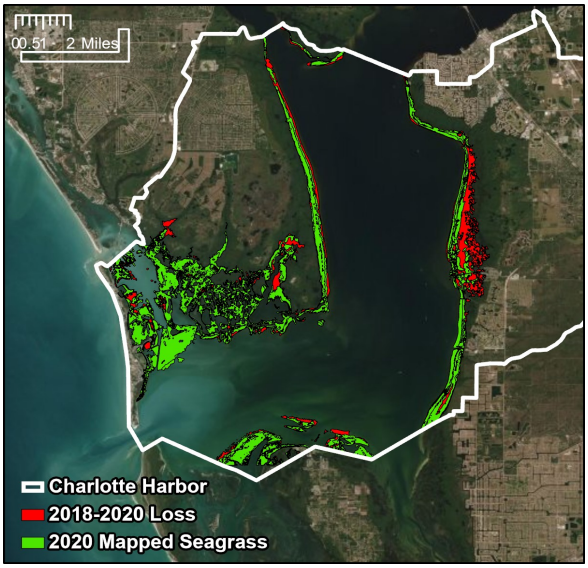
# Seagrass in Charlotte Harbor

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

Charlotte Harbor is the largest, deepest, and most diverse of the estuaries in this region. Charlotte Harbor is influenced by three watersheds - Peace River, Myakka River, and Charlotte Harbor Proper. Fresh water from the Peace and Myakka rivers mixes with salt water coming through Boca Grande Pass from the Gulf of Mexico. While areas closer to the Pass receive significant tidal flushing (Gasparilla Sound), areas in the upper harbor near the mouths of the rivers have dissolved oxygen, color, and salinity levels that are significantly affected by the seasonal fluctuations in river discharges. Seagrasses present within Charlotte Harbor include Shoalgrass (*Halodule wrightii*), Turtlegrass (*Thalassia testudinum*) and Manateegrass (*Syringodium filiforme*), as well as Widgeongrass (*Ruppia maritima*), and Paddlegrass and Stargrass (*Halophila* spp.)[1].



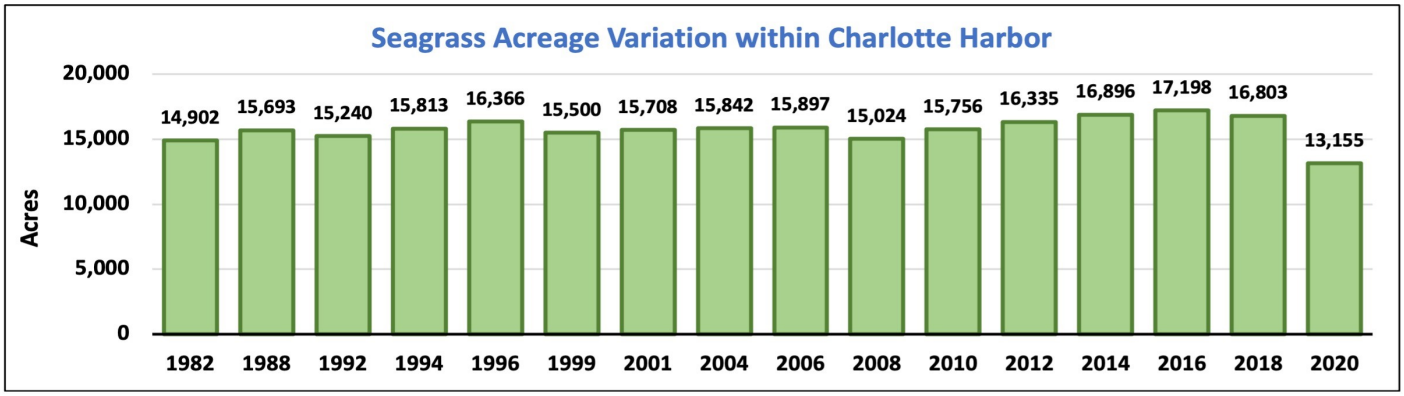

## Seagrass Measures Water Quality & Improves Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

The graph below depicts results from bi-annual seagrass mapping in Charlotte Harbor from 1982-2020. Seagrass in this area has remained relatively stable over time since monitoring began, but acreage declined significantly in the Charlotte Harbor region between 2018 and 2020. In fact, between 2018 and 2020, the region lost 3,648 acres of seagrass, representing a 22% loss overall. The reason for this decline is complex and likely involves several factors; such as recent storm events, increased temperatures and rainfall, additional nutrient runoff from land, as well as prolonged red tide and algae blooms in the region. The CHNEP continues to work with our partners to investigate causes.

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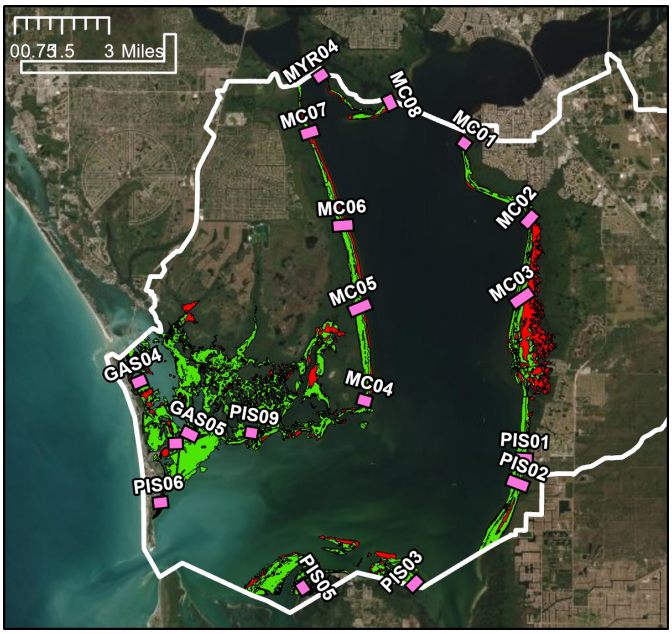
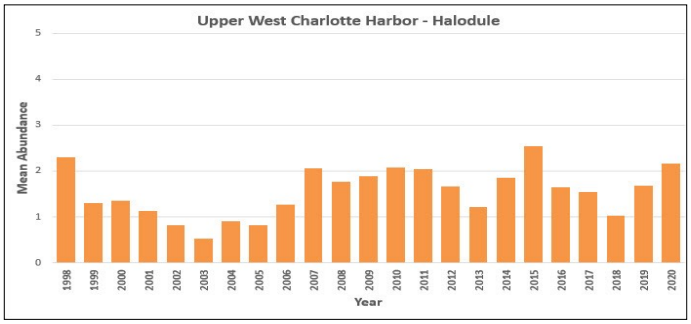
## Monitoring Sites

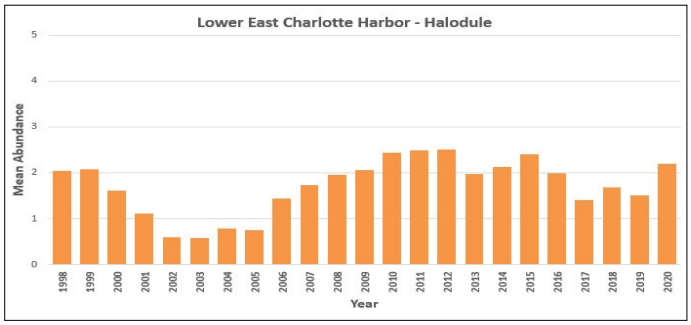
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in Charlotte Harbor by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring in the Harbor examines species types, density, distribution and how deep the grass will grow (this is dependent on light availability).

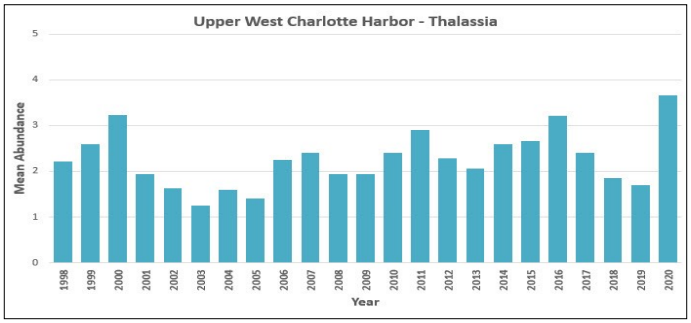


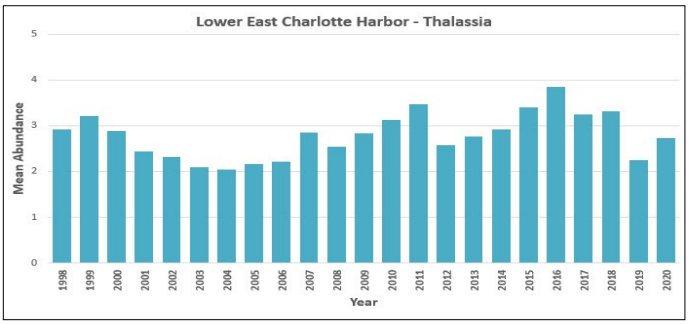

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species at different monitoring locations in Charlotte Harbor for the years 1998-2020: Shoalgrass (*Halodule wrightii*) shown in orange and Turtlegrass (*Thalassia testudinum*) shown in aqua. They demonstrate that both Shoalgrass and Turtlegrass saw declines in abundance at multiple monitoring locations starting as far back as 2016, preceding the decline in overall acreage observed between 2018 and 2020. However, data collected in 2020 demonstrates modest gains (though not full recovery) for both species throughout the Harbor. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]Southwest Florida Water Management District (1982, 1988, 1992, 1994, 1996, 1999, 2001, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020)
[3]Charlotte Harbor Aquatic Preserves: Seagrass Transect Monitoring Program 1998-2020. Florida Department of Environmental Protection.

## CONTACT INFORMATION

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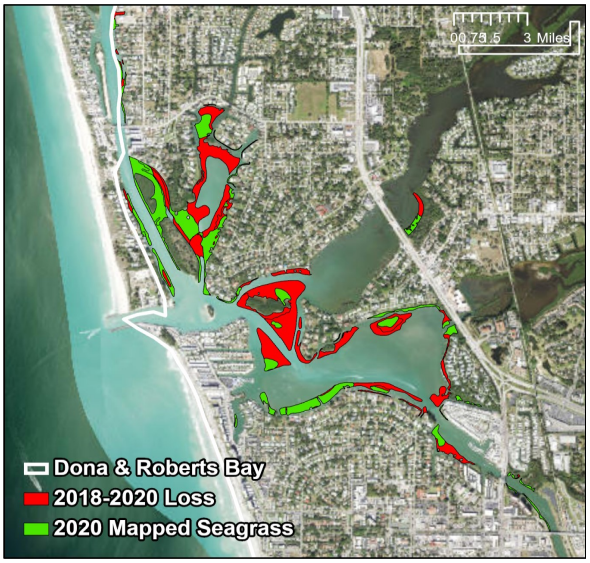
# Dona & Roberts Bays

# FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

The Dona and Roberts Bays connects one of the five major watersheds in Sarasota County to the Gulf of Mexico via the Venice Inlet. Significant modifications have been made to the drainage basins, principally to the main tributaries. Many of the creeks have been dammed in order to inhibit upstream flow of salt water. They are also deepened or lengthened to allow better drainage. These have resulted in a complex sedimentation and erosion pattern with substantial anthropogenic influences. Seagrasses present within Dona and Roberts Bay include Shoalgrass (*Halodule wrightii*), Turtlegrass (*Thalassia testudinum*), and Manateegrass (*Syringodium filiforme*)[1]. In 2018, seagrass monitoring detected declining trends throughout most of the county, including major losses in Dona and Roberts Bay.



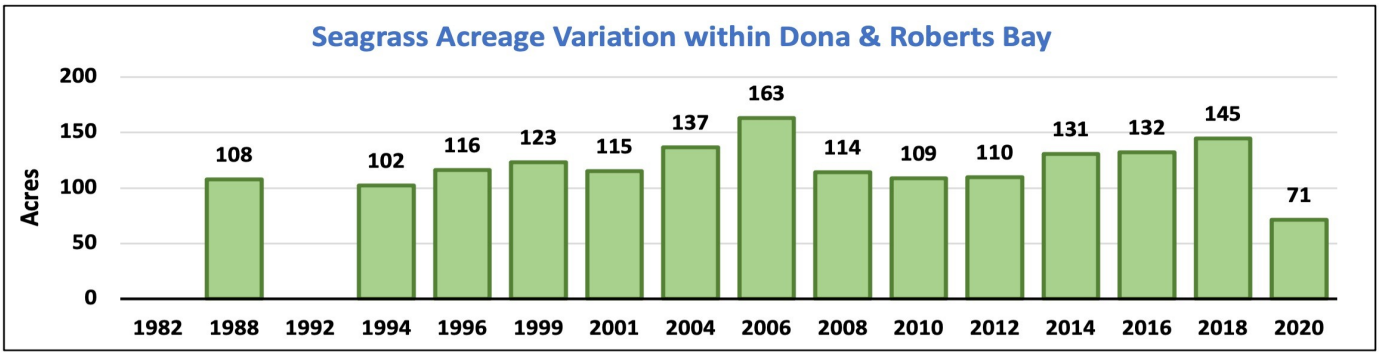

## Seagrass Measures Water Quality & Improves Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

The below graphic depicts results from seagrass mapping in Dona & Roberts Bay from 1988-2020[2]. Seagrass acreage in the Dona & Roberts Bay basin had been steadily increasing since 2010. In 2018, seagrass reached 145 acres, passing the target 112 acres for Dona & Roberts Bay. However, between 2018-2020, 73 acres of seagrass were lost, representing a 51% loss of total acreage. The cause of this decline is complex and involves several likely factors including red tide, increasing nutrient loads, hurricanes, rainfall pattern and others. The CHNEP continues to work with our partners to investigate causes.

