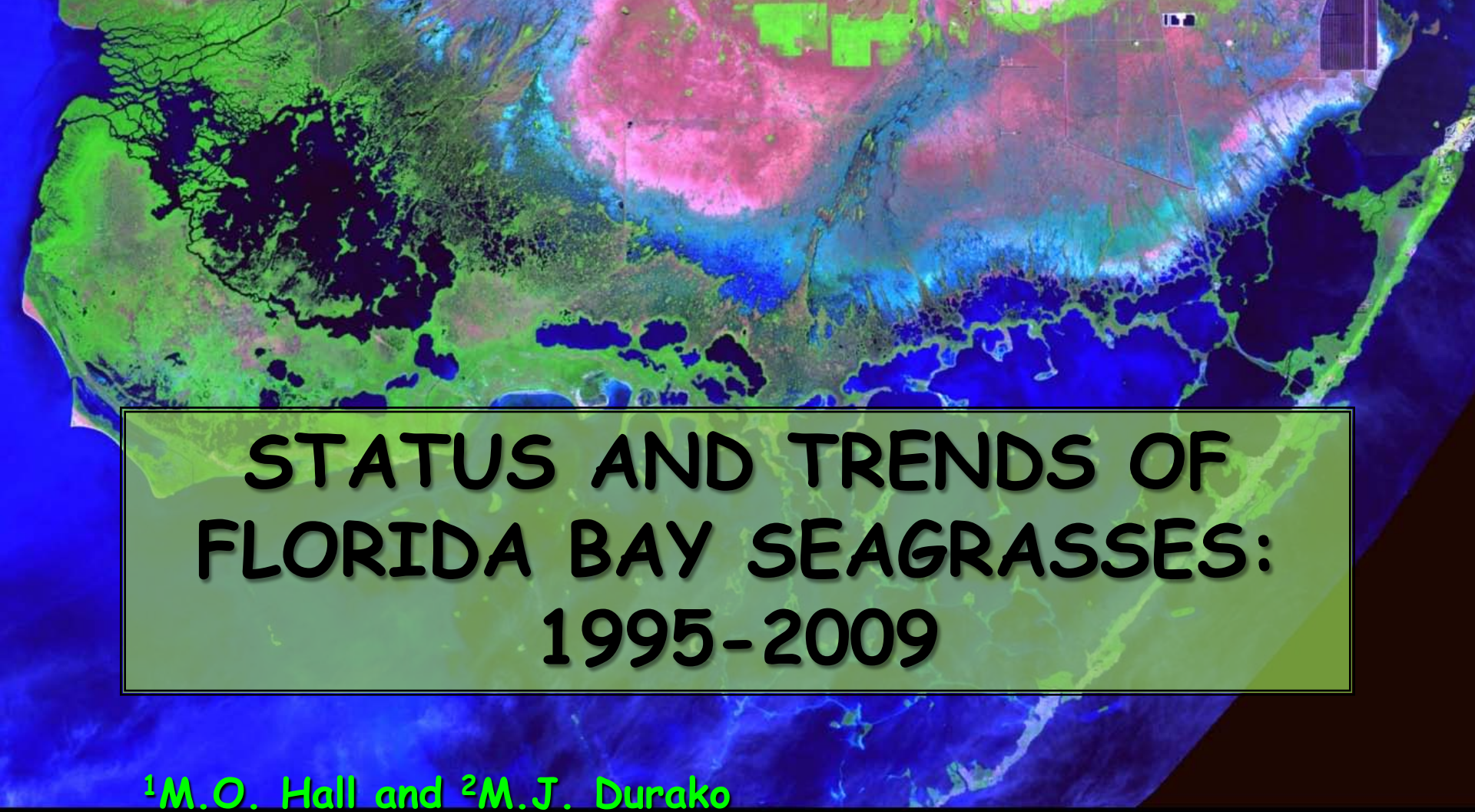
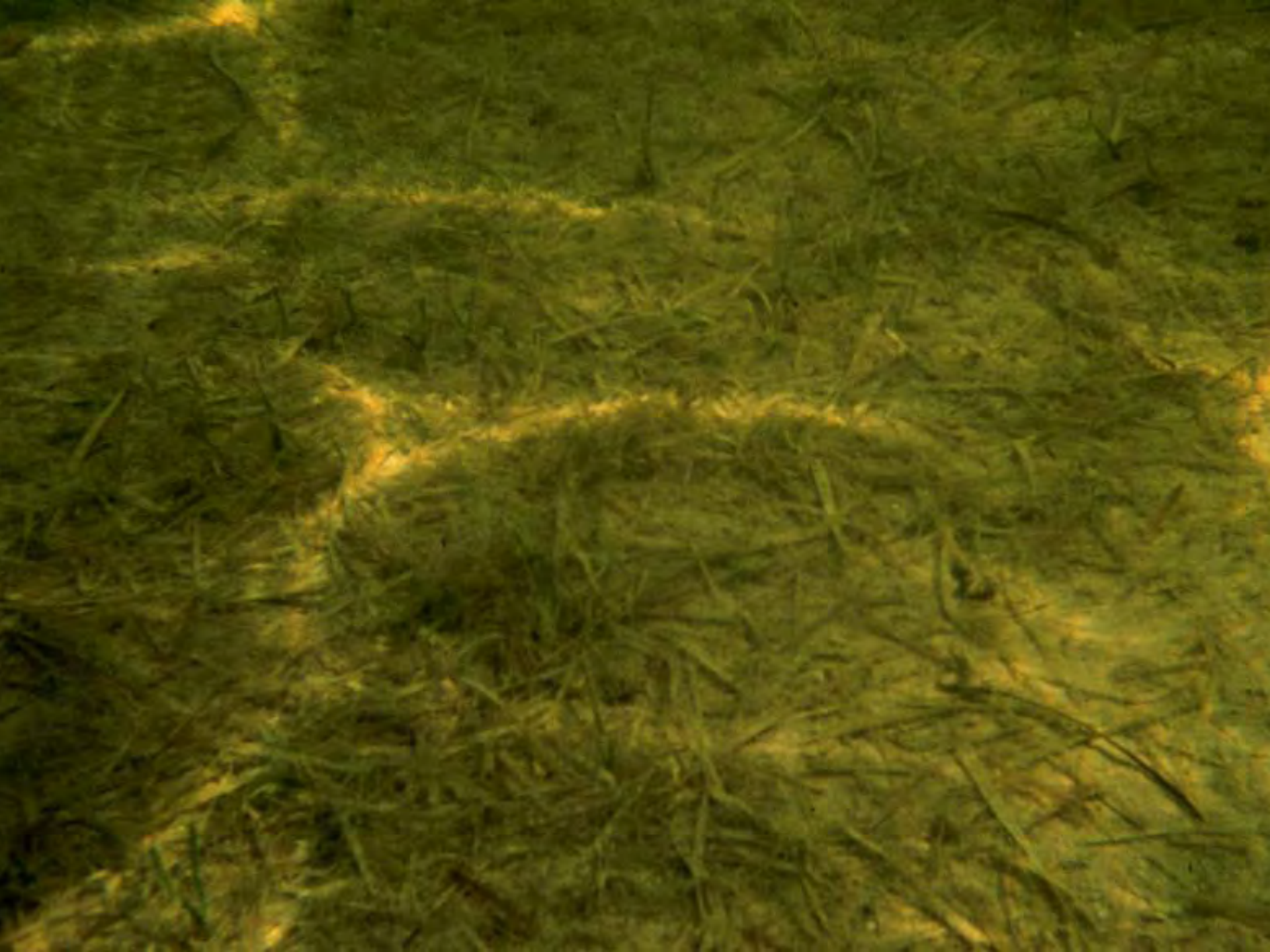
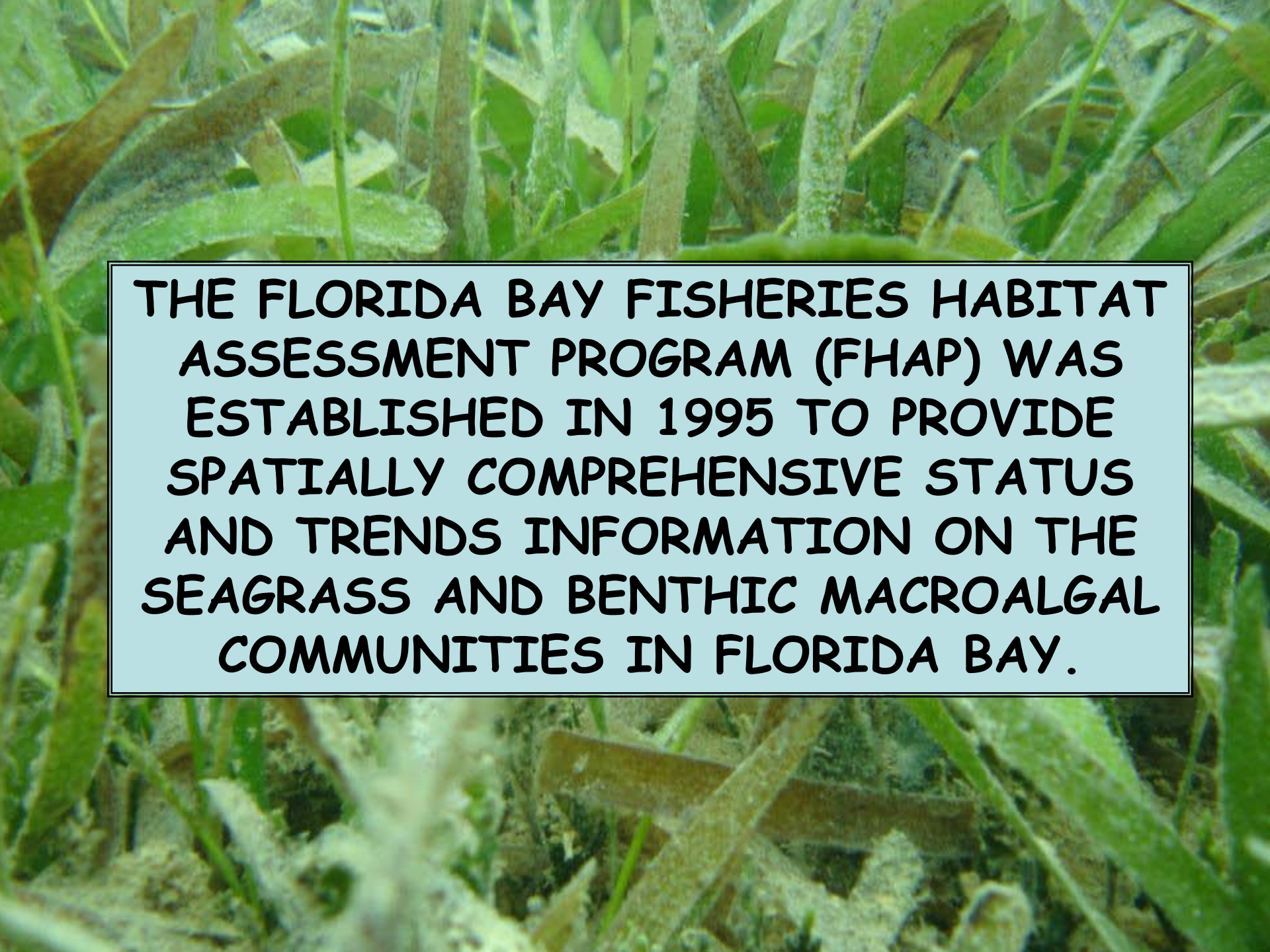


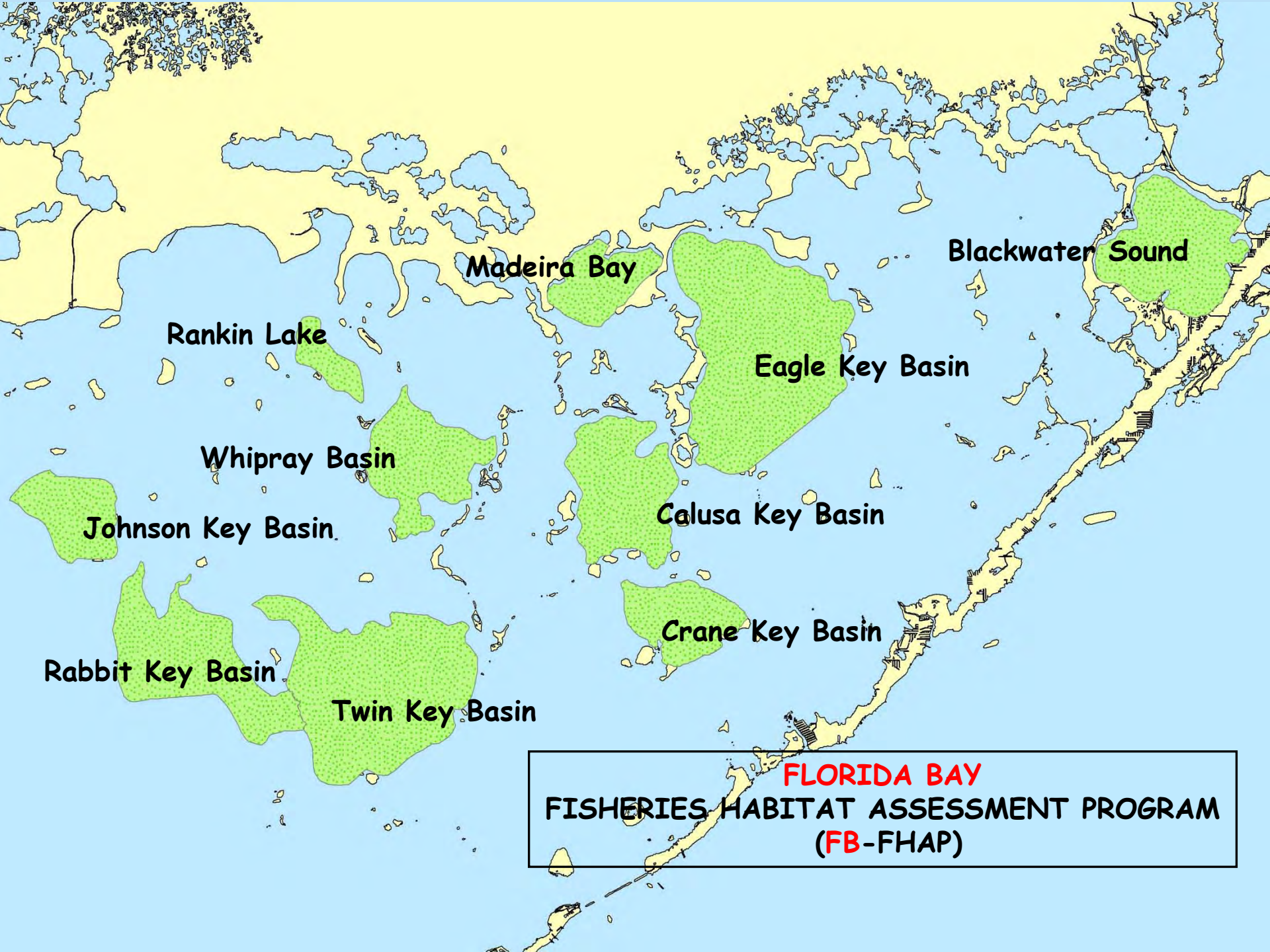
STATUS AND TRENDS OF FLORIDA BAY SEAGRASSES: 1995-2009

