Disposal of Sewage Sludge in the Lake Okeechobee Watershed Is Hurting Everglades Restoration

Introduction

Audubon is calling on the State of Florida, wastewater utilities, and landowners to end the practice of land disposal of dried sludge from sewage treatment plants (also referred to as wastewater residuals and bio-solids) in the Lake Okeechobee watershed. Nutrients in the lake and its tributaries exceed state and federal standards and pollution from phosphorous has reached a crisis point. As a result, Florida's largest lake faces ecological collapse. Sludge contributes nearly one-fourth of the phosphorous in the Lake Okeechobee watershed and is the most preventable source or pollution.

Long-term efforts to recover Lake Okeechobee, its watershed, coastal estuaries and Everglades are being undermined by the continued disposal of sewage sludge on land that drains into Lake Okeechobee and its watershed. An integral part of the Everglades ecosystem, Lake Okeechobee presently is so polluted by nutrients (phosphorus and nitrogen) that its water cannot be delivered to the Everglades without costly treatment. Sludge contains high levels of phosphorous and nitrogen, the two pollutants most harmful to the lake. Land application of sludge—either for disposal or under the guise of being a fertilizer—allows the nutrients in sludge to migrate off-site through runoff and leaching. While cleanup efforts are proceeding at a snail's pace, pollution continues into the lake and watershed from sources that can and should be controlled.

Audubon has long advocated for source controls to limit the amount of nutrients entering the watershed. In spite of several state initiatives, more nutrients continue to enter the watershed and measured quantities of phosphorous continue to increase. Based upon the data presented in this paper, Audubon renews its call for a prohibition on land application of sewage sludge in the Lake Okeechobee watershed. The costs of cleaning up the phosphorus from sewage sludge alone have not been calculated but will be in the billions of dollars. The existence of so much additional phosphorous in the watershed will complicate meeting state and federal standards and continue to contribute pollution for many years to come. The disposal of sludge and most of its use as a fertilizer in the Lake Okeechobee watershed should come to an immediate end.

Continued Sludge Disposal Compromises the Greater Everglades System

Phosphorus and nitrogen pollution have been long-term problems for Lake Okeechobee, the St. Lucie and Caloosahatchee estuaries, and the Everglades. Nutrient loading creates many undesirable changes in Florida's naturally nutrient poor ecosystems[1]. Perhaps most prominent are algal blooms that secrete toxins that can harm fish, wildlife, and humans, sometimes lethally. Nutrient enrichment also damages ecosystems by fueling the growth of noxious vegetation that can replace desirable vegetation. Nutrient enrichment essentially replaces the unique natural ecosystems of Florida, including springs, lakes, rivers, estuaries, the Everglades, and Lake Okeechobee, with different kinds of ecosystems, undesired by humans and native resident and migrating wildlife.

[1]For more detail on phosphorus and nitrogen effects to Lake Okeechobee, see, "Audubon of Florida. 2005. Lake Okeechobee: A synthesis of information and recommendations for its restoration. P. N. Gray, C. J. Farrell, M. L. Kraus, and A. H. Gromnicki. Eds. Audubon of Florida, Miami, FL. http://www.audubonofflorida.org/pubs_OkeechobeeReport.html

Land Application of Sewage Sludge is Major Source

The phosphorus and nitrogen overloading into Lake Okeechobee originated in large part from agricultural fertilizers, but it is now increasingly coming from Florida's cities in the form of sewage sludge. According to the Florida Department of Environmental Protection (DEP), in 2006 there were more than 2,000 permitted wastewater treatment facilities in the state. One by product of sewage treatment is sludge. A recommended disposal method for sludge is to dry it and spread it on agricultural fields. Spreading residuals on land has become increasingly common and is contributing to nutrient overloading in many watersheds.

Thousands of truck loads of sewage residuals contaminate the Okeechobee watershed.

Decades of Effort to Clean Up Lake Okeechobee

Lake Okeechobee has undergone a steady increase in pollution from phosphorous and nitrogen for decades. Water quality studies in 1969 and 1970 revealed the lake was becoming phosphorus enriched. Primary sources at that time were agricultural fertilizer and animal waste.

