On January 9, 2008, the State of Florida Senate, Environmental and Preservation Committee held hearings in Tallahassee on FDEP proposed legislation to close all six of the south Florida ocean sewage outfall pipes.

Several environmental organizations made presentations and provided comments in favor of the proposal.

Miami-Dade and Broward Counties argued against the plan.

The National Oceanographic and Atmospheric Administration, which is under contract to the wastewater treatment plant trade organization made a futile attempt to cloud the issue. The sewer plant’s consultant, NOAA’s Dr. John Proni, tried to shift the focus away from the sewage outfalls, blaming algal blooms and reef degradation on cold water upwellings, agriculture run-off, groundwater discharge, inlets, septic systems, atmospheric deposition and every conceivable culprit other than his client’s sewage outfall pipes. Proni’s presentation was based on unpublished studies and questionable data interpretation. NOAA has not released these data and has refused to make it available. Reef Rescue has filed a “Freedom of Information Act” request with the federal government to have the Proni data made public.

The NOAA “take my word for it” smoke and mirror presentation was reminiscent of the Bush administration’s refusal to accept evidence of Global Warming and the Tobacco Industry’s decades long misinformation campaign.

Thankfully, based on the laughter which followed many of the opponent’s statements, not many in the audience were buying the dog and Proni show.

Proni’s final admission, when questioned by the Senate, that he, himself would not swim in the outfall effluent plume was a fitting end to his presentation.

Below is the Reef Rescue Power Point presentation made to the Senate.

Unlike NOAA, we have made our backup data available for public review.
Palm Beach County Reef Rescue

an all volunteer, grassroots, nonprofit, 501(c)3 conservation organization dedicated to protecting the coral reef ecosystem of south Florida
formed by a group of local recreational divers, our ranks now spread worldwide and include divers and non-divers alike concerned with protecting our vulnerable coral reef resources.
the core group of divers have spent 10’s of thousands of hours underwater on the coral reefs in the vicinity of the Delray Beach ocean outfall. Over the last 20 years, our group has developed an intimate understanding of these reefs and have witnessed their decline.
We have defendable data, developed using sound scientific principles.
Case Study

Delray Beach Ocean Outfall Algal Bloom Investigations
The smoking Delray Beach ocean outfall pipe

Delray Beach sewage outfall pipe

http://www.reef-rescue.org/PowerPoint/Delray1.wmv
After viewing video close window to return to slideshow

Video by Elaine Blum
Palm Beach County Reef Rescue -2008
Nutrient pollution kills coral and smothers reefs with algal blooms.
Before
During Palm Beach County Reef Rescue -2008
After

Palm Beach County Reef Rescue - 2008
Red Algae Bloom
Lyngbya attacks Gulf Stream Reef

In early 2002, a red cyanobacteria, Lyngbya, spread across Gulf Stream Reef in south Palm Beach County.
- For many months divers from the Boynton Beach area spent hundreds of hours underwater mapping the spread of the bloom,
- Delineating the full extent of the Lyngbya algae,
- And tracking the bloom back to the source.
The nutrient source: the Delray Beach ocean discharge sewage pipe.
A search of public records revealed a connection between the beginning of the bloom and an increase in the quantity of nitrogen waste discharged from the Delray ocean outfall.
Divers mapped the Lyngbya as it spread, died-off and reappeared...
...and established a correlation between the quantity of nitrogen discharged and the bloom cycle.
Monthly Discharge Monitoring Reports
Delray Beach WWTP

TKN
Ammonia
Nitrite/Nitrate
Phosphorus

2001 to 2008
Monthly Discharge Monitoring Reports
Delray Beach WWTP

Total Kjeldahl Nitrogen (TKN)

2001 to 2008
Total Kjeldahl Nitrogen

Begining of Gulf Stream Reef Lyngbya bloom

2001 to 2008
TKN Bloom Threshold

Begining of Gulf Stream Reef Lyngbya bloom

Lyngbya die-off

1,200 lbs./day

2001 to 2008
Reef Rescue conducted a coastal water quality monitoring project in 2005. Samples were collected from multiple locations both up and down current of the Delray ocean outfall pipe. Eight separate sample collection episodes were completed from August 16, 2005 through November 8, 2005, representing a total of over 100 water samples.
The water quality monitoring project established background conditions and documented a jump in nutrient levels as the current traveled northward past the Delray Beach ocean outfall.
The 2005 Reef Rescue coastal water quality project tied together onsite visual observations, the correlation of Lyngbya bloom dynamics with the WWTP Discharge Monitoring Reports and in-field physical and chemical analyses to establish a defendable case of degradation to the receiving environment caused by the discharge of nutrients from the Delray Beach ocean outfall.

Palm Beach County Reef Rescue Boynton/Delray Coastal Water Quality Monitoring Project Sample Collection Stations

Theoretical Effluent Plume Model

Effluent plume model based on 2004 NOAA Farfield Tracer Study, width versus distance measurements. Plume width at Station 5 predicted to be 250 meters wide.

Note: Station 2 is the location of the outfall surface boil.
2007 NOAA Ocean Outfall Dye Test

On February 27, tracer dye is released from the sewer plant ocean outfall pipe.