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## Seagrass Trends

The table to the right shows the Sarasota County 2021 Seagrass Monitoring Scorecard which identifies bays with problem trends for seagrass and algae characteristics[3]. Red symbolizes undesirable conditions, green is good, and yellow is intermediate. Desirable conditions are dense seagrass coverage, tall seagrass, few epiphytes growing on the seagrass, and less drift algae in the seagrass habitat. The highest scoring bay is deemed to have seagrass in the worst health condition.

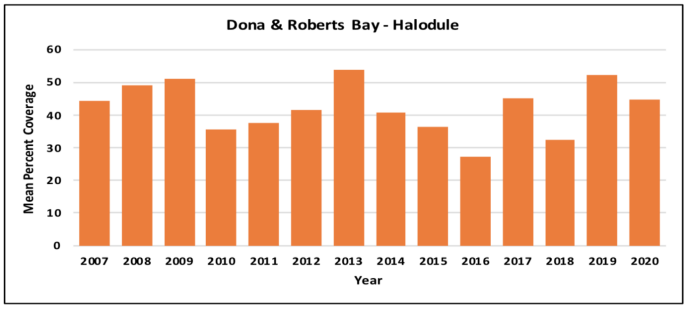
In Charlotte Harbor and surrounding estuaries, anecdotal data points to a shift from seagrass to algae. Based on Sarasota County field monitoring data, Dona & Roberts Bay saw declines in overall seagrass density and blade height, combined with increased epiphyte and green algae (Caulerpa) abundance.

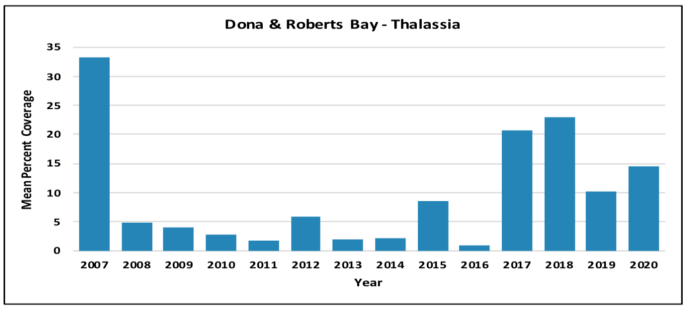
**Sarasota County Seagrass Monitoring Scorecard 2021**

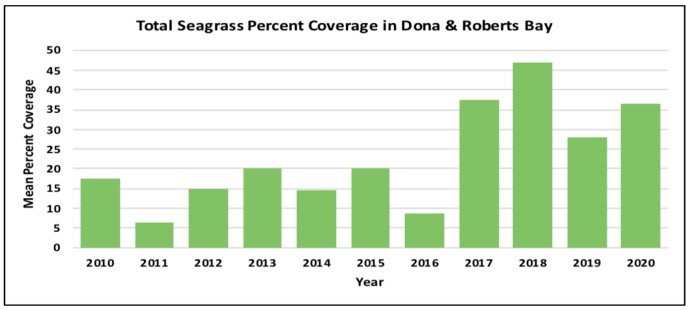
| Seagrass Health Characteristics | Sarasota Bay | Roberts Bay | Little Sarasota Bay | Blackburn Bay | Dona Roberts Bays | Lemon Bay |
|---|---|---|---|---|---|---|
| Seagrass Density Trend | - | - | - | ↓ | ↓ | ↓ |
| Thalassia Abundance Trend | - | - | - | ↓ | - | - |
| Syringodium Abundance Trend | - | - | - | - | - | - |
| Halodule Abundance Trend | ↓ | - | - | - | - | - |
| Thalassia Blade Height Trend | - | - | - | ↓ | - | ↓ |
| Syringodium Blade Height Trend | ↓ | ↓ | - | ↓ | ↓ | - |
| Halodule Blade Height Trend | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| Drift Algae Trend | - | - | - | - | - | - |
| Epiphyte Trend | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Caulerpa Trend | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Score | 5 | 4 | 3 | 7 | 5 | 5 |

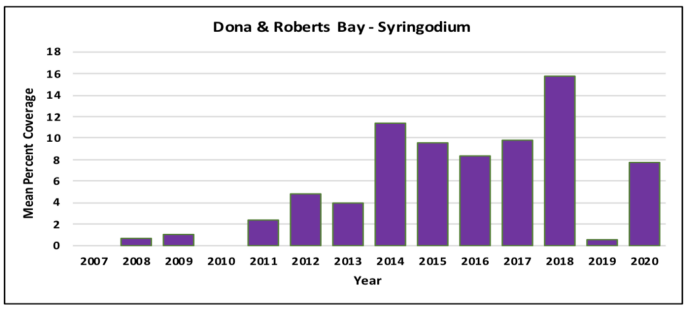
## Seagrass Diversity and Health

The bar graphs below show the total abundance for three seagrass species Shoalgrass (*Halodule wrightii*), Turtlegrass (*Thalassia testudinum*) and Manateegrass (*Syringodium filiforme*), as well as the total percent coverage of seagrass at different monitoring locations in Dona and Roberts Bay for the years 2007-2020. They demonstrate that seagrass, Turtlegrass and Manateegrass saw declines in abundance at multiple monitoring locations in 2019. However, data collected in 2020 demonstrates modest gains (though not full recovery) for both species throughout the region. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]Southwest Florida Water Management District (1982, 1988, 1992, 1994, 1996, 1999, 2001, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020)
[3]Sarasota County NPDES MS4 2020 Annual Report Monitoring Data Summary: Biological Monitoring — Seagrass.

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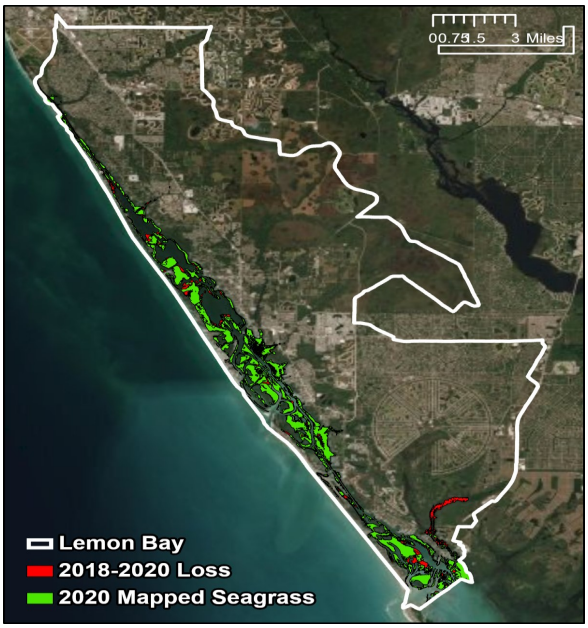
# Seagrass in Lemon Bay

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

Lemon Bay Basin extends from South Venice to the Gasparilla Island Causeway. Due to high amounts of urban land use, the watershed has been impacted by stormwater runoff, channelization of natural streams, increase of impervious surfaces, and conversion of natural habitat to other land uses. The tributaries to the estuary have also been transformed by ditching for mosquito control and development activities. Seagrasses within Lemon Bay include Shoalgrass (*Halodule wrightii*), Turtlegrass (*Thalassia testudinum*) and Manateegrass (*Syringodium filiforme*)[1]. Paddlegrass (*Halophila* sp.) was also documented prior to 2007. Lower Lemon Bay receives tidal flushing from New Pass and has large seagrass meadows. Upper Lemon Bay has freshwater inputs from the artificial waterway 'Venice Canal', seagrass meadows here have lower total acreage and less species diversity.



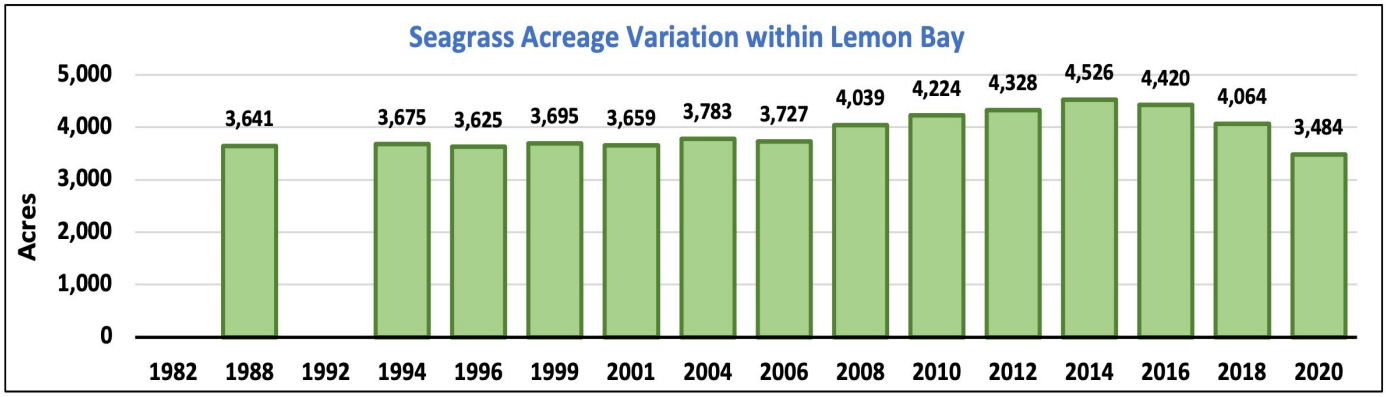

## Seagrass as a Way to Track Water Quality & Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

The below graphic depicts results from bi-annual seagrass mapping in Lemon Bay from 1988-2020[2]. Seagrass in this area has increased since the 1990's and remained relatively stable since that time, but acreage began to decline in 2016 and demonstrated more loss between 2018 and 2020. In fact, between 2018 and 2020, Lemon Bay lost 579 acres of seagrass (14% loss overall). The reason for this decline is complex and likely involves several factors; such as recent storm events, increased temperatures and rainfall, additional nutrient runoff from land, as well as prolonged red tide and algae blooms in the region. The CHNEP continues to work with our partners to investigate causes.

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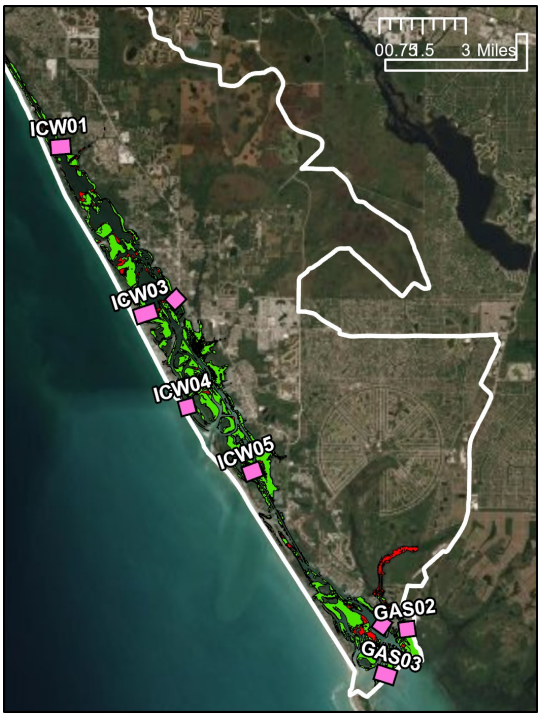
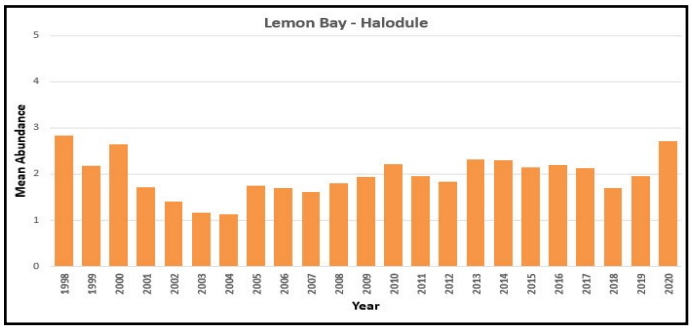
## Monitoring Sites

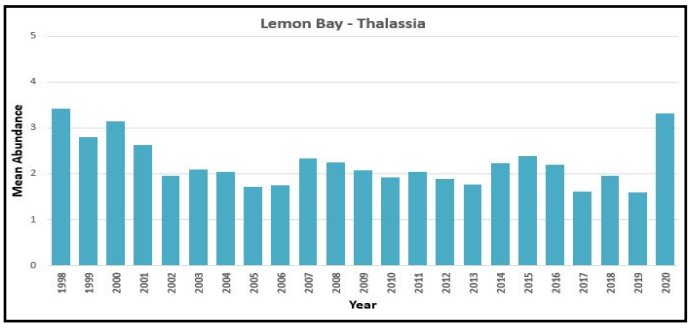
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in Lemon Bay by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring in the Harbor examines species types, density, distribution and how deep the grass will grow (this is dependent on light availability).

