National Speleological Society Evidence Package
November 17, 2025

10.50
70

This Instrument Prepared By
And Return to:
Stephen L. Evans
Post Office Box 3518
Plant City, Florida 33564-3518

OFFICIAL RECORDS
93 DEC -6 PM 4:00
ALACHUA COUNTY, FL

Grantee Social Security Number:
Federal ID No. 54-6026867

Property Appraiser's Parcel 3066-002-00
Identification Number: ~~5987-000-00~~

National Speleological Society Inc
2813 Cave Ave
Huntsville, AL 35810

FEE SIMPLE DEED

THIS INDENTURE, made this 7th day of June, 1993, Between Asgrow Florida Company whose post office address is 4144 Highway 39 North, Plant City, Florida 33565, of the County of Hillsborough, State of Florida, hereinafter referred to as Grantor, and National Speleological Society, Inc., a corporation existing under the laws of the District of Columbia, whose post office address is Cave Avenue, Huntsville, Alabama 35810, hereinafter referred to as Grantee,

WITNESSETH, that said Grantor, for and in consideration of the sum of One Hundred Dollars ($100.00), and other good and valuable consideration to Grantor in hand paid by Grantee, the receipt whereof is hereby acknowledged, has granted, bargained and sold to Grantee, and Grantee's heirs and assigns forever, the following described land, situate, lying and being in Alachua County, Florida, to-wit:

A tract of land situated in Section 10, Township 8 South, Range 18 East, Alachua County, Florida, said tract of land being more particularly described as follows:

Commence at a concrete monument at the Southwest corner of the aforementioned Section 10, Township 8 South, Range 18 East for a point of reference and run N.88°24'02"E., along the South line of said Section 10, a distance of 792.27 feet; thence run N.00°39'21"W., along the East line of the West 792.16 feet of the S.W. 1/4 of the S.W. 1/4 of said Section 10, a distance of 508.06 feet to a concrete monument (LS #3456) on the Northerly right of way line of State Road No. 20-25 A.K.A. U.S. Highway No. 441 (200 foot right of way) and the **TRUE POINT OF BEGINNING**; thence run S.77°51'07"E., along said Northerly right of way line, a distance of 143.86 feet to a concrete monument (LS #3456); thence run N.12°08'53"E., a distance of 200.00 feet to a concrete monument (LS #3456); thence run S.77°51'07"E., a distance of 59.81 feet to a concrete monument (LS #3456); thence run N.60°49'36"E., a distance of 101.29 feet to a concrete monument (LS #3456); thence run N.07°01'30"E., a distance of 70.52 feet to a concrete monument (LS #3456); thence run N.28°08'16"W., a distance of 91.36 feet to a concrete monument (LS #3456); thence run N.60°43'36"E., a distance of 367.96 feet to a concrete monument (LS #3456) on the East line of the aforementioned S.W. 1/4 of the S.W. 1/4 of Section 10; thence run N.00°00'26"W., along said East line, a distance of 330.30 feet to a concrete monument at the Northeast corner of said S.W. 1/4 of the S.W. 1/4; thence run S.88°18'34"W., along the North line of said S.W. 1/4 of the S.W. 1/4, a distance of 626.05 feet to a concrete monument (LS #3456); thence run S.00°39'21"E., along the aforementioned East line of the West 792.16 feet of the S.W. 1/4 of the S.W. 1/4, a distance of 844.40 feet to the **TRUE POINT OF BEGINNING**, containing 8.581 acres more or less.

Doc. St. Amt. $ .70
J.K. "Buddy" Irby, Clerk of Circuit Court
Alachua County - By C. Huff

SUBJECT TO:

1. Taxes for the year 1992 and subsequent years.

2. Conditions, easements and restrictions of record, if any, but this reference shall not operate to reimpose any of them.

1237123

O.R. BK 1938 PG2425

3. Zoning ordinances and other restrictions and prohibitions imposed by applicable governmental authorities.

4. All matters of record.

To have and to hold the same unto the Grantee, its heirs and assigns, to their proper use, benefits and enjoyment forever.

IN WITNESS WHEREOF, grantor has hereunto set grantor's hand and seal the day and year first above written.

Signed, sealed and delivered in our presence:

Asgrow Florida Company,
a Florida corporation,

Rebecca McCormich

By: Dr. Gerald L. Crane, President
4144 Highway 39 North
Plant City, Florida 33565

Stephen Evans

STATE OF FLORIDA:
COUNTY OF HILLSBOROUGH:

The foregoing instrument was acknowledged before me this 7th day of June, 1993, by Dr. Gerald L. Crane, president of Asgrow Florida Company, a Florida corporation, on behalf of the corporation. He is personally known to me or has produced a valid Florida Drivers license as identification and did take an oath.

Stephen L. Evans
Commission No. CC 022093
Notary Public, State of Florida
My Commission Expires: June 17, 1994

NOTARY PUBLIC, STATE OF FLORIDA AT LARGE
MY COMMISSION EXPIRES JUNE 17, 1994
BONDED THRU AGENT'S NOTARY BROKERAGE

AYESHA SOLOMON
ALACHUA COUNTY
PROPERTY APPRAISER
KNOWLEDGEABLE · COMMUNITY FOCUSED · COMMITTED

Layers | Home | Map | Real Property Search | Tangible Property Search | Sales Search | Sales List | Comp Search | Results | Report | Tax Estimator | Storm / Calamity Damage Form | Sales Results | Property Use Code Reults | Comp Resu

Layer List | Legend

Quick Links:

- Property Search
- View Map

Layers:

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- Labels
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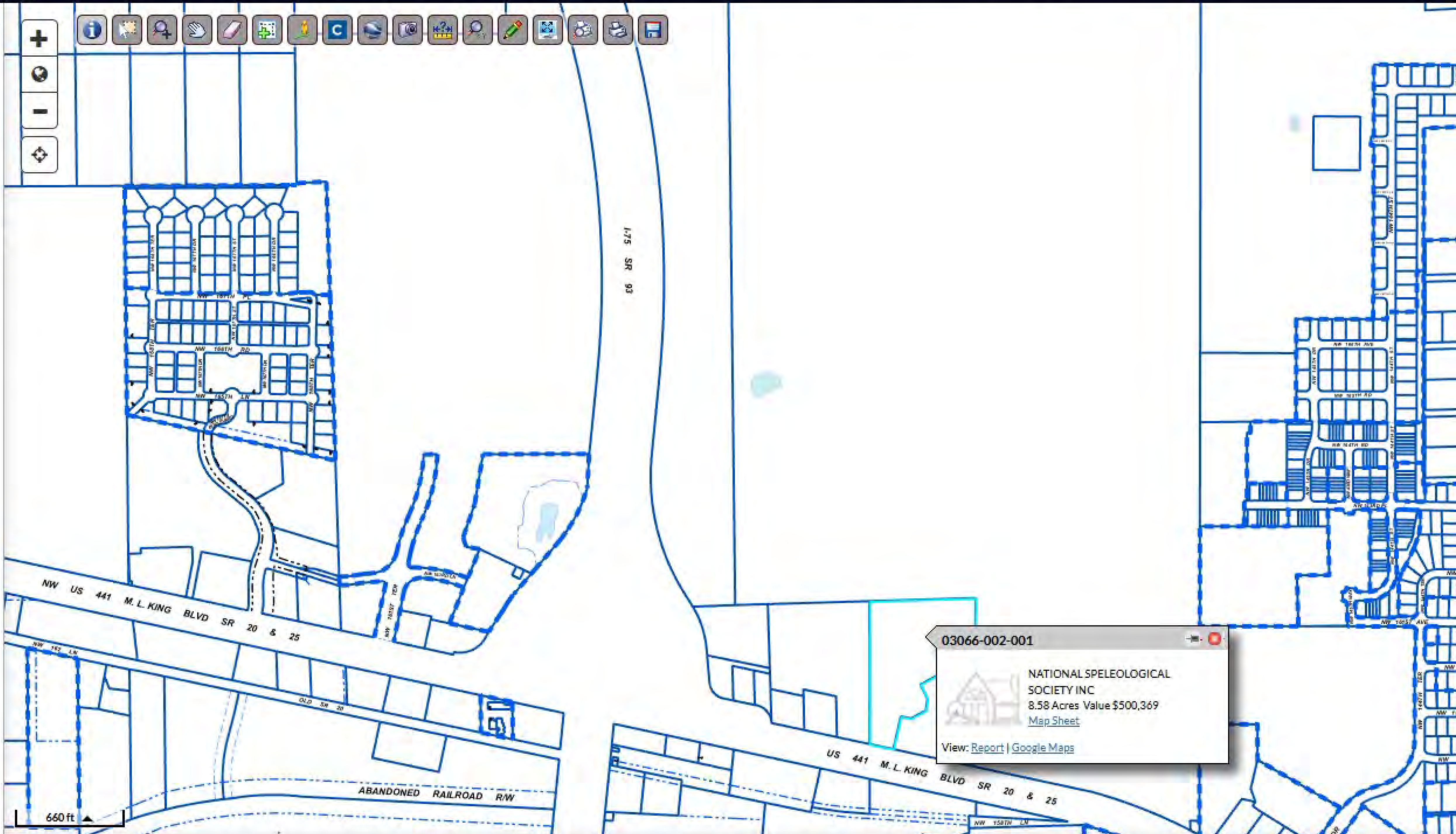
- Transportation
- Voting Districts
- Census Blocks (2010)
- Water & Wetlands
- Zoning
- Imagery
- Base Map
- TPP Search

Restore Layer Defaults



Parcel ID	03066-002-001	Prop ID	12753	Owner Address	NATIONAL SPELEOLOGICAL SOCIETY INC
Sec/Twp/Rng	10-08-18	Class	VACANT COMM		6001 PULASKI PIKE NW
Property Address		Acreage	8.58		HUNTSVILLE, AL 35810

District 1700 - ALACHUA

Brief Tax Description COM SW COR SEC E 792.27 FT N 508.06 FT TO N R/W US 441 POB S 77 DEG E 143.86 FT N 12 DEG E 200 FT S 77 DEG E 59.81 FT N 60 DEG E 101.29 FT N 7 DEG E 70.52 FT N 28 DEG W 91.36
844.40 FT TO POB OR 1938/2425
(Note: Not to be used on legal documents)

We are the National Speleological Society

Founded in 1941, the NSS is the largest membership organization dedicated to caves & caving. Composed of over 8,000 members and 250+ local chapters - known as grottos - we work to connect cavers so they can work on exploring, studying, and conserving caves worldwide.

Whether you are just starting or have been caving for years, membership in the NSS means being a part of the largest community of cavers in the world.

Attending a grotto meeting - held all over the country every week - means being involved in countless caving trips, projects, and conservation efforts

What We Do

- Connect Cavers Worldwide
- Recreation & Fellowship
- Conservation & Preservation
- Cave Exploration
- Science
- Education

Mission Statement

4

The National Speleological Society (NSS) is a non-profit membership organization dedicated to the scientific study of caves and karst; protecting caves and their natural contents through conservation, ownership, stewardship, and public education; and promoting responsible cave exploration and fellowship among those interested in caves.

Come caving with us!

Whether you are just starting or have been caving for years, the NSS is the best place to start. With over 250 local chapters - known as grottos - there is a community of cavers near you!

SELECT A STATE

Our Focus

Caving community

Being an NSS member means connecting with other cavers and staying on top of discoveries, gear, and developments in speleology. With events throughout the year, there are plenty of ways to connect! Plus membership means discounts on gear and events!

- Annual Convention
- Regional Events
- Grottos

Cave protection

With over 23 preserves and countless other initiatives, the NSS works everyday to preserve the underground environment for future generations. Learn about our conservation efforts, visit a preserve, or get involved today!

- → NSS Preserves
- → Cave Conservation

Cave exploration

Few activities provide the opportunity to explore never-before-seen places on earth. Every year NSS members are involved in exploring some of the most significant caves on earth.

→ Learn About Cave Cartography

Cave Science

Whether through scientific grants or the work of it's members, the NSS is dedicated to furthering human knowledge about the underground environment.

→ Learn about White Nose Syndrome

Interested in becoming a member?

Be a part of the largest cave membership organization in the world and help us explore, protect, and study caves! Sign up today and get access to:

- Digital or Print NSS Publications
- Gear Discounts
- Event & Training Discounts
- Access to NSS Grants
- Caving Trips

Join today, find your grotto, and start caving!

JOIN NOW

JOIN NSS

With over 8,000 Members the NSS is the largest caving focused membership organization in the world. Find out why you belong.

JOIN

SUPPORT

Donations to the NSS help support programs advancing cave science, preservation, exploration, and education. Find out how you can help.

DONATE

GET INVOLVED

The heart and soul of the NSS is our volunteers. Find out how you can get involved and help promote caving science, exploration and preservation.

VOLUNTEER

NATIONAL SPELEOLOGICAL SOCIETY

6001 Pulaski Pike
Huntsville, AL 35810-1122 USA
(256) 852-1300

nss@caves.org

CONTACT

PHOTOGRAPHERS & CARTOGRAPHERS

PRIVACY POLICY

OPEN POSITIONS

Mill Creek Sink Nature Preserve (Alachua Sinks)

In 1993, the NSS accepted the donation of Mill Creek Sink, which is a completely water-filled cave. The surface stream system is dissected by more than 10 swallow holes that divert water underground, draining a basin of more than 70 square miles. The sinkhole slopes steeply nearly 50 feet down to the water's edge. The sinkhole is filled with very dark, tannic-stained water for most of the year, as well as fallen trees and debris. Clear water is not encountered for a considerable distance into the system. The main cave system has tunnel both upstream and downstream with depths known to 227 feet.

KEY STATS

LOCATION
Alachua County, Florida

YEAR ACQUIRED
1993

LENGTH
>1500 ft

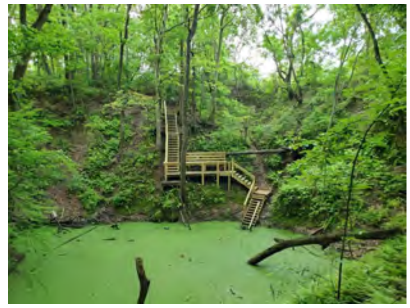
12

Want to Visit?

Access to the preserve is limited to qualified cave divers only. Visitation will only be permitted for research, data collection, water sampling, or survey. No training activities are allowed. All visitors must contact PreservesScience@caves.org for activity approval prior to requesting a permit.

GET PERMIT

SEE ACCESS RULES



→ Biology

↓ Geology

Mill Creek Sink lies along a persistent topographical feature known as the Cody Escarpment. This westward-facing escarpment is the erosional boundary between an upland plateau to the east and a karst plain to the west. The upland plateau, with elevations up to the 190 feet mean sea level (MSL), is known as the Hawthorne Plateau or the Northern Highlands. The plateau once extended completely across Alachua County, and is composed of marine and deltaic sediments. Karst features are scarce on the plateaus due to the impervious clays of the Hawthorne Formation. The plateau landscape is characterized by very low relief, which along with a high water table forms swampy pine flatwoods and cypress ponds.

Retreat of the escarpment has exposed the underlying limestone sediments of the karst plain, which were reduced to their present topographically low level (less than 75 feet MSL) through the action of solution and modified by the Pleistocene higher sea level stands. Small short caves, solution pipes, and cenote like sinkholes are common on the karst plain.

The site consists of 8.8 acres of land, most of which lies below the 100 year flood plain, and thus has very little commercial development potential. However, there is a 50-foot wide section of land to the east of the sinkhole, which comes out to front on US Hwy. 441. It is important to note that the Mill Creek Sink property does not include any land on the high ground west of the sinkhole. All of the property between the sinkhole and Sonny's BAR-B-Q is privately owned. The property is managed for diving, research, and educational purposes and both the committee members and the Alachua Police Department monitors its use.

Mill Creek Sink is a water-filled sinkhole connected to a water filled cave located near I-75 in the city of Alachua, Florida. Mill Creek Sink is the only known window to the underground Mill Creek Stream System. The sinkhole slopes steeply nearly 50 feet down to the water's edge. Most of the year the sinkhole is filled with very dark, tannic-stained water as well as fallen trees and debris. Clear water is normally not encountered for a considerable distance into the system. The main cave system has tunnel both upstream and downstream with depths to 227 feet.

→ Hydrology

→ Management Plan

→ Preserve Access Rules

→ Email Contact For Preserve Access

JOIN NSS

With over 8,000 Members the NSS is the largest caving focused membership organization in the world. Find out why you belong.

JOIN

SUPPORT

Donations to the NSS help support programs advancing cave science, preservation, exploration, and education. Find out how you can help.

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GET INVOLVED

The heart and soul of the NSS is our volunteers. Find out how you can get involved and help promote caving science, exploration and preservation.

VOLUNTEER

NATIONAL SPELEOLOGICAL SOCIETY

6001 Pulaski Pike
Huntsville, AL 35810-1122 USA
(256) 852-1300

nss@caves.org

MILL CREEK SINK NATURE PRESERVE MANAGEMENT PLAN

The following Preserve Management Plan was adopted by the Board of Governors of the National Speleological Society to define management of Mill Creek Sink Nature Preserve (Alachua County, Florida). The intention of this plan is to protect the property and promote good relations between the NSS and neighboring landowners. Please observe the rules and encourage others to do the same so that this unique and outstanding cave may be enjoyed by all. Contact the NSS Property Managers at MillCreekPreserve@caves.org if you have any questions or need to request special arrangements.