[1]M.O. Hall and [2]M.J. Durako
[1]Florida Fish and Wildlife Conservation Commission, Florida Fish and Wildlife Research Institute
[2]Center for Marine Science, University of North Carolina at Wilmington

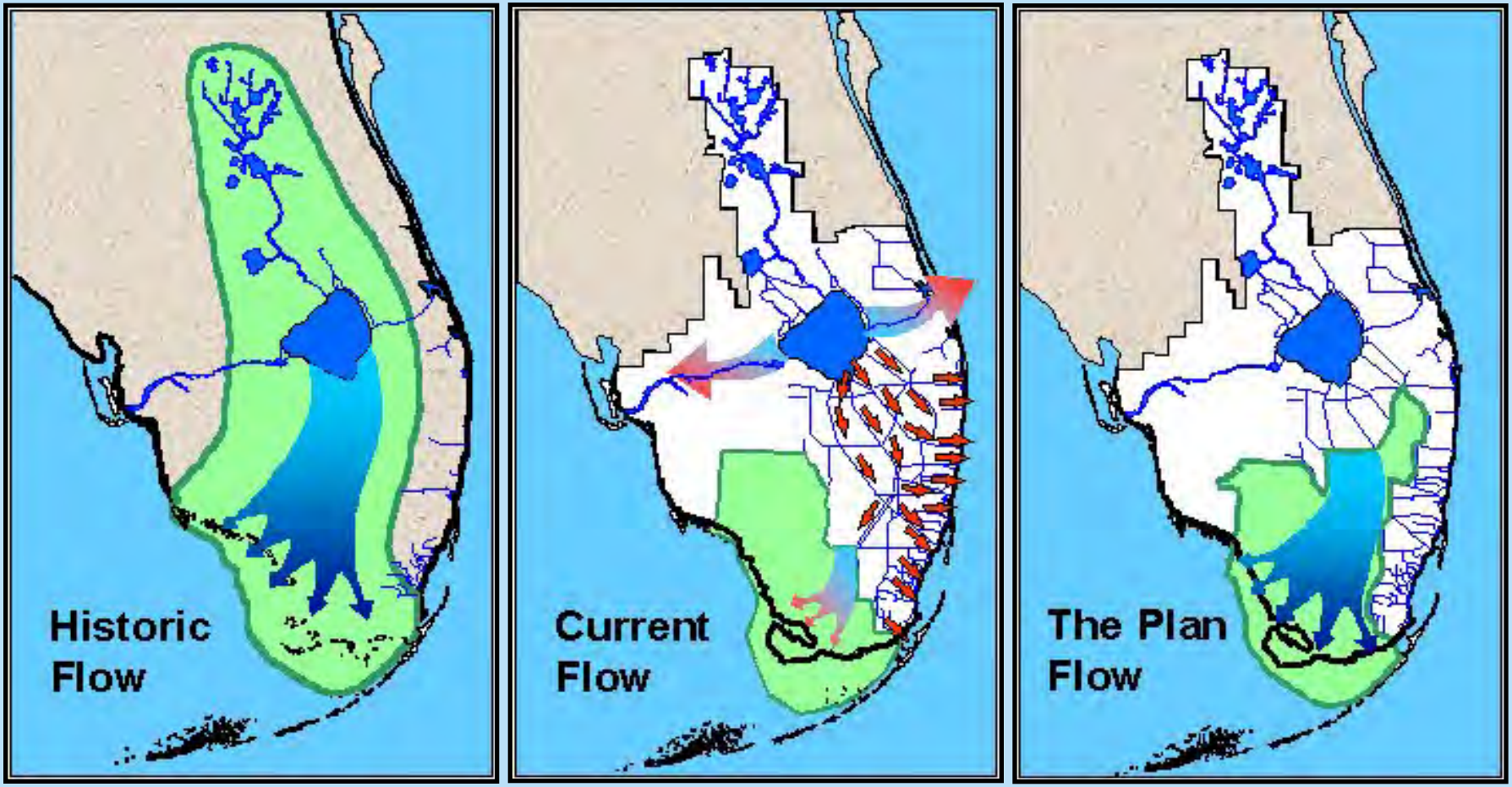




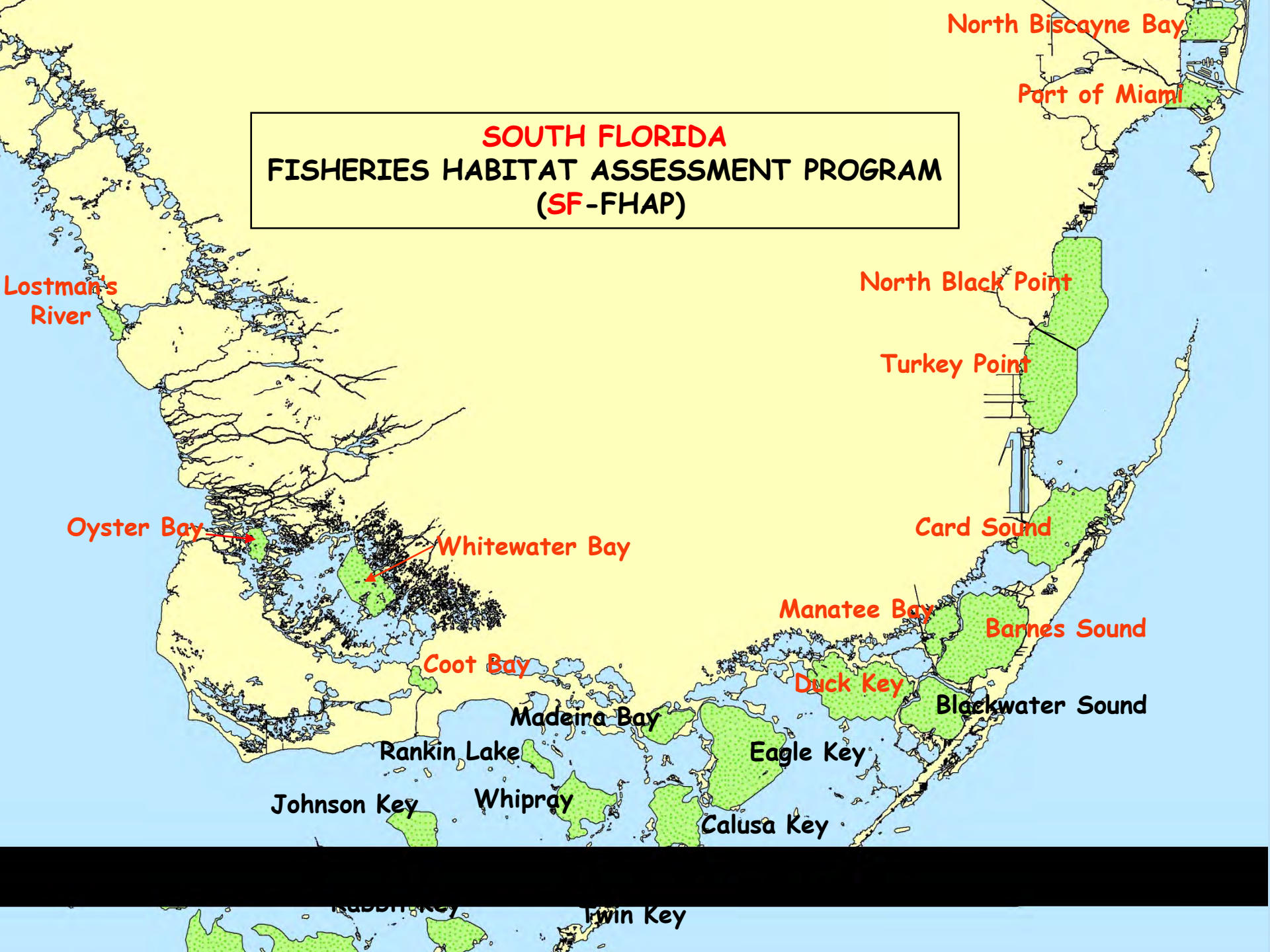
THE FLORIDA BAY FISHERIES HABITAT ASSESSMENT PROGRAM (FHAP) WAS ESTABLISHED IN 1995 TO PROVIDE SPATIALLY COMPREHENSIVE STATUS AND TRENDS INFORMATION ON THE SEAGRASS AND BENTHIC MACROALGAL COMMUNITIES IN FLORIDA BAY.

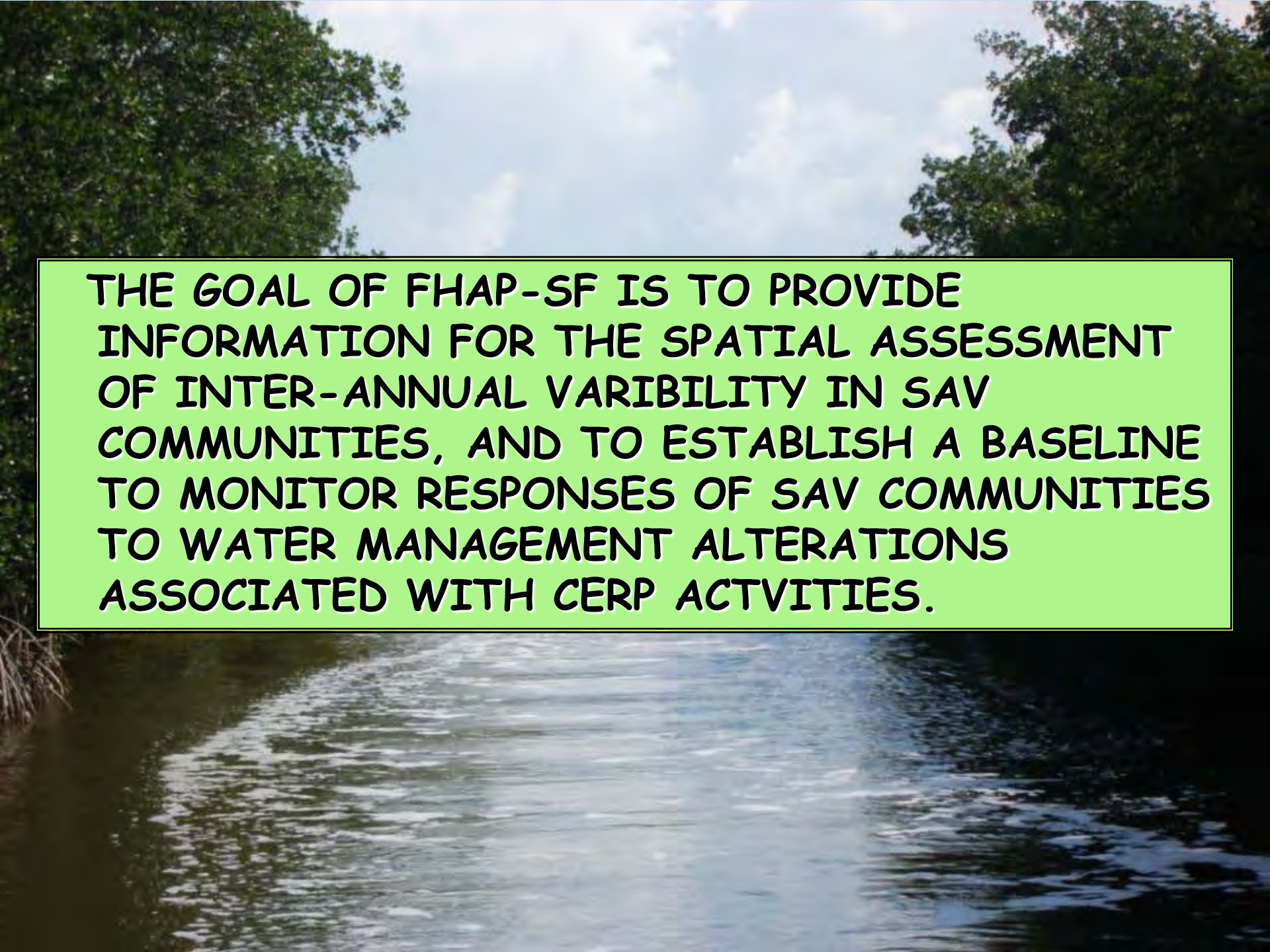

Madeira Bay
Blackwater Sound
Rankin Lake
Eagle Key Basin
Whipray Basin
Johnson Key Basin
Calusa Key Basin
Crane Key Basin
Rabbit Key Basin
Twin Key Basin
FLORIDA BAY
FISHERIES HABITAT ASSESSMENT PROGRAM
(FB-FHAP)

THE CERP PLAN



CERP IMPLEMENTATION WILL ALTER THE VOLUME, TIMING, AND SPATIAL DISTRIBUTION OF FRESHWATER INFLOW, RETURNING THE SOUTH FLORIDA SYSTEM TO MORE NATURAL HYDROLOGICAL CONDITIONS.


