

**Lower St Johns Technical Advisory Committee (TAC)
Meeting Summary
Host: Clay County
Green Cove Springs, FL
February 8, 2006**

Attendees

Russell Brodie, FWD	Tom Kallemeyn, FDEP
Tiffany Busby, Wildwood Consulting	Dan Littles, Jr. Clay County BCC
Dean Campbell, SJRWMD	Don Loop, Stewards of the St Johns
Ed Cordova, FDEP	mindy matthews, St Johns River
Cindy Cosper, DEP Watershed Monitoring	Alliance
Barry Cotter, COJ-EQD	Jim Maher, FDEP
Dean Dobberfuhr, SJRWMD	Lori McCloud, SJRWMD
Bob Gamble, City of Green Cove Springs	Kraig McLane, SJRWMD
Melinda Granlund, SJRWMD	Dana Morton, COJ-EQD
Courtney Hart, SJRWMD	Alan Obaigbena, FDOT
John Hendrickson, SJRWMD	Nicole Robinson, DEP/CAMA- Northeast FL Aquatic Preserves
John Higman, SJRWMD	Jennifer Sagan, Sagan Biological
Mike Hollingsworth, USACE	Lucy Sonnenberg, JU

Welcome and Introductions

The meeting began at 10:05 am. Dan Littles, Jr., Co-Chair, welcomed everyone and introduced Fritz Behring, Clay County Manager. Mr. Behring welcomed the group to Clay County and indicated his interest in supporting river restoration efforts. Mr. Littles thanked everyone for coming and the participants introduced themselves.

No comments were made on the November 30, 2005 meeting summary.

Presentation: “Effects of Urbanization on Headwater Stream Ecosystems and Detrital Export”

Dean Dobberfuhr described this study, of which Phase I is complete. He explained that it started with the question, “What happens when you urbanize a wetland and its watershed?” He set out to better understand the relationship between impervious surface and stream ecosystem function.

The null hypothesis (H_0) was that there is no relationship between impervious surface and stream ecosystem function. Alternate hypothesis 1 (H_1) was that there is a relatively smooth decline in stream function related to increases in impervious surface. Alternate hypothesis 2 (H_2) was that there is an apparent threshold in the impervious surface relationship to stream ecosystem function.

Phase I objectives of the study were:

1. Quantify detrital inputs and utilization;
2. Determine trophic changes; and
3. Determine downstream effects.

The study targeted first and second order headwater streams. Twenty sites were selected to represent a range of percent urban cover. A normalized difference vegetation index (NDVI) was computed using a ratio of the difference between near infrared and red categories. Detritus samples were collected and the ash free dry mass (AFDM) was measured for each site. In the more urbanized sites, a loss of canopy leaves was observed. Also, when streams are urbanized, the vegetation tends to convert to hydrilla.

Trophic changes in focal streams were measured considering an attenuated seasonal response. They used reference streams, urbanized streams, and hydrilla-dominated streams to compare trophic levels.

The study also included measuring the functional feeding group richness. When streams are more urbanized, the “scraper” feeding guild is added. It was noted that the seasonality of the guilds is different. Changes in the guilds are important because invertebrates are an important food source for fishes. There are also implications for invertebrate predators.

The study analyzed stream function by looking at diurnal oxygen patterns for two focal streams. The first stream was an urban stream with a mostly intact riparian corridor and floodplain. The second stream was a hydrilla-dominated stream with an open canopy. A net heterotrophic stream microbial loop was observed as well as reduced carbon export.

John Hendrickson asked how respiration was measured. Mr. Dobberfuhl answered that it was done with the light/dark bottle method.

Litter processing rates were also analyzed to assess stream function. Breakdown rates for red maple and sweet gum were measured. It was observed that litter processing increases until about thirty percent total impervious area (PTIA) is reached and then the litter processing rate declines; this is a classic “subsidy-stress” response.

When downstream effects were observed, water quality parameters were significantly correlated with percent impervious surface. Mr. Dobberfuhl outlined those parameters that were positively and negatively correlated with impervious surface percent.

Benthic organic matter changes were also assessed. Benthic organic matter changed with PTIA with respect to both the amount and composition. Invertebrate guilds were representative of seasonality and changes in PTIA. It was observed that hydrilla is detrimental. Nutrients and metals do not show a consistent pattern with PTIA.

So, in trying to answer the original question, there isn't a clear answer, but this project indicated that at 50 percent urbanization you reach about 17 percent impervious surface. At (only) 50 percent urbanization, one generally observes a high percentage of parks/green areas, surface water, and intact riparian areas. When 70 percent urbanization is reached, the land use tends to be more high density residential, older subdivisions, commercial and industrial facilities, and maintained canals. Under the 70 percent urbanization level, degraded water quality is observed. So the study concludes that green areas are important to stream health.

