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CONSULTANT'S UPDATE

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HOW PERVIOUS CONCRETE IMPROVES STORMWATER QUALITY

By Mark T. Livesay, EI and Stephen D. McConn, PE

Designers and developers have used pervious pavement in selective applications for at least the last 20 years. Long deemed a specialty product to meet certain "green" initiatives, the mindset towards pervious pavement is beginning to change. Most individuals involved in the design and development business know common regulatory terminology such as numeric nutrient criteria, impaired water bodies, and the statewide stormwater rule. These rules vie to protect Florida's waters from further degradation and promote healthy aquatic ecosystems, safe recreational and fishing environments, and satisfactory water supplies. What do these new regulations mean, though? It means everyone must prioritize stormwater treatment in new developments, as runoff from such systems drain into the natural receiving systems. As stormwater quality becomes more critical, efficient site design will need to employ multiple low impact development methods and new technologies to manage stormwater including pervious pavement, rain gardens, and traditional ponds. In the paragraphs that follow we will present the details on how a recent project utilized pervious concrete pavement to help meet the stormwater quality criteria.

The Site

As common with all projects, this one had its own set of unique and challenging design issues. The client, who directed us to design a new auto-dealership, rightly indicated that the design must maximize both the dealership's visibility and vehicle display area. However,

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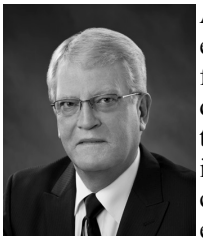
IS IT TIME TO JUMP BACK INTO THE SRF PROGRAM?

By Ted R. Fylstra



As national, state and local economies begin to recover from the worst recession in decades, obtaining funding to construct infrastructure improvements remains a challenge for many. However, communities that have constructed projects in the last few years have benefited from discounted bid pricing, sometimes as much as 50% less than pricing experienced before the onset of the recession.

Although there is still uncertainty that the recent signs of economic recovery will continue and strengthen, it may be the right time to begin planning for the future. The Florida Department of Environmental Protection's (FDEP) State Revolving Fund (SRF) loan/grant programs may be the optimum funding vehicle to begin the process.

What are the programs?

SRF Clean Water (CWSRF) programs provide financial savings for projects that benefit the environment, including protection of public health and conservation of local watersheds. Federal and state contributions fund loans for a wide variety of water quality projects including all types of stormwater, water-

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EOHS NEWS

- EPA Enforcement Director promises more enforcement of the Lead Renovation, Repair and Painting (RRP) Rule.
- First-Ever EPA Mercury and Air Toxics Standards will protect millions of families and children from harmful and costly air pollution from power plant emissions. These new standards will provide health benefits that far outweigh the cost of compliance. For more information, please contact us or visit www.epa.gov/mats
- Health risks from coal tar-based pavement sealant products greater than previously believed. Four new studies indicate that exposure to coal tar-based asphalt sealers can cause adverse health impacts, especially in young children (3 to 5 yrs old). The new research, published in

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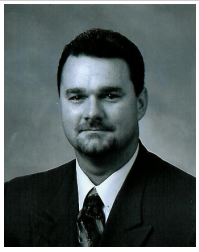
Inside this issue:

THE USFWS, SKINKS AND CENTRAL FLORIDA

By Arthur "Art" D. Wade III, PWS



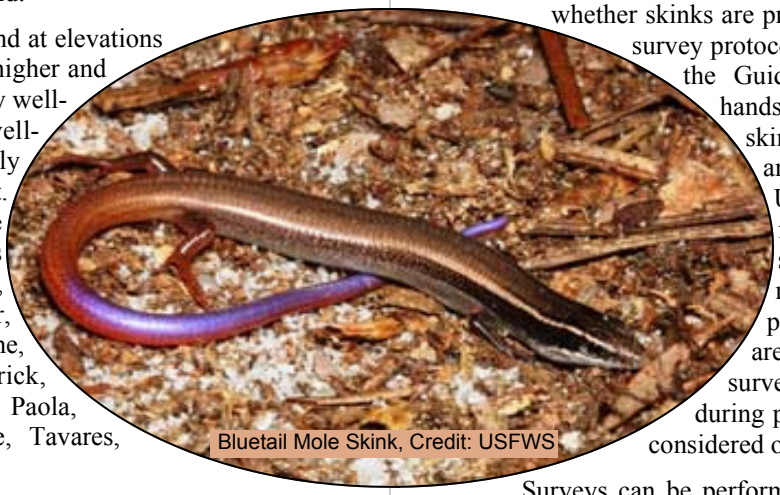
Property owners and developers have plenty to consider when planning for a project: location, financing, infrastructure improvements, environmental regulations, safety, etc. Those in several counties within the interior portion of Central Florida now have another one….lizards. Yes, you read that right: Lizards. No, not the insurance-selling types or ones large enough to destroy cities. We're talking small lizards/skinks, and you certainly won't save any money, no matter who you call.

