ENVIRONMENTAL PROTECTION COMMISSION OF HILLSBOROUGH COUNTY

TECHNICAL SUPPORT DOCUMENT FOR PROPOSED LOCAL FERTILIZER RULE – CHAPTER 1-15
May 7, 2010

INTRODUCTION

In an effort to improve water quality in Hillsborough County, the Environmental Protection Commission of Hillsborough County (EPC) is preparing a draft fertilizer management rule which is stricter than the model code created by the Florida Department of Environmental Protection (FDEP).

Excessive inputs of the macro-nutrients nitrogen (N) and phosphorus (P) have been demonstrated to cause water pollution (see, for example, entire December 2008 edition of the journal Harmful Algae (2008) as well as Southwest Florida Water Management District (SWFWMD) 2002. Multiple studies by and for the Environmental Protection Commission of Hillsborough County, Tampa Bay Estuary Program (TBEP), and the Chesapeake Bay Program among others have shown the adverse impacts of over-enrichment to surface waters. A recent scientific study by Peebles et al. (2009) for an impaired watershed partially contained within Hillsborough County indicates that a significant and growing percentage of the nitrogen in sediments is coming from inorganic fertilizer sources. Leggette, Brashears & Graham, Inc. (LBG) (2004) examined sources of nitrogen to groundwater in Lake Tarpon, a large lake near the Hillsborough County/Pinellas County border. They estimated that roughly 79% of the nitrogen in the surficial groundwater system contributing to Lake Tarpon is from fertilizers (agricultural and residential). Most fertilizers contain significant amounts of nutrients and must be considered in any program intended to protect and enhance surface water quality. The following summarizes a review of information supporting these provisions. These findings are taken from reports, studies, personal interviews, and public workshop comments.

The objective of this document is to provide technical assistance for the Commissioners, FDEP, Florida Department of Agriculture and Consumer Services (FDACS), and the University of Florida's Institute of Food and Agricultural Sciences (IFAS). Specifically, information is summarized herein to augment the technical rationale for elements of EPC's proposed rule regulating the application, purchase, and use of landscape fertilizer within Hillsborough County.

Section 403.9337, Florida Statutes states that a local government may adopt additional or more stringent standards than the model ordinance if the following criteria in subsection (2)(a) and (b) are met:

> **403.9337 Model Ordinance for Florida-Friendly Fertilizer Use on Urban Landscapes.**--
>
> (1) All county and municipal governments are encouraged to adopt and enforce the Model Ordinance for Florida-Friendly Fertilizer Use on Urban Landscapes or an equivalent requirement as a mechanism for protecting local surface and groundwater quality.
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> (2) Each county and municipal government located within the watershed of a water body or water segment that is listed as impaired by nutrients pursuant to s. 403.067, shall, at a minimum, adopt the department's Model Ordinance for Florida-Friendly Fertilizer Use on Urban Landscapes. A local government may adopt additional or more stringent standards than the model ordinance if the following criteria are met:
>
> (a) The local government has demonstrated, as part of a comprehensive program to address nonpoint sources of nutrient pollution which is science-based, and economically and technically feasible, that additional or more stringent standards than the model ordinance are necessary in order to adequately address urban fertilizer contributions to nonpoint source nutrient loading to a water body.
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> (b) The local government documents that it has considered all relevant scientific information, including input from the department, the institute, the Department of Agriculture and Consumer Services, and the University of Florida Institute of Food and Agricultural Sciences, if provided, on the need for additional or more stringent provisions to address fertilizer use as a contributor to water quality degradation. All documentation must become part of the public record before adoption of the additional or more stringent criteria.

Some elements of the EPC's proposed fertilizer rule are more stringent than the model ordinance developed by the FDEP. The following provisions that are in this category are discussed below:

- Seasonal Restrictions - no N or P fertilizer application during the rainy season (June 1 - September 30)
- Retail Sales Restriction – no N or P fertilizer sales during restricted season (June 1- September 30)
- Fertilizer-Free Zones - No fertilizer shall be applied within ten (10) feet from any surface water body or seawall.

This document is the EPC's demonstration and justification for a more stringent fertilizer rule, but this condensed paper does not reflect the entirety of the documents the EPC has reviewed during this process. Nonetheless, this paper cites the most relevant research to support the EPC's position.

NONPOINT SOURCE POLLUTION PROTECTION

The EPC is an independent local government and separate from the government of Hillsborough County. Hillsborough County also has three municipalities: City of Plant City, City of Tampa, and City of Temple Terrace. The County and the three municipalities all have waterbodies impaired for nutrients, thus pursuant to section 403.9337, F.S. those four governments must adopt fertilizer management ordinances. The EPC, in coordination with Hillsborough County and the three municipalities, is proposing a draft fertilizer rule that will apply within all four of these governments' jurisdictions. The FDEP has concurred with the EPC that the EPC can pass one rule to fulfill all four governments' obligations under section 403.9337, F.S.

The four local governments and the EPC have comprehensive programs in place to address nonpoint sources of nutrient pollution. The comprehensive programs have been effective in improving surface water quality and seagrass restoration in the Tampa Bay region, but additional and more stringent fertilizer regulations are needed than the FDEP's model ordinance in order to adequately address urban fertilizer contributions to nonpoint source nutrient loading.

In fact, through the Hillsborough River Basin Management Action Plan (FDEP, 2009), the Tampa Bay region addresses surface water quality improvement of these impacted waters. Area stakeholders have provided resources of more than $80 million dollars for operational and program costs to improve surface water quality in this area (see BMAP attachment).

Additional examples of comprehensive programs to address nonpoint source nutrient pollution include:

Wastewater

Advanced Wastewater Treatment Levels on all Plants discharging to Tampa Bay and tributaries
Industrial Pre-treatment requirements
Private Pump Station Identification and Compliance Program
Emergency Response Program
Sanitary Sewer Overflow Database
Contamination Complaint Response Program
Lift Station Security Program
Septic Tank Mapping and Hot Spot Program
Septic Tank Set-back Program (Land Development Code)
Public Health Education Program
Environmental Protection Commission Regulatory Authority
EPC water quality monitoring program

Regional and Miscellaneous Efforts

Watering Restrictions
Maximization of Use of Reclaimed Water on Lawns
Promotion of Florida Friendly Yards and Neighborhoods
Cooperative Extension Education Programs
Best Management Action Plans Adopted for multiple impaired water bodies
Tampa Bay Estuary Program
Agency for Bay Management/Tampa Bay Regional Planning Council
Area-wide Water Quality Plan
SWFWMD's Surface Water Improvement and Management Program
Hillsborough River Watershed Alliance
Tampa Bay Comprehensive Conservation and Management Plan (CCMP)
Nitrogen Management Consortium
Development of Multiple Watershed Management Plans
Reasonable Assurance document
Municipal NPDES stormwater permits
EPC MOUs with Temple Terrace, County, and Tampa to assist in compliance and enforcement of their NPDES permits related to stormwater and illicit discharges
Cities and County costly infrastructure upgrades to improve stormwater treatment
TBEP, Tampa Bay Water, Hillsborough, Tampa, and SWFWMD public messaging regarding fertilizer use, water conservation, Florida-friendly planting, and/or irrigation practices.

