



# PONCE DE LEON INLET LIGHTHOUSE ILLUMINATIONS

4931 South Peninsula Drive • Ponce Inlet, Florida 32127 • [www.ponceinlet.org](http://www.ponceinlet.org) • [www.lighthouselocker.org](http://www.lighthouselocker.org) • (386) 761-1821 • [lighthouse@ponceinlet.org](mailto:lighthouse@ponceinlet.org)  
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IMAGE BY HAROLD WALLMAN

Dear Members,

I hope this issue of *Illuminations* finds you happy and well. This time of year is always active at the Ponce Inlet Lighthouse as travelers flock to the greater Daytona Beach area from far and wide in search of sunshine and sparkling beaches. In addition to our regular daily offerings, the Preservation Association hosts numerous events throughout the summer season.

Be sure to visit us on Thursday, July 4th, for the museum's Independence Day Celebration before heading to your favorite fireworks show. Held annually, this important event celebrates our nation's birth with many activities including guided tours of the light station and numerous family-oriented workshops. A complete listing of scheduled events in the months of July, August, and September can be found in the Calendar of Events on page six.

As many of you know, the Ponce de Leon Inlet Lighthouse Preservation Association is not-for-profit 501 (c) (3) organization governed by an all-volunteer Board of Trustees comprised of eleven Ponce Inlet residents who are committed to the ongoing preservation and dissemination of the maritime and social history of the Ponce Inlet Lighthouse. The Board is assisted in its endeavors by an all-volunteer Advisory Committee made up of like-minded Town residents drawn from the general membership. Together, these two groups guide the ongoing operations of the Preservation Association.

This dedicated group of preservationists

has collectively donated thousands of hours to the Ponce Inlet Lighthouse over the years. Some have served the Association for decades and others for a few years. Regardless of their time in office, the personal contribution of every member of this selfless group of men and women is invaluable. They work not for personal gain or public praise, but to ensure this important National Historic Landmark continues to shine for this and future generations to come. On behalf of the entire lighthouse staff, I thank each and every member of the Board of Trustees and Advisory Committee for their tireless efforts.

One of the most commonly asked questions' regarding financial contributions to the General Operating Fund is "How is my denotation spent?" Many of those dollars were used to fund some much needed preservation work to the 500-gallon tanks located in the Oil Storage Building. Originally used by the lighthouse keepers to store kerosene, these massive iron tanks were recently cleaned, treated, and recoated with a miomastic moisture cured urethane paint that is specially formulated to protect metal in harsh coastal environments. Completed by the museum's maintenance department, additional work in the Oil Storage Building included the repairs to the roof and the repainting of interior woodwork.

I am pleased to announce that the museum's most recent publication, *The Ponce Inlet Lighthouse: An Illustrated History* is now available for purchase. Although scheduled to hit the shelves in October, 2018, printing delays

postponed the book's release until April of this year. Written by museum curator Ellen Henry, this fully illustrated hardback volume is the culmination of more than 40 years of research by the Preservation Association and is the definitive history of the Ponce De Leon Inlet Light Station. Signed first edition copies are available for purchase online and in the lighthouse gift shop.

The Association's many successes over the years could not have been achieved without the continued support of members like you. As you read through this issue of *Illuminations* please reflect on the significant accomplishments of the Preservation Association over the past four decades and consider the substantial costs associated with continuing this important work in the years ahead. Information regarding ways to support the Ponce Inlet Lighthouse can be found online at [www.ponceinlet.org](http://www.ponceinlet.org). You may also contact me via email at [edgunn@ponceinlet.org](mailto:edgunn@ponceinlet.org) or by phone at (386) 761-1821 ext. 15 to learn more.

I wish you all a happy and healthy summer and look forward to seeing you at the Ponce Inlet Lighthouse and Museum in the near future.

With Warm Regards,

*Ed Gunnlaugsson*

Ed Gunnlaugsson  
Executive Director  
Ponce Inlet Lighthouse

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## FRONT COVER IMAGE

PORT ORANGE  
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WINNING PHOTO IN THE  
INTERMEDIATE CATEGORY.

PHOTOGRAPHER:  
Harold Wallman

Bio: Harold bought his first camera in Korea in 1953 and started taking slides and pictures. After 50 years as a toolmaker, he retired and purchased his first digital camera and has been taking landscape pictures all over New England, Florida and North Carolina with his Daughter.

THE PONCE DE LEON INLET LIGHTHOUSE PRESERVATION ASSOCIATION IS DEDICATED TO THE PRESERVATION AND DISSEMINATION OF THE MARITIME AND SOCIAL HISTORY OF THE PONCE DE LEON INLET LIGHT STATION.

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Subscription is a benefit of membership in the Association. *ILLUMINATIONS* welcomes letters and comments from our readers.

## REGULAR HOURS OF OPERATION

MAY 27, 2018 – SEPTEMBER 2, 2019  
OPEN DAILY FROM 10:00 AM UNTIL 9:00 PM  
(LAST MUSEUM ADMISSION SOLD AT 8:00 PM)

SEPTEMBER 3, 2019 – MAY 24, 2020  
OPEN DAILY FROM 10:00 AM UNTIL 6:00 PM  
(LAST MUSEUM ADMISSION SOLD AT 5:00 PM)

## SCHEDULED TOWER CLOSURES

JULY 16, 2019 (TUESDAY)  
TOWER CLOSED FROM 7:15 PM UNTIL 9:00 PM  
MUSEUM AND GIFT SHOP OPEN UNTIL 9:00 PM  
(LAST MUSEUM ADMISSION SOLD AT 8:00 PM)

AUGUST 15, 2019 (THURSDAY)  
TOWER CLOSED FROM 7:15 PM UNTIL 9:00 PM  
MUSEUM AND GIFT SHOP OPEN UNTIL 9:00 PM  
(LAST MUSEUM ADMISSION SOLD AT 8:00 PM)

SEPTEMBER 14, 2019 (SATURDAY)  
TOWER CLOSED FROM 6:45 PM UNTIL 9:00 PM  
MUSEUM AND GIFT SHOP OPEN UNTIL 9:00 PM  
(LAST MUSEUM ADMISSION SOLD AT 8:00 PM)

## UPCOMING MEETINGS

JULY 15, 2019 (MONDAY)  
BOARD OF TRUSTEES AND QUARTERLY MEMBERSHIP MEETING  
(OPEN TO GENERAL MEMBERSHIP)