INTRODUCTION

The Mill Creek Sink property is owned by the National Speleological Society (NSS), and managed by the Cave Diving Section of the NSS (NSS-CDS). Because of the nature and complexity of the underwater cave system, access to the cave shall be permitted to only qualified cave divers. The goal of the management plan is to allow continued access to Mill Creek Sink for cave diving and to protect this valuable resource so that future cave divers can visit and appreciate a cave in near pristine condition. To this end, a management committee shall set cave diving requirements. In addition, fences and gates are installed as necessary to prevent unauthorized visitation to the site.

Equally important is the protection of the surrounding property and connected water resources due to development in the region. Mill Creek Sink is located within the City of Alachua and is adjacent to I-75. As with most of Florida, development is occurring at a rapid rate. By educating and working with local officials with the goal to minimize the impact of growth in the area on the cave system.

HISTORY

Mill Creek Sink is located in the city of Alachua, Florida and was originally established by the NSS as the Alachua Sink Preserve on November 7, 19921. The donor of the property was the Asgrow Florida Corporation, a division of the Upjohn Company. John Kibler, a long time NSS-CDS member and Asgrow employee, was one of the driving forces behind the donation to the NSS. The NSS interest in the ownership of this property is primarily due to its significant value as a hydrological resource and to protect access to this site.

SURFACE RESOURCES

Biological

Several species of plants exist in the floodplain and on the rim and rim slopes that are uncommon to the area. The site represents a southern refugium for some species that normally occur north of the area or west in the Florida Panhandle area. The floodplain may represent a pre-Columbian forest remnant, which has not been logged as such for one reason or another. Large cypress and water elm dominate the canopy in the low elevation.

Dr. Dana Griffin of the University of Florida suggests that the water elms *(Planera aquatica)* girth measurements may be of champion tree dimensions.

Out of range or uncommon plants occurring at the site are:
- Collinsonia canadensis (Horse Balm)
- Arisaema draconian (Green Dragon)
- Triadenum walteri (Marsh St. John's Wort)
- Aristolichus serpentaria (Snakeroot)
- Thelypteris dentata (Downy-shield fern)
- Onoclea sensibilis (Sensitive fern)

Geological

Mill Creek Sink lies along a persistent topographical feature known as the Cody Escarpment. This westward-facing escarpment is the erosional boundary between an upland plateau to the east and a karst plain to the west. The upland plateau, with elevations up to the 190 feet mean sea level (MSL), is known as the Hawthorne Plateau or the Northern Highlands. The plateau once extended completely across Alachua County, and is composed of marine and deltaic sediments. Karst features are scarce on the plateaus due to the impervious clays of the Hawthorne Formation. The plateau landscape is characterized by very low relief, which along with a high water table forms swampy pine flatwoods and cypress ponds.

Retreat of the escarpment has exposed the underlying limestone sediments of the karst plain, which were reduced to their present topographically low level (less than 75 feet MSL) through the action of solution and modified by the Pleistocene higher sea level stands. Small short caves, solution pipes, and cenote like sinkholes are common on the karst plain.
The site consists of 8.8 acres of land, most of which lies below the 100 year flood plain, and thus has very little commercial development potential. However, there is a 50-foot wide section of land to the east of the sinkhole, which comes out to front on US Hwy. 441. It is important to note that the Mill Creek Sink property does not include any land on the high ground west of the sinkhole. All of the property between the sinkhole and Sonny's BAR-B-Q is privately owned. The property is managed for diving, research, and educational purposes and both the committee members and the Alachua Police Department monitors its use.

Hydrological

The surface stream, Mill Creek and Townsend Branch, drains over 70 square miles north of Mill Creek Sink and is dissected by over 10 swallow holes. Mill Creek Sink is the only known window that allows access to the underwater cave. There is a swallow hole located north of the main sinkhole, which provides an in feeder of surface runoff into the system. The other sinks are alluviated to the extent that the investigators cannot extend them.

<u>UNDERGROUND RESOURCES</u>

Biological

Mill Creek Sink is home to turtles, both soft-shell and snapping varieties. Alligators are occasionally seen also. Brim and catfish are seen in the basin and catfish have been spotted throughout the cave system. Blind cave crayfish, the Pallid Cave crayfish (*Procambarus pallidus*), the Florida Cave Amphipod (*Crangonyx grandimus*) and the Hobb's Cave Amphipod (*Crangonyx hobsi*) are also found in the cave and are "species of special concern" designated by the State of Florida. The Florida

Committee on Rare and Endangers Biota of Florida has published the selected information for State of Florida Game and Freshwater Fish Commission. This information supports and recommends protection of these and other related cave species.

Geological
Mill Creek Sink is a water filled sinkhole connected to a water filled cave located near I-75 in the city of Alachua, Florida. Mill Creek Sink is the only known window to the underground Mill Creek Stream System. The sinkhole slopes steeply nearly 50 feet down to the water's edge. Most of the year the sinkhole is filled with very dark, tannic-stained water as well as fallen trees and debris. Clear water is normally not encountered for a considerable distance into the system. The main cave system has tunnel both upstream and downstream with depths to 227 feet.

Hydrological
Dye tracing studies3 done by the NSS-CDS in February of 1976 and 2006 revealed that Mill Creek Sink is connected to Hornsby Springs, a straight line distance of six miles. Hornsby Springs is a tributary water source for the Santa Fe River. The Santa Fe River is designated as an "Outstanding Florida Waterway" which is the most prominent designation for a river in the State of Florida. The uniqueness of this hydrological relationship provides an upstream karst window to a sensitive water source, which is part of a major conduit feeding the Florida Aquifer. Further understanding of the hydrology of Mill Creek Sink is needed and can be gained through exploration and survey of the system. Protection from point and non-point pollution is the primary reason in favor of NSS ownership. Additionally, NSS ownership with local management by the Mill Creek Sink Management Committee (MCSMC) would provide the basis for ongoing field study in this area.

MANAGEMENT COMMITTEE
The NSS-CDS manages Mill Creek Sink (formerly Alachua Sink) for the NSS and shall delegate certain responsibilities set forth below to the Mill Creek Sink Management Committee (MCSMC). The management of the cave is authorized and complies with NSS Act 26-505. The NSS-CDS shall be the sole diving authority for the site. The CDS shall ensure the MCSMC adheres to current standards and practices. All diving practices shall be reviewed and approved by the NSS-CDS Training Chairman. The MCSMC shall report to the CDS quarterly as to all site activity.

The MCSMC shall retain day-to-day site management activities. The NSS-CDS shall endorse all reports prepared for the NSS by the MCSMC prior to submission to the NSS. The MCSMC shall be chaired by a NSS-CDS appointed Site Manager who shall have the authority to appoint guides with the concurrence of the guide committee and the advice and consent of the NSS-CDS BoD. All divers (term divers shall include MCSMC guides) shall attest to their level of training in Cave Diving and mixed gas diving. All divers are required to have dive accident insurance. All divers shall use current NSS-CDS liability waivers. Guides are required to have current CPR training and shall be required to be members of the NSS and the NSS-CDS. All guides shall submit copies of current CPR training and NSS membership to the Site Manager by the beginning of the new year in order to retain guiding privileges

Alachua Sink shall be reserved as a scientific and research cave diving site. Recreational diving is not permitted. All dives shall be for specific scientific purposes or in preparation for scientific purposes. All divers and the guides shall be considered volunteers of the NSS and the NSS-CDS. A post dive report shall be prepared and endorsed by the guide and divers upon conclusion of each dive. All post dive reports and liability waivers shall be submitted by the guide to the Site Manager quarterly for storage in NSS-CDS archives This policy affords the NSS and the NSS-CDS the protection of the Florida Volunteer Act (F.S. 768.1355). It will fulfill the mission statement of the NSS-CDS and the Guidelines for Research on Property Owned or Managed by the National Speleological Society (Refer to Act 88-480) There shall be no fees or reimbursements to any person in order to dive this site.

<u>ACCESS POLICY</u>

The depth of the system, the extremely poor visibility in the basin, and the presence of a restriction in the downstream at 190 feet makes Mill Creek Sink a very advanced level dive. All divers who elect to dive Mill Creek Sink, do so on a voluntary basis. No training dives are allowed. Commercial diving is not allowed. No fees may be charged for access to the site by anyone, including authorized guides. Access to the cave system shall only be permitted within the framework of the MCSMC Access Policy.

Eligibility to Dive

Divers may be granted access to dive Mill Creek Sink under any of the three access policies:

1. Guided Diving Access

a. Shall be a member of the NSS and the NSS-CDS
b. Shall be "Full Cave Diver" certified
c. Shall show proof of the Abe Davis Award4 or equivalent experience.
d. Shall have logged 3 cave dives to 150 feet with required decompression of 45 minutes or more.
e. Shall be certified to utilize breathing gases appropriate for depths beyond 130 FFW per NSS-CDS Standards and Procedures.
f. Shall have DAN diving accident Insurance or equivalent.
g. Shall sign an NSS-CDS liability waiver on the day of diving.
h. Shall be accompanied on the dive by an MCSMC guide.
i. Shall be limited to dive teams of 1 guide and two divers. In order to dive the downstream tunnel; a diver shall have completed three dives in the upstream section.

2. Unguided Diving Access

Divers are permitted to dive MCS unguided. The Mill Creek Sink Site Manager or designee shall approve such dives in advance. Divers shall submit to the Site Manager:
a. A dive plan to include the names of the divers.
b. A brief experience history.
c. The date, time and purpose of the proposed dive.
The divers may then be assigned a MCS guide to act as 'dive coordinator'. The divers, individually, shall meet all of the above requirements. Additionally, they shall have sufficient credentials and logged dives within other complex cave systems that demonstrates diving proficiency that surpasses the criteria needed for safe diving at Mill Creek Sink. The MCSMC guide has the following responsibilities:
a. Review of the divers diving credentials.
b. Schedule an appropriate dive time so unaccompanied dive teams may be limited to one team per day. (Research Teams are not subject to dive team limits except as otherwise provided.)
c. Brief the dive team, review dive plan run times and witness the NSS-CDS diver liability release on the day of the dive.
d. Collection of post dive reports indicating Research/Scientific observations.

3. Research/Scientific Diving Access
Divers may be granted unencumbered access for volunteer Research /Scientific Diving if:
a. They are, or have served as, guides or the former Alachua Sink Management Committee. Research/Scientific Divers shall not lead "Guided Dives" but may elect to form dive teams of other Research/Scientific Divers as their assistants.
b. They apply and receive approval for Project Status to the Board of Directors of the NSS-CDS and meet access policies. For administrative purposes, the Site Manager may appoint an MCSMC Research/Scientific Diver or Guide to act as liaison to the Research/Scientific Project.

<u>GUIDES</u>

Responsibilities of Guides
All visitors shall execute an NSS-CDS Liability Release prior to entering the site. The guide shall submit the signed liability releases to the Site Manager for filing one week. Guides shall notify the Site Manager of intended activities prior to visiting the system. It is the guide's responsibility to determine safe site conditions prior to visitation. The guide has the final decision to allow a particular guided or unguided dive to continue and may stop the dive at any time for any reason. All MCSMC Guides are volunteers approved by the Site Manger based upon their experience with Mill Creek Sink. At a minimum, a candidate seeking to be a volunteer guide shall have completed 10 dives in the system with two different guides. Guides shall be certified to utilize breathing gas mixtures appropriate for depths beyond 130 FFW per NSS-CDS Standards and Procedures. All guides shall have DAN diving accident insurance or equivalent.

Additionally, they shall meet the following requirements:
a. Have a current, signed NSS-CDS release prior to diving.
b. Have current CPR training.

Number of Guides
The number of may fluctuate depending on the activity and availability of the individual guides.

<u>PUBLICITY POLICY</u>

There have been several ongoing research projects at Mill Creek Sink in recent years. Scientist or explorers interested in projects at Mill Creek Sink are encouraged to contact the Mill Creek Sink Management Committee with a carefully planned, written project proposal. All data collected shall be made available to the MCSMC, NSS-CDS and the NSS. Interaction with educational, scientific and government institutions and agencies.
The MCSMC shall maintain relations with local officials and provide education and input into issues that may affect the cave system or the drainage area that feeds the cave system. It is particularly important that the City of Alachua, as the primary local governing body, be kept informed of site conditions. They have provided invaluable assistance in patrolling the site for trespassers and have a significant public safety interest. All public comments in reference to NSS-CDS and NSS policy shall be deferred to the Chairman of the NSS-CDS.

<u>SURFACE MANAGEMENT</u>

The Mill Creek Sink Management Committee shall install and maintain a locked gate at the primary access point to the sink. The property shall be posted, and arrangements have been made with the Alachua Police Department to monitor for unauthorized access. A parking area shall be maintained and a parking permit system implemented. Occupants of vehicles not displaying the proper permits are considered to be trespassing.

FUTURE PLANS

Steps from the parking lot to the water have been constructed. Additional site improvements to facilitate conservation, preservation and safety are an ongoing priority of the MCSMC.
Long range plans for the property includes 'nature trails' that would provide kiosks and plant identification markers as well as benches and picnic areas. Other long-term ideas include the possibility of a joint venture between the school district, Santa Fe Community College and the NSS, to utilize the property as a karst environmental educational area. All such future plans for the site would assure continued access for divers.

The property to the west of Mill Creek Sink should be considered for acquisition by the NSS or NSS-CDS to preclude development of the property adjacent to the sink. Contact with the property owner has been initiated, but there is no immediate interest on their part in transferring ownership. The owner suggested yearly contact be made, in writing, expressing continued interest in the property.

REFERENCES

1 NSS Acts Section 26, Act 26-505.
2 Source: Geology of the Western Part of Alachua County, Florida by: Williams, Nicol and Randazzo, 1977, Bureau of Geology.
3 Source: Sheck Exley, private communication
4 The Abe Davis Award is granted by the NSS-CDS to those individuals who have successfully completed 100 safe cave dives.

Developed and submitted jointly by the Mill Creek Sink Preserve Management Committee and the National Speleological Society Cave Diving Section for adoption by the National Speleological Society Board of Directors

Approved: June 2007 - Jim Taylor, Manager, Mill Creek Sink Preserve Management Committee
Approved: June 2007 - NSS-CDS Board of Directors
Approved: July 2007 - NSS Board of Governors

Commercial Use Statement: The Board of Governors of the National Speleological Society reaffirms its standing policy that bans the commercial use of our properties, and specifically, prohibits any activity where a charge of any type is made or a payment of any type made to anyone organizing or leading a trip to the cave preserve.

City of Alachua

MAYOR GIB COERPER
Vice Mayor Jennifer Blalock
Commissioner Shirley Green Brown
Commissioner Dayna Miller
Commissioner Edward Potts

OFFICE OF THE CITY MANAGER
MIKE DAROZA

June 29, 2022

Sayed Moukhtara
7717 NW 20th Lane
Gainesville, Florida 32605

RE: TARA FOREST WEST, TARA APRIL & TARA PHOENICIA

Dear Mr. Moukhtara:

This letter is in regards to the above referenced projects.

It has come to the attention of City staff ("Staff") during the review of development applications involving the above three referenced projects that were submitted at various times, that numerous aspects and requirements for them are inextricably intertwined or dependent on other prerequisites before they can be considered for final approval. In other words, none of the above projects stands on their own merit, but instead, they are dependent on the approval of the other applications.

As such, Staff, including Planning & Community Development and Public Services, will not be proceeding with further review of each of these projects in their current form, as it does not appear that any of them can receive ultimate final approval standing individually on their own merit. As Staff has been reviewing the viability of the above referenced projects, the interdependency of one project on the other or on other applications has become readily apparent. Staff does not wish to mislead any applicant regarding the success of an application.

If you wish to discuss the above, a meeting with City staff can be arranged.

Regards,

Mike DaRoza

Mike DaRoza
City Manager

Cc: Kathy Winburn, Planning & Community Development Director
Rodolfo Valladares, Public Services Director
Justin Tabor, AICP, Principal Planner
Adam Hall, AICP, Principal Planner

EXHIBIT
tabbies
A

wood.

Tara Forest, Tara Phoenicia, and Tara Baywood Site Environmental Resource Assessment

Alachua, Florida

Technical Review Report

Prepared for:

City of Alachua

15100 NW 142nd Terrace/ PO Box 9
Alachua, Florida 32616

Prepared by:

Wood Environment & Infrastructure Solutions, Inc.

404 SW 140th Terrace
Gainesville, FL 32601

Prepared by:
Shannon McMorrow, PWS
Senior Scientist

Reviewed by:
Suzy Baird
Senior Scientist

Wood Project No.: 2402210028

December 2021

wood.