SOUTH FLORIDA
FISHERIES HABITAT ASSESSMENT PROGRAM
(SF-FHAP)
North Biscayne Bay
Port of Miami
Lostman's River
North Black Point
Turkey Point
Oyster Bay
Whitewater Bay
Card Sound
Manatee Bay
Barnes Sound
Coot Bay
Duck Key
Blackwater Sound
Madeira Bay
Rankin Lake
Eagle Key
Johnson Key
Whipray
Calusa Key
Twin Key

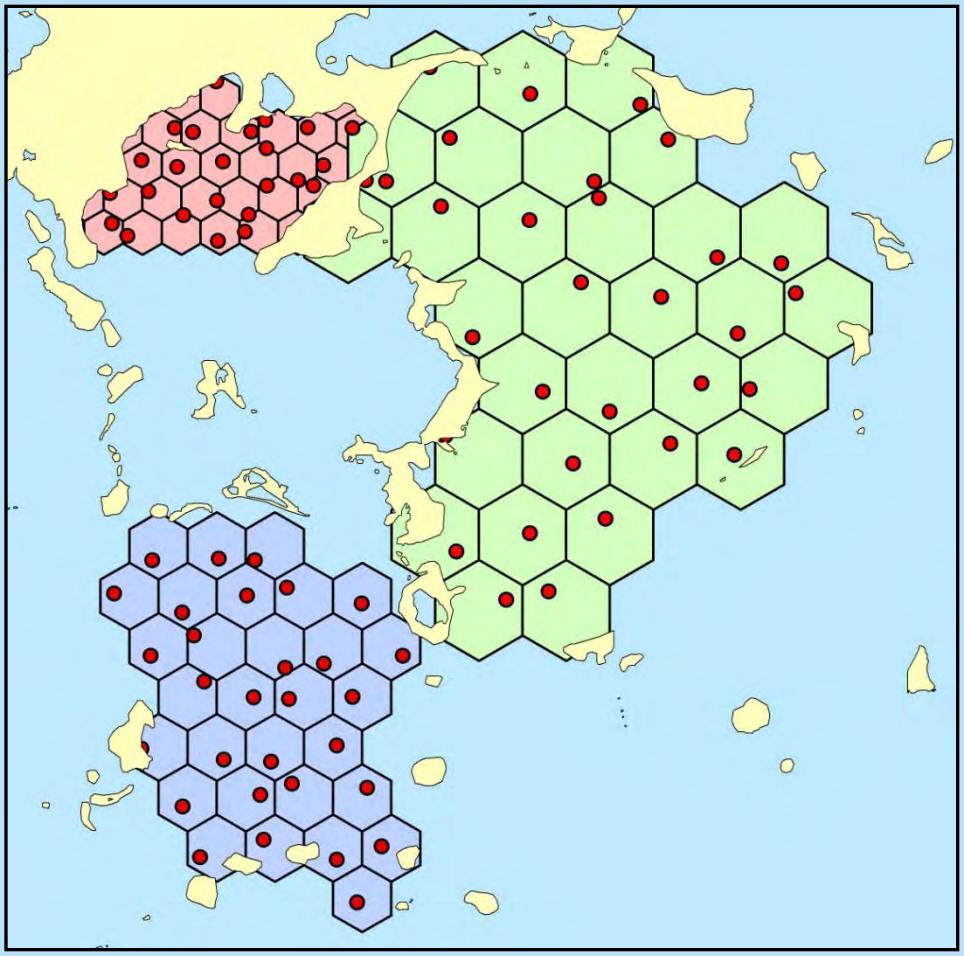

THE GOAL OF FHAP-SF IS TO PROVIDE INFORMATION FOR THE SPATIAL ASSESSMENT OF INTER-ANNUAL VARIBILITY IN SAV COMMUNITIES, AND TO ESTABLISH A BASELINE TO MONITOR RESPONSES OF SAV COMMUNITIES TO WATER MANAGEMENT ALTERATIONS ASSOCIATED WITH CERP ACTVITIES.

SAMPLING DESIGN:

- MONITORING STATIONS ARE DETERMINED USING A SYSTEMATIC RANDOM-SAMPLING DESIGN.

- EACH LOCATION IS DIVIDED INTO 30 TESSELATED HEXAGONAL GRID CELLS.

- SINGLE SAMPLING STATION RANDOMLY SELECTED FROM EACH GRID CELL.



SEAGRASS DISTRIBUTION AND ABUNDANCE:

- SAV COVER IS VISUALLY ASSESSED USING A MODIFIED BRAUN-BLANQUET FREQUENCY/COVER ANALYSIS.
- EIGHT 0.25 M2 QUADRATS ARE EXAMINED AT EACH STATION.
- MONITORING CONDUCTED ANNUALLY AT THE END OF THE DRY SEASON (MAY OR JUNE).

Braun/Blanquet Cover Abundance Scale

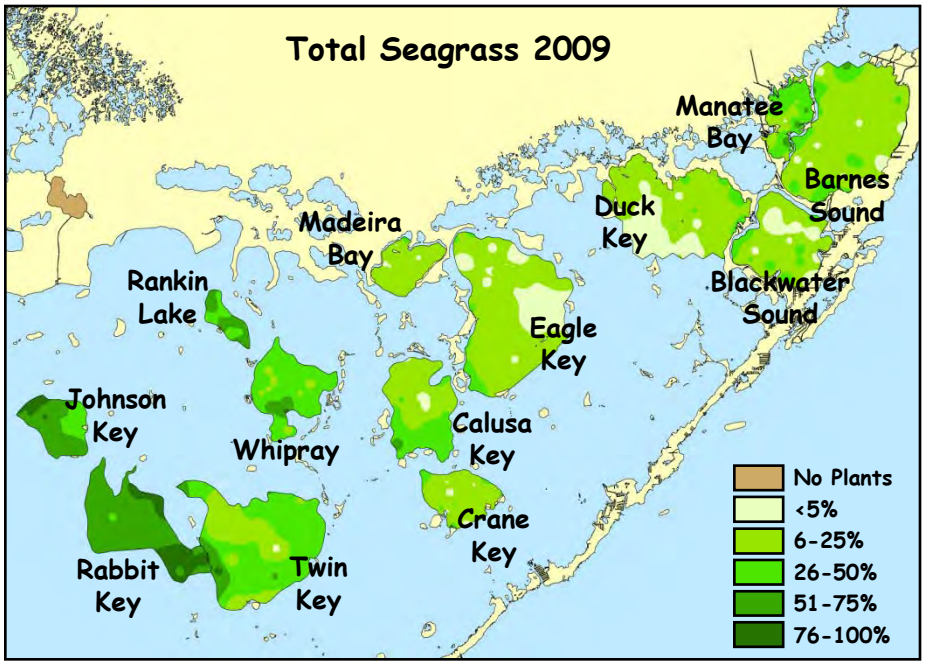
0.1 = Solitary shoot with small cover
0.5 = Few shoots with small cover
1.0 = Numerous shoots, < 5% cover
2.0 = Any number of shoots, 5-25% cover
3.0 = Any number of shoots, 26-50% cover
4.0 = Any number of shoots, 51-75% cover
5.0 = Any number of shoots, 76-100% cover

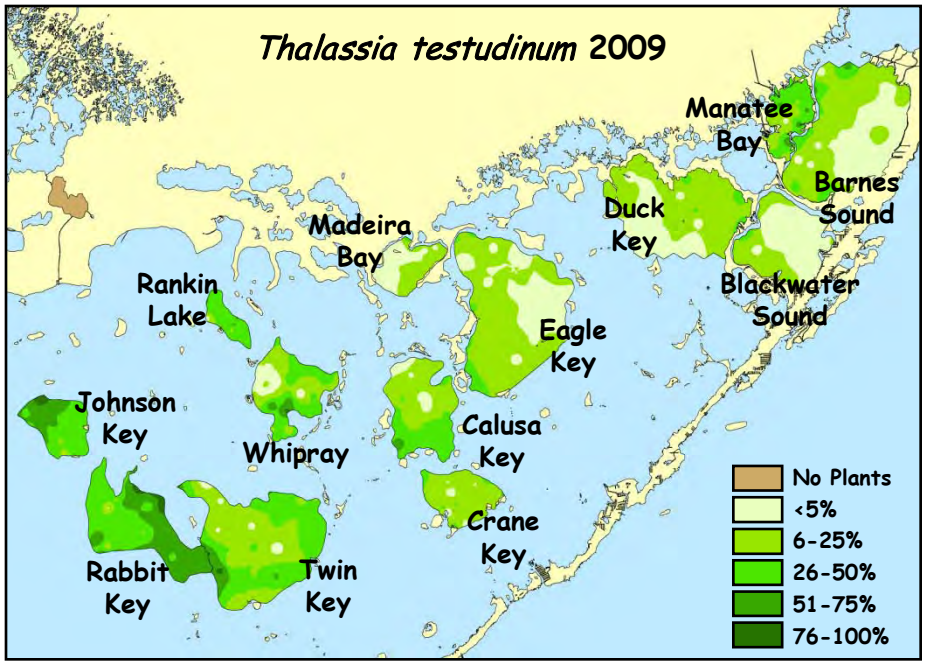
EPIPHYTE ABUNDANCE AND SHOOT MORPHOMETRICS:

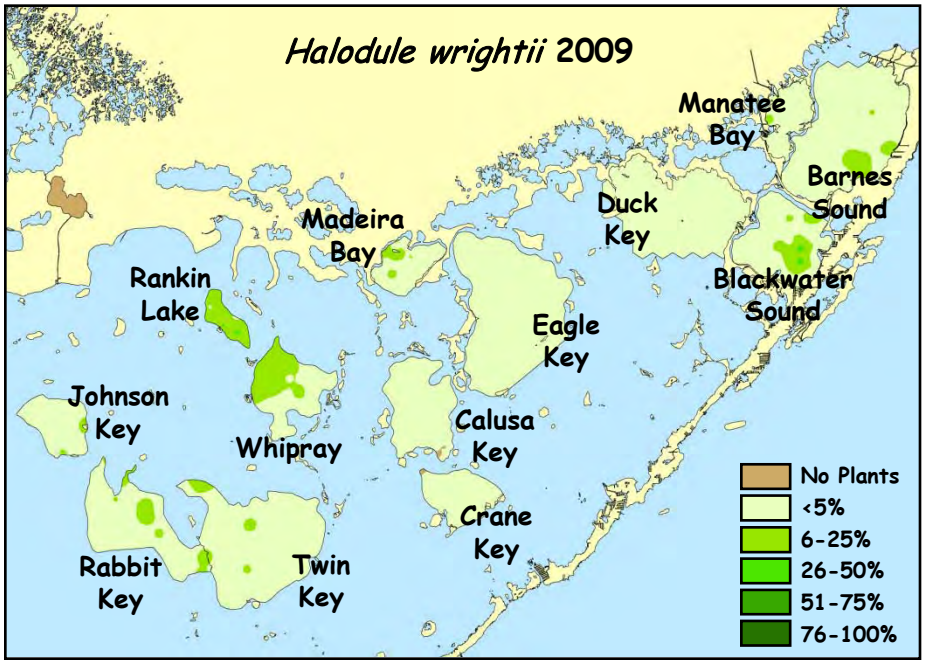
- TEN *THALASSIA* SHOOTS ARE COLLECTED AT EACH SITE TO DETERMINE EPIPHYTE ABUNDANCE AND SHOOT MORPHOMETRICS.