Stormwater

County Stormwater Quality Management Ordinance #94-15
City of Temple Terrace Code of Ordinances, Section 25.716
Stormwater Ecologist Education Program
Pet Waste Campaign Study
Lake Watch and Hillsborough County Stream Water Watch
Adopt-a-Pond Program
Systematic Program for Stormwater Improvements
Separate Stormwater Utility Fee
Conservation Element of the County Comprehensive Plan
Stormwater Management Element of the Comprehensive Plan
Street sweeping that the County and Tampa participate in through FDOT
EPC water quality monitoring program
Officer Snook Education Program

Clearly, the Tampa Bay region is committed to reducing nonpoint source pollution, but best on impaired waters in the region and water quality data showing continued nutrient pollution, a more stringent rule is merited.

SEASONAL RESTRICTIONS

Section 1-15.04(a) of the proposed rule states:

> *"No applicator shall apply fertilizers containing nitrogen and/or phosphorus to turf and/or landscape plants during the restricted season from June 1 -September 30.*

Justification

National Weather Service data (NOAA 2010 and WeatherBase.com 2010) for the Tampa Bay region indicates that the months of June, July, August, and September are the 4 wettest months of the year. Randy Lascody, Senior Forecaster, of the National Weather Service (NOAA 2002) describes the climatological reasons for this. In addition to tropical storms and hurricanes, these 4 months are dominated by daily thunderstorm activity in the Tampa Bay region. The exact locations of the rainfall associated with these thunderstorms cannot be easily predicted by meteorologists, nor can the intensity of a given rain event. The state fertilizer model does not contain a summer application ban, but in some regions of the state the summer rains are not as frequent or intense as in the Tampa Bay region, thus the one-size fits all fertilizer model does not make sense for a region that experiences different rainfall patterns than certain other regions of Florida.

Rainfall data over the last 48 years for Tampa clearly demonstrates that the preponderance of yearly rain falls during the months of June, July, August and September (WeatherBase.com 2010). More specifically, over the past 48 years of record, June rainfall averaged 5.6", July 7.3", August 7.9", and September 6.3". Combined, these 4 months represent more than half the average annual total rainfall received. The next highest month was March, with 3.4". In addition to tropical storms and hurricanes, these 4 months are dominated by thunderstorm activity. Over the past 48 years of record, the average number of days with thunderstorm activity in Tampa has been as follows: 14 days in June, 21 days in July, 20 days in August, and 12 days in September. The next closest month is May, with an average of 5 days. Finally, over the past 48 years, on average June has had 12 rainy days, July - 16, August - 17, and September - 13. The next closest months are January, February, March, and October, with 7 rainy days on average each.

The rationale for this provision to ban the application of N and P containing fertilizers during this 4 month period (termed "summer period" for purposes of this report) is that more frequent rains will increase the likelihood of higher levels of soil saturation, runoff, and leachate carrying nutrients to surface water and groundwater. This is reasonable, in that over 50% of our annual rains occur during this summer period (Weatherbase.com 2010). Also, the brief but intense rains create the ideal conditions for

suspending small particles such as fertilizer, dissolving it into its components, and carrying it to nearby water bodies. IFAS has recognized that stormwater runoff is a critical pathway for fertilizer transport to a receiving water body. Hauxwell et al. (2001) states "limit the use of fertilizers on residential and commercial lawns and landscaping. When fertilizing, it is important to minimize quantities and avoid fertilizing before heavy rains. Storm water runoff can transport fertilizer intended for yards directly to coastal waters." SWFWMD (2009) also recommends "do not fertilize if rain is predicted in the next 24–36 hours." Since it is extremely difficult to predict whether a given location will receive rain on a given day during the summer period, having a general ban on the spreading of N and P fertilizer during these 4 months would provide assurances that excess nutrients are not being washed into surface water bodies. Additionally, given the high frequency of rainfall during the summer months (e.g. 21 days in July), it is difficult to refrain from fertilizing within 24 to 36 hours if it may rain every other day or more frequently in the summer.

According to IFAS staff, a prohibition on the application of N-fertilizer during the 4 months of frequent rains has the potential to "stress" some lawns and landscapes. Multiple comments received from representatives of the lawn/landscape industry as well as from representatives of fertilizer manufacturers and distributors also echo this sentiment. Hochmuth et al. (2009) concluded that summer application of fertilizer can be beneficial because the warmer months are the peak growing season for turf grasses, and nutrient assimilation through the roots is at a maximum. IFAS staff, as well as representatives from the landscaping industry, also express concerns that a 4 month time period may be too extreme and can result, over time, in lowered turf grass health, hence lowered assimilation capabilities. This view is echoed by representatives from FDACS (Rackley and Collier, 2010, personal communication) and FDEP (Thomas, 2010, personal communication), among others. Given there are already fertilizer products on store shelves that claim to be slow-release for time frames that are 4 months or longer, it would appear that such products could be applied prior to the application ban and still provide enough nutrition to maintain turf health for the entire period. FDACS, IFAS, and others suggest that such claims are not realistic under high summer temperatures and high moisture conditions (both of which are factors that break down the slow-release coatings on granular slow release fertilizer products). However, we have been able to find no long-term scientific study to definitively address the question of the efficacy of slow-release fertilizer products to last over a 4 month summer period. It is our position, at this time, to accept the claims made as they are stated on the labels of the fertilizer products. We welcome scientific data that suggest that these claims are not valid.

A recently-received study of N-deficiency in turf grasses from Sarasota County (which has a summer application ban) compared with lawns in neighboring counties without a summer ban appears to indicate a higher percentage of N-deficient lawns in Sarasota compared with those other neighboring counties (Troutman, et al., 2008). The authors suggest that the N-deficiency observed will tend to increase over the coming years of continued application ban. The study does not, however, address water quality run-off from the various lawns. In fact, the majority of turf grass studies performed in Florida have focused primarily on requirements for optimal turf grass health rather than on quantifying run-off of nutrients to surface waters during rain events.

One question that remains largely unanswered in the literature is whether it is necessary to facilitate maximum turf growth to achieve and maintain a healthy, attractive lawn. Some landscapers have provided their opinions to EPC staff that moderate or low levels of growth maintain plant health and also reduce maintenance requirements (public workshop comments). These landscapers suggest that allowing turf grasses and landscape plants to grow at a sustainable, but less than maximum rate is a prudent, reasonable, and cost-effective approach to landscaping. Some lawn care specialists have observed that turf grasses not fertilized during the summer remain perfectly healthy (although sometimes not so emerald green during the summer months), but suffer no ill effects (Juchnowicz, 2009).