Tara Forest, Tara Phoenicia, and Tara Baywood Site Environmental Resource Assessment

Technical Review Report

Alachua, Florida
Project # 2402210028 | City of Alachua

Prepared for:

City of Alachua
15100 NW 142nd Terrace/ PO Box 9, Alachua, FL 32616

Prepared by:

Wood Environment & Infrastructure Solutions, Inc.
404 SW 140th Terrace
Newberry, FL 32669
USA
T: 352.332.3318

December 2021

Table of Contents

List of Tables

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List of Acronyms

CFR	Code of Federal Regulations
City	City of Alachua
ERP	Environmental Resource Permit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FNAI	Florida Natural Areas Inventory
FWC	Florida Fish and Wildlife Conservation Commission
IPaC	Information for Planning and Consultation
SRWMD	Suwannee River Water Management District
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
Wood	Wood Environment & Infrastructure Solutions, Inc.

1.0 Introduction

1.1 Purpose

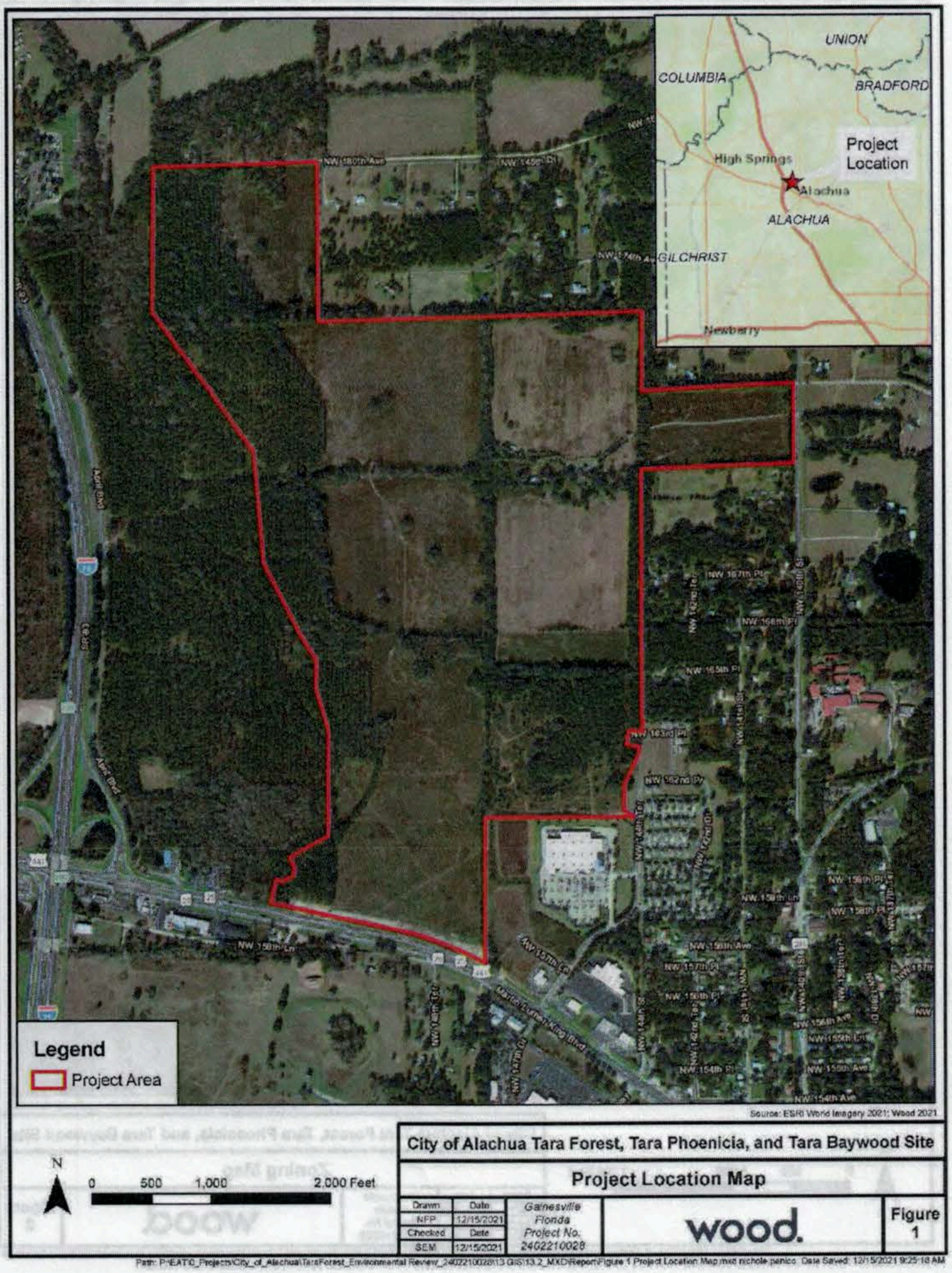
Wood Environment & Infrastructure Solutions, Inc. (Wood) was authorized by the City of Alachua (the City) to perform technical review of the Environmental Resource Assessment Report prepared by Creative Environmental Solutions, Inc (July 2021) for the Tara Forest, Tara Phoenicia, and Tara Baywood Site.

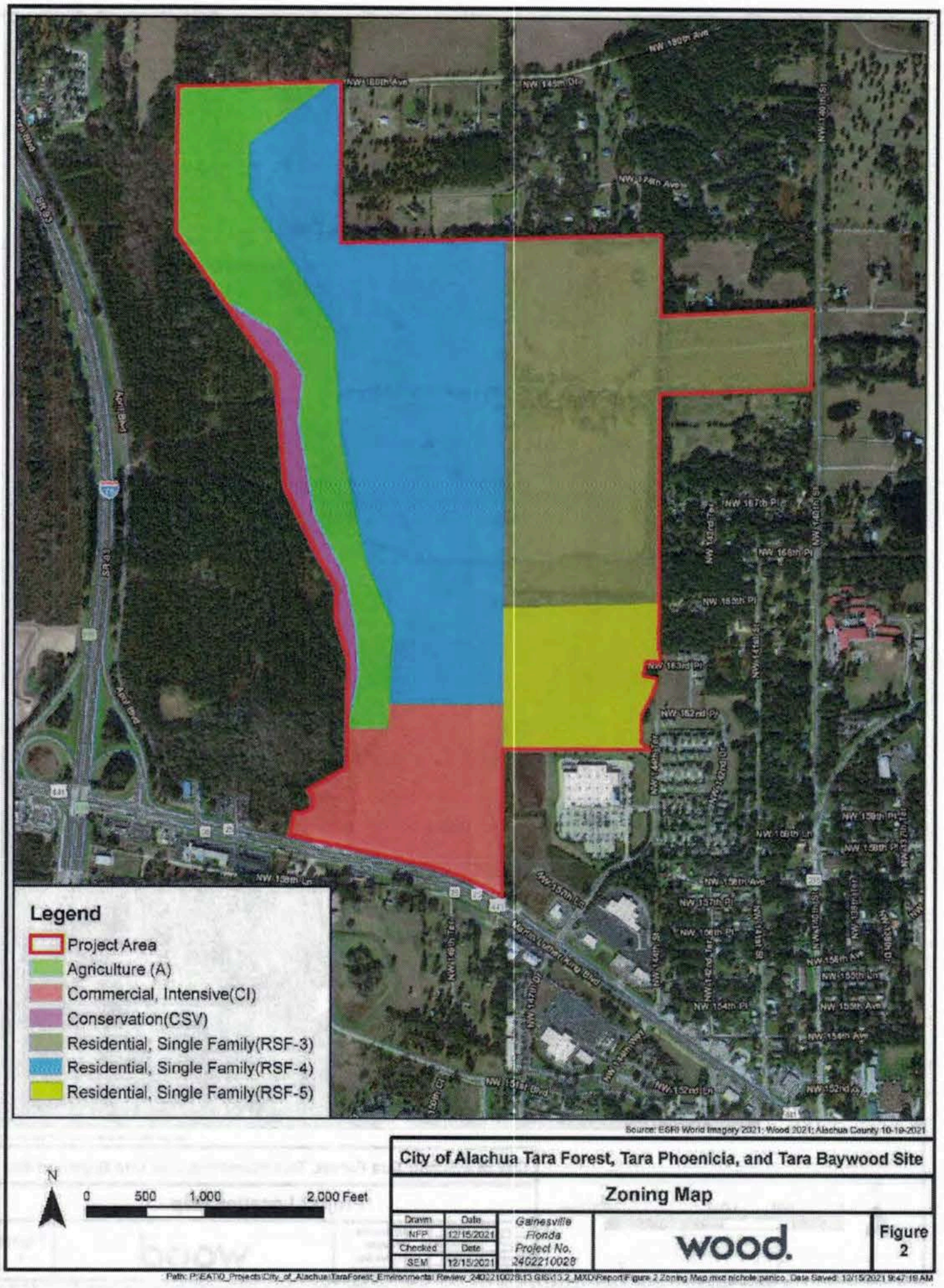
1.2 Background

Tara Forest, LLC. submitted an Environmental Resource Assessment Report to the City for the Tara Forest, Tara Phoenicia, and Tara Baywood Site prepared by Creative Environmental Solutions, Inc. (dated July 2021). The City has requested Wood review the report because the subject parcel is east of and upgradient from Mill Creek and Mill Creek Sink. Due to the Karst environment and presence of sink holes in the vicinity of the Project Site, the City requested a review of readily available information on underground caves, and potential design considerations and/or avoidance areas.

The applicant (Tara Forest, LLC) is seeking to develop a portion of Tara Forest, Tara Phoenicia and Tara Baywood Site (**Figure 1**). The 378 +/- acre property is located northeast of the intersection of Interstate 75 and US Highway 441 and is currently zoned as Agriculture, Commercial, Conservation, and Residential (**Figure 2**).

Wood scientists have reviewed the Environmental Resource Assessment Report to verify if the report findings are professionally acceptable. The findings of the review of the Environmental Resource Assessment are presented in Section 2 and 3.


UNION
COLUMBIA
BRADFORD
Project Location
High Springs
Alachua
ALACHUA
GILCHRIST
Newberry
NW 180th Ave
NW 174th Ave
NW 167th Pl
NW 166th Pl
NW 165th Pl
NW 163rd Pl
NW 162nd Pl
NW 158th Ave
NW 157th Pl
NW 156th Pl
NW 154th Pl
NW 155th Ave
NW 154th Ave
Legend
Project Area
Source: ESRI World Imagery 2021; Wood 2021
N
0
500
1,000
2,000 Feet
City of Alachua Tara Forest, Tara Phoenicia, and Tara Baywood Site
Project Location Map
Drawn
NFP
Date
12/15/2021
Checked
SEM
Date
12/15/2021
Gainesville Florida
Project No. 2402210028
wood.
Figure 1


Legend
Project Area
Agriculture (A)
Commercial, Intensive(CI)
Conservation(CSV)
Residential, Single Family(RSF-3)
Residential, Single Family(RSF-4)
Residential, Single Family(RSF-5)
N
0 500 1,000 2,000 Feet
City of Alachua Tara Forest, Tara Phoenicia, and Tara Baywood Site
Zoning Map
Drawn NFP Date 12/15/2021
Checked SEM Date 12/15/2021
Gainesville Florida Project No. 2402210028
wood.
Figure 2

2.0 Environmental Assessment and Listed Species Survey Review

Wood environmental scientists conducted a desktop review and site assessment to confirm or deny the findings of the Environmental Resource Assessment report. The site assessment included review of wetland delineation lines for consistency with 1987 United States Army Corps of Engineers (USACE) "Corps of Engineers Wetlands Delineation Manual" and the Florida wetland delineation method, "Delineation of the Landward Extent of Wetlands and Surface Waters" (Chapter 62-340). In addition, the site was reviewed for potential presence of protected species or their habitat.

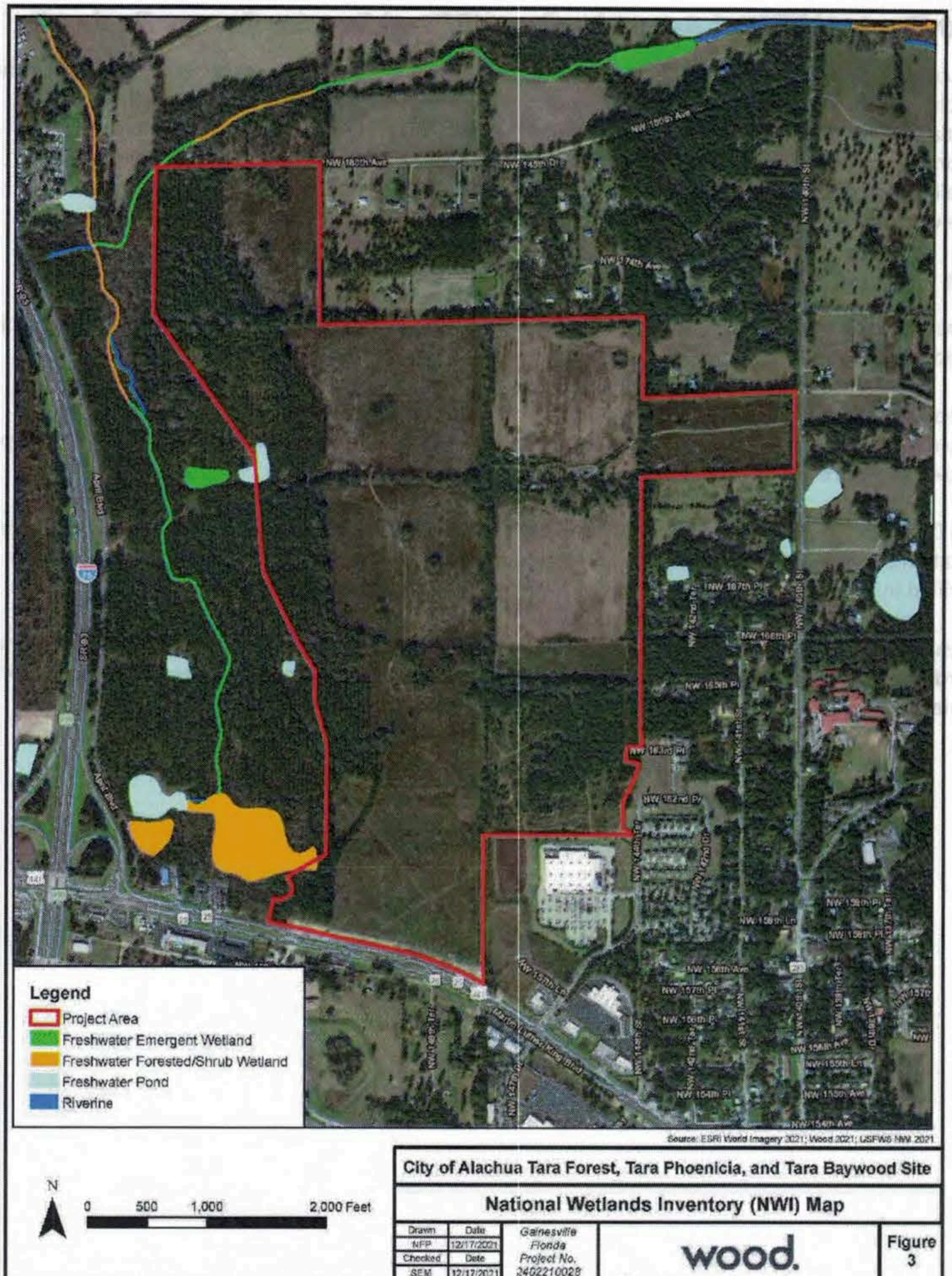
2.1 Wetland Delineation Review

Creative Environmental Solutions scientists delineated the wetland habitat on and adjacent to the subject property on June 11, 2021.

Wood scientist reviewed the USFWS National Wetland Inventory and NRCS soils (provided in the Environmental Resource Assessment report) to aid in identification of wetlands. The USFWS NWI map is shown as **Figure 3**.

On December 14, 2021, Wood scientists reviewed the wetland delineation and agreed with the general location of the wetland boundary lines. Prior to development, the wetland delineation will need to be verified by Alachua County and Suwannee River Water Management District (SRWMD).

Creative Environmental Solutions, Inc. also mapped upland habitats throughout the property as upland hardwood forest, mixed hardwood-pine, floodplain marsh, and coniferous plantation. Wood scientists reviewed the property and generally agreed with Creative Environmental Solutions assessment.


Legend
Project Area
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
N
0
500
1,000
2,000 Feet
City of Alachua Tara Forest, Tara Phoenicia, and Tara Baywood Site
National Wetlands Inventory (NWI) Map
Drawn
NFP
Date
12/17/2021
Checked
SEM
Date
12/17/2021
Gainesville
Florida
Project No.
2402210028
wood.
Figure
3

2.2 Threatened & Endangered Species Review

Creative Environmental Solutions scientists performed a desktop survey for the potential presence of threatened and endangered species using Florida Natural Areas Inventory (FNAI) and performed a site investigation for evidence of listed species and their habitat. Wood scientists reviewed the Creative Environmental Solutions assessment. The methods used by Creative Environmental Solutions are consistent with methods that Wood scientists follow for listed species evaluations. However, we also use the USFWS Information for Planning and Consultation (IPaC) Resource List Report (USFWS, 2021a). The IPaC resources list report includes an informal list of endangered species, critical habitat, migratory birds, wildlife refuges, and wetlands (collectively referred to as trust resources) under the USFWS jurisdiction that are known or expected to be on or near the project area (**Appendix A**).

