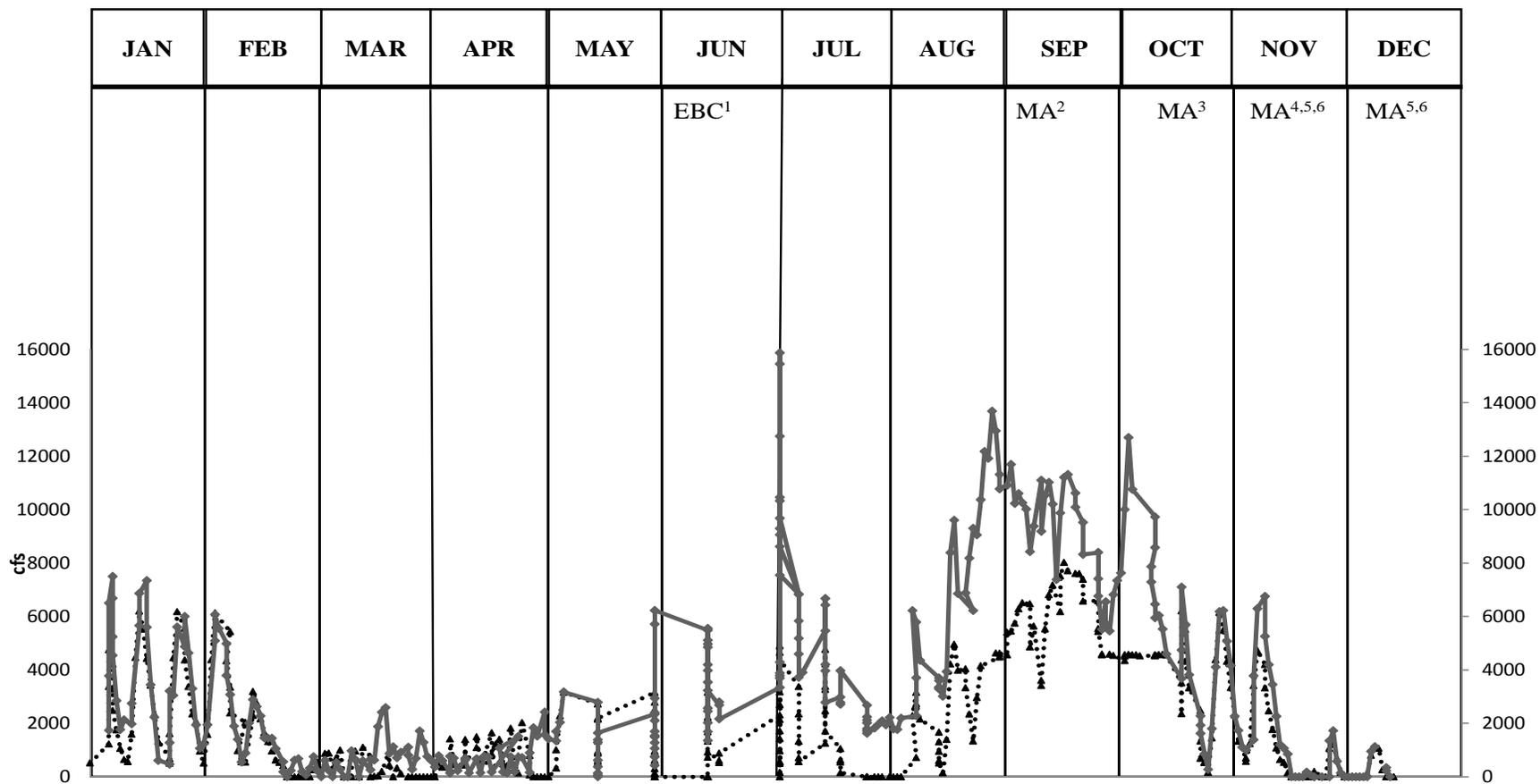


Appendix 9.1. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2003 detail below.

