Why do Fish Die in our Lakes in the Summer?

The fish that are most affected by our summer conditions are *Tilapia*, a non-indigenous species that have not fully adapted to the summer extremes we experience in our stormwater ponds. Let's examine a few facts about *Tilapia* and the causes of this annual die-off event.

<u>*Facts about Tilapia*</u>: *Tilapia* are invasive to Florida and not normal occupants of our Florida aquatic ecosystem. We do not stock them in our ponds. So, how did they get so widespread within stormwater ponds throughout Florida? There is much speculation, but a favored mechanism is based in the fact that *Tilapia* are mouth-brooders, meaning that they will carry fertilized eggs in their mouths until hatching. During breeding season, *Tilapia* are in the shallows and easily detected by Ospreys and other predators. It is logical to believe that an Osprey carrying a captured *Tilapia* overland would also cross over a few ponds. A *Tilapia* under stress will release any eggs it is carrying. Eggs being introduced in a pond would easily populate that pond. From hatching to maturity is only 6 months for *Tilapia*, and being mouth-brooders, population increase is speedy.

<u>*Why are Tilapia affected more than our Natural Fish Community*</u>: As noted, *Tilapia* are not indigenous and do not adapt well to summer conditions of high-water temperatures, decreased dissolved oxygen, and increased chemical herbicide treatment. Breaking these elements down –

1. Natural summer conditions result in high water temperatures. We have measured water temperatures of 85-88F. Our ponds are increasingly shallow because of years of bank erosion and soil loss filling our ponds. The shallow nature of our ponds allows the warm temperatures to reach the bottom, which causes oxygen to rise. Under stress, *Tilapia* school and head for the bottom which is now oxygen deficient.
2. After a long drought, such as we had this year, the rainy season creates stormwater runoff that carries nitrogen compounds (such as sodium nitrate) from our last fertilizer application in May. Nitrates have three effects: (a) plants absorb it, but if few plants are present, algae use it instead, causing harmful algal blooms; (b) when the nitrate ions are converted to nitrite ions, these stick to the fish's hemoglobin, causing asphyxiation (much like asphyxiation when a human breaths in carbon monoxide); (c) *Tilapia*, being mostly vegetarians, eat plants and algae that may be coated with herbicides used to control invasive plants and algae blooms.

<u>*What are We doing about it*</u>: We are monitoring fish kills as they occur. If they are severe enough, we will have them removed. We understand that decaying fish is noxious and uncomfortable for our residents. There is no toxin released to jeopardize health and safety. We try to avoid this task of active removal for few dead fish, since it is an added expense to our

normal lake maintenance. Nature has its own “cleanup crew”. Nature’s scavengers of vultures, birds, and the occasional mammal will typically take care of the floating fish. While we still don’t have the Healthy Lakes Initiative well established in most of our lakes, this process will better assimilate nutrients that contribute to dying fish.

How are We attempting to Control Overpopulation: We employ three primary methods to help control overpopulation of *Tilapia*: (a) We encourage the protection of alligators in our lakes which are the major predators of adult *Tilapia*; (b) Bass are primary predators of immature *Tilapia*, so we are attempting to determine the population dynamics of our lakes in terms of support for healthy fish community; (c) We are using a *Tilapia* harvester to periodically come in and collect as many *Tilapia* as he can take away.