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Charlotte Harbor Aquatic Preserves: Propeller Scar Mapping

Final Report



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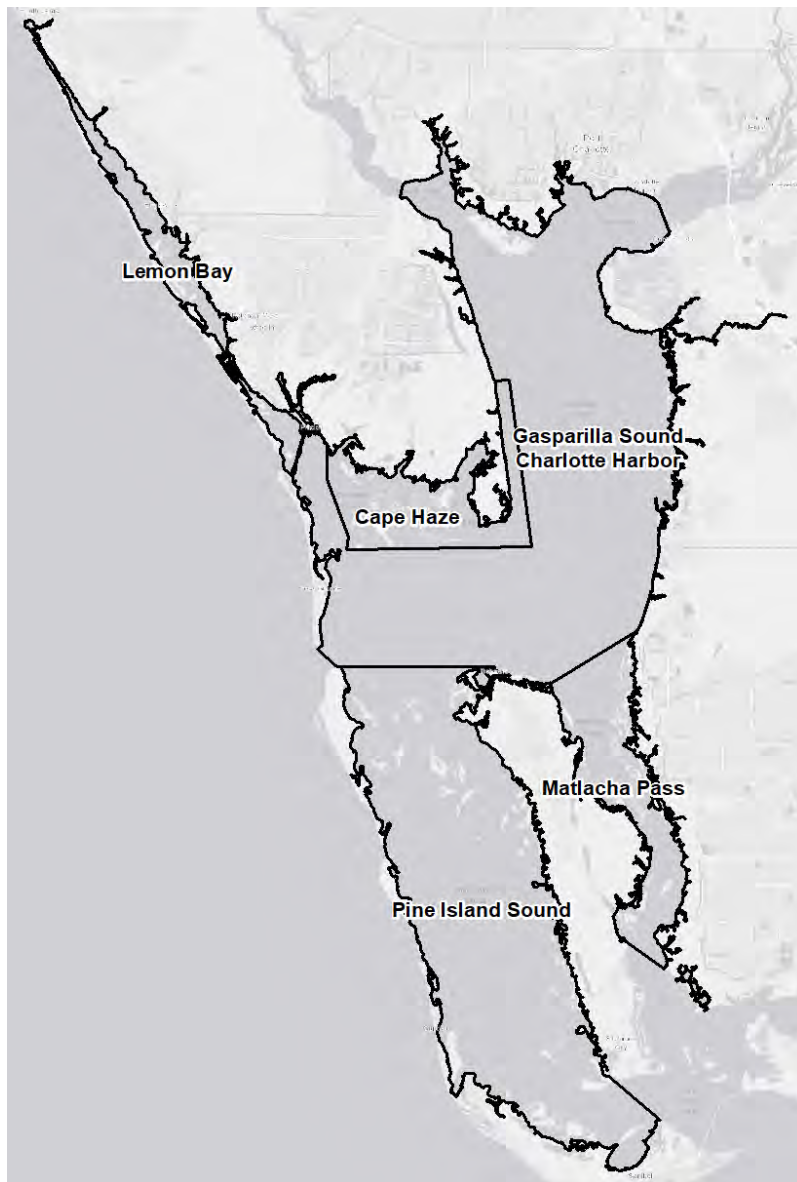
Cover Photo: Severe and moderate seagrass scarring near Little Bokeelia Bay, Pine Island Sound, Florida.

