuaries (and residents). As private businesses and individuals, oystermen often use their own capital and resources to purchase and place the cultch material. With roughly 400,000 acres of water bottoms held in private oyster leases through Louisiana Department of Wildlife and Fisheries, the restoration efforts of oystermen in Louisiana have the potential to significantly improve the availability and quality of oyster reefs across the coast.

All photos obtained from the Louisiana Conservationist (Louisiana Department of Wildlife and Fisheries magazine) digital article titled "Building up the Bottom" laconservationist.wlf.la.gov/buildingupthebottom

Limestone work in Louisiana

December 2019

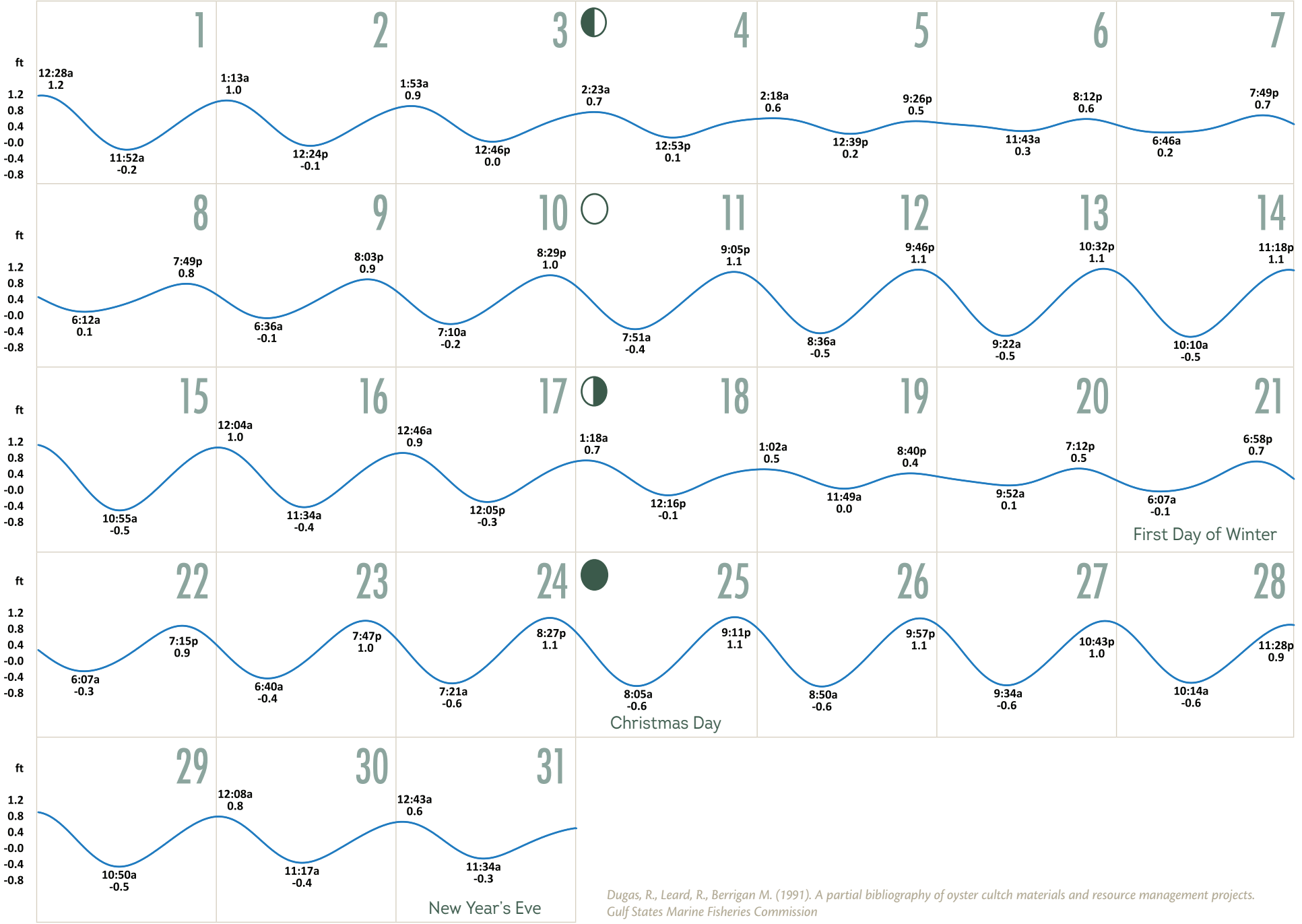
NOVEMBER 2019

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

JANUARY 2020

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6



Tide adjustment table can be found on the back cover

To learn more about Louisiana's commercial fishing industry, visit: wlf.louisiana.gov/fishing/commercial-fishing

High Tide:
December 1
12:28 a.m. • 1.2 ft.

Low Tide:
December 23
8:50 a.m. • -0.6 ft.