The IPaC resources list included three species not included in the FNAI species list for the project site. These included the eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*), the frosted flatwoods salamander (*Ambystoma cingulatum*), and Monarch Butterfly (*Danaus plexippus*). **Table 1** outlines the species listed in the IPaC resource lists, their preferred habitat, and if that preferred habitat is found on the subject property. Foraging habitat for the eastern black rail (freshwater marshes) is noted as being present in the wetlands of the subject property. Although the frosted flatwoods salamander was listed by IPAC for the subject property, the current range for this species does not overlap with the subject property (USFWS, 2021b). The monarch butterfly was recently announced as a candidate species by USFWS, but it is not yet listed or proposed for listing, and there are no Section 7 of the Endangered Species Act requirements at this time (USFWS, 2021b). Creative Environmental Solutions also did not discuss several state listed wildlife species that were listed by FNAI as potentially occurring on the subject site. These species include the burrowing owl and the Florida mouse. These species, their preferred habitat, and if that preferred habitat is found on the subject property is included in **Table 1**.

On December 14, 2021 Wood scientists evaluated the onsite habitat compared with preferred habitats for the listed species identified by FNAI and IPaC. Wood scientists agreed with the habitat assessments made by Creative Environmental Solutions scientists. Creative Environmental Solutions observed 2 gopher tortoise burrows, and Wood scientists observed a third burrow on December 14, 2021 (**Figure 4**). Based on Creative Environmental Solutions assessment, they anticipate 6.8 (7) gopher tortoises inhabit the site. Prior to development, a Florida Fish and Wildlife Conservation Commission (FWC) compliant gopher tortoise survey would be required.

Creative Environmental Solutions did not discuss the state listed plant species that may occur on the subject property. **Table 1** includes the listed plants identified in the FNAI species report. No listed plant species are anticipated to occur on the subject property, and were not observed during Wood's site assessment on December 14, 2021.

No threatened or endangered wildlife or plant species were observed during Wood's site assessment.

2.3 Tree Protection

The Creative Environmental Solutions report did not discuss tree protection. Wood scientists observed many large trees on the property. If large trees are to be removed as part of the development, a City of Alachua Tree Removal Permit will be required.

Table 1. Threatened and Endangered Species with Potential for Occurrence on the Project Area

Scientific Name[(a)]	Common Name[(a)]	Listing Status [(a)]	Preferred Habitat [(b)]	Habitat Present on Project Site[(d)]
Laterallus jamaicensis ssp. *jamaicensis*	Eastern Black Rail	PT	Salt, brackish, and freshwater marshes[(c)]	Yes
Ambystoma cingulatum	Frosted Flatwoods Salamander	FT	Slash and longleaf pine flatwoods with a wiregrass floor and scattered wetlands	No, subject property outside current range of species.
Danaus plexippus	Monarch Butterfly	FC	Milkweed host plant (primarily *Asclepias spp.*) [(c)]	No
Athene cunicularia floridana	Florida Burrowing Owl	ST	Open prairies with little understory vegetation	No, subject property outside current range
Podomys floridanus	Florida Mouse	SSC	Xeric uplands with sandy soils, such as sandhill and scrub	No
Agrimonia incisa	Incised Groove-bur	ST	Fire maintained longleaf pine forest [(f)]	No
Calopogon multiflorus	Many-flowered Grass-pink	ST	Dry to moist flatwoods with longleaf pine, wiregrass, saw palmetto [(e)]	No
Hartwrightia floridana	Hartwrightia floridana	ST	Seepage slopes, edge of baygalls and springheads, wet prairies, and wet flatwoods [(e)]	No
Litsea aestivalis	Pondspice	SE	Peaty soils in edges of baygalls, flatwoods ponds, and cypress domes [(e)]	No
Matelea floridana	Florida Spiny-pod	SE	Upland hardwood forests [(f)]	Yes
Pycnanthemum floridanum	Florida Mountain Mint	ST	Wet swales/depressions in pine flatwoods, wet prairies, floodplain forest [(f)]	No
Salix floridana	Florida Willow	SE	Very wet, calcareous soils usually in dense floodplain forest [(f)]	No
Sideroxylon alachuense	Silver Buckthorn	SE	Upland hardwood forests around lime sinks and on shell mounds [(e)]	No

Prepared by: SEM Checked by: JLM

Note:

PT = Federally Proposed Threatened
FT = Federally Designated Threatened
FE = Federally Designated Endangered
ST = State Designated Threatened
FC = Federal Candidate
SE = State Endangered

Sources:

(a) USFWS. 2021a. IPaC Resource Report. 12/9/2021. Generated from website: https://ecos.fws.gov/ipac/.
(b) Preferred habitat determined using FWC species profiles (FWC 2021), unless otherwise stated
  a. FWC. 2021. Species Profiles. Website accessed December 2021: https://myfwc.com/wildlifehabitats/profiles/.
(c) Preferred habitat determined using USFWS species profiles (USFWS 2021b)
  a. USFWS. 2021b. Southeastern Wildlife, Species Profiles. Website accessed December 2021: https://www.fws.gov/southeast/wildlife/.
(d) Wood. 2021. Site Visit on December 14, 2021.
(e) FNAI, 2019. Florida Natural Area Inventory Field Guide. Species Field Guides - Florida Natural Areas Inventory (fnai.org).
(f) Nature Serve, 2021. Nature Server Explorer. Search Results | NatureServe Explorer . Accessed December 15, 2021.


Legend
Project Area
Active Observed by Creative Environmental Solutions
Active Observed by Wood
Inactive Observed by Creative Environmental Solutions
N
0 500 1,000 2,000 Feet
Source: ESRI World Imagery 2021; Wood 2021
City of Alachua Tara Forest, Tara Phoenicia, and Tara Baywood Site
Approximate Location of Gopher Tortoise Burrows Map
Drawn Date
NFP 12/15/2021
Checked Date
SEM 12/15/2021
Gainesville Florida Project No. 2402210028
wood.
Figure 4

3.0 Geological Assessment

Creative Environmental Solutions' report indicated "No significant Geological Features (caves, springs, sinkholes, etc.) were observed on the site". They also indicated there were no surface features observed that indicated a direct connection to the Floridan aquifer.

According to Butt et al. (2006), the Mill Creek Sink Cave is located along the southern perimeter of the project site (**Figure 5**) and is a direct connection to the Floridan Aquifer.

The entire study area is known to be underlain with an extensive cave network and to have active karst features such as sinkholes, swallets (sinking streams), and areas that have experienced substantial subsidence. The sink noted just off the southwest corner of the property in the Creative Environmental Solutions report and shown in (**Figure 5**) is the Mill Creek Sink and is a very large water-filled sinkhole providing direct diver access to a large tunnel network in the upper Florida Aquifer.

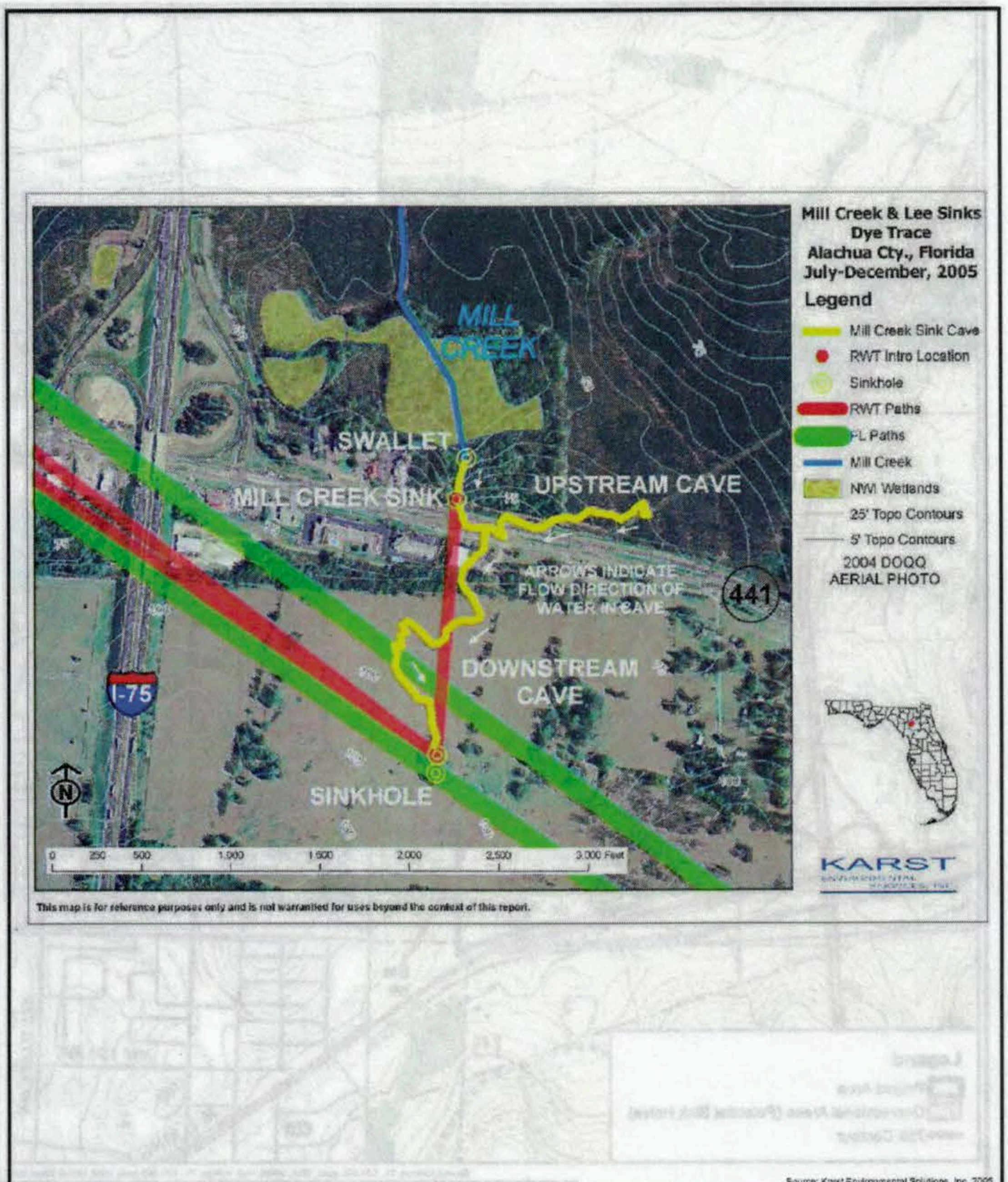
Based on a comparison of the site topographic information since 1962 (USGS), the entire western boundary of the property (<75ft elevation) appears to be an area potentially experiencing active ground subsidence. Based on the 1962 topographic map there are sinkholes present at multiple locations along this western boundary. The historical topographic maps (USGS), also indicate the presence of a sinkhole in the northwestern portion of the site and in the general vicinity of the northern portion of the eastern boundary (**Figure 6**).

The Mill Creek Sink is directly connected to the Upper Floridan Aquifer and there at least two features shown on the 1962 topographic map along Mill Creek stream valley that appear to be swallets; one immediately adjacent to the western boundary of the property (in the lower 1/3rd of the property boundary) and the other on the western side of Mill Creek immediately south and west of the first one) (**Figure 6**). There are isolated locations along the northern and eastern portion of the property and in at least one stream valley cutting diagonally across the property that appear to be exhibiting ground subsidence consistent with the formation and development of sinkholes. Whether or not these types of features are directly connected to the Floridan Aquifer would need to be demonstrated in the field.

3.1 Avoidance Areas and Recommendations

In general, within the lower Mill Creek Valley (elevation < 75 ft contour, western portion of the property), may be susceptible to subsidence, and development in these areas should consider the possibility of subsidence or sinkhole formation. Further, the depressional areas and stream valleys identified in **Figure 6**, and the Mill Creek Sink Cave shown in **Figure 5**, may experience more settlement over time, with potential for sink hole formation.

Wood recommends evaluating the likelihood of ground loss due to karst by performing site-specific engineering and geological studies. Following additional investigation, Wood recommends avoiding development in areas that have shown ground loss between the 1960's and today and selecting areas for development at higher elevations.



City of Alachua Tara Forest, Tara Phoenicia, and Tara Baywood Site

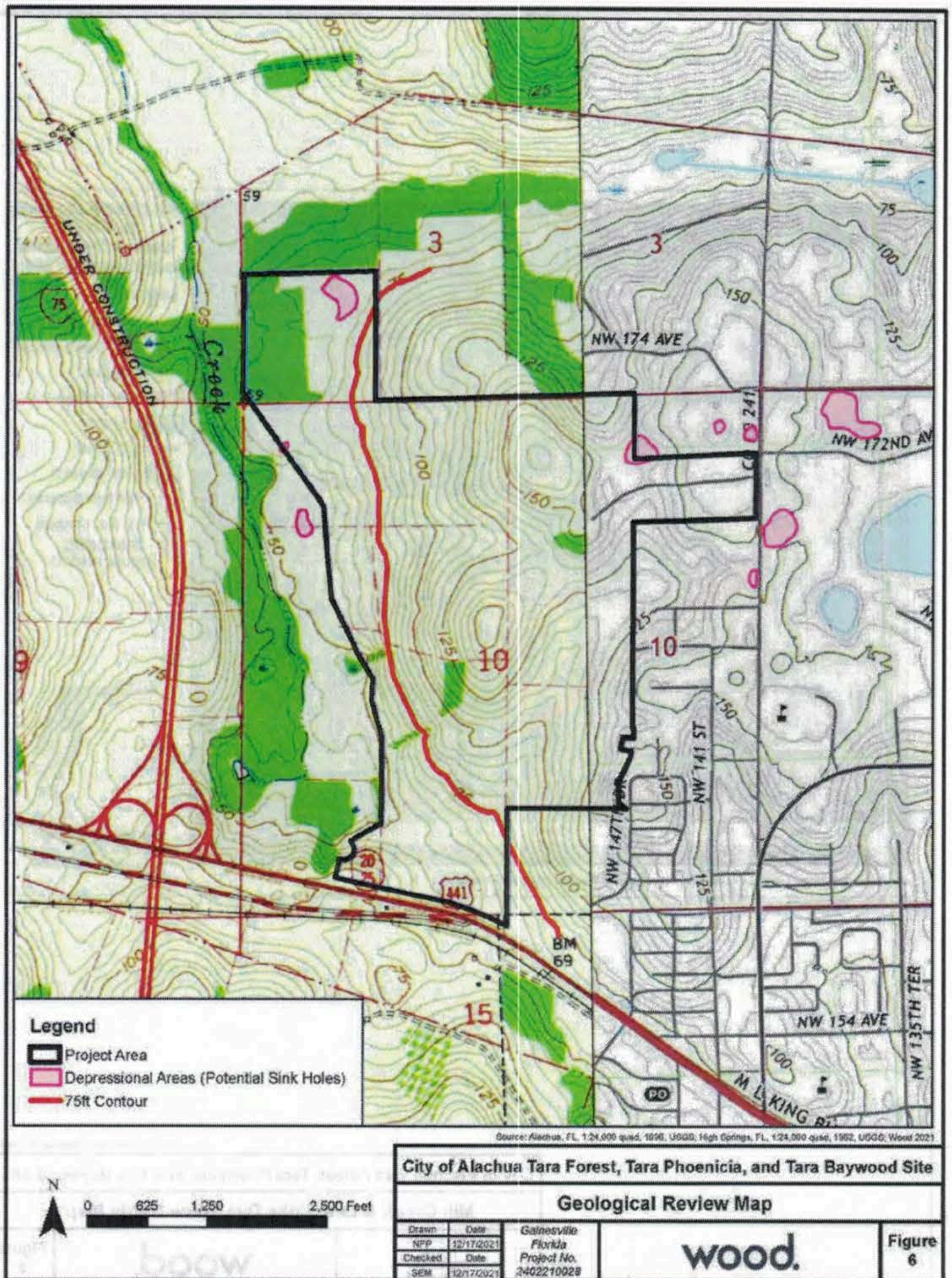
Mill Creek & Lee Sinks Dye Trace Study Map

Gainesville
Florida
Project No.
2402210028

wood.

Figure
5

Path: \\GNV-FS1\projects\EAT\0_Projects\City_of_Alachua\TaraForest_Environmental Review_2402210028\13 GIS\13.2_MXD\Report\Figure 5 Mill Creek & Lee Sinks Dye Trace Study Map.mxd nichole.panico Date Saved: 12/15/2021 10:16:44 AM


UNDER CONSTRUCTION
Creek
NW 174 AVE
NW 172ND AV
NW 147 TER
NW 141 ST
NW 154 AVE
NW 135TH TER
M L KING BL
BM 69
Legend
Project Area
Depressional Areas (Potential Sink Holes)
75ft Contour
Source: Alachua, FL, 1:24,000 quad, 1990, USGS; High Springs, FL, 1:24,000 quad, 1992, USGS; Wood 2021
N
0 625 1,250 2,500 Feet
City of Alachua Tara Forest, Tara Phoenicia, and Tara Baywood Site
Geological Review Map
Drawn NPP Date 12/17/2021
Checked SEM Date 12/17/2021
Gainesville Florida Project No. 2402210028
wood.
Figure 6

4.0 Summary and Conclusions

Wood scientists generally agree with the Environmental Resource Assessment Report for the Tara Forest, Tara Phoenicia, and Tara Baywood Site prepared by Creative Environmental Solutions. Although, the report did not address some of the listed species with the potential to occur on the site, species on the IPAC resources list and state listed plant species, impact to listed species are not anticipated.