This article will discuss the Sand Skink and Bluetail Mole Skink Consultation Guide (Guide) published by the United States Fish and Wildlife Service (USFWS) in February 2012 and summarize the general process property owners must maneuver through when a project will potentially impact skinks or their habitats.

What's the big deal about these little critters? Plenty.

The sand skink (*Neoseps reynoldsi*) and bluetail mole skink (*Eumeces egregius lividus*) are protected by the USFWS due to loss of habitat, fragmentation, changes in land use, over-collection, and the skinks' limited range. Sand skinks are considered Threatened by the USFWS and found in Highlands, Lake, Marion, Orange, Osceola, Polk and Putnam counties, particularly within the Lake Wales, Winter Haven, and Mount Dora Ridges. Bluetail mole skinks have a much more limited range: the Lake Wales Ridge within Highlands, Polk, and Osceola counties and are considered Endangered by the USFWS. These lizards are found nowhere else in the world.

Both species are typically found at elevations of 82 feet above sea level or higher and prefer soils that are moderately well-drained to excessively well-drained, areas that are generally good for human development. The "skink soils", as they are referred to in the Guide, are as follows: Apopka, Arredondo, Archbold, Astatula, Candler, Daytona, Duette, Florahome, Gainesville, Hague, Kendrick, Lake, Millhopper, Orsino, Paola, Pomello, Satellite, St. Lucie, Tavares, and Zuber soil series.



Bluetail Mole Skink, Credit: USFWS

What happens if I live in one of these counties, my property is 82 feet above sea level or greater, and I have skink soils?

First, see if your project falls within the Consultation Area. Not all portions of the counties listed above have the appropriate soils or elevations to be considered skink habitat. Therefore, the USFWS has published a Consultation Area Map (http://www.fws.gov/verobeach/ReptilesPDFs/20120206_Skink%20consultation%20area%20map.pdf) to assist in determining whether or not the project will impact skinks.

If your project falls within or close to the Consultation Area, it is recommended you contact the USFWS prior to beginning your project, or contact Chastain-Skillman, Inc. to assist you with this process. The following information will be needed:

1. Describe the Proposed Action

   All features and activities of the proposed project should be described with supporting documentation. Details such as project location, limits of construction, staging, clearing and filling, roads, should be addressed, including soil maps, elevations, habitat types, surveys, etc.

2. Determine and Describe Species or Habitat That May Be Affected

   a. Determine whether the project will impact skinks or other listed species.

   b. Determine whether the project will impact skink habitat. Skink habitat includes those areas with skink soils and includes pine plantations, active or inactive citrus groves, pastures, residential developments, and neglected fields and overgrown scrub.

   c. Conduct a skink survey or "opt to assume" presence of skinks. If the above evaluation determines that skink habitat is present or may be affected, the owner has two options: Conduct a formal skink survey or assume that skinks are present. If the owner assumes they are present, they can proceed to Step 3 below.

   If the owner wishes to conduct a formal survey to determine whether skinks are present, they have to follow the survey protocol presented in Appendix A of the Guide. While surveys are the hands-on approach to knowing if skinks are on the property, they are not foolproof. In fact, the USFWS states "that failure to find skinks with a coverboard survey does not necessarily mean that the site is not occupied. If skinks or skink signs are detected at any time after surveys are completed, including during project construction, the site is considered occupied."

   Surveys can be performed any time of the year, but tracks are most often seen in the spring (March through May) and fall (October through November). The survey process is quite detailed and is beyond the scope of this article. See Appendix A of the Guide or contact CSI for more information.