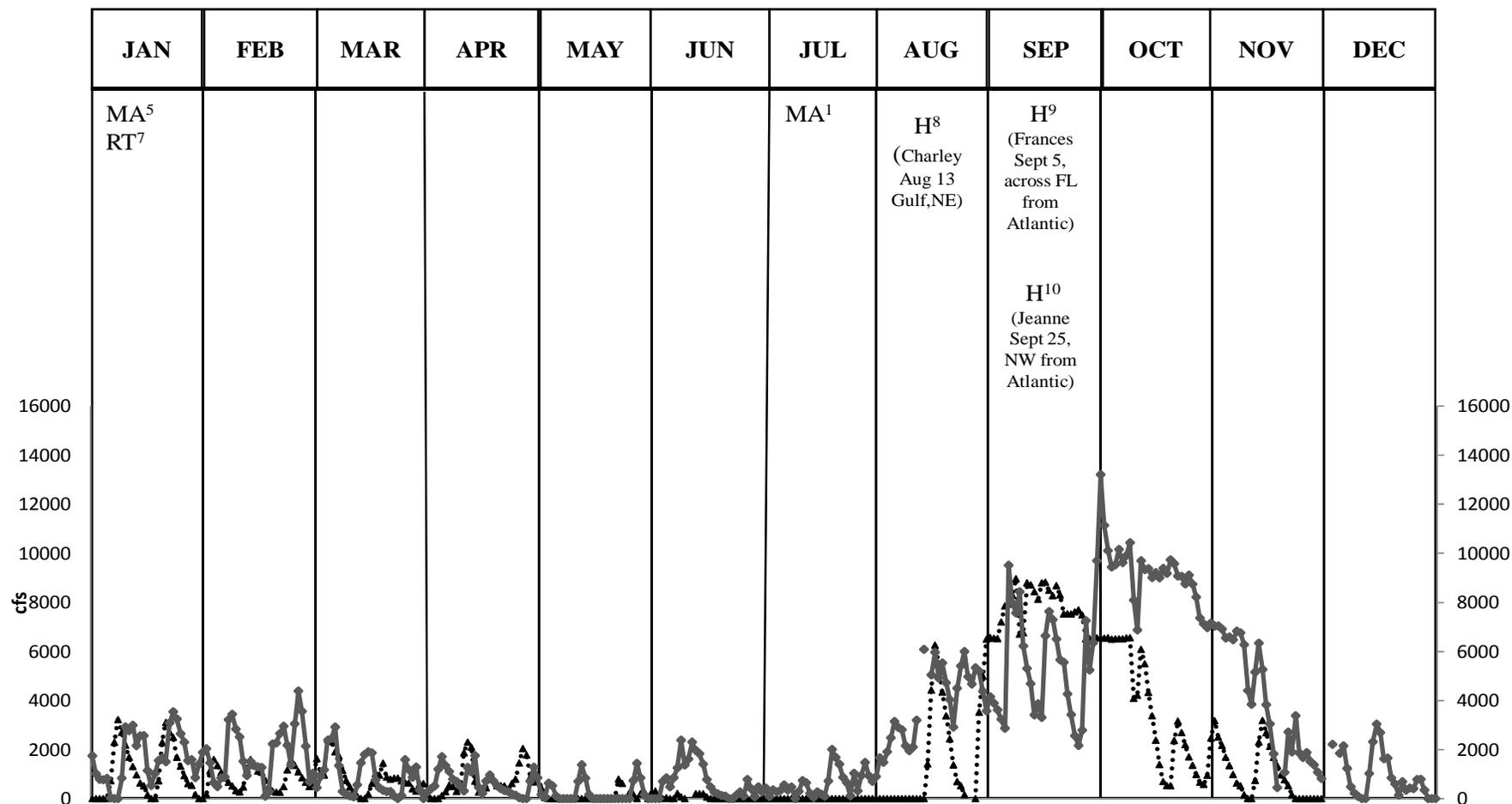
## 2003



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
 Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane.

Appendix 9.1. Cont. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2004 detail below.

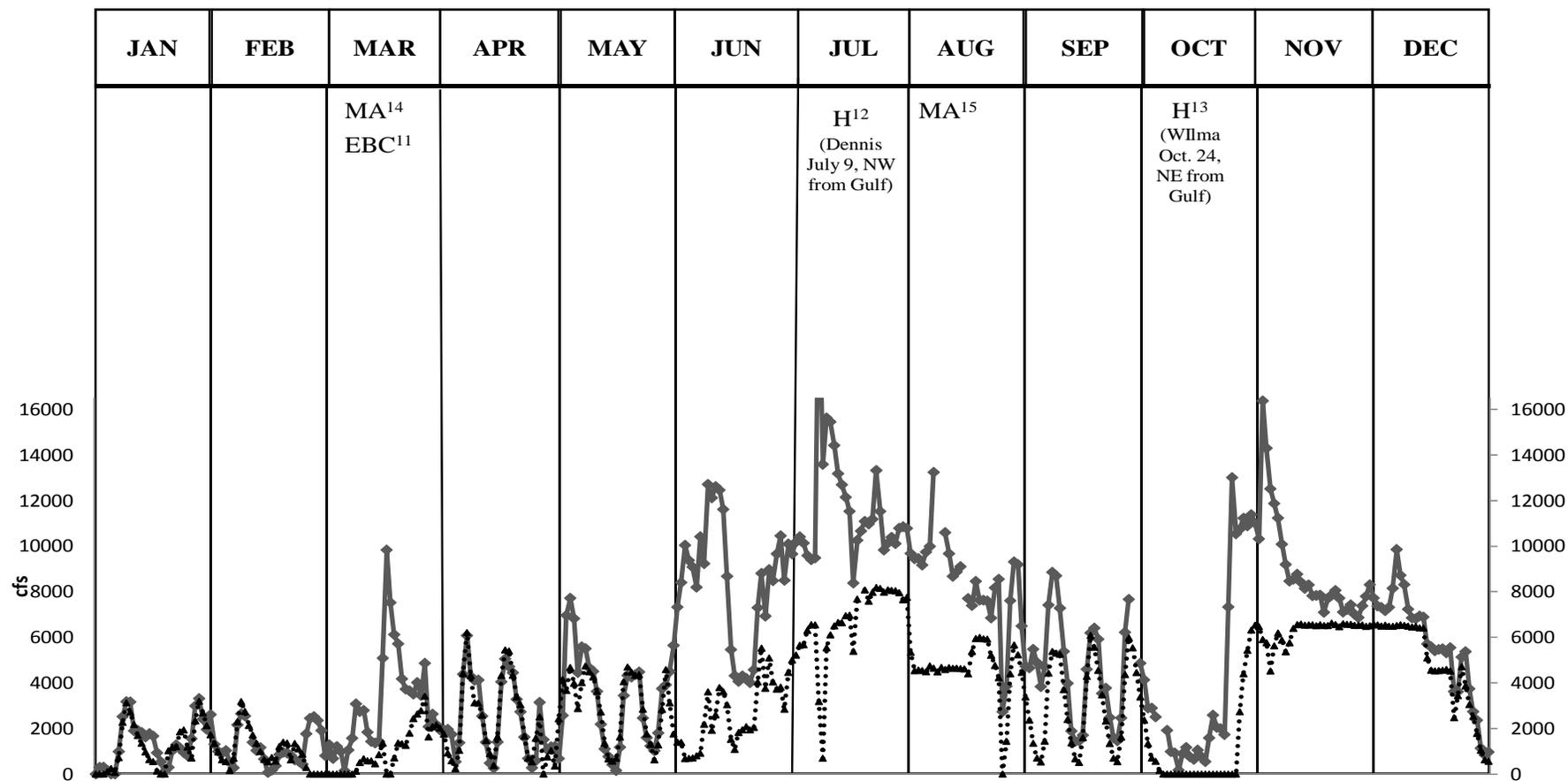
## 2004



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
 Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane.

Appendix 9.1. Cont. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2005 detail below.