AUGUST 19, 2019 (MONDAY)  
BOARD OF TRUSTEES MEETING  
(CLOSED TO GENERAL PUBLIC AND MEMBERSHIP)

SEPTEMBER 16, 2019 (MONDAY)  
BOARD OF TRUSTEES MEETING  
(CLOSED TO GENERAL PUBLIC AND MEMBERSHIP)

## CLIMB TO THE MOON SCHEDULE

### CLIMB TO THE MOON

JULY 16, 2019  
(TUESDAY)  
7:30 PM – 9:00 PM

AUGUST 15, 2019  
(THURSDAY)  
7:30 PM – 9:00 PM

SEPTEMBER 14, 2019  
(SATURDAY)  
7:00 PM – 8:30 PM

Journey to the top of the Ponce Inlet Lighthouse and experience this National Historic Landmark in all its glory. Join the *Old Lighthouse Keeper* on a personal tour of lighthouse and lantern room, and enjoy breathtaking views of the Atlantic Ocean, Ponce Inlet, and scenic inland waterways.

Toast the setting sun with a sparkling beverage and enjoy delicious hors d'oeuvres by the light of the full moon with your significant other and friends. Offered only on the eve of each full moon, this special event is limited to 25 participants only. Tickets must be purchased in advance by calling Angel at (386) 761-1821 ext. 10. Prices are \$35 for non-members and \$30 for members.

Food for this event is generously donated by Hidden Treasure Rum Bar and Grille. Locally owned and operated, Hidden Treasure Restaurant offers a wide selection of delicious entrees, appetizers, and beverages and is located directly across from the lighthouse on the north bank of the Ponce Inlet waterway. You can visit them online at [www.hiddentreasurerestaurants.com](http://www.hiddentreasurerestaurants.com)



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**JULY 4, 5, & 6, 2019, .....INDEPENDENCE DAY CELEBRATION AT THE LIGHTHOUSE  
THURSDAY-SUNDAY, 12:00 PM TO 2:00 PM**

Celebrate the 4th of July at the Ponce Inlet Lighthouse & Museum! Discover the fascinating story of this important National Historic Landmark as you climb 203 steps to the top of Florida's tallest lighthouse and explore one of the most complete and authentic historic light stations in the county. Examine turn-of-the-century artifacts, visit with historic re-enactors, tour the lighthouse gallery deck with one of the museum's knowledgeable docents, and participate in family-oriented workshops and activities.

**AUGUST 3, 2019, ..... NATIONAL LIGHTHOUSE DAY  
SATURDAY, 10:30 AM – 2:30 PM**

Founded by the Ninth Act of Congress on August 7, 1789, the US Light-House Establishment (later renamed the US Lighthouse Service) was responsible maintaining and operating the nation's system of lighthouses, beacons, buoys and public piers until its duties were absorbed by the US Coast Guard in 1939. In 1988, Congress officially declared August 7th National Lighthouse Day in honor of anniversary of the US Lighthouse Establishment founding more than two hundred years ago. Visit the Ponce Inlet Lighthouse and Museum on August 3rd to celebrate this important date in our nation's history by exploring the historic light station, climbing to the top of Florida's tallest Lighthouse, and participating in kid's craft workshops and other family-oriented activities from 10:30 am until 2:30 pm.

**AUGUST 11, 2019, ..... SPIRIT OF 45' DAY  
SUNDAY, 10:30 AM TO 2:30 PM**

Visit the Ponce Inlet Lighthouse and catch the spirit of 1945! Established by Congress in 2010, Spirit of 45' Day coincides with August 14, 1945, the pivotal date in our nation's history when President Truman officially announced that WWII had come to an end and when the United States assumed the mantle of leadership in the rebuilding of the postwar world. Service men and women attached to US Coast Guard Station Ponce Inlet will be on site at 1:00 PM to perform a flag raising ceremony.



**SPIRIT OF 45 DAY**  
**AUGUST 11, 2019**  
 HELP US HONOR THE COURAGE,  
 COMMITMENT, AND SACRIFICE OF THE MEN AND WOMEN  
 WHO LED OUR NATION TO **VICTORY** IN WWII!!

**AUGUST 17, 2019, ..... INTERNATIONAL LIGHTHOUSE/LIGHTSHIP DAY  
SATURDAY, 10:30 AM – 2:30 PM**

Be a part of a day that promotes public awareness of lighthouses and lightships and their need for continued preservation and restoration. Learn the important role lighthouses and lightships played in the development of our nation's maritime industry and how these important beacons helped save countless lives by guiding ships safely on their way. Explore the historic Ponce Inlet Light Station, climb to the top of Florida's tallest lighthouse, and participate in family-oriented activities including a special lightship-building workshop with the kids.

***ATTENTION READERS: All activities are included with regular or member admission and without advanced reservations unless otherwise noted. Additional information regarding upcoming events can be found online at [www.ponceinlet.org](http://www.ponceinlet.org) under the Calendar of Events tab. Individuals wishing to learn more about these and other museum offerings may contact Programs Manager Mary Wentzel by phone at (386) 761-1821 ext. 18, or via email at [mwentzel@ponceinlet.org](mailto:mwentzel@ponceinlet.org) for additional information.***

# Evolution of Lighthouse Illumination

Humans have relied on maritime commerce for their survival and prosperity for untold millennia. Archaeological excavations have uncovered evidence of mankind's seafaring roots as far back as 8,000 B.C.E. when stone-age people were crafting dugout canoes from hollowed-out logs and building small rafts by lashing river reeds together. Predating the wheel by more than 1,000 years, these simple vessels were used to fish, explore, raid, and establish trade relationships with neighboring tribes and communities.

The earliest sailing vessels were used by ancient Mesopotamians in the Persian Gulf and by other civilizations in India, the Far East, and elsewhere. By 1,000 B.C.E. nearly every coastal civilization in the world had grown to recognize the importance of maritime trade to their continued prosperity, resulting in considerable effort in developing sturdy ships capable of surviving the harsh open sea and establishing a system of navigational aids to guide them safely home.

## Bonfire Beacons of Wood and Coal:

The world's first illuminated aids to navigation were nothing more than wood-burning bonfires located near the mouths of inlets or bays, on exposed sandbars, or atop tall cliffs overlooking the sea. As time passed, these simple beacons were moved off the ground and



Simple wood bonfires were the world's earliest illuminated aids to navigation.

into iron baskets called braziers (or cressets). A major advantage of using a brazier was the ease with which its visible range could be improved by placing it on a raised platform or simply hanging it from a tall pole with an iron chain.