For much of Florida, including the Tampa Bay region, summer is not the only growth period for turf grasses and landscape vegetation. Plants are also active in spring and fall. SWFWMD (2009) recognized that the prudent application of fertilizer bracketing the rainy season is a reasonable alternative to summer fertilization, stating: "*do not apply fertilizer if heavy rainfall is forecast in the next 24 hours."* and *"fertilize only when the grass is actively growing. Spring and fall are the two key times for fertilizer application in Florida."*

It is also necessary to mention that N from inorganic fertilizers is not the only source of N available to plants (or that may end up in surface waters) during summer months. In many cases, there are other sources of nutrients available for plants and turf. Reclaimed water containing N is used for irrigation in many areas including much of urbanized unincorporated Hillsborough County, parts of Tampa and Plant City. Irrigation of turf using reclaimed water can reduce the need for fertilizer application. Barth (2009, personal communication) provided his assessment of reclaimed water on a large multi-use development in Sarasota County. He indicated that changes to fertilization practices, including the use of reclaimed water, on turf grasses in common areas have the potential to reduce maintenance and turf repair costs by an order of magnitude. Since December 2006 their fertilizer usage rates were reduced to 4 lb/1000 ft^2/yr

or less. However, Barth does not suggest a definitive application rate. Water Management Districts have long advocated the use of reclaimed water for irrigation, both to reduce water use and to lower nutrient application to lawns. For example, SWFWMD (2009) recommends *"if your household utilizes reclaimed water, you may not need to fertilize as much or as often. Reclaimed water contains nutrients like nitrogen and phosphorus, which are also in fertilizer."* Usable nitrogen is also delivered to the land surface via atmospheric deposition and from organic N decomposing in grass clippings, leaves, etc.

The debate relating to the summer application ban extends to the effects of N-fertilization on disease and pest infestations as well. High N application rates have been linked to increased problems with diseases such as fungus and insects such as chinch bugs (public workshop comments). Summer is a peak growth season for insects and fungus as well as plants. Problems with summer fertilization and disease/insect problems have also been recognized by IFAS *"...fertilization with N in the summer is not always desirable since this often encourages disease and insect problems. Many times the addition of iron (Fe) to these grasses provides the desirable dark green color, but does not stimulate excessive grass growth which follows N fertilization"* (Sartain, 2007). However, other persons familiar with the same areas of Sarasota County as used by Barth for his opinions have stated that these observations pre-dated the applications of new pesticides on these areas and that observations of reduced pests and fungus are actually the result of these new products, rather than attributable to reduced N applications (public workshop comments).

Barth (2010, personal communication) also indicated that high N application during peak growing season can lead to "over-thatching" in St. Augustine grass. This occurs when the thatch builds up to a depth where the grass root system cannot reach the soil, and obtains water and food only from the underlying grass layer. This makes the lawn more susceptible to drought, disease, and insect damage.

It should be noted that no landscape professional we have taken public comments from has advocated summer fertilization with high concentrations of N. The differences of professional opinions expressed at our public workshops have centered on whether it is more beneficial to allow "spoon-feeding" (limited applications of 0.5 lbs/1000 sq. ft. or less on turf and/or landscape plants during summer months). This would, according to some, help avoid turf stress versus the increased chances for N run-off into surface water bodies as a result of stressed lawns and frequent summer-time rain events.

Revised IFAS recommendations for turf grass fertilization (Sartain, 2007) were examined. As noted, these recommendations focus primarily on turf grass health and not directly on the protection of surface

water quality (Sartain et al. 2008). Many of the fertilization schedules recommend June or September applications. The potential impacts to turf grass conditions of shifting those applications one month should be investigated in controlled, field-based experiments. IFAS publications plus comments by multiple persons indicate that the addition of micronutrients such as iron during the summer is recommended with, and in some cases, in lieu of N. However, these same persons acknowledge that a small concentration of N is needed for efficient uptake of the micronutrients by the plant.

One potential approach, proposed by many landscaping industry representatives, to help minimize the misuse of fertilizer during the summer rainy season while maintaining some flexibility to attend to turf and/or landscape plants that may have a nitrogen deficiency would be to require that all persons who apply fertilizer during the summer months be trained and certified. We have been unable to locate data on the potential for pollution as a result of such an exemption. A study conducted in the Wekiva River watershed (FDEP/SJRWMD 2010) suggests that commercial landscape/lawn care companies do contribute substantial amounts of N to surface waters. However, this study did not differentiate between trained and untrained lawn care professionals.

Another area of uncertainty relates to landscape plants. There is general agreement that landscaped areas represent a small percentage of the typical yard and that "spoon feeding" of landscape plants represents a smaller chance of contributing to surface water run-off of nutrients than does broadcast-type fertilization of turf. There is NOT general agreement, however, over the *need* to fertilize landscape plants during the summer months. Information from some landscape plant nurseries suggests that newly planted landscape plants will require N inputs within a few months of initial planting, hence a 4 month blackout period may prove detrimental to the survival of newly planted landscape plants. Conversely, some nurseries sell their plants pre-fertilized thereby eliminating the need for additional nutrients upon initial placement in the ground.

Another aspect of a proposed application ban during the summer rainy season that is difficult to quantify is the cost/benefit ratio. Hillsborough County engineers and scientists within the stormwater and water resource services departments are currently examining the potential costs to reduce N concentrations in impaired water bodies. Current estimates run into tens, if not hundreds, of millions in additional tax dollars for infrastructure, operations, and maintenance costs (HCPW 2009, personal communication). Efforts to preempt the possible introduction of nutrients into surface waters during summer rainy periods appear to be a relatively less expensive tool to implement given the massive costs of non-compliance. Additionally, proponents of an application ban suggest that individual homeowners will save money via

less effort to cut turf due to slower growth rates with less N, less costs to treat for disease and pests, and less cost for irrigation. Opponents of fertilizer application and sales restrictions may argue that there is also the potential for over-use of fertilizer in May and October with a resultant excess of nutrients moving into surface water bodies. Others suggest that an outright ban on N and P fertilization for 4 months will reduce turf health over time, leading to increased costs for turf restoration plus increased use of N to bring the turf back to health.

Sarasota County has had a ban on N-fertilizer applications during the 4 month summer rainy season since 2008. Consequently, their application ban has been in place for 2 summer rainy seasons. Documentation from Sarasota County officials indicate that they have seen no overall decline in turf conditions (Sarasota County BOCC, 2009). However, at least one IFAS turf specialist who visited Sarasota during the fall of 2009 returned with an opinion that did not fully match that of the Sarasota officials (Hochmuth 2009, personal communication).

On balance, several points are evident with respect to the issue of the pros and cons of a summertime application ban:

1. It is reasonable to conclude that a summertime fertilizer ban will result in a decrease in nutrient inputs to surface water bodies during that time frame;
2. Overall costs of such a ban to the average Hillsborough County homeowner will likely be far less than the costs of subsidizing additional stormwater infrastructure and subsequent operation and maintenance of infrastructure to treat nutrient laden waters;
3. The ability of meteorologists to pin-point specific locations for summer rain and to predict expected quantities of rain from a given storm event remains problematic therefore, there is always a chance of nutrients from a morning fertilization becoming part of a surface water run-off event that afternoon or the following day.