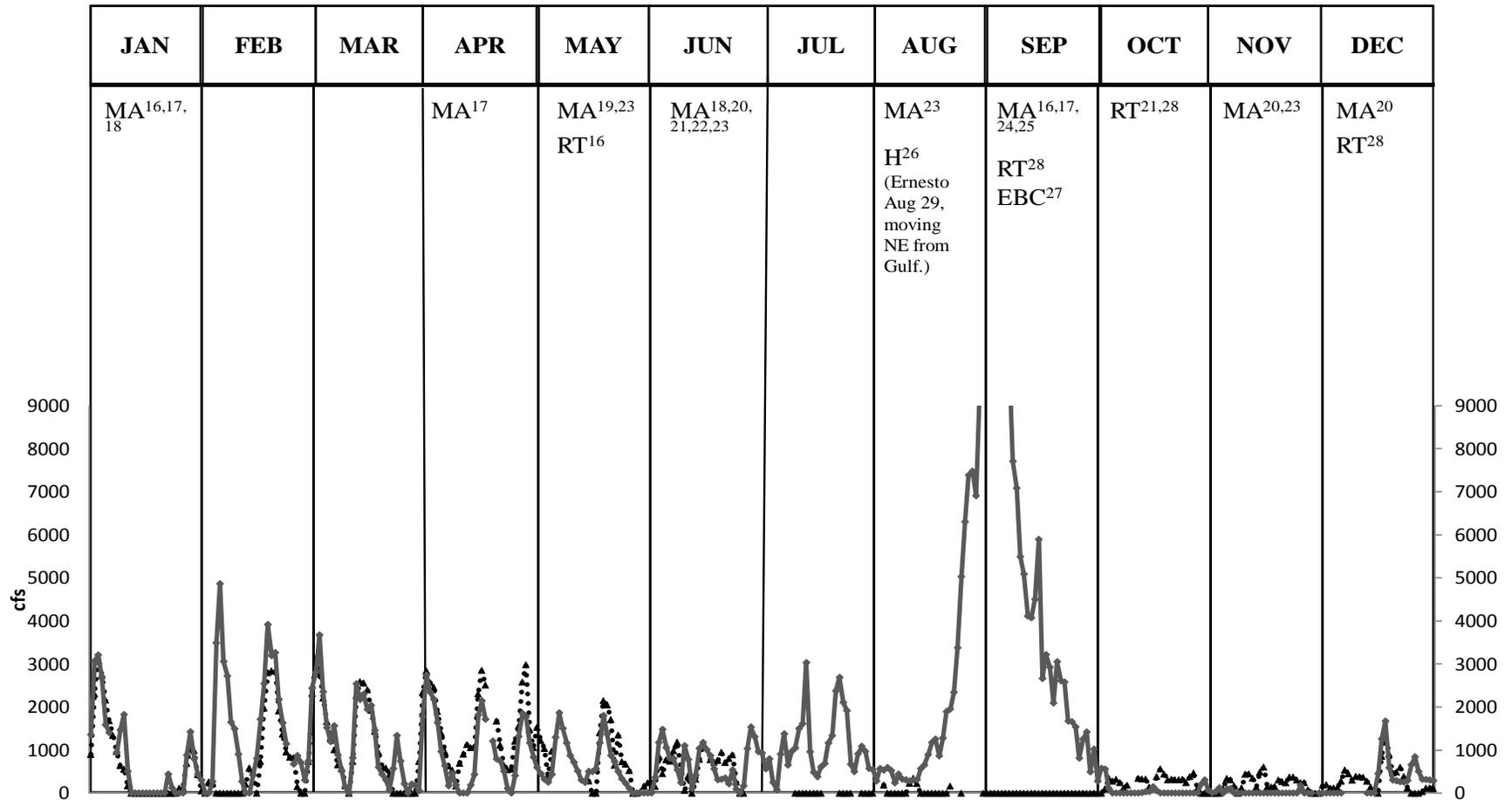
## 2005



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
 Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane.

Appendix 9.1. Cont. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2006 detail below.