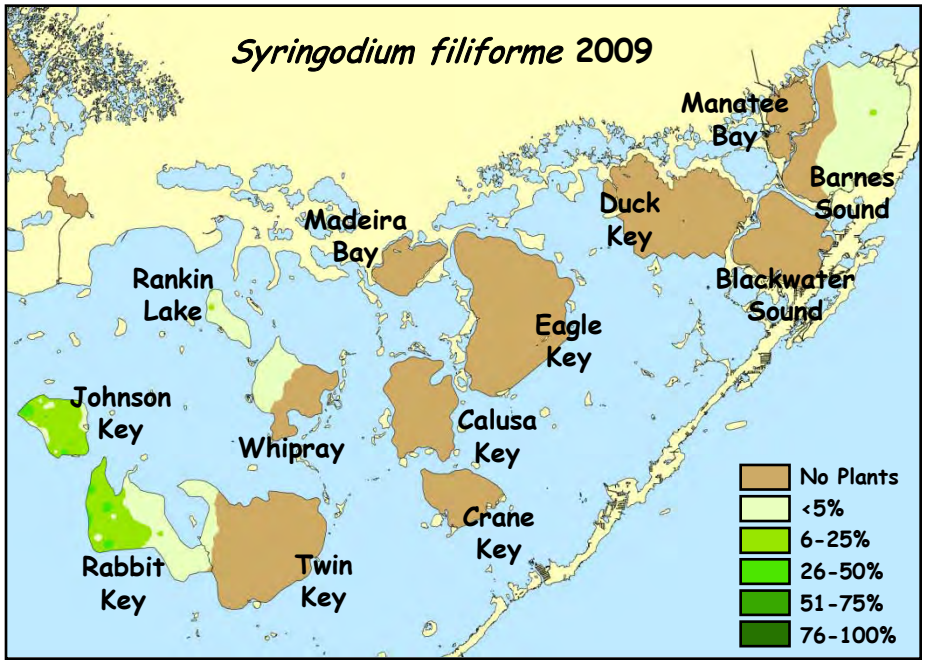
THALASSIA PHOTOSYNTHETIC CHARACTERISTICS:

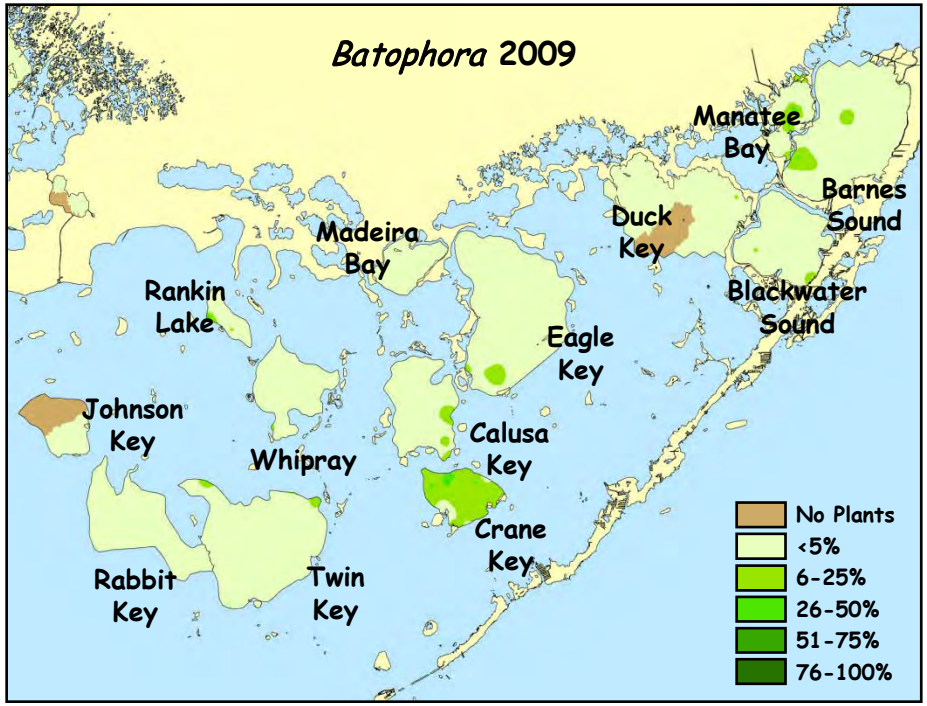
- PHOTOSYNTHETIC EFFICIENCY IS MEASURED AT EACH STATION USING A PULSE-AMPLITUDE MODULATED (PAM) FLUORESCENCE METER.
- CHANGES IN PHOTOSYNTHETIC CHARACTERISTICS MAY BE EVIDENT BEFORE CHANGES IN SEAGRASS ABUNDANCE AND BIOMASS BECOME APPARENT.

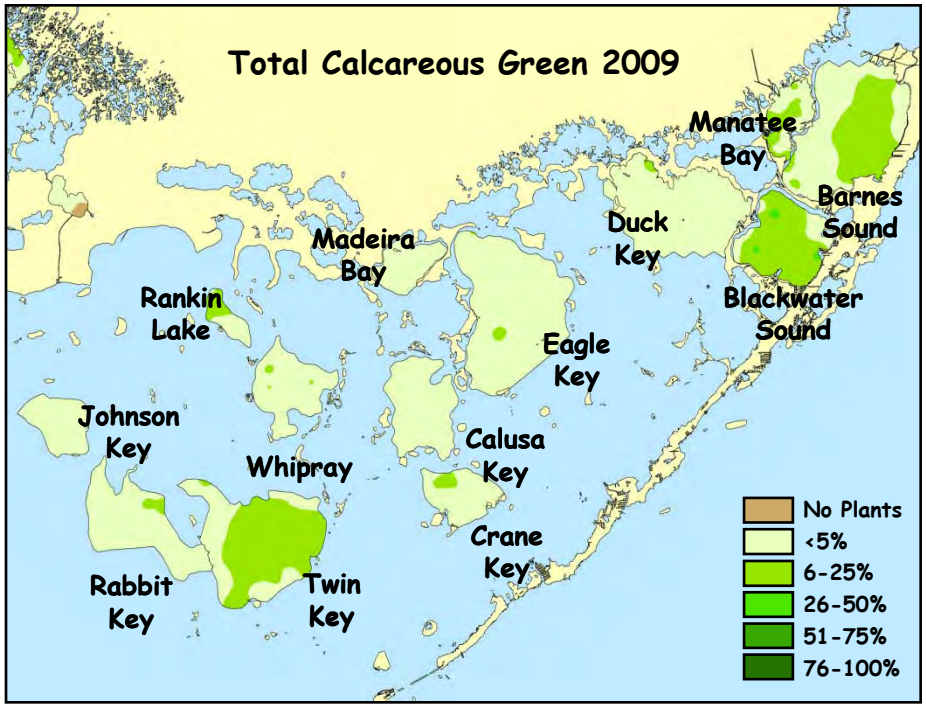

Total Seagrass 2009
Manatee Bay
Barnes Sound
Duck Key
Madeira Bay
Rankin Lake
Blackwater Sound
Eagle Key
Johnson Key
Calusa Key
Whipray
Crane Key
Rabbit Key
Twin Key
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

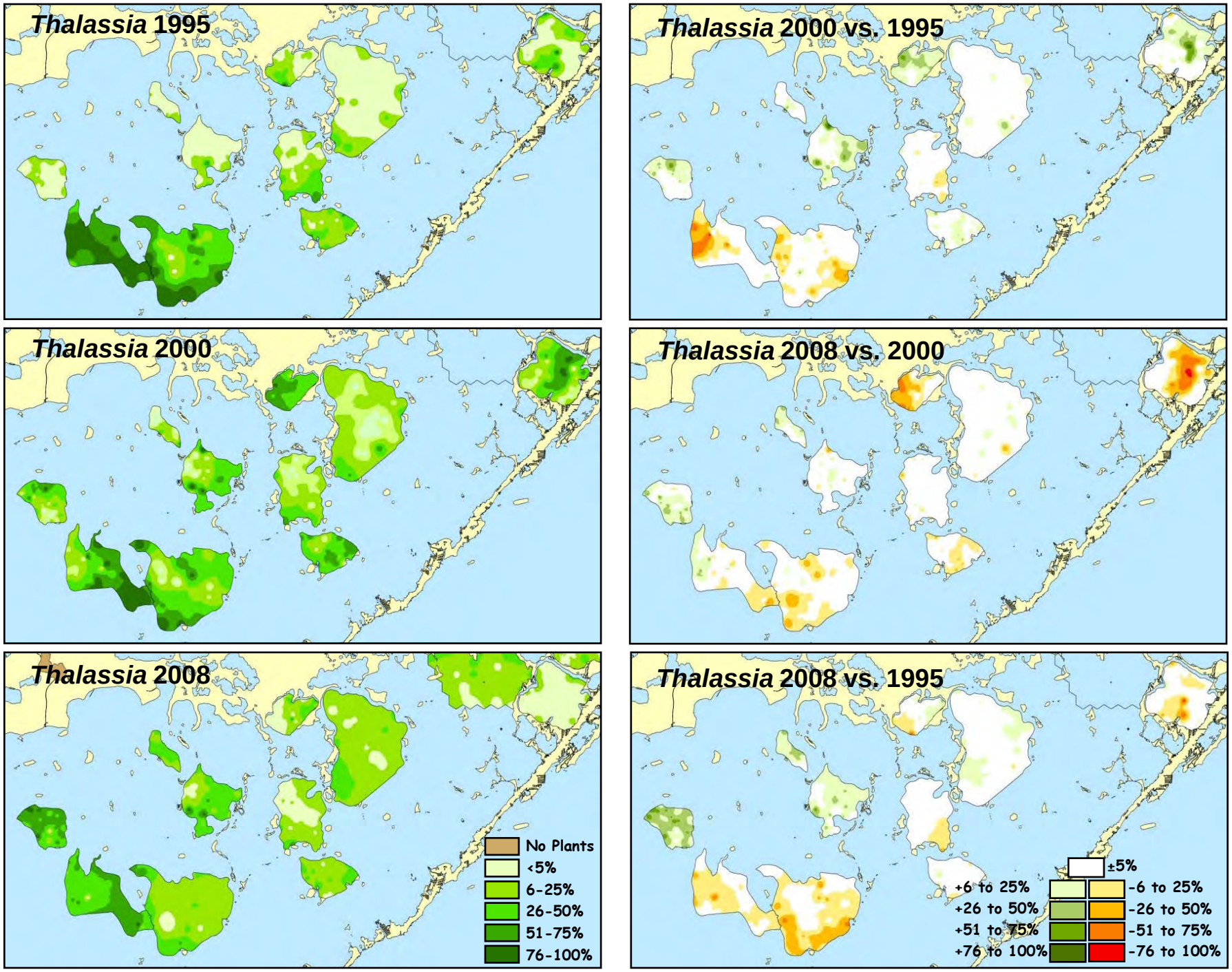

Thalassia testudinum 2009
Manatee Bay
Barnes Sound
Duck Key
Madeira Bay
Rankin Lake
Blackwater Sound
Eagle Key
Johnson Key
Calusa Key
Whipray
Crane Key
Rabbit Key
Twin Key
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

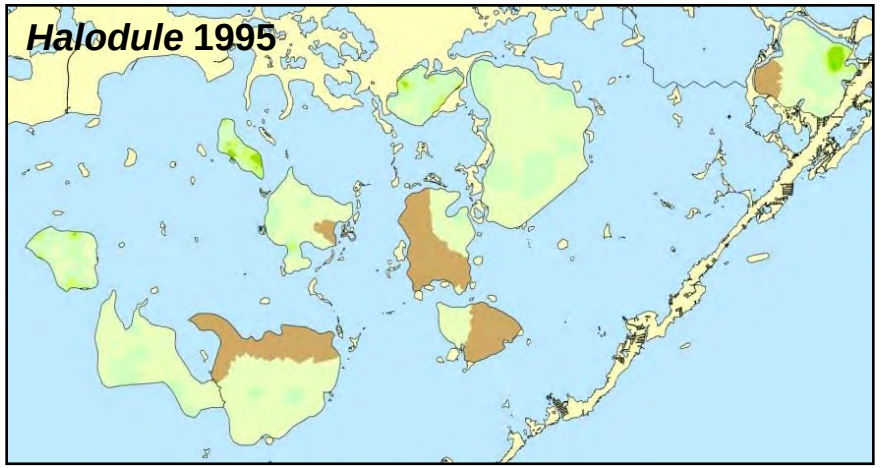

Halodule wrightii 2009
Manatee Bay
Barnes Sound
Duck Key
Madeira Bay
Rankin Lake
Blackwater Sound
Eagle Key
Johnson Key
Calusa Key
Whipray
Crane Key
Rabbit Key
Twin Key
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

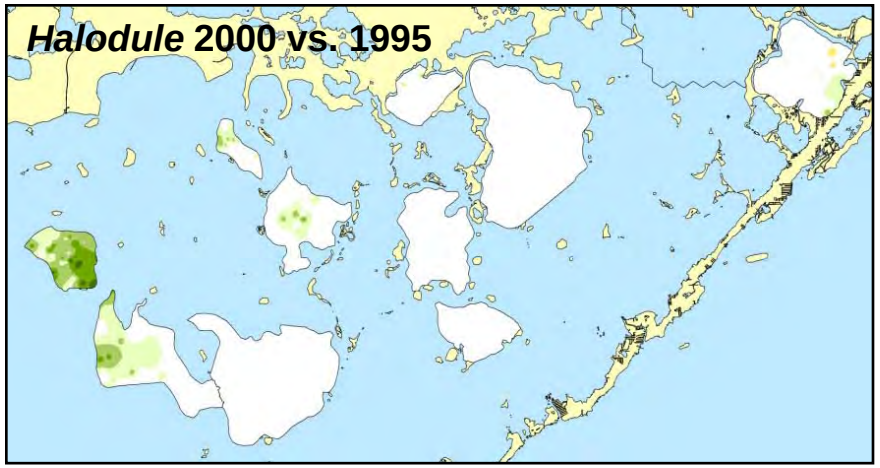

Syringodium filiforme 2009
Manatee Bay
Barnes Sound
Duck Key
Madeira Bay
Rankin Lake
Blackwater Sound
Eagle Key
Johnson Key
Calusa Key
Whipray
Crane Key
Rabbit Key
Twin Key
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

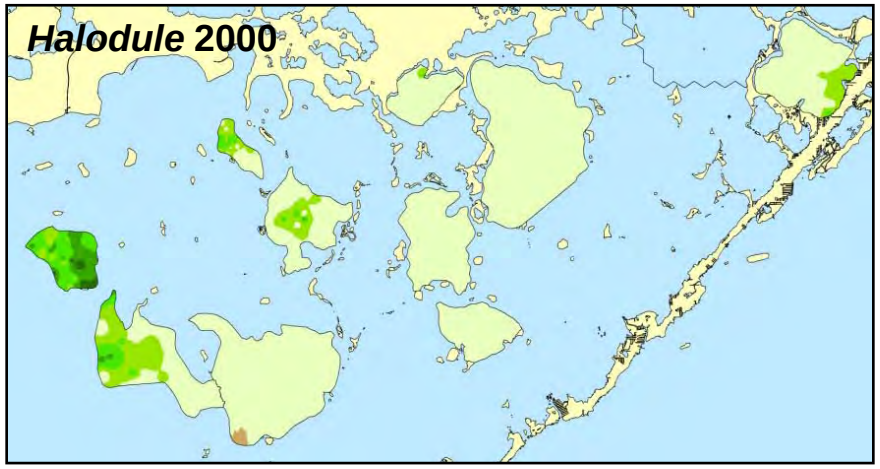

Batophora 2009
Manatee Bay
Barnes Sound
Duck Key
Madeira Bay
Rankin Lake
Blackwater Sound
Eagle Key
Johnson Key
Calusa Key
Whipray
Crane Key
Rabbit Key
Twin Key
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