However, multiple aspects of this issue remain debatable without additional data:

1. The extent to which the inability to use N/P for turf/landscape applications during 4 months might gradually reduce plant health such that the beneficial aspects of lawns and landscapes (sediment/nutrient filtering, CO2 sequestration, thermal reductions, etc.) might be compromised and would then require additional N to restore over and above what would be required for maintenance;
2. The potential for negative economic impacts on the industry;
3. Whether turf with no summertime inorganic N is less or more resistant to pests and disease;
4. Whether allowing trained/licensed professionals to use fertilizers in the summer, as their training deems necessary, will increase the amount of N run-off into surface water bodies when compared with an absolute ban;
5. The effectiveness of slow release fertilizers to last for more than 4 months during a summertime ban.
6. Whether very low concentrations of N in fertilizers and/or top dressings that contain micro-nutrients would improve plant health without compromising water quality.

On balance, the weight of evidence with respect to an application ban during the summer rainy season suggests that it would be prudent and more cost-effective to minimize the opportunities for nutrient run-off into surface water bodies by prohibiting applications containing N/P. Manufacturers' labels indicate that there are products currently on the market that can last for more than the 4 month application ban period. Some evidence from 2 summers of bans in Sarasota indicates that turf health has not declined dramatically, if at all.

The Commission may want to closely examine an option that allows landscape plants to be "spoon-fed" during the summer ban. The potential for water quality degradation is less likely for selective use of N-fertilizers for landscape plants than with broadcast spreading for turf. The Commission may also choose to examine an option that would allow trained and licensed lawn care professionals only to apply N/P fertilizer during the summer ban period should the turf and/or landscape plants need a small concentration of N to maintain health. It should be noted again, however, that we have found no scientific documentation quantifying potential water quality improvements using this approach.

SLOW-RELEASE FERTILIZERS

Section 1-15.05 of the proposed rule requires a minimum percentage of slow-release granular nitrogen fertilizer.

Justification

The rate of absorption of slow-release, inorganic fertilizer into soil and plants is slower than traditional fertilizer. This allows a more even and complete uptake of nutrients and reduces the risk of leaching into surface water and groundwater. A stated disadvantage of typical, inorganic fertilizers is that they "leach readily" (Sartain, 2007; Zone Ten Nursery, 2009). Slow-release N helps to equalize the release rate of nutrients and lengthens the time period of effectiveness of an application, thus reducing the number of applications required over a year.

A slow-release fertilizer is safer to use than a highly soluble granular type as it reduces the risk of over-fertilization and burning plants. It also provides for proper levels of soil nutrients for a longer time. Fertilizers containing only soluble N and P disappear rapidly from the soil. Thus, the use of slow-release fertilizers present an opportunity for a reduction in nutrients released into water bodies. These benefits have been extensively documented by commercial, academic, and regulatory entities (Blaylock et al., 2005; Wang and Alva, 1996; Zvomuya et al., 2003). Seedland (2009) stated *"the time-released fertilizers are easy for the homeowner to manage and won't burn the grass if sufficient rainfall occurs or systematic*

watering is available." The South Florida Water Management District (2009) also points out that slow-release fertilizer is an advantage when nutrients cannot be applied as frequently.

Some commercial groups understand the environmental benefits and economic opportunities of slow-release fertilizer. Georgia Pacific (2009) advertises that their Nitamin® brand fertilizers contain 60 – 94% slow-release N which:

- allows less ammonia volatilization,
- reduces nitrate leaching, and
- lowers required nitrogen application rates

Success with slow-release fertilizer has been demonstrated with commercial applications as well as research projects (American Vegetable Grower, 2009). Slow-release fertilizers come in many forms. Studies with ureaform (UF) products show beneficial effects of slow-release nitrogen fertilizer in improved fertility management and reduced pollution of drainage waters (Alexander and Ulrich Helm, 1990).

Thus, the proven technology of slow-release fertilizer provides less risk of environmental degradation and increases flexibility for the user. The extensive use of slow-release fertilizer is a valuable element of a comprehensive fertilizer management program.

Cost / Benefit to Citizens

Cost savings that can accompany the use of slow-release fertilizer include the following:

- reduced labor cost due to fewer applications per year,
- reduced cost of repair of over-fertilized, burned turf, and
- less water required for irrigation.

Slow-release fertilizers are readily available in Florida, but their cost is currently higher than traditional soluble product.

The data indicate that the use of slow release fertilizers can be beneficial. The EPC endorses the use of slow-release fertilizers. The proposed rule follows the TBEP model ordinance and remains silent as to exact percentage(s) of slow-release N-fertilizer required.

RETAIL SALES RESTRICTION

Section 1-15.11(a) of the proposed rule states:

> *"Effective June 1, 2012, no person shall sell, at retail, any lawn or landscape fertilizer, liquid or granular, within Hillsborough County that contains any amount of nitrogen or phosphorous during the restricted season from June 1-September 30, unless otherwise provided for in this rule."*

Justification

Decades of surface water quality monitoring data by the EPC clearly indicate the negative impact that the summer rainy season has on the already nutrient impaired waters of Tampa Bay. In an earlier section of this report we have presented the arguments for and against the summer time application of N-fertilizer. These same arguments apply to the sales restriction issue. From a regulatory/enforcement perspective, the prohibition of sales is more readily enforceable than is the prohibition of application.

It has been suggested by representatives of the landscaping industry, representatives of the fertilizer manufacturers, FDACS staff, FDEP staff, and IFAS staff that a summer sales restriction would have "unintended consequences" including, but not limited to:

- compromised turf grass health and viability
- increased stormwater runoff due to compromised lawn's inability to filter water
- over fertilization by homeowners immediately prior to and following the summer ban period leading to increased nutrient loading
- inconsistency in fertilizer regulations throughout Florida

However, it has also been suggested by various local governments and TBEP that limiting the summer sale of fertilizers would:

- prevent excessive nutrients from entering surface waters due to misuse of products and application techniques
- provide a consistent practice and message throughout the Tampa Bay area since Pinellas County has already passed a similar sales restriction
- allow local governments a cost-effective means of reducing additional nutrient loads to already impaired waters of Hillsborough County
- be a cost-effective mechanism of enforcement and education

Given the current lack of research on the subject, the most common sense approach would suggest that fewer nutrients placed on lawns and impervious surfaces during summer months would lead to fewer opportunities for nutrient runoff and, therefore, be beneficial to the surface waters of Hillsborough County particularly during those months of increased rainfall activity. Florida case law has not addressed fertilizer sales bans, but it has been addressed in federal court in Wisconsin and upheld. (see Croplife America Inc, et al vs. City of Madison, et al, 373 F.Supp.2d 905)

Cost / Benefit to Citizens

Several cost savings can result from a retail sales restriction, including the following:

- reduced annual purchase cost as less product would be purchased and applied,
- reduced maintenance and labor cost resulting from slower growth rates and less frequent mowing,
- reduced cost for turf repair resulting from disease and insect damage, and
- less water required for irrigation.