Phase II of the project will include a study of the interface between the tributaries and the main stem. It will compute net organic export using the following data: Rate of ¹⁵N Uptake, Quantity, Form, and System Metabolism. It will evaluate the utilization of habitat by biota (e.g. fish,

invertebrates). The study will also include an analysis of nutrient uptake and ^{15}N cycling. The study will evaluate whether streams are net exporters or importers of organic matter.

After the presentation, there was a question and answer session and some of the discussion was as follows:

Dana Morton asked about what happened with nitrogen levels in the various types of streams.

Mr. Dobberfuhr answered that there was a negative correlation between total Kjeldahl nitrogen (TKN) and impervious surface, which was surprising. Some of the dissolved inorganic nitrogen (DIN) may be tied up in chlorophyll. Nitrogen levels are also sensitive to flow.

Mr. Morton asked what tributaries were included in the study sites.

Mr. Dobberfuhr responded that most were small, unnamed streams.

John Higman asked if the minerals were being changed too. Did the study look at conductivity? Is there a difference in the chemical interactions (e.g. aluminum) and is an ionic response possible?

Mr. Dobberfuhr responded that yes, it is very possible. Adsorption is a big factor in these streams.

Cindy Cosper asked if Mr. Dobberfuhr would be willing to present his results at a biocriteria meeting in Palatka being planned.

Mr. Dobberfuhr replied affirmatively.

John Hendrickson asked if the results show that modern development is better in general and if those results conflict with the idea that infilling old urban areas is good for the environment.

Mr. Dobberfuhr stated that there is the potential to investigate “smart growth” policies and to separate out the different types of land use.

Jennifer Sagan noted that after the *Pfisteria* outbreak in the Chesapeake, the surrounding states were buying buffer areas to abate the problem—was the recommended width of the buffer set by a scientific evaluation or a policy decision?

Mr. Dobberfuhr replied that they are trying to embark on a study with the University of North Florida (UNF) to look at riparian buffers in the Lower St Johns. Most of the buffer standards are not based on science. The study will look at the size, vegetative composition, and land use patterns related to buffers.

Tiffany Busby asked about how the study was designed.

Mr. Dobberfuhr noted that Art Benke helped design the study.

The final report for Phase I is now available. Each chapter is written as a stand alone scientific paper and several chapters have already been submitted to peer-reviewed journals.

Mr. Dobberfuhr agreed to provide copies of his PowerPoint presentation and final report for the TAC website.

Presentation: “Preliminary Results: DEP Status Network 2005 Random Sampling of Fresh Water Rivers in the Lower St Johns Basin”

Cindy Cosper outlined the 2005 Status Network sampling results for the freshwater rivers in the Lower St Johns River basin. The large rivers category includes the St. Johns and smaller rivers like Black Creek and Dunn’s Creek. The Status Network uses a randomized sampling approach of 30 sites per resource per basin. The Network sampling includes chemical and biological parameters. A stream condition index (SCI) was computed for some of the river sites. It is hard to use the SCI on large rivers; the SCI wasn’t designed to be used when the specific conductivity is over 600 umhos/cm.

The study measured the field parameters including the following: dissolved oxygen, pH, specific conductance, temperature, at 0.3 m below the surface (in the daytime) and at 0.1 meter off the bottom. Samples for lab analysis are taken at 0.3 meters from the surface. Bacteriological samples (fecal coliforms and Enterococci) are all qualified samples which exceed a 6 hour holding time. Ms. Cospers noted that one big Enterococci bacteria spike was observed in Dunn's Creek, but that is likely due to not being analyzed within 24 hours. The results from the Lower and Middle Basins will be compared. One comparison of specific conductance values was projected. Small streams in the Lower St Johns River (LSJR) and Middle St Johns River (MSJR) basins were also sampled in 2005.

A report on the results from the 2000-2003 SJRWMD Status Network data results is in the process of being written by Aisa Ceric in Environmental Sciences unit of St Johns River Water Management District (SJRWMD) as an SJRWMD 2006 publication. The DEP Watershed Monitoring unit is working on putting the full 2005 data set, including the SCIs, into STORET.

The habitat scores are looking good for the Lower Basin, but the SCI scores are not. It was noted that the Department is considering not using SCI scores for large rivers as there are issues with the applicability of the SCI. One issue is that the bugs may be absent or unreachable at the time of sampling when they are present at other times. Also, the random sample sites make bug collection less comparable to other best habitat studies. Overall the results for the Lower basin's freshwater river resource look good.