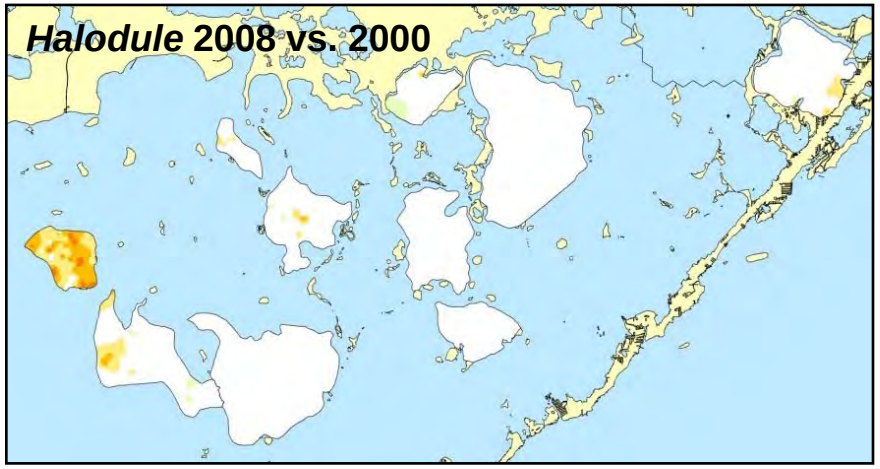

Total Calcareous Green 2009
Manatee Bay
Barnes Sound
Duck Key
Madeira Bay
Rankin Lake
Blackwater Sound
Eagle Key
Johnson Key
Calusa Key
Whipray
Crane Key
Rabbit Key
Twin Key
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

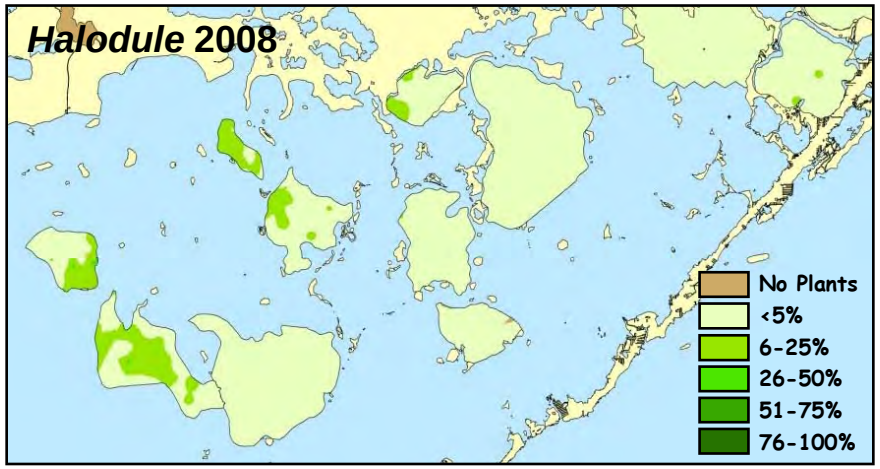

Thalassia 1995
Thalassia 2000 vs. 1995
Thalassia 2000
Thalassia 2008 vs. 2000
Thalassia 2008
No Plants
<5%
6-25%
26-50%
51-75%
76-100%
Thalassia 2008 vs. 1995
±5%
+6 to 25%
+26 to 50%
+51 to 75%
+76 to 100%
-6 to 25%
-26 to 50%
-51 to 75%
-76 to 100%

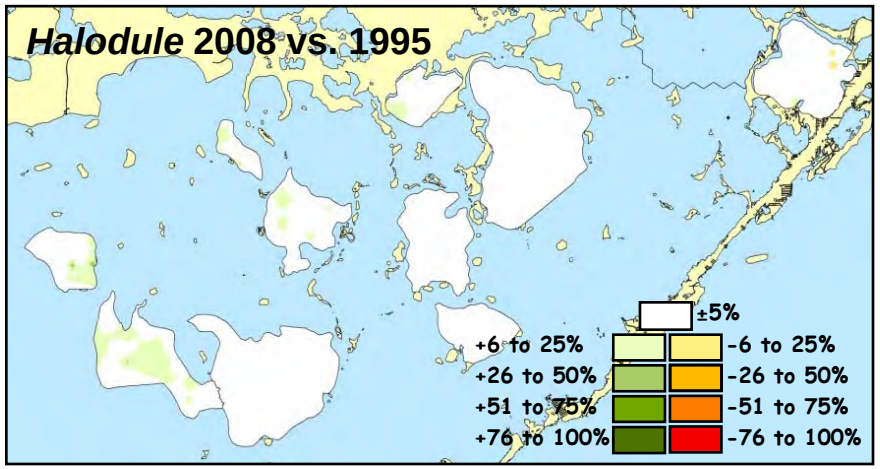

Halodule 1995

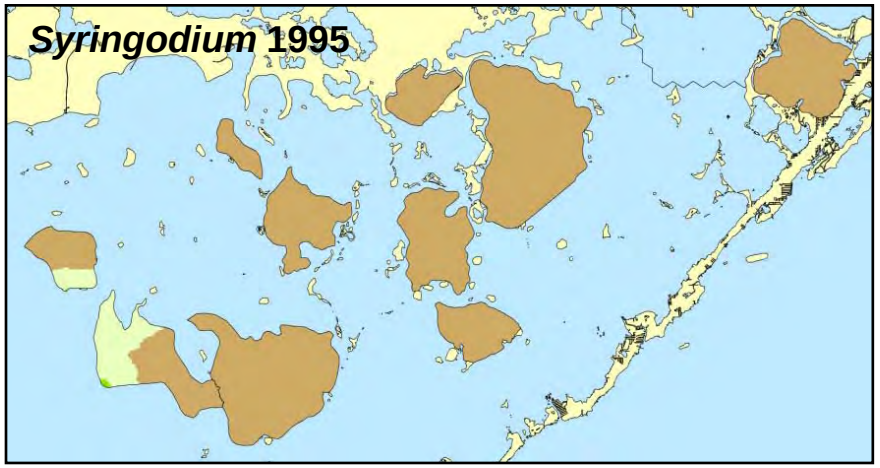

Halodule 2000 vs. 1995

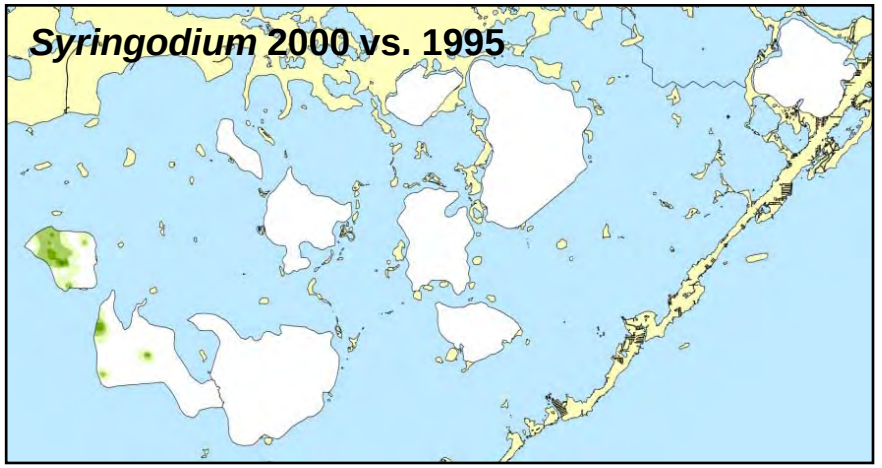

Halodule 2000

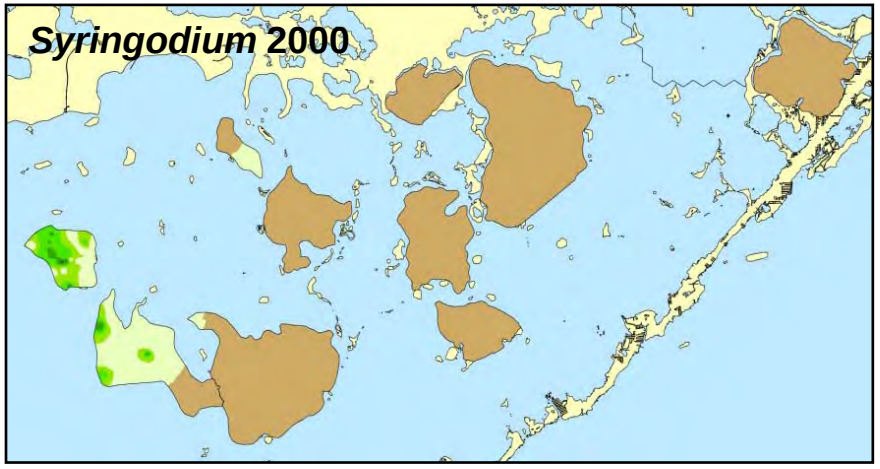

Halodule 2008 vs. 2000

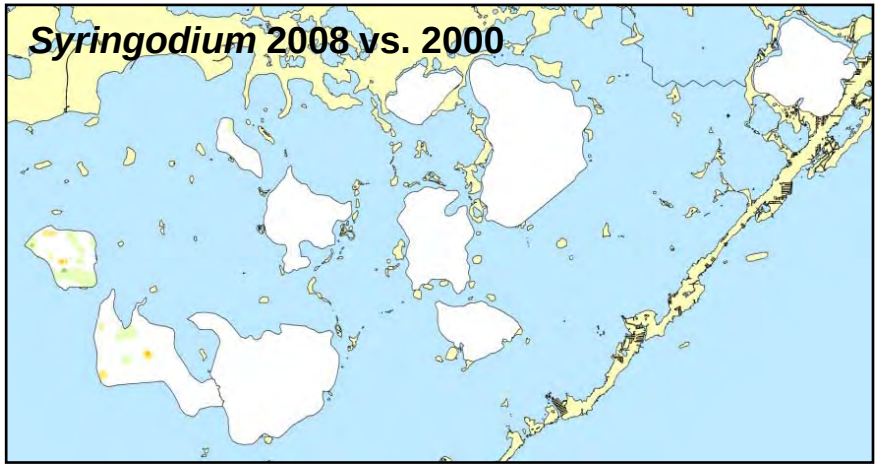

Halodule 2008
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

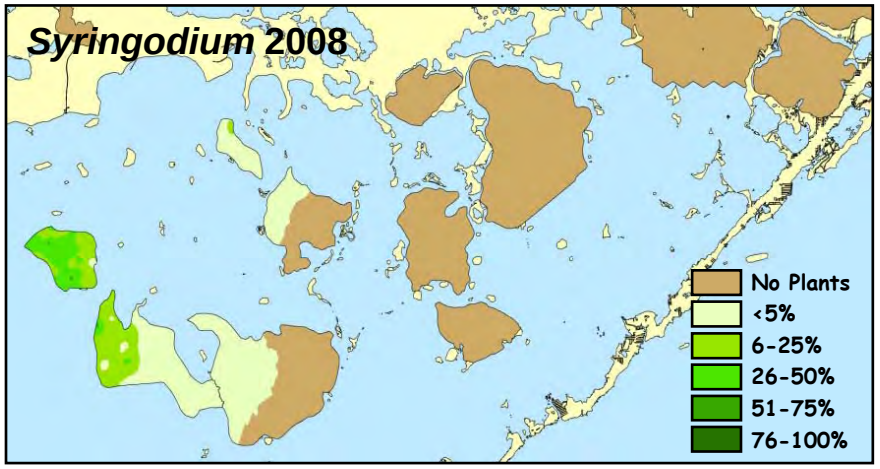

Halodule 2008 vs. 1995
±5%
+6 to 25%
+26 to 50%
+51 to 75%
+76 to 100%
-6 to 25%
-26 to 50%
-51 to 75%
-76 to 100%

