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# Pond Appeal Series: Teaching Community Stakeholders to Manage Pestiferous Aquatic Midge Emergences from Storm Water Retention Ponds

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**Abstract:** Saint Lucie West (Florida) residents living adjacent to storm water retention ponds complained about the emergence of large swarms of pestiferous aquatic midges. Pond Appeal is a program developed by the Saint Lucie County Cooperative Extension to educate residents about pond best management practices that would result in a reduction in midge emergences. One hundred and fifty people participated in the program. All participants indicated they increased their understanding of pond management techniques and adopted practice changes that enabled them to better manage these ponds. This resulted in a reduction in pestiferous aquatic midges and improved quality of life.

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According to the United States Census Bureau, there was a 31.2% population increase in Saint Lucie County, Florida between April 1, 2000 and July 1, 2006. New communities are being developed to accommodate this influx of new residents. Developers are required to create storm water retention systems as part of their site development plans, within which storm water retention ponds play an integral role. Unfortunately, there is a gap in knowledge between what these new residents expect from their ponds and their ponds' actual function. This knowledge gap has resulted in pond management inadequacies and resident complaints.

Saint Lucie West is one of the newest communities in Saint Lucie County. The Saint Lucie West Services District's mission is, in part, to provide surface water management services. They have the responsibility of managing 119 storm water retention ponds in their community of approximately 30,000 residents.

## About Aquatic Midges

The Saint Lucie West Services District contacted the University of Florida/Saint Lucie County Extension to request help with a pestiferous aquatic midge problem. Aquatic midges are mosquito-like Diptera belonging to the families Chironomidae and Chaoboridae (Koehler, 2003). Chironomidae are commonly referred to as "Blind Mosquitoes," and Chaoboridae are commonly referred to as "Phantom Predatory Midges." Midge eggs, larva, and pupa live in storm water retention ponds, and their larva thrive in low oxygen zones. These larva are often referred to as "wrigglers." These insects do not bite, suck blood, or carry diseases; however, they emerge from ponds in large numbers, primarily in the warm summer months.

Unfortunately, the emergence of these pestiferous aquatic midges affects the quality of life of the residents living around many of the storm water retention ponds in Saint Lucie West. Adult midges prefer to rest in shady areas in the day and are often found in large numbers under eaves, on patio screens, and in foyers. A one-time count found that there were as many as 20 midges per square inch coating the shaded areas of homes. Residents were selling their homes because they found the situation untenable, and this issue became a political thorn for the elected officials overseeing the Saint Lucie West Services District.

Because these insects are difficult to control, the Saint Lucie West Services District contacted the University of Florida/Saint Lucie County Extension and requested help devising and implementing an Aquatic Midge Integrated Pest Management (IPM) Plan. The IPM plan, which was adopted by the District, featured the use of insect growth regulators, insectivorous fish, light traps, and algae control strategies.

## Pond Appeal Extension Program

According to Media Richness Theory, face-to-face communication is often the most effective medium to communicate complex or ambiguous messages to others (Daft, Lengel, & Trevino, 1987). The Pond Appeal Series was developed by the Extension office to provide face-to-face interaction between the residents of the community and the technical experts at the University of Florida/Saint Lucie County Cooperative Extension. The goal of this series involved increasing the residents' understanding of the complex functions of storm water retention ponds, what constituted a healthy storm water retention pond, and how the Aquatic Midge IPM plan was necessary to improve quality of life for those people living around these ponds.

Qualitative data was collected prior to the start of the first Pond Appeal seminar. A group of 25 program participants visited a typical Florida storm water retention pond. The storm water retention pond visited was located at the Saint Lucie County Cooperative Extension office in Fort Pierce. A survey was conducted to gauge the participants' perception of what constitutes a healthy, desirable pond.

Participants agreed that healthy ponds are those with fertilizer and pesticide-free buffers between turf and pond's edge; clean, clear water with no algae and low turbidity; irregular shape; and adequate fish and wildlife. In addition, they preferred buffers with pond cypress and water lilies, variable vegetation heights and textures, and multiple colors. These surveys also indicated that they perceived unhealthy ponds as those with invasive plants in and around the ponds, insect problems (such as midge problems), and evidence of trash and pollution.