John Hendrickson asked about the map and what rivers were included.

Ms. Cospers described where the samples were taken (in the fresh portion of the St Johns River, in Black Creek, Dunn's Creek and one at the Barge Canal) and about the conductance issues being debated.

Mr. Hendrickson noted there were many stations and asked when the samples were taken.

Ms. Cospers responded that they were all taken between May and June 2005. Most of the Lower Basin samples were collected in May 2005.

Mr. Hendrickson asked when the next round of Lower Basin sampling will occur.

Ms. Cospers responded that there are five-year sampling rotations—they have five (5) years to collect data in the seven (7) basins within the Lower St Johns.

John Higman noted that most samples were collected at 0.3 m below the surface, but how does that correlated with the benthic community included in the SCI?

Ms. Cospers responded that field analytes are also collected at 0.10 m off the bottom.

Mr. Higman asked if the bottom samples had a better correlation with the benthic samples.

Ms. Cospers replied that most of the top and bottom conductance were pretty similar—there is more to the SCI issue than conductance. There may be other top/bottom issues.

Presentation: “Using Hyperspectral Imagery to Detect Submerged Aquatic Vegetation”

Courtney Hart outlined a new Water Management District effort to use hyperspectral imagery instead of aerial photos to detect submerged aquatic vegetation (SAV). Ms. Hart outlined the monitoring methods used. Historically, aerial photography was used that had the following limitations: 1) Time intensive; 2) Underestimates grassbeds; and 3) Difficulty distinguishing emergents, algae, and SAV. The advantage of aerial photography is that it can cover a large area but ground truthing is time-intensive.

Hyperspectral imagery collects image data on hundreds of adjacent bands. It gives high spectral resolution and includes more of the electromagnetic spectrum. This tool has the potential to distinguish algae, emergent vegetation, and SAV species.

The St Johns River Water Management District received imagery using compact airborne spectrographic imager (CASI) data. Sixty-seven images were taken on September 13-18, 2003. The images have two-meter spatial resolution using a swath width of 1,024 meters. In post processing, the images had radiometric correction, across track illumination correction, and geocorrection of the 2004 digital ortho quadrangles (DOQs). The data was reported in standard radiance units.

This pilot study looked for the presence/absence of SAV. They used a parent swath (29-2) and four secondary swaths to develop methodology to apply to the remaining 62 images.

The bands were set up as requested using 19 selected bands using variable bandwidths. Through the pilot study, they learned that smaller bandwidths would be more useful.

Image processing was performed that provided normalization and calibration. A classification process was used to give each pixel a class designation based on its value across 19 bands. Through the analysis process, one can choose between supervised or unsupervised classification.

A spectral angle mapper (SAM) is a presence/absence tool using spectral matching. It is a physically-based spectral classification that uses an n -dimensional angle to match pixels to reference spectra. It is insensitive to illumination and albedo effects. Smaller angles represent closer matches to the reference spectrum but it may leave unclassified pixels.

Ground truthing uses transect sites for classification and transect sites for quality assurance (QA). Regions of interest included polygons created from transects. Spectral signature curves were created by analyzing band numbers. There *is* a distinct signature between SAV and water. There is confusion between algae and SAV—they need to create a class for algae. Next time, they need to adjust the bandwidths and need to ground truth to get distinct signatures for SAV, emergents, algae and water.

Through this pilot study, they have created a spectral library from the classes created from the four images. The data issues identified in the pilot study include:

- 1) Poor spatial accuracy. Solution—use an inertial measurement unit (IMU) in the plane when the images are taken and use targets for ground control.
- 2) Classification accuracy. Solution—need additional ground truthing of other classes in the river such as algae, bare sand, muddy bottom and emergents.

Suggestions for the next round of images (that are scheduled for April 2006) include:

- 1) Better ground control for spatial accuracy;
- 2) Collect more band widths with narrower band widths; and
- 3) Better ground truthing.

After the presentation, there were questions and answers that included the following:

Jennifer Sagan asked if tannins can affect imagery.

Ms. Hart replied that they shouldn't effect the results, but it is hard to tell. They may not be able to apply their results to other river basins because of the color differences.

Lunch Break

[Editor's Note: Due to a family medical emergency, Mike Hartman was unable to attend this meeting to provide an update on Hogan Creek as indicated on the agenda. A written report is planned to the TAC in the near future.]