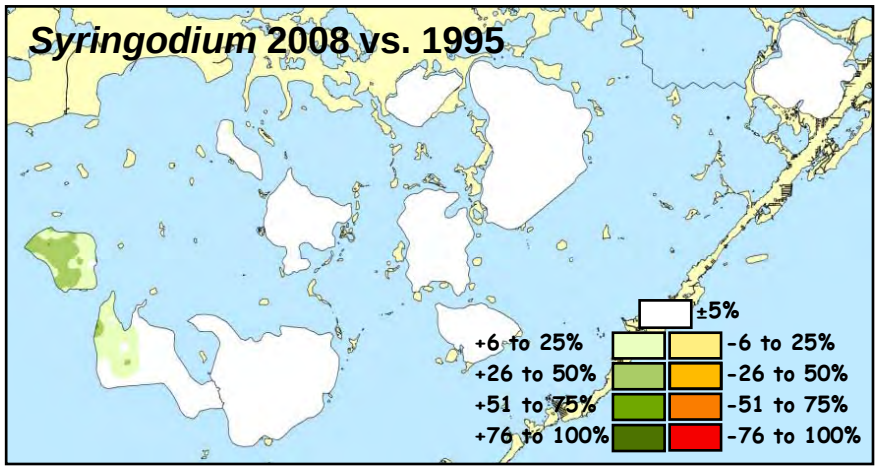

Syringodium 1995

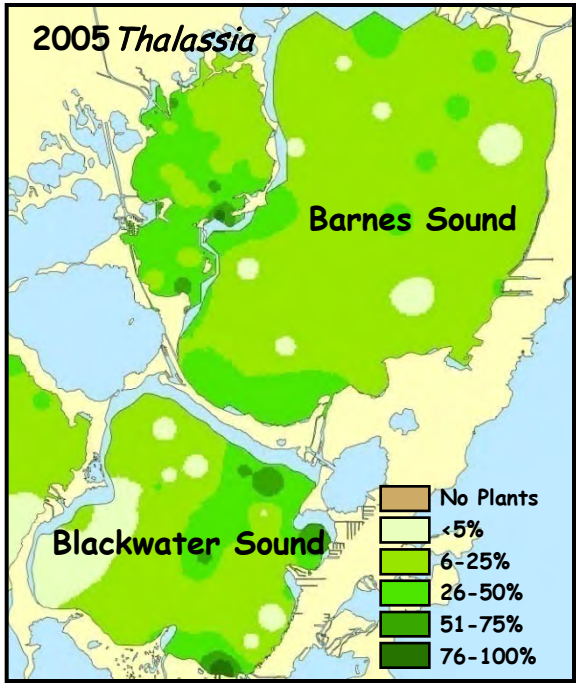

Syringodium 2000 vs. 1995

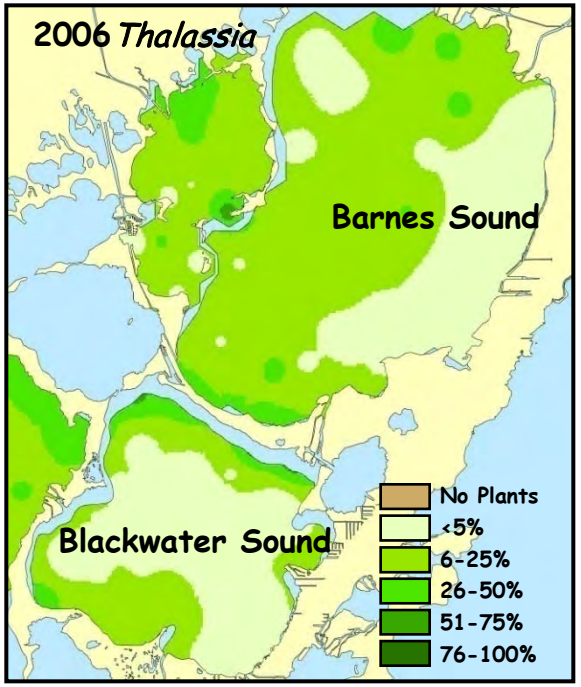

Syringodium 2000

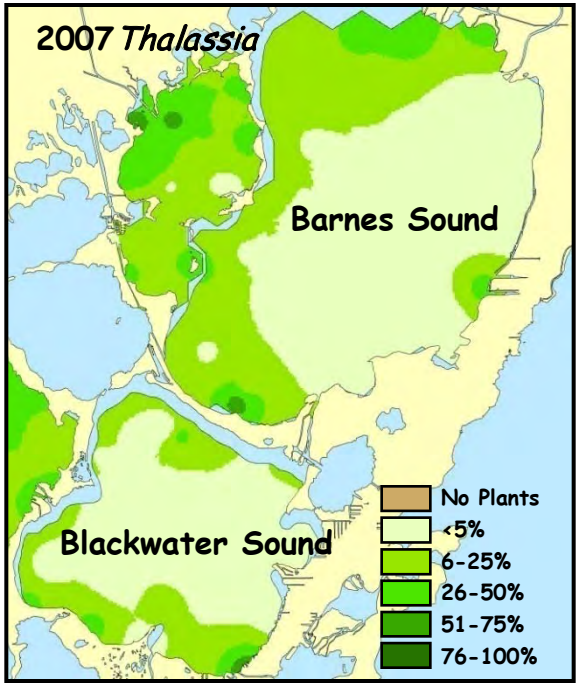

Syringodium 2008 vs. 2000

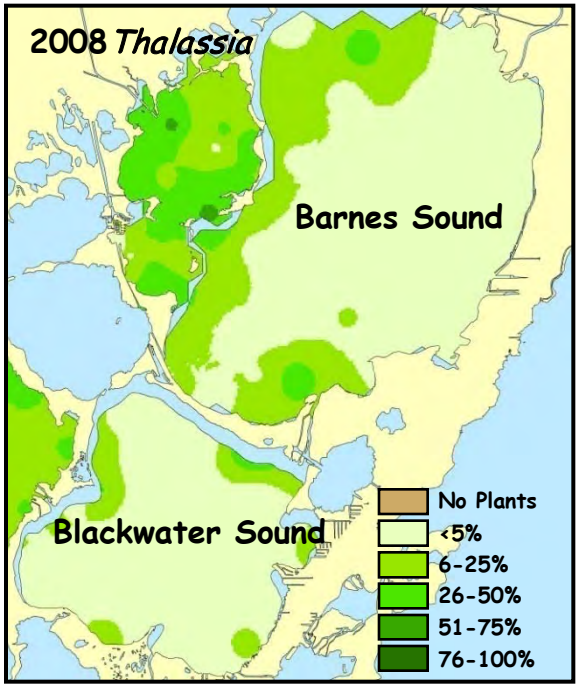

Syringodium 2008
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

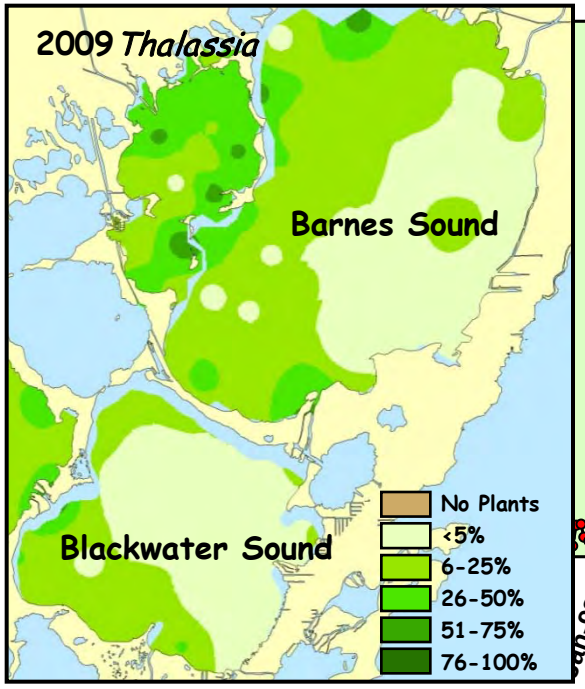

Syringodium 2008 vs. 1995
±5%
+6 to 25%
+26 to 50%
+51 to 75%
+76 to 100%
-6 to 25%
-26 to 50%
-51 to 75%
-76 to 100%