A "Special project to prevent the eutrophication of Lake Okeechobee" in 1976 outlined many measures to protect the lake. That was followed by the Rural Clean Water Program (1980s), the Surface Water Improvement and Management Plan (SWIM, 1988), the Dairy Rule (1989), and the Lake Okeechobee Works of the District Program. The phosphorus goal for these plans, as set in the 1987 SWIM Plan, was an annual average of 371 metric tons of phosphorus inflow. After four decades of these plans, the lake's phosphorus levels continue to increase. The average phosphorus level in Lake Okeechobee from 2003-2007 was 173 parts per billion (ppb), and the highest 5-year average in history[2]. Phosphorus loads to the lake between 2003-2007 were among the highest 5-year averages in history, averaging 630 metric tons[3].

The federal Clean Water Act requires that a Total Maximum Daily Load (TMDL) be set for every impaired water body. The lake's TMDL was set in 2000, with a deadline to achieve the goal by 2015. Based on updated information and modeling, the TMDL was set to an average of 105 metric tons of inflow per year. DEP estimates an additional average of 35 metric tons of phosphorus deposition in rain and dust, making the total annual load 140 metric tons. If the lake's TMDL is met, it is predicted that over time the lake's water will return to the 40 ppb average concentration. That will allow the lake to recover to its natural conditions.

In 2004 the Lake Okeechobee Protection Plan (LOPP) and in 2005 the Lake Okeechobee and Estuary Recovery (LOER) plans were developed to meet the lake's TMDL for phosphorous. (See Table 1.) Both plans rely on a variety of treatment systems and best management plans. Cleanup advocates have also argued for specific controls on nutrient sources, including human and animal wastes and fertilizers.

[2]SFWMD 2008. South Florida Environmental Report. Chapter 10: Lake Okeechobee Protection Program – state of the Lake and Watershed. West Palm Beach, FL.
[3]Ibid.

LOPP features	LOER features
• Meet Lake Okeechobee's phosphorus TMDL by 2015 • Implement nutrient Best Management Practices (BMPs) throughout Okeechobee's watershed ("source control") • Research and monitoring for BMP effectiveness • Coordinate with CERP Lake Okeechobee Watershed Project • Urban Stormwater retrofits and BMPs • Expand Reservoir and STA pilot projects	• Eliminate Land Application of Residuals • Fast Track Reservoir & STA Projects • Lake Okeechobee Regulation Schedule Revisions • Set TMDLs for Tributaries • Fertilizer BMPs ("source control") • Alternative Water Storage • Innovative Land-Use Planning • Revise Environmental permitting (ERP) Continued Implementation of LOPP & LOWP

Table 1. Selected features for the Lake Okeechobee Protection Plan (LOPP, 2004) and the Lake Okeechobee and Estuary Recovery (LOER, 2005) plan.

One facet of the LOER plan was a strong consensus proposal to *eliminate* phosphorus loading from residual dumping in the Okeechobee watershed. A 2007 re-appraisal of the LOPP in the "Northern Everglades" plan[4] concluded that even with greater efforts than envisioned in the LOPP, agencies still are not on track to meet the lake's phosphorus goal by the 2015 deadline.

Following the LOPP and LOER, the Florida Legislature in 2007 passed Senate Bill 392, which prohibited the disposal of wastewater residuals (sludge) within the Lake Okeechobee watershed.

Current Challenges: Phosphorous and Nitrogen

Target levels for nutrients in the Lake Okeechobee watershed are far from being met. As noted above, phosphorous from human sources exceed the TMDL by 500 percent. A major contributor to the lake's high phosphorous loadings is continued introduction of phosphorous in the system.

A recent study (Mock Roos & Associates 2002[5]) stated, "Lake loading can be decreased most stated, "Lake loading can be decreased most effectively by decreasing phosphorus runoff and *decreasing net phosphorus imports in each tributary basin*" (emphasis added, p. 107). Yet, Mock Roos's 2002 and 2003 reports estimated an ongoing addition of about 5,600 tons of phosphorus to the lake's watershed each year. This is equivalent to adding as much phosphorous in one year as would be allowed to flow into the lake over 53 years. Human waste through sewage sludge contributes approximately 1,523 tons of the estimated annual import. If eliminated from the watershed, the annual load could be immediately reduced by about 25 percent.