This coal fired cresset (or brazier) was once housed in an open air lantern room perched atop the St. Agnes Lighthouse in Great Britain.

Although easily seen by passing ships during calm conditions, even a moderate storm could extinguish an unprotected bonfire when it was needed the most. Wood-fired beacons were eventually covered with simple shelters made of stone to protect them from the natural elements. Designed to protect the fire from rain, these early structures

were the first step in the technological development of formal lighthouses.

A lighthouse is a tower that is used to guide ships during both day and night that houses a very bright light called a beacon. The world's first recorded lighthouse was the Pharos Lighthouse of Alexandria, Egypt. Commissioned by Ptolemy I in the third-century B.C.E., the Pharos Lighthouse was a 450-foot tall engineering marvel that consisted of three stone tiers (square, octagonal, and round) stacked atop each other and capped with a large open-air lantern room featuring a statue of Poseidon, the Greek God of the Sea, at its summit. From its lofty perch nearly 400 feet above sea level, the lighthouse's bonfire beacon would have been visible from nearly 50 miles away. The tower was so impressive it was named one of the Seven Wonders of the Ancient World by Greek historian Diodorus Siculus.

Unfortunately, the Pharos Lighthouse fell into the sea in 1,326 C.E. after being damaged by several earthquakes. Although remnants of this once-magnificent structure lie at the bottom of Alexandria's harbor, another tower modeled in its image still stands today. Constructed by the Romans on the northwest coast of Spain around 200 C.E., the Tower of Hercules was designed to house a bonfire beacon in lighthouses. Long since converted to house a more modern light, the tower still features the chimney once used to draw the smoke produced by its original bonfire beacon outside.

The Tower of Hercules now stands as the oldest existing lighthouse in the world.



Constructed in the 3rd century BC, the Pharos Lighthouse marked the entrance to the Harbor of Alexandria, Egypt from approximately 250 B.C.E. until 1,323 C.E.

Wood-burning beacons were expensive to supply and maintain. Capable of burning up to a cord of firewood in a single evening (a cord of cut wood measures 4'x4'x8'), the amount of time and effort required to operate a single bonfire was staggering. Easily consuming a small forest of trees in single year, the combined cost of operating a substantial number of these simple beacons could easily grow to incredible proportions.

In locations where wood was not readily available, alternative fuels were often used. These fuel sources included torches, hay bales, and bundles of sticks dipped in pine pitch (boiled sap), bitumen (oil seeping from the ground), tar, and olive oil. Used extensively by the Greeks and Romans, the earliest historic reference of pine pitch being employed for lighthouse illumination can be found in Homer's 3,000-year-old epic poems *The Iliad* and *The Odyssey*.

Wood continued to be used to fuel lighthouse beacons well into the 1700s; however, the thirteenth century witnessed a steep decline in its popularity as new mining techniques made the extraction of coal more affordable. As a fuel source, coal was better than wood in many ways: it was easier to transport and store, was impervious to rain and moisture, burned longer and brighter, was more reliable, and required far less effort to maintain. Favored throughout northwest Europe where plentiful coal deposits made it cost-effective, coal surpassed wood as the preferred fuel of choice in most lighthouses by the early 1400s.

Although superior to wood in many ways, coal still had its downsides. It was expensive, especially when one considered the fact that a single lighthouse could consume more than three tons per year. Coal was incredibly dirty when burned and its fumes could easily overwhelm the lighthouse keeper who maintained it. The quality of the light produced by coal also varied according to the direction and strength of the wind,

which could either push the flames inland and out of the view of passing ships or obscure the flames in thick clouds of smoke. In either case, strong winds could easily render exposed coal-fired beacons all but useless as navigational aids.

### Guiding Ships by Candle Power: Using Animal Fat to Light the Way

Because of the cost and performance issues associated with maintaining and operating wood or coal-burning beacons, many lighthouse lantern rooms were enclosed with glass in the late sixteenth and early seventeenth centuries to allow for the burning of tallow candles instead. Although the amount of light produced by a single candle was nothing compared to a wood or coal-fired beacon, when dozens of candles were burned in unison the amount of light produced could be quite significant, particularly when they were arranged in a chandelier.

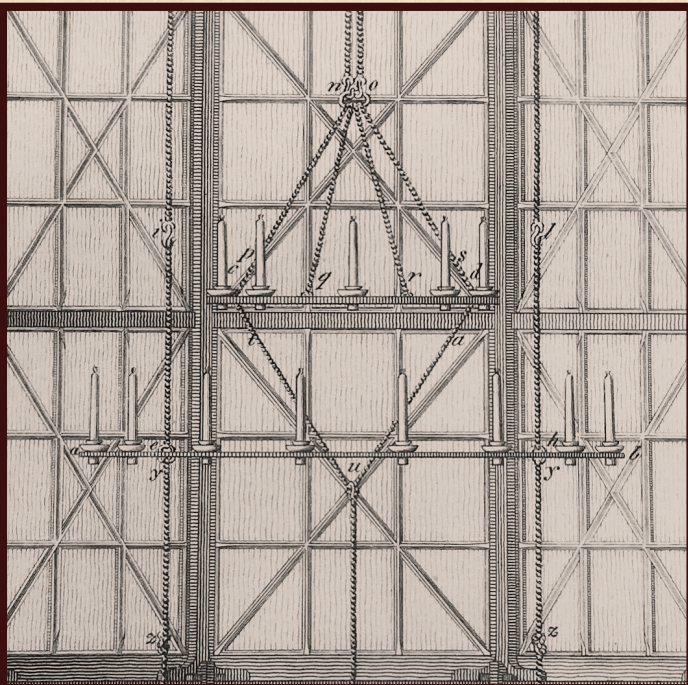
Tallow candles were made from hard fat cut from the carcasses of sheep and cows during the butchering process. Once removed, the fat was cleaned of any excess flesh and boiled in water until it had completely dissolved. Poured through a fine strainer to remove any impurities, the clarified liquid was simmered until all the water had evaporated and nothing but liquefied fat remained. Strained a second time, the melted fat was made into candles by either repeatedly dipping a long wick into the hot vat or by pouring the melted fat into candle molds. Once hardened, the candles were stored in a cool dry place until they were ready to use.



Prior to the introduction of Argand's oil lamp, most eighteenth-century lighthouse beacons were illuminated by either coal or wood fires set in iron braziers, tallow candles set in hanging chandeliers, or with simple oil lamps made of rope wicks set in oil baths.