FERTILIZER-FREE ZONES

Section 1-15.07 of the proposed rule states:

> *"Fertilizer shall not be applied within ten (10) feet from the landward extent of any surface water as identified in section 62-340.600(2), Florida Administrative Code. For example, you may not apply fertilizer within ten feet of the top of bank of any surface water or the top of a seawall."*

Justification

Requiring a fertilizer-free and/or "no-mow" zone along water bodies is a standard approach to protecting water quality from impacts due to nutrient enrichment, introduction of oil, grease, and heavy metals, and sediment (Florida Yards & Neighborhoods Handbook, 2009). Keeping impervious surface away from shorelines also reduces the potential for erosion and sedimentation in a water body. Likewise, not applying fertilizer adjacent to surface waters or wetlands greatly decreases the potential for over-enrichment of the water body and subsequent eutrophication. Numerous local governments in Florida now require a setback for site alteration and impervious surfaces, and protection of valuable habitat, within buffer zones (EPC, 2007).

It is widely recognized by professional landscapers and researchers alike that maintaining a non-fertilized strip along water bodies is a good practice for protecting water. No-mow zones also help absorb nutrients present in runoff as well as add a margin for application error (Watschke, 2010; White et al., 2007).

Thus, setting a fertilizer-free and no-mow zone adjacent to water bodies and wetlands is well justified and documented.

Cost / Benefit

Several cost savings can result from implementing a "fertilizer-free zone" adjacent to a surface water body or wetland including the following:

- reduced purchase cost as less overall product would be applied,
- reduced maintenance and labor cost resulting from less area to maintain
- less need to improve degraded water quality through the use of expensive capital improvement projects targeting nutrient-enriched stormwater runoff

OTHER CONSIDERATIONS

Tampa Bay Estuary Program (2006) found that "Stormwater runoff from urban, residential and agricultural lands remains the largest source of nitrogen, the primary pollutant in the bay. An overabundance of nitrogen can cause algae blooms and reduce oxygen levels in the bay, resulting in turbid water, fish kills and loss of seagrass when the water becomes so opaque that sunlight cannot reach underwater grasses. Stormwater accounted for 63% of total nitrogen loadings to Tampa Bay from 1999-2003." More specifically, TBEP found that 20% of the total load to Tampa Bay is estimated from residential stormwater runoff. It should be noted that only a portion of that load is from fertilizers.

The potential benefits of fertilizer management were illustrated in a recent study by the Tampa Bay Estuary Program (2008). TBEP estimates of the potential reduction in N loadings to Tampa Bay were made for ranges of both percent contribution of fertilizer to total urban runoff nutrient loadings, and percent compliance with a series of recommendations for controlling fertilizer application, including a summer blackout with a possible one-time exemption. Conservative estimates from the TBEP indicate an approximate reduction of residential N loading to Tampa Bay by 4.1%.

In addition to the studies and data presented above, other studies indicate the need for a more stringent approach. As stated previously, Leggette, Brashears & Graham, Inc. (LBG) (2004) estimated that roughly 79% of the nitrogen in the surficial groundwater system contributing to Lake Tarpon is from fertilizers (agricultural and residential). Also, a recently published study (2009) by Lehman et al documents statistically significant decreases in total phosphorus concentrations in the Huron River

following implementation of a lawn fertilizer ordinance which restricts the sale of fertilizers containing phosphorus, and requires compliance by lawn care professionals. It should be noted that ambient phosphorus levels in the soils in that part of Michigan largely negate the need for supplemental phosphorus. Nonetheless, this study suggests that a sales restriction can be an effective tool in the management of nutrients into surface water bodies.

Although there are many sources of nutrients that enter surface water and groundwater, studies such as that of Peebles et al (2009) and LBG (2004) indicate that fertilizer use and transport are increasing to an extent that enough enters the receiving water bodies to impact water quality and the local biota.

In addition to these expected water quality benefits, it is anticipated that by limiting a lawn's growth rate it will lower required levels of time and effort for maintenance, as well as provide a cost savings, as recognized by both academic and commercial publications. Trenholm et al. (2006) concluded *"A lower-fertility lawn is best for those with little time to spend on lawn care.... (higher fertility lawns) ...will require more time and money for lawn care."* Seedland (2009) also stated that *"the level of maintenance you wish to provide (more fertilizer = more work, more mowing more disease control monitoring, and more water) will determine how many applications you make to your grass."*

SUMMARY and CONCLUSIONS

There are good reasons to adopt an ordinance more stringent than the State's model. Among the most compelling is the fact that multiple water bodies within Hillsborough County, including Tampa Bay, have been declared "impaired waters" by FDEP - with nutrients the causative agents. Impairment is due to nutrient loadings to these water bodies exceeding that which can be assimilated in the water body while maintaining water quality standards and supporting a viable ecosystem. Therefore, actions that reduce the volume of fertilizer applied and which maximize the efficiency of uptake of nutrients by plants, will benefit the environment.

EPC staff asserts that a more stringent rule will provide benefits, including but not limited to:

- prevention of excessive nutrients from entering surface waters due to misuse of products and application techniques
- providing a consistent practice and message throughout the Tampa Bay area since Pinellas County has already passed a similar sales restriction

- allow local governments a cost-effective means of reducing additional nutrient loads to already impaired waters of Hillsborough County
- be a cost-effective mechanism of enforcement and education
- less water required for irrigation, and
- less need to improve degraded water quality through construction of millions of dollars of new and improved stormwater infrastructure projects.

The cost of cleaning polluted water is substantial and local governments usually pay the majority of the amount. Some of the rule provisions discussed above are forms of source control, that is, they reduce the amount of a pollutant before it enters the environment. This is a more economical approach to protecting water quality than remediation, or treating the water downstream after it has become polluted.

Both environmental stewardship and cost savings can be realized while protecting the health and appearance of turf grasses and landscape vegetation by examining established traditional practices and adjusting them to reflect current priorities. The EPC's proposed fertilizer rule, with a vigorous public educational component and manageable enforcement at retail outlets, will be an effective tool to achieve these goals.

Implementation of a source control approach to water quality protection is much less costly than cleaning the water farther downstream after it has become polluted. It has been shown that keeping excess nutrients out of the environment is a superior method of environmental protection in terms of cost to local governments, citizens, and other land owners.

The provisions of the EPC's proposed fertilizer ordinance, including a summer retail sales restriction, increased use of slow-release fertilizer, summer application restrictions, and fertilizer-free zones are necessary as part of an effective, comprehensive approach to controlling nonpoint sources of pollution for the purpose of protecting and improving the aquatic and estuarine resources of Hillsborough County.

Similar to most highly technical and developing fields, opinions about appropriate fertilizer management strategies differ among various entities. However, the discussion above presents credible, technically-defensible evidence that a suite of science-based and economically and technically feasible actions can and should be implemented by the Environmental Protection Commission of Hillsborough County.

