

Data Inventory - Santa Fe River Watershed

[Dec 1, 2007]

Project: Geo-Temporal Estimation and Visualization of Soil Properties in a Mixed-Use Watershed

Principal Investigator: S. Grunwald

Co-Principal Investigators: N.B. Comerford, D.A. Graetz and M.W. Clark

Post-Docs: C.M. Bliss and G.L. Bruland

Graduate Students: A. Sabesan and S. Lamsal

Collaborator: R. Srinivasan (Texas A&M)

Funding source: United States Department of Agriculture (USDA) Nutrient Science for Improved Watershed Management Program (Grant # 2002-00501) [9/2002 - 9/2006].

Project: Linking Experimental and Soil Spectral Sensing for Prediction of Soil Carbon Pools and Carbon Sequestration at the Landscape Scale

Principal Investigator: S. Grunwald

Co-Principal Investigator: J.O. Sickman

Graduate Students: G.M. Vasques and X. Chunhao

Undergraduate Student: N. DiGruttolo

Funding source: Natural Resources Conservation Service (NRCS) - Cooperative Ecosystem Study Unit (CESU) [9/2005 to 9/2006] (Grant: 68-3A75-4-73, Mod. 1; Phase 1)

Project: Linking Experimental and Soil Spectral Sensing for Prediction of Microbial Bioavailability of Organic C, N and P in Soils at the Landscape Scale

Principal Investigator: S. Grunwald

Co-Principal Investigator: N.B. Comerford and J.O. Sickman

Post-Doc: Mi-youn Ahn

Graduate Student: G.M. Vasques

Funding source: Natural Resources Conservation Service (NRCS) - Cooperative Ecosystem Study Unit (CESU) (Grant: 68-3A75-4-73, Mod. 2; Phase 2)

Field and soil data collection: Forest Soils Laboratory and Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida

Geospatial modeling and spectroscopy: GIS Research Laboratory, Soil and Water Science Department, University of Florida

The metadata described in this document match the following associated data files:

SantaFe_Data_Inventory.xls

There are several worksheets:

- *Lab 0-30 cm:* Site ID, geographic data, soil laboratory data pertaining to lab analysis done on 0-30 cm soil samples.
- *Lab 30-60 cm:* Site ID, geographic data, soil laboratory data pertaining to lab analysis done on 30-60 cm soil samples.

- *Lab 60-120 cm*: Site ID, geographic data, soil laboratory data pertaining to lab analysis done on 60-120 cm soil samples.
- *Lab 120-180 cm*: Site ID, geographic data, soil laboratory data pertaining to lab analysis done on 120-180 cm soil samples.
- *Lab 0-10cm*: Site ID, geographic data, soil laboratory data pertaining to lab analysis done on 0-10 cm soil samples.
- *Lab profile data*: Site ID, geographic data, soil laboratory data calculated along the soil profile.
- *Land use field data*: Site ID, geographic data, land use mapped in the field at various time periods.
- *Soil field data*: Site ID, geographic data, soils mapped in the field.

Notes:

Site was renamed from "2081" to "3000" later on in the project. Site 2081 and 3000 are identical. The original coordinates are 30°03'07.97"N and 82°10'24.81"W (or 30.052225 and -82.173575); land use: improved pasture.

Sites 92 and 2041 are outside the watershed; but some soil properties are available for those sites and included in the data inventory.

Table 1. Geographic data - sites mapped within the Santa Fe River Watershed.

Variable names	Descriptions
SiteID	Site identification number (ID)
IDmod_pine	<p>Site ID modifier - indicating a mature pine stand.</p> <p>Rationale: Sites that were "pine regeneration" indicated by the SiteID were selected and a mature stand near the respective pine regeneration site selected to provide a chronosequence from mature plantation to harvested plantation to regeneration plantation.</p> <p>e.g. SiteID = 39 (representing a pine regeneration site) AND IDmod_pine = 1 (indicating a mature stand near the #39 pine regeneration site)</p> <p>SiteID = 39 (representing a pine regeneration site) AND IDmod_pine = 0 (indicating that this site is a pine regeneration site)</p>
IDmod_year	Site ID modifier - indicating "plus one year where the pine regeneration site was sampled the following year in order to develop the chronosequence"

	e.g. SiteID = 39 (representing a pine regeneration site) AND IDmod_year = 1 ("plus one year")
Latitude	latitude (degrees)
Longitude	longitude (degrees)
X_Coord	x-coordinate (easting) in Albers Equal Area Conic project (m)
Y_Coord	y-coordinate (northing) in Albers Equal Area Conic project (m)

Map projection parameters:

Albers Conical Equal Area
Projection: Albers
False_Easting: 400000.00000000
False_Northing: 0.00000000
Central_Meridian: -84.00000000
Standard_Parallel_1: 24.00000000
Standard_Parallel_2: 31.50000000
Central_Parallel: 24.00000000
Linear Unit: Meter (1.000000)
Geographic Coordinate System:
GCS_North_American_1983_HARN
Datum: D_North_American_1983_HARN
Prime Meridian: 0

Table 2. Overview soil laboratory data - Santa Fe River Watershed (alphabetical order; only main properties are listed; calculated properties are in Table 3).

Properties	Time	Sites (n)	Depth (cm)				
			0-10	0-30	30-60	60-120	120-180
% C, N and P in different size fraction	Jan. 2004 and May 2005	172 (142)	x				
BD	Reconstructed from FL Soil Char. Data		x	x	x	x	x
DWTC100; DWTN100; TC100; TN100	Calculated	141	Depth-weighted avg. TC and TN down to 100 cm				
DWTC180; DWTN180; TC100; TN100	Calculated	141	Depth-weighted avg. TC and TN down to 180 cm				
HC	Sept. 2003; Jan 2004; May 2004	141		x			
HC_Perc	Sept. 2003; Jan 2004; May 2004	141		x			
HN	Sept. 2003; Jan 2004; May 2004	141		x			
HN_Perc	Sept. 2003; Jan 2004; May 2004	141		x			
MinC_8 to MinC_36	?	140		x			
MinC%_8 to MinC%_36	?	140		x			
MinCavg_8 to MinCavg_36	?	140		x			
NH4min0 to NH4min29	mainly 2005	141		x			
Nmin0 to Nmin29	mainly 2005	141		x			
NO3min0 to NO3min29	mainly 2005	141		x			
NO3-N (6 times)	Sept. 2003; Jan 2004; May 2004; Jan 2005; May 2005; Sept. 2005	141		x	x	x	x
OM	?	141		x (141)	x (141)	x (135)	x (123)
P	May 2005	143		x	x	x	x
pH	?	142		x (141)	x (142)	x (138)	x (128)
Pmin0 to	mainly 2005	141		x			

Pmin29							
RC	Sept. 2003; Jan 2004; May 2004	141		x			
TC	Sept. 2003; Jan 2004; May 2004	141		x (141)	x (141)	x (139)	x (133)
TCA		141		x (141)			
Texture (sand, silt, clay)	?	141		x (141)	x (141)	x (135)	x (123)
TN	Sept. 2003; Jan 2004; May 2004	141		x (141)	x (141)	x (139)	x (133)
TOC07	Sept. 2003; Jan 2004; May 2004	141		x			
TOC02	Sept. 2003; Jan 2004; May 2004	141		x			
TOC	?	140		x			
VNIR	Sept. 2003; Jan 2004; May 2004	141		x (141)	x (141)	x (139)	x (133)

Table 3. Soil laboratory data: variable names, description and units - Santa Fe River Watershed.

Missing values are encoded: blank fields

Below detection limit data are encoded: BDL

The following layer designations are used:

- L1: Layer 1 = 0-30 cm
- L2: Layer 2 = 30-60 cm
- L3: Layer 3 = 60-120 cm
- L4: Layer 4 = 120-180 cm
- L10: Layer top = 0-10 cm
- L100: Layer 0-100 cm
- L180: Layer 0-180 cm

e.g.