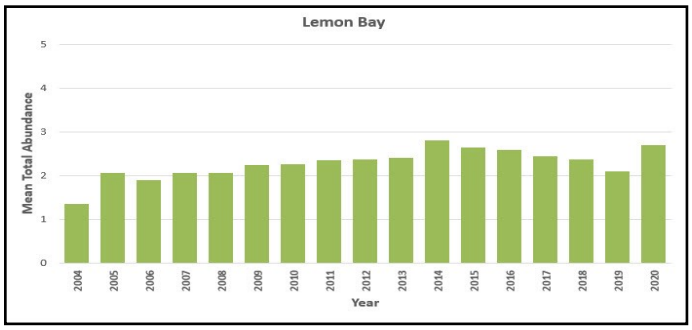


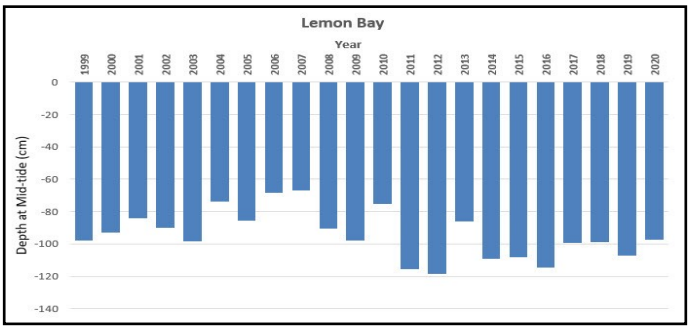

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*), total amount of grass, and depth at which the grass was growing at selected monitoring locations in Lemon Bay area for the years 1998-2020[3]. They demonstrate that Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*) saw declines in abundance at multiple monitoring locations starting as far back as 2017, preceding the decline in overall acreage observed between 2018 and 2020[3]. However, data collected in 2020 demonstrates modest gains (though not full recovery) for both species throughout the area. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.

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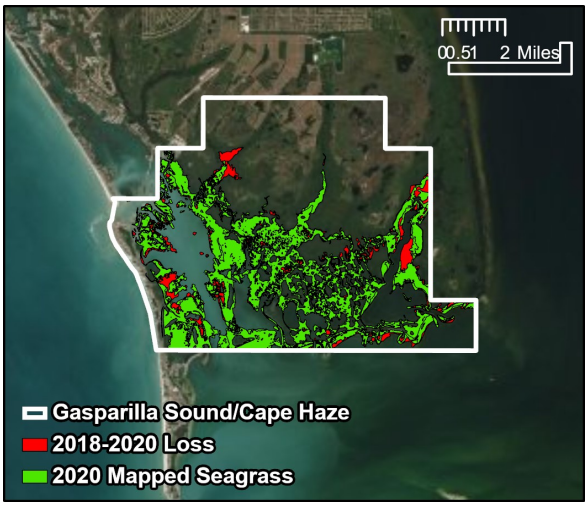
# Seagrass in Gasparilla Sound/Cape Haze

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

Gasparilla Sound/Cape Haze is a section of the larger Charlotte Harbor basin, it is close to both Boca Grande Pass and Little Gasparilla Pass and receives significant tidal flushing. The upper harbor area is large and deeper than Gasparilla Sound and is highly influenced by the Peace and Myakka Rivers. Gasparilla Sound contains some of the most dense seagrass beds in the area. For this reason, seagrass acreages and characteristics as well as targets are sub-divided out in this fact sheet. Seagrasses present in Gasparilla Sound include mostly Shoalgrass (*Halodule wrightii*), followed by Turtlegrass (*Thalassia testudinum*) and Manateegrass (*Syringodium filiforme*)[1].

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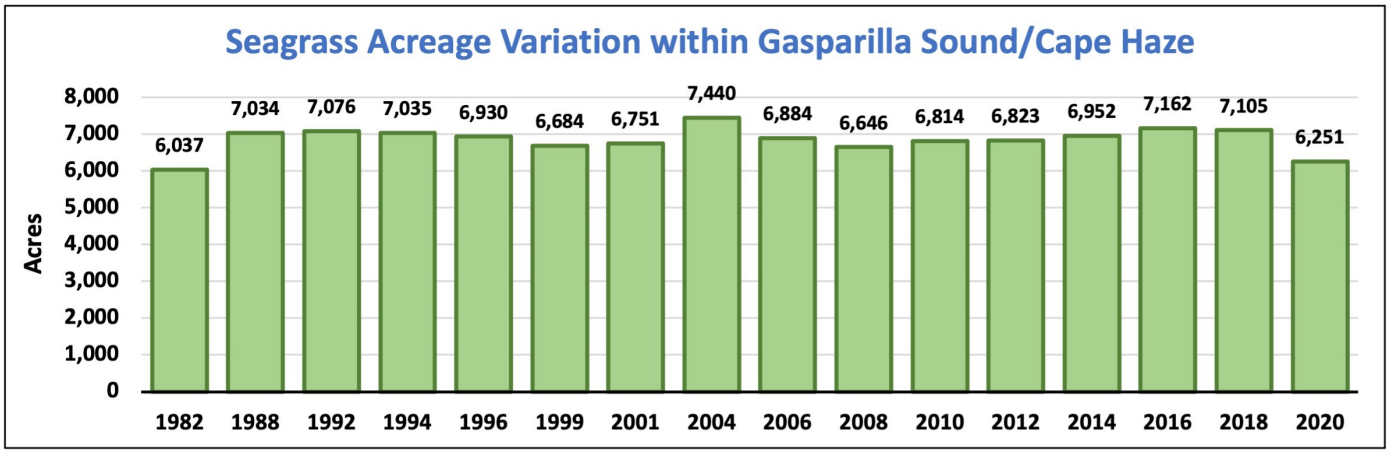
## Seagrass Acreage

The below graphic depicts results from bi-annual seagrass mapping in Gasparilla Sound/Cape Haze from 1982-2020[2]. Seagrass in this area has remained relatively stable over time since monitoring began, but acreage declined significantly in the region between 2018 and 2020. In fact, between 2018 and 2020, Gasparilla Sound/Cape Haze lost 854 acres of seagrass, representing a 12% loss overall. The reason for this decline is complex and likely involves several factors; such as recent storm events, increased temperatures and rainfall, additional nutrient runoff from land, as well as prolonged red tide and algae blooms in the region. The CHNEP continues to work with our partners to investigate causes.

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## Monitoring Sites

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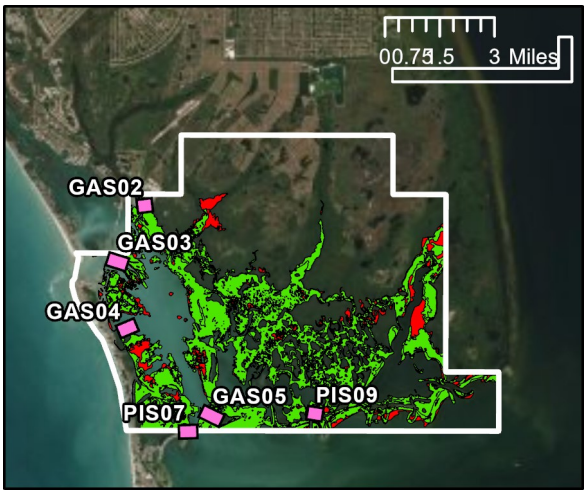
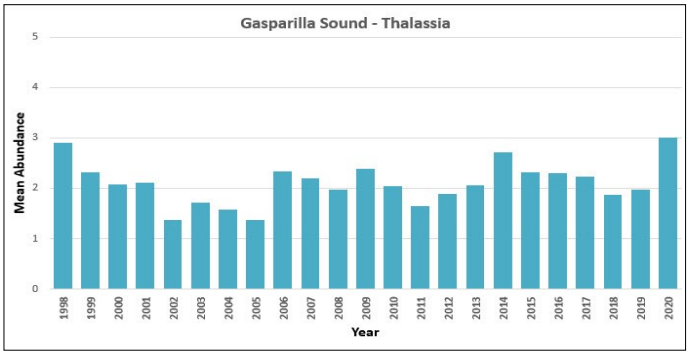
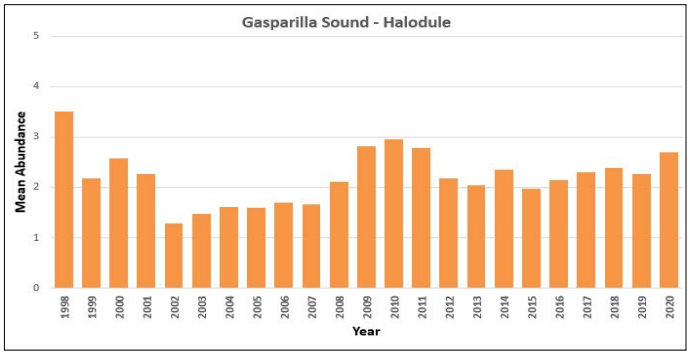
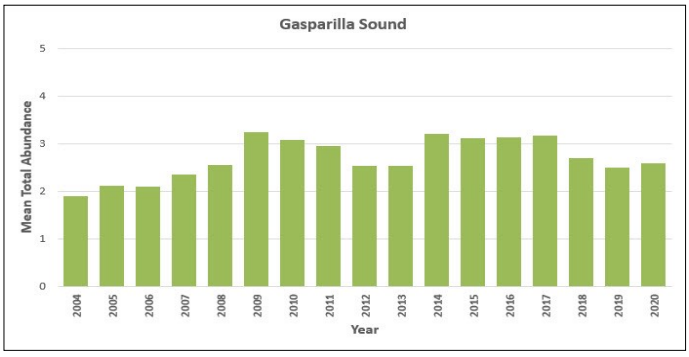


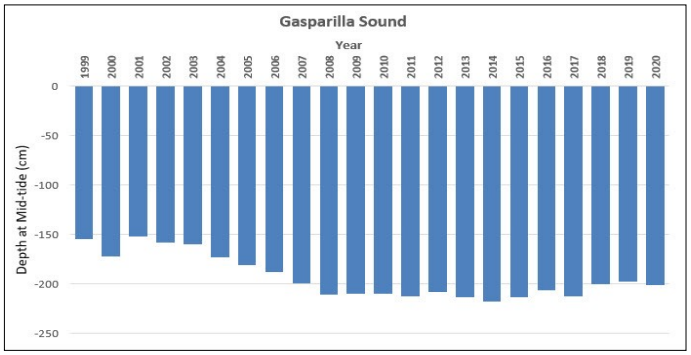

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species, Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*), total amount of grass, and depth at which the grass was growing at selected monitoring locations in Gasparilla Sound basin area for the years 1998-2020[3]. They demonstrate that Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*) saw declines in abundance at multiple monitoring locations starting as far back as 2017, preceding the decline in overall acreage observed between 2018 and 2020. However, data collected in 2020 demonstrates modest gains (though not full recovery) for both species throughout the area. Note that a stable meadow with diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]Southwest Florida Water Management District (1982, 1988, 1992, 1994, 1996, 1999, 2001, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020)
[3]Charlotte Harbor Aquatic Preserves: Seagrass Transect Monitoring Program 1999-2020. Florida Department of Environmental Protection.

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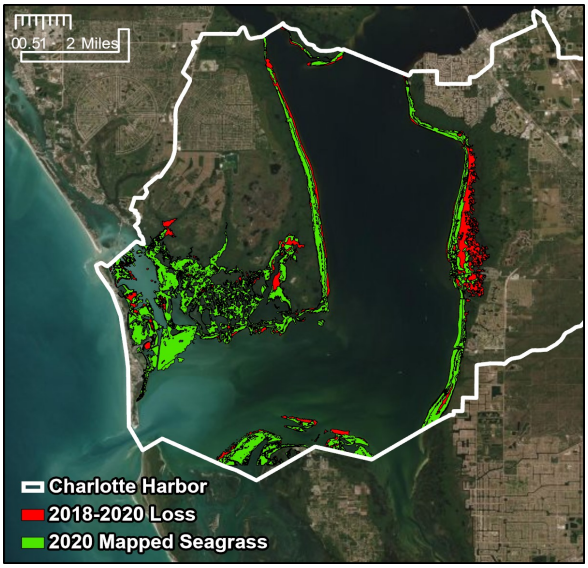
# Seagrass in Charlotte Harbor

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

Charlotte Harbor is the largest, deepest, and most diverse of the estuaries in this region. Charlotte Harbor is influenced by three watersheds - Peace River, Myakka River, and Charlotte Harbor Proper. Fresh water from the Peace and Myakka rivers mixes with salt water coming through Boca Grande Pass from the Gulf of Mexico. While areas closer to the Pass receive significant tidal flushing (Gasparilla Sound), areas in the upper harbor near the mouths of the rivers have dissolved oxygen, color, and salinity levels that are significantly affected by the seasonal fluctuations in river discharges. Seagrasses present within Charlotte Harbor include Shoalgrass (*Halodule wrightii*), Turtlegrass (*Thalassia testudinum*) and Manateegrass (*Syringodium filiforme*), as well as Widgeongrass (*Ruppia maritima*), and Paddlegrass and Stargrass (*Halophila* spp.)[1].