[4]SFWMD 2007. Lake Okeechobee Watershed Construction Project: Phase II Technical Plan. West Palm Beach, FL.

[5] See: Mock-Roos & Associates, Inc. 2002. Phosphorus budget update for the northern Lake Okeechobee watershed. Final report. South Florida Water Management District Contract No. C-11683.West Palm Beach, FL and Mock-Roos & Associates. 2003. Lake Istokpoga and Upper Chain of Lakes phosphorus source control: Task 4 final report. South Florida Water Management District Contract No. C-13413. West Palm Beach.

Nitrogen

In addition to phosphorus, nitrogen loading to Lake Okeechobee is a long-standing concern, but has been eclipsed in urgency by phosphorus. Nitrogen loading has similar nutrient enriching effects as phosphorus, but has added concerns that some of its forms (e.g., ammonia, nitrates) are harmful to people (and wildlife) if ingested. Nitrogen is a serious problem in downstream estuaries, as brackish and saltwater ecosystems can be more sensitive to nitrogen driven changes.

Nitrogen in Lake Okeechobee is in the range of about 1500 ppb, which is 25 percent above the lake's target of 1200 ppb total nitrogen[6]. Nitrogen has improved some over the years in the lake but has not reached its goal and further control efforts are warranted[7].

Legacy Phosphorous

Phosphorous builds up in soils and is released over time. This build-up in the Lake Okeechobee watershed is referred to as legacy phosphorous. Today's additions of nutrients are tomorrow's legacy problems, and continued application of sewage sludge creates both short-term pollutant loads, and even greater long-term legacy phosphorous pollution liability. Lake Okeechobee's watersheds have been fertilized for decades and some lands, on which phosphorus is no longer being applied, continue to have high outflow levels and have been blamed for some of the extreme recent loading in the lake.

[6] South Florida Water Management District. 2003. Surface Water Improvement and Management (SWIM) Plan--update for Lake Okeechobee 2002. SFWMD, West Palm Beach.

[7] Daniel J. Conley, D. J., H. W. Paerl, R. W. Howarth, D. F. Boesch, S.P. Seitzinger, K. E. Havens, C. Lancelot, G. E. Likens. 2009. Controlling Eutrophication: Nitrogen and Phosphorus. Science Magazine, AAAS. 323:1014-1015.

Costs of Cleaning Up Phosphorus to Repair Damage Caused by Phosphorus

Cleaning up the water in the Lake Okeechobee and its watershed has an enormous and shifting price tag. The Northern Everglades Plan, authorized in 2007 legislation and crafted by the South Florida Water Management Direct (SFWMD) estimated that addressing the state's part of Lake Okeechobee's phosphorus problem through stormwater treatment projects is projected at more than $1 billion. This is in addition to the U.S. Army Corps of Engineer's (Corps) $1 to 1.4 billion estimates for the Lake Okeechobee Watershed component of the Comprehensive Everglades Restoration Plan (CERP), most of which directly or indirectly involves nutrient control.

On-farm treatment costs and nutrient controls required under the state's TMDL program are also expensive. The cost per unit effort of phosphorus removal is variable and depends on the location, volumes and timing of treatment strategies. A recent comparison[8] of various technologies over a range of water quality conditions estimated that removal costs range from $53 per pound to as much as $2,961 per pound. Cleaning up nearly 1,400 tons per year being added to the Lake Okeechobee watershed from sludge residuals, assuming a minimal cost of $50 per pound, would result in at least $140 million a year in additional cost to tax payers.

[8] Daisuke Sano, D. A. Hodges, and R. Degner. 2005. Economic Analysis of Water Treatments for Phosphorus Removal in Florida. Univ. FL, IFAS. EDIS document FE576. http://edis.ifas.ufl.edu/pdffiles/FE/FE57600.pdf

Sludge Disposal through Land Application in the Lake Okeechobee Watershed

One facet of the LOER plan was a strong consensus to *eliminate* phosphorus loading from sewage sludge or residuals dumping in the Okeechobee watershed. Sludge is disposed of as both Class B and Class AA residuals.