Most lighthouse chandeliers were made of iron or brass and suspended from the ceiling of an enclosed lantern room. Available in a wide range of sizes, these hanging fixtures could hold anywhere from a handful to several dozen candles. One of the largest chandeliers ever used was installed in the Eddystone Lighthouse, a solitary stone tower perched atop a jagged outcropping of rock in the middle of the English Channel. It was a massive lighting fixture equipped with sixty one-pound tallow candles that had to be replaced every three hours.





John Smeaton's drawings of the tallow candle chandelier that hung in England's Eddystone Light. A bell rang every 4 hours to remind the lighthouse keeper to lower the chandelier and replace the candles illuminating the lantern room.

Typically made onsite by the lighthouse keepers themselves, tallow candles were far cheaper than wax candles but were messy, difficult to store in hot humid climates, and prone to melting before they could be used. These problems, along with the fact that tallow candles were easily blown out, led to them being replaced by oil lamps in the mid-1700s.

**Early Oil Lamps in Lighthouse Illumination:**

When the transition to oil lamps initially occurred, lighthouse keepers found that they had very few options to choose from. Eighteenth-century oil lamps were based on antiquated technology that had barely changed since the days of the Roman Empire. Originally designed for personal use or to illuminate small interior spaces, these archaic lamps quickly proved themselves ill-suited for lighthouse applications.



Acquired by the museum in 2016, this rare nineteenth-century Bucket Lamp is one example of the wide variety of oil lamps used in US lighthouses during the 1800s.

Introduced in 1760, the pan (or spider) lamp was a simple device that used multiple wicks set in a pan of

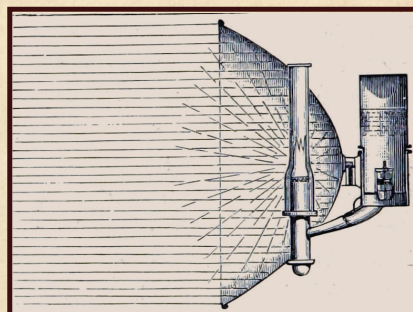
oil. The number of wicks varied from two to as many as twenty-four, with eight being the most common (hence the name spider lamp). Pan lamps came in several forms including circular (commonly referred to as compass lamps), rectangular, and square. There were even special donut-shaped pan lamps for use in lightships. New Jersey's Sandy Hook Lighthouse, built in 1764, is said to have used two pan lamps with a total of 48 oil blazes, hung from the lantern room ceiling by chains.

Pan lamps were superior to earlier lamps in many ways: they could operate for twelve or more hours on single fill, produced more light than their antiquated counterparts, and could be easily adapted to fit almost any application. Although better than candles, pan lamps suffered from many of the same problems: they were dirty, inefficient, hard to maintain, and difficult to see from far away on even the clearest of nights. The oil-burning flame also produced a large amount of soot and smelled terrible! Sometimes the fumes became so unbearable many keepers were forced to leave the lantern room in order to find a breath of fresh air. Pan lamps worked but their overall performance was less than stellar.

**The Argand Lamp and Winslow Lewis Lighting Apparatus**

In 1781, a Swiss scientist named Aimé Argand transformed lighthouse illumination with the invention of a revolutionary lamp that used a hollow wick to produce a clean burning flame. Fed through a narrow tube affixed to an elevated oil reservoir, the lamp's wick drew air through its core to create a much more efficient fuel-to-air ratio. The resulting flame was steady, bright, and almost soot-free. Additional features of the Argand Lamp included a glass chimney that reduced flickering by protecting the flame from the wind and drawing oxygen deprived fumes out of the way, and a parabolic mirror mounted directly behind the chimney that helped increase the lamp's visible range by focusing some of its light into a beam.

The elegant simplicity, economy, and reliability of the



Argand Burner with Reflector.

Created by Swedish inventor Aimé Argand in 1781, the Argand Lamp greatly improved the visibility of lighthouse beacons by producing a relatively bright, clean burning flame.

Argand Lamp made it superior to pan lamps in every way. Representing the first major change in oil lamp design in more than a thousand years, the Argand Lamp would be installed in nearly every lighthouse in Europe by the end of the eighteenth century.

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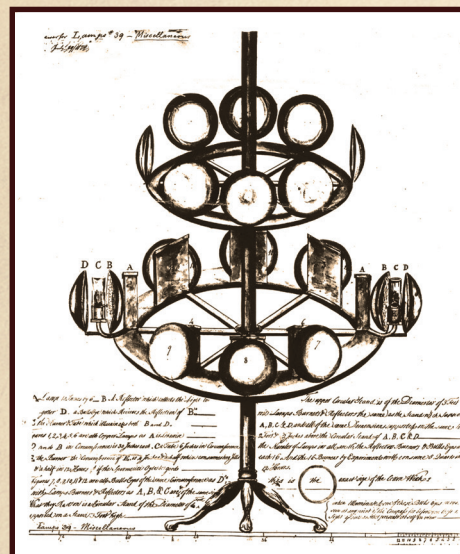
**EVOLUTION OF LIGHTHOUSE ILLUMINATION (continued)**

In 1812, the US Lighthouse Establishment adopted a new lighting system of its own. Patented by a former ship captain named Winslow Lewis in 1810, the “Magnifying and Reflecting Lantern” was marketed as “a new and improved lantern for use in lighthouses.” Commonly referred to as the Winslow Lewis Lighting Apparatus the newly developed optic was essentially a cheap copy of the lamp invented twenty-one years earlier by Argand with a convex lens mounted in front. Shoddily constructed from inferior materials, the Lewis lamp was plagued by numerous quality control issues that impeded its overall performance and reliability. Regardless of these many short-comings, Congress awarded Lewis a lucrative contract in 1812 to retrofit all of the nation’s lighthouses with his patented design.

Even when equipped with highly polished reflectors and clear fault-free glass, the Argand and Winslow Lewis lamps were simply not up to the task for which they were developed. Both models captured only a fraction of the light produced, and much of what was captured was subsequently lost to diffusion when it was projected out to sea. Commonly referred to as ‘scattering,’ diffusion occurs when the rays of light emitted by a central source are absorbed

or deflected by particles in the air. Although difficult to detect up close, diffusion could have a significant impact on a beacon’s visibility over long distances.

Diffusion posed a real problem for lighthouse keepers since its effects could only be addressed by manually adjusting the parabolic reflector and glass lens mounted to each



The design of Winslow Lewis’s Lighting Apparatus was “borrowed” from the Swiss physicist and chemist Pierre Ami Argand’s oil lamp which was invented thirty years earlier.