- L1_BD: bulk density in layer 1 (0-30 cm)
- L4_TC: total carbon in layer 4 (120-180 cm)
- L100_TC: total carbon layer 0-100 cm

Variable names	Descriptions
BD	Bulk density (g cm ⁻³)
[L1, L2, L3,L4]	<p>Reconstructed bulk densities from the Florida Soil Characterization Dataset (FSCD) for four soil layers: 0-30, 30-60, 60-120, and 120-180 cm.</p> <p><u>Method:</u></p> <ol style="list-style-type: none"> a. For each sampling site in the Santa Fe River Watershed (SFRW) the Soil Series classified in the field by Wade Hurt (compare Table 5) were identified. b. Some sites had to be reclassified to match "old Soil Series" classifications (according to suggestions by Wade Hurt). c. Soil Series found in the SFRW were matched with those in FSCD. d. In the FSCD, BD values were measured at each soil horizon, with variable depths. Only those horizons with 3 valid replicate measurements of BD were used. e. A soil profile reconstruction technique was used to recalculate BD values within the depth ranges that were measured in SFRW, i.e. 0-30, 30-60, 60-120, and 120-180 cm. f. Depth-weighted averages were obtained for each measured profile in the FSCD. <p>Detailed calculation can be accessed at: G:\Santa_Fe_USDA\SantaFeDatabase\Watershed_data\Env_Ancillary_Data_New_05-07\Supporting_data\Calculation_Depth-Weighted_BD_&_OC_From_FL_Characterization.xls</p> <p>Bulk densities were derived by Gustavo M. Vasques (GIS Research Laboratory, Soil and Water Science Department, University of Florida - S. Grunwald).</p>
C60	% total carbon in size fraction 2000 to 250 microns

<p>[L10]</p>	<p>Soil samples from 0 to 10 cm depth; collected on January 2004 and May 2005.</p> <p>Size Fractionation.- Soil samples were sieved by shaking 25 g of air-dried soil through stacked 8 cm diameter sieves on an automatic shaker for 30 minutes. Each soil sample was separated into four soil size fractions: 2000 to 250µm, 250 to 150µm, 150 to 45µm and < 45µm. The reason for dry sieving was to maintain the aggregated nature of the sample that can be destroyed by wet sieving. Sieving time was determined in a preliminary study where five soils representing different land uses were shaken for five minute intervals, starting at 15 minutes and up to 1 hour. No significant differences in the <45µm fraction weights were found beyond 30 minutes of shaking time. Each size fraction was weighed and expressed as a percentage of the whole soil dry weight.</p> <p>Total carbon was analyzed using a Carlo-Erba CN Analyzer (CE Instruments, model NCS-2500) using a 15 to 25 mg subsample of the size fraction ground to a fine powder with zirconium beads.</p> <p>Data generated by Dr. Christine Bliss and the Forest Soils Lab under the direction of Dr. Nick Comerford. Laboratory personnel involved in analyses were Aja Stoppe, Adriana Comerford, and Shinjiro Sato.</p>
<p>C100</p> <p>[L10]</p>	<p>% total carbon in size fraction 250 to 150 microns</p> <p>Details: Compare variable "C60"</p>
<p>C325</p> <p>[L10]</p>	<p>% total C in size fraction 150 to 45 microns</p> <p>Details: Compare variable "C60"</p>
<p>Cclay</p> <p>[L10]</p>	<p>% total C in size fraction < 45 microns</p> <p>Details: Compare variable "C60"</p>
<p>Clay</p> <p>[L1, L2, L3, L4]</p>	<p>Soil texture: clay (%)</p> <p>Measured in four soil layers: 0-30, 30-60, 60-120, and 120-180 cm.</p> <p>Soil samples were collected from 141 sampling locations (across the Santa Fe River Watershed) at four depth increments (0-30, 30-60, 60-120 and 120-180 cm). The samples were air-dried, store in plastic containers, and then analyzed for texture. The Pipette method (Kilmer and Alexander, 1949) was used to derive soil texture. After textural analysis was done, the initial weight of the soil sample used for texture analysis was adjusted by the organic matter content computed by the method of Loss on Ignition (Nelson and Sommers, 1982).</p> <p>Texture analysis was done with 50 g soil samples. Prior to texture analysis, the organic matter content was removed by heating with peroxide. The weight of the sample taken for analysis was later adjusted by deducting the organic matter content of the sample.</p> <p>For loss on ignition (LOI), 10 g soil samples were taken, over dried overnight (105 degree C) to remove moisture, then ignited for 1 hour at 200 degree C followed by 6 hours at 550 degree C.</p> <p>Sand, silt and clay contents are expressed as %.</p>

	<p>References:</p> <p>Kilmer, V. J, and L. T. Alexander. 1949. Methods of making analysis of soils. Soil Science 68: 15-24.</p> <p>Nelson, D. W., and L. E. Sommers. 1982. Total carbon, organic carbon and organic matter. In A. L. Page, R. H. Miller, and D. R. Keeney (eds.) Methods of soil analysis. Part 2, 2nd ed. Agronomy Monograph. 9. ASA and SSSA, Madison, WI.</p> <p>Analysis was conducted by Sanjay Lamsal in the Environmental Pedology Laboratory, Soil and Water Science Department, University of Florida (W.G. Harris).</p>
<p>HC</p> <p>[L1]</p>	<p>Hydrolyzable carbon (mg kg^{-1})</p> <p>L1: 0-30 cm depth.</p> <p>Hydrolyzable carbon in soils was measured after digestion with 6N HCl following methods of McLauchlan and Hobbie (2004).</p> <p>McLauchlan, K.K. and Hobbie, S.E. 2004. Comparison of labile organic matter fractionation techniques. Soil Sci. Soc. Am. J. 68:1616-1625.</p> <p>Details:</p> <p>1.1 Hydrolyzing soluble soil organic carbon (SOC) with acid:</p> <ol style="list-style-type: none"> Digest with 6 M HCl for 16 hr (e.g. 1 g soil and 10 ml HCl (Mclauchlan and Hobbie, 2004)) Isolate the residue (recalcitrant SOC pool) and hydrolysable fraction (slow and labile SOC pools); wash the residue, then measure TC, TN of the residue and the DOC of hydrolysable fraction is calculated by the difference of TC between bulk soil and the residue. <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>HC_m2</p> <p>[L1]</p>	<p>Hydrolyzable carbon (kg m^{-2})</p> <p>Areal soil hydrolysable carbon content in depth 1, i.e. from 0 to 30 cm.</p> <p>Calculated measure: HC (mg kg^{-1}) and BD (g cm^{-3}) in 0-30 cm depth.</p> <p>Calculations by Gustavo M. Vasques (GIS Research Laboratory, Soil and Water Science Department, University of Florida - S. Grunwald).</p>
<p>HC_Perc</p> <p>[L1]</p>	<p>Hydrolyzable carbon (%)</p> <p>L1: 0-30 cm depth.</p> <p>Hydrolyzable carbon in percent of total carbon.</p> <p>Calculations:</p> <p>$\text{HC_Perc} = (\%C \text{ in unacidified soil} - \%C \text{ after acid treatment}) / (\%C \text{ in unacidified soil})$</p> <p>Details: Compare variable "HC"</p>