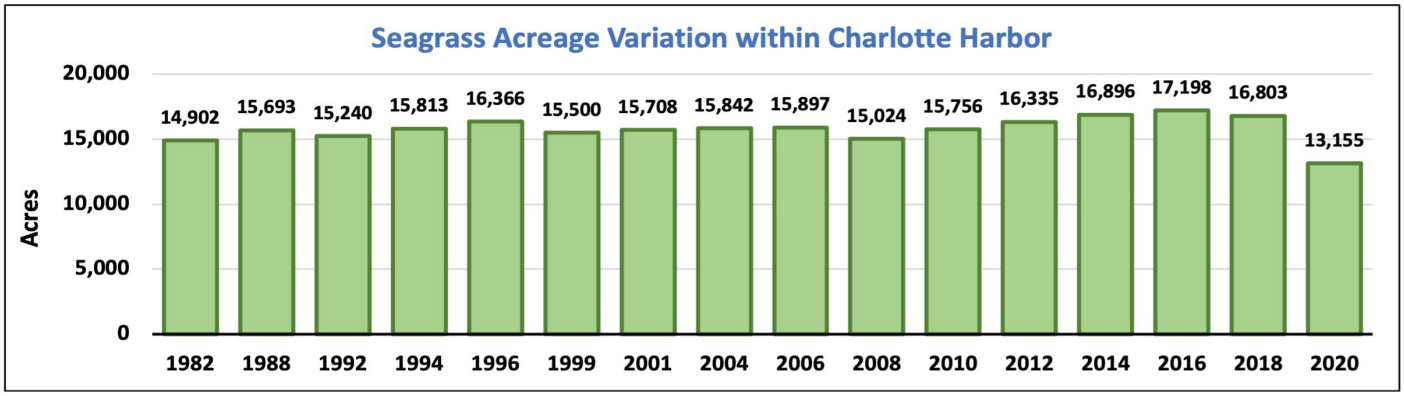

## Seagrass Measures Water Quality & Improves Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

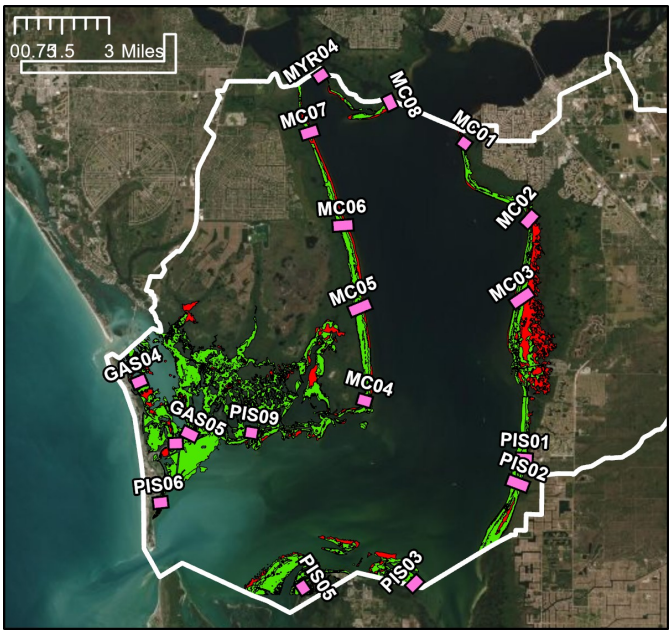
The graph below depicts results from bi-annual seagrass mapping in Charlotte Harbor from 1982-2020. Seagrass in this area has remained relatively stable over time since monitoring began, but acreage declined significantly in the Charlotte Harbor region between 2018 and 2020. In fact, between 2018 and 2020, the region lost 3,648 acres of seagrass, representing a 22% loss overall. The reason for this decline is complex and likely involves several factors; such as recent storm events, increased temperatures and rainfall, additional nutrient runoff from land, as well as prolonged red tide and algae blooms in the region. The CHNEP continues to work with our partners to investigate causes.




For more information, please visit the CHNEP Water Atlas at chnep.wateratlas.usf.edu

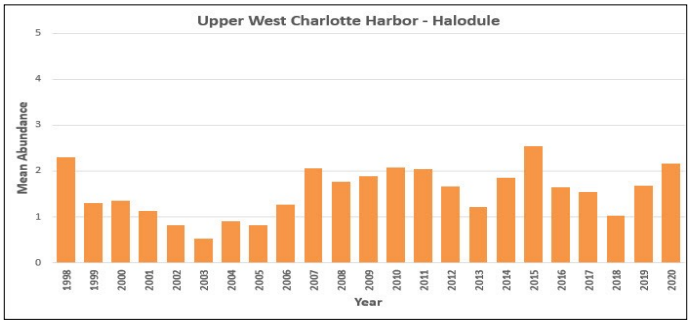
## Monitoring Sites

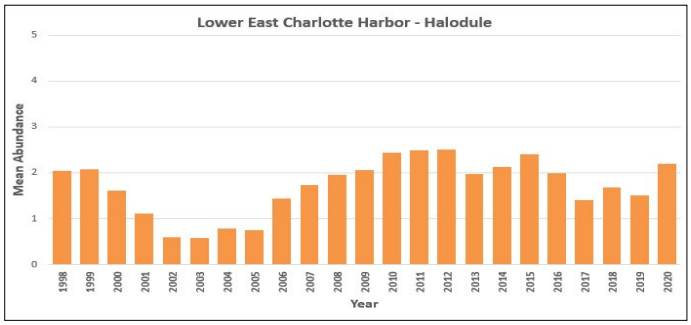
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in Charlotte Harbor by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring in the Harbor examines species types, density, distribution and how deep the grass will grow (this is dependent on light availability).

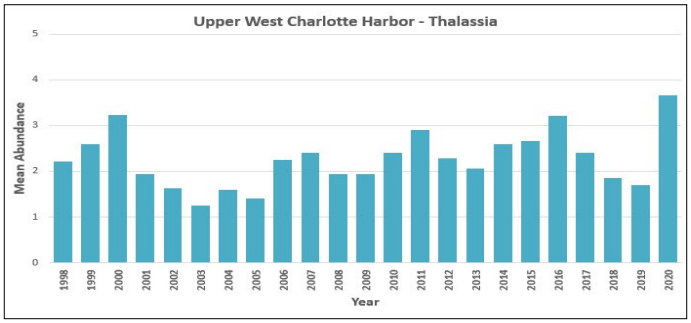


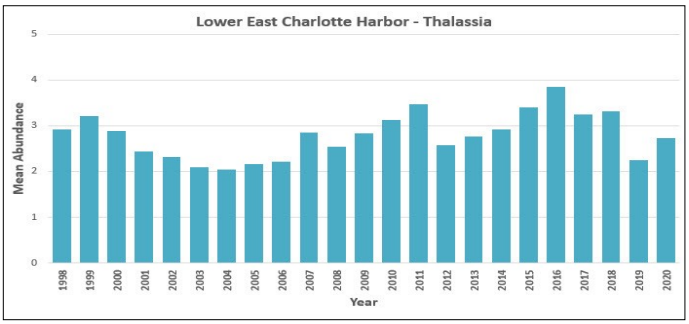

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species at different monitoring locations in Charlotte Harbor for the years 1998-2020: Shoalgrass (*Halodule wrightii*) shown in orange and Turtlegrass (*Thalassia testudinum*) shown in aqua. They demonstrate that both Shoalgrass and Turtlegrass saw declines in abundance at multiple monitoring locations starting as far back as 2016, preceding the decline in overall acreage observed between 2018 and 2020. However, data collected in 2020 demonstrates modest gains (though not full recovery) for both species throughout the Harbor. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]Southwest Florida Water Management District (1982, 1988, 1992, 1994, 1996, 1999, 2001, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020)
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# Seagrass in Pine Island Sound and Matlacha Pass

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

Pine Island Sound basin also encompasses Matlacha Pass and San Carlos Bay. This area is known for its extensive seagrass beds. Pine Island Sound receives tidal flushing from nearby Boca Grande, Captiva, and Redfish Pass and contains both Pine Island Sound and Matlacha Aquatic Preserve.s The basin is influenced by inputs from the Caloosahatchee River and Punta Rassa Pass to the south. Seagrasses present within Pine Island Sound basin include mostly Manateegrass (*Syringodium filiforme*), followed by Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*), as well as Paddlegrass and Stargrass (*Halophila* sp.)[1]. Propeller scarring and freshwater from the Caloosahatchee River continue to impact seagrass beds throughout the region.

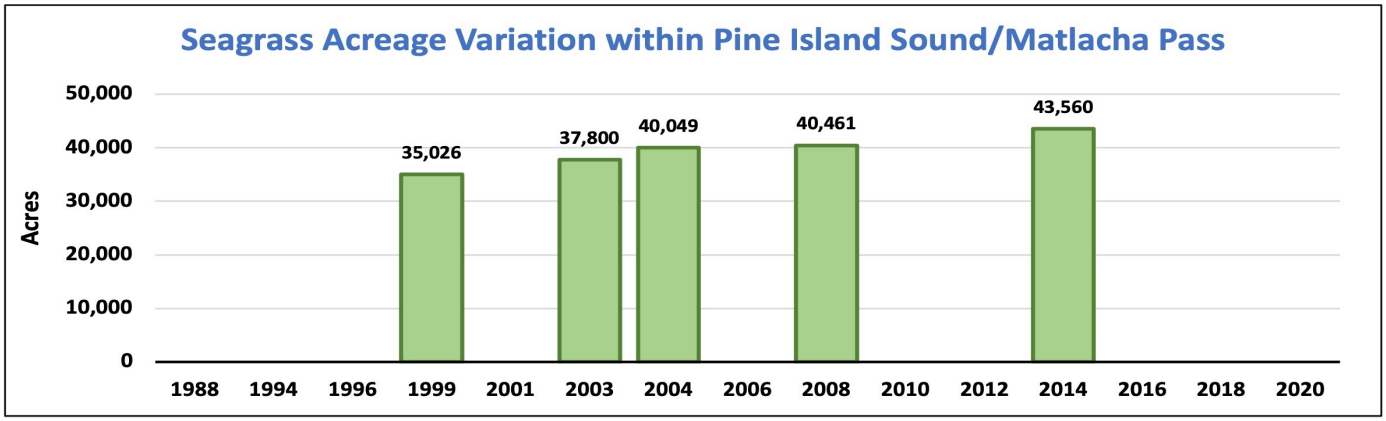

## Seagrass Measures Water Quality & Improves Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

The below graphic depicts results from seagrass mapping in Pine Island Sound/Matlacha Pass from 1999-2014[2]. Due to tidal flushing in Pine Island Sound, which hosts the majority of the regions seagrass, acreages in this area have remained relatively stable over time since monitoring began. However, consistent mapping of seagrass with aerial photography is needed at least every 3-4 years in order to evaluate trends in acreage. Updated data for the region was collected by the South Florida Water Management District (SFWMD) in the winter of 2020-2021 and will become available in early 2022.



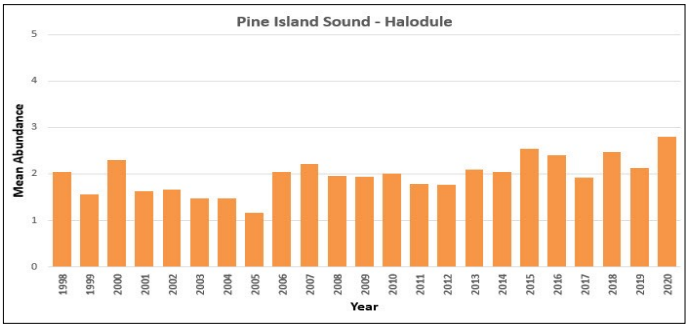

For more information, please visit the CHNEP Water Atlas at chnep.wateratlas.usf.edu

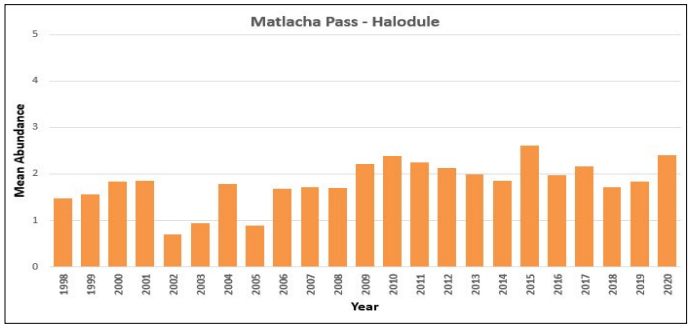
## Monitoring Sites

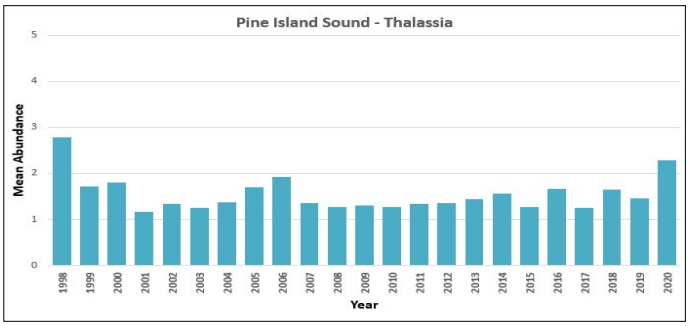
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in the area by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring examines species types, density, distribution and how deep the grass will grow (this is dependent on light availability).

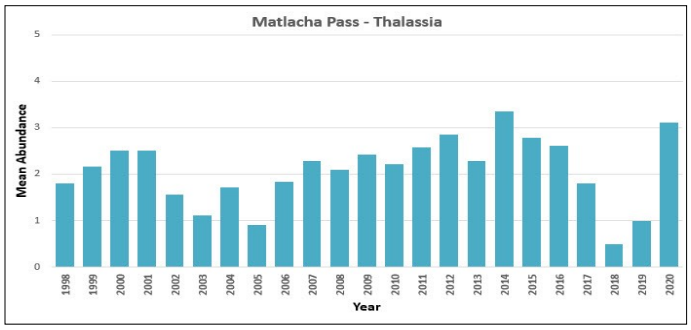

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species at different monitoring locations in Pine Island Sound area (PI01-09) and Matlacha Pass (MP01-04) for the years 1998-2020[3]. They demonstrate that while Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*) remain relatively stable in the Pine Island Sound area, which is mostly influenced by seawater from the nearby passes, Matlacha Pass (which receives freshwater flows from the Caloosahatchee River) has experienced recent declines in both Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*). However, data collected in 2020 demonstrates modest gains (though not full recovery) for both species throughout the area. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]South Florida Water Management District (1999, 2003, 2004, 2008, 2014)
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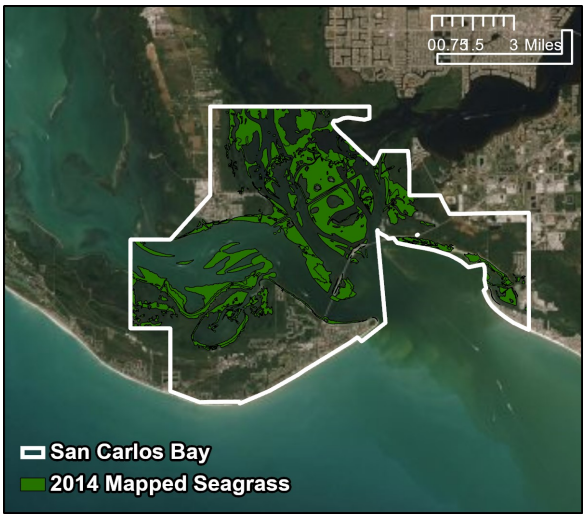
# Seagrass in San Carlos Bay

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

San Carlos Bay is located southwest of Fort Myers, at the mouth of the Caloosahatchee River. It connects to Pine Island Sound to the west and to Matlacha Pass to the north. Seagrass present within San Carlos Bay include mostly Shoalgrass (*Halodule wrightii*), followed by Turtlegrass (*Thalassia testudinum*), Manateegrass (*Syringodium filiforme*), as well as Paddlegrass and Stargrass (Halophila spp.)[1].