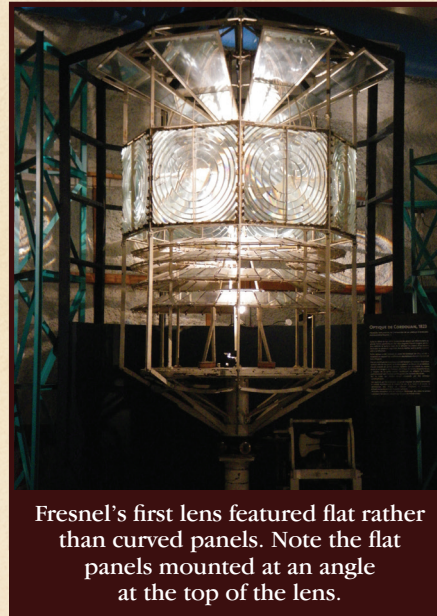
lamp. While helpful, the process was labor-intensive and inexact. Despite the lighthouse keeper’s best efforts, the visible range of the Argand and Lewis lamps remained mediocre and shipwrecks continued to occur at an alarming rate.

**The Fresnel Lens**

Although technological innovation was commonplace throughout the Industrial Revolution, significant advance-

ments in the field of lighthouse optics remained virtually non-existent until 1819 when a young French physicist name Augustin Fresnel challenged Sir Isaac Newton’s theory that light was a “swarm of individually colored particles called corpuscles” that traveled in a straight line. Although well over a century old by the time of Fresnel’s birth, Newton’s theory on light remained widely accepted

despite his failure to adequately explain diffraction. Diffraction is the bending of light; a common phenomenon that occurs when light passes through an opening or around an obstacle in its path. Although recognizing that diffraction did occur, no one, including Newton himself, could explain how or why.



Fresnel’s first lens featured flat rather than curved panels. Note the flat panels mounted at an angle at the top of the lens.

Fresnel believed he could solve the issue of diffraction by considering light as a wave rather than a particle. His idea was highly unorthodox and contrary to the accepted Newtonian theory of the day. Fresnel submitted his findings in the form of an unpublished essay to physicist Andre Ampere from whom we get the term ampere. Deliberately or not, Ampere lost the unread essay. However, a young member of the French Academy of Science named Francois Arago tested Augustin’s theories and proved them to be correct.

Fresnel was appointed Secretary to the Commissioner of Lighthouses in 1819 at the urging of Arago who had become one of his closest friends and advocates. Augustin continued his research on the characteristics of light and in the development of ways to apply his findings in a practical manner to lighthouse optics. Fresnel theorized that the inherent flaw in lighthouse optics of the time resided in the way light was being redirected and focused. Metal reflectors captured only a small percentage of the light being produced while the lenses fitted in front of the



Born May 10, 1788, Augustin Fresnel was a brilliant French scientist who proved that light traveled in waves. He later applied his theories in the development of the Fresnel lens.

light source were of such poor quality that they often degraded its intensity. Fresnel believed he could create a lighthouse beacon that would outshine any installed at that time using a high-quality glass lens of sufficient size to capture most of the light created by a central source. Yet there was a problem with this approach: the sheer size and weight of the glass pane needed to do the job was impractical for lighthouse applications.

Fresnel's solution to this dilemma was a composite panel made of individual prisms set in a bronze frame. Collectively, the prisms would perform the same job as a single large lens, yet weighed much less. Completed panels would then be bolted together to form a cylinder around a central light source. Together, these panels could effectively capture nearly all the light produced by a lamp and project it out to sea as a horizontal beam of concentrated light.

Fresnel knew he had to construct a working model of his lens to prove the validity of his design to French Lighthouse Commission. His next hurdle was finding the right type of glass. Although leaded glass (also known as flint glass) was the most common material used in the production of optics at the time, it was far too heavy and dense for use in a lens that would be installed at the top of a lighthouse. Dismissing leaded glass from the list of possibilities, Fresnel chose crown glass as the material from which to fashion his lenses. Crown glass was harder, lighter, and easier to work with than lead glass, and produced far fewer bubbles and imperfections than its leaded counterpart when shaped in a mold.

Fresnel demonstrated the performance of his new glass lens panel to the French Commission of Lighthouses in the spring of 1820. According to Fresnel, the commission members were "dazzled by the spectacle I gave them." The single panel worked so well that the chief commissioner immediately ordered a full apparatus be constructed of eight identical panels.

Fresnel demonstrated his octagonal lens to the citizens of Paris on the evening of April 13th, 1821. Huge crowds of Parisians including the entire membership of the Commission of Lighthouses were gathered at opposite ends of the city to witness the event; some at the Paris Observatory and some on the distant hills of Montmartre. The lens performed magnificently and the Argand and Lewis lamps were rendered obsolete in a single night. Within thirty years, nearly every lighthouse in Europe

was equipped with one of Fresnel's revolutionary optics.

Fresnel lenses came in six different sizes which he classified as orders. The largest of all the lenses was a first order Fresnel lens. Measuring twelve feet high and six feet wide, a first order Fresnel lens used more than 200 glass prisms to cast a brilliant beam of light more than twenty miles out to sea. First, second, and third order lenses were commonly used in lighthouses while the smaller fourth, fifth, and sixth order lenses were employed in buoys, channel markers, and other minor aids to navigation. Additional sizes were later added to this classification system including a third middle lens that measured halfway between a third and fourth order and the hyperradiant lens which was larger than a first.



The Ponce Inlet Lighthouse and Museum's Ayres Davies Lens Exhibit Building houses one of the largest collection of historic Fresnel lenses, lamps, and minor aids to navigation in the United States.

The United States Light House Establishment decided to replace the aging Winslow Lewis lamps with Fresnel lenses in 1852. The transition was completed within eight years and by 1860, a sparkling Fresnel lens could be found in

every lighthouse in the country.

Fresnel lenses remained the primary optic used in American lighthouses from the mid-1800s through the 1950s. The introduction of electricity at the turn-of-the-century revolutionized the lighthouse industry even more. Rotating lenses were now turned with electric motors rather than old hand-cranked clockwork mechanisms while Thomas Edison's incandescent light bulb replaced kerosene lamps altogether. As time went by, new lighting technology such as the modern aero beacon (similar to a spotlight) made Fresnel lenses obsolete.