3. Evaluate Effects of the Proposed Action and Incorporate Conservation Measures

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a. Describe the effects the proposed project will have on skinks.

b. Describe cumulative impacts which may occur as a result of nearby projects.

c. Evaluate conservation measures that can be utilized to avoid or minimize impacts or that will be used to compensate for incidental takes. A take is defined by the USFWS as harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. An incidental take is an authorized take.

4. Document methods, evidence, analyses, and reasoning and make a determination; prepare and submit a complete consultation initiation package to the USFWS.

   The consultation initiation package is a compilation of the information collected in steps 1 through 3 above, as well as reasons/evidence to support an effect determination. Three effect determinations are possible:

   a. No effect – The project contains no suitable habitat and will not affect sand/bluetail mole skinks. This cannot be used if there is evidence of sand/bluetail mole skinks on the property.

   b. May affect, not likely to adversely affect – The project will have only beneficial, insignificant, or discountable effects on sand/bluetail mole skinks. Conservation measures* are required to be implemented.

   c. May affect, likely to adversely affect – The project will adversely affect sand/bluetail mole skinks. Conservation measures* are required to be implemented, as well as a formal consultation with the USFWS.

*Conservation measures are detailed in Appendix B of the Guide.

Once the USFWS service approves the consultation initiation package, the project can proceed. However, the consultation process may be reinitiated if:

- The amount or extent of incidental take is exceeded.
- The project is later determined to impact listed species or critical habitats not considered.
- The project is modified and creates an effect not previously considered.
- A new species is listed or critical habitat is designated which may be affected by the project.

Conclusion

The guidelines from the USFWS could potentially impact a significant number of properties with development potential. Projects will require an additional level of planning, permitting, and compensatory measures to offset impacts to skinks and their habitats. If you have any questions regarding the Guide or would like assistance with working with the USFWS, please contact us for more information.

References

Sand Skink and Blue-tailed (Bluetail) Mole Skink Guide: http://www.fws.gov/verobeach/ReptilesPDFs/20120206_Skink%20CCG_Final.pdf

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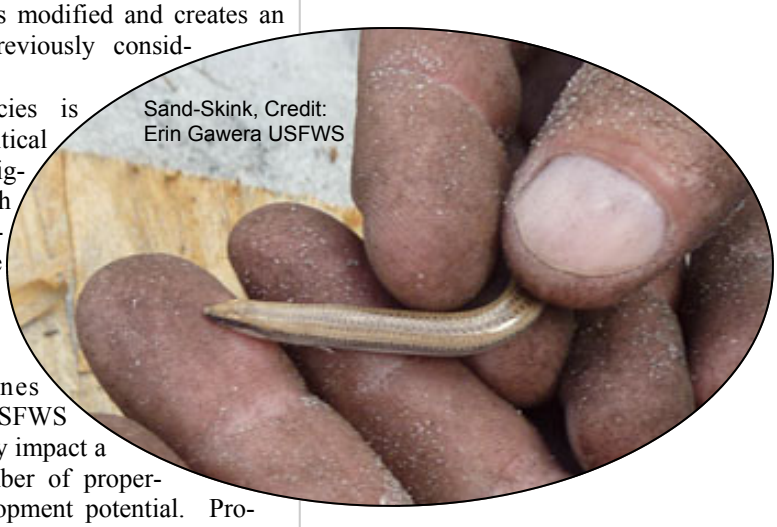

Sand-Skink, Credit: Erin Gawera USFWS

(EOHS—Continued from page 1)

peer-reviewed science journals, focuses on a class of chemicals found in the coal tar known as "polycyclic aromatic hydrocarbons" or (PAHs). PAHs are considered carcinogenic and the coal tar dust exposure route for children is considered very similar to that of lead dust exposure (i.e., hand to mouth contact and ingestion). Both Home Depot and Lowe's have discontinued selling coal tar-based sealant products. Fore more information, please contact us or visit: www.epa.gov/bns/reports/stakejun2008/B(a)P/CTSFactSheet_08.pdf

Local EOHS Professional Development Conferences

- American Industrial Hygiene Association (AIHA)
  Florida AIHA Spring Conference
  St. Petersburg, FL (April 2012)

- American Society of Safety Engineers (ASSE)
  EPA Region IV Safety & Health Conference
  Tampa, FL (April 2012)

(SRF—Continued from page 1)

shed protection or restoration, and estuary management projects, as well as more traditional municipal wastewater treatment projects including water reuse and conservation projects.