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BMAP Stakeholder	Hillsborough River Basin Project Name	Project Number	Date Completed	Funding Source (L/S/F)*	Program** Total Cost	Estimated Capital Cost	Estimated Operating Cost	Total Stakeholder Costs
FDEP	Microbial Source Tracking-Phase 1	BWC-01	2008	S	$42,528	$10,632		
Total FDEP Costs					**$42,528**	**$10,632**	**$0**	**$10,632**
City of Plant City	Plant City Stormwater Inlet Marking Program	BWC-14	ongoing	L	$1,000		$500	
City of Plant City	Plant City Spill Prevention/Response Program	BWC-19	ongoing	L	$50,000		$25,000	
City of Plant City	Plant City Sewer Line Maintenance Program	BWC-20	ongoing	L	$1,500,000		$750,000	
City of Plant City	Plant City Lift Station Security Program	BWC-21	ongoing	L	$10,000		$5,000	
City of Plant City	Plant City Lift Station Auxiliary Power Program	BWC-22	ongoing	L	$47,000	$40,000	$7,000	
City of Plant City	Plant City WWTP/Lift Station Maintenance	BWC-23	ongoing	L	$1,500,000		$750,000	
City of Plant City	Plant City Inflow & Infiltration (I&I) Program	BWC-24	ongoing	L	$1,500,000		$750,000	
City of Plant City	Plant City Grease Management Program	BWC-25	ongoing	L	$50,000		$25,000	
City of Plant City	Plant City WWTP Fecal Coliform Bacteria Reduction Program	BWC-46	ongoing	L	$125,200		$62,600	
City of Plant City	Lake Thonotosassa Diagnostic Assessment & WQ Treatment Project	SBF-12	2008	S	$50,000	$50,000		
City of Plant City	Pistol Range Stormwater Retrofit Project	SBF-16	2000	L	$649,810	$649,810		
City of Plant City	Plant City Grease Management Program	SBF-27	ongoing	L	$50,000		$25,000	
City of Plant City	Plant City Inflow & Infiltration (I&I) Program	SBF-28	ongoing	L	$1,500,000		$750,000	
City of Plant City	Plant City WWTP/Lift Station Maintenance	SBF-29	ongoing	L	$1,500,000		$750,000	
City of Plant City	Plant City Stormwater Inlet Marking Program	SBF-30	ongoing	L	$1,000		$500	
City of Plant City	Plant City Spill Prevention/Response Program	SBF-31	ongoing	L	$50,000		$25,000	
City of Plant City	Plant City Sewer Line Maintenance Program	SBF-32	ongoing	L	$1,500,000		$750,000	
City of Plant City	Plant City Lift Station Security Program	SBF-33	ongoing	L	$10,000		$5,000	
City of Plant City	Plant City Lift Station Auxiliary Power Program	SBF-34	ongoing	L	$47,000	$40,000	$7,000	
City of Plant City	Plant City WWTP Fecal Coliform Bacteria Reduction Program	SBF-35	ongoing	L	$125,200		$62,600	
Total City of Plant City Costs					**$10,266,210**	**$779,810**	**$4,750,200**	**$5,530,010**
City of Tampa Stormwater	City of Tampa Interactive Watershed Atlas	LHR-09	2008	L	$60,000	$35,000	$25,000	
City of Tampa Stormwater	North Tampa Pond Enlargements	LHR-11	2002	L	$1,300,000	$1,300,000		
City of Tampa Stormwater	Lowry Park Zoo Stormwater Rehabilitation	LHR-12	2002	L	$345,000	$345,000		
City of Tampa Stormwater	River Tower Park Shoreline & Stormwater Improvements (with SWFWMD/FDOT)	LHR-20	2009	S & L	$2,100,000	$2,100,000		
City of Tampa Stormwater	Riverwalk Project	LHR-21	2011	S, L, & F	$40,000,000	$40,000,000		
City of Tampa Stormwater	Robels Park - SWMM Project	LHR-34			---			
City of Tampa Stormwater	Urban Lake Rescue, Lake Roberta	LHR-41	2008	S	$272,000	$272,000		
City of Tampa Stormwater	Downstream Defender-Lake Roberta	LHR-42	2006	S & L	$140,000	$140,000		
City of Tampa Stormwater	Epps Park Sediment traps (6) & O&M	LHR-43	2003	S & L	$350,000	$350,000		
City of Tampa Stormwater	Robles Park - SWMM Project	LHR-44	2009	S & L	$500,000	$500,000		
City of Tampa Stormwater	Street Sweeping	LHR-45	ongoing	S & L	---			
City of Tampa Wastewater	Tampa-Wastewater Collection System Study	LHR-15	2007	L	---			
City of Tampa Wastewater	Tampa-Nebraska Av/SR60 to Hillsborough Av Pipeline improvements	LHR-16	2007	L	---			
City of Tampa Wastewater	Tampa-Emergency Generators at Hanna Pump Station	LHR-17	2007	L	$265,000	$265,000		
City of Tampa Wastewater	Tampa-Grease Ordinance	LHR-18	2006	L	$100,000	$100,000		
City of Tampa Wastewater	Tampa-12th Street Forcemain Replacement	LHR-19	2007	L	$17,000,000	$17,000,000		
City of Tampa Wastewater	Tampa-North Blvd. Inverted Siphon Rehabilitation	LHR-39	2008	L	$350,000	$350,000		
City of Tampa Wastewater	Tampa-Sewer System Evaluation Study Manhole Rehabilitation Phase I	LHR-40	2007	L	$750,000	$750,000		
Total of City of Tampa Costs					**$63,532,000**	**$63,507,000**	**$25,000**	**$63,532,000**
City of Temple Terrace	Broadway Outfall CDS Unit	LHR-46	2001		---			
Total Temple Terrace Costs					**$0**	**$0**	**$0**	**$0**
EPC of HC	Survey of MSGP Stormwater Associated with Industrial Facilities	BWC-06	2006	L	$30,080	$7,520		
EPC of HC	Private Pump Station ID & compliance program	BWC-28	2009	L	$22,200		$7,400	
EPC of HC	Fecal Coliform Monthly Monitoring-HC	BWC-29	ongoing	L	$1,521		$1,521	
EPC of HC	Sanitary Sewer Overflow Database	BWC-30	ongoing	L	---			
EPC of HC	Bacterial Contamination Complaint Response to HCHD	BWC-32	ongoing	L	---			
EPC of HC	Survey of MSGP Stormwater Associated with Industrial Facilities	LHR-04	2006	L	$30,080	$7,520		
EPC of HC	Private Pump Station ID & compliance program	LHR-27	ongoing	L	$22,200		$7,400	
EPC of HC	Fecal Coliform Monthly Monitoring-HC	LHR-28	ongoing	L	$3,232		$3,232	