Although many historic Fresnel lenses were lost in the 1950s and 1960s when they were removed from towers, many others were saved. The Ponce Inlet Lighthouse's original 1887 fixed first order Fresnel lens and 1933 rotating third order Fresnel lens were recovered by the Ponce de Leon Inlet Lighthouse Preservation Association and restored to their former glory. The first order Fresnel lenses that were once housed in the lantern rooms of the Ponce Inlet Lighthouse and Cape Canaveral Lighthouse are now on display in the museum's Ayres Davies Lens Exhibit Building. The third order lens was reinstalled at the top of the lighthouse in 2004 and continues to operate as a private aid to navigation to this day.

## LIGHTHOUSE HAPPENINGS

The Ponce Inlet Lighthouse had a busy spring season. Lighthouse docents donated their valuable time leading onsite tours and workshops and facilitating educational outreach programs within the local community. In addition to these important public endeavors, the volunteers also attended several docent training sessions in an effort to further develop their knowledge and understanding of this important National Historic Landmark.

In April, the programs department took 19 members of the museum's volunteer corps on a special excursion down the St. Johns River to learn about the waterway's diverse ecology and rich cultural heritage. Embarking from DeBary's Highbank's Marina aboard a roomy pontoon boat, the two-hour sight-seeing tour provided participants ample opportunity to view alligators, migratory birds, raccoons, cypress trees, water plants, and other forms of indigenous flora and fauna in their natural habitat while learning how early Florida settlers relied on this important waterway for trade and travel through the mid-to-late 1800s and early twentieth century.

The docents discovered how only the upper two-thirds of the St. Johns' 310-mile length were navigable by the riverboats of the time. Often constructed by regional shipwrights, these unique steam-powered vessels were specifically designed to operate on Florida's notoriously shallow waterways. Developed to haul a wide variety of cargo including manufactured goods, raw materials, foodstuff, and passengers; these versatile river boats plied the dark, tannic waters of St. Johns River on a daily basis and were vital to the continued growth and prosperity of many towns and communities along its banks including Sanford, DeBary, Deland, and Palatka.

The docents' trip on the St. John's River mirrored that of their turn-of-the-century predecessors in many ways with a few exceptions. Unlike those who followed the same route in the mid-19th and early-20th centuries, our docents did not experience the thick clouds of black smoke that enveloped steam-powered vessels during most of their journey nor were they required to get out and push their boat off of

sandbars if it ran aground. Surprising, no one seemed to mind this lack of historic accuracy. Following the river boat excursion, the volunteers traveled to DeBary Hall where they enjoyed a very nice boxed lunch and a fabulous tour of the historic grounds.

Volusia County hosts its annual Social Studies Fair in February to coincide with National History Day. Now in its 40th consecutive year, this special event showcases student projects submitted by public and private elementary, middle, and high schools throughout the county. Each student entry exhibited at the Volusia County Social Studies Fair must first pass through an exhaustive round of judging at the individual grade and school-wide levels before being selected for inclusion in the event. Judges are required to assess each project based on its adherence to the year's official theme and project format guidelines. The 2019 Social Studies Fair theme of "Triumph and Tragedy in History" challenged students to develop presentations

based on the fact that history is uneven, and almost all great acts and accomplishments involve elements of success and failure. Although all projects required an accompanying research paper, students were given a variety of project formats to choose from including a craft, poster, exhibit, or map. Those wishing to enhance their projects even more were allowed to include a video presentation or live performance.

Representatives of the Ponce Inlet Lighthouse have enjoyed the privilege of serving as judges at this important scholastic event for many years. In 2015, the museum decided to celebrate outstanding student achievement by introducing a special *Ponce Inlet Lighthouse Social Studies Award*. Presented the student who has created the best maritime, Florida, or lighthouse history themed project at the elementary, middle, and high school levels, this unique award includes: a free family membership to the Ponce Inlet Lighthouse and Museum, recognition in the Association's quarterly journal *Illuminations*, a certificate of achievement, and a \$75 cash prize.



Ponce Inlet Lighthouse and Museum volunteer docents embark on a fascinating journey down the St. John's River.

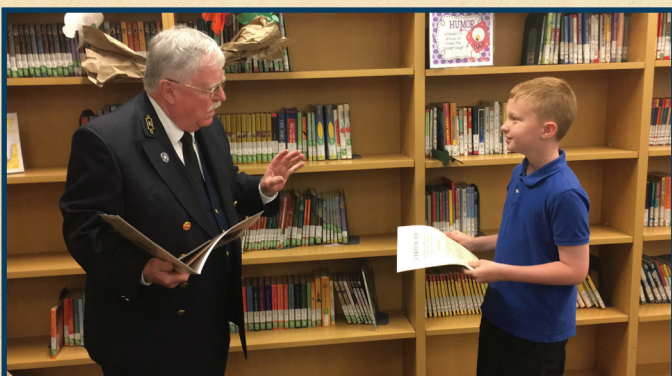


St. Barnabas 5th grader Aiden Dawber is presented the Ponce Inlet Lighthouse Preservation Association Social Studies Fair Award by the museum's Lead Docent John Mann.

After completing the duties assigned to him as official judge of the 2019 Social Studies Fair, Lead Docent John Mann reexamined all student entries with a subject matter aligned to the Lighthouse Award's specific criteria. Although finding all the submitted elementary, middle, and high school projects to be of excellent quality, two stood out above all the rest.

Aiden Dawber, a fifth grade student at Deland's St. Barnabas Episcopal School, thought lighthouses were the perfect subject matter for exploring this year's theme of "Triumph and Tragedy in History." Aiden researched the subject of lighthouse construction and reproduced an excellent scale-model of a land-based brick-giant lighthouse and correctly interpreted the use of the daymark to aid ships at sea in daytime navigation. Dawber's project focused on the works of John Smeaton, the 18th Century English civil engineer who first developed the use of interlocking granite blocks in the construction of several lighthouses in England. Developed through an exhaustive process of research and experimentation, Smeaton's innovative technique was subsequently duplicated by lighthouse builders around the world.

The second recipient of the Association's annual social studies award was Charlie Blix, a fourth grade student at Orange City's Manatee Cove Elementary School. Charlie developed a model of something which not only aided and eased the life of keepers and their families in Florida's thirty lighthouses, but certainly advanced and bolstered the development and livability of Florida itself.



John Mann presents the Ponce Inlet Lighthouse Preservation Association's Annual Social Studies Award to Manatee Cove Elementary 4th grader Charlie Blix.