	<p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>HN</p> <p>[L1]</p>	<p>Hydrolyzable nitrogen (mg kg⁻¹)</p> <p>L1: 0-30 cm depth.</p> <p>Hydrolyzable nitrogen in soils was measured after digestion with 6N HCl following methods of McLauchlan and Hobbie (2004).</p> <p>McLauchlan, K.K. and Hobbie, S.E. 2004. Comparison of labile organic matter fractionation techniques. Soil Sci. Soc. Am. J. 68:1616-1625.</p> <p>Details: Compare lab methods variable "HC".</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>HN_Perc</p> <p>[L1]</p>	<p>Hydrolyzable nitrogen (%)</p> <p>L1: 0-30 cm depth.</p> <p>Hydrolyzable nitrogen in percent of total nitrogen.</p> <p>Calculations: $\text{HN_Perc} = (\%N \text{ in unacidified soil} - \%N \text{ after acid treatment}) / (\%N \text{ in unacidified soil})$</p> <p>Details: Compare variable "HN"</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>MinC8</p> <p>[L1]</p>	<p>Total cumulative carbon mineralized (µg/g) at 8 days of incubation.</p> <p>Carbon Mineralization Experiment Method: Soil samples were collected from top 0-30 cm at 140 sites, and they were air dried and passed through a 2 mm sieve. Before incubation, 1 g soils were wetted in 100% of water holding capacity in 12-mL Borosilica vials. For the first 5 days, samples were pre-incubated in the open system at 35°C incubator in the dark. The amount of water lost, during the pre-incubation, was daily added into soil samples. After the pre-incubation, samples and blank vials were filled with CO₂ free-air, sealed with rubber septa, and incubated for 3 days before the first CO₂ concentration measurement following by CO₂ measurements at weekly intervals for a period of 36 days (8, 15, 22, 29, and 36 day). The samples were prepared in duplicates (set 1 and 2).</p> <p>Analytical methods: The CO₂ concentration in the headspace was measured using a CO₂ - Coulometer (UIC Inc., Joliet, IL) with CO₂ free-air as a purge and carrier gas (sample running time-5 min; purge time-5 sec). The detection limit was 0.1 µg of C, and each vial was refilled automatically with CO₂ free-air after the measurement.</p> <p>Analysis was conducted in the Geology Department, University of Florida (Mi-youn Ahn & N.B. Comerford)</p>
<p>MinC15</p>	<p>Total cumulative carbon mineralized (µg/g) at 15 days of incubation.</p>

[L1]	Details: Compare lab method MinC8
MinC22 [L1]	Total cumulative carbon mineralized ($\mu\text{g/g}$) at 22 days of incubation. Details: Compare lab method MinC8
MinC29 [L1]	Total cumulative carbon mineralized ($\mu\text{g/g}$) at 29 days of incubation. Details: Compare lab method MinC8
MinC36 [L1]	Total cumulative carbon mineralized ($\mu\text{g/g}$) at 36 days of incubation. Details: Compare lab method MinC8
MinCm8 [L1]	Average incremental carbon mineralized ($\mu\text{g/g}$) between day 0 and day 8 of incubation. Calculation: 2 sets of measurements were averaged. Details: Compare lab method MinC8.
MinCm15 [L1]	Average incremental carbon mineralized ($\mu\text{g/g}$) between day 8 and day 15 of incubation. Calculation: 2 sets of measurements were averaged. Details: Compare lab method MinC8.
MinCm22 [L1]	Average incremental carbon mineralized ($\mu\text{g/g}$) between day 15 and day 22 of incubation. Calculation: 2 sets of measurements were averaged. Details: Compare lab method MinC8.
MinCm29 [L1]	Average incremental carbon mineralized ($\mu\text{g/g}$) between day 22 and day 29 of incubation. Calculation: 2 sets of measurements were averaged. Details: Compare lab method MinC8.
MinCm36 [L1]	Average incremental carbon mineralized ($\mu\text{g/g}$) between day 29 and day 36 of incubation. Calculation: 2 sets of measurements were averaged. Details: Compare lab method MinC8.

MinC_Perc8 [L1]	Total carbon mineralized after 8 days as percent from total carbon content in soil sample (%) {Calculated as following: Accumulated C in ug (after day x) /C content in ug)*100} Details: Compare lab method MinC8 Analysis was conducted in the Geology Department, University of Florida (Mi-youn Ahn & N.B. Comerford)
MinC_Perc15 [L1]	Total carbon mineralized after 15 days as percent from total carbon content in soil sample (%) Details: Compare lab method MinC8
MinC_Perc22 [L1]	Total carbon mineralized after 22 days as percent from total carbon content in soil sample (%) Details: Compare lab method MinC8
MinC_Perc29 [L1]	Total carbon mineralized after 29 days as percent from total carbon content in soil sample (%) Details: Compare lab method MinC8
MinC_Perc36 [L1]	Total carbon mineralized after 36 days as percent from total carbon content in soil sample (%) Details: Compare lab method MinC8
MinC_m2 [L1]	Areal content of soil mineralizable carbon in layer 1, measured at constant rate from day 15 until day 29 of incubation (kg/m ²) Details: Compare lab method MinC8
MinC_m2d [L1]	Areal mineralization rate of carbon in layer 1, measured from day 15 until day 29 of incubation (kg/m²/day) Details: Compare lab method MinC8
N60 [L10]	% total nitrogen in size fraction 2000 to 250 microns Soil samples from 0 to 10 cm depth; collected on January 2004 and May 2005. Size Fractionation_- Soil samples were sieved by shaking 25 g of air-dried soil through stacked 8 cm diameter sieves on an automatic shaker for 30 minutes. Each soil sample was separated into four soil size fractions: 2000 to 250µm, 250 to 150µm, 150 to 45µm and < 45µm . The reason for dry sieving was to maintain the aggregated nature of the sample that can be destroyed by wet sieving. Sieving time was determined in a preliminary study where

	<p>five soils representing different land uses were shaken for five minute intervals, starting at 15 minutes and up to 1 hour. No significant differences in the <45µm fraction weights were found beyond 30 minutes of shaking time. Each size fraction was weighed and expressed as a percentage of the whole soil dry weight.</p> <p><u>Total nitrogen</u> was analyzed using a Carlo-Erba CN Analyzer (CE Instruments, model NCS-2500) using a 15 to 25 mg subsample of the size fraction ground to a fine powder with zirconium beads.</p> <p>Data generated by Dr. Christine Bliss and the Forest Soils Lab under the direction of Dr. Nick Comerford. Laboratory personnel involved in analyses were Aja Stoppe, Adriana Comerford, and Shinjiro Sato.</p>
N100 [L10]	<p>% total nitrogen in size fraction 250 to 150 microns</p> <p>Details: Compare variable "N60"</p>
N325 [L10]	<p>% total nitrogen in size fraction 150 to 45 microns</p> <p>Details: Compare variable "N60"</p>
Nci [L1]	<p>Inorganic nitrogen in the cold TCA extract (ug N per g soil)</p> <p>L1: 0-30 cm depth.</p> <p>Samples dates are mixed in order to have a complete set of soil samples.</p> <p><u>TCA Fractionation for Mineral Soil</u></p> <p><u>Chemical and Reagent list:</u> TCA (Trichloroacetic Acid) CCl_3COOH Formula Wt. is 163.39 0.30M TCA = $163.39\text{g/mol} \times 0.3\text{mol/L} = 49.017\text{g/L}$ 0.15 M TCA = $163.39\text{g/mol} \times 0.15 \text{mol/L} = 24.5085\text{g/L}$ 2 M KCl Formula Wt. is 74.56 2M KCl = $74.56 \times 2 = 149.12\text{g/L}$ 18 M H_2SO_4 H_2O_2 Reagent B</p> <p><u>Procedure:</u> Mineral soil sieved was to <2mm and stored air dried. There was a cold TCA extraction, then a hot TCA extraction with a H_2SO_4 digestion on both cold and hot extractions to determine total nutrient.</p> <p>1. <u>Cold Extraction, 4°C:</u> The 4°C temperature is maintained as long as a mixture of ice and water is present in the bath. Five g of air dry soil was placed in a 50 mL centrifuge tube. Ten mL of 0.30M TCA was placed into the centrifuge tube. The tubes were kept at 4°C in an ice bath and shaken by hand, 10 shakes fore each tube every 10 min for 1 hour. Samples were cleared by centrifugation at 3000 rpms for 10 minutes. The supernatant was removed by suction (a 5 mL pipette) into a 25 mL volumetric. The volume removed was recorded. The residue was washed in the 50 mL tube with 10 mL of 0.30M TCA. The sample was centrifuged again and added it to the first extract in the 25 mL volumetric, this was also recorded. The volumetric was brought to volume (25 mL) with DDI water and the supernatant filtered with Watman 42 filter paper into a glass vial. The solutions were</p>