The Pond Appeal Series took into account the residents' concept of what constitutes a healthy, desirable

pond. The concepts taught in the Pond Appeal Program was a meshing of strategies to make these ponds more desirable while at the same time educating the community of the steps necessary to implement the Aquatic Midge Management Plan.

## Aquatic Midge IPM Plan

The first strategy discussed in Pond Appeal was the use of insect growth regulators (IGR's) to control midge pupa. (S)-Methoprene pellets were used. (S)-Methoprene can effectively stop the formation of midge pupa in the water (Ali, 1991). These pellets release the IGR for up to 30 days. The (S)-Methoprene label recommends a dosage of 5 to 10 pounds per acre, which should be applied 20 feet from the water's edge. Although the use of (S)-Methoprene is effective at controlling aquatic midge pupa, it can be expensive. Additional aquatic midge management tactics were necessary.

The second strategy discussed was the use of insectivorous fish to biologically control aquatic midges in these ponds. Ponds can be stocked with bream and bass to control nuisance aquatic insects and provide recreational fishing opportunities. According to the Florida Fish and Wildlife Conservation Commission, bream should be stocked at a rate of 500 fingerlings per acre. Bream (70% blue gill/30% readear) should be stocked in the fall, allowing them to spawn. One hundred bass fingerlings per acre were stocked in the spring when feeder fish were available. Stocking in the summer was not recommended because high temperatures can potentially stress the fish (Cichra, 1995).

The third strategy discussed was the use of light traps to control adult midges (Ali et al., 1994). Lights were installed in upland buffers adjacent to the infested ponds. The plan called for these lights to shine downward on white boards to attract adult aquatic midges at night. Insecticides were then used to control the adult midges that were attracted to the light traps.

The fourth strategy discussed was algae control. Larval Chironomidae graze on algal detritus that settles to the bottom of these ponds. Ponds can be treated with chemicals such as copper, to control algae; however, it was decided that a nutrient abatement strategy should also be implemented. This strategy involved the enforcement of the Florida Green Industry Standards for fertilizer application to turf around ponds. According to the Florida Department of Environmental Protection (2002), for flat turf, the district should adopt the use of three foot untreated buffers if a fertilizer spreader with a deflector shield is used or a 10-foot untreated buffer if a spreader without a deflector shield is used. For steeply sloped turf, larger buffers were recommended. Other environmentally friendly practices such as avoiding blowing grass clippings into the water and using slow release fertilizers are also featured in this nutrient abatement strategy.

## Conclusion

In conclusion, the outreach efforts through the Pond Appeal Program resulted in increased awareness of what constitutes a healthy, desirable storm water retention pond and how the Pestiferous Aquatic Midge Management Plan will result in a reduction of pestiferous aquatic midges in Saint Lucie West. A random sample of 15 Pond Appeal Series participants was surveyed upon completion of the Pond Appeal Series. The survey indicated that 100% of these program participants understood how to manage storm water retention ponds in a manner that improves water quality, enhances aquatic plants and wildlife, and results in a reduction of pestiferous aquatic midges.