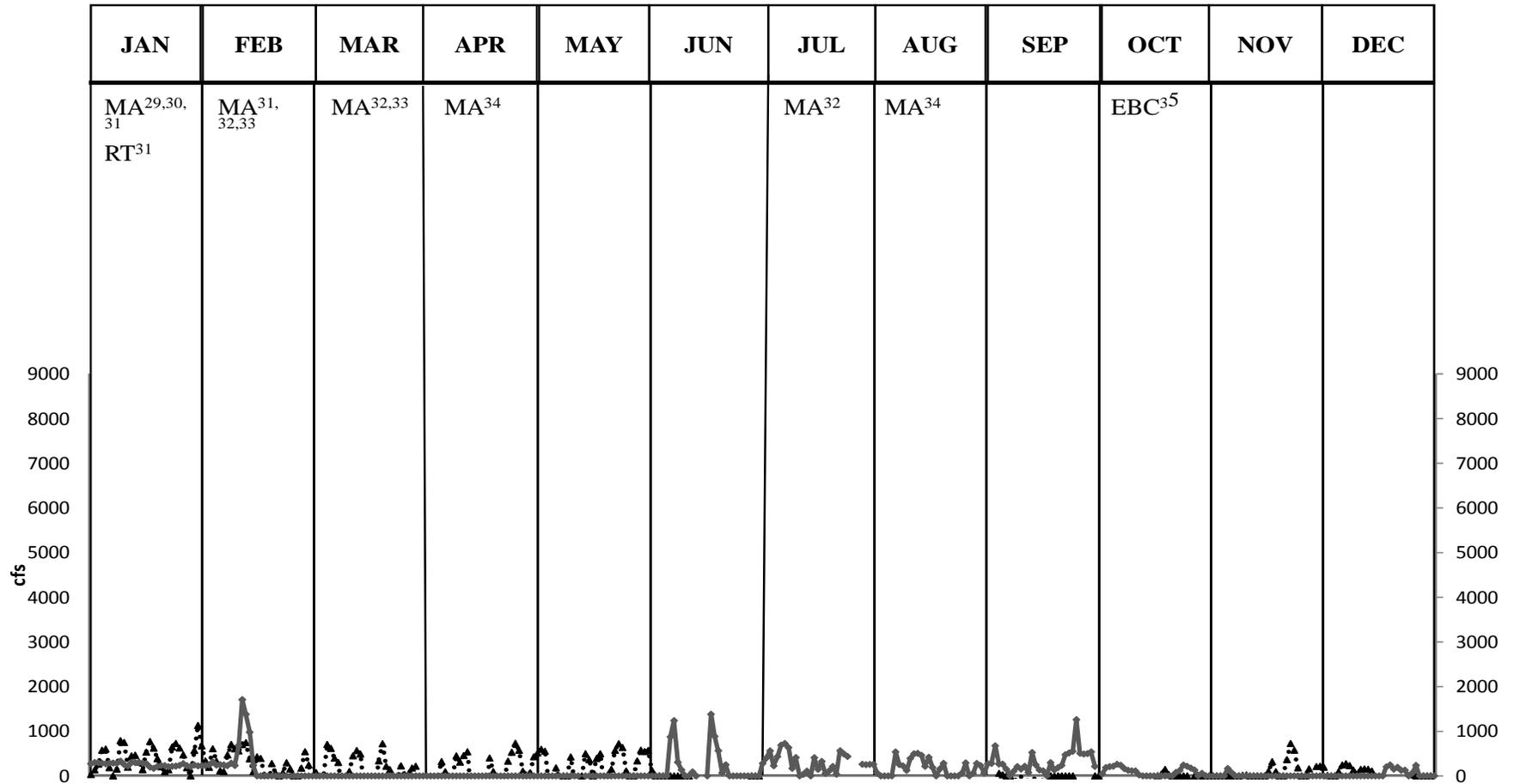
## 2006



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane.

Appendix 9.1. Cont. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2007 detail below.

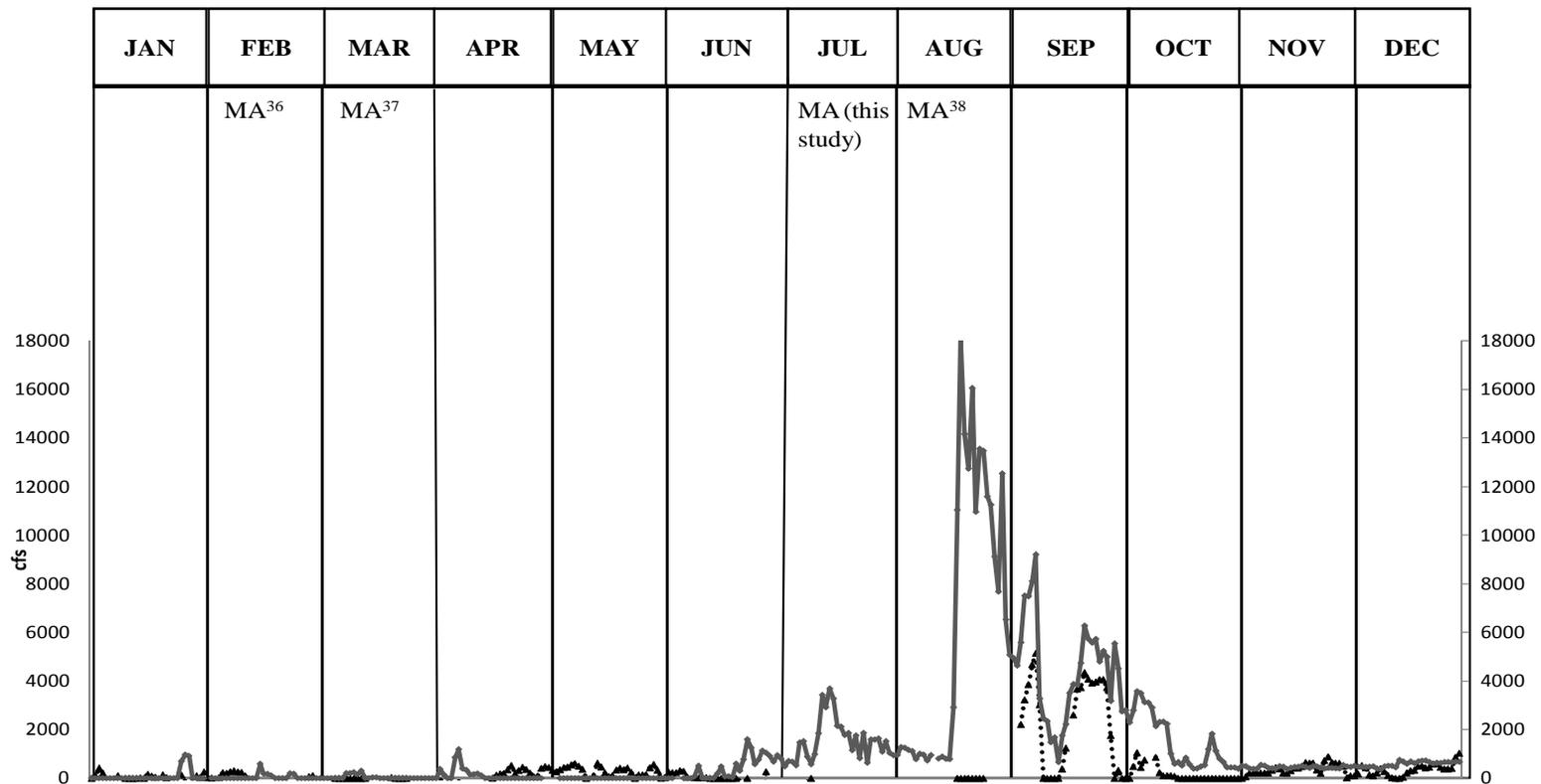
## 2007



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
 Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane.

Appendix 9.1. Cont. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2008 detail below.