Presentation: "Tributary Assessment Team Update"

Tom Kallemeyn provided an update on the Tributary Assessment Team's efforts to address fecal coliform pollution in the Lower Basin tributaries. Mr. Kallemeyn noted that the team members include the City of Jacksonville (Environmental Quality Division as well as the Department of Public Works), Duval County Health Department, Florida Department of Environmental Protection and JEA. Their efforts to date include conducting seven (7) sampling events and developing a draft manual. Next steps include one additional sampling event, review of the draft manual, and an update. Also, a public meeting on the results will be held in June 2006. Mr. Kallemeyn reviewed the sample site locations and the problems within each creek. The next five (5) tributaries to be evaluated are slated to be: Hogan Creek, Miller Creek, Craig Creek, Deer Creek and Big Fishweir Creek. Sampling for these sites is set to start in March 2006. They will follow the lessons learned from the initial seven creeks. They will only be sampling fecal coliforms with no microbial source tracking, like the initial effort. They will pinpoint areas of concern and conduct abatement actions from there.

Future issues include several streams with high counts and no known source. These sites could have bacteria in the sediment, but the role of sediment sources is unknown.

Mr. Kallemeyn noted that most of the samples in the first round of tributaries analyzed exceed the State standard for fecal coliform bacteria (only 36 of 243 sites met the standard).

A question was asked about what to do about the unknown sources.

Mr. Kallemeyn replied that it is possible the soils are a source, but the team doesn't know.

A question was asked if well data was evaluated to see if bacteria levels are elevated.

Mr. Kallemeyn responded that the team is looking at some well data.

There was discussion about groundwater information.

Ed Cordova asked if there was a known success story where an urban area was able to clean up their bacteria problems.

Mr. Kallemeyn responded that the team's assessment is that a lot can be done but it is going to be very hard for these areas to meet the State standard for fecal coliforms of 400.

Presentation: "Dissolved Oxygen in the Freshwater Section/Technical Discussion on Whether an SSAC is Needed"

John Hendrickson changed the title from the agenda to focus on the *marine* section of the river. Mr. Hendrickson recapped the Lower St Johns River TMDL process to date and outlined the eutrophication response variables that were used for the TMDL. In the freshwater reach, they looked at chlorophyll-*a*; in the marine reach, they looked at hypoxia. He noted that in blackwater creeks in Florida, 25 percent of the time, those creeks do not meet the dissolved oxygen (DO) standard of 5 mg/L.

There occurs the classic salinity-density stratification. In the Georgia Bight, the marine waters tend to be well-mixed with a high tidal range and extensive tidal marsh systems. When the water comes out of the marsh with the tide, it is deoxygenated.

Mr. Hendrickson described the EPA study that applies to this situation called, “*Ambient Aquatic Life Water Quality Criteria for Dissolved Oxygen (Saltwater): Cape Cod to Cape Hatteras.*” The EPA study is the product of a 10-year research effort. It applied the approach established by EPA in 1985 using dissolved oxygen to derive numerical water quality standards for nutrients.

The approach utilizes persistent exposure criteria on oxygen-sensitive marine species looking at the following: 1) Juvenile and adult survival; 2) Growth rates; and 3) Larval development.

There was discussion of the analyses to look at these three criteria.

Using the exceedence events based on the EPA Saltwater study, a site specific alternative criterion (SSAC) for dissolved oxygen was developed for the Lower St Johns marine reach. Mr. Hendrickson noted that according to the Florida Administrative Code (FAC 62-302), a site specific alternative criterion applies when: 1) Natural conditions preclude attainment; 2) There is a human-induced non-abatable condition (e.g. a dredged channel); or 3) There is a less restrictive standard that is sufficient for native organisms survival and growth. The area of intended applicability for the Lower St Johns SSAC is the predominantly marine reach of the Lower St Johns.

Mr. Hendrickson outlined the growth reduction function developed by Dr. Brietberg and the life history data used for the study. The proposed SSAC increases the level of protection over the EPA guidance in three ways: 1) The threshold for assessing impact is raised from 4.64 mg/L (DO) to 5 mg/L; 2) The continuous sub-4.64 mg/L exposure was revised to an accumulated exposure; and 3) The minimum acute concentration was raised from 2.37 mg/L to 2.80 mg/L.

The proposed DO levels for the SSAC were sent to FDEP and the authors of the Virginia Province study are reviewing the proposal.

Dana Morton asked if the previous TMDL will meet this proposed SSAC.

Mr. Hendrickson responded that we don’t know—the model has not been run to analyze that. He noted that the SSAC was derived independently of the reduction targets.

There was general discussion about further refinements to the water quality model.

Bob Gamble asked if there was going to be a SSAC for the freshwater section.

Mr. Hendrickson replied that the State standard of 5 mg/L applies right now and we don’t foresee changing that.

Mr. Morton asked about the monitoring needs for the proposed SSAC—how would those DO levels be confirmed?