BMAP Stakeholder	Hillsborough River Basin Project Name	Project Number	Date Completed	Funding Source (L/S/F)*	Program** Total Cost	Estimated Capital Cost	Estimated Operating Cost	Total Stakeholder Costs
EPC of HC	Tracking of City of Tampa Consent Order for entire WW Collection System	LHR-29	2012	L	$1,750		$1,750	
EPC of HC	Sanitary Sewer Overflow Database	LHR-30	ongoing	L	$3,600		$1,200	
EPC of HC	Bacterial Contamination Complaint Response to HCHD	LHR-33	ongoing	L	---			
EPC of HC	Survey of MSGP Stormwater Associated with Industrial Facilities	NR-05	2006	L	$30,080	$7,520		
EPC of HC	Private Pump Station ID & compliance program	NR-13	2009	L	$22,200		$7,400	
EPC of HC	Fecal Coliform Monthly Monitoring-HC	NR-14	ongoing	L	$190		$190	
EPC of HC	Sanitary Sewer Overflow Database	NR-16	ongoing	L	---			
EPC of HC	Survey of MSGP Stormwater Associated with Industrial Facilities	SBF-05	2006	L	$30,080	$7,520		
EPC of HC	Private Pump Station ID & compliance program	SBF-20	2009	L	$22,200		$7,400	
EPC of HC	Fecal Coliform Monthly Monitoring-HC	SBF-21	ongoing	L	$4,563		$4,563	
EPC of HC	Sanitary Sewer Overflow Database	SBF-22	ongoing	L	---			
EPC of HC	Bacterial Contamination Complaint Response to HCHD	SBF-24	ongoing	L	---			
Total EPC Costs					**$223,977**	**$30,080**	**$42,056**	**$72,136**
FDEP	Development of Decision Matrix to Identify Appropriate Response Actions to WQ Mon. Results	BWC-31	2007	L	---			
FDEP	Microbial Source Tracking-Phase 1	LHR-01	2008	S	$42,528	$10,632		
FDEP	Surface Water Temporal Variability Network Monitoring Site	LHR-31	ongoing	S	$385,000		$385,000	
FDEP	Development of Decision Matrix to Identify Appropriate Response Actions to WQ Mon. Results	LHR-32	2007	S & L	---			
FDEP	Microbial Source Tracking-Phase 1	NR-01	2008	S	$42,528	$10,632		
FDEP	Development of Decision Matrix to Identify Appropriate Response Actions to WQ Mon. Results	NR-17	2007	S & L	---			
FDEP	Microbial Source Tracking-Phase 1	SBF-01	2008	S	$42,528	$10,632		
FDEP	Development of Decision Matrix to Identify Appropriate Response Actions to WQ Mon. Results	SBF-23	2007	S & L	---			
Total FDEP Costs					**$512,584**	**$31,896**	**$385,000**	**$416,896**
FDOT	Public Education Program for Tampa Bay Regional Planning Council distribution	BWC-33	ongoing	S	$50,000		$12,500	
FDOT	FDOT 56th Street Retrofit (CDS Unit in City of Temple Terrace)	LHR-14	2003	S & L	$453,000	$453,000		
FDOT	Street Sweeping, I-275 & I-4 at FL, Nebraska & Hillsborough Av.	LHR-36	ongoing		---			
FDOT	Public Education Program for Tampa Bay Regional Planning Council distribution	LHR-37	ongoing	S	$50,000		$12,500	
FDOT	Public Education Program for Tampa Bay Regional Planning Council distribution	NR-18	ongoing	S	$50,000		$12,500	
FDOT	Public Education Program for Tampa Bay Regional Planning Council distribution	SBF-25	ongoing	S	$50,000		$12,500	
Total FDOT Costs					**$653,000**	**$453,000**	**$50,000**	**$503,000**
HC Health Department	High Probability Areas Map for Septic System Failure	BWC-04	2007	S	$1,250	$1,250		
HC Health Department	Septic System 200-ft Setback	BWC-07	ongoing	S	$2,000		$2,000	
HC Health Department	Septic System Complaint Response	BWC-26	ongoing	S	$1,250		$1,250	
HC Health Department	Public Health Education Program (via Permit Issuance)	BWC-34	ongoing	S	$500		$500	
HC Health Department	High Probability Areas Map for Septic System Failure	LHR-03	2007	S	$1,250	$1,250		
HC Health Department	Septic System Complaint Response	LHR-26	ongoing	S	$1,250		$1,250	
HC Health Department	Public Health Education Program (via Permit Issuance)	LHR-38	ongoing	S	$500		$500	
HC Health Department	High Probability Areas Map for Septic System Failure	NR-03	2007	S	$1,250	$1,250		
HC Health Department	Septic System 200-ft Setback	NR-06	ongoing	S	$2,000		$2,000	
HC Health Department	Septic System Complaint Response	NR-12	ongoing	S	$1,250		$1,250	
HC Health Department	Public Health Education Program (via Permit Issuance)	NR-19	ongoing	S	$500		$500	
HC Health Department	High Probability Areas Map for Septic System Failure	SBF-03	2007	S	$1,250	$1,250		
HC Health Department	Septic System 200-ft Setback	SBF-06	ongoing	S	$2,000		$2,000	
HC Health Department	Septic System Complaint Response	SBF-19	ongoing	S	$1,250		$1,250	
HC Health Department	Public Health Education Program (via Permit Issuance)	SBF-26	ongoing	S	$500		$500	
Total HCHD Costs					**$18,000**	**$5,000**	**$13,000**	**$18,000**
HC Parks & Rec Department	Audubon Ranch on Cone Ranch-floodplain fencing for cattle restriction	BWC-27	2003	L	---			
HC PGMD	HC Land Development Code (Sec 4.01.16, Septic System Setback)	NR-07	ongoing	L	---			
HC Public Works/Stormwater	Septic Tank Mapping & Hot Spot Analysis	BWC-03	2008	L	$28,000	$7,000		
HC Public Works/Stormwater	Bacteriological source tracking study	BWC-05	2002	S & L	$50,000	$25,000		
HC Public Works/Stormwater	Officer Snook	BWC-08	ongoing	L	$9,000	$2,250		
HC Public Works/Stormwater	Stormwater ecologist education program	BWC-09	ongoing	L	$9,000	$2,250		
HC Public Works/Stormwater	Pet Waste Campaign Study	BWC-10	2009	L	$24,000		$8,000	