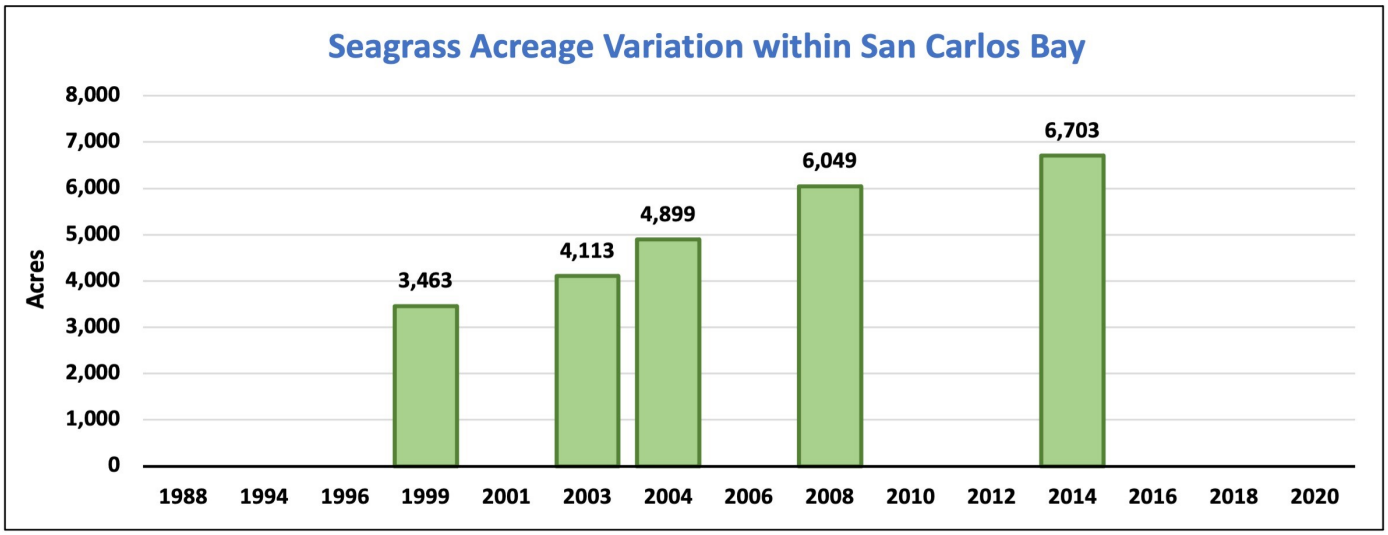

## Seagrass Measures Water Quality & Improves Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

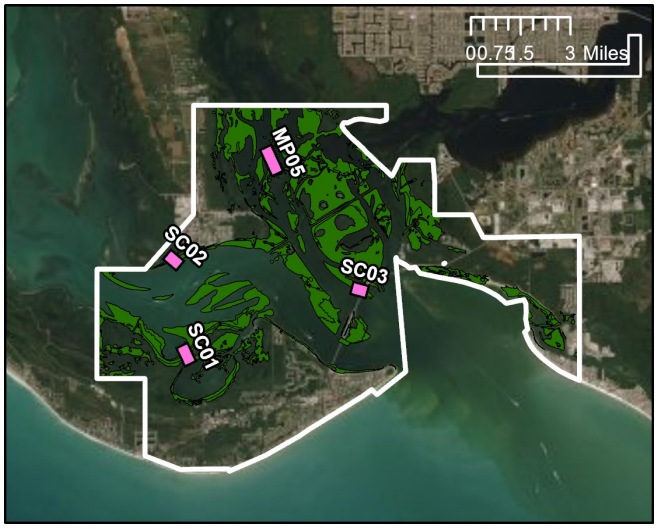
The below graphic depicts results from seagrass mapping in San Carlos Bay from 1999-2014[2]. Seagrass in this area appears to have increased over time since monitoring began. However, consistent mapping of seagrass with aerial photography is needed at least every 3-4 years in order to evaluate trends in acreage. Updated data for the region was collected by the South Florida Water Management District (SFWMD) in the winter of 2020-2021 and will become available in early 2022.




For more information, please visit the CHNEP Water Atlas at chnep.wateratlas.usf.edu

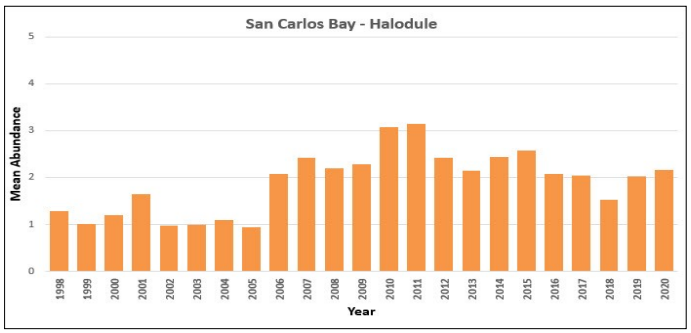
## Monitoring Sites

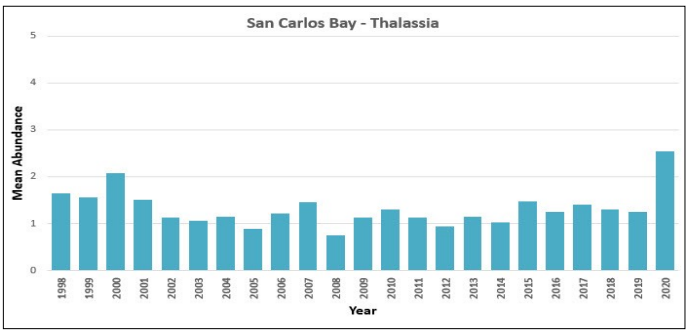
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in San Carlos Bay by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring in the Bay examines species types, density, distribution, and how deep the grass will grow (this is dependent on light availability).

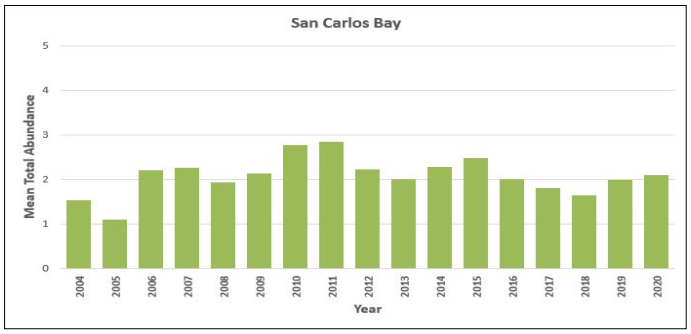


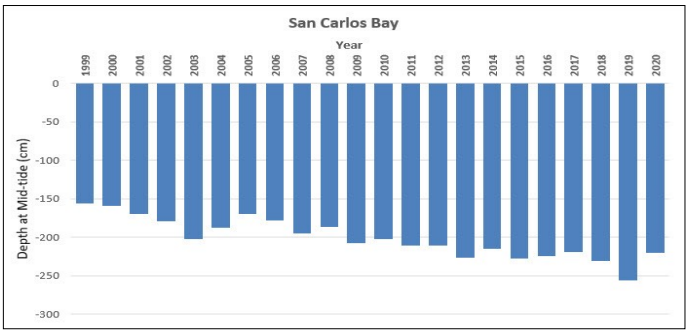

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species at monitoring locations in San Carlos Bay, total amount of grass, and depth at which the grass was growing at these same monitoring sites in the years 1998-2020[3]. They demonstrate that both Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*) have been declining since 2016. However, data collected in 2020 demonstrates modest gains (though not full recovery) for both species throughout the area. Note that a diverse and stable seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
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# Seagrass in Estero Bay

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

Estero Bay was the first aquatic preserve in Florida. The western border consists of a chain of barrier islands. The estuary has significant freshwater inputs from small rivers and weak tidal exchange due to the restricted size of the four main inlets. Although the estuary is separated from the Charlotte Harbor estuary, it does receive water indirectly from the Caloosahatchee River through San Carlos Bay. Seagrasses present within Estero Bay include mostly Turtlegrass (*Thalassia testudinum*), followed by Shoalgrass (*Halodule wrightii*) and Manateegrass (*Syringodium filiforme*), as well as some Widgeongrass (*Ruppia maritima*), Paddlegrass and Stargrass (*Halophila* spp.) [1].

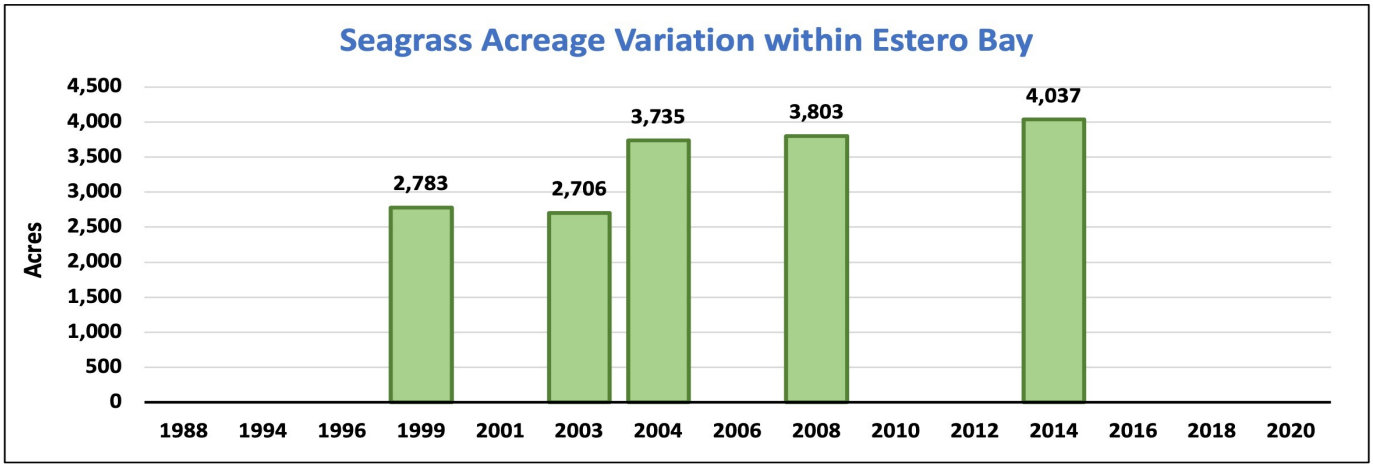

## Seagrass Measures Water Quality & Improves Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

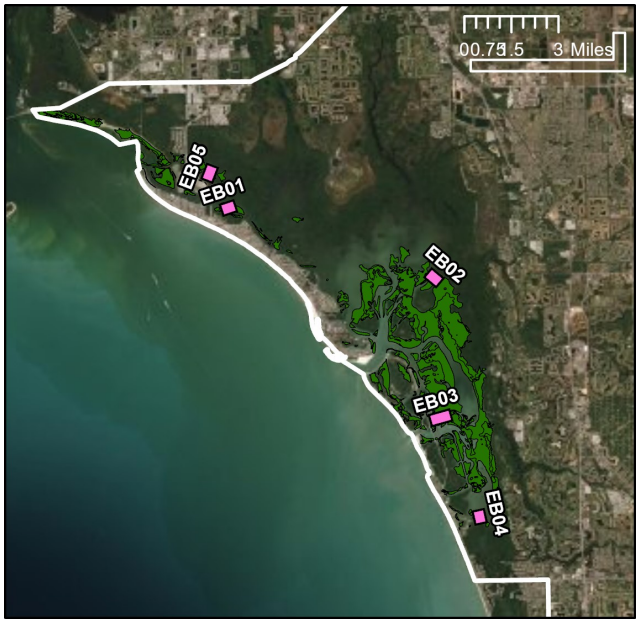
The below graphic depicts results from seagrass mapping in Estero Bay from 1999-2014[2]. From 2004 to 2014, seagrass acreage in the Estero Bay basin appears relatively stable with slight increases. However, consistent mapping of seagrass with aerial photography is needed at least every 3-4 years in order to evaluate trends in acreage. Updated data for the region was collected by the South Florida Water Management District (SFWMD) in the winter of 2020-2021 and will become available in early 2022.