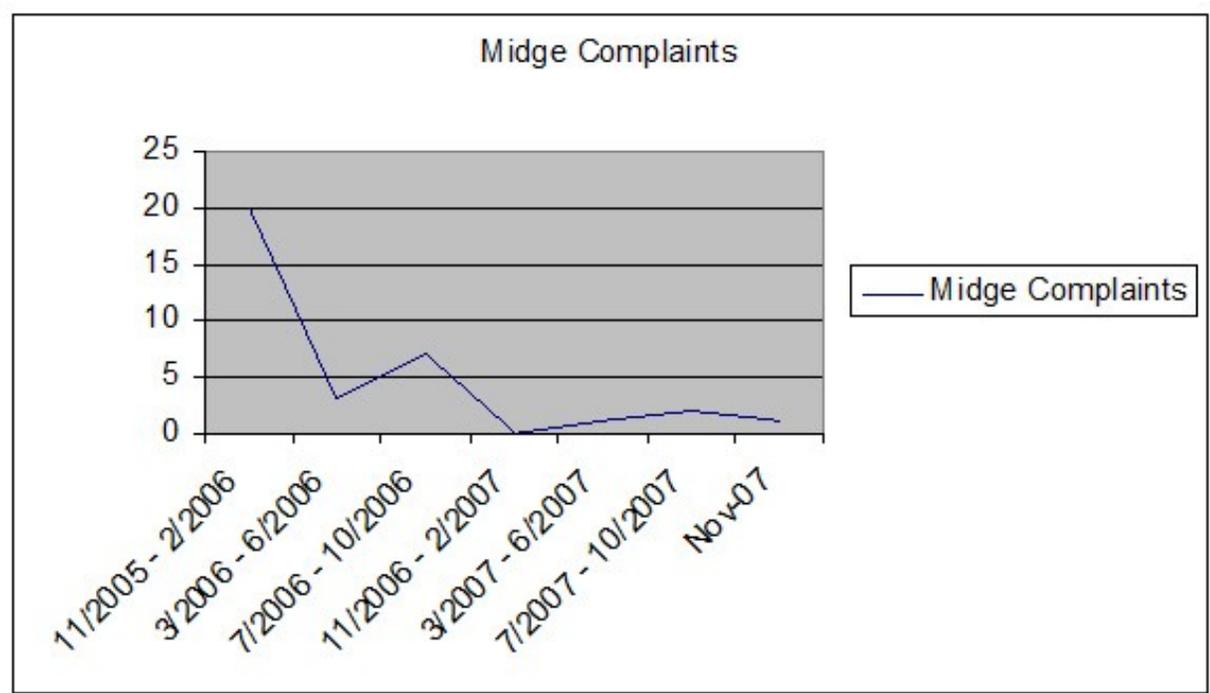
In addition, the Saint Lucie West Services District began logging aquatic midge complaint calls in November 2005 (Table 1, Figure 1). In the 11 months prior to the completion of the Pond Appeal Series in September 2006, the district logged a total of 25 complaints. This translates to 2.27 complaints per month. In the 14

months after the Pond Appeal Program and the implementation of the Pestiferous Aquatic Midge Management Plan, the District logged a total of nine complaint calls. This translates to .6 complaint calls per month.

**Table 1.**  
Midge Complaints

Month	Complaints
11/2005 - 2/2006	20
3/2006 - 6/2006	3
7/2006 - 10/2006	7
11/2006 - 2/2007	0
3/2007 - 6/2007	1
7/2007 - 10/2007	2
11/2007	1

**Figure 1.**  
Midge Complaints



A further indication of effectiveness is demonstrated by a post-course follow-up interview presented in the Appendix.

The Pond Appeal series was an effective way to educate the community about the management practices being implemented to control the pestiferous aquatic midges. The series was attended by one 150 participants. All participants came away with a better understanding of the function of storm water ponds in their communities and how best management practices are necessary to manage problems such as the pestiferous aquatic midge problem faced by residents of Saint Lucie West. Resident satisfaction improved; pestiferous aquatic midges were effectively managed; and political tensions eased as a result of these efforts.

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### Appendix: Participant Testimonial

The Pond Appeal Program conducted by the University of Florida/Saint Lucie County Cooperative Extension affected the lives of many residents living around the community's storm water retention ponds. The post-course follow-up interview below took place in January 2008. This is a discussion between Ken Gioeli, Natural Resources Extension Agent, and Diane Goldberg, Saint Lucie West resident and former Chairperson on the Lakes Preserve Committee.

KG: Prior to your participation in the Pond Appeal Program, please rate your knowledge of pond ecology and management.

DG: Pretty much a novice. The only thing I knew was bird watching in Delray Beach.

KG: How long have you been a resident of Florida?

DG: 30 years

KG: How long have you been a resident of Saint Lucie West?

DG: 3 years

KG: Please describe the midge problems you experienced before the midge management plan was implemented.