Wetlands are protected under Rule 62-330.020 Environmental Resource Permitting of the Florida Administrative Code (F.A.C.), Section 404 of the Clean Water Act [United States Environmental Protection Agency (USEPA)], and Alachua County Code of Ordinances (Part II, Title 7, Chapter 77). If future development includes impacts to these wetlands or the wetland buffer (as defined by Alachua County and SRWMD) Environmental Resource Permit (ERP) and Alachua County development permits will be required.

The assessment of geologic features within the subject site did not include a thorough review of historical topographic maps or published reports about the karst nature of the surrounding landscape. Section 3 of this report outlines concerns and recommendations associated with the geology of the subject site. Additional site-specific engineering and geological studies are recommended.

5.0 References

Florida Fish and Wildlife Conservation Commission (FWC). 2021. Species Profiles. Website accessed December 2021: https://myfwc.com/wildlifehabitats/profiles/.

Florida Natural Area Inventory. 2019. Florida Natural Area Inventory Field Guide. Species Field Guides - Florida Natural Areas Inventory (fnai.org).

Butt, P.L., S. Boyes, and T.L. Morris. 2006. Mill Creek and Lee Sinks Dye Trace, July through December 2005. Karst Environmental Services, Inc. for Alachua County Environmental Protection Department. June 7, 2006

Nature Serve. 2021. Nature Server Explorer. Search Results | NatureServe Explorer. Accessed December 15, 2021.

United States Fish and Wildlife Service (USFWS). 2021a. Information for Planning and Consultation (IPaC) Resource Report. 12/9/2021. Generated from website: https://ecos.fws.gov/ipac/.

USFWS. 2021b. Southeastern Wildlife, Species Profiles. Website accessed December 2021: https://www.fws.gov/southeast/wildlife/.

Appendix A
USFWS Information for Planning and Consultation (IPaC) Resource List Report

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Alachua County, Florida

Local office

North Florida Ecological Services Field Office

(904) 731-3336
(904) 731-3045

7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Eastern Black Rail Laterallus jamaicensis ssp. jamaicensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10477	Threatened
Wood Stork Mycteria americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8477	Threatened

Reptiles

NAME	STATUS
Eastern Indigo Snake Drymarchon corais couperi Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/646	Threatened
Gopher Tortoise Gopherus polyphemus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6994	Candidate

Amphibians

NAME	STATUS
Frosted Flatwoods Salamander Ambystoma cingulatum Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/4981	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN

THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

American Kestrel Falco sparverius paulus — Breeds Apr 1 to Aug 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9587

Bald Eagle Haliaeetus leucocephalus — Breeds Sep 1 to Jul 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Great Blue Heron Ardea herodias occidentalis — Breeds Jan 1 to Dec 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Magnificent Frigatebird Fregata magnificens — Breeds Oct 1 to Apr 30
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Swallow-tailed Kite Elanoides forficatus — Breeds Mar 10 to Jun 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8938

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

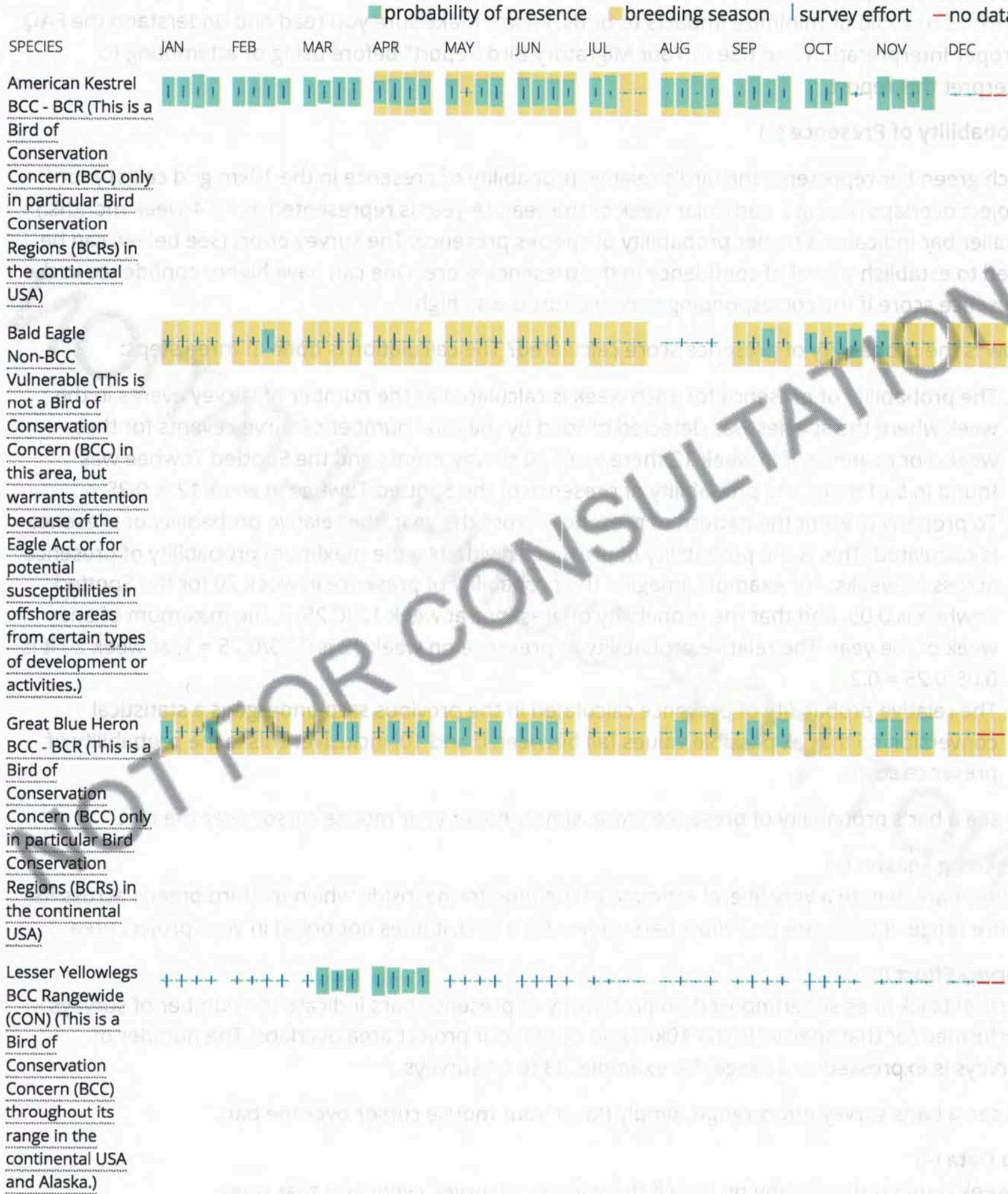
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

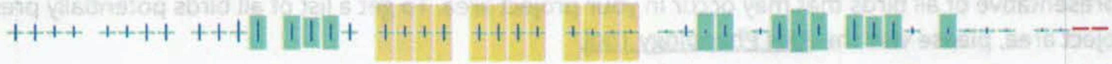
Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Magnificent Frigatebird
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Prairie Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Red-headed Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Swallow-tailed Kite
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Protecting the Aquifer in the Vicinity of Mill Sink

Alachua County Environmental Protection Department
October 1, 2024

Santa Fe River and Springs

A 2013 study attributed $84 million (in recreation alone) to the Santa Fe Springs.

The Aquifer is Vulnerable to Pollution and Overpumping

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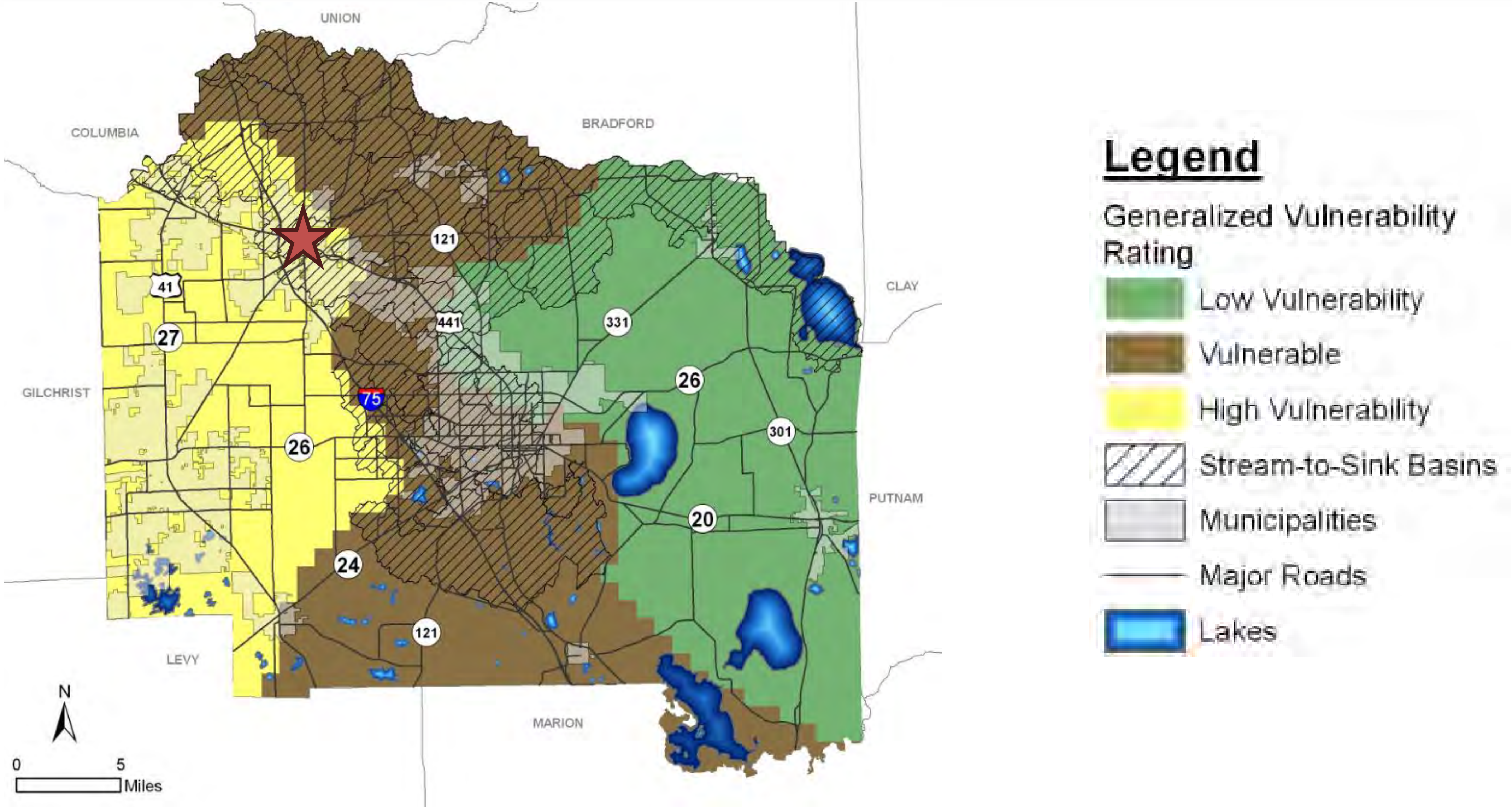
Image from Wes Skiles "Waters Journey (Karst Productions)"