With the beaches of Delray in the background, the red stained sewage plume is captured by the current and travels north onto Gulf Stream Reef, site of the destructive Lyngbya algal blooms.

Photo by Steve Spring
Reef Rescue has submitted six environmental investigation reports to the FDEP identifying the cause of the Gulf Stream Reef algal blooms as the Delray Beach ocean outfall.

- The Occurrence and Distribution of Cyanobacteria on Gulf Stream Reef, Boynton Beach, Florida (September 2003)
- The Occurrence and Distribution of Cyanobacteria on Gulf Stream Reef - Results of Phase II Investigations (February 2004)
- The Occurrence and Distribution of Cyanobacteria on Gulf Stream Reef, Boynton Beach, Florida - Supplemental Data (April 2004)
- Correlation Between Waste Water Treatment Plant Effluent Quality and Cyanobacteria Proliferation on Gulf Stream Reef (September 2004)
- Environmental Conditions Status Report Cyanobacteria Proliferation, Gulf Stream Reef, Boynton Beach, Florida (June 2005)
- Examination of Effluent Plume Behavior Delray Beach Florida Ocean Outfall (September 2006)
Algae blooms are just the tip of the iceberg.

250 year old Brain Coral, one of the oldest living residents of Palm Beach County, began life at the time the Declaration of Independence was signed.

Now threatened by pollution.
Scientists have linked the human fecal bacterium Serratia marcescens to lethal Acropora White Pox disease in Florida.
Over 90% of Florida’s Acropora corals have died in the last 20 years... prompting the federal government to add Elkhorn and Staghorn corals to the Endangered Species List in 2006.
EPA warns Personal Care Products and Pharmaceuticals (PCPPs) pose a threat to the aquatic environment.
Medical waste, hormones, viruses and pharmaceuticals, which survive the wastewater treatment process, affect sex ratios and disrupt reproduction of aquatic organisms.
EPA warns contact with south Florida sewage effluent poses a human health risk.

- EPA identified the Delray outfall as representing the most significant risk to human health in south Florida due to its near-shore proximity.

- EPA quote: “The most probable human exposure pathways include fishermen, swimmers [scuba divers], and boaters who venture out into the Florida Current and experience direct contact, accidental ingestion of water, or ingest fish or shellfish exposed to effluent.”

Source: April 2006, University of Florida, Outfall Study
The nearshore sewage effluent plume has become a recreational playground for divers and fishers.
There is no agency (State, local or federal) that monitors the sewage effluent plume for possible human exposure and potential health risks.

The Palm Beach County Health Dept. has ignored our repeated requests to comment on this issue.
Delray Outfall Status

- In December 2005, Delray’s NPDES permit to operate the outfall expired.

- Citing the work of Reef Rescue, FDEP has not renewed the outfall permit.

- In December 2006, bowing to public sentiment and impending litigation the joint city councils of Delray and Boynton Beach unanimously voted to move forward with plans to close the ocean outfall pipe.
The wastewater treatment plant is now upgrading to increased water reuse with deep well injection as backup.

The new system is planned to be operational by 2009.

Delray continues to operate the outfall without a valid federal NPDES permit.

Reef Rescue continues to monitor the impacts to the reef from the ocean outfall pipe.
Florida is home to the 3rd longest coral reef on the planet...
...but has failed to adopt any nutrient standards for the protection of its coral reef resources, unlike many Caribbean countries...
### State of Hawaii Water Quality Standards for Open Coastal Waters

<table>
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<th>Constituent</th>
<th>Geometric Mean Not to Exceed the Given Value:</th>
<th>Not to Exceed the Given Value More than 10% of the Time:</th>
<th>Not to Exceed the Given Value More than 2% of the Time:</th>
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<td>Ammonium (µM)</td>
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<td>Nitrate + Nitrite (µM)</td>
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<td>Total P (µM)</td>
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<td>Chl a (µg/l)</td>
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<td>Turbidity (NTU)</td>
<td>0.50</td>
<td>1.25</td>
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</table>

1: HAR 11-54.6
Even before the NPDES permits for the south Florida ocean outfalls expired, there were no restrictions on the amount of nutrients allowed to be discharged.
Yet, lobbyists for the wastewater industry continue to debate what every grade school student knows.

Manure makes plants grow. In this case sewage causes coral killing algae blooms.
<table>
<thead>
<tr>
<th></th>
<th>Boynton-Delray</th>
<th>Boca Raton</th>
<th>Broward/North</th>
<th>Hollywood</th>
<th>M-D/North</th>
<th>M-D/Central</th>
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<td><strong>Permitted flow (MGD)</strong></td>
<td>24.0</td>
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<td>42.0</td>
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<td>16</td>
<td>84</td>
<td>40</td>
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<td>129</td>
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<td><strong>2005 reuse¹ (MGD)</strong></td>
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<td><strong>2005 reuse¹ (%)</strong></td>
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<td>33</td>
<td>3</td>
<td>7</td>
<td>&lt; 1</td>
<td>0</td>
<td>4</td>
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</table>

Table: April 2006, University of Florida, Outfall Study

Southeast Florida Ocean Outfalls
Reef Rescue environmental investigation reports are available as pdf downloads at:

www.reef-rescue.org