DG: When I first moved in, it was so terrible that when I called my association and asked what was happening with it and why it was happening, they told me it was the Service District's responsibility. I called them and they told me when they were having meetings and that is when I started going to their meetings. I got up in front of them to make my complaints. They said, of course, that they were already aware of having these problems and getting so many complaints at that point they were going to see what they could do about it. They were getting lots of complaints.

KG: Do you think the midge problem hurt property values in your neighborhood?

DG: Having first moved in, I can't say that is what I first noticed and looked at, at the time I was buying my house. So it did not affect what I was offering for the house, but to some people it was very important and their perceptions caused them to feel that, yes, that would be true. Looking out at the water, the algae looked so horrible covered with this green and brown slim and they couldn't sit outside because they would be just inundated with all these little flies even though they didn't bite it was just not comfortable sitting out there and (delete that) they couldn't enjoy the outdoors and the fact that they were paying extra to live on the water.

KG: Did you participate in the Pond Appeal Program?

DG: Yes

KG: Prior to your participation in the Pond Appeal Program, did you understand midge biology and management?

DG: No. It was a new problem for me.

KG: Do you think most people living around these ponds understood why the midges were present in large numbers in your community?

DG: Absolutely not. Since I was being proactive, they asked me to be the Chairperson on the Lakes Preserve Committee. This was a big question for those that lived on the lakes, and there was no awareness.

KG: How important was the role of the Pond Appeal Program in educating the residents about their ponds?

DG: Because I went through the program and being in charge of that in the Cascades, I explained that to lots of people and after that point the Service District became proactive in taking care of the problem. I could get the people to be patient in allowing the Service District to work on it. I took what I learned and explained it to everybody that I was in contact with that had the problem.

KG: What was the most important thing you learned in the Pond Appeal Program?

DG: I think more than treating the ponds with chemicals there were other alternatives that were important to prevention. That is what I encouraged the Service District to do and not rely strictly on chemicals which were very costly and detrimental to any life in the pond. Certainly I know that at times they would need to use the chemicals but if they added more fish to the water and put in the plants necessary to support the fish life then they would not need to use the chemicals as often and that would end up hopefully being a more environmental way of taking care of it as well as a cheaper way of taking care of it. I think the Pond Appeal program gave them the information they needed to use these other options.

KG: Upon completion of the Pond Appeal Program, do you think you have a better understanding of the pond management needs in your community?

DG: Yes. I think I was able to get enough people to understand the problems and the solutions and give them the patience to let the course of whatever treatments were used to take place instead of expecting that in one week everything would be ok.

KG: Did the midge management plan described in the Pond Appeal Program increase your understanding of midge biology and management?

DG: Oh yes. Definitely. That is where I learned all of it.

KG: Now that you've completed the Pond Appeal Program, do you understand why this midge problem occurred?

DG: Certainly nobody knows why midges should be in these waters, but I guess it is just natural for the area to have this kind of insect. I would say that it is just something that is native to this environment and just like everything else in nature it becomes a part of your life.

KG: Will your ponds ever be midge-free?

DG: No

KG: Were you aware that Extension devised the midge management plan and taught the Saint Lucie West Services District how to implement the plan?

DG: Yes - because I went to the Service District meetings, they did let me know they were working with you.

KG: When the Saint Lucie West Services District receives complaints about midges and acts, does their management strategy work?

DG: Yes, but it is only temporary which is why I would like you to really go back to them and ask them to use more environmental tools to take care of it so that their frequent use of chemical pest control would be lessened. I think their understanding was that they only had to put in the plants and fish once and from then on the only thing they would have to do is go in and use the chemicals. Since they are only using the chemicals when they have a complaint, which is not as often as in the beginning when it was so out of control when everyone complained, that this was sufficient.

KG: Are the ponds in your community more appealing now?

DG: Yes

KG: Do you have any final comments on the Pond Appeal Program or Midge Management Plan?

DG: I think it was absolutely wonderful. It made a great deal of difference in everybody's life in this community and I can't thank you enough and tell you how much I appreciated the opportunity to (delete be able to) participate.

KG: Thank you.

This article is online at <http://www.joe.org/joe/2008december/iw5.shtml>.

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