WATER QUALITY OF THE HOMOSASSA & HALLS RIVERS AND MASON CREEK

More than 50 enthusiastic volunteers have now completed a series of water quality tests to get a better picture of the health of the Homosassa River, Halls River and Mason Creek. This Homosassa River Alliance project, designed to help understand our coastal streams, was made possible by the Southwest Florida Water Management District (SWFWMD) as a Community Education Grant.

Over the years SWFWMD has conducted a variety of studies to more clearly define the changes that are taking place in the Springs Coast Rivers as a consequence of nutrient loading. In 1999/2000 they funded the University of Florida (UF) to develop an extensive data base on the Homosassa River. We compared our results with those found by UF. SWFWMD Environmental scientists helped us to analyze our findings.

The project covered a variety of weather situations. The first test on March 15th occurred near the end of an extended dry spell. The next week a good sized storm (over 2 inches of rain) passed through the area. We looked for stormwater runoff effects by testing on two consecutive days after the storm. The final tests took place on April 19th which was after five days of clear weather. Prior to that there had been a series of three major storms.

NITRATES LEVELS

Excess amounts of nitrates and phosphates can cause dramatic increases in aquatic plant growth and changes in the types of plants and animals that live in a stream.

Sources of nitrates include wastewater, failed septic systems, fertilizer and animal waste. SWFWMD has identified fertilizers as a major source of nitrates in the Homosassa Spring water. Nitrate concentrations have been steadily increasing in the coastal spring water since the late 1960's.

UF found the mean nitrate level to be .412 ppm (parts per million) in the Homosassa Main Springs. This is over 40 times higher than natural background levels. In 1960 the Homosassa Springs measured at .130 ppm. While these nitrate levels are well below safe drinking water standards (10 ppm), the ecosystems are clearly responding to this increase in nutrients in the water. At the springs we measured up to .51 ppm

LOCATION	ALLIANCE STUDY			UF STUDY		
	LOW	HIGH	AVE	LOW	HIGH	AVE
At the Springs	.410	.510	.460	.327	.465	.412
Homosassa Blue Waters	.310	.390	.350	.249	.422	.369
Halls River	.100	.250	.180			
Homosassa Canals	.110	.410	.200			
Homosassa at Marker 69	.180	.180	.180	.001	.141	.055
Mason Creek	.100	.200	.140			
Mason Creek Canal	.600	.600	.600			
Bluebird Springs	.270	.270	.270			

The nitrates in the main river decrease as you go downstream due to the uptake by plants and algae. Total nitrogen, which stays relatively constant in the Homosassa, is a combination of ammonia (NH3), nitrates (NO3), nitrites (N02) and nitrogen-rich organic matter. The nitrogen can be exchanged among these various forms.

After the storm the nitrate levels of the Homosassa River increased 8% in the Blue water and 21% at MacRae's ramp. The canal and side stream areas swings were dramatic both increasing (up to 87%) and decreasing (down by 32%). With a little imagination you could almost see the canals and side streams getting flushed into the river.

The final tests in April took place after a series of three major storms and then five days of clear weather. At this time the nitrates stayed high at the springs (.470 Parts Per Million), and in some of the canals (.380 PPM). But the nitrates decreased rapidly as you move downstream from the springs. Downstream of the Seagrass Pub the nitrates in the main river had dropped below .100 PPM. This decrease is much more rapid than noted in March and the trend matches the findings of prior University of Florida (UF) studies. This nitrate decrease is due to the rapid nutrient uptake by plants and algae as we enter the growing season. Unfortunately the total nitrogen is still in the river. It has just changed from nitrates to organic nitrogen that will eventually be released back into the river.

PHOSPHATES

In normal, healthy freshwater systems phosphates are present in very low concentration which limits plant growth. UF concluded that phosphate is the limiting nutrient for our coastal waters including the Homosassa River. That means we have enough nitrates present such that even a small increase in phosphate will stimulate the plant growth and dramatically increase the algae blooms. The Homosassa River's susceptibility to phosphorus is probably relatively new, and related to the nitrate increase over the past few decades.

Under natural conditions phosphates levels in the water are low because phosphorus does not easily dissolve in water. However humans add phosphates to water through wastes, failed septic tanks, fertilizers, commercial cleaning preparations and disturbances to land and vegetation. Storm water does its part by flushing this material from the land into the waters.

Florida has no specific standards for phosphorus in water. In the Everglades Recovery Program the goal is to reduce phosphorous to a level below .01 Parts Per Million (PPM).