	<p>analyzed for Inorganic P and Ammonium. 10 mLs of extract and 2 mL of 2 M KCl were pipetted into 50 mL glass digestion tubes and dried at 100°C. The tubes were digested at 340°C with 2 mLs of 18 M H₂SO₄ for 30 min. The TP and TN in these samples was analyzed.</p> <p>2. <u>Hot Extraction, 90°C</u>: The residue was extracted with 10 mL of 0.15 M TCA in a 90°C water bath for one hour. Samples were cleared by centrifugation at 3000rpms for 10 min. The supernatant was removed by suction as before and the residue was washed with 10 mL of 0.15 M TCA. It was centrifuged again and the subsequent supernatant was added to the first extract. Samples were brought to volume (25 mL). The extract was analyzed inorganic P and N, TP and TN as mentioned above.</p> <p>TCA Extraction Technique: An adaptation of the method of Chapin and Kedrowski. 1983. Seasonal changes in N and P fractions and autumn retranslocation in evergreen and deciduous taiga trees. Ecology 64: 376-391. The adaptation was published in Polglase et al. 1992. P, N and C fractions in litter and soil of southern pine plantations. Soil Sci Soc Am. J 56:566-572.</p> <p>Analysis was conducted in the Soil and Water Science Department, University of Florida (N.B. Comerford and A. Stoppe)</p>
Nclay [L10]	<p>% total N in size fraction < 45 microns</p> <p>Details: Compare variable "N60"</p>
Nco [L1]	<p>Organic nitrogen in the cold TCA extract (ug N per g soil)</p> <p>Details: Compare variable "Nci"</p>
Ncht [L1]	<p>Total nitrogen in the cold and hot TCA extract (ug N per g soil)</p> <p>Details: Compare variable "Nci"</p> <p>Calculation: Ncht = Nct + Nht</p>
Nct [L1]	<p>Total nitrogen in the cold TCA extract (ug N per g soil)</p> <p>Details: Compare variable "Nci"</p>
Nhi [L1]	<p>Inorganic nitrogen in the hot TCA extract (ug N per g soil)</p> <p>Details: Compare variable "Nci"</p>
Nho [L1]	<p>Organic nitrogen in the hot TCA extract (ug N per g soil)</p> <p>Details: Compare variable "Nci"</p>
Nht	<p>Total nitrogen in the hot TCA extract (ug N per g soil)</p> <p>Details: Compare variable "Nci"</p>

[L1]	
<p>NH4min0</p> <p>[L1]</p>	<p>Initial extractable nitrogen at day 0 (ug N/g whole soil)</p> <p>0-30 cm soil depth.</p> <p><u>Collection:</u> 144 soil samples from the Santa Fe watershed were sampled, air dried and stored in plastic containers. The samples come mostly from the September 2005 sampling but other sampling dates were used when sufficient soil was not available. The analyses on these samples were accomplished with 20% duplication.</p> <p><u>Measurement of ammonium concentrations:</u> Measurements were made colorimetrically from extracts of the soil. The initial measurement was made on air dry soil before wetting. Five g of air dry soil were placed in a wide mouth plastic bottle, extracted with 20 mL of 3 mM Oxalate, shaken for 10 minutes and centrifuged for 10 min at 2500 rpm. Initial studies showed that this low level ionic strength solution gave the same extractable N results as 1M KCH₃COO (data not shown). The samples were filtered through Whatman 42 filter paper (or some equivalent of this, such as Fisher Brand P2). For samples with high amounts of colloidal material that did not filter to an acceptable clarity, concentrated 0.1 ml KCH₃COO was added before centrifugation and they were filtered with 45 micron filter paper membranes. Concentrations of 5 solutes (NH₄⁺, P, TP, TN and NO₃⁻) were measured on this single 3 mM Oxalate extraction. For each test, blanks, solution replications and spikes were included in the analysis. Ammonium (after a H₂SO₄ digestion) was measured by the Indophenol Blue method (Keeney and Nelson, 1982)</p> <p>Reference: Keeney, D.R., and D. W. Nelson. 1982. Nitrogen – inorganic forms. In A.L. Page, R.H. Miller and D.R. Keeney (eds.) Methods of Soil Analysis – Part 2. American Society of Agronomy Inc., Soil Science Society of America Inc., Madison, WI.</p> <p><u>Bringing the air dried soil to Field Capacity:</u> A relationship was calculated from characterization data for predicting field capacity by relating it to the organic matter and clay content of the soils. Organic matter and clay was measured in the samples and the relationship was applied to these soils. Sufficient water was added to bring the soil to the gravimetric water content representing field capacity.</p> <p><u>Incubation - Preconditioning and Mineralization:</u> The soil samples were brought to Field Capacity in a 120 ml polyethylene bottle and put into an incubator at 35°C. On days 0, 8, 15, 22, 29. Ammonium concentrations were measured as indicated above. The moisture level was maintained and adjusted by a weekly analysis of the soil moisture content in the incubation bottle.</p> <p>Analysis was conducted in the Forest Soils Laboratory, Soil and Water Science Department, University of Florida (N.B. Comerford, A. Stoppe and A. Comerford)</p>
<p>NH4min8</p> <p>[L1]</p>	<p>Extractable nitrogen at day 8 (ug N/g whole soil)</p> <p>Details: Compare variable "NH4min0"</p>
<p>NH4min15</p> <p>[L1]</p>	<p>Extractable nitrogen at day 15 (ug N/g whole soil)</p> <p>Details: Compare variable "NH4min0"</p>

NH4min22 [L1]	Extractable nitrogen at day 22 (ug N/g whole soil) Details: Compare variable "NH4min0"
NH4min29 [L1]	Extractable nitrogen at day 29 (ug N/g whole soil) Details: Compare variable "NH4min0"
Nmin0 [L1]	<p>Initial extractable nitrogen at day 0 (ug N/g whole soil)</p> <p>0-30 cm soil depth.</p> <p><u>Collection:</u> 144 soil samples from the Santa Fe watershed were sampled, air dried and stored in plastic containers. The samples come mostly from the September 2005 sampling but other sampling dates were used when sufficient soil was not available. The analyses on these samples were accomplished with 20% duplication.</p> <p><u>Measurement of Total N concentrations:</u> Measurements were made colorimetrically from extracts of the soil. The initial measurement was made on air dry soil before wetting. Five g of air dry soil were placed in a wide mouth plastic bottle, extracted with 20 mL of 3 mM Oxalate, shaken for 10 minutes and centrifuged for 10 min at 2500 rpm. Initial studies showed that this low level ionic strength solution gave the same extractable N results as 1M KCH₃COO (data not shown). The samples were filtered through Whatman 42 filter paper (or some equivalent of this, such as Fisher Brand P2). For samples with high amounts of colloidal material that did not filter to an acceptable clarity, concentrated 0.1 ml KCH₃COO was added before centrifugation and they were filtered with 45 micron filter paper membranes. Concentrations of 5 solutes (NH₄⁺, P, TP, TN and NO₃⁻) were measured on this single 3 mM Oxalate extraction. For each test, blanks, solution replications and spikes were included in the analysis. Total N (after a H₂SO₄ digestion) was measured by the Indophenol Blue method (Keeney and Nelson, 1982)</p> <p>Reference: Keeney, D.R., and D. W. Nelson. 1982. Nitrogen – inorganic forms. In A.L. Page, R.H. Miller and D.R. Keeney (eds.) Methods of Soil Analysis – Part 2. American Society of Agronomy Inc., Soil Science Society of America Inc., Madison, WI.</p> <p><u>Bringing the air dried soil to Field Capacity:</u> A relationship was calculated from characterization data for predicting field capacity by relating it to the organic matter and clay content of the soils. Organic matter and clay was measured in the samples and the relationship was applied to these soils. Sufficient water was added to bring the soil to the gravimetric water content representing field capacity.</p> <p><u>Incubation - Preconditioning and Mineralization:</u> The soil samples were brought to Field Capacity in a 120 ml polyethylene bottle and put into an incubator at 35°C. On days 0, 8, 15, 22, 29. Total N concentrations were measured as indicated above. The moisture level was maintained and adjusted by a weekly analysis of the soil moisture content in the incubation bottle.</p> <p>Disclaimer: Aerobic digestion was used also for wetland soils. This may not be a suitable method for wetland soil samples.</p> <p>Analysis was conducted in the Forest Soils Laboratory, Soil and Water Science Department,</p>

