

## **Review of Staff Utilization for Water Quality Activities**

The City Council of Marco Island is approaching budget season. During this time of the year, the City Council must review every issue and prioritize the allocation of the available finite resources to all the goals that benefit the Citizens. The current attention to the quality of the waters around our Island suggests that we address two key resources. First, water quality is an element in the job descriptions of several city employees. Second, water quality may be impacted significantly by the city budget process. The purpose of this white paper is to examine how the allocation of personnel and budget resources can be a factor in the pursuit of improving water quality around Marco Island.

Howard Reed 4/23/19

## Marco Island Water Quality Improvement Project

Issue Name		Issue #	
Description		Rev. Date	
MI Dept		Q Factor	
MI Contact			
Organization			
Org Contact			
Budget			
Hypothesis			
Materials and Methods			
Data Collected to Date			
Conclusions to Date			
Current Action Recommendations			
References			

## Topic and Study Descriptions

1. Swales, Streets and Retention
  - a. Island wide reshaping of swales to improve stormwater percolation time
  - b. Raising of stormwater inlets to improve stormwater percolation time in the swales
  - c. Potential impact of street vacuuming on water quality. Study the potential impact of street vacuuming on water quality by measuring the quantity and quality of materials vacuumed from the streets versus the impact of the same materials washed into the canals through stormwater events.
  - d. Study the potential impact of pervious pavers as used for residential and commercial property development.
  - e. Study the impact of retention ponds
  - f. Study hydrocarbons and debris washed from streets
2. Fertilizers and Groundskeeping
  - a. Banning the application of fertilizers under certain conditions and during certain times of the year to reduce nutrient loading in the canals.
  - b. Prohibitions against actions which could introduce grass clippings and other organic matter into the waterways such as operating lawnmowers without grass catchers, mowing within a specified distance of a seawall, blowing grass clippings into storm water inlets, etc.
3. Site Development
  - a. Requirement that certain residential property permit applications include a site plan demonstrating that the Pervious/Impervious Ratio meets the specified standard.
  - b. Requirement that certain commercial property permit applications include a site plan demonstrating that the Pervious/Impervious Ratio meets the specified standard.
  - c. Requirement that certain residential property permit applications include a site plan demonstrating that the stormwater retention capability meets the specified standard.
4. Subsurface Sampling and analysis
  - a. Evaluation of the effects of accumulated sludge on canal bottoms on water quality
  - b. Utilization of sampling wells to determine nutrient flow to canals
5. Weather Events
  - a. A retrospective study to determine what correlation, if any, exists between reordered rainfall amounts and recorded water quality measurements.
  - b. First Flush Study - Study the chemical composition of stormwater as it is recovered from specified surfaces such as roofs, driveways, swales, etc., immediately after the beginning of a rain event and in closely spaced time intervals thereafter until the samples approach equilibrium

- c. Review of the changes to water sampling data in relation to hurricane and tropical storm events
- 6. Reuse Water
  - a. Study the potential impact of reuse water on the nutrient loading in the canals, especially the impact on nitrogen and phosphorus levels.
  - b. Quantify the amount for reuse water and its spatial distribution and model how much of it ends up in the canals.
  - c. Track the amount of reuse water distributed by the water system over time and compare that against nitrogen and phosphorus levels recorded in the canals.
  - d. Consider isotope marking a sample of reuse water and trace its movement from an irrigation system to the canals
- 7. Gulf Loop Current
  - a. Study the effects of the Gulf of Mexico Loop Current in both the macro and micro currents operating in the waterways.
  - b. Study the flushing effect of currents within of tidal currents in the canal system
- 8. Seawalls, Inlets and Outfalls
  - a. Study the impact of aging and deteriorating seawalls on nutrient transfer into the canals.
  - b. Study the impact of extending the canal seawalls into a lot to create the well for a nautical garage.
  - c. Review the results of the MS-4 outfall study
  - d. Review the results of the Inlet location study
- 9. Water Testing
  - a. Review changing the current quarterly inland water quality testing to monthly inland water quality testing
  - b. Review changing the current quarterly offshore water quality testing to monthly offshore quality testing
- 10. Sources from off Marco Island
  - a. Long distance offshore testing in the Gulf of Mexico
  - b. Testing in the Marco River
  - c. Testing for impacts from the Goodland septic system
  - d. Testing for impacts from the Isle of Capri septic system
- 11. Sources from boat uses and anchorages
  - a. Boat bottom cleaning at residential docks
  - b. Boat bottom cleaning at commercial docks and marinas
  - c. Holding tank discharges
- 12. Water treatment plant discharges
- 13. Sources from golf courses