The National Academy of Science 2008 peer review of CERP[9] stated, "The state is making appropriate investments in improving water quality by initially focusing on source control in the Lake Okeechobee watersheds" (p. 168). As noted previously, a key strategy in reducing the lake's phosphorus loading is stopping further imports to the watershed (often called "source control"). This is reflected in the LOER plan's goal to **"Eliminate land application of residuals"** in the watershed. That reduction effort has been very successful in a small part of the watershed, but has not been applied in some 85 percent of the watershed.

Most sewage sludge is classified as B or AA products. Class B is a dried waste product with some sterilization of microbes. Class AA is more processed and sterilized and often is constituted as dry pellets, but can be in many forms. Even processed sludge is not treated for phosphorus removal. From a nutrient perspective it is virtually the same as Class B. Both products contain an average of that varies around about 5.5 percent nitrogen and 2.2 percent phosphorous. The state is proposing under a new rule to allow AA to be packaged and marketed as fertilizers.

[9] Progress toward restoring the Everglades: Second biennial review – 2008. National Research Council. National Academies Press, Washington D.C.

How Much Phosphorous From Sewage Sludge

Audubon examined the contribution of residuals application to phosphorus imports to Lake Okeechobee's watershed. In order to do so, Audubon contacted DEP to obtain the latest data. DEP, however, does not conduct an annual compilation of this data and could not readily produce these numbers. Staff in three of the four DEP Districts that govern the Lake Okeechobee watershed were able to compile some estimates (at great effort because data are not reported in a manner that facilitates tabulation). Because one of four districts did not report, and two others have incomplete data, the numbers presented herein account for only part of the phosphorus applied in residuals in the lake's watershed. Additionally, some counties such as Palm Beach and Martin do not allow land application within their boundaries, thus their residuals are exported to other counties and DEP Districts. This complicates a full accounting of all incoming sources for Okeechobee's watershed.

Audubon's review of DEP records finds that at least 363 metric tons of phosphorus and 574 metric tons of nitrogen were deposited in 8,049 total dry tons of Class B residuals in Lake Okeechobee's watershed in 2007. DEP's summary of Class AA residuals applications[10] estimated the deposal and application of 52,737 tons of product in Lake Okeechobee's watershed counties (Glades, Highlands, Polk, Orange, Osceola and Okeechobee Counties. (See Figure 1.) If one makes the assumption that the material contained 2.2 percent phosphorus, this would amount to about 1,160 tons of phosphorus.[10]

[10] Summary of Class AA residuals: 2007. Domestic Waste Water Section, FDEP. http://www.dep.state.fl.us/water/wastewater/dom/docs/ClassAA_Annual_Summary_07.pdf. Note: Orange County is partly in Okeechobee's watershed and applies a reported 10,240 dry tons of Class AA, which would have about 225 tons of phosphorus, but because Audubon does no have access to the exact percent deposited Okeechobee's watershed, those numbers are omitted from these estimates.