	University of Florida (N.B. Comerford, A. Stoppe, and A. Comerford)
Nmin8 [L1]	Extractable nitrogen at day 8 (ug N/g whole soil) Details: Compare variable "Nmin0"
Nmin15 [L1]	Extractable nitrogen at day 15 (ug N/g whole soil) Details: Compare variable "Nmin0"
Nmin22 [L1]	Extractable nitrogen at day 22 (ug N/g whole soil) Details: Compare variable "Nmin0"
Nmin29 [L1]	Extractable nitrogen at day 29 (ug N/g whole soil) Details: Compare variable "Nmin0"
NO3min0 [L1]	<p>Initial nitrogen extraction amount at day 0 (ug N/g whole soil)</p> <p>0-30 cm soil depth.</p> <p><u>Collection:</u> 144 soil samples from the Santa Fe watershed were sampled, air dried and stored in plastic containers. The samples come mostly from the September 2005 sampling but other sampling dates were used when sufficient soil was not available. The analyses on these samples were accomplished with 20% duplication.</p> <p><u>Measurement of nitrate concentrations:</u> Measurements were made colorimetrically from extracts of the soil. The initial measurement was made on air dry soil before wetting. Five g of air dry soil were placed in a wide mouth plastic bottle, extracted with 20 mL of 3 mM Oxalate, shaken for 10 minutes and centrifuged for 10 min at 2500 rpm. Initial studies showed that this low level ionic strength solution gave the same extractable N results as 1M KCH₃COO (data not shown). The samples were filtered through Whatman 42 filter paper (or some equivalent of this, such as Fisher Brand P2). For samples with high amounts of colloidal material that did not filter to an acceptable clarity, concentrated 0.1 ml KCH₃COO was added before centrifugation and they were filtered with 45 micron filter paper membranes. Concentrations of 5 solutes (NH₄⁺, P, TP, TN and NO₃⁻) were measured on this single 3 mM Oxalate extraction. For each test, blanks, solution replications and spikes were included in the analysis. Nitrate concentrations were measured by Nitration of Salicylic acid (Cataldo, 1975).</p> <p>Reference:</p> <p><u>Bringing the air dried soil to Field Capacity:</u> A relationship was calculated from characterization data for predicting field capacity by relating it to the organic matter and clay content of the soils. Organic matter and clay was measured in the samples and the relationship was applied to these soils. Sufficient water was added to bring the soil to the gravimetric water content representing field capacity.</p> <p><u>Incubation - Preconditioning and Mineralization:</u> The soil samples were brought to Field Capacity in a 120 ml polyethylene bottle and put into an incubator at 35°C. On days 0, 8, 15, 22, 29. Nitrate concentrations were measured as indicated above. The moisture level was</p>

	<p>maintained and adjusted by a weekly analysis of the soil moisture content in the incubation bottle.</p> <p>Analysis was conducted in the Forest Soils Laboratory, Soil and Water Science Department, University of Florida (N.B. Comerford, A. Stoppe and A. Comerford)</p>
NO3min8 [L1]	<p>Extractable nitrogen at day 8 (ug N/g whole soil)</p> <p>Details: Compare variable "NO3min0"</p>
NO3min15 [L1]	<p>Extractable nitrogen at day 15 (ug N/g whole soil)</p> <p>Details: Compare variable "NO3min0"</p>
NO3min22 [L1]	<p>Extractable nitrogen at day 15 (ug N/g whole soil)</p> <p>Details: Compare variable "NO3min0"</p>
NO3min29 [L1]	<p>Extractable nitrogen at day 15 (ug N/g whole soil)</p> <p>Details: Compare variable "NO3min0"</p>
NO3N_9_03 [L1, L2, L3, L4]	<p>Nitrate-nitrogen ($\mu\text{g g}^{-1}$) observed in September 2003</p> <p>Measured in four soil layers: 0-30, 30-60, 60-120, and 120-180 cm.</p> <p>Lab method: The samples were extracted with 2M KCl (Keeney and Nelson, 1982) and the extraction solution was analyzed for NO₃-N content and expressed in $\mu\text{g g}^{-1}$ of dry soil.</p> <p>Keeney, D.R., and D. W. Nelson. 1982. Nitrogen – inorganic forms. In A.L. Page, R.H. Miller and D.R. Keeney (eds.) Methods of Soil Analysis – Part 2. American Society of Agronomy Inc., Soil Science Society of America Inc., Madison, WI.</p> <p>BDL - below detection limit (detection limit is generally > 0.02 ppm but may vary due to the machine. 0.02 ppm is not ug/g as is listed here, but is the concentration the machine reads)</p> <p>Analysis was conducted in the Soil and Water Science Department, University of Florida (N.B. Comerford and D.A. Graetz)</p>
NO3N_1_04 [L1, L2, L3, L4]	<p>Nitrate-nitrogen ($\mu\text{g g}^{-1}$) observed in January 2004</p> <p>Details: Compare NO3N_9_03</p>
NO3N_5_04 [L1, L2, L3, L4]	<p>Nitrate-nitrogen ($\mu\text{g g}^{-1}$) observed in May 2004</p> <p>Details: Compare NO3N_9_03</p>
NO3N_1_05 [L1, L2, L3, L4]	<p>Nitrate-nitrogen ($\mu\text{g g}^{-1}$) observed in January 2005</p> <p>Details: Compare NO3N_9_03</p>

NO3N_5_05 [L1, L2, L3, L4]	Nitrate-nitrogen ($\mu\text{g g}^{-1}$) observed in May 2005 Details: Compare NO3N_9_03
NO3N_9_05 [L1, L2, L3, L4]	Nitrate-nitrogen ($\mu\text{g g}^{-1}$) observed in September 2005 Details: Compare NO3N_9_03
OM [L1, L2, L3, L4]	Organic matter (%) Method: loss on ignition Analysis was conducted in the Forest Soils Laboratory, Soil and Water Science Department, University of Florida (N.B. Comerford)
P [L1, L2, L3, L4, L180]	Phosphorus ($\mu\text{g g}^{-1}$) Measured in four soil layers: 0-30, 30-60, 60-120, and 120-180 cm (L1, L2, L3, and L4). L180: Depth weighted profile average of phosphorus. Calculated as following: $\text{L180_P} = (\text{P layer 1} * 30 + \text{P layer 2} * 30 + \text{P layer 3} * 60 + \text{P layer 4} * 60) / 180$ Lab method: Mehlich-1 in $\mu\text{g P g}^{-1}$ soil (detection limit is 0.01 ppm) Analysis was conducted in the Soil and Water Science Department, University of Florida (N.B. Comerford and C.M. Bliss)
P60 [L10]	% Mehlich extractable P ($\mu\text{g P g}^{-1}$ of size fraction soil) in size fraction 2000 to 250 microns Soil samples from 0 to 10 cm depth; collected on January 2004 and May 2005. Size Fractionation_- Soil samples were sieved by shaking 25 g of air-dried soil through stacked 8 cm diameter sieves on an automatic shaker for 30 minutes. Each soil sample was separated into four soil size fractions: 2000 to 250μm, 250 to 150μm, 150 to 45μm and < 45μm . The reason for dry sieving was to maintain the aggregated nature of the sample that can be destroyed by wet sieving. Sieving time was determined in a preliminary study where five soils representing different land uses were shaken for five minute intervals, starting at 15 minutes and up to 1 hour. No significant differences in the <45 μm fraction weights were found beyond 30 minutes of shaking time. Each size fraction was weighed and expressed as a percentage of the whole soil dry weight. Mehlich 1 Extractable Phosphorus - Phosphorus was extracted as Mehlich I P (Nelson et al. 1953) and soluble reactive P in the extract was determined by the method of Murphy and Riley (1962). References: Nelson W.L., Mehlich A. and Winters E. 1953. The development, evaluation and use of soil tests for phosphorus availability. Agron 4:153-188.