Alachua County Floridan High Aquifer Recharge Map



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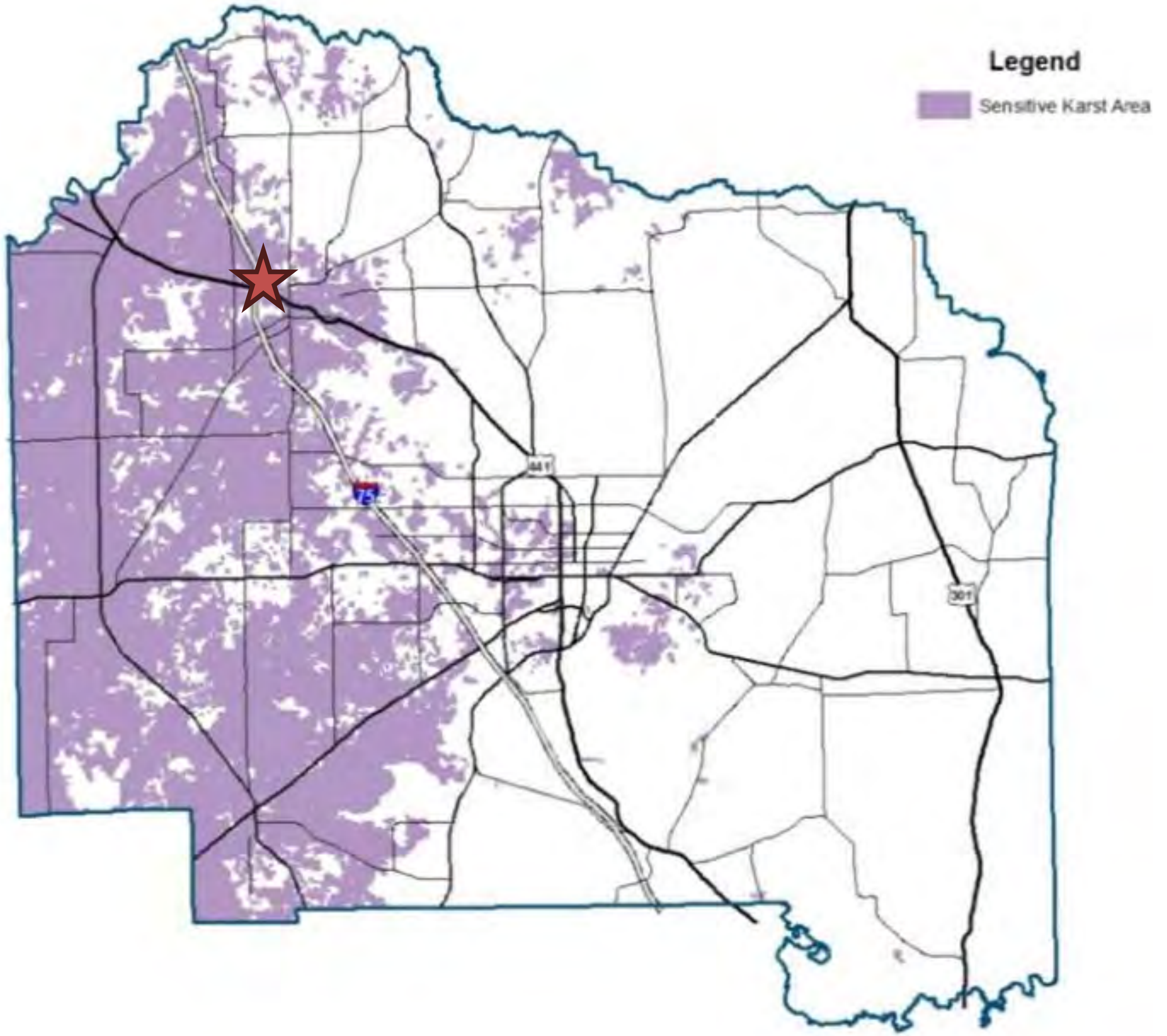
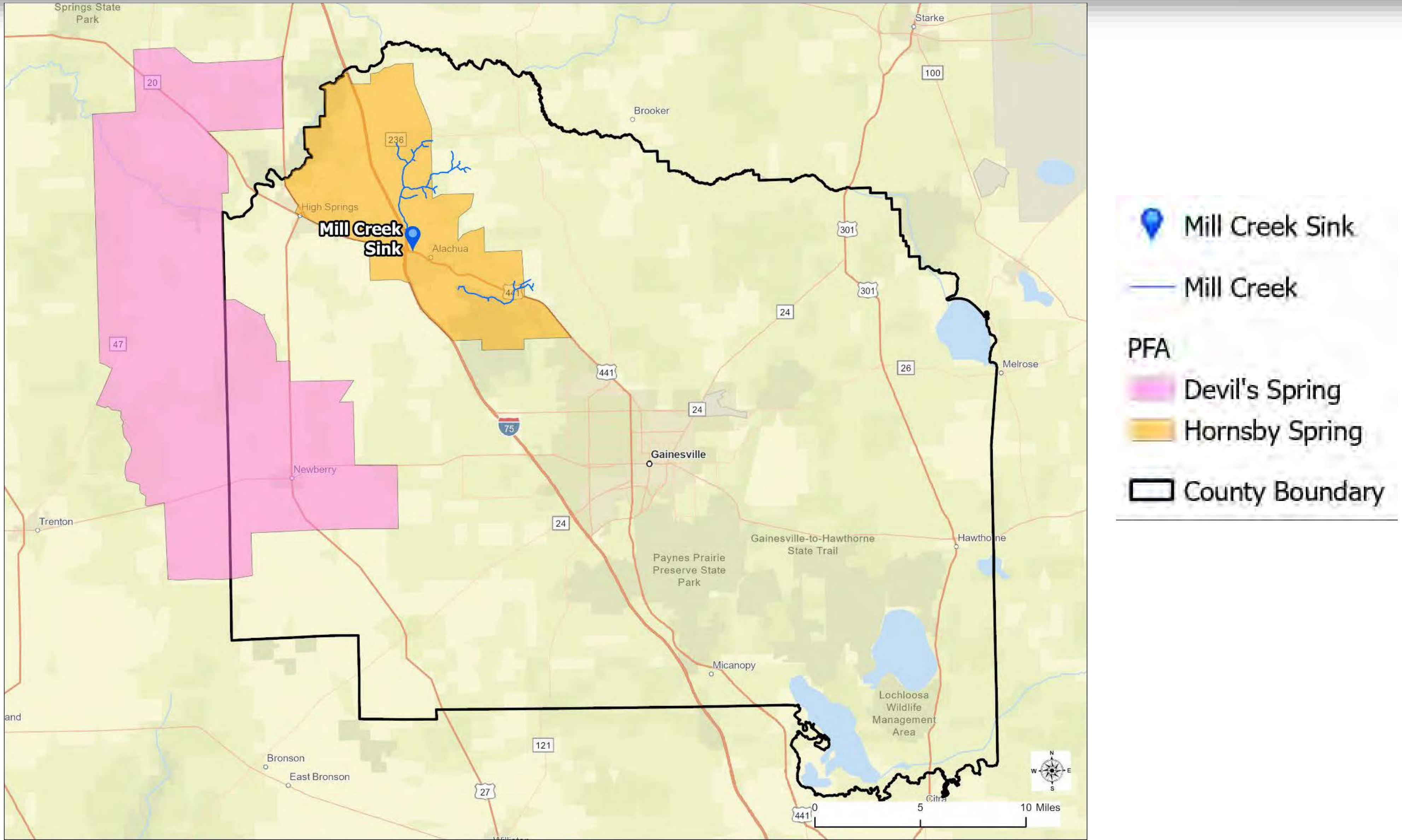
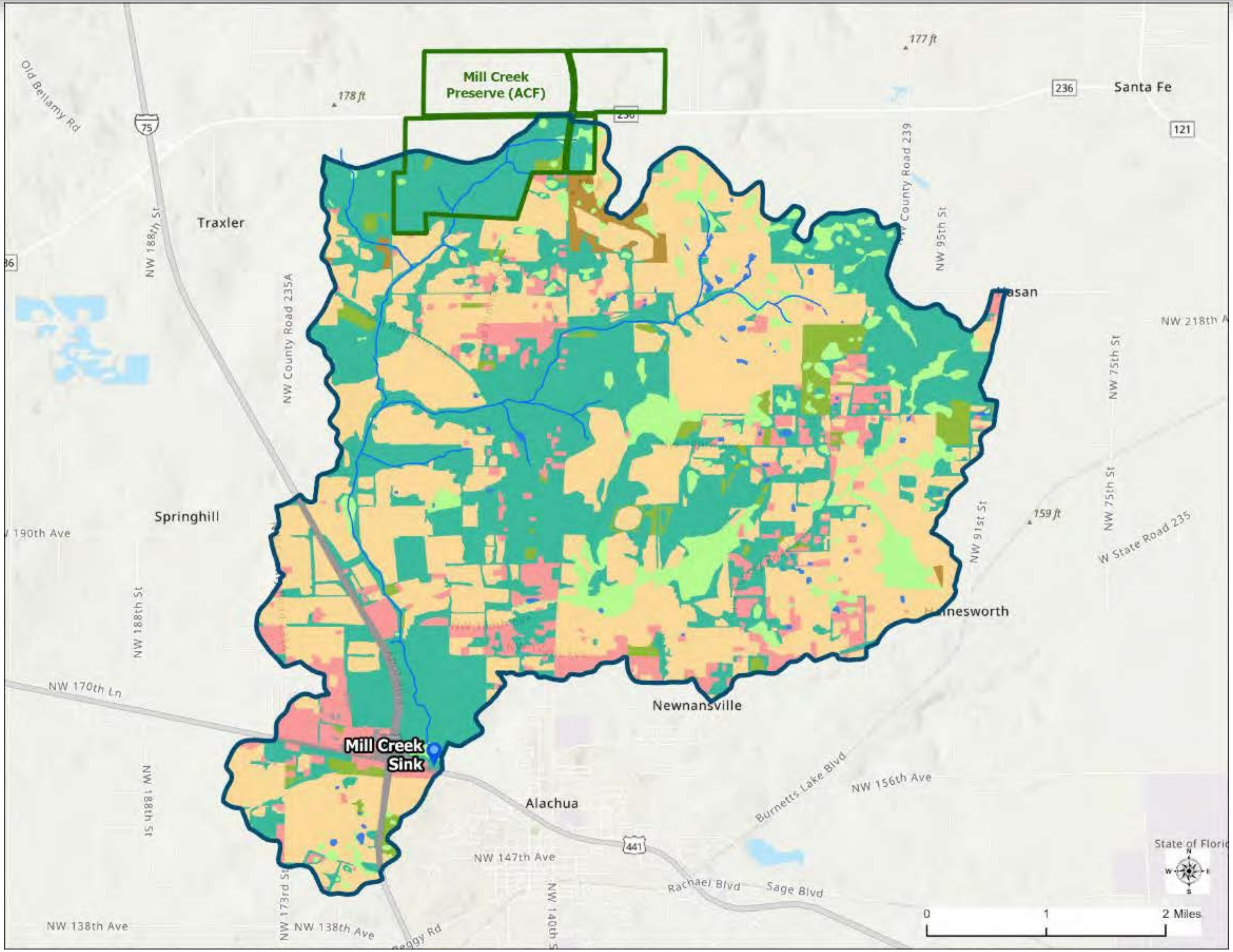
Alachua County Sensitive Karst Areas



Hornsby Springs Priority Focus Area



Mill Creek Watershed



- Mill Creek Sink
- Mill Creek
- Mill Creek Preserve (ACF)
- Mill Creek Watershed

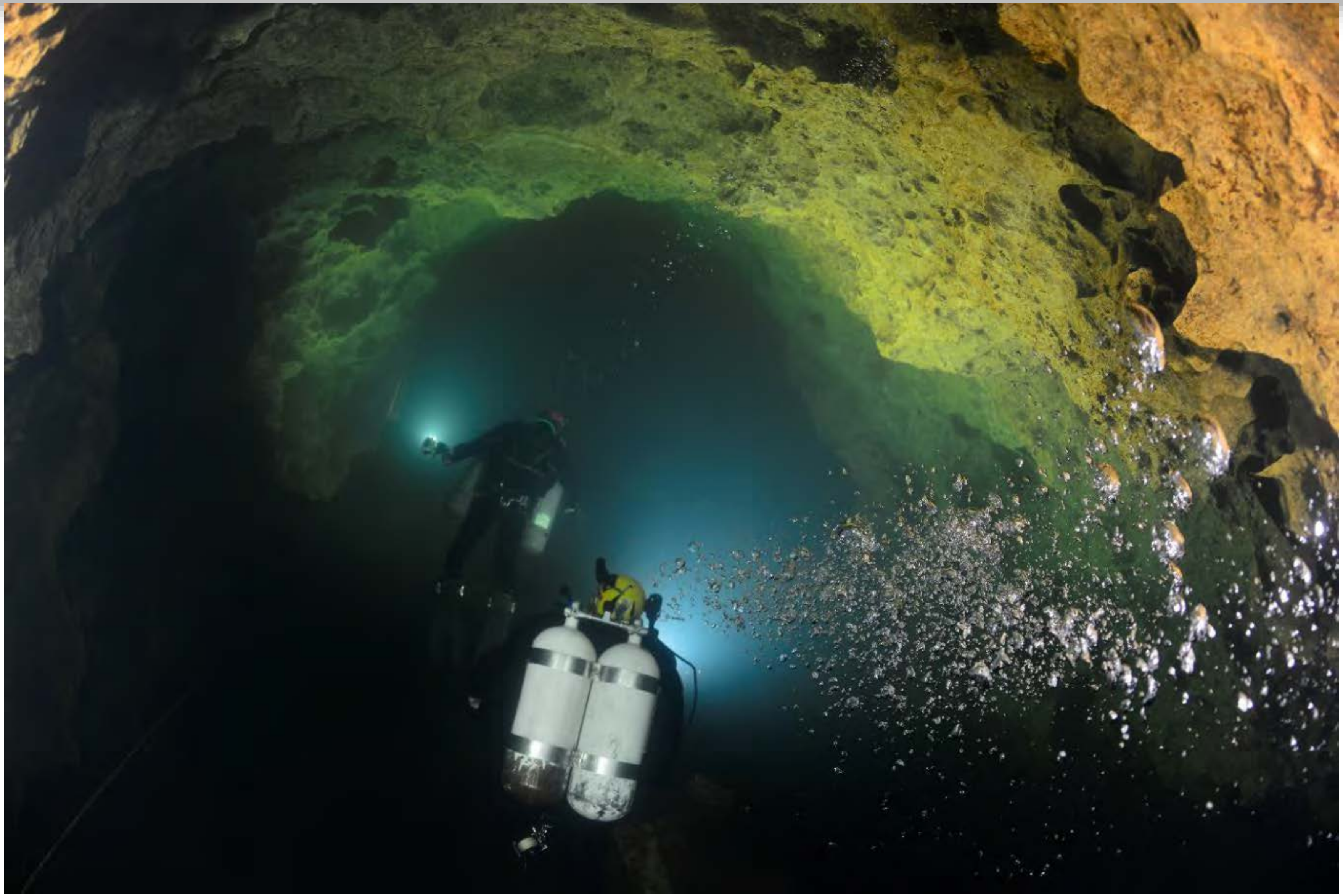
Land-Use Type

- Agriculture
- Barren Land
- Rangeland
- Transportation, Communication, and Utilities
- Upland Forest
- Urban and Built-Up
- Water
- Wetlands

Mill Creek Sink

- **Terminus of Mill Creek and Townsend Branch**
- **Part of an ancient drainage system, connected to Hornsby Spring and the Santa Fe River**
- **Hundreds of feet of mapped cave, several large rooms, and complex system of conduits extending to depths up to 215 feet**

Mill Creek Sink Cave



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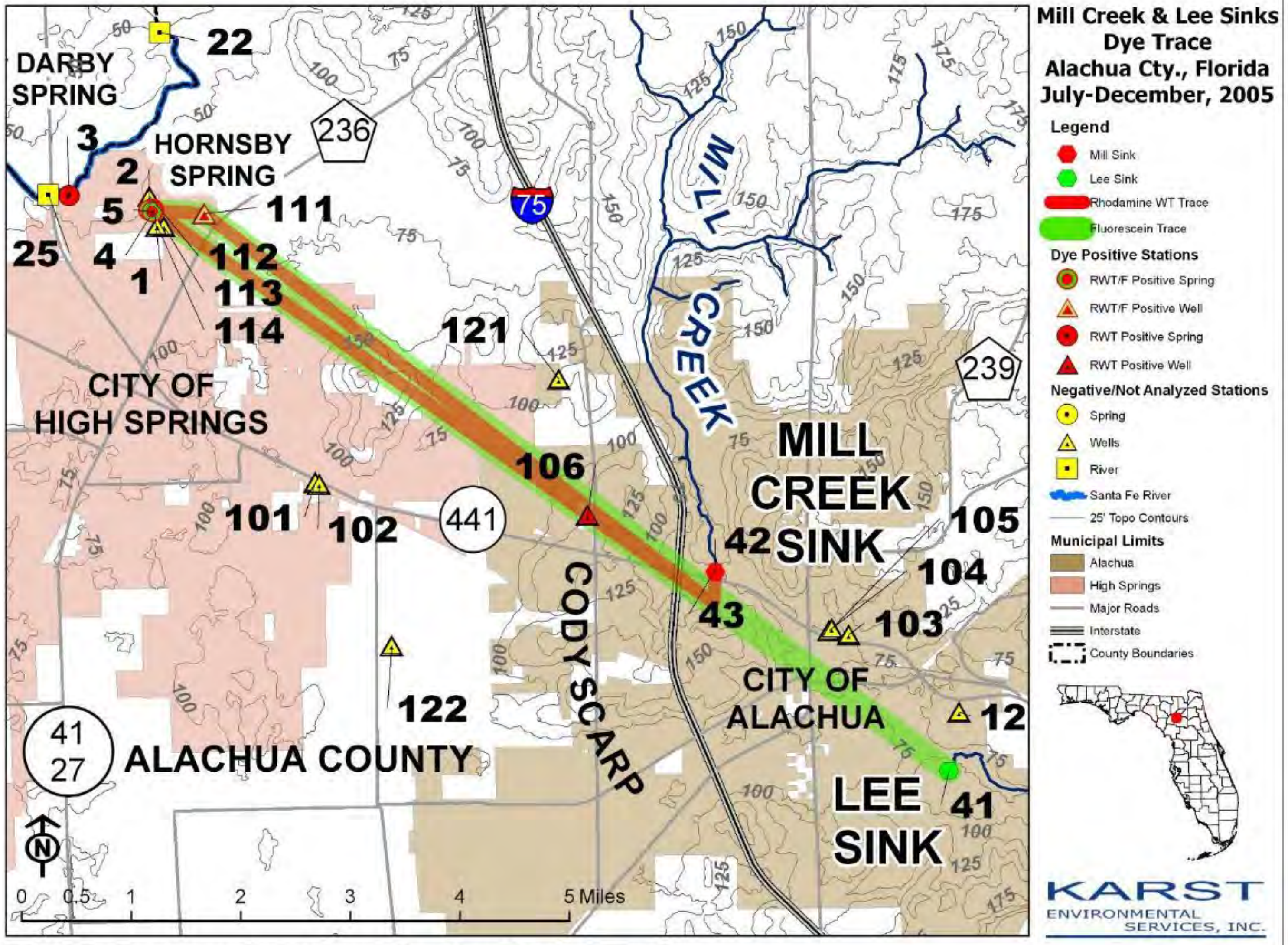
Mill Creek Sink Dye Trace

- **2005 study hydrologically linked Mill Creek Sink to Hornsby Spring and Santa Fe Hills.**
  - **Dye was deployed at the sink and detected 6 miles away at Hornsby Springs within 12 days.**
  - **Detections also reported at Santa Fe Hills Well (1.27 miles away) and Darby Spring (6 miles).**
  - **Dye was detected up to as late as 154 days later at Hornsby Spring.**

Mill Creek Sink Dye Trace



This map is for reference purposes only and is not warrantied for uses beyond the context of this report.

Mill Creek Sink Biological Survey

- **ACEPD and Karst Environmental completed a 2022 survey for Troglobitic Species (cave adapted).**
- **Over 30 cave adapted isopods and amphipods were recorded, 1st ever recording of such species in this location.**
- **One cave adapted crayfish, *Procambarus pallidus* (Florida endemic species) was identified.**

Pallid Cave Crayfish (*Procambarus pallidus*)

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Mill Creek Sink Water Quality Improvement Project

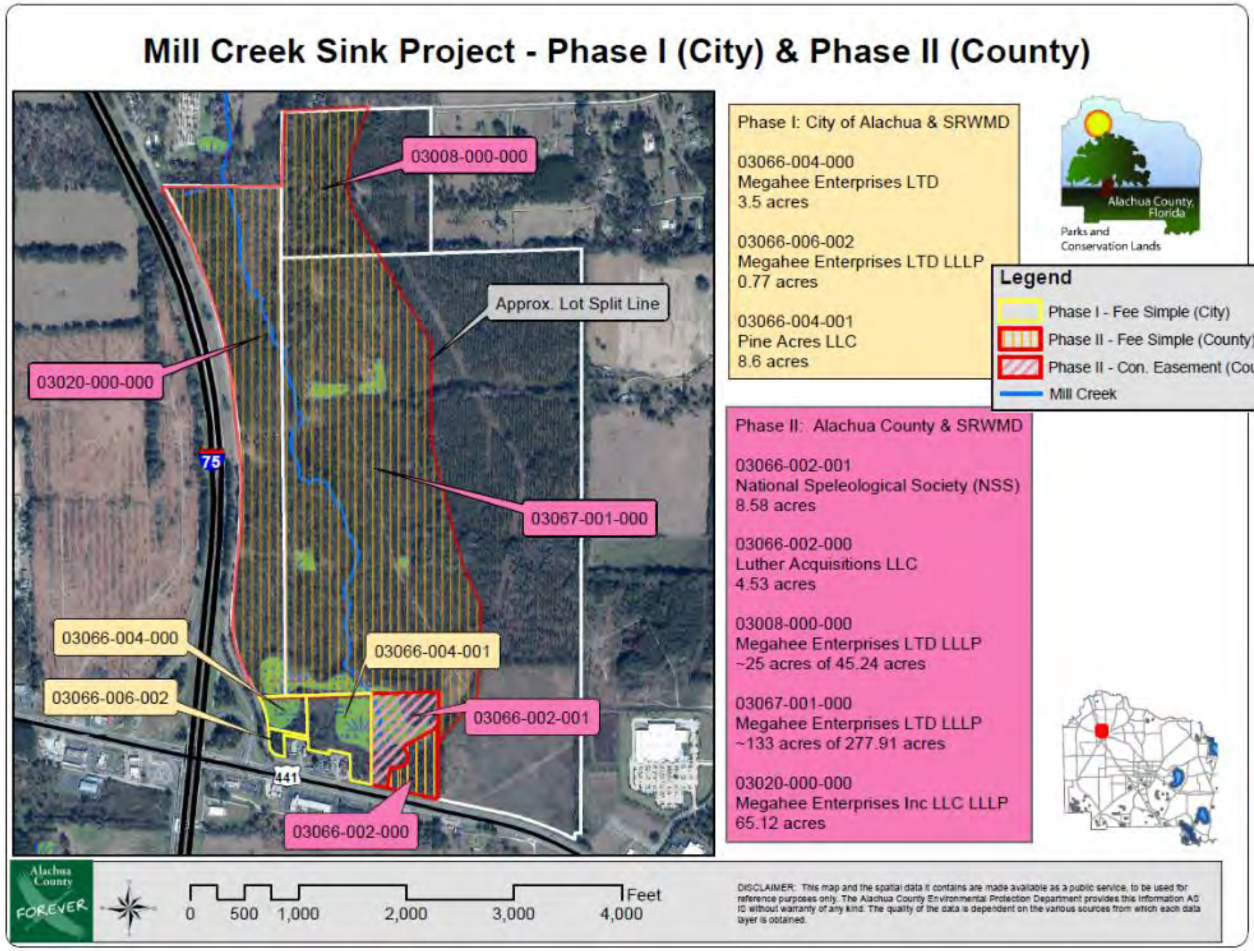
$2M project implemented by the City of Alachua funded by SRWMD and FDEP (Phase I of Mill Creek Sink Project grant).