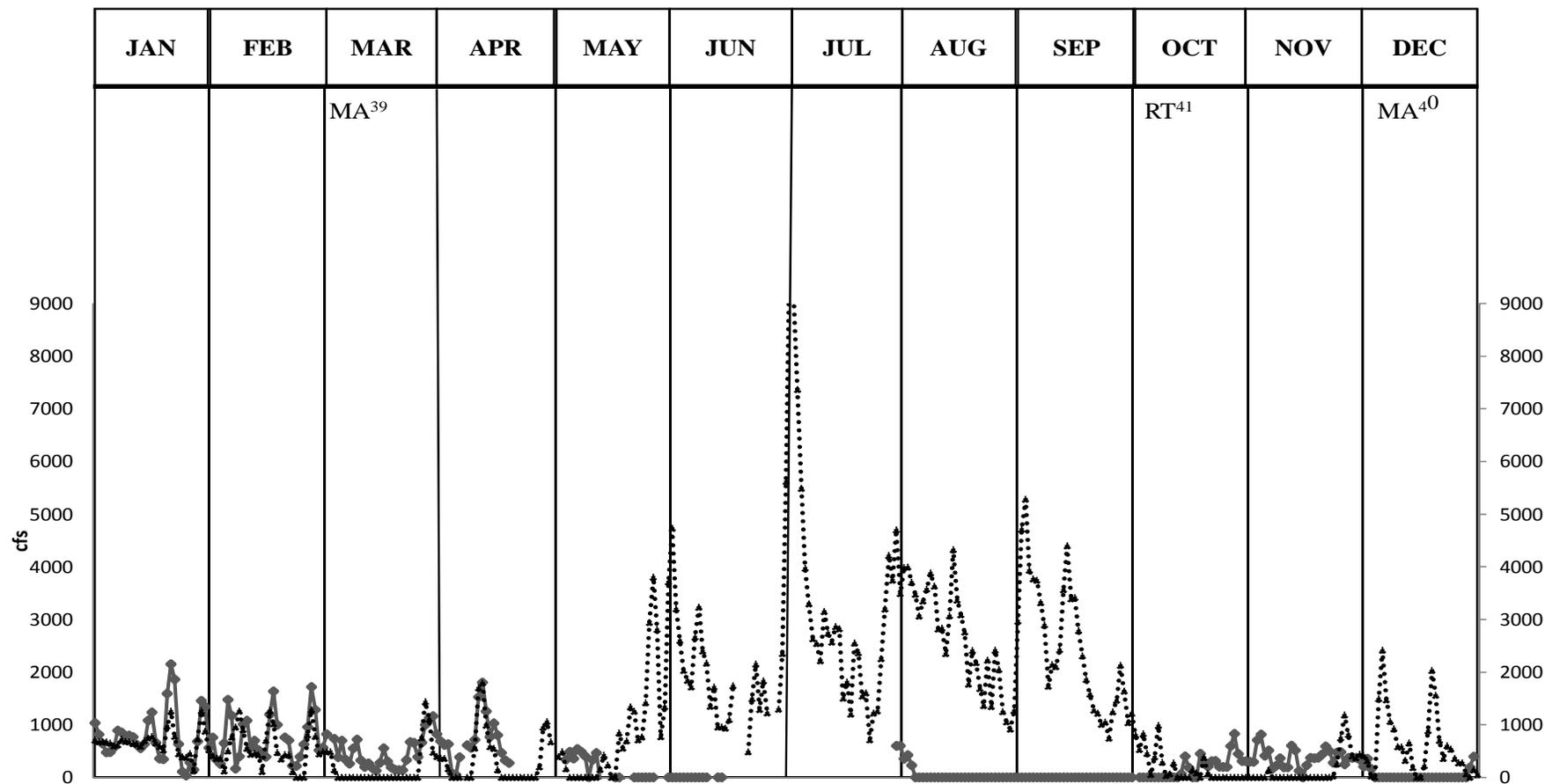
## 2008



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
 Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane.

Appendix 9.1. Cont. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2009 detail below.