Blix replicated an almost full-scale model of Apalachicola physician Dr. John Gorrie's ice-making machine which eliminated the need to import ice from the north and gave birth to two of the most important technological developments in Florida history... refrigeration and air conditioning. Each state is allowed to place two statues within the US Capital Building's Statuary Hall. Dr. John Gorrie's statue is one of Florida's two.

The museum hosted its Spring Homeschool Day on May 9, 2019. The theme for this year's event was "Early Navigation and Communication." We were pleased to have the Aids to Navigation Team assigned to Coast Guard



Jessica Guidroz, Chief Boatswains Mate from ANT Ponce de Leon Inlet shows homeschoolers some of the Aids to Navigation devices now used by the U.S. Coast Guard.

Station Ponce Inlet onsite to share some of their modern aids of navigation equipment with the students. Chief Boatswains Mate Jessica Guidroz and four members of her crew answered many questions from the inquisitive group.

After learning how ships navigate and communicate in the modern age, the students broke into groups to discover how this was done the old-fashioned way. Homeschoolers had a chance to learn the Marryat Code System, a form of signal flag communication that was used before the invention of the telegraph, radio, and other high-tech devices. In addition to Marryat's Code, homeschoolers also learned about other forms of early flag-based communication including the Semaphore Flag System.

Developed in 1794, the Semaphore Flag System used a special code book to generate over 8,000 specialized words and phrases that helped soldiers communicate with each other in times of war. By 1850, the electronic telegraph had rendered the semaphore system obsolete. Homeschoolers had a wonderful opportunity to see the changes that have occurred through history.



SN Nicholas Dangel shows homeschoolers an electronic Aid to Navigation.

The success of the museum's programs department would not be possible without the help of our dedicated volunteer corps. The Ponce Inlet Preservation Association is always looking for individuals interested in accepting the challenge and becoming a lighthouse volunteer. Those wishing to participate are encouraged to contact programs manager Mary Wentzel by email at [mwentzel@ponceinlet.org](mailto:mwentzel@ponceinlet.org) or by

phone at (386) 761-1821 ext. 18 to sign up. You can also learn more about volunteering opportunities online at [www.ponceinlet.org](http://www.ponceinlet.org).

## VOLUNTEER OF THE QUARTER: TERRY REVAK



Volunteer Debbie Sobien (left) depicts the character of Mary Potts as Volunteer of the Quarter Terry Revak (right) portrays Dr. Ruth Mary Rogan Benerito.

Committed to the ongoing preservation and dissemination of the maritime and social history of Ponce de Leon Inlet Light Station, the Lighthouse Preservation Association relies heavily on its volunteer corps to achieve its ongoing mission. Made up of men and women from within the local community, this dedicated group of individuals delivers the vast majority of the museum's educational programs. Offered free of charge to both onsite visitors and within Volusia County's public and private schools, these important offerings promote public awareness and appreciation for this important National Historic Landmark.

Each quarter, the Preservation Association recognizes a docent who exemplifies the spirit of volunteerism. We are pleased to recognize Terry Revak as the museum's Volunteer of the Quarter.

Terry Revak moved to Florida in 1983, from southern Wisconsin to attend the University of Central Florida where she later earned a Bachelor of Science degree followed by a Master's in Business Administration. Terry married her husband Mike in 1986. The young couple moved to Oviedo where they raised their two children Andrew and Grace. Andrew is 24 years old and lives in Hayden, CO. Their youngest child Grace is 20 years old and is attending Florida Atlantic University where she is pursuing a degree in Ocean Engineering.

When asked how she came to live in Ponce Inlet, Terry replied, "We raised our children in Oviedo but also had a home in Ponce Inlet that we used for weekends and vacations. As Mike approached retirement, we discussed our future and decided to make the town of Ponce Inlet our permanent residence." The couple built a home in the Las Olas sub-division and quickly immersed

themselves in their new home town.

Terry decided to become a volunteer within the Ponce Inlet community after discovering retirement left her with ample time on her hands. Terry decided to become a volunteer within the Ponce Inlet community. Impressed by the accomplishments of the Preservation Association, the light station's designation as a National Historic Landmark, and the many docent opportunities afforded by the museum, Terry felt the Ponce Inlet Lighthouse was the perfect place to start her journey. When asked what she likes most about volunteering at the museum Terry replied, "I enjoy the abundance of history around me but I truly love interacting with people of all ages at the lighthouse."

Terry spends most of her time at the lighthouse leading tours and helping out with craft workshops during school tours and events. One of Terry's interests is sewing and working with fabric. Terry is always eager to measure and cut hundreds of lighthouse flags and pennants for upcoming special events. In addition to these activities, Ms. Revak has also ventured into the realm of historic re-enactment by assuming the persona of American chemist Dr. Ruth Mary Rogan Benerito.

Born in 1913, Dr. Benerito was a New Orleans native who graduated from high school at the age of 14 and was enrolled as freshman at Tulane University at 15. The American chemist invented the popular wrinkle-resistant wash and wear cotton fabric that changed the lives of so many housewives in the 1950s. Dr. Benerito was very successful in the textile industry and accumulated over 55 patents during her career including chemical additives that made fabrics both stain and fire resistant.



Volunteer of the Quarter Terry Ravak with her husband Mike.

As Dr. Benerito, Terry often works alongside fellow lighthouse docent and historic re-enactor Debbie Sobien who portrays Mary Potts, the inventor the "Mrs. Potts Iron." The Potts iron was designed with a detachable handle so the iron could be heated on the stove, allowing the handle to stay separate and cool. Although these two female figures lived in different time periods, together they represent the spirit and ingenuity of women through history.

Terry spends much of her free time pursuing other interests including cooking, baking, sewing, golf, and walking her 1 ½ year old harlequin Great Dane, Maui, around Ponce

Inlet. In addition to volunteering at the lighthouse, Ms. Revak also serves on the Ponce Inlet Community Center's Board of Trustees. "I feel blessed to live in Ponce" Terry reflects, "How lucky are we to live by the sea?"

We are extremely lucky to have Terry Revak here at the lighthouse and are exceptionally proud to name her as this issue of Illumination's Volunteers of the Quarter. Thank you Terry for all that you do!