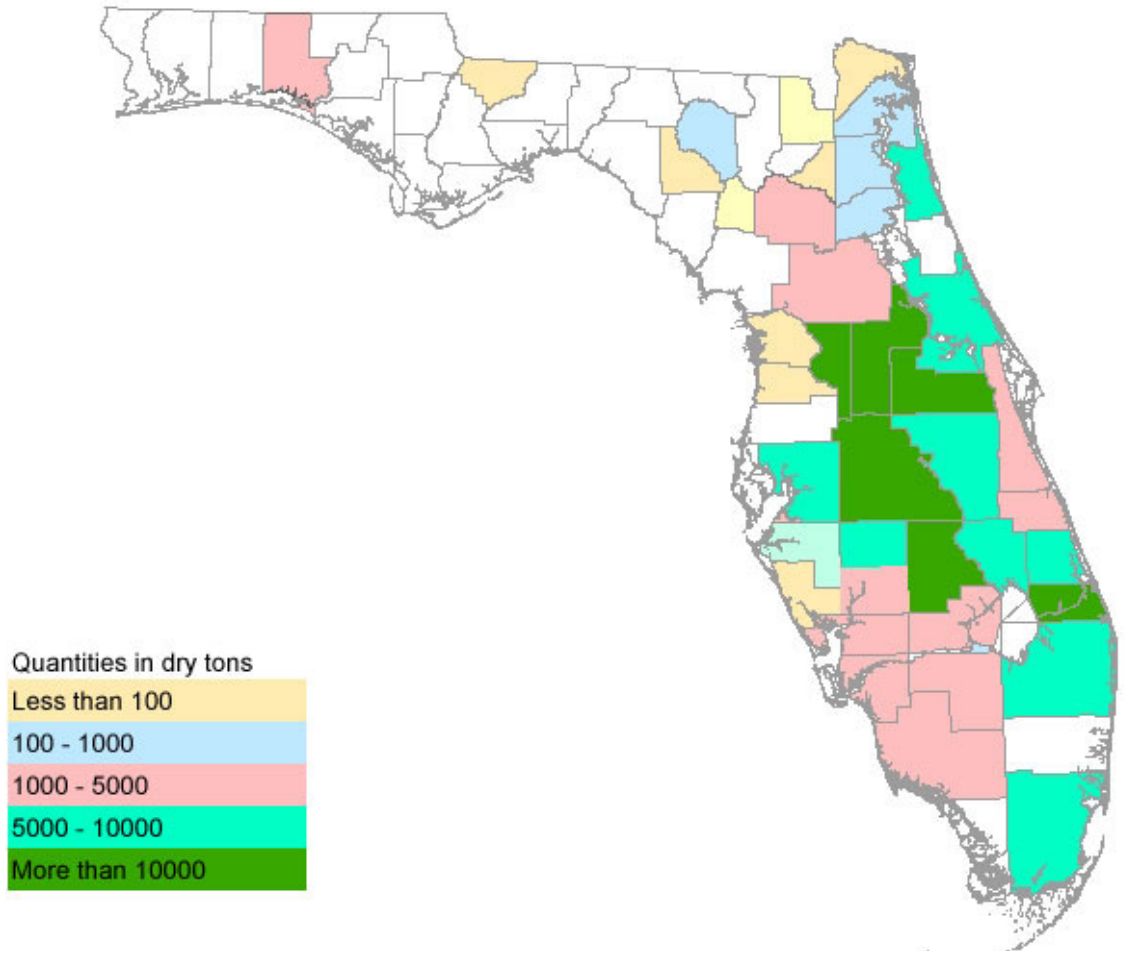

Figure 1. Estimated amount of Class AA residuals distributed and marketed in 2007[2]. (Note that a major part of the Kissimmee/Okeechobee watershed, consisting of Polk, Orange, and Highlands Counties are in the highest levels of product, while other Kissimmee/Okeechobee watershed counties, Osceola and Okeechobee also are high. Also note that some low population counties have high levels of application, illustrating that much of the deposition comes from other regions of state, creating significant difficulty tallying how much any one area is receiving.

While DEP and others have operated from the perspective that Class AA residuals are environmentally preferable to Class B residuals, this perspective is not valid when it comes to the protection of Lake Okeechobee, the estuaries, and the Everglades. Even though Class AA residuals are dried and composted to the point that they are cleaner to handle, produce fewer nuisance odors, and are freer of bacterial contamination, Class AA residuals are still as high in phosphorus and nitrogen as Class B, and this pollution can flow downstream into the watershed.

With some imports not accounted for, ***at least*** 1,523 tons of phosphorus (363 and 1,160 for Class B and AA, respectively) is being added to Lake Okeechobee's watershed through residual application each year. (This number varies from Mock Roos estimates partly because the latter used different data bases.)