PROJECT

Location

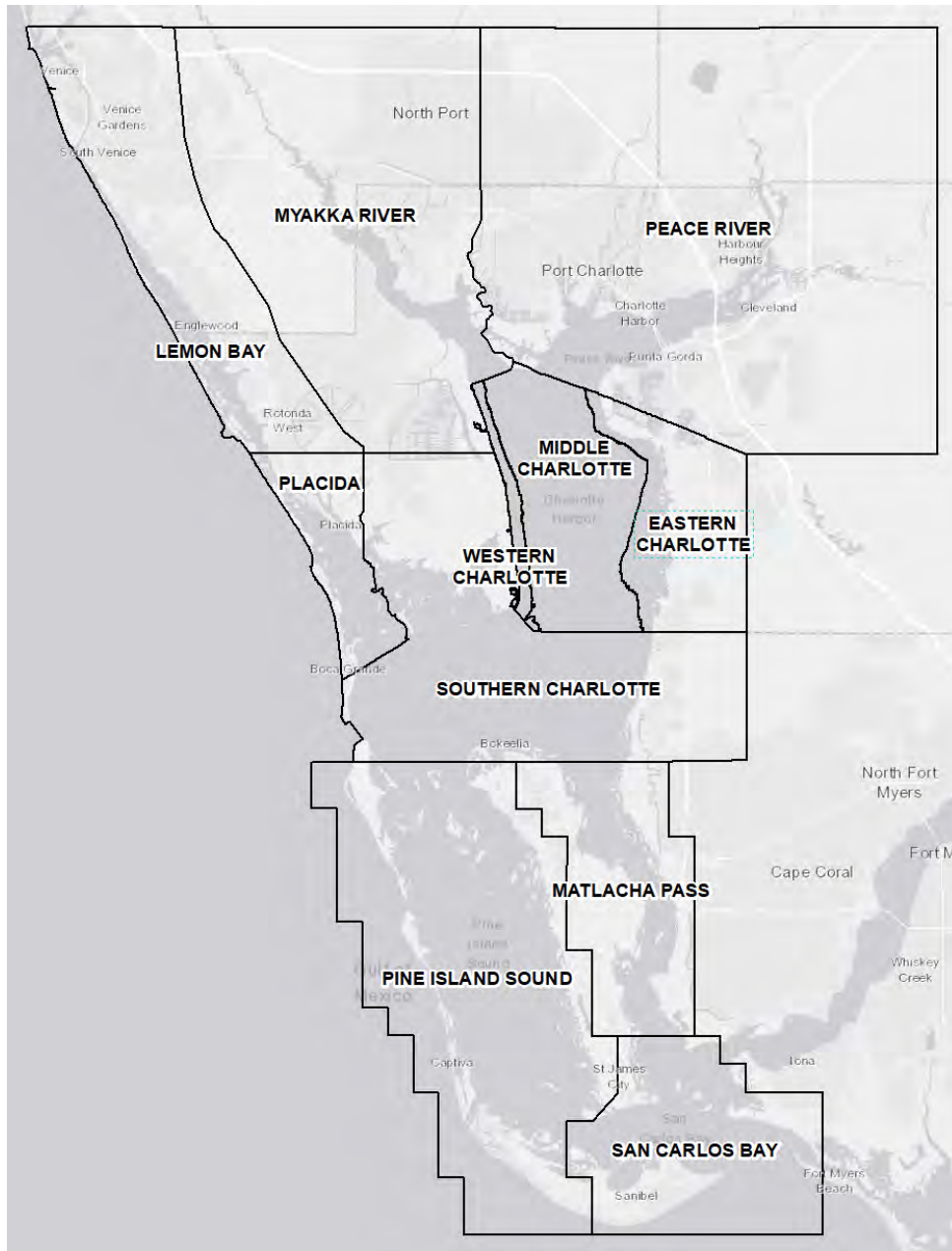
Quantum Spatial (QSI) was contracted by the Florida Department of Environmental Protection's Charlotte Harbor Aquatic Preserves to map propeller scarring within five aquatic preserves: Lemon Bay, Cape Haze, Gasparilla Sound - Charlotte Harbor, Pine Island Sound and Matlacha Pass. These aquatic preserves are zones for acreage summary and differ from previous scar map zones.

The five aquatic preserves located in southwest Florida (Map 1):



The seagrass segments have been used by water management districts to assess seagrass and were used as zones for acreage summary from the 2003 report on propeller scarring.