# JOIN THE PONCE DE LEON INLET LIGHTHOUSE PRESERVATION ASSOCIATION

## A GENERAL ANNUAL MEMBERSHIP INCLUDES:

- Free admission to the museum and lighthouse during regular hours of operation
- 10 percent discount in the museum gift shop and online store
- One subscription to The Light Station quarterly newsletter
- Invitations to special events
- Volunteer opportunities

## MEMBERSHIP CATEGORIES:

**General** . . . . . \$20

- The benefits listed above for one individual

**Senior** . . . . . \$10

- All privileges of General Membership for one individual 62 years or older

**Student** . . . . . \$10

- All privileges of General Membership for one individual 12 years or older with a valid student identification

**Family** . . . . . \$40

- All privileges of General Membership for the immediate family
- Immediate family is limited to one or two adults and your children under age 18. Grandchildren are not eligible.
- You will be issued one membership card for each parent, and each card will list the names of your children.
- Child under 12 must be accompanied by an adult

**2nd Assistant Keeper** . . . . . \$100

- All privileges of General or Family Membership
- Recognition of your membership in the quarterly newsletters' 2nd Assistant Keeper List

**1st Assistant Keeper** . . . . . \$200

- All privileges of 2nd Assistant Membership
- Two gift General Memberships
- Recognition of your support in the quarterly newsletters' 1st Assistant Keeper List

**Principal Keeper** . . . . . \$500

- All privileges of 1st Assistant Membership
- A personalized guided tour of the Light Station
- Recognition of your support in the quarterly newsletters' Principal Keeper List

**Corporate Lampist** . . . . . \$500

- All privileges of General or Family Membership for up to five company principals
- A personalized guided tour of the Light Station
- Use of the Light Station's conference room for one meeting.
- Recognition of your companies support in the quarterly newsletters' Corporate Lampist List

## FLORIDA DEPT. OF AGRICULTURE AND CONSUMER SERVICES CHARITABLE ORGANIZATION NUMBER AND DISCLAIMER:

Registration #: CH137

A COPY OF THE OFFICIAL REGISTRATION AND FINANCIAL INFORMATION MAY BE OBTAINED FROM THE DIVISION OF CONSUMER SERVICES BY CALLING TOLL-FREE (800-435-7352) WITHIN THE STATE. REGISTRATION DOES NOT IMPLY ENDORSEMENT, APPROVAL, OR RECOMMENDATION BY THE STATE.



**Please complete the entire form to enroll, or join online at [www.lighthouselocker.org](http://www.lighthouselocker.org).**

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- Renewal
  
- 2nd Assistant Keeper . . . . . \$100
- 1st Assistant Keeper . . . . . \$200
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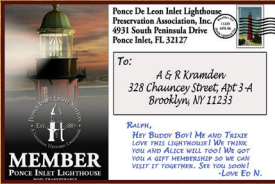
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 4931 S. Peninsula Dr., Ponce Inlet, FL 32127

**Thank You for Your Generous Support!**



## PONCE INLET LIGHTHOUSE ANNUAL GIFT MEMBERSHIP

Give your family and friends the gift of history and adventure with an annual membership to Ponce De Leon Inlet Lighthouse for as little as \$10! The benefits of membership include a

subscription to the Association's quarterly newsletter *Illuminations*, free admission to lighthouse and museum for an entire year, and much more. Please see the membership enrollment form on page 15 for more details.

## PONCE INLET LIGHTHOUSE MEMORIAL BRICKS

The Ponce Inlet Lighthouse Memorial Brick Program is a unique and thoughtful way to honor friends and loved ones or celebrate special events including weddings, birthdays, and family vacations. Each laser-engraved brick features the Ponce de Leon Inlet Lighthouse logo and up to three lines of text. Each personalized brick is installed in the Light Station's memorial walkway leading out onto the historic grounds where it will remain in perpetuity.



- Lighthouse Memorial Brick: Item # 0289 Price: \$100
- Full Size Duplicate Memorial Brick: Item # 0290 Price: \$85
- Miniature Duplicate Memorial Brick: Item # 0291 Price: \$40



## PONCE INLET LIGHTHOUSE SUN CATCHER

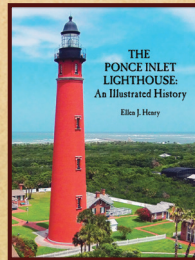
Bring a splash of color into the room as you enjoy the long days of summer with this custom hand-painted sun catcher featuring the Ponce Inlet Lighthouse. Measures 6.5" X 9".

Item #:0310  
Price: \$25.99 (+ S&H)

## THE PONCE INLET LIGHTHOUSE: AN ILLUSTRATED HISTORY

The Ponce Inlet Lighthouse: An Illustrated History is the culmination of more than 40 years of research by the Ponce De Leon Inlet Lighthouse Preservation Association. Written by museum curator Ellen Henry, this fully illustrated hardback volume is the definitive history of the historic Ponce De Leon Inlet Light Station. Signed first edition copies of this recently published book are now available for purchase online and in the lighthouse gift shop.

Price: \$49.95 (+S&H)



## TERVIS INSULATED LIGHTHOUSE SPORTS BOTTLE

Keep hydrated with this custom Ponce Inlet Lighthouse Water Bottle. Made by Tervis, this unbreakable insulated 24 ounce plastic bottle features a hinged water-tight snap lid and molded strap loop. Like all Tervis products, this dishwasher-safe custom water bottle is guaranteed for life and BPA free.

Item #:4018  
Price: \$28.99 (+ S&H)

The Ponce de Leon Inlet Lighthouse Gift Shop specializes in unique lighthouse and nautical themed gifts for people of all ages. Our wide selection includes clothing, house wares, toys, and collectibles. Customers may also shop online at [LIGHTHOUSELOCKER.ORG](http://LIGHTHOUSELOCKER.ORG). Please contact the Gift Shop at (386) 761-1821 ext. 21 or via email at [giftshop@ponceinlet.org](mailto:giftshop@ponceinlet.org) for more information.

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## PONCE INLET LIGHTHOUSE WIND CHIMES

Relax on the back porch as you listen to the relaxing sounds of this custom set of bamboo wind chimes featuring Florida's tallest lighthouse! Designed specifically for the Ponce Inlet Lighthouse these one of kind bamboo chimes emit a low soothing melody and measure 23" long.



Item #: 2954  
Price: \$15.99 (+ S&H)



PONCE INLET LIGHTHOUSE  
MEMBERSHIP COUPON  
**20% OFF ANY  
SINGLE ITEM**

Limit one coupon per member. Coupon may not be used in conjunction with any other discount. Proof of membership must be shown at time of purchase. Not valid for purchase of Memorial Bricks.  
Good from July 1, 2019 - October 1, 2019