BMAP Stakeholder	Hillsborough River Basin Project Name	Project Number	Date Completed	Funding Source (L/S/F)*	Program** Total Cost	Estimated Capital Cost	Estimated Operating Cost	Total Stakeholder Costs
HC Public Works/Stormwater	LakeWatch & HC Stream Water Watch	BWC-11	ongoing	S	$116,000		$38,666	
HC Public Works/Stormwater	2-Adopt-a-Pond in Blackwater Crk Watershed	BWC-12	1997	L	$138,000		$34,500	
HC Public Works/Stormwater	Cone Ranch Restoration Project	BWC-17	1999	F	$392,000	$392,000		
HC Public Works/Stormwater	Septic Tank Mapping & Hot Spot Analysis	LHR-02	2008	L	$28,000	$7,000		
HC Public Works/Stormwater	Officer Snook	LHR-05	ongoing	L	$9,000		$2,250	
HC Public Works/Stormwater	Stormwater ecologist education program	LHR-06	ongoing	L	$9,000		$2,250	
HC Public Works/Stormwater	Pet Waste Campaign Study	LHR-07	2009	L	$24,000	$8,000		
HC Public Works/Stormwater	LakeWatch & HC Stream Water Watch	LHR-08	ongoing	S	$116,000		$38,666	
HC Public Works/Stormwater	10 Adopt-A-Pond in Lower Hillsborough River Watershed	LHR-10	2004	L	$138,000	$34,500		
HC Public Works/Stormwater	Claonia-May Stormwater Pond	LHR-22	2000	L	$160,000	$160,000		
HC Public Works/Stormwater	Septic Tank Mapping & Hot Spot Analysis	NR-04	2008	L	$28,000	$7,000		
HC Public Works/Stormwater	Officer Snook	NR-08	ongoing	L	$9,000		$2,250	
HC Public Works/Stormwater	Stormwater ecologist education program	NR-09	ongoing	L	$9,000		$2,250	
HC Public Works/Stormwater	Septic Tank Mapping & Hot Spot Analysis	SBF-02	2008	L	$28,000	$7,000		
HC Public Works/Stormwater	Bacteriological source tracking study	SBF-04	2002	S & L	$50,000	$25,000		
HC Public Works/Stormwater	Officer Snook	SBF-07	ongoing	L	$9,000		$2,250	
HC Public Works/Stormwater	Stormwater ecologist education program	SBF-08	ongoing	L	$9,000		$2,250	
HC Public Works/Stormwater	Pet Waste Campaign Study	SBF-09	2009	L	$24,000		$8,000	
HC Public Works/Stormwater	LakeWatch & HC Stream Water Watch	SBF-10	ongoing	S	$116,000		$38,666	
HC Public Works/Stormwater	Emerald Lakes Adopt-A-Pond	SBF-11	2004	L	$138,000	$34,500		
HC Public Works/Stormwater	4-Adopt-A-Pond in Spartman, Baker & Flint Watersheds	SBF-13	2006	L	$138,000	$34,500		
HC Public Works/Stormwater	Pemberton Creek Stormwater Improvements	SBF-15	2005	L	$992,000	$992,000		
HC Public Works/Stormwater	Valrico Forest Subdivision Pond	SBF-18	2010	L	$607,000		$607,000	
Total HC Costs					**$3,407,000**	**$1,738,000**	**$786,998**	**$2,524,998**
HRB Basin Working Group	Evaluation of Progress Toward Water Quality Improvements	BWC-48	ongoing	S	---			
HRB Basin Working Group	Evaluation of Progress Toward Water Quality Improvements	LHR-50	ongoing	S	---			
HRB Basin Working Group	Evaluation of Progress Toward Water Quality Improvements	NR-21	ongoing	S	---			
HRB Basin Working Group	Evaluation of Progress Toward Water Quality Improvements	SBF-37	ongoing	S	---			
Total HRB BWG Costs					**$0**	**$0**	**$0**	**$0**
HRWA	Hillsborough River Watershed Alliance	LHR-48	ongoing	S	$30,000		$30,000	
Total HRWA Costs					**$30,000**	**$0**	**$30,000**	**$30,000**
Pasco County	DNA Source Identification	BWC-02	2008	L	$100,000		$33,333	
Pasco County	Watershed Management Plan	BWC-15	ongoing	S & L	$1,600,000		$1,600,000	
Pasco County	Fecal Coliform Quarterly Monitoring-HC	BWC-35	ongoing	L	$6,000		$3,000	
Pasco County	DNA Source Identification	NR-02	2008	L	$100,000	$33,333		
Pasco County	Watershed Management Plan	NR-10	ongoing	S & L	$1,600,000		$1,600,000	
Pasco County	Fecal Coliform Quarterly Monitoring-HC	NR-15	ongoing	L	$6,000		$6,000	
Total Pasco Costs					**$3,412,000**	**$33,333**	**$3,242,333**	**$3,275,666**
Polk County	Polk Cnty Land Development Regulations with Evaluations Reports to DCA	BWC-13	2000	L	---			
Polk County	Stormwater Quality Management Ordinances	BWC-36	1993	L	$10,000	$10,000		
Polk County	Surface Water Protection Ordinance	BWC-37	1988	L	$5,000	$5,000		
Polk County	Wastewater Residuals Management Ordinance	BWC-38	1995	L	$10,000	$10,000		
Polk County	Drainage Maintenance on Blackwater Creek	BWC-39	ongoing	L	$9,000		$9,000	
Polk County	Water Quality Ambient Monitoring for Blackwater Creek	BWC-40	ongoing	L	$5,200		$5,200	
Polk County	Illicit Discharge Complaint Investigation (applies to Itch & Blkwtr, part of NPDES response)	BWC-41	ongoing	L	$100		$100	
Polk County	Blackwater Creek Watershed Management Plan (for the Itch & Blkwtr)	BWC-42	2004	L	$206,000	$206,000		
Polk County	Routine Maintenance Erosion Control (Itch & Blkwtr)	BWC-43	ongoing	L	---			
Total Polk Costs					**$245,300**	**$231,000**	**$14,300**	**$245,300**
SWFWMD	McIntosh Park Water Quality/Wetland Enhancement (with HC)	BWC-18	2007	S & L	$3,824,564	$3,824,564		
SWFWMD	Lake Thonotosassa Project-wetland & sedimentation basin	SBF-17	1999	S	$1,380,000	$1,380,000		
Total SWFWMD Costs					**$5,204,564**	**$5,204,564**	**$0**	**$5,204,564**

BMAP Stakeholder	Hillsborough River Basin Project Name	Project Number	Date Completed	Funding Source (L/S/F)*	Program** Total Cost	Estimated Capital Cost	Estimated Operating Cost	Total Stakeholder Costs
TBEP	TBEP Annual Progress Report Coordination	BWC-47	2010	S	$1,000		$250	
TBEP	Pooches for the Planet	LHR-47	2007	L	$5,000		$5,000	
TBEP	TBEP Annual Progress Report Coordination	LHR-49	2010	S	$1,000		$250	
TBEP	TBEP Annual Progress Report Coordination	NR-20	2010	S	$1,000		$250	
TBEP	TBEP Annual Progress Report Coordination	SBF-36	2010	S	$1,000		$250	
Total TBEP Costs					**$9,000**	**$0**	**$6,000**	**$6,000**
UF IFAS/DACS	Ag BMP actions FDACS statewide program	BWC-16	ongoing	S	---			
UF IFAS/DACS	Ag BMP actions FDACS statewide program	NR-11	ongoing	S	---			
UF IFAS/DACS	Ag BMP actions FDACS statewide program	SBF-14	2008	S	---			
Total UF IFAS/DACS Costs					**$0**	**$0**	**$0**	**$0**
	TOTAL BMAP CAPITAL COSTS					**$72,024,315**		
	TOTAL BMAP OPERATIONAL COSTS						**$9,344,887**	
	TOTAL BMAP STAKEHOLDER COSTS							**$81,369,202**

* L/S/F = local (L), state (S), federal (F) funding source
** Program Costs may include multi-year budget