The seagrass segment boundaries (Map 2):



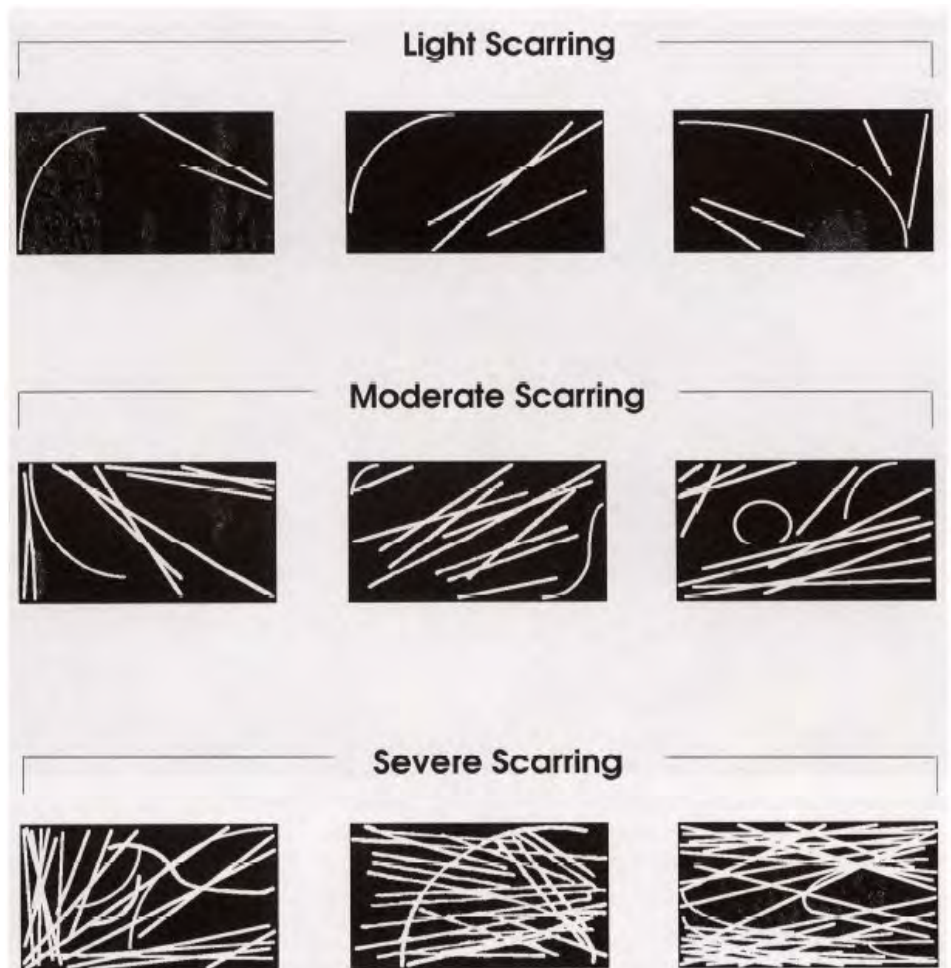
Methodology

This 2020 propeller scar mapping effort is delivered as a feature class named **propScar_2020**.

QSI reviewed the metadata provided by the 2003 propeller scar mapping completed by the Florida Fish & Wildlife Research Institute (FWRI) to determine the methodologies utilized in 2003 and mimicked these within the 2020 propeller scar mapping.

Of note was the diagrammatic representation of the three categories of estimated scarring intensity which was used as a guide for the delineation and classification of propeller scarred habitats (Sargent et al., 1995).

QSI mapped propeller scar by manually digitizing polygons overlaid on the 2020 and 2021 aerial imagery. Polygons were mapped to a minimum of one quarter (0.25) acre. These polygons were assigned a scar code value, like the 2003 mapping, of light (1), moderate (2), and severe (3).