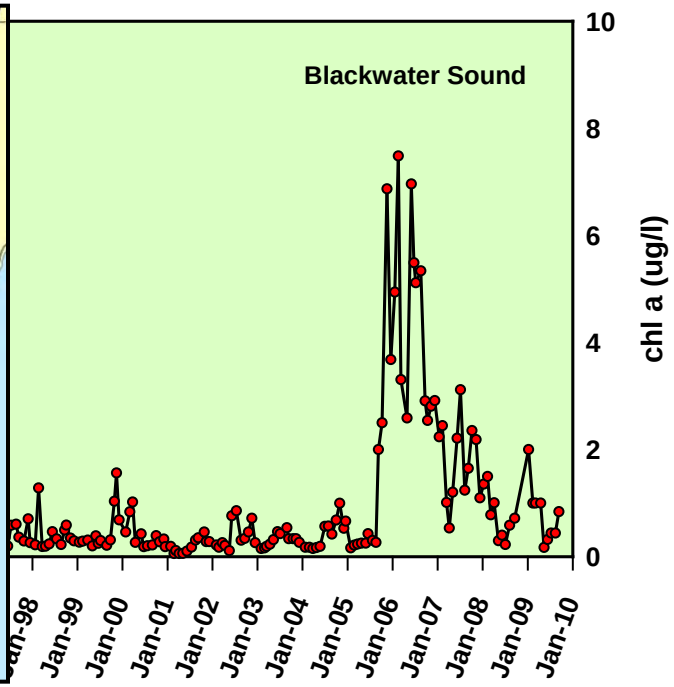

2005 Thalassia
Barnes Sound
Blackwater Sound
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

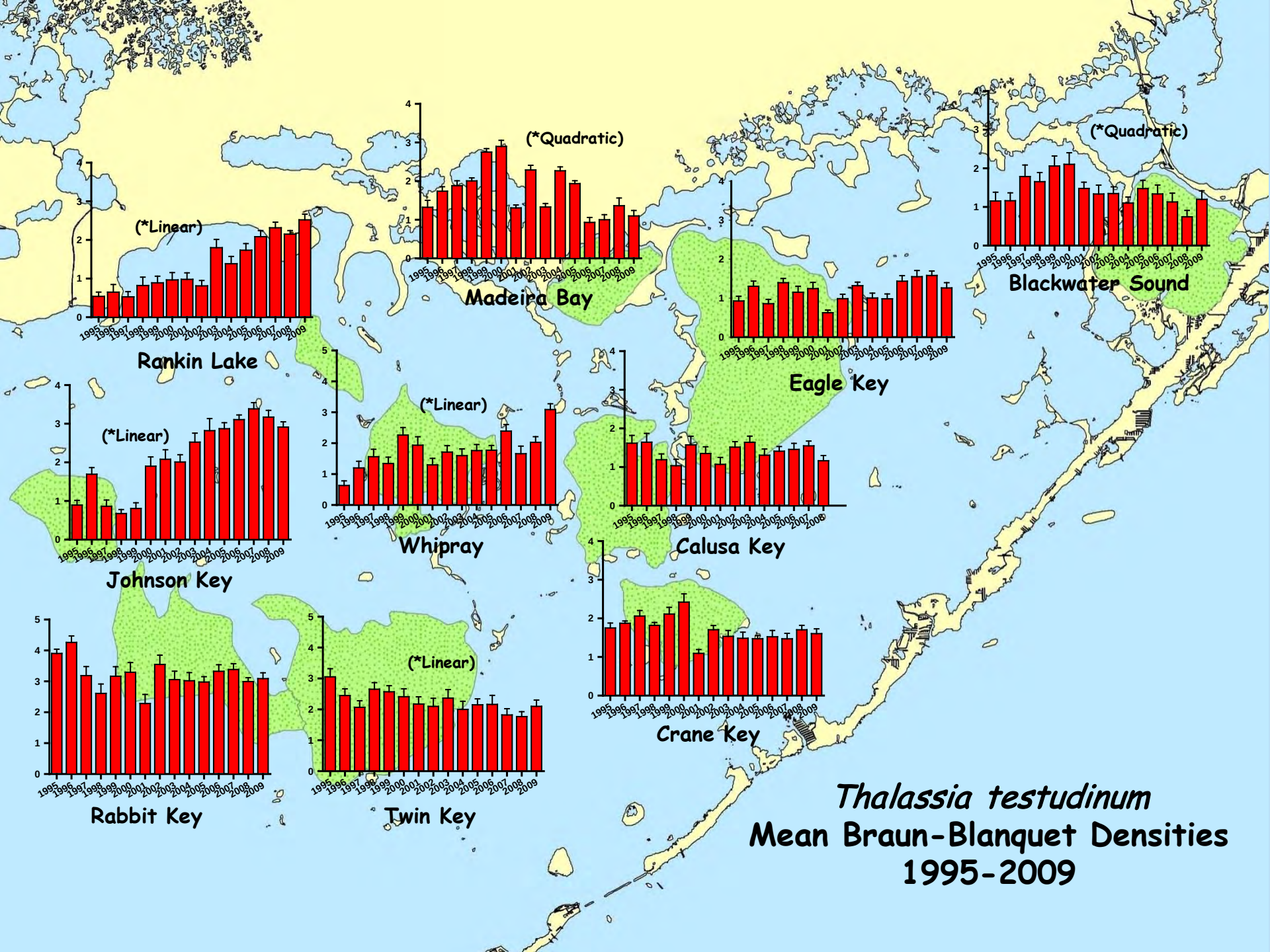

2006 Thalassia
Barnes Sound
Blackwater Sound
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

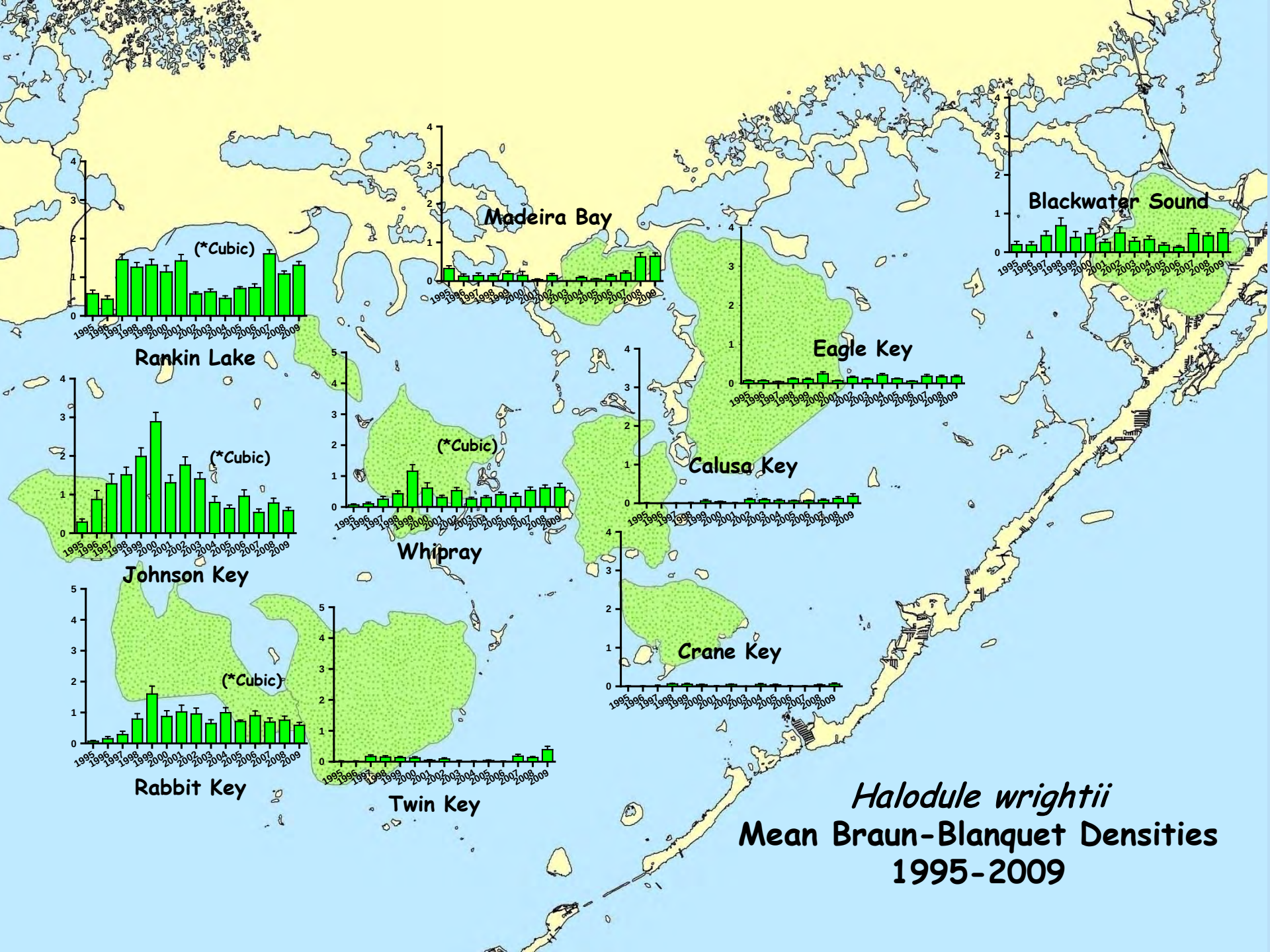

2007 Thalassia
Barnes Sound
Blackwater Sound
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

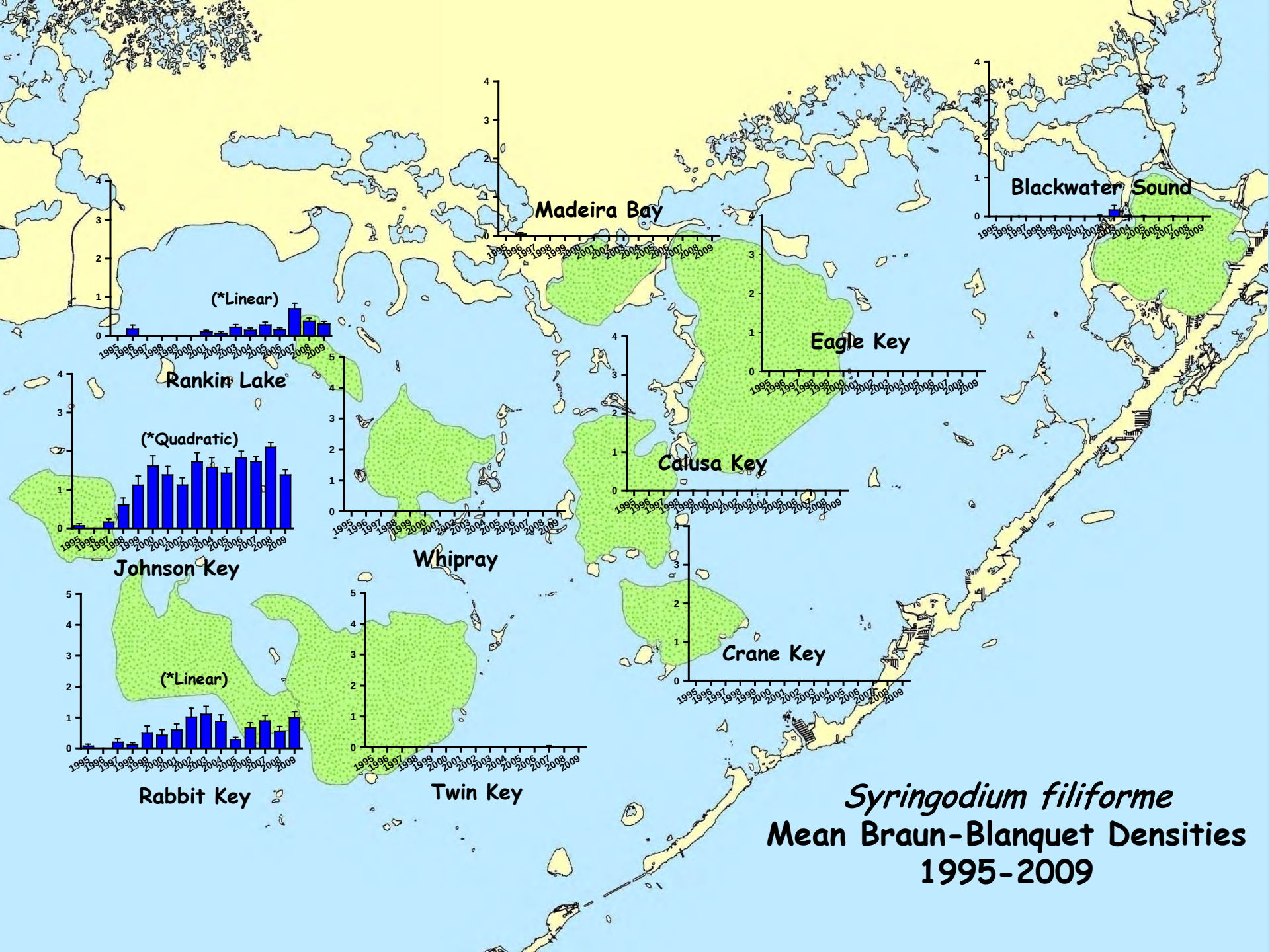

2008 Thalassia
Barnes Sound
Blackwater Sound
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

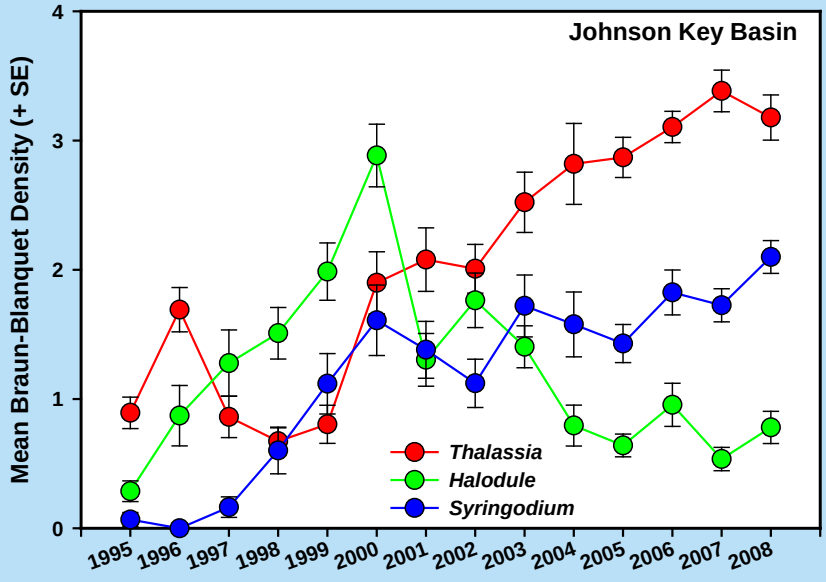

2009 Thalassia
Barnes Sound
Blackwater Sound
No Plants
<5%
6-25%
26-50%
51-75%
76-100%

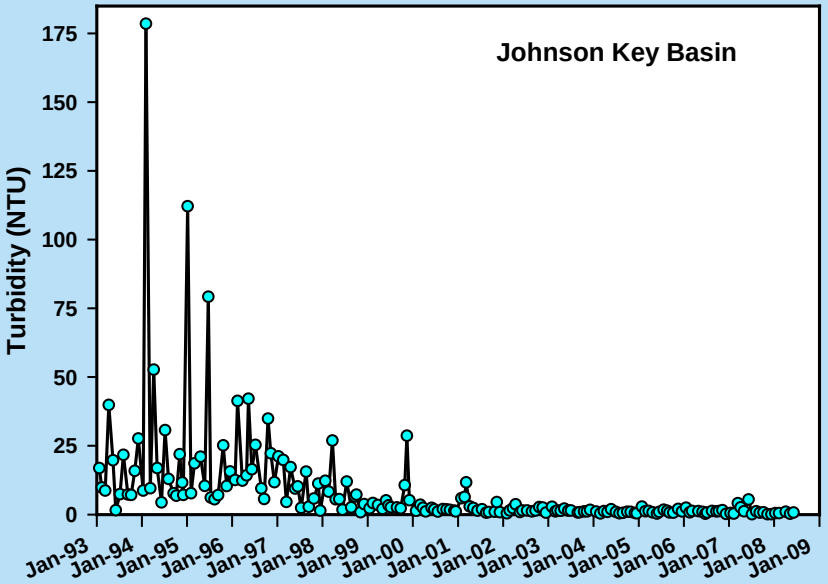

Blackwater Sound
chl a (ug/l)
0
2
4
6
8
10
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10


(*Linear)
Rankin Lake
(*Quadratic)
Madeira Bay
(*Quadratic)
Blackwater Sound
Eagle Key
(*Linear)
Johnson Key
(*Linear)
Whipray
Calusa Key
Crane Key
Rabbit Key
(*Linear)
Twin Key
Thalassia testudinum
Mean Braun-Blanquet Densities
1995-2009


Madeira Bay
Blackwater Sound
(*Cubic)
Rankin Lake
Eagle Key
(*Cubic)
Calusa Key
(*Cubic)
Johnson Key
(*Cubic)
Whipray
Crane Key
(*Cubic)
Rabbit Key
Twin Key
Halodule wrightii
Mean Braun-Blanquet Densities
1995-2009


Madeira Bay
Blackwater Sound
(*Linear)
Rankin Lake
Eagle Key
(*Quadratic)
Calusa Key
Johnson Key
Whipray
Crane Key
(*Linear)
Rabbit Key
Twin Key
Syringodium filiforme
Mean Braun-Blanquet Densities
1995-2009


Johnson Key Basin
Mean Braun-Blanquet Density (+ SE)
Thalassia
Halodule
Syringodium
0
1
2
3
4
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008