Mr. Hendrickson replied that monitoring will have to rise to the occasion.

John Higman asked about the number of invertebrates in the DO study.

Mr. Hendrickson responded that there were lots of invertebrates and zooplankton included in the study (e.g. shrimp and blue crab, among others).

Someone asked if the American shad was in there.

Russ Brodie replied that they are finding shad upstream—the counts are included in the report to the Water Management District.

Mr. Hendrickson added that the American shad was not on the species list for the Virginia Province study.

Mr. Higman noted that they seem to be vulnerable in fish kills.

Mr. Brodie responded that they shouldn’t be particularly vulnerable—they are a mostly freshwater fish and they don’t stay for long periods of time in marine waters.

Technical Updates and Announcements

Lower St Johns TMDL Update

Jim Maher noted that EPA had rescinded the adopted TMDL. A new EPA-developed TMDL was put into place on January 23, 2006 with an allocation. The EPA allocation was based upon the draft allocation that the Executive Committee/Stakeholders were working on, with a few adjustments. The site specific alternative criterion (SSAC) process for dissolved oxygen in the marine section is underway and the Department is trying to be ready for the March ERP meeting. The SSAC, if approved, would then have to be approved by EPA. If the SSAC is adopted, then a new Florida-developed TMDL could be proposed, but it is unknown how different that would be from the previous TMDL.

Don Loop asked about the timeline for the process.

Mr. Maher replied that the Department expects, optimistically, to approve the SSAC and have new model runs over the summer. So in the fall, perhaps a new Florida TMDL and BMAP could be adopted.

Mr. Cordova noted that those timelines don't include time for legal challenges, if they occur.

Tiffany Busby noted that the next TMDL Executive/Stakeholders meeting is on March 9th.

Legislative Funding Update

Kraig McLane gave a report on the special legislative initiative status. He noted the legislative process is using the value analysis and they are applying aggressively for wastewater treatment plant upgrade funding. The District has raised the funding request from \$10 million to \$20 million. The request includes approximately \$15 million for wastewater upgrades and \$5 million for the tributary assessment team (TAT) work and other projects. Partnerships have been formed to promote the package with the Legislature. The Jacksonville Mayor's office is putting together a platform and a legislative meeting was held on February 1st to coordinate efforts. A briefing document is available that can be sent to the TAC members via e-mail. The bill sponsors are Sen. King and Rep. Pickens.

Wastewater Treatment Plant Value Analysis and Optimization Update

Kraig McLane reported that the Water Management District's contractors completed the value analysis in the fall. Now, they are working on optimizing the projects along with all the nonpoint source projects. The results will be presented at the March 9th TMDL meeting.

Fisheries Data Collection Update

Russ Brodie reported that they are working on the grant-funded project to look at low dissolved oxygen events. The project is getting more and more interest from researchers and management within FMRI.

Someone asked Mr. Brodie his opinion on the most sensitive fish in the Lower Basin.

Mr. Brodie responded that the forage fish guild is the key part of the food chain.

St Johns River Alliance Update

mindy matthews reminded the TAC members that the Jacksonville Zoo event will be held on February 25th from 4 to 7 pm. There will be food, live music and it will be a fund raiser for the Alliance. Don Loop added that the Alliance is a significant organization because for years we talked about the need to have an organization encompass the entire St Johns River and now we finally have that. There are representatives on the Board from all the counties along the river. Part of the funding raised from this event will go towards the restoration of Hogan Creek.

Ms. Matthews noted the next Board of Directors meeting will be held in Sanford on March 24th from 10 am to 2 pm. The agenda will include a summary of all three zoo events. She also noted that the Alliance has a friends program with a \$25 membership fee.

Next Meeting Date

Tiffany Busby noted that the next meeting should be held in May or June and asked about potential conflicts with other meetings or conferences. TAC members offered the following dates to *avoid*:

May 15-17: SLRP Camp/Training

May 10-11: FDEP-NED Retreat

June 14-16: Stormwater Association Meeting, Sanibel/Fort Myers

1st week of June: Lake Management Society meeting, St Augustine

Last week in March: SEERs Meeting, GTMNERR/Ponte Vedre

The St Johns River Water Management District will be the host for the Spring meeting. Kraig McLane noted that he would like to hold the meeting in St Johns County.

Kraig McLane and Tiffany Busby thanked Dan Littles for hosting the meeting and providing the facilities for the group.

Adjournment

Dan Littles adjourned the meeting at approximately 2:20 pm.

Meeting summary prepared by Tiffany Busby. Please send comments to busbytl@bellsouth.net or call 904-797-2721.