	<p>Murphy J. and Riley H.P.1962. A modified single solution method for the determination of phosphate in natural waters. Anal Chim Acta 27: 31-36.</p> <p>Data generated by Dr. Christine Bliss and the Forest Soils Lab under the direction of Dr. Nick Comerford. Laboratory personnel involved in analyses were Aja Stoppe, Adriana Comerford, and Shinjiro Sato.</p>
<p>P100 [L10]</p>	<p>% Mehlich extractable P (ug P g⁻¹ of size fraction soil) in size fraction 250 to 150 microns</p> <p>Details: Compare variable "P60"</p>
<p>P325 [L10]</p>	<p>% Mehlich extractable P (ug P g⁻¹ of size fraction soil) in size fraction 150 to 45 microns</p> <p>Details: Compare variable "P60"</p>
<p>Pclay [L10]</p>	<p>% Mehlich extractable P (ug P g⁻¹ of size fraction soil) in size fraction <45 microns</p> <p>Details: Compare variable "P60"</p>
<p>Pci [L1]</p>	<p>Inorganic phosphorus in the cold TCA extract (ug P per g soil)</p> <p>L1: 0-30 cm depth.</p> <p>Samples dates are mixed in order to have a complete set of soil samples.</p> <p><u>TCA Fractionation for Mineral Soil</u></p> <p><u>Chemical and Reagent list:</u> TCA (Trichloroacetic Acid) CCl₃COOH Formula Wt. is 163.39 0.30M TCA = 163.39g/mol x 0.3mol/L = 49.017g/L 0.15 M TCA = 163.39g/mol x 0.15 mol/L = 24.5085g/L 2 M KCl Formula Wt. is 74.56 2M KCl = 74.56 x 2 = 149.12g/L 18 M H₂SO₄ H₂O₂ Reagent B</p> <p><u>Procedure:</u> Mineral soil sieved was to <2mm and stored air dried. There was a cold TCA extraction, then a hot TCA extraction with a H₂SO₄ digestion on both cold and hot extractions to determine total nutrient.</p> <p>1. <u>Cold Extraction, 4°C:</u> The 4°C temperature is maintained as long as a mixture of ice and water is present in the bath. Five g of air dry soil was placed in a 50 mL centrifuge tube. Ten mL of 0.30M TCA was placed into the centrifuge tube. The tubes were kept at 4°C in an ice bath and shaken by hand, 10 shakes fore each tube every 10 min for 1 hour. Samples were cleared by centrifugation at 3000 rpms for 10 minutes. The supernatant was removed by</p>

	<p>suction (a 5 mL pipette) into a 25 mL volumetric. The volume removed was recorded. The residue was washed in the 50 mL tube with 10 mL of 0.30M TCA. The sample was centrifuged again and added it to the first extract in the 25 mL volumetric, this was also recorded. The volumetric was brought to volume (25 mL) with DDI water and the supernatant filtered with Watman 42 filter paper into a glass vial. The solutions were analyzed for Inorganic P and Ammonium. 10 mLs of extract and 2 mL of 2 M KCl were pipetted into 50 mL glass digestion tubes and dried at 100°C. The tubes were digested at 340°C with 2 mLs of 18 M H₂SO₄ for 30 min. The TP and TN in these samples was analyzed.</p> <p>2. <u>Hot Extraction, 90°C</u>: The residue was extracted with 10 mL of 0.15 M TCA in a 90°C water bath for one hour. Samples were cleared by centrifugation at 3000rpms for 10 min. The supernatant was removed by suction as before and the residue was washed with 10 mL of 0.15 M TCA. It was centrifuged again and the subsequent supernatant was added to the first extract. Samples were brought to volume (25 mL). The extract was analyzed inorganic P and N, TP and TN as mentioned above.</p> <p>TCA Extraction Technique: An adaptation of the method of Chapin and Kedrowski. 1983. Seasonal changes in N and P fractions and autumn retranslocation in evergreen and deciduous taiga trees. Ecology 64: 376-391. The adaptation was published in Polglase et al. 1992. P, N and C fractions in litter and soil of southern pine plantations. Soil Sci Soc Am. J 56:566-572.</p> <p>Analysis was conducted in the Soil and Water Science Department, University of Florida (N.B. Comerford and A. Stoppe)</p>
Pco [L1]	<p>Organic phosphorus in the cold TCA extract (ug P per g soil)</p> <p>Details: Compare variable "Pci"</p>
Pcht [L1]	<p>Total phosphorus in the cold and hot TCA extract (ug P per g soil)</p> <p>Details: Compare variable "Pci"</p> <p>Calculations: Pcht = Pct + Pht</p>
Pct [L1]	<p>Total phosphorus in the cold TCA extract (ug P per g soil)</p> <p>Details: Compare variable "Pci"</p>
pH [L1, L2, L3, L4]	<p>pH [-]</p> <p>pH measured using 2:1 water:soil solution</p> <p>Analysis was conducted in the Soil and Water Science Department, University of Florida (N.B. Comerford and C.M. Bliss)</p>
Phi [L1]	<p>Inorganic phosphorus in the hot TCA extract (ug P per g soil)</p> <p>Details: Compare variable "Pci"</p>

Pho [L1]	Organic phosphorus in the hot TCA extract (ug P per g soil) Details: Compare variable "Pci"
Pht [L1]	Total phosphorus in the hot TCA extract (ug P per g soil) Details: Compare variable "Pci"
Pmin0 [L1]	<p>Initial phosphorus extraction amount at day 0 (ug P/g whole soil)</p> <p>0-30 cm soil depth.</p> <p><u>Collection:</u> 144 soil samples from the Santa Fe watershed were sampled, air dried and stored in plastic containers. The samples come mostly from the September 2005 sampling but other sampling dates were used when sufficient soil was not available. The analyses on these samples were accomplished with 20% duplication.</p> <p><u>Measurement of Total Phosphorus concentrations:</u> Measurements were made colorimetrically from extracts of the soil. The initial measurement was made on air dry soil before wetting. Five g of air dry soil were placed in a wide mouth plastic bottle, extracted with 20 mL of 3 mM Oxalate, shaken for 10 minutes and centrifuged for 10 min at 2500 rpm. Initial studies showed that this low level ionic strength solution gave the same extractable N results as 1M KCH₃COO (data not shown). The samples were filtered through Whatman 42 filter paper (or some equivalent of this, such as Fisher Brand P2). For samples with high amounts of colloidal material that did not filter to an acceptable clarity, concentrated 0.1 ml KCH₃COO was added before centrifugation and they were filtered with 45 micron filter paper membranes. Concentrations of 5 solutes (NH₄⁺, P, TP, TN and NO₃⁻) were measured on this single 3 mM Oxalate extraction. For each test, blanks, solution replications and spikes were included in the analysis. Total P (after a H₂SO₄ digestion with peroxide) was measured by the Murphy and Riley (1962) method.</p> <p>Reference: Murphy J. and Riley H.P.1962. A modified single solution method for the determination of phosphate in natural waters. Anal Chim Acta 27: 31-36.</p> <p><u>Bringing the air dried soil to Field Capacity:</u> A relationship was calculated from characterization data for predicting field capacity by relating it to the organic matter and clay content of the soils. Organic matter and clay was measured in the samples and the relationship was applied to these soils. Sufficient water was added to bring the soil to the gravimetric water content representing field capacity.</p> <p><u>Incubation - Preconditioning and Mineralization:</u> The soil samples were brought to Field Capacity in a 120 ml polyethylene bottle and put into an incubator at 35°C. On days 0, 8, 15, 22, 29. Total P concentrations were measured as indicated above. The moisture level was maintained and adjusted by a weekly analysis of the soil moisture content in the incubation bottle.</p> <p>Disclaimer: Aerobic digestion was used also for wetland soils. This may not be a suitable method for wetland soil samples.</p> <p>Analysis was conducted in the Forest Soils Laboratory, Soil and Water Science Department, University of Florida (N.B. Comerford, A. Stoppe and A. Comerford)</p>