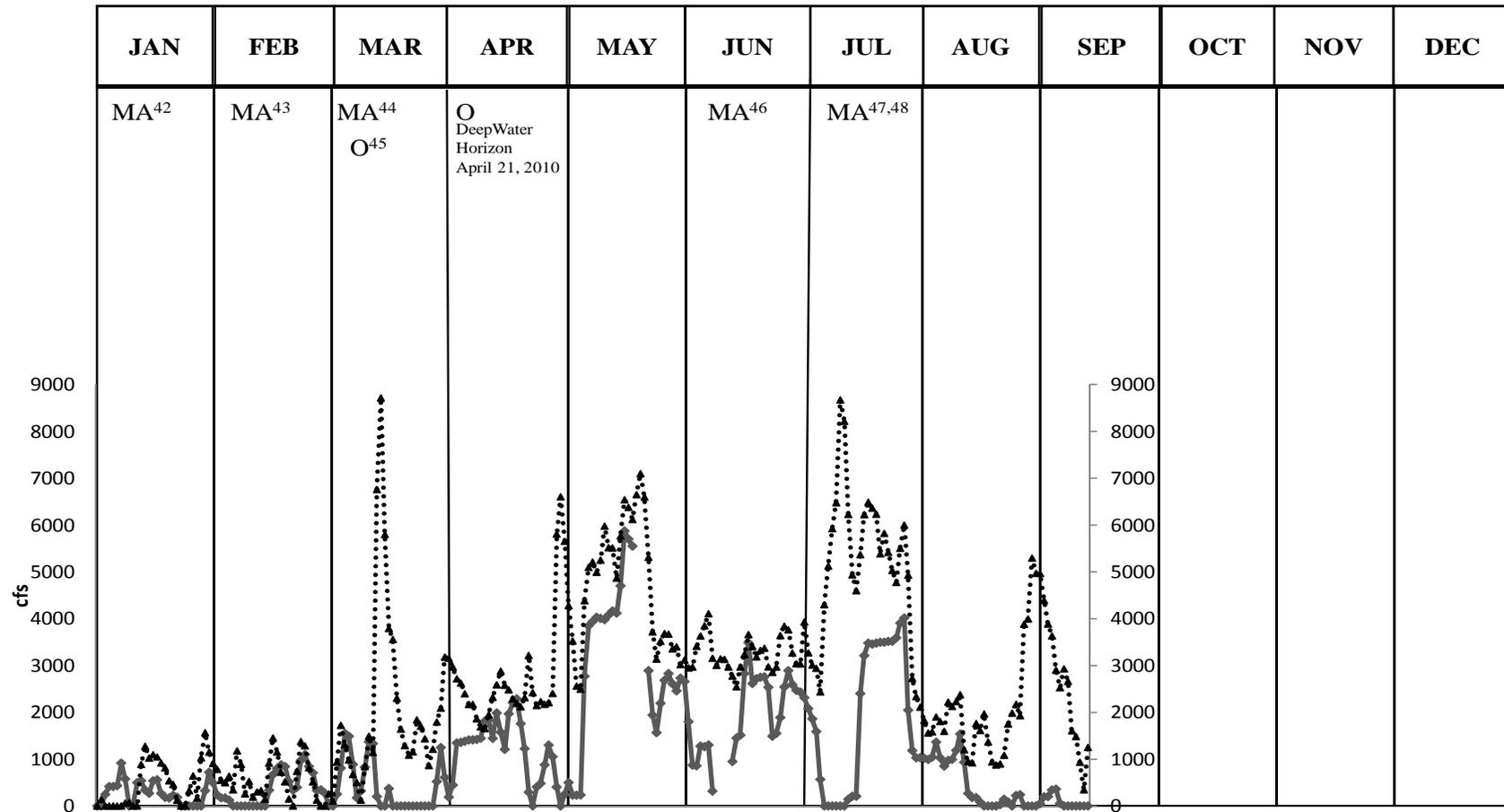
## 2009



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
 Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane.

Appendix 9.1. Cont. Timeline of events from 2003-2010 related to drift algae project, including bloom events, beach closures, red tide, hurricanes and other relevant data; 2010 detail below.

## 2010



\*Flow Data from DBHydro (South Florida Water Management District). Dotted Line is S77 and solid line is S79 (discharge in cfs).  
 Event Code: **MA**-Macroalgae, **EBC**-Enterococcus Beach Closure, **RT**-Red Tide, **H**-Hurricane. **O**-Other.

### Key to Appendix 9.1 Observations

<sup>1</sup>Florida Department of Health, Healthy Beaches (archived *Enterococcus* findings, see <http://esetappsdohealth.state.fl.us/irm00beachwater/default.aspx>). Only “poor” findings used for *Enterococcus* as they resulted in a beach advisory. June 25, 2003. Lighthouse Beach. A “poor” result is defined as 105 or greater *Enterococcus* sp. per 100 ml of seawater or a geometric mean of  $\geq 36$  cfu (colony forming units/100 ml of *Enterococcus* sp).

<sup>2</sup>C. Mansell (City of Sanibel, Florida), September 2003, National Healthy Beaches Campaign (NHBC), Healthy Beaches Reports, 2003-2007. “Dead” red algae reported from Tarpon Bay to Lighthouse Beach, with a rating of 3 out of 4 for in severity (range of 0, absent to 4, ‘infested’). Beach cleaned 9/12/2003.

<sup>3</sup>C. Mansell (City of Sanibel, Florida), October 2003, NHBC, Healthy Beaches Reports, 2003-2007. Red algae piled as high as 18-24”, with a rating of 3 out of 4 for in severity (range of 0, absent to 4, ‘infested’). Beach mechanically cleaned 10/25 and 10/27/2003.

<sup>4</sup>C. Mansell (City of Sanibel, Florida), November 2003, NHBC Healthy Beaches Reports, 2003-2007. November 2003, red algae was rated as a 4 out of 4 (“infested”).

<sup>5</sup>C. Dawes, 2004 (USF, Dept. of Biology). Drift Algae in the Charlotte Harbor area. Report to the SFWMD. December 2003 also contained two red algae, *Hypnea spinella* and *Solieria filiformis*. Dominant species for samples in 2004 are red algae, *Chondria atropurpurea*, *Gracilaria caudata*, *Hypnea spinella*, and *Solieria filiformis*. Collector, J. Evans (City of Sanibel) from Sanibel beaches

<sup>6</sup>S. Lundy, Dec. 16, 2003, News-Press. “Beach rakes seaweed from shore”; additional comments, “unusual” accumulation around Thanksgiving on Fort Myers Beach also.

<sup>7</sup>Florida Fish and Wildlife Conservation Commission (FWC). October 27, 2009, Red Tide Counts Archive, Red Tide online.com, see [http://research.myfwc.com/gallery/image\\_details.asp?id=17081](http://research.myfwc.com/gallery/image_details.asp?id=17081). Estimates are generic for the entire Sanibel/Ft. Myers area.

<sup>8-10</sup>NOAA Satellite and Information Service, Query Results, “Tropical storm and Hurricanes in Florida. Hurricanes to hit near or in Lee county, including coastal Collier County included for 2004: (<sup>8</sup>)*Charley*, hit Lee County August 13<sup>th</sup>, 2004, moving northeast from the Gulf; (<sup>9</sup>) *Frances*, hit Lee County on Sept 5<sup>th</sup>, 2004, moving northwest from the Atlantic; (<sup>10</sup>) *Jeanne*, hit Lee County on Sept 25<sup>th</sup>, 2004, moving northwest from the Atlantic.

<sup>11</sup>Florida Department of Health, Healthy Beaches (archived *Enterococcus* findings, see <http://esetappsdohealth.state.fl.us/irm00beachwater/default.aspx>) for Blind Pass/Turner Beach, March 18, 2005. Only “poor” counts for *Enterococcus* that result in advisory are reported.

<sup>12-13</sup>NOAA Satellite and Information Service, Query Results, “Tropical storm and Hurricanes in Florida. Hurricanes to hit near or in Lee or Collier counties included for 2005: (<sup>14</sup>)*Dennis*, hit Dennis hit coastal Collier and Lee counties on July 9, 2005, northwest from the Gulf. (<sup>15</sup>)*Wilma* hit Collier and Lee counties on October 24<sup>th</sup>, 2005, moving northeast from the Gulf.

<sup>14</sup>J. Evans, pers. obs., Picture reference for 2006 (City of Sanibel). Beaches affected include Blind Pass Beach, Lighthouse Beach, Bowman’s Beach, Pier 2-5 and Tarpon Bay Beach (see Figures 9.1). Red tides are also documented for October 2006.