For more information, please visit the CHNEP Water Atlas at chnep.wateratlas.usf.edu

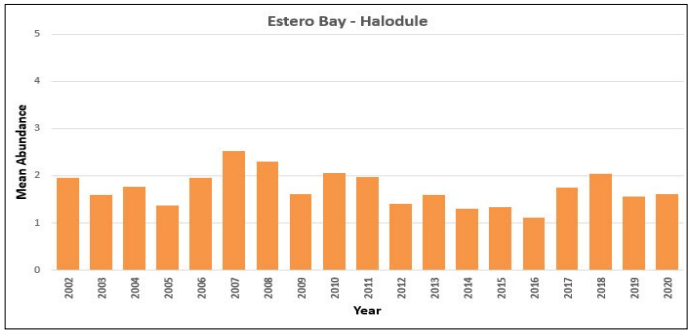
## Monitoring Sites

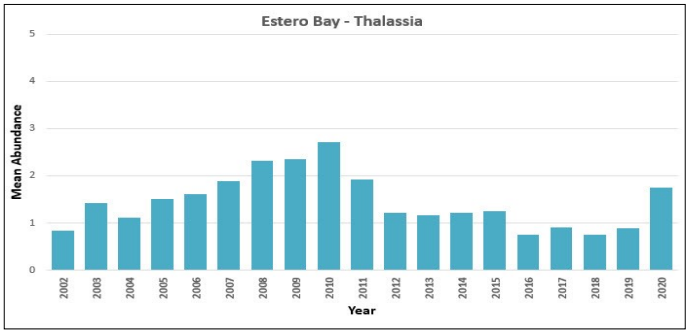
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in Estero Bay by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring in the Bay examines species types, density, distribution and how deep the grass will grow (this is dependent on light availability).

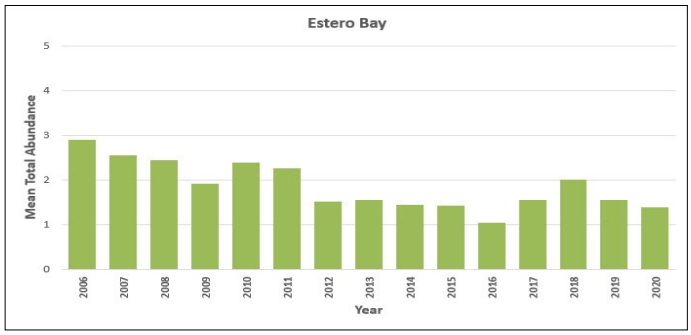


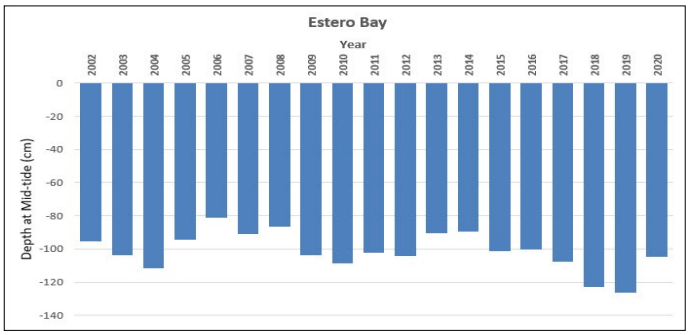

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species, Shoalgrass (*Halodule wrightii*) and Turtlegrass (*Thalassia testudinum*), total amount of grass, and depth at which the grass was growing at the monitoring sites in Estero Bay for the years 2002-2020[3]. They demonstrate that while Shoalgrass (*Halodule wrightii*) remains relatively stable throughout the system, seagrass and Turtlegrass (*Thalassia testudinum*) saw declines in abundance at multiple monitoring locations starting as far back as 2011. However, data collected in 2020 shows modest gains (though not full recovery) for Turtlegrass throughout the area. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.

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[2]South Florida Water Management District (1999, 2003, 2004, 2008, 2014)
[3]Estero Bay Aquatic Preserve. Seagrass Monitoring Program (2002-2020).

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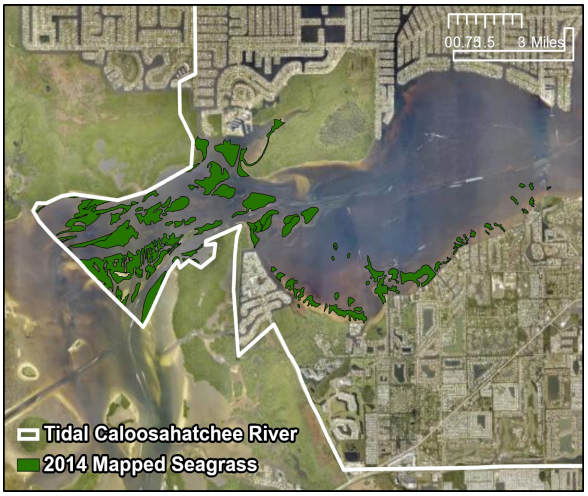
# Seagrass in the Tidal Caloosahatchee River

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

The Caloosahatchee River watershed spans Lake Okeechobee to San Carlos Bay. The historically shallow and meandering river has been modified into a highly managed and regulated waterway. The river and estuary's ecosystems are significantly altered, watershed runoff and discharges from Lake Okeechobee have impacted the water quality and salinity. The freshwater Caloosahatchee River was home to many acres of Tapegrass (*Vallisneria americana)* that have seen significant declines due to multiple causes, primarily fluctuating salinity levels related to the management of Lake Okeechobee and freshwater releases from the lake to the river. Those acreages are not quantified here, as the data below is focused primarily on the Tidal portions of the Caloosahatchee River that are too salty for Tapegrass to grow. Seagrasses present within the Tidal Caloosahatchee River include Turtlegrass (*Thalassia testudinum*) and Shoalgrass (*Halodule wrightii*), followed by Manateegrass (*Syringodium filiforme*), Widgeongrass (*Ruppia maritima*), Paddlegrass and Stargrass (*Halophila* spp.)[1].



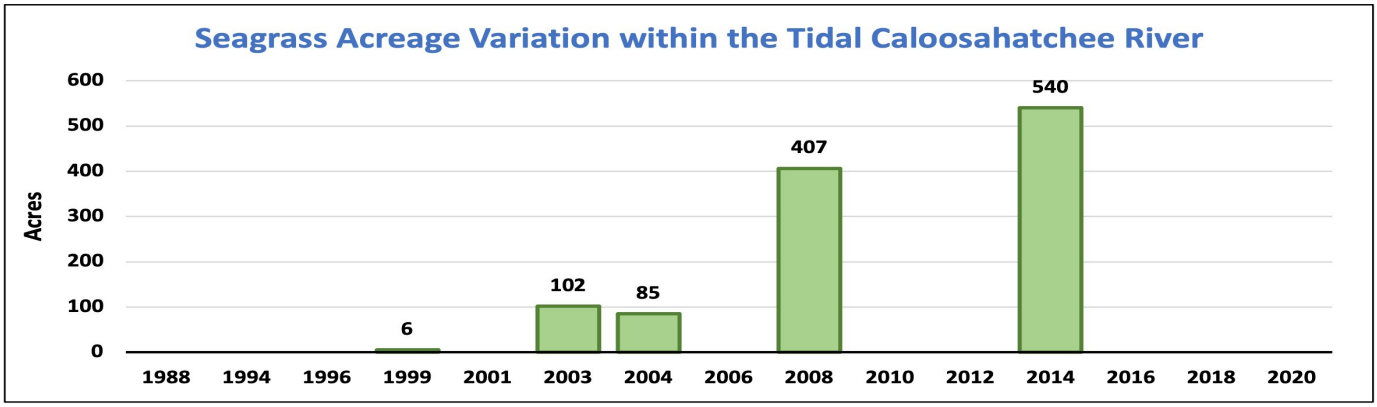

## Seagrass Measures Water Quality & Improves Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

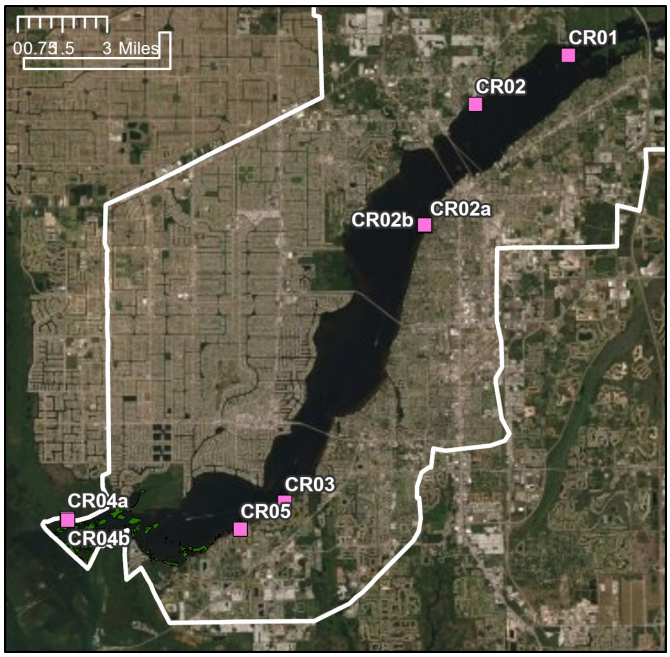
The below graphic depicts results from seagrass mapping in the tidal portion of the Caloosahatchee River from 1999-2014[2]. From 2006 to 2014 seagrass acreage in the tidal Caloosahatchee River appears to have increased. However, consistent mapping of seagrass with aerial photography is needed at least every 3-4 years in order to evaluate trends in acreage. Updated data for the region was collected by the South Florida Water Management District (SFWMD) in the winter of 2020-2021 and will become available in early 2022.




For more information, please visit the CHNEP Water Atlas at chnep.wateratlas.usf.edu

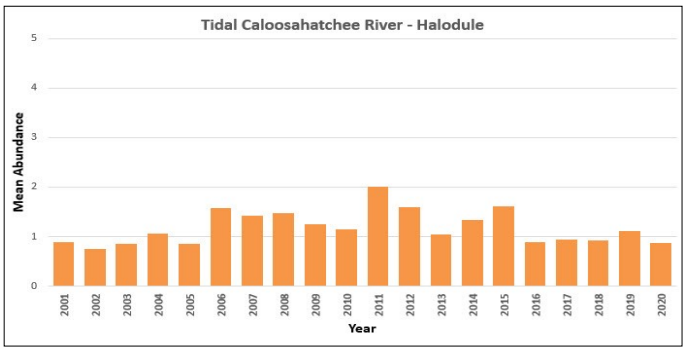
## Monitoring Sites

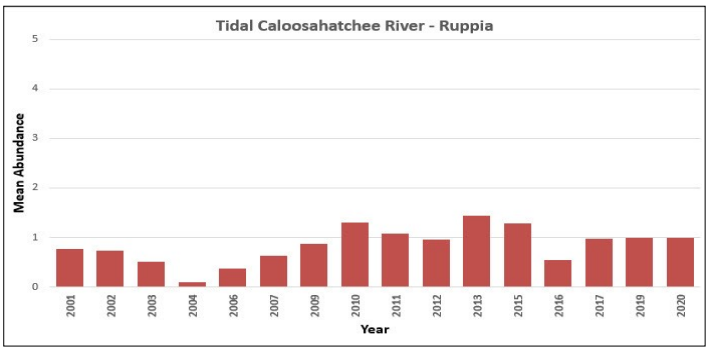
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in by the Florida Department of Environmental Protection and Water Management District. Annual seagrass monitoring examines species types, density, distribution and how deep the grass will grow (this is dependent on light availability).

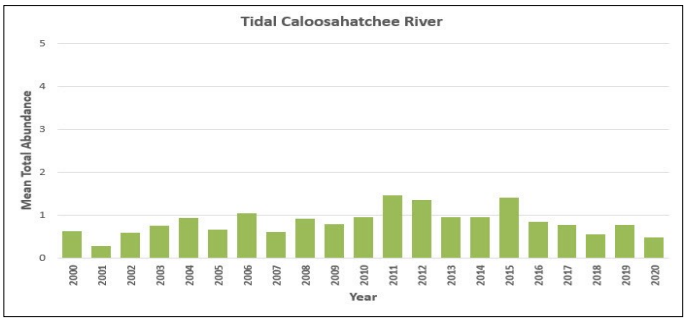


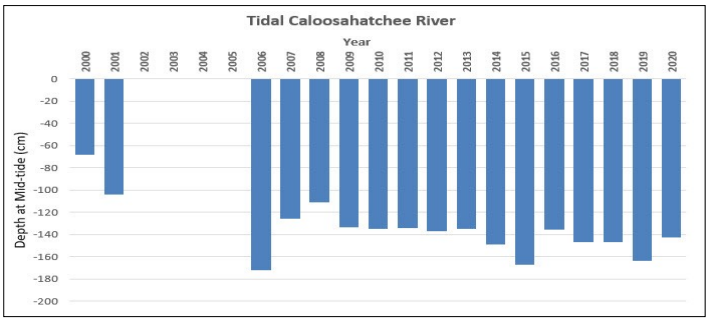

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species, Shoalgrass (*Halodule wrightii*) and Widgeongrass (*Ruppia maritima*), total amount of grass, and depth at which the grass was growing at selected sites in the tidal Caloosahatchee the years 2001 -2020[3]. Although seagrass total acreage appears to be increasing in aerial imagery, seagrass abundance at the six monitoring stations depicted does not appear to remain stable or is declining. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]South Florida Water Management District (1999, 2003, 2004, 2008, 2014)
[3]Florida Department of Environmental Protection, South Florida Water Management District.

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# Seagrass in Tidal Myakka River

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

The Myakka River is Florida's only federally designated Wild and Scenic River. It lies between Tampa Bay and Port Charlotte. The Myakka River is 68 miles long with the lowest 20 miles being brackish water with tidal influence. The watershed is fairly undeveloped so the riverine ecosystem is about as intact as in the southern half of the state. Seagrasses present within the Myakka River Basin primarily consist of Shoalgrass (*Halodule wrightii*) followed by Widgeongrass (*Ruppia maritima*)[1]. Note that Tidal Myakka River seagrass meadows comprise a small portion of the total acreage for Charlotte Harbor area and are mainly influenced by freshwater flows from the river.