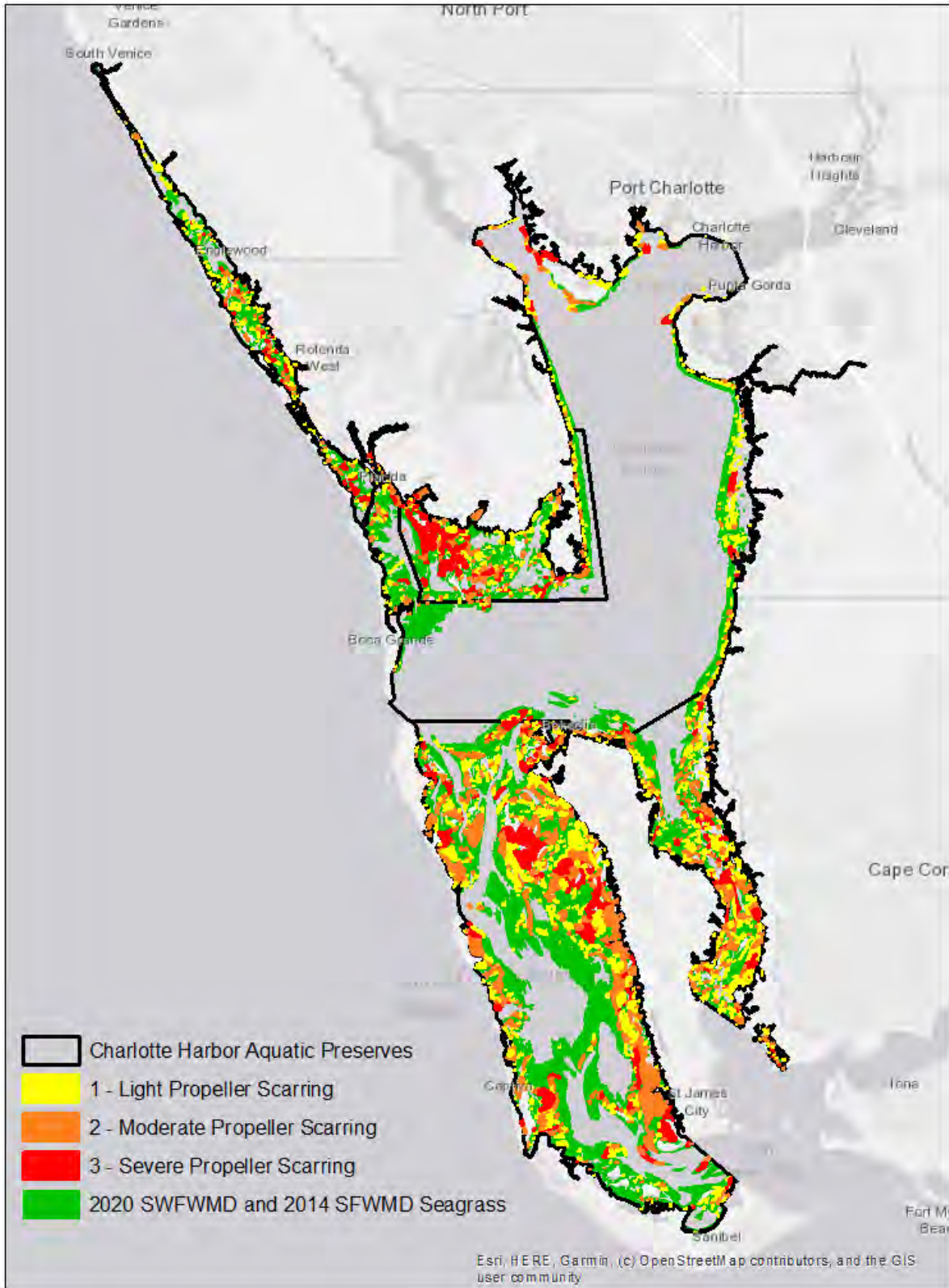


Source Data

The following items were provided by the Aquatic Preserves and used during the project:

- 2003 Propeller scar map
- Charlotte Harbor Aquatic Preserve boundaries
- Segment boundaries
- SWFWMD 2020 Aerial Imagery
- SWFWMD 2020 Seagrass polygons
- SFWMD 2021 Aerial Imagery
- SFWMD 2014 Seagrass polygons