Pmin8 [L1]	Extractable phosphorus at day 8 (ug P/g whole soil) Details: Compare variable "Pmin0"
Pmin15 [L1]	Extractable phosphorus at day 15 (ug P/g whole soil) Details: Compare variable "Pmin0"
Pmin22 [L1]	Extractable phosphorus at day 22 (ug P/g whole soil) Details: Compare variable "Pmin0"
Pmin29 [L1]	Extractable phosphorus at day 29 (ug P/g whole soil) Details: Compare variable "Pmin0"
RC [L1]	Recalcitrant carbon (mg kg ⁻¹) L1: 0-30 cm soil depth Calculated: RC = TC - HC Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)
RC_m2 [L1]	Recalcitrant carbon (kg m ⁻²) Areal soil recalcitrant carbon content in depth 1, i.e. from 0 to 30 cm Calculated measure: RC (mg kg ⁻¹) and BD (g cm ⁻³) in 0-30 cm depth. Calculations by Gustavo M. Vasques (GIS Research Laboratory, Soil and Water Science Department, University of Florida - S. Grunwald).
RC_Perc [L1]	Recalcitrant carbon (%) L1: 0-30 cm soil depth Calculated: RC_Perc = 100 - HC_Perc Details: Compare variable "RC" Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)
RN [L1]	Recalcitrant nitrogen (mg kg ⁻¹) L1: 0-30 cm soil depth

	<p>Calculated: $RN = TC - HN$</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>RN_Perc</p> <p>[L1]</p>	<p>Recalcitrant nitrogen (%)</p> <p>L1: 0-30 cm soil depth</p> <p>Calculated: $RN_Perc = 100 - HN_Perc$</p> <p>Details: Compare variable "RN"</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>Sand</p> <p>[L1, L2, L3, L4]</p>	<p>Soil texture: sand (%)</p> <p>Details of lab method: compare variable "Clay"</p>
<p>Silt</p> <p>[L1, L2, L3, L4]</p>	<p>Soil texture: silt (%)</p> <p>Details of lab method: compare variable "Clay"</p>
<p>TC</p> <p>[L1, L2, L3, L4, L100, L180]</p>	<p>Total carbon ($mg\ kg^{-1}$)</p> <p>0 to 30 cm (L1); 30 to 60 cm (L2); 60 to 120 cm (L3); and 120 to 180 cm (L4). L100: soil total carbon content from 0 to 100 cm. L180: soil total carbon content from 0 to 180 cm.</p> <p>Total C was measured by combustion using a Thermo-Finnigan Flash EA1112 elemental analyzer. Samples were oven-dried at 70 °C for 72 hours and ground for analysis.</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>TC_m2</p> <p>[L1, L2, L3, L4, L100, L180]</p>	<p>Total carbon ($kg\ m^{-2}$)</p> <p>Areal soil total carbon content in depths: 0 to 30 cm (L1); 30 to 60 cm (L2); 60 to 120 cm (L3); and 120 to 180 cm (L4).</p> <p>L100: Areal soil total carbon content from 0 to 100 cm. L180: Areal soil total carbon content from 0 to 180 cm.</p> <p>Calculated measure: TC ($mg\ kg^{-1}$) and BD ($g\ cm^{-3}$).</p> <p>Calculations by Gustavo M. Vasques (GIS Research Laboratory, Soil and Water Science Department, University of Florida - S. Grunwald).</p>
<p>TN</p> <p>[L1, L2, L3, L4, L100, L180]</p>	<p>Total nitrogen ($mg\ kg^{-1}$)</p> <p>0 to 30 cm (L1); 30 to 60 cm (L2); 60 to 120 cm (L3); and 120 to 180 cm (L4).</p>

<p>L100, L180]</p>	<p>L100: soil total carbon content from 0 to 100 cm. L180: soil total carbon content from 0 to 180 cm.</p> <p>Total N was measured by combustion using a Thermo-Finnigan Flash EA1112 elemental analyzer. Samples were oven-dried at 70 °C for 72 hours and ground for analysis.</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>TN_m2</p> <p>[L1, L2, L3, L4, L100, L180]</p>	<p>Total nitrogen (kg m⁻²)</p> <p>Areal soil total nitrogen content in depths: 0 to 30 cm (L1); 30 to 60 cm (L2); 60 to 120 cm (L3); and 120 to 180 cm (L4).</p> <p>L100: Areal soil total carbon content from 0 to 100 cm. L180: Areal soil total carbon content from 0 to 180 cm.</p> <p>Calculated measure: TN (mg kg⁻¹) and BD (g cm⁻³).</p> <p>Calculations by Gustavo M. Vasques (GIS Research Laboratory, Soil and Water Science Department, University of Florida - S. Grunwald).</p>
<p>TOC02</p> <p>[L1]</p>	<p>Hot water extractable carbon - particle size class 0.2 µm (mg g⁻¹) [dissolved organic carbon]</p> <p>L1: 0-30 cm depth</p> <p>Hot water extractable carbon was measured on a Shimadzu TOC-5050 analyzer using extractions procedures from Sparling et al. (1998) and Gregorich et al. (2003).</p> <p>TOC02: TOC in hot water extracts after filtering with a 0.2 µm glass fiber filter, in mg g⁻¹ (carbon fraction < 0.2 µm).</p> <p>Details:</p> <p>1.2 Extracting soluble soil organic carbon with hot water:</p> <ol style="list-style-type: none"> a. Weigh soil and add hot water to match soil and water ratio (1: 10; Sparling et al., 1998) b. Place the tube of soil and water mixture at 80 °C for 16 hr (temperature and time are operationally defined) c. Centrifuge, decant, and filtrate soil solution, 0.2 µm (GFF, Whatman) as the cutoff d. The bulk soil solution (without filtration) was fractionated into colloid and dissolved organic carbon fractions. A 0.2 µm filtration membrane was used. Therefore, the colloidal organic carbon (COC) is operationally defined as the 0.2-0.7 µm fraction calculated by the difference of TOC between <0.7 µm and <0.2 µm fractions, while DOC fraction is the <0.2 µm. e. Filtrated solutions were stored at 4 °C, ready for analysis. <p>Gregorich, E.G., Beare, M.H., Stoklas, U. and St-Georges, P. 2003. Biodegradability of soluble organic matter in maize-cropping soils. <i>Geoderma</i>, 113:237-252.</p> <p>Sparling, G., Vojvodić-Vuković, M. and Schipper, L.A. 1998. Hot-water-soluble C as a simple measure of labile soil organic matter: the relationship with microbial biomass C. <i>Soil Biology and Biochemistry</i>, 30:1469-1472.</p>