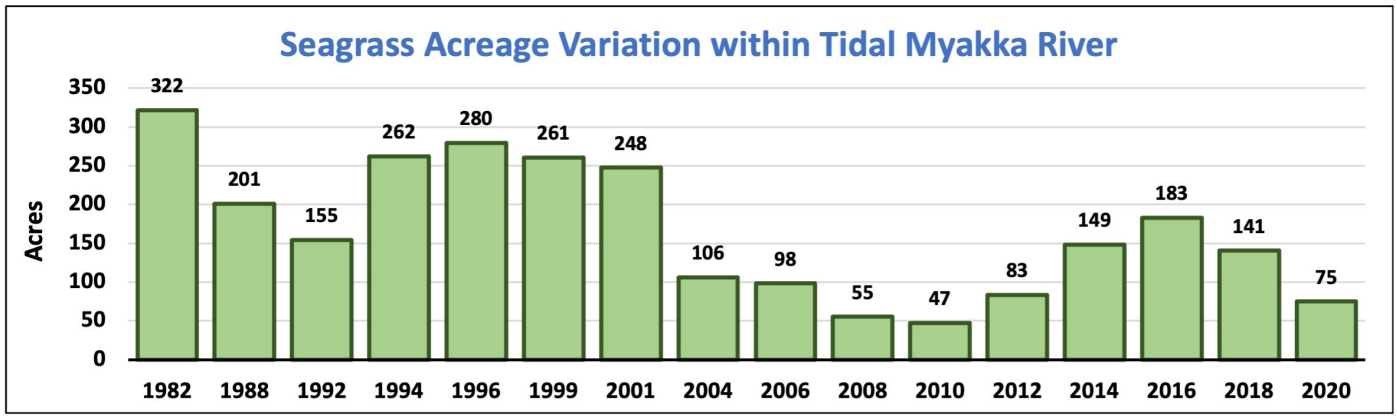

## Seagrass as a Way to Track Water Quality & Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

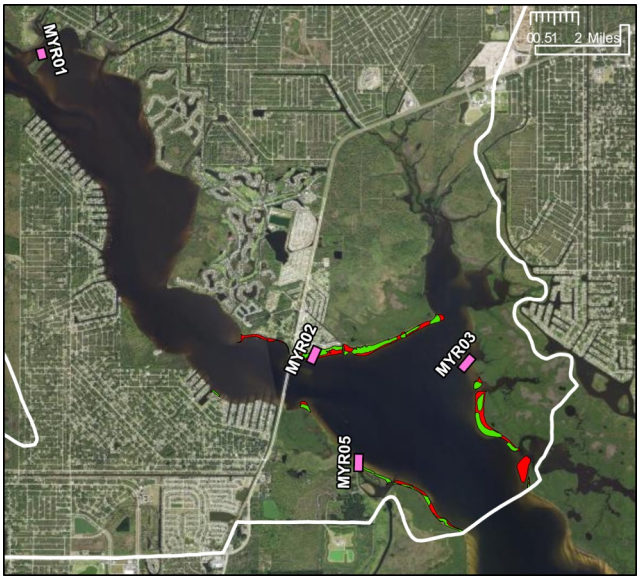
The below graphic depicts results from seagrass mapping in the tidal portion of the Myakka River from 1982-2020[2]. Although seagrass acreage was increasing from 2010-2016, it began to decline in 2018 and demonstrated more losses from 2018 to 2020. In fact, between 2018 and 2020, the Tidal Myakka River lost 66 acres of seagrass, representing a 47% loss overall. The reason for this decline is complex and likely involves several factors; such as recent storm events, increased temperatures and rainfall, additional nutrient runoff from land, as well as prolonged red tide and algae blooms in the region. The CHNEP continues to work with our partners to investigate causes.




For more information, please visit the CHNEP Water Atlas at chnep.wateratlas.usf.edu

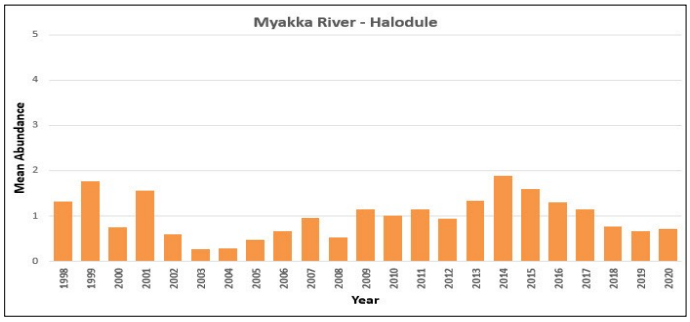
## Monitoring Sites

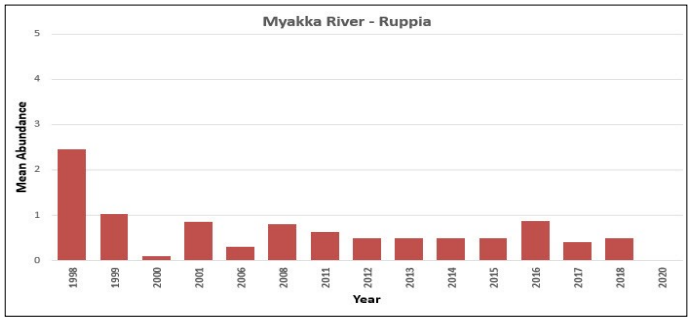
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in Tidal Myakka River by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring in the Harbor examines species types, density, distribution, and how deep the grass will grow (this is dependent on light availability).

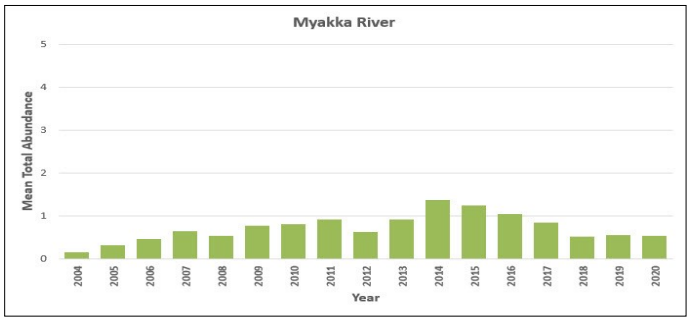


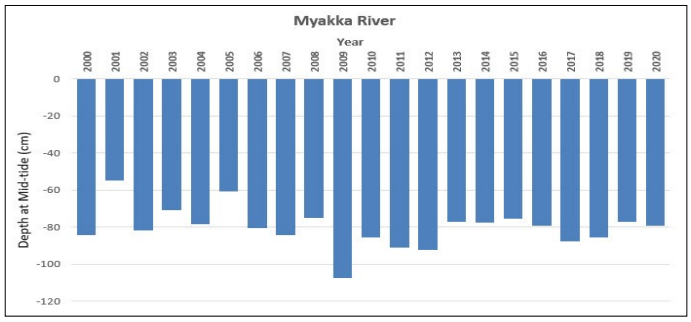

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species Shoalgrass (*Halodule wrightii*) and Widgeongrass (*Ruppia maritima*), total amount of grass, and depth at which the grass was growing at selected monitoring locations in Tidal Myakka area for the years 1998-2020[3]. They demonstrate that overall density of seagrass, Shoalgrass (*Halodule wrightii*), and Widgeongrass (*Ruppia maritima*) have seen declines in abundance at multiple monitoring locations starting as far back as 2015, preceding the decline in overall acreage observed between 2018 and 2020. However, data collected in 2020 demonstrates modest gains from 2019-2020 for Shoalgrass (*Halodule wrightii*) in the area. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]Southwest Florida Water Management District (1982, 1988, 1992, 1994, 1996, 1999, 2001, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020)
[3]Charlotte Harbor Aquatic Preserves: Seagrass Transect Monitoring Program 1998-2020. Florida Department of Environmental Protection.

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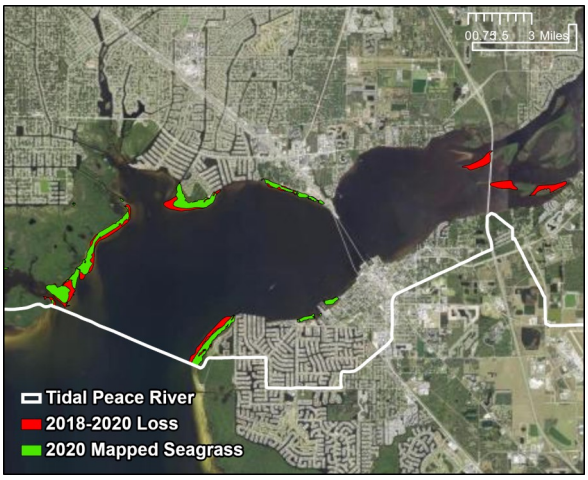
# Seagrass in Tidal Peace River

FISH, WILDLIFE, & HABITAT PROTECTION

## Summary

The Peace River Basin spans 105 miles from Green Swamp to Charlotte Harbor. From its headwaters in Polk County, the Peace River meanders through swamps, pine flatwoods, hardwood hammocks and marshes before it fans out into the Charlotte Harbor estuary. The watershed is low and flat, peppered with shallow lakes and wetlands and is impacted by development, agriculture, and mining. Seagrasses present within the Tidal Peace River primarily consist of Shoalgrass (*Halodule wrightii*) and a small percentage of Widgeongrass (*Ruppia maritima*)[1]. Note that Tidal Peace River seagrass meadows comprise a small portion of the total acreage for Charlotte Harbor area and are mainly influenced by freshwater flows from the river.



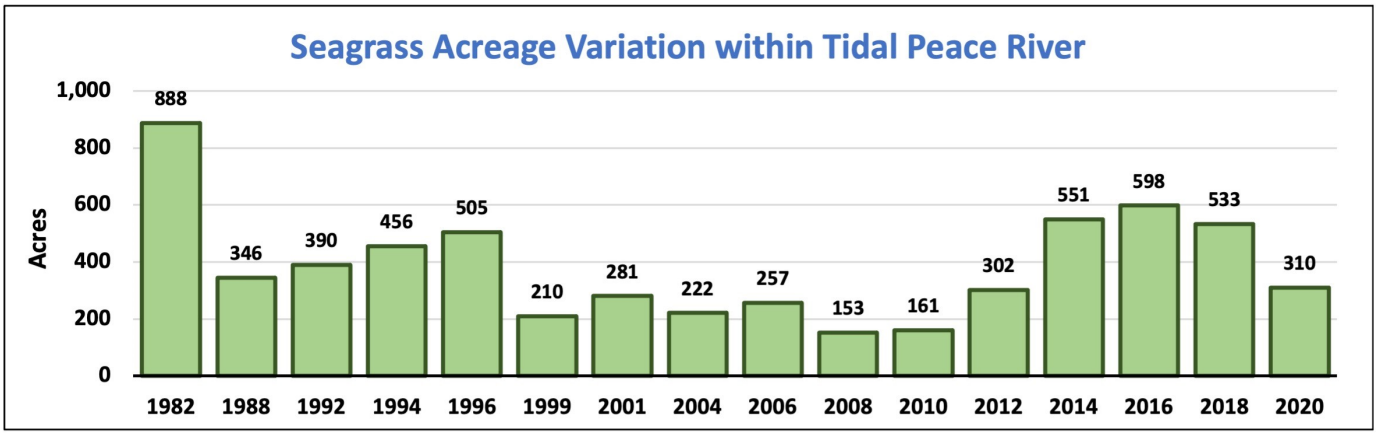

## Seagrass as a Way to Track Water Quality & Estuary Health

Over 2.2 million acres of seagrass have been mapped in estuarine and nearshore Florida waters. Many economically important fish and shellfish species depend on seagrass beds during critical stages of their life. Seagrass beds also contribute to better water quality by trapping sediments, storing carbon, and filtering nutrients from stormwater runoff. Florida had historical declines in seagrass acreage during the 20th century. Seagrass requires clean water and ample sunlight to grow. Because seagrass thrives in clean and clear water - it is used by agencies and local governments as a way to measure water quality. This is done in two ways:

- Mapping changes in seagrass acreage and location over time with aerial photography (spatial coverage). This is valuable for estimating seagrass locations, acres and broad changes over time.
- On-the-ground monitoring of changes in species composition, estimation of bottom cover in a seagrass bed (abundance), and maximum depth in which seagrass can grow due to light availability and water clarity (deep edge). This monitoring works to characterize the density, complexity, and stability of those seagrass meadows.

## Seagrass Acreage

The below graphic depicts results from seagrass mapping in the tidal portion of the Peace River from 1982-2020[2]. Although seagrass acreage was increasing from 2010-2016, it began to decline in 2018 and demonstrated more losses from 2018 and 2020. In fact, between 2018 and 2020, the Tidal Peace River lost 223 acres of seagrass, representing a 42% loss overall. The reason for this decline is complex and likely involves several factors; such as recent storm events, increased temperatures and rainfall, additional nutrient runoff from land, as well as prolonged red tide and algae blooms in the region. The CHNEP continues to work with our partners to investigate causes.