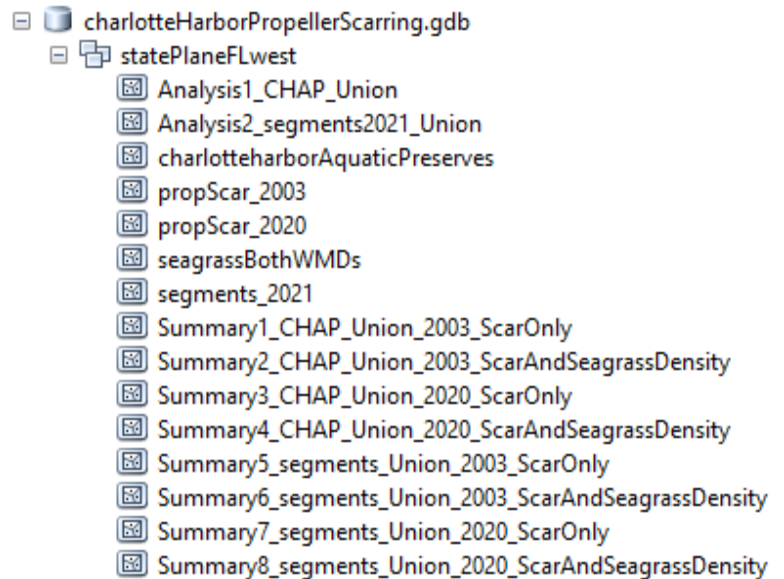
Final 2020 Propeller Scar Map



Delivered Data

The propeller scar vector data layers, alphabetically, include:

- **Analysis1_CHAP_Union:** A union of the Charlotte Harbor Aquatic Preserve (CHAP) boundaries with both the 2003 and 2020 propeller scar layers. This layer is the base layer for the summaries 1-4.
- **Analysis2_segments2021_union:** A union of the segments created for tracking and reporting of seagrass coverage in the greater Charlotte Harbor area. This is the base layer for the summaries 5-8.
- **charlotteharborAquaticPreserves:** A boundary layer of the five aquatic preserves mapped for propeller scarring.
- **propScar_2003:** A layer from the 2003 study for propeller scar mapping
- **propScar_2020:** The primary layer from the current propeller scar mapping effort.
- **seagrassBothWMDs:** A layer that combined both water management districts seagrass mapping into one layer. The SWFMWD (2020) and SFWMD (2014) were clipped to the aquatic preserve boundaries and merged. There was an omission sliver along the boundary where the two should meet of 1-6 feet. This sliver was filled in by extending SWFMWD's polygons south by 1-6 feet to meet without overlap nor gap the SFWMD data.
- **Segments_2021:** A boundary layer that combined seagrass segment layers from SWFMWD and SFWMD to create a replication of the seagrass segments from the 2003 mapping.
- **SummaryX_CHAP_Union_X_X:** Summaries 1 through 4 which dissolved either the 2003 polygons or the 2020 polygons from Analysis1 with only the scar code or both the scar code and the seagrass density to provide four unique summaries per aquatic preserve boundary. Named respectively.
 - The summary layers are also exported to tabular (.dbf) for excel input.
- **SummaryX_segments_Union_X_X:** Summaries 5 through 8 dissolved either the 2003 polygons or the 2020 polygons from Analysis2 with only the scar code or both the scar code and the seagrass density to provide four unique summaries per segment boundary. Name respectively.
 - The summary layers are also exported to tabular (.dbf) for excel input.



COMPARISONS

Propscar acreage reported by Aquatic Preserve (Map 1)

The 2020 propeller scar map shows a decrease of 36% overall scarring compared to 2003 within the Charlotte Harbor Aquatic Preserves. Total acreage decreased to a total of 17,113 acres in 2020 from 26,941 acres in 2003. While each aquatic preserve saw a decrease Pine Island Sound saw the smallest decrease, of -15%, for the five aquatic perseveres (the other 4 average was -54%).

	2003 Acres	2020 Acres	Increase/ Decrease (Acres)	Increase/ Decrease (%)
Cape Haze (Total size: 12,739 acres)				
Light	686	358	-328	-48%
Moderate	2,472	541	-1,931	-78%
Severe	1,023	965	-58	-6%
Total	4,181	1,865	-2,316	-55%
% AP scarred	33%	15%		

Gasparilla Sound Charlotte Harbor (Total size: 84,492 acres)				
Light	186	563	377	202%
Moderate	3,873	396	-3,477	-90%
Severe	523	439	-84	-16%
Total	4,582	1,398	-3,184	-69%
% AP scarred	5%	2%		

Lemon Bay (Total size: 7,226 acres)				
Light	122	218	96	78%
Moderate	479	147	-332	-69%
Severe	579	207	-373	-64%
Total	1,180	571	-609	-52%
% AP scarred	16%	8%		