Mill Creek Sink Water Quality Improvement Project

- **Primary goal to reduce nitrogen loading to the Santa Fe River Basin, which is listed as impaired for nitrogen.**
- **Also intended to remove other pollutants such as heavy metals, polycyclic aromatic hydrocarbons, and suspended solids.**

Land Conservation

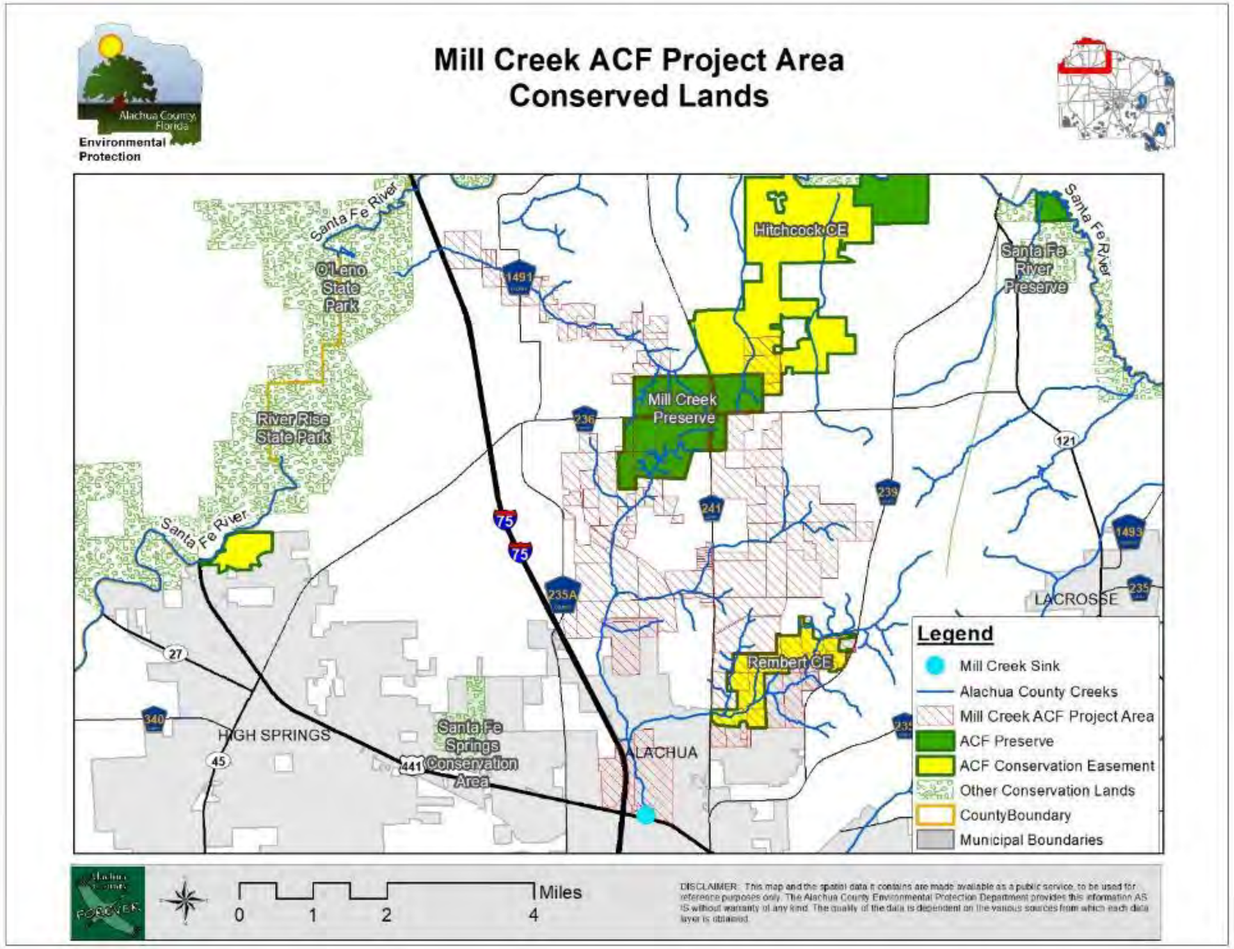
- **Portions of the property were added to the County Active Acquisition List in 2018.**
- **ACEPD received acquisition funding from SRWMD and FDEP. (Phase II of Mill Creek Sink Project grant).**
- **County staff were not able to negotiate an agreement with the current landowner.**



Land Conservation

Mill Creek ACF Project Area

- **Mill Creek Preserve**
- **Rembert Conservation Easement**
- **Hitchcock Ranch Conservation Easement**



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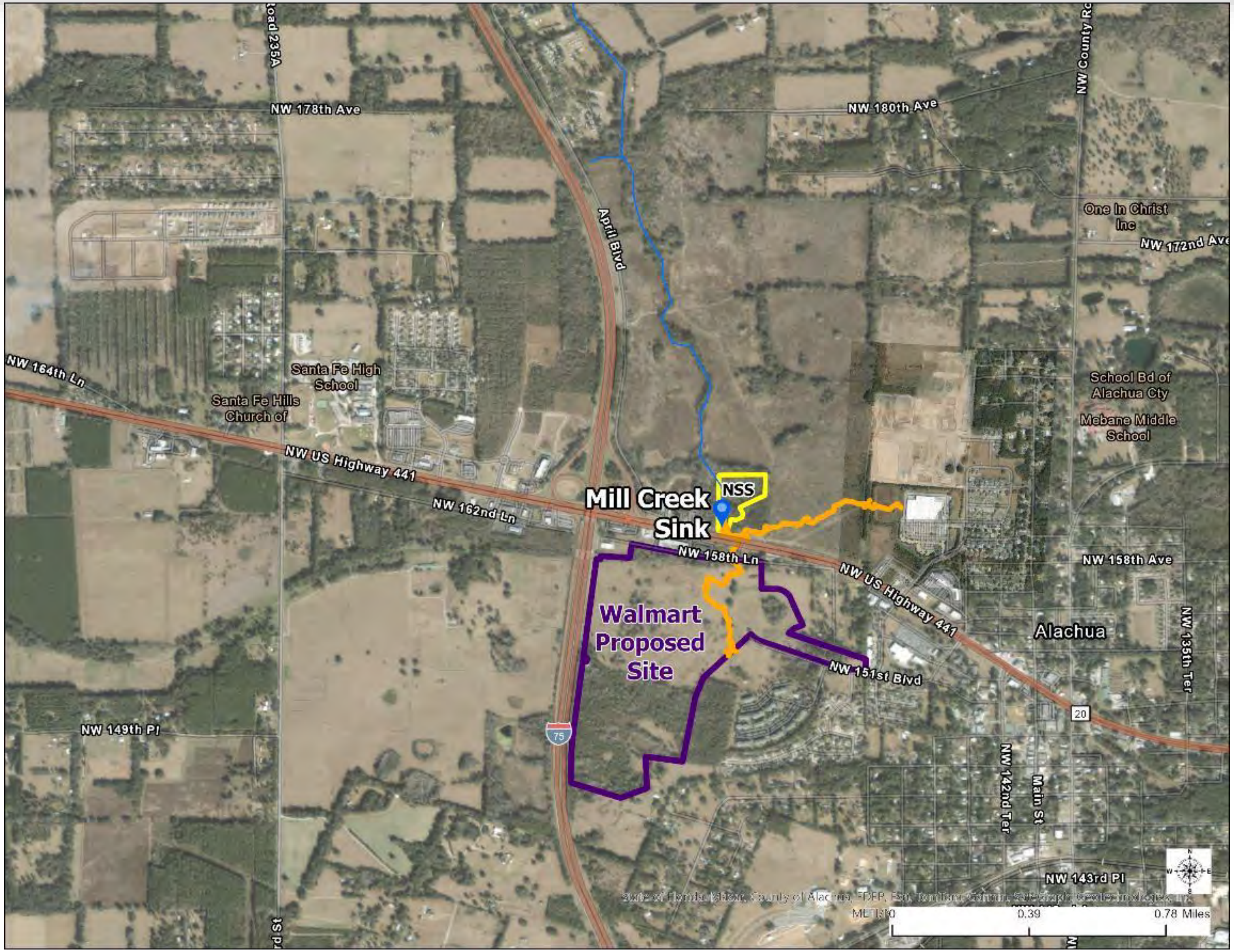
History of Mill Creek Sink Issues and County Involvement

- **Walmart 2006 Agreement**
- **2015 Settlement Agreement and deed restrictions**
- **These discussions played a part in the adoption of Countywide regulations for improved stormwater treatment and an Advanced Stormwater Treatment Manual**

2006 Walmart Proposal



Mill Creek Sink

Mill Creek

2016 Mill Creek Sink Cave System

Mill Creek Sink Nature Preserve (NSS)

Walmart Proposed Site

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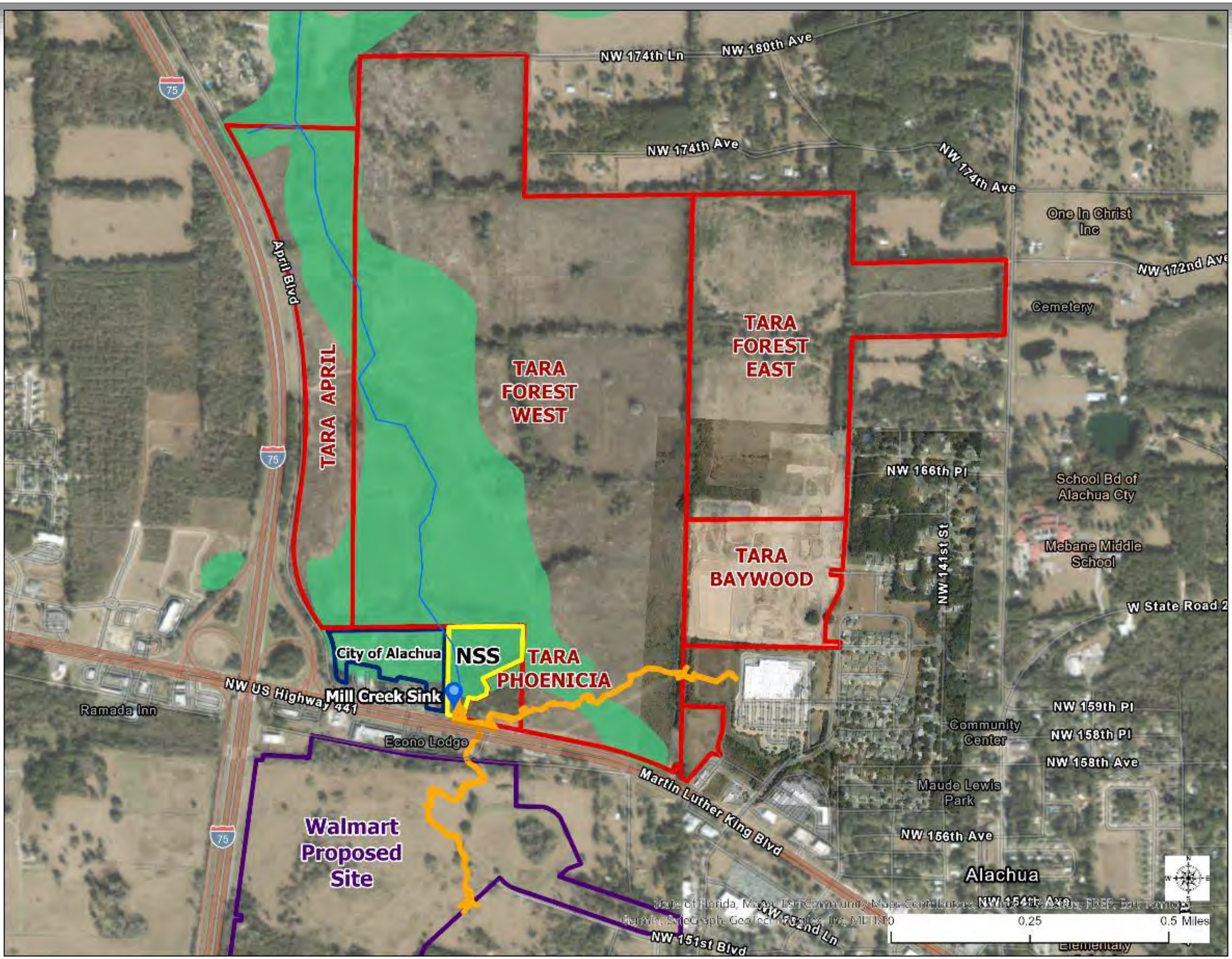
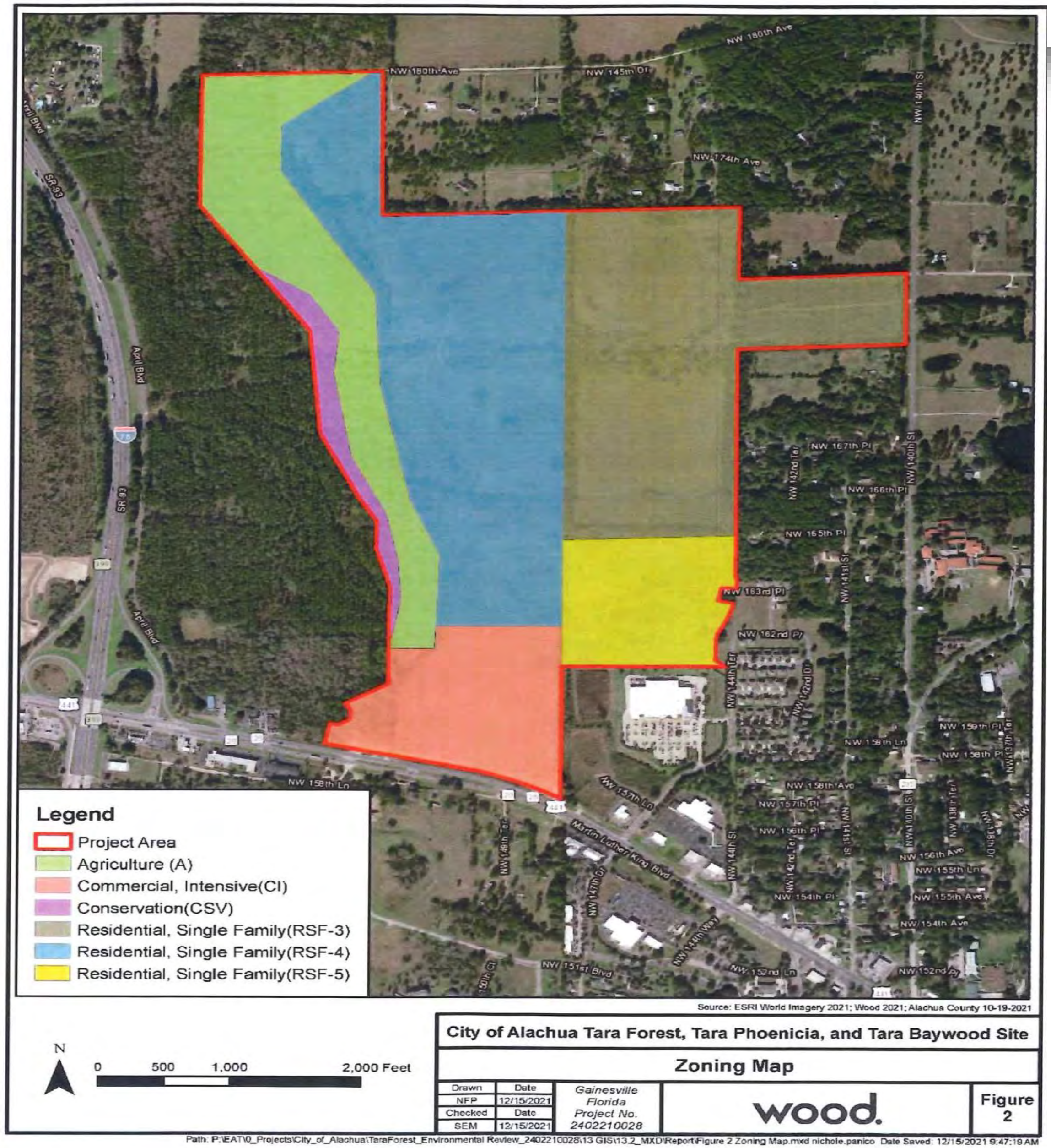
Proposed Tara Developments