14. Stormwater
  - a. Stormwater from residential properties
  - b. Stormwater from commercial properties
  - c. Outfall filter effectiveness
15. Animal, bird and bat feces
16. Industrial discharges
17. Parking lot discharges
18. Study the impact of artificial reefs
19. Tidal cycle and volume modeling
20. Seagrass study-does the seagrass die because of water chemistry imbalance or turbidity?
21. Policy decision matrix
  - a. Waterways
    - i. Canals
    - ii. Beaches
    - iii. Bays
    - iv. Rivers
    - v. Lakes
  - b. Water Quality Issues
    - i. Impurities
    - ii. Nutrients
    - iii. Microbials
    - iv. Suspended Solids
    - v. Floating materials
    - vi. Health Threats
      1. Animal Life
        - a. Fish
        - b. Other Sea Animal Life
      2. Plant Life
        - a. Sea Grass
        - b. Other Sea Plant Life

## FUNDING AND FEASIBILITY

A.	Onsite Project Administration Grad. Student (2-years)	\$72,000
B.	Street sweeping	TBD
C.	Canal Monitoring	\$6,500
D.	Source Tracking	\$70,000
E.	Gator Byte	\$13,200
F.	Advanced Ecological / Biogeochemical Monitoring	\$15,000
G.	Education	\$25,000

Source: UFAS Extension Webinar

**Marco Island Water Quality Improvement Cost Analysis**

Updated 4-5-2019

<u>Program</u>	<u>Estimated One Time</u>	<u>Estimated Annual Cost</u>	<u>Total</u>	<u>Objective</u>
1 Increase to Monthly Water Testing and Additional Reporting	\$ 35,000	\$ 35,000	\$ 70,000	Identify and quantify the problem, determine sources, determine trends, monitor solutions.
2 Implement U of F Testing Program	\$ 200,000	\$ 25,000	\$ 225,000	Identify and quantify the problem, determine sources, determine trends, monitor solutions.
3 Professional public education and outreach publication	\$ 50,000	\$ 35,000	\$ 85,000	Increase public awareness of issues , solicit support for solutions.
4 Code Enforcement of Existing Ordinances		\$ 75,000	\$ 75,000	Stop fertilizer and grass clipping pollution.
5 New Licensing procedures for Landscapers	\$ 50,000	\$ 50,000	\$ 100,000	Enforce licensing and control, education.
6 Fertilizer Ban	\$ 25,000		\$ 25,000	Stop nitrogen based fertilizer usage.
7 Swale Reconstruction and Rehabilitation Program	\$ 3,000,000	\$ 100,000	\$ 3,100,000	Restore swales to increase stormwater retention.
8 Raise all stormwater drains to road surface levels	\$ 500,000		\$ 500,000	Slow release of stormwater to canals.
9 Recycled water improvements	\$ 400,000	\$ 100,000	\$ 500,000	Reduces contaminants in reuse water.
10 Street Vacuuming	\$ 175,000	\$ 75,000	\$ 250,000	Reduce contaminants on roadways .
11 Pet Waste Disposal Education program/pamphlet	\$ 15,000		\$ 15,000	Stop pet waste from entering canals.
12 Muck Removal and canal dredging	\$ 5,000,000		\$ 5,000,000	Remove contaminants in canals that contribute to eutrophication.
13 Building Code Revisions for Runoff and Coverage ratios	\$ 25,000		\$ 25,000	Encourage site coverage controls, reduce impervious surfaces.
14 Lobby Collier County and state for reducing upland pollution sources	\$ 50,000		\$ 50,000	Help stop or control upland pollution.
15 Construct Closed Stormwater Sewer System	\$12,000,000		\$12,000,000	Construct closed Stormwater sewer system.
16 Increase Public Works Annual Staffing and Budget		\$ 200,000	\$ 200,000	Increase staffing for swale management and other water related projects.
17 Require Homeowners to Install 6 foot buffer between lawn and canal	\$ -	\$ -	\$ -	Reduce fertilizer pollution.
Total	\$21,525,000	\$ 695,000	\$22,220,000	

Source: Email from Rick Woodworth