Johnson Key Basin
Turbidity (NTU)
0
25
50
75
100
125
150
175
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
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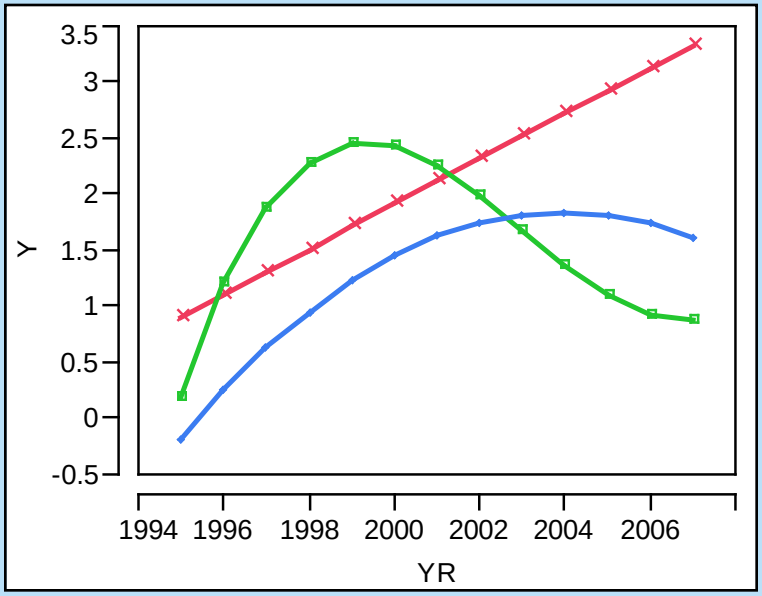
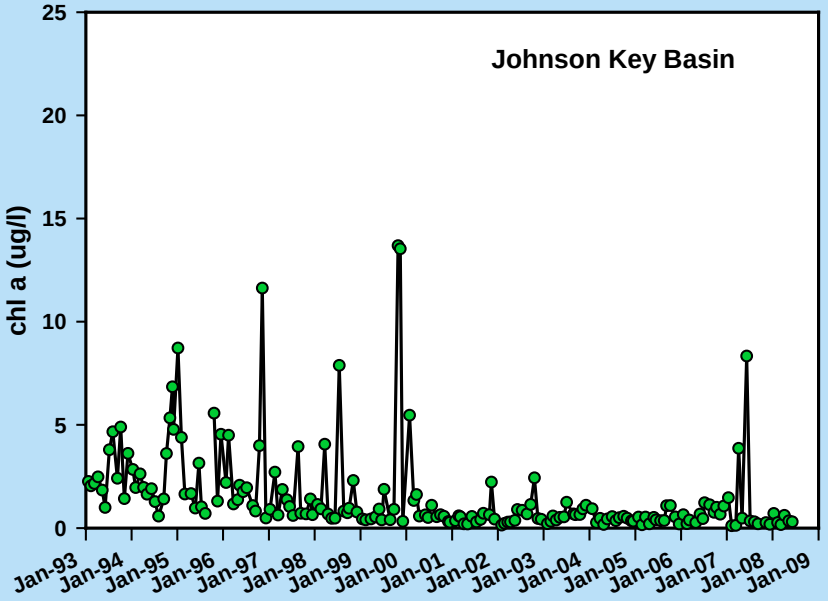
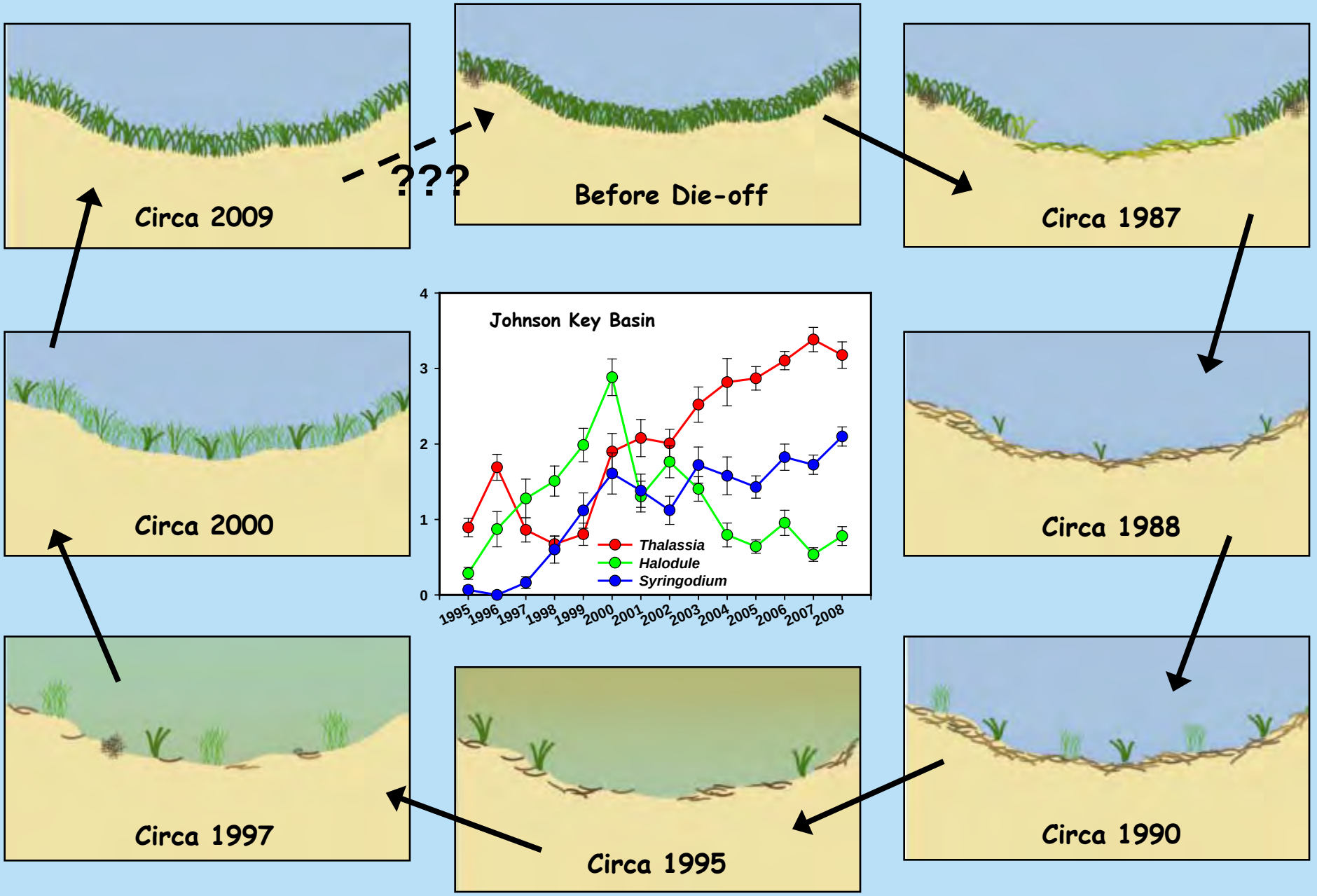
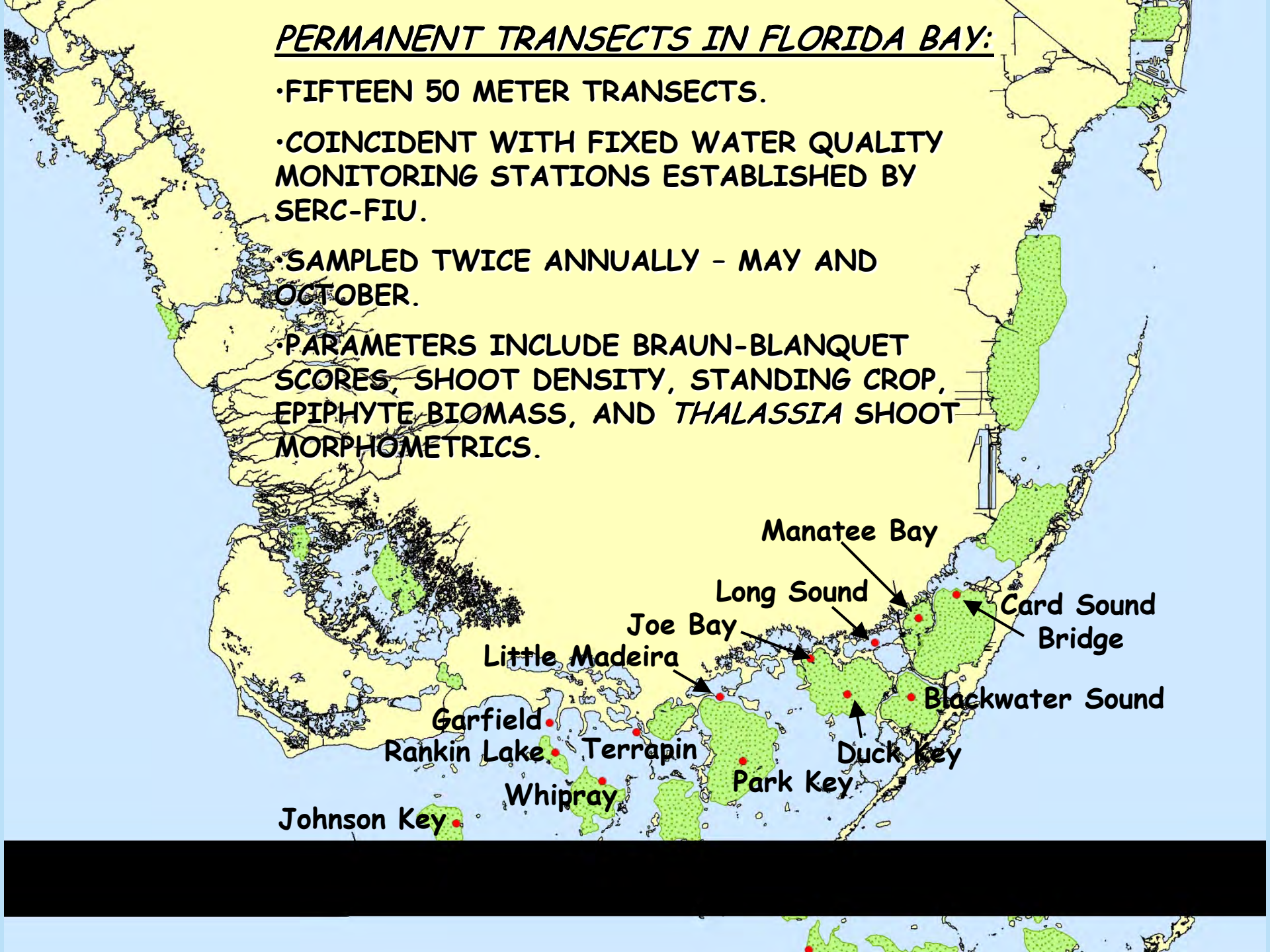
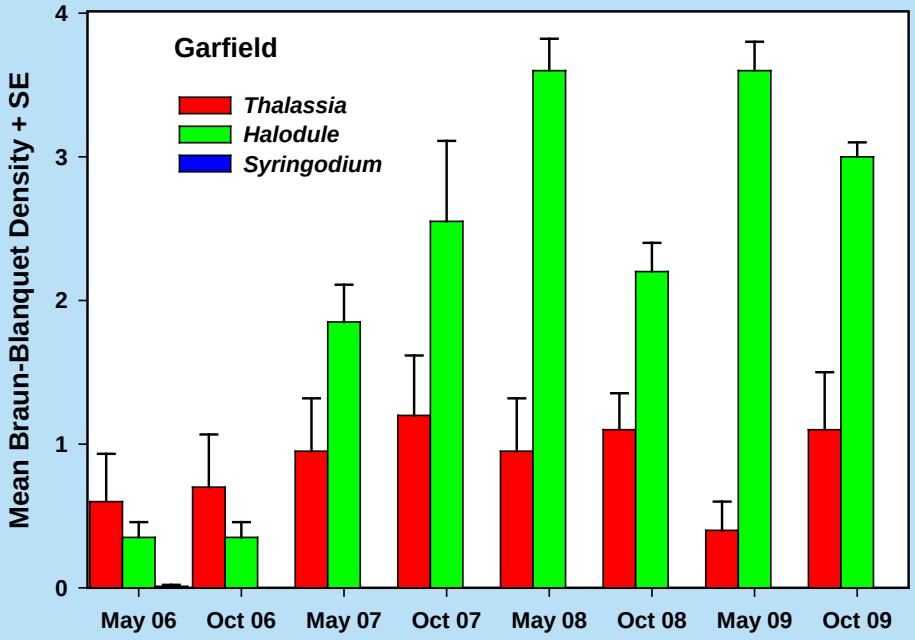
Jan-06
Jan-07
Jan-08
Jan-09

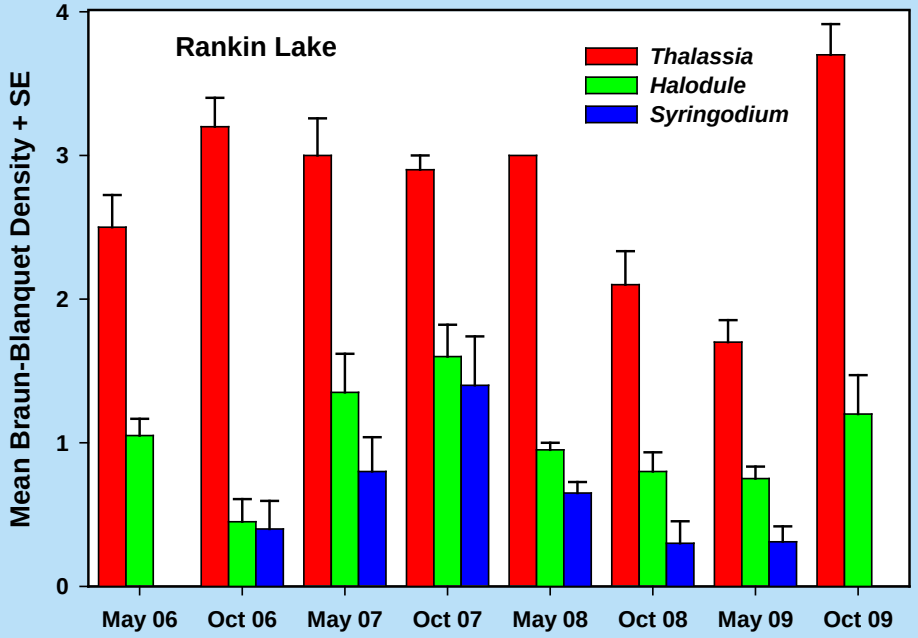

Y
YR
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
1994
1996
1998
2000
2002
2004
2006


Johnson Key Basin
chl a (ug/l)
0
5
10
15
20
25
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09


Circa 2009
???
Before Die-off
Circa 1987
Johnson Key Basin
Thalassia
Halodule
Syringodium
0
1
2
3
4
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Circa 2000
Circa 1988
Circa 1997
Circa 1995
Circa 1990


PERMANENT TRANSECTS IN FLORIDA BAY:
•FIFTEEN 50 METER TRANSECTS.
•COINCIDENT WITH FIXED WATER QUALITY MONITORING STATIONS ESTABLISHED BY SERC-FIU.
•SAMPLED TWICE ANNUALLY – MAY AND OCTOBER.
•PARAMETERS INCLUDE BRAUN-BLANQUET SCORES, SHOOT DENSITY, STANDING CROP, EPIPHYTE BIOMASS, AND THALASSIA SHOOT MORPHOMETRICS.
Manatee Bay
Long Sound
Card Sound Bridge
Joe Bay
Little Madeira
Blackwater Sound
Garfield
Rankin Lake
Terrapin
Duck Key
Park Key
Whipray
Johnson Key


Garfield
Thalassia
Halodule
Syringodium
Mean Braun-Blanquet Density + SE
0
1
2
3
4
May 06
Oct 06
May 07
Oct 07
May 08
Oct 08
May 09
Oct 09


Rankin Lake
Thalassia
Halodule
Syringodium
Mean Braun-Blanquet Density + SE
0
1
2
3
4
May 06
Oct 06
May 07
Oct 07
May 08
Oct 08
May 09
Oct 09

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National Park for more than a decade.