- Mill Creek Sink
- Mill Creek
- 2016 Mill Creek Sink Cave System
- Mill Creek Sink Nature Preserve (NSS)
- Tara Subdivisions
- City of Alachua
- Walmart Proposed Site
- Flood Hazard Area

Proposed Tara Developments



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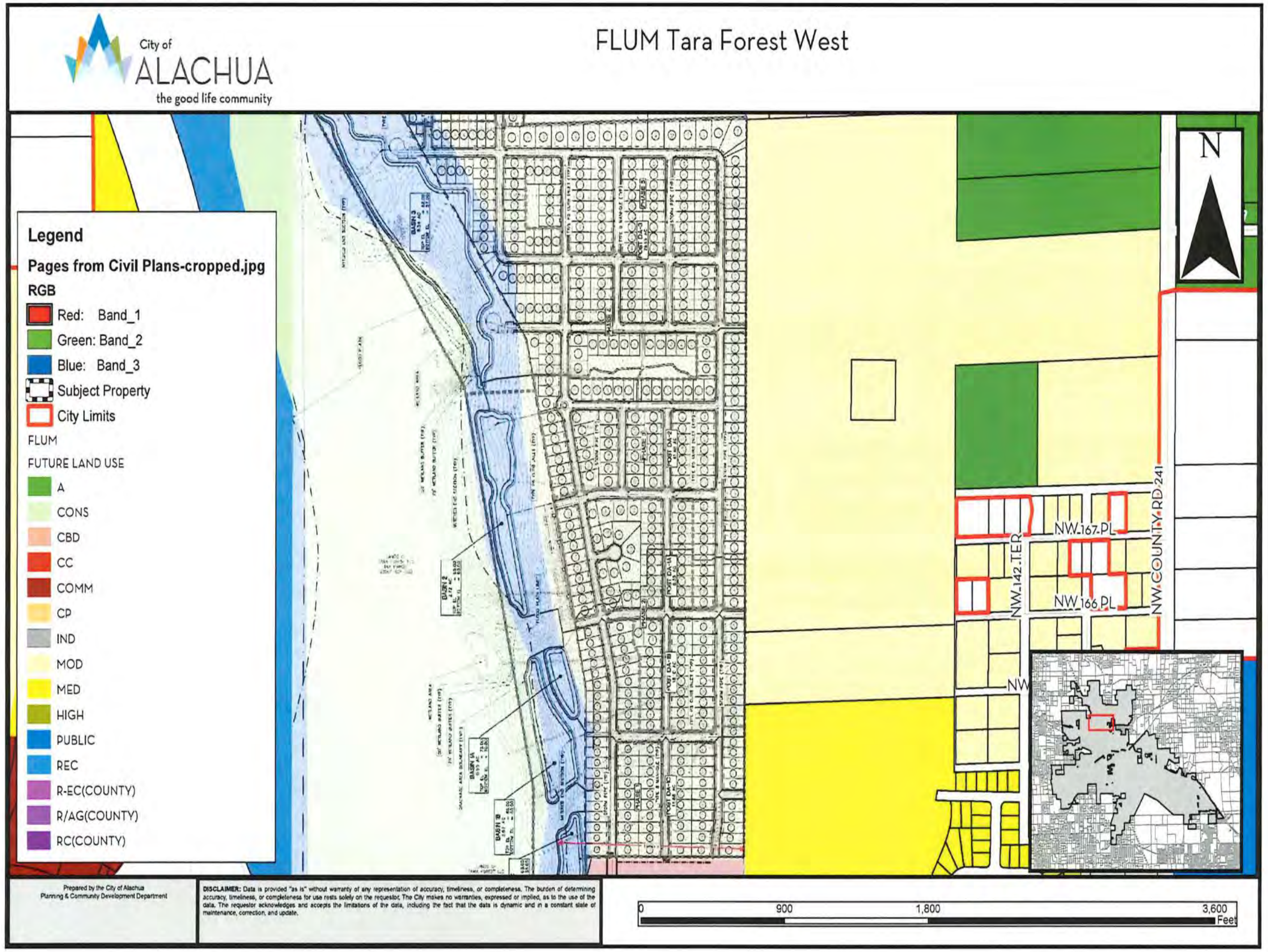
Proposed Tara Developments

Name	Acreage	Proposed Land Use & # Lots	Status
Tara Baywood	36 Ac.	Residential- Townhomes 211 lots	Final Plat Approved (Ph. 2) July, 2024 Under Construction
Tara Forest East	148 Ac.	Residential 340 Lots	Final Plat Approved (Ph. 2) July, 2024
Tara Forest West	395 Ac.	Residential 540 Lots	Preliminary Plat Approved July, 2024
Tara April	Included w/TFW	SW & Floodplain Infrastructure for TF West	Awaiting Public Hearing
Tara Phoenicia	Included w/TFW	Commercial	Under Review

Proposed Tara Developments



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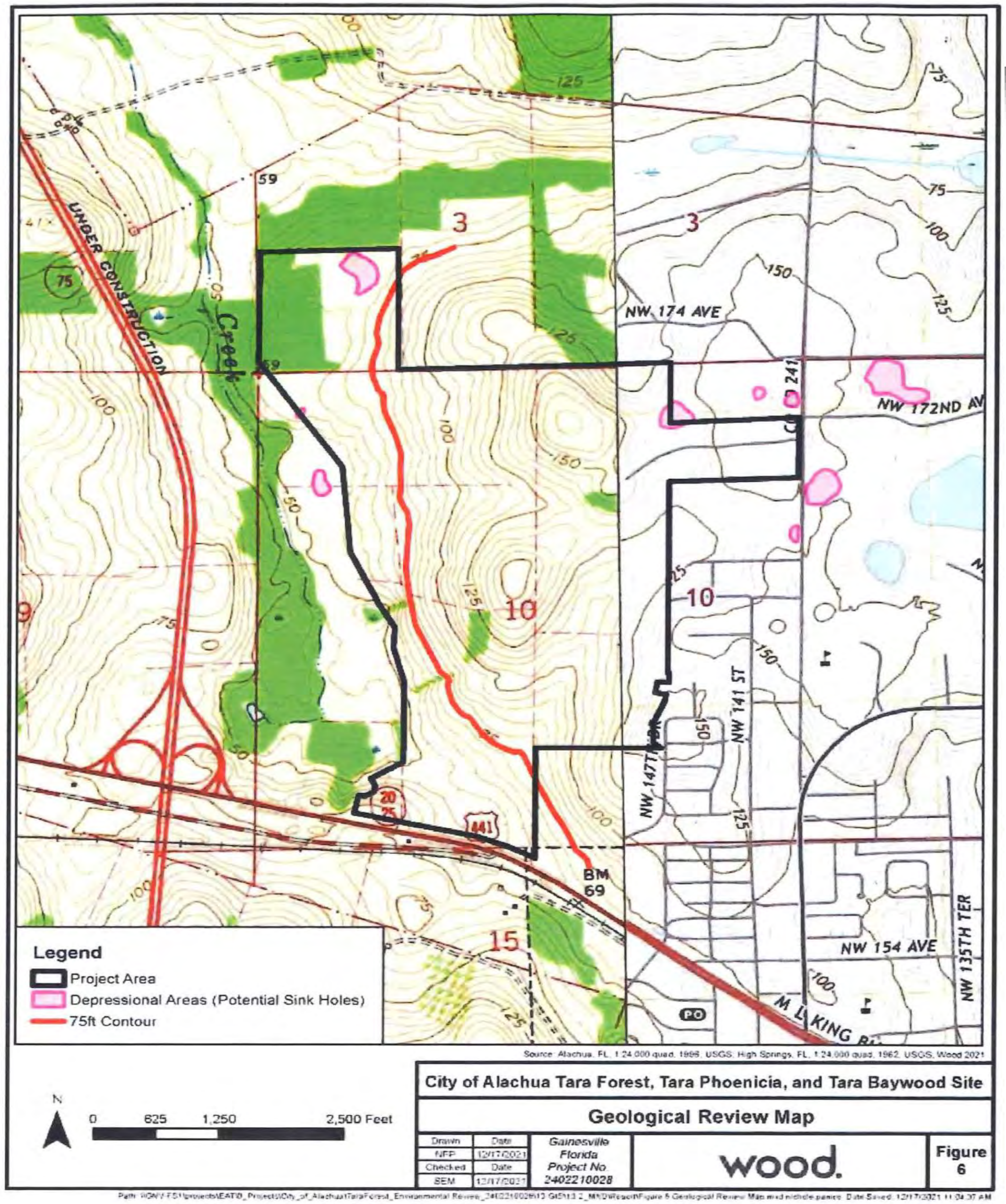
Proposed Tara Developments



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Mill Creek Sink – Development Concerns

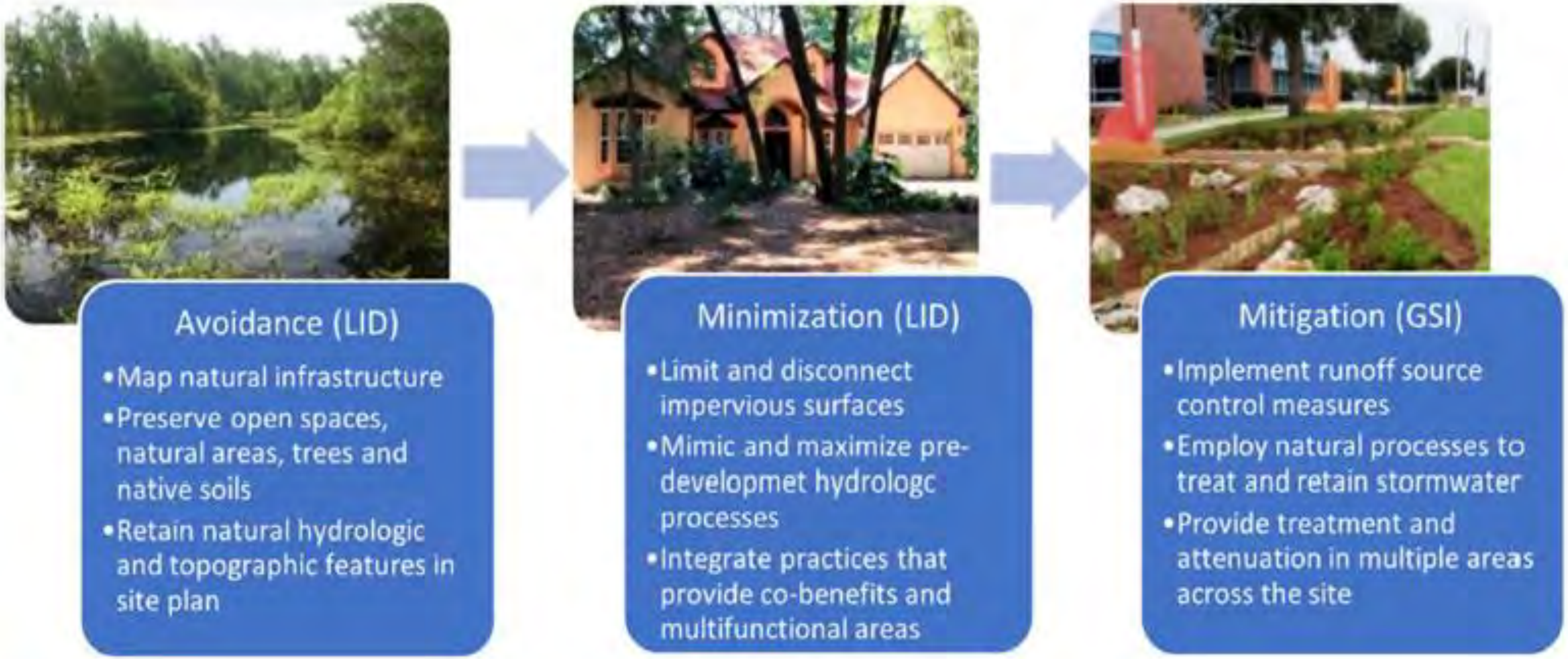
- **Developing within karst geology increases chances of sinkholes.**
  - **Sinkholes can damage property and create a direct conduit for pollutants to contaminate drinking water and springs.**
- **Proposed development patterns result in high water use for landscapes.**
  - **Manicured landscapes also contribute to nitrogen pollution from fertilizers.**

Actions to Protect the Watershed

- **Creating a conservation area is the most protective option.**
- **If the area is developed, low impact development techniques should be in place.**
- **Monitoring wells should be installed to demonstrate protection of the Floridan aquifer.**

Low Impact Development (LID)

LID is most successful when incorporated into earliest stages of planning.



Low Impact Development
Best Management Practices (BMPs)

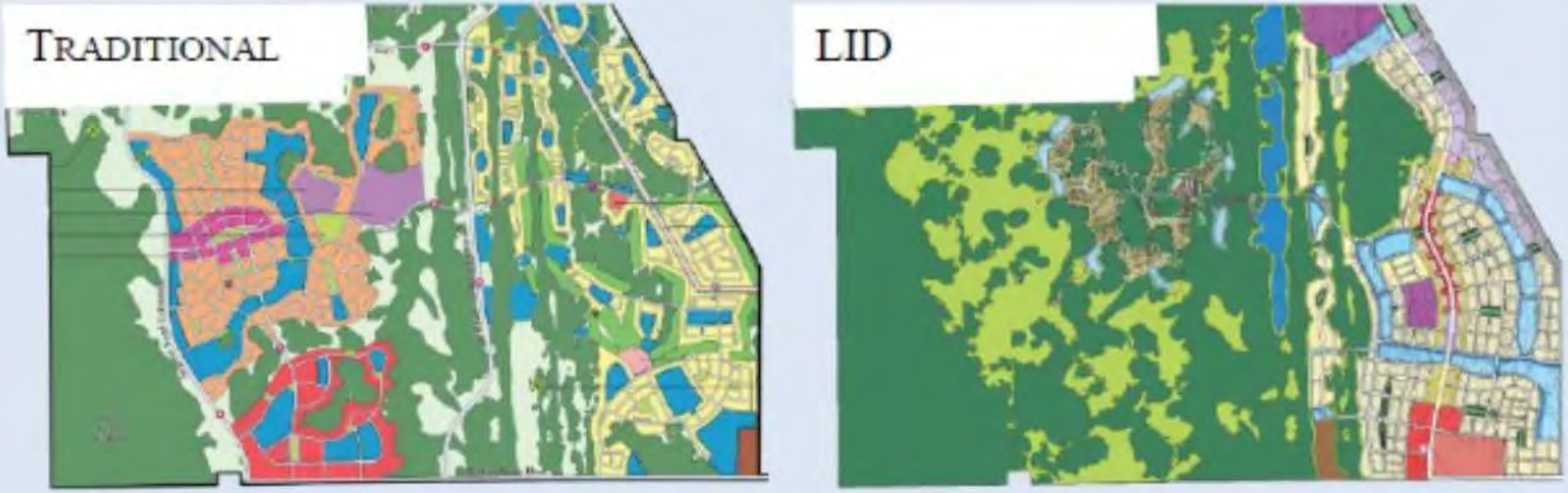
Site Planning (Avoidance)

- Inventory site assets (hydrology, topography, soils, vegetation, structures)
- Protect surface waters, wetlands and groundwater
- Preserve open space
- Retain tree canopy and native landscapes
- Cluster design and maximize gross density
- Minimize building footprint
- Minimize total impervious area
- Minimize directly-connected impervious area
- Eliminate curbs and implement curb cuts

Low Impact Development

Site Planning

LID DESIGN FOR A FLORIDA DEVELOPMENT OF REGIONAL IMPACT: *RESTORATION*



In this example of a planned development in East Central Florida, the LID master plan protects sensitive wetlands and hydrologic features while significantly reducing impervious area. LID design strategies used include preserving open spaces, clustering, building vertically, minimizing new landscaped area requiring supplemental inputs, and nonpotable water for irrigation needs.

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Image source: Marine Resource Council

Low Impact Development Best Management Practices (BMPs)

Source Control (Minimization)

- Retain natural landscape depressions
- Minimize clearing and grading
- Minimize soil disturbance and compaction
- Build with landscape slope
- Retain native landscapes at the lot level
- Florida-friendly landscapes
- Rainfall interceptor trees
- Minimize/eliminate fertilizer & irrigation
- Community and home-owner education