<sup>15</sup>B.E. Lapointe et al., 2006. Harmful algal blooms in coastal waters of Lee County, FL: Bloom dynamics and identification of land-based nutrient sources. Phase II Final Report. In: Harmful Algae 4:1106–1122. “Bloom event” sampled in 2005 was lower in biomass estimates than 2004, but species composition similar (e.g., *Hypnea spinella*, *Agardhiella subulata*, *Gracilaria tikvahiae*, *Acanthophora spicifera*). Blooms of *Enteromorpha* sp. and *Ulva lactuca* (Chlorophyta) also occurred on beaches in southern Lee County during August of 2005.

- <sup>16</sup>K. Lollar, 2006. The News-Press, “Excessive *Cladophora* mats in Ding Darling Center and off of Sanibel.”
- <sup>17</sup>R.D. Bartleson, et al., 2006. Macroalgae and seagrass monitoring during spring and summer of 2006. Report to City of Sanibel by SCCF Marine Lab. In the April 2006 a bloom dominated by *Ceramium* spp. in the Refuge’s impoundments. Algae in the Refuge’s embayments was thick near shore and dominated by Rhodophyta (e.g., *Gracilaria*) and some Phaeophyta (e.g., *Dictyota* spp.).
- <sup>18</sup>K. Lollar, 2006. The News-Press, “Drift algae: water woes continue on Lee beaches.”
- <sup>19</sup>H. Downing, pers. obs., 2006. City of Sanibel, field notes and pictures, May 2006.
- <sup>20</sup>C. Mansell (City of Sanibel, Florida), National Healthy Beaches Campaign (NHBC), Healthy Beaches Reports, 2003-2007. June 2006, red algae documented on Sanibel as level 3; November 2006, red algae documented on Sanibel as level 3; December 2006. Red algae documented on Sanibel beaches as level 4 (infested).
- <sup>21</sup>J. Evans, pers. obs., June 2006 (City of Sanibel), picture reference of red algae accumulations. Photos indicate another red algae bloom on Sanibel. Photos also document Red tide event in October 2006, and late December 2006/early January 2007. Aerial photos included courtesy of City of Sanibel.
- <sup>22</sup>K. Spinner, 2006. Sarasota Herald Tribune, June 28, 2006. Algae makes foul return to Southwest Florida coast. Large amount of red algae at Fort Myers Beach (FMB). R. Bartleson, SCCF Marine Lab referenced. *Lyngbya* (Cyanobacteria) bloom on Sanibel also.
- <sup>23</sup>City of Sanibel Beach Conditions, 2006. April 2006, large quantities of macroalgae at Lighthouse and Blind Pass beaches. June 2006, Lighthouse beach affected by red algae, no sp. listed. Lighthouse beach also had a swimming advisory June 12<sup>th</sup>, 2006 (Lee County Health Department Advisory was cleared on the June 13<sup>th</sup> 2006. November 2006 reports large amounts of red algae, 2-12” deep. Donax, Algiers and Tarpon Bay beaches were also strongly affected by red algae accumulation. Beach reports did not indicate specific algal species.
- <sup>24</sup>K. Lollar, Sept. 29, 2006. The News-Press. “The September strandings indicate that the drift (macroalgae) is related to Tropical Storm *Ernesto*.”
- <sup>25</sup>M. Krzos, 2006. The News-Press, Sept. 2<sup>nd</sup> 2006, Red drift algae expand southward. Red algae reported to be 4ft wide, 4 inches high, extends from the north end of Little Hickory Island to Bonita Beach.
- <sup>26</sup>NOAA Satellite and Information Service, Query Results, “Tropical storm and Hurricanes in Florida. Hurricanes that hit near Lee or Collier counties-2006. Hurricane *Ernesto* hit Collier County on Aug 29<sup>th</sup>, 2006, moving northeast from South Florida.
- <sup>27</sup>Florida Department of Health, Healthy Beaches (archived *Enterococcus* findings, see <http://esetappsdo.h.doh.state.fl.us/irm00beachwater/default.aspx>). Archived *Enterococcus* counts for Blind Pass, Turner and Tarpon Bay beaches on September 20-22, 2006. Only “poor” counts for *Enterococcus* that result in advisory reported here.
- <sup>28</sup>Florida Fish and Wildlife Conservation Commission. Red Tide Counts Archive. Red Tide online.com, [http://research.myfwc.com/gallery/image\\_details.asp?id=17081](http://research.myfwc.com/gallery/image_details.asp?id=17081). Estimates are generic for the entire Sanibel/Ft. Myers area.
- <sup>29</sup>Ochoa, Sept. 22, 2007. The New-Press. “FGCU scientists to study red drift algae: Rhodophyte bloom at Ft. Myers Beach (R. Loflin, City of Sanibel cited).”
- <sup>30</sup>C. Mansell (City of Sanibel, Florida), January 2007, National Healthy Beaches Campaign (NHBC), Healthy Beaches Reports, 2003-2007. Reports of Sanibel beaches at level 4 (infested) with red algae. No species information.

<sup>31</sup>J. Evans, pers. obs., 2007. City of Sanibel. Pictures of macroalgal accumulations, January 2007 pictures indicate another macroalgal bloom on Sanibel, as well as a Red Tide event. Also included, Feb. 2007 aerial survey photo of red algae bloom.

<sup>32</sup>K. Laakkonen, pers. obs. 2007. Environmental Sciences Coordinator, Town of Fort Myers Beach. The July 07 event was mostly Sargassum on the beaches of Sanibel, and the Feb/March 2007 event was many species.

<sup>33</sup>L. Ruane, January 5, 2008. The News-Press. "Lee Tourism officials want algae study Council seeks to rid beaches of problem." February and March, 2007 included large amounts of macroalgae that were cleaned from on Ft. Myers Beach and the City of Sanibel.

<sup>34</sup>City of Sanibel Beach Conditions, 2006-2007. Red algae reported on Sanibel, specifically Algiers and Lighthouse beach for April 10 and 16, 2007. On August 7, 2007, Lighthouse beach again was implicated; however on August 8, 2007, an announcement that Sanibel beaches were in excellent condition was reported.

<sup>35</sup>Florida Department of Health, Healthy Beaches website. Archived *Enterococcus* counts for Blind Pass and Turner beaches, October 1 and 8, 2007. Only "poor" counts for *Enterococcus* that result in advisory are reported here.