The UF tests found total phosphorous in the Homosassa to range from .013 to .038 PPM. UF also found phosphorus running higher in the fall/winter readings and lower in the spring/summer. In March, we detected levels of .047, .110, .130 and .960 PPM at four sites which were scattered across the entire range of our testing area: the Blue Water, The Halls River, the Homosassa River and a canal. These levels were not detected again in any test either just after the storms or in April. The storms apparently flushed the phosphates from these areas.

SALINITY
An estuary is a transition area where fresh and salt waters mix and there is a tidal influence. The Homosassa and Halls Rivers and Mason Creek are estuaries. All the way up to the springs! These waters have a constantly changing mixture of salt and fresh water. Salinity goes from near zero at the springs to about 35 Parts Per Thousand (PPT) in the Gulf.

One interesting thing about the Homosassa Springs is that three vents of the main spring all have different levels of salinity ranging from near zero to 2.5. This probably accounts for the variety of fish that hang out there. I have been told that salty springs also exist in the Mason creek and Halls River areas.

Here are the March test results:

LOCATION	**ALLIANCE STUDY**			**UF STUDY**		
	LOW	HIGH	AVE	LOW	HIGH	AVE
Spring Cove Springs	0	0	0			
Homosassa Blue Waters	3	6	5.2	.6	1.6	1.1
Halls River	4	6	5.3			
Homosassa Marker 69	3	14	5.3	1.4	15.2	3.7
Homosassa Canals	0	10	6.1			
Mason Creek	14	17	15.5			
Bluebird Springs	3.5	3.5	3.5			

In April the Homosassa salinity was generally lower. The Halls River and Mason Creek salinities were basically unchanged between March and April. The wide range of tides results in a constant changing of the saltwater and freshwater mixture. This is one parameter that needs to be viewed as cyclic and monitored over a long period of time.

WATER CLARITY
The water clarity tests are performed with a device called a Secchi disk. The water was clear enough that the disk could be seen all the way to the bottom of the water for all but one of our test sites. All our tests were in the upper half of the river. The lower 3 to 4 mile area is categorized as a marsh complex and there the water clarity is substantially reduced. The water clarity is the lowest just inshore from the gulf and then increases further out in the gulf.

Water clarity was better in March than in April.

Water clarity in the Homosassa is related to chlorophyll, a substance found in all plants including algae. Chlorophyll is what turns the water green. What causes it to grow? Temperature, nutrients, run off, low flow rate and recreation. Recreation? Yep. Stirring this stuff up with boats and people accelerates its growth. And all these things pick up at this time of year.

BACTERIA

Fecal coliform testing is a practical and widely used indicator for bacteria. The units are "colony forming units (CFM) per 100 milliliters. The Florida fecal coliform standard for both potable water and recreation is an average of 200 CFM per 100 ml. The standard for shellfish is much tighter at 14 CFM per 100 ml.

The standards are based on monthly averages recognizing that the numbers can vary quite a bit depending on a variety of conditions including recent rainfall. So we have to be cautious about interpreting the results of these limited numbers of tests. A second thing to remember is the fact that sources of fecal contamination includes all birds and animals not just humans.

The bacteria test levels were relatively low (between 1 and 71) in March before the storm and show a jump (between 25 and 300) after the storm. The actual stormwater runoff effects may also be even higher than our tests showed because we did not know exactly when the peak effect shows up at a particular location.

LOCATION	**BEFORE STORM March 15**		**AFTER STORM March 23 & 24**	
	LOW	HIGH	LOW	HIGH
Pepper creek	47	47	25	300
Spring Cove Springs	1	13	NT	NT
Homosassa Blue Waters	35	71	35	300
Halls River	1	52	53	53
Homosassa River to Marker 69	1	52	59	220
Homosassa Canals	2	38	NT	NT
Mason Creek	3	29	46	98
Bluebird Springs	1	1	NT	NT

NT means not tested.

In April the bacteria test levels were back down to the range of 0 to 93.

In 1997 and 1998 a considerable amount of fecal coliform testing was done by the University of South Florida in the Homosassa Main Springs area. The results of those tests showed CFM's in the Blue Waters (at sites similar to ours) to range from 9 to 105 and in Pepper Creek to range from 76 to 140.

THANKS TO ALL THE VOLUNTEERS

This project has been very interesting and informative for all. Our results align well with prior testing. The Homosassa River Alliance appreciates the time and energy from all who participated in these tests. A great job was done by all. And we all have a better picture of the Homosassa.

Ron Miller, President Homosassa River Alliance
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