How Residuals Contribute to Over-Fertilization in the Lake Okeechobee Watershed

In DEP's Central District residuals were applied at rates ranging from 45 to 162 pounds per acre (Table 2). Similarly, two sites in the Southwest District applied phosphorus at 118 and 155 pounds per acre, respectively. To meet Lake Okeechobee's TMDL (105 tons per year), an average of only one-tenth of a pound can enter the lake from each acre. Thus, the application rates reported here range from 450 to 1,620 times greater than the ideal level (e.g., 45 pounds/acre is 450 times one-tenth pound/acre). Further, the Cow/Calf Best Management Practices manual (1999)[11] recommends applying residuals at agronomic rates and recommends no phosphorus additions at all for grasses in this region[12]. Yet, even though phosphorus additions are not needed for agricultural purposes on pasture grasses, these are the sites of most frequent residuals disposal.

An example of the magnitude of the residual application problem is to examine Site 6 (Table 2), which applied 109 tons of phosphorus in 2007. This one property, which at 1,700 acres occupies 0.06 percent of the watershed area, is applying more phosphorus than the entire TMDL for Lake Okeechobee (105 metric tons). Again, the application rate is far above that needed to grow bahiagrass, and would not be used if the land owner was no t receiving the product for free or a fee. In the end, the excessive nutrient loadings from residuals are being driven by a perceived need to get rid of a nuisance by-product, and not by true agricultural requirements.

[11] http://jefferson.ifas.ufl.edu/old/ag_pages/cow_calf_bmp.htm

[12] Also see IFAS Circular #916 "Fertilization of established bahiagrass pasture in Florida:"http://rcrec-ona.ifas.ufl.edu/cir916.html

Summary for 2007, FDEP Central District

Amounts land-applied in metric tons	Total Solids	Total Nitrogn	Total Phosphorus	Phosphorus pounds per acre
Site 1	211	7.5	3.1	59
Site 2	1347	26.7	21.8	162
Site 3	1405	53.4	21.8	45
Site 4	169	10.2	4.2	131
Site 5	2162	175.7	62.8	75
Site 6	2755	276.7	109.1	141
Totals	**8049**	**550.2**	**222.8**	

Table 2. Estimates of metric tons of residual spreading in the Central District (Osceola and Orange Counties) in 2007

District	Total estimated phosphorus deposition in 2007 (metric tons)	Total estimated nitrogen deposition in 2007 (metric tons)
Southeast	4.15	23.5
Southwest	135.9	No data obtained
South	No data obtained	No data obtained

Table 3. Estimates of residual spreading in the DEP's Southeast District (Okeechobee County), Southwest District (Polk, Hardee and Desoto Counties), and South District (Glades and Highlands County) regions of Lake Okeechobee's watershed (sources: SFWMD and FDEP pers. comm.).

Land application of sewage sludge is recommended nationally by the Environmental Protection Agency (EPA). It was thought to be an inexpensive disposal mechanism that could enhance soil structure and fertility and produce revenue for agricultural landowners. Some have also argued that sludge is superior to chemical fertilizers. While cheap fertilizer is a valid reason for land application of sewage sludge, the real motivation is mostly disposal of an unwanted waste product.

The organic material in the sludge rapidly breaks down in South Florida's wet and sandy soils and the nutrients are released. Nitrogen is quickly washed out of sand and there is limit as to how much phosphorous will stay in the soil. Phosphorous is also released when soils are saturated.

DEP and the Florida Department of Agriculture and Consumer Services (DACS) have sought ways to allow sludge to be used and in doing so to limit water quality problems from excessive dumping and fertilization by limiting the application of residuals to an "agronomic rate". Whether in organic or inorganic forms, the form of the nutrient is not of concern; the concern is the *rate* that residuals are applied. Unfortunately, the "agronomic rate" specified in Best Management Practices by DACS in agreement with DEP are only based on levels that are considered the optimal amount desired to stimulate growth of the crop at the given site. Application at a so-called "agronomic rate" has no bearing on meeting water quality goals. Excessive nutrients move downstream in the watershed even if fertilizer applications follow Best Management Practices for nutrients. Application of residuals through land spreading—even at what should be considered acceptable agronomic rates—is out of step with the entire methodology of addressing the pollution coursing down Lake Okeechobee's tributaries, into the lake, and ultimately the coastal estuaries of the St. Lucie and Caloosahatchee Rivers.