<sup>36</sup>B. Klement, pers. obs., 2008. From Feb 8<sup>th</sup>, 2008 SCCF ML beach assessments, Bowman's Beach (1029h): Tide was fairly high with the surf looking very large at times. Larger waves, not a great deal of fresh macroalgae, however. Most of what was present on the beach was composed of material stranded at least one day or more. A large amount of drift macroalgae, however, was observed in Clam Bayou towards Bowman's beach beneath the bridge (this appeared to be mostly red algae, often in rather large accumulations).

<sup>37</sup>B. Klement, pers. obs., 2008. From March 8, 2008. SCCF ML beach assessments, Tarpon Bay Beach (1100h). Surf larger at Tarpon Bay than at Bowman's beach. A very large wrack line accumulating, composed primarily of marine invertebrates. Sea urchins made up the majority of the stranded animals with dying or dead scallops, cockles, mussels, sea cucumbers, and parchment worm tubes (photos *TB\_10Mar08\_4*). There were also some large amounts of drift macroalgae scattered amongst the wrack line. Also, from March 3, 2008. SCCF ML beach assessments, Bowman's beach (1000h), tide very high. Relatively large amounts of macroalgae on beach as compared to past weeks – significant accumulations apparent very near the tide line, composed primarily of red algae; however, some browns and greens were observed also. Many fragments in the wrack line appeared to be fairly old, however.

<sup>38</sup>SCCF Turtle volunteers (for the Mote Marine Laboratory, Beach Conditions Reporting System) noted on August 20<sup>th</sup> and 21, 2008. "Thick" macroalgal accumulations on the surf line and beach at Lighthouse Point.

<sup>39</sup>Special to the Island Reporter, March 6, 2009. "Drift algae appears in Pine Island Sound." Heavy fouling of seagrass blades by *Hinckia* sp. Have been reported around Sanibel. SCCF cited in article.

<sup>40</sup>K. Provost, pers. obs., December 2009. SCCF ML beach assessments. Report algae up to 6 inches deep on Tarpon Bay Beach access. Algae ID as *Hypnea spinella*, *Agardhiella subulata*, *Gracilaria tikvahiae*, and *Acanthophora spicifera*. Observed algae not considered large "bloom".

<sup>41</sup>C. Mansell, (City of Sanibel, Florida), October 2009. City Receives Algal Bloom (Red Tide) Notice and an Update from Lee County Health Department. Red tide report, City of Sanibel. October 30, 2009. October 28, 2009 and October 29, 2009; South Seas Plantation 56,300 cells/L Low (b) Respiratory irritation and possible fish kills, Tarpon Road Beach 560,000 cells/L Medium Respiratory irritation/shellfish harvesting closures/fish kills: Lighthouse Beach 2,000 cells/L, Very Low (a) Possible respiratory irritation; Lynn Hall Park, 0 cells/L; Lovers Key Park 0 cells/L; Bonita Beach Park, 0 cells/L.

<sup>42</sup>L. Coen and J. Raffensperger, pers. obs., 2010. Algae collected at Tradewinds Dr., southeast of Bowman's beach, near beach access #7. Algae mostly *Hypnea spinella*, *Agardhiella subulata* and *Gracilaria mammalaris*. Large numbers of dead snook were reported at this beach location. The majority of this algae is what is mostly found at inshore sites, and may be accumulating because of the cold weather swing, or increased currents

<sup>43</sup>NBC-2, WBBH, February 21-22, 2010. "Algae continues to line Ft. Myers Beach." Pictures indicate algae was "typical" of what occurs in the winter months. Algae was collected and identified by SCCF staff *Gracilaria tikvahiae*, *Solieria filiformis*, *Chondria collinsiana*, *Agardhiella subulata*, *Spyridia filamentosa*, and *Halymenia pseudofloresia*

<sup>44</sup>L. Coen and K. Provost, March 2010. Several calls received at Marine Lab related to macroalgae on beaches (March 9<sup>th</sup> and 10<sup>th</sup>, 2010) from Keith Laakonnen (Ft. Myers Beach). Lab staff out that day sampling offshore sites collected material 10 March, and collected algae on Ft. Myers Beach. Algae identified as *Chondria collinsiana*, *Gracilaria bursa-pastoris*, *Polysiphonia* sp., *Daysa baillouviana* and *Solieria filiformis* (material was included in other analyses). J. Evans also collected material from three beaches (name them) on Sanibel Island. Algae were similar to Ft. Myers Beach samples, including several *Chondria* sp., *Daysa baillouviana* and *Gracilaria* sp.

<sup>45</sup>A. Bryant, pers. obs., February 13 2010. Turtle and Beach Condition assessment by volunteers reported mass strandings of large jellyfish (identified later as *Rhopilema verrilli*) on several beaches, especially near the Sundial Resort on Sanibel.

<sup>46</sup>M. Campbell and E. Milbrandt, August 2010. *Ectocarpus* sp. bloom noted by Lee County and SCCF staff at offshore Drift Algae study sites GOM12 (June 8, 2010) and also at a Lee County artificial reef (Belton-Johnson in August 2010). Alga identified as *Ectocarpus* sp. by K. Provost and E. Milbrandt. Video sent by M. Campbell (Lee County Natural Resources).

<sup>47</sup>H. Downing, pers. obs., July 15, 2010. Algae was collected at Tarpon Bay beach and at the beaches off of Rabbit Road and West Gulf Drive, July 15, 2010. Collection and identification at SCCF by K. Provost and E. Milbrandt. Species were two rhodophytes, *Halymenia pseudofloresia* and *Agardhiella subulata*. Algae included in UC Davis isotope analyses, as it had been found also at several nearshore and offshore sites in the recent SCCF Drift Algae sampling (June 7, 2010).

<sup>48</sup>K. Laakonen, and L. Coen, pers. obs., July 19, 2010. Species appeared to be different from those reported earlier on July 15 2010 by City of Sanibel; however, B. Reynolds (Lee County Environmental Lab) reported no algae on beach by July 20<sup>th</sup>, 2010.