	<p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>TOC02_m2</p> <p>[L1]</p>	<p>Hot water extractable carbon - particle size class 0.2 μm (kg m^{-2}) [dissolved organic carbon]</p> <p>Areal content of soil dissolved organic carbon < 0.2 μm in depth 1, i.e. from 0 to 30 cm.</p> <p>Calculated measure: TOC02 (mg kg^{-1}) and BD (g cm^{-3}) in 0-30 cm depth.</p> <p>Calculations by Gustavo M. Vasques (GIS Research Laboratory, Soil and Water Science Department, University of Florida - S. Grunwald).</p>
<p>TOC02_Perc</p> <p>[L1]</p>	<p>Hot water extractable carbon - particle size class 0.2 μm (%) [dissolved organic carbon]</p> <p>Details compare variable "TOC02"</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>TOC07</p> <p>[L1]</p>	<p>Hot water extractable carbon - particle size class 0.7 μm (mg g^{-1}) [dissolved organic carbon]</p> <p>L1: 0-30 cm depth</p> <p>Hot water extractable carbon was measured on a Shimadzu TOC-5050 analyzer using extractions procedures from Sparling et al. (1998) and Gregorich et al. (2003).</p> <p>TOC07: TOC in hot water extracts after filtering with a 0.7 μm glass fiber filter, in mg g^{-1} (carbon fraction < 0.7 μm).</p> <p>Details: Compare lab method variable "TOC02".</p> <p>Analysis was conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
<p>TOC07_m2</p> <p>[L1]</p>	<p>Hot water extractable carbon - particle size class 0.7 μm (kg m^{-2}) [dissolved organic carbon]</p> <p>Areal content of soil dissolved organic carbon < 0.7 μm in depth 1, i.e. from 0 to 30 cm.</p> <p>Calculated measure: TOC07 (mg kg^{-1}) and BD (g cm^{-3}) in 0-30 cm depth.</p> <p>Calculations by Gustavo M. Vasques (GIS Research Laboratory, Soil and Water Science Department, University of Florida - S. Grunwald).</p>
<p>TOC07_Perc</p>	<p>Hot water extractable carbon - particle size class 0.7 μm (%) [dissolved organic carbon]</p>

[L1]	<p>Details compare variable "TOC07"</p> <p>Analysis conducted in the Wetland Biogeochemistry Laboratory, Soil and Water Science Department, University of Florida (J.O. Sickman and X. Chunhao)</p>
Valid	Validation code layer 0-30 cm
[L1, L2, L3, L4]	Indicates whether training (VALID=99) or testing (VALID=2) sample in 0-30 cm (L1); 30-60 cm (L2); 60-120 cm (L3); and 120-180 cm (L4)

Table 4. Spectral data - Santa Fe River Watershed.

(VNIR scanning and chemometric modeling by Gustavo M. Vasques)

Variable names	Descriptions
VNIR	<p>Reflectance values in the visible/near-infrared (VNIR) range (nm).</p> <p>The same soil samples analyzed for TC, HC, RC, TOC07 and TOC02 were scanned.</p> <p>Sample preparation: Basic sample preparation consisted of air-drying, sieving using a 2-mm mesh and ball-milling. In order to remove the effect of moisture, the soil samples were dried for 12 h at 40-45 °C.</p> <p>Scanning: Soil samples were scanned using a QualitySpec® Pro spectroradiometer (Analytical Spectral Devices Inc., Boulder, CO). The instrument measures reflectance in the wavelength range of 350-2500 nm, at 1-nm intervals. The soil samples were scanned four times, with replicates collected at angles of 90°. Reference spectrum using Spectralon (LabSphere, North Sutton, NH) was collected prior to the first scan and at every 25 samples. An average spectral curve was calculated for each sample (from the four scans).</p> <p>Analysis was conducted in the Environmental Pedology Laboratory, Soil and Water Science Department, University of Florida (S. Grunwald and G.M. Vasques)</p>

Table 5. Soil field data collected at 143 sites across the Santa Fe River Watershed.

(by Wade Hurt, Natural Resource Conservation Service; time period: Sept. 2003 to Sept. 2005)

Variable names	Descriptions
Wserie1	Soil Series (first Soil Series)
Wremarks	Remarks field conditions by Wade Hurt
Wclass1	Classification (first classification)
WOrder1	Soil Order (first Soil Order)
W_Bh_1	Depth to the Bh horizon in inches (first mapped soil profile) [9999: none]
W_Bt_1	Depth to the Bt horizon in inches (first mapped soil profile) [9999: none]
W_Wet_1	Depth to wet season saturation (first mapped soil profile) [9999: none; 1111: above soil surface]
Wserie2	Soil Series (second Soil Series)
Wclass2	Classification (second classification)
WOrder2	Soil Order (second Soil Order) [A : Alfisols; E : Entisols; H : Histosols; I : Inceptisols; M : Mollisols; S : Spodosols; U : Ultisols]
W_Bh_2	Depth to the Bh horizon in inches (second mapped soil profile) [9999: none]
W_Bt_2	Depth to the Bt horizon in inches (second mapped soil profile) [9999: none]
W_Wet_2	Depth to wet season saturation (second mapped soil profile) [9999: none; 1111: above soil surface]

F_Bh_1	Field mapped data - based on Soil Taxonomic Data (Soil Series) Depth to the Bh horizon in inches [9999: none] (only the first Bh horizon encountered from the top down in a soil profile was considered)
F_Bt_1	Field mapped data - based on Soil Taxonomic Data (Soil Series) Depth to the Bt horizon in inches [9999: none] (only the first Bt horizon encountered from the top down in a soil profile was considered)
F_E_1	Field mapped data - based on Soil Taxonomic Data (Soil Series) Depth to the E horizon in inches [9999: none] (only the first E horizon encountered from the top down in a soil profile was considered)
F_g_1	Field mapped data - based on Soil Taxonomic Data (Soil Series) Depth to the "g" horizon in inches [9999: none] (only the first "g" horizon encountered from the top down in a soil profile was considered) [g: gleying]
F_E_thick	Field mapped data - based on Soil Taxonomic Data (Soil Series) Thickness of the E horizon in inches [9999: none] (if more than one E horizon was present in a given soil profile the E horizons depths were added)
F_Bh_thick	Field mapped data - based on Soil Taxonomic Data (Soil Series) Thickness of the Bh horizon in inches [9999: none] (if more than one Bh horizon was present in a given soil profile the Bh horizons depths were added)
F_Bt_thick	Field mapped data - based on Soil Taxonomic Data (Soil Series) Thickness of the Bt horizon in inches [9999: none] (if more than one Bt horizon was present in a given soil profile the Bt horizons depths were added)
F_g_thick	Field mapped data - based on Soil Taxonomic Data (Soil Series) Thickness of the "g" horizon in inches [9999: none] (if more than one "g" horizon was present in a given soil profile the "g" horizons depths were added)
F_A_C	Field mapped A-C horizon [1: yes; 0: no]
F_alb_c	Field mapped albic horizon in soil profile [1: yes; 0: no]
F_arg_c	Field mapped argillic horizon in soil profile [1: yes; 0: no]

Table 6. Field land use mapped within the Santa Fe River Watershed.

(by Christine Bliss)

Variable name	Description
LU9_2003	Field land use mapped in Sept. 2003 at 124 sampling sites
LU1_2004	Field land use mapped in Jan. 2004 at 124 sampling sites
LU5_2004	Field land use mapped in May 2004 at 130 sampling sites
LU1_2005	Field land use mapped in Jan. 2005 at 141 sampling sites
LU5_2005	Field land use mapped in May 2005 at 141 sampling sites
LU9_2005	Field land use mapped in Sept. 2005 at 141 sampling sites
LU_info	Additional information - land use mapping
LU_code	Land use code (matches LU9_2005) 1: Coniferous pine 2: Crops 3: Forest regeneration 4: Improved pasture 5: Rangeland 6: Tree grove 7: Upland forest 8: Urban 9: Wetland