The program provides funding for the highest-priority water quality needs. CWSRF monies are loaned to communities at lower than market rate interest rates, and loan repayments are recycled back into the program to fund additional water quality protection projects. The revolving nature of these programs provides for an ongoing funding source that will last far into the future.

The Drinking Water State Revolving Fund (DWSRF) Program provides low interest rate loans for planning, designing, and constructing public water facilities. The Department solicits project information from Eligible Entities throughout the year. The information is used to establish the project priority list for the following annual cycle. Funds are made available for Pre-construction Loans to rate-based public water systems, Construction Loans of $75,000 minimum or more, and Pre-construction Grants and Construction Grants to small financially disadvantaged communities. The Loan Terms include a 20-year (30-year for financially disadvantaged communities) amortization and low interest rates. Each year, 15% of the funds are reserved exclusively for small communities having populations less than 10,000. In addition, small communities may qualify for loans from the unreserved 85% of the funds.

Why use the programs?

- The programs provide low interest loan and grant funding to qualified communities to meet a community's needs.
- Interest rates are no more than 80% of the current 20-year bond index and based on a community's "Affordability Index"; the average rate is 60% of the index with many communities qualifying for an interest rate at or near 2.0%.
- There are no pre-payment penalties when an improving economy generates increased revenues.
- There are no commitments required in the program; a community can opt out at any stage of the process and repay only the amount borrowed.
- Environmental approval of the Facilities and Capital Financing Plans is valid for a period of five (5) years and may be extended with minimal effort.
- There are minimal costs involved in getting into the program.
- Funding is available: CWSRF representatives are looking for projects to fund.

What Chastain-Skillman, Inc. (CSI) will do for you:

Our company is uniquely qualified to provide the services you need to take advantage of the SRF programs. CSI will use its vast experience with other communities across the state to successfully provide the services you need to use these programs.

1. CSI has the capacity to serve your needs with demonstrated expertise encompassing more than $1.5 billion in funding and program management experience.
2. We will review your infrastructure and financial needs to determine the best-fit projects for the programs.
3. Our 62 years of engineering experience in municipal water and wastewater engineering provides the depth of expertise required for successful project completion.
4. Our Project Funding Specialist has been successful in securing grants and loans from federal, state, local, and private sources for more than 25 Florida communities. We offer a team of in-house experts with multiple years of experience in all services related to the program.
5. Using CSI expertise to navigate the SRF programs does NOT commit you to using CSI for design, bidding, and construction services. Although we would welcome the opportunity to provide those services for your projects, we have successfully managed SRF projects for many communities involving their in-house or consulting engineers.

What do you need to do next?

The CWSRF program timing requires that RFIs for funding consideration for the current funding cycle be submitted to the FDEP before June 1st of this year. The DWSRF will accept RFIs at any time and "hold" them for the next cycle.

If you and surrounding communities are experiencing signs of economic recovery; if you are interested in using these funding programs; if you are interested in taking advantage of the current low-bid environment, now is the time to begin the process.

Please contact us to discuss the opportunities available to your community under these or other funding programs.

Remember - the SRF programs offer:

- Low interest rates and grants are available for qualified communities and projects.
- There is no commitment and you may exit the program at any point.
- There is no pre-payment penalty.
- There are minimal costs involved in getting into the program.
- Funding is available.

Please contact us at your convenience to discuss the opportunities available to your community under these or other funding programs.

CSI welcomes the opportunity to discuss your project and funding needs with you. Together, we may find the low-cost solution to your needs.

Ted Fylstra has a Bachelor of Science Degree in Industrial Engineering from the New Jersey Institute of Technology and over eleven years experience in Loan/Grant Management Services in the state of Florida for numerous communities and funding programs. Ted has personal experience determining funding applicability and eligibility, preparing funding applications, and documenting compliance with funding constraints, as needed, to comply with audit requirements for over $1.5 billion in grants and loans. He can be reached at (813) 621-9229 or tfylstra@chastainskillman.com.

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this meant that the stormwater treatment pond needed to be atypically small yet still function within agency regulations.