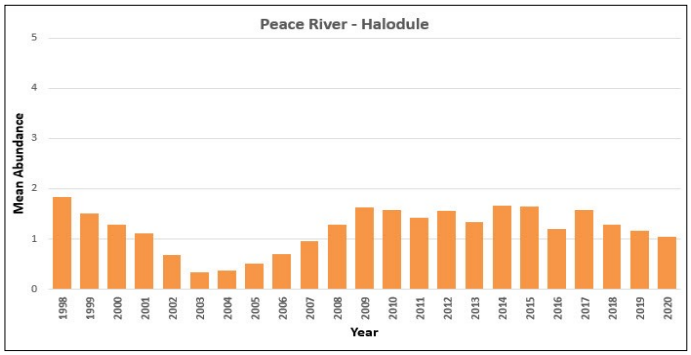

For more information, please visit the CHNEP Water Atlas at chnep.wateratlas.usf.edu

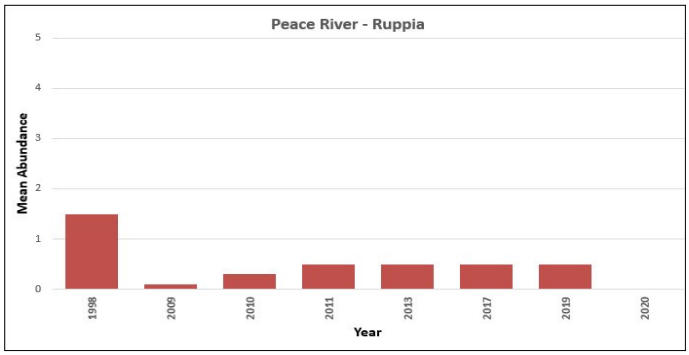
## Monitoring Sites

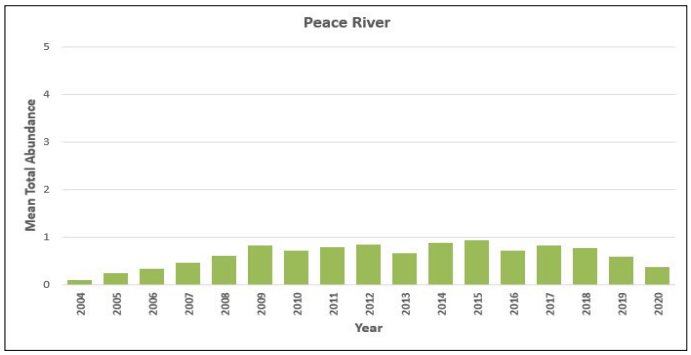
Monitoring is the repeated observation of a system to detect localized changes in a specific seagrass meadow over time in response to environmental conditions and light availability as well as measure overall health. The map to the right shows locations of monitoring sites (highlighted in pink) in selected meadows in Tidal Peace River by the Florida Department of Environmental Protection Aquatic Preserve staff. Annual seagrass monitoring in the Harbor examines species types, density, distribution, and how deep the grass will grow (this is dependent on light availability).

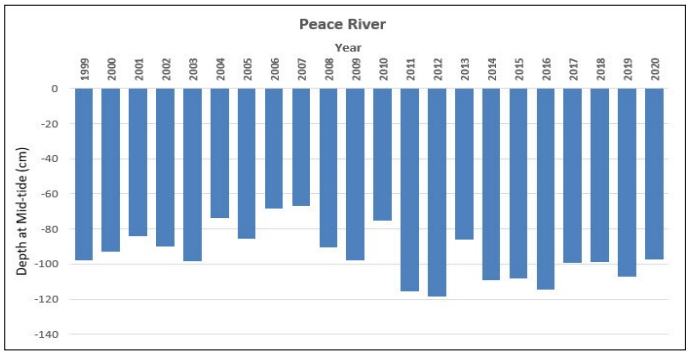

## Seagrass Diversity and Health

The bar graphs below show the total abundance for two seagrass species Shoalgrass (*Halodule wrightii*) and Widgeongrass (*Ruppia maritima*), total amount of grass, and depth at which the grass was growing at selected monitoring locations in Tidal Peace area for the years 1998-2020[3]. They demonstrate that overall density of seagrass, Shoalgrass (*Halodule wrightii*), and Widgeongrass (*Ruppia maritima*) have seen declines in abundance at multiple monitoring locations starting as far back as 2017, preceding the decline in overall acreage observed between 2018 and 2020. Note that a diverse seagrass species composition is an important indicator of a healthy seagrass meadow and serves as more complex habitat for fish and shellfish.




[1]Yarbro, L. A., and P. R. Carlson, Jr., eds. 2016. Seagrass Integrated Mapping and Monitoring Program: Mapping and Monitoring Report No. 2. Fish and Wildlife Research Institute Technical Report TR-17 version 2. vi + 281 p.
[2]Southwest Florida Water Management District (1982, 1988, 1992, 1994, 1996, 1999, 2001, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020)
[3]Charlotte Harbor Aquatic Preserves: Seagrass Transect Monitoring Program 1998-2020. Florida Department of Environmental Protection.

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*Uniting Central and Southwest Florida to protect water and wildlife*

# Macroalgae Blooms in Charlotte Harbor

# WATER QUALITY IMPROVEMENT

## Summary

Macroalgae (commonly known as seaweeds) are aquatic plants that use sunlight and nutrient in the water to survive. They are components of healthy Florida ecosystems and some amounts of macroalgae are natural in our estuaries. However, excessive blooms can have harmful effects on Florida's ecosystems and economy.

Blooms are occurring across the state and globally at an increasing frequency. Macroalgae are typically classified into three groups – red, green, and brown algae. They can detach from the bottom and float along the water and are often referred to as "drift algae".


## Contributing Factors

**Nutrient pollution** is the primary contributing factor to algae blooms and is a widespread problem in Florida. High nutrient levels (nitrogen and phosphorus) can stimulate excessive algae growth, causing more frequent and/or more severe algae blooms.

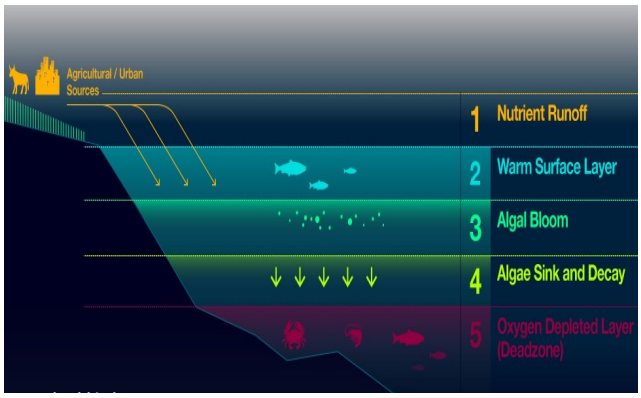
Sources of nutrient pollution include:

- Agricultural, industrial, mining, and urban stormwater runoff, as well as fertilizer runoff from lawns and golf courses.
- Development and loss of wetlands leads to high flow volumes that carry nutrients into waters.
- Improperly constructed, placed, or maintained septics can leach nutrients and bacteria into groundwater and indirectly to surface waters. Ageing wastewater infrastructure can also discharge high amounts of nutrient-rich water.

## Impacts to the Ecosystem

Both plants and animals in a bay need oxygen to survive, and the seagrasses which provide food and cover for bay creatures need light for photosynthesis. Macroalgae blooms can:

- Decrease oxygen levels in the water so they are too low to support fish and shellfish.
- When algae decays it can smother and trap nutrients in the sediment causing sediment to become mucky.
- Large blooms may shade seagrass meadows, which also need light to grow.



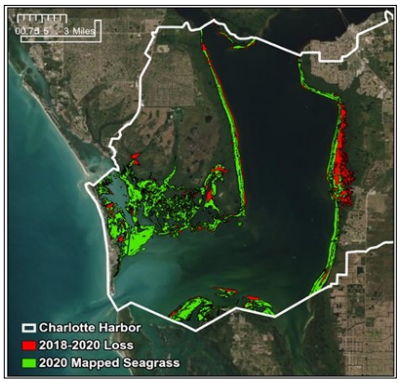

## Impacts to the Economy

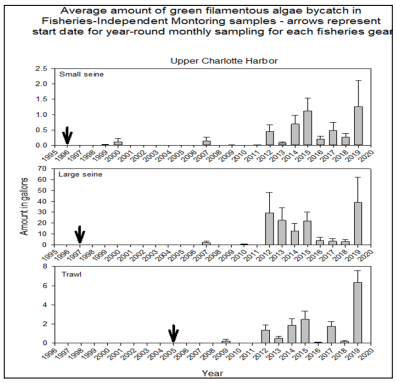
Severe or frequent algae blooms can have harmful effects on the economy as well. Recreational and tourist-based industries depend on clean and clear water as well as healthy beaches and drive a significant portion of Florida's economy, they are especially vulnerable to impacts from blooms. The economic costs include losses in tourism and recreational revenue, decreased property values, fisheries and shellfisheries closures, as well as the cost of managing these impacts (cleaning beaches and monitoring)[2].

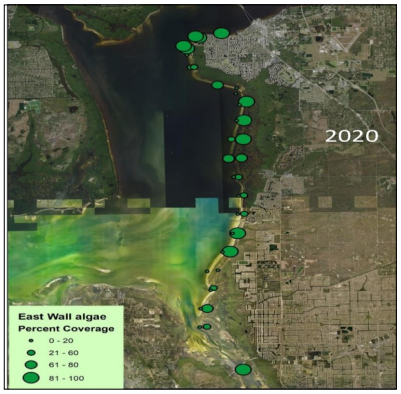
## Macroalgae Blooms in Charlotte Harbor

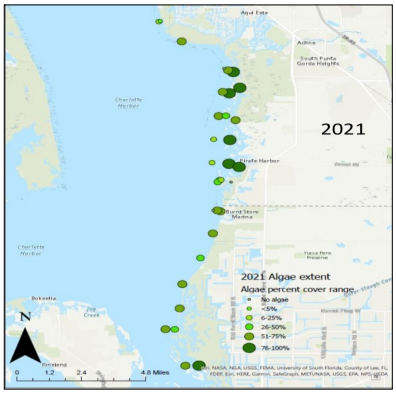
Blooms are occurring at an increasing frequency in Charlotte Harbor and surrounding estuaries[3,4,5]. FL Fish & Wildlife Fisheries Independent Monitoring (FIM) scientists have collected data Charlotte Harbor since 1989[6]. This historical data shows that large algae blooms were not seen in the Harbor until around 2012 (top right). Since then, multiple green algae blooms have occurred at 'hot spots' in the region. Following Hurricane Irma and an extended red tide bloom, another massive bloom of algae occurred in parts of Charlotte Harbor. The maps on the lower right illustrate the percent coverage of macroalgae found by scientists along the East Wall in January 2020 and again in January 2021.

Seagrass meadows along the Harbor's East Wall appear to have been severely damaged due in part to the bloom event (top left).



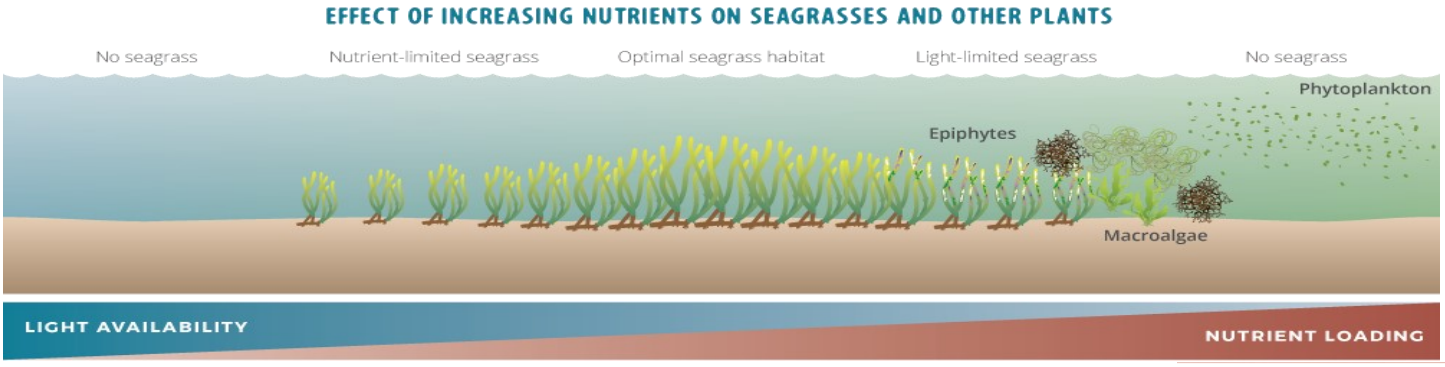




## Research and Management Needs

- Macroalgae blooms are not specifically monitored in the Charlotte Harbor region, algae data is only gathered when scientist are capturing fisheries or seagrass data. Support is needed for additional monitoring and analysis of both seagrass and algae trends together. A new citizen science project 'Eyes on Seagrass' will help add to existing scientific efforts by documenting both seagrass and algae.
- Continued studies on the impacts of climate change, as they will exacerbate stressors causing current blooms- increased temperatures and more frequent/intense storms causing more nutrient pollution runoff from land.
- Investigate to establish source/concentration for increased nutrients and manage our watersheds to mitigate.
- Support for legislation on nutrient reduction policies, as well as funding for upgrades to reduce nutrient impacts from wastewater systems and stormwater. Support for protection/restoration of wetlands that help cleanse water.




ian.umces.edu

[1]Quigley, Christine. "Sorting through the Green Stuff." *Sarasota Bay Estuary Program*, 21 Sept. 2021, https://sarasotabay.org/sorting-through-the-green-stuff/.
[2]Heil, Cynthia Ann, and Amanda Lorraine Muni-Morgan. "Florida's Harmful Algal Bloom (HAB) Problem: Escalating Risks to Human, Environmental and Economic Health with Climate Change" *Frontiers*,
[3]Florida Department of Environmental Protection, Aquatic Preserves Monitoring
[4]UF/IFAS Florida SeaGrant, Eyes on Seagrass Program
[5]Southwest Florida Water Management District
[6]Florida Fish and Wildlife Conservation Commission, Fisheries-Independent Monitoring Program

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