Matlacha Pass (Total size: 14,620 acres)				
Light	426	1,026	599	141%
Moderate	1,943	1,005	-938	-48%
Severe	2,062	599	-1,463	-71%
Total	4,432	2,630	-1,802	-41%
% AP scarred	30%	18%		

Pine Island Sound (Total size: 58,401 acres)				
Light	1,770	2,853	1,083	61%
Moderate	5,465	5,246	-219	-4%
Severe	5,330	2,550	-2,781	-52%
Total	12,565	10,649	-1,916	-15%
% AP scarred	22%	18%		

Grand Total	26,941	17,113	-9,828	-36%
% AP scarred	15%	10%		

* This table is also found in 2020propScarSummaries.xlsx derived from the CHAP summaries 1 & 2.

Propscar acreage reported by Seagrass Segments (Map 2)

The same base map of the 2020 propeller scar map was used to compare the seagrass segments and shows the same decrease of 36% overall scarring compared to 2003. For comparison the 2020 and 2003 acreages are summarized for acreage per seagrass segment (Map 2). *Note that the seagrass segments do not have a percent total area scarred, due to the segment boundary including land and open water.

	2003 Acres	2020 Acres	Increase/ Decrease (Acres)	Increase/ Decrease (%)
EASTERN CHARLOTTE				
Light	0	217	217	n/a
Moderate	2,698	46	-2,652	-98%
Severe	19	101	82	428%
Total	2,717	365	-2,352	-87%

LEMON BAY				
Light	122	183	61	50%
Moderate	371	122	-249	-67%
Severe	331	108	-223	-67%
Total	823	413	-411	-50%

MATLACHA PASS				
Light	426	981	555	130%
Moderate	1,682	937	-745	-44%
Severe	1,959	562	-1,397	-71%
Total	4,067	2,480	-1,587	-39%

MIDDLE CHARLOTTE				
Light	32	17	-15	-46%
Moderate	63	18	-45	-71%
Severe	0	0	0	n/a
Total	94	35	-59	-63%

MYAKKA RIVER				
Light	72	57	-15	-20%
Moderate	54	77	23	43%
Severe	3.8	104.3	100.5	2605%
Total	130	239	109	84%

PEACE RIVER				
Light	44	105	61	137%
Moderate	23	66	44	192%
Severe	0	112	112	n/a
Total	67	283	216	322%

PINE ISLAND SOUND				
Light	1,717	2,711	993	58%
Moderate	5,158	5,084	-74	-1%
Severe	4,702	2,307	-2,395	-51%
Total	11,577	10,101	-1,475	-13%

PLACIDA				
Light	31.6	109.1	77.5	245%
Moderate	857	144	-713	-83%
Severe	519	239	-280	-54%
Total	1,407	492	-915	-65%

SAN CARLOS BAY				
Light	53	85	32	61%
Moderate	307	63	-245	-80%
Severe	232	72	-160	-69%
Total	592	220	-372	-63%

SOUTHERN CHARLOTTE				
Light	690	484	-206	-30%
Moderate	2,697	714	-1,983	-74%
Severe	1,434	1,145	-288	-20%
Total	4,821	2,343	-2,478	-51%

WESTERN CHARLOTTE				
Light	2.5	67.9	65.4	2640%
Moderate	324	64	-260	-80%
Severe	319	10	-310	-97%
Total	645	141	-504	-78%

Grand Total	26,941	17,113	-9,828	-36%
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* This table is also found in 2020propScarSummaries.xlsx derived from the Segments summaries 5 &6.

Propscar severity reported by Aquatic Preserve (Map 3)

The 17,113 acres of 2020 propeller scarring has been summarized by severity per Charlotte Harbor Aquatic Preserve and by seagrass density per Charlotte Harbor Aquatic Preserve, by varying size using the sum of acres per aquatic preserve.

*Note: Pine Island Sound has the highest amount of scarring, whereas Lemon Bay has the least.

**Note: The 2020 propeller scar map captured scarring that may have occurred on algae, oyster, or other non-seagrass cover types from the SWFWMD and SFWMD FLUCCS maps.