To further complicate the design, the project site contributed runoff to a surface water body impaired for total phosphorus (TP). That is to say, the amount of TP in the downstream surface water body exceeds the threshold limits specified in Florida's water quality standards. Discharges from new land development projects can potentially augment the pollutant loadings that originally caused the impairment. Thus, to protect Florida surface waters from further degradation, the Water Management Districts (WMDs) and the Florida Department of Environmental Protection (FDEP) only permit development projects that provide a net improvement in the pollutants that contribute to an impaired water body. In the case of our design, the TP loading discharged from the dealership could not exceed the TP loading discharged from the existing site conditions.

The existing site consisted mostly of large single-family parcels, with impervious surfaces comprising only about 10% of the total site. In contrast, the proposed dealership consisted of multiple buildings and parking areas covering over 80% of the total site. Generally speaking, stormwater runoff collects more pollutants from impervious surfaces (particularly driving surfaces) than from vegetated surfaces.

Consequently, the stormwater runoff generated from the dealership required a higher level of treatment than runoff from a conventional site. This involved increasing the capacity of the stormwater management system to treat an additional volume of runoff. Soil conditions dictated that the design must utilize a wet pond system. However, increasing the capacity of a traditional wet pond requires that the pond area be expanded or the pond stage be raised, thus decreasing the developable area and visibility of the site.

The Solution

To meet the client's needs while still satisfying water quality requirements, the proposed development needed to incorporate a nontraditional design solution. Taking direction from the FDEP and WMD's Environmental Resource Permit Draft Stormwater Quality Applicant's Handbook, the design utilized a "treatment train" stormwater management approach. Treatment trains are stormwater treatment systems that consist of multiple Best Management Practices (BMPs) in series to remove the required pollutant load. For example, a pretreatment BMP will remove a certain amount of TP before discharging to subsequent downstream treatment methods, thus reducing the TP load removal required by each BMP.

The auto-dealership design utilized pervious concrete as the pretreatment BMP with a wet pond system serving as the primary treatment method. Pervious concrete has often been used as a means of lowering stormwater runoff with its low curve number (compared to traditional pavement); however, we decided to design a system that focuses on a water quality application.

The pervious concrete BMP consists of the natural subsoil, sub-base (washed, coarse aggregate), and pervious concrete pavement. The pervious concrete section and sub-base contain a large number of interconnected voids, allowing stormwater runoff to percolate through the system and down into the underlying soil. This essentially mimics the function of a dry retention pond system, providing water quality treatment via natural percolation into the native soils. This proved valuable in our design as a portion of the site's stormwater runoff was routed to the pervious concrete system and treated via infiltration into the underlying soil, thus lessoning the stormwater volume and TP load on the downstream wet pond.

For the pervious concrete system to continually provide adequate water quality treatment, the system must adhere to a number of important design guides. For example, pervious concrete lacks the structural stamina of traditional asphalt or concrete and cannot withstand heavy vehicle loads, high traffic volumes, or areas of frequent turning movements. Thus, our design employed the pervious concrete only in parking stalls. Additionally, the pervious concrete areas possessed no slope and were surrounded by a ribbon curb extending one inch above the surface of the parking stalls. This helps to capture the stormwater runoff and allows "nuisance ponding" to indicate if failure has occurred. These, along with many other design guides, help the system maintain a maximum level of performance.

The Results

The auto-dealership's pervious concrete system proved to possess many clear advantages as a water quality feature in the treatment train approach. As mentioned previously, the comparatively low curve number of the pervious concrete reduced the total stormwater runoff generated from the site. Beyond reducing water quantity, the pervious concrete system enhanced water quality by reducing the TP load on the downstream primary wet treatment pond.

The water quality application of pervious concrete allowed us to address our client's needs by incorporating one innovative system. The reduction in TP provided by the pervious concrete system both decreased the surface area and lowered the bank elevation of the primary wet treatment pond. Essentially, the design exchanged increased pond surface area and pond staging for a drivable pervious concrete system without sacrificing water quality functionality. This exchange increased the dealership's visibility and developable area to fulfill the client's needs while still maintaining regulatory compliance.

As we move forward with new stormwater regulations, we must be flexible in our design approach to find the best fit for the project, the site, and the client. This means incorporating new and innovative design methods as well as new technologies. This will help clients to maximize the development area, minimize infrastructure costs, and keep costs within established budgets. For more information on pervious concrete pavement and its long-term performance, please contact Steve McConn or Mark Livesay.

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