DID YOU KNOW:

The BTNEP Management Conference works to build consensus in the development and implementation of its Comprehensive Conservation and Management Plan.

https://ccmp.btnep.net/ and https://btnep.org/about-btnep/management-conference/

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Dugas, R., Leard, R., Berrigan M. (1991). A partial bibliography of oyster cultch materials and resource management projects. Gulf States Marine Fisheries Commission

TIDE CORRECTIONS

To find the best time to fish your favorite locations, find a location that is closest to your area and add or subtract the time from the corresponding daily prediction.

AREA	LOW (Hours:Minutes)	High (Hours:Minutes)
Shell Beach, Lake Borgne	+5:10	+4:01
Chandeleur Lighthouse	+0:38	+0:05
Venice, Grand Pass	+1:28	+1:06
Southwest Pass, Delta	-0:29	-1:29
Empire Jetty	-1:35	-2:03
Bastian Island	+0:22	-0:19
Quatre Bayou Pass	+0:27	+1:18
Independence Island	+2:09	+1:29
Caminada Pass	+1:44	+1:14
Timbalier Island	+0:33	-0:41
Cocodrie, Terrebonne Bay	+2:50	+1:10
Wine Island	+1:12	+0:08
Raccoon Point	-0:10	-1:03
Ship Shoal Light	-1:40	-2:54

Charts in this calendar are intended for use solely as a reference guide to Louisiana fishing. It is not intended for navigational use. BTNEP makes no warranty, expressed or implied, with respect to the accuracy or completeness of the information contained in these charts. BTNEP assumes no liability with respect to the use of any information contained in this document.

BTNEP THANKS...

BARATARIA-TERREBONNE ESTUARY FOUNDATION

2019 Moon Phase Calendar Icons

- First Quarter
- Third Quarter
- Full Moon
- New Moon

BTNEP BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

2019 TIDAL GRAPH CALENDAR

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Contributors: Susan Testroet-Bergeron, Andrew Barron, Matt Benoit, Dean Blanchard, and Nicole Lundberg

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Front and back cover photos by Lane Lefort

FISHING REGULATIONS

This is not a comprehensive or official copy of the laws in effect and should not be utilized as such. Size and creel limit regulations are presented for selected species only. These species as well as other species may be managed by seasons, quotas and permits. Different regulations for bass, catfish and crappie may apply within specific areas. Contact the Louisiana Department of Wildlife and Fisheries (LDWF) for specific information.

FRESHWATER SPECIES

SPECIES	SIZE LIMIT	DAILY LIMIT
Large mouth and Spotted Bass***	None	10
(False River located in Pointe Coupee Parish)	14" Minimum (TL)	5
Crappie (Sac-a-lait)	None	50
Striped or Hybrid Striped Bass	None: 2 over 30" (TL)	5 (Any combination)
White Bass	None	50
Yellow Bass	None	50
Channel Catfish	25 less than 11" (TL)	100 (100 total of these three species)
Blue Catfish	25 less than 12" (TL)	100
Flathead Catfish (Spotted, Yellow or Opelousas)	25 less than 14" (TL)	100
Freshwater Drum (Gaspergou)	12" Minimum (TL)	25

SALTWATER SPECIES

SPECIES	SIZE LIMIT	DAILY LIMIT
Speckled Trout*	12" Minimum (TL)	25
(Cameron & Calcasieu Parishes**)	12" Minimum (TL), two over 25"	15
Red Fish*	16" Minimum (TL), one over 27"	5
Black Drum	16" Minimum (TL), one over 27"	5
Southern Flounder	None	10
Greater Amberjack	State & Federal Reg. 30" Min. (FL)	1
Cobia (Ling or Lemon Fish)	State & Federal Reg. 33" Min. (FL)	2
King Mackerel	State & Federal Reg. 24" Min. (FL)	2
Spanish Mackerel	State & Federal Reg. 12" Min. (FL)	15
Red Snapper***	State & Federal Reg. 16" Min. (TL)	***

** For Red Drum (Redfish) and Spotted Seatrout (Speckled Trout): Recreational saltwater anglers may possess a two day bag limit on land; however, no person shall be in possession of over the daily bag limit in any one day or while fishing on the water, unless that recreational saltwater angler is aboard a trawler engaged in commercial fishing for a consecutive period of longer than 25 hours.*

*** (Cameron & Calcasieu Parishes) Daily take and possession limit of 15 Spotted Seatrout (Speckled Trout): no person shall possess, regardless of where taken, more than two spotted seatrout exceeding 25 total inches in length, which are considered part of the daily bag and possession limit in state and coastal territorial waters South of 1-10 at the Louisiana/Texas border to its junction with LA HWY 171, south to Hwy's 14 and 27 near Holmwood, south along Hwy. 27 to Hwy. 82 to the Gulf of Mexico.*

**** There are specific regulations for Bass, Red Snapper and Shark. Contact the LDWF for more information.*

FORK LENGTH (FL): Tip of snout to fork of tail. TOTAL Length (TL): Tip of snout to tip of tail.

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