DEP Undermines the Legislature's Efforts to End Disposal of Sewage Sludge in the Lake Okeechobee Basin

Consistent with the specific goal of the LOER program, in 2007 the Florida Legislature passed Senate Bill 392, which contained the provision **"…prohibiting the disposal of wastewater residuals within the Lake Okeechobee watershed pursuant to certain conditions…"**

These words, taken from the actual title of the bill underscore the legislative intent that application residuals to the land surface generally be excluded from watersheds in the Lake Okeechobee basin beginning in 2008. Senate Bill 392 states:

> "After December 31, 2007, the department **may not authorize the disposal** of domestic wastewater residuals within the Lake Okeechobee watershed unless the applicant can affirmatively demonstrate that the phosphorus in the residuals will not add to phosphorus loadings in Lake Okeechobee or its tributaries. This demonstration shall be based on achieving a net balance between phosphorus imports relative to exports on the permitted application site. Exports shall include only phosphorus removed from the Lake Okeechobee watershed through products generated on the permitted application site. **This prohibition** does not apply to Class AA residuals that are marketed and distributed as fertilizer products in accordance with department rule."

The legislature left a ***very narrow*** window for exceptions to the general prohibition. The two possible exceptions are (a) an extraordinary demonstration, seen as nearly impossible, that a specific application of residuals on a specific site would "…not add to phosphorus loadings" because exactly the same amount of phosphorus is simultaneously being removed from the same site in the form of products produced on that site; or (b) that only AA residuals marketed and distributed as fertilizer are used at the site. Thus, the Florida Legislature clearly intended to cease the practice of hauling Class B and AA residuals that are not packaged, marketed and used as fertilizers, from sewage treatment plants around Florida to the Lake Okeechobee Basin for disposal.

DEP Ignores Intent of Legislative Ban

Rather than embracing the new law as an opportunity to significantly reduce nutrient loading to Lake Okeechobee and its downstream systems, DEP has sought to develop arguments in a DEP Guidance Memorandum to support a rationale that justifies agency decisions to ignore this critical legislation and allow residuals applications to continue largely unchanged within the watershed. As noted earlier, DEP monitoring and reporting of where, and how much, residuals are placed in Lake Okeechobee's watershed is inadequate nor is there sufficient testing of water samples to verify water quality protection measures.

Contrary to what appears to be clear requirements in the new law, and without requiring the extraordinary demonstration required by Senate Bill 392's narrow exception, DEP now allows renewal of permits for land application of sewage sludge residuals in the lake's watershed. That action by DEP, coupled with a broad interpretation of what constitutes "marketing and distribution" of class AA residuals, has essentially nullified the impact of the intended prohibitions in SB 392.[13]

Class AA residuals are not treated for phosphorus removal and should be treated the same as Class B. Instead of following the Legislature's very narrowly crafted exceptions to a general prohibition on residuals dumping in the Lake Okeechobee basin, DEP has artfully kept the door open to the flow of ever increasing amounts of residuals into the watershed of the Everglades, Florida's most nutrient-challenged ecosystem.

[13] Current and proposed definitions of "distribution and marketing" (See Draft Revisions to Rule 62-640) read as follows "Distribution and Marketing" is the giveaway or sale of biosolids meeting the criteria of Rule 62-640.850, F.A.C., or a product derived from such biosolids, either packaged or in bulk form, by owners or operators of treatment works or by a person who receives biosolids or biosolids products from treatment works." Thus, DEP circumvents the concept that use of Class AA residuals in the Okeechobee Basin would be limited to only those fertilizers which are sold on a retail basis, and opens the door to the continued "dumping" of large volumes of AA residuals handed off from sewage treatment plants to land spreading contractors.

Statewide Residuals Rule Draft Flawed

DEP also regulates residuals on a state-wide basis through Chapter 62-640: Biosolids. This rule is undergoing revision. Audubon finds this rule, even as proposed for revision, will not protect Lake Okeechobee from nutrient loading. The current rule, and proposed revisions share the same fundamental flaws as DEP's response to Senate Bill 392:

- Land application, even in impaired watersheds, continues to be encouraged;
- The draft rule completely sidesteps the requirement in the new law that strictly constrains land spreading to those instances where an applicant can "…affirmatively demonstrate that the phosphorus in the residuals will not add to phosphorus loadings in Lake Okeechobee or its tributaries".

Instead, the draft rule allows residuals to be land applied based on "Nutrient Management Plans" that use "agronomic rates" that will create water quality problems, as opposed to the law's required "nutrient balances" that would almost always prohibit dumping in the Okeechobee watershed. Class B residuals producers are encouraged to convert to Class AA residuals, removing restrictions on their subsequent land application, actually resulting in more dumping.

- The draft rule reiterates the broad definition of "distribution and marketing" so as to allow Class AA residuals to continue to be dumped or land spread in the Okeechobee Basin.
- Producers and distributors of residuals have extensive reporting requirements, but DEP has no requirement to compile, analyze, or report the data.
- Newer technologies for disposal are not encouraged (see following section)
- Residuals imports from other states are allowed

Alternative Disposal of Sludge

There are some alternatives to land disposal of sludge. These include true fertilizer products, energy, and landfills.

Fertilizer - Fertilizer is assumed to be a good result but should only be used in carefully balanced forms and nutrient management plans. The fact is most Florida soils do not need any phosphorous for many plants, so the use of sludge or residuals as a fertilizer product is not appropriate for most Florida soils.

Landfills – Containing the nutrients and other pollutants in sludge in landfills is an appropriate disposal means. Eventually, gases from decomposing sludge would need to be collected to avoid contributing greenhouse gases.

Energy – Technology exists today to turn sludge into a clean and renewable source of energy. Already one firm has demonstrated a technology that can turn the carbon content of sludge into clean synthetic gas, which can be used to decrease greenhouse gas emissions that cause climate change. This technology may be considered carbon neutral in the context of the current policy debate on climate change.

Land application of sewage residuals results in nutrients washing down canals and streams to Lake Okeechobee, the Everglades, and the St. Lucie and Caloosahatchee estuaries.

Conclusion

Disposal of sewage sludge in the Lake Okeechobee watershed continues in spite of repeated efforts to end the practice. Sludge is a major—and the most easily controlled—nutrient source. Rather than being used as a useful form of fertilizer it is typically dumped under the guise of being a fertilizer. The costs of cleaning up the phosphorus from sewage sludge alone have not been calculated but will be in the billions of dollars. The existence of so much additional phosphorous in the watershed will complicate meeting state and federal standards and continue to contribute pollution for many years to come. The disposal of sludge and most of its use as a fertilizer in the Lake Okeechobee watershed should come to an immediate end.

Recommendations

1. DEP should move aggressively to faithfully implement the new legislative mandate to end the practice of sludge (residual disposal) in the Lake Okeechobee watershed.
2. DEP should keep sufficient records under its existing permit program so that regulators and the public can understand the extent of residuals application in the entire basin and the resulting water quality.
3. DEP should abandon internal efforts to extend permits and should seek every opportunity to revoke existing permits.
4. Sludge (residuals) application in the Okeechobee Basin cannot be applied in any manner that adds to nutrient loading, or impairs water quality in any way.
5. Existing permit holders should be required to perform the analysis to demonstrate their application of residuals "…will not add to phosphorus loadings in Lake Okeechobee or its tributaries." If they fail the test, permits should be revoked as soon as legally practical. DEP should attempt revocation and allow administrative law judges or courts to resolve the equities.
6. Facilities to produce "Class AA residuals" or marketable fertilizers should not be allowed to apply their products at any level except in nutrient balance and should be discouraged from locating in the basin.
7. The Class AA product exemption should be strictly interpreted by DEP, not creatively interpreted to allow residuals application to continue. Specifically, DEP should seek rule amendments to narrowly constrain the term "distribution and marketing" as it relates to Class AA residuals so that the exemption only applies to commercial fertilizers.
8. DEP should encourage all sewage treatment facilities producing residuals in Florida to consider alternative uses of residuals such as for alternative energy generation.
9. DEP must create annual reports compiling the amount and location of all residuals applications in the watershed, including cumulative total applications, pounds per acre for total residuals, phosphorus and nitrogen, crop type and rates that were applied at each site, and relevant water quality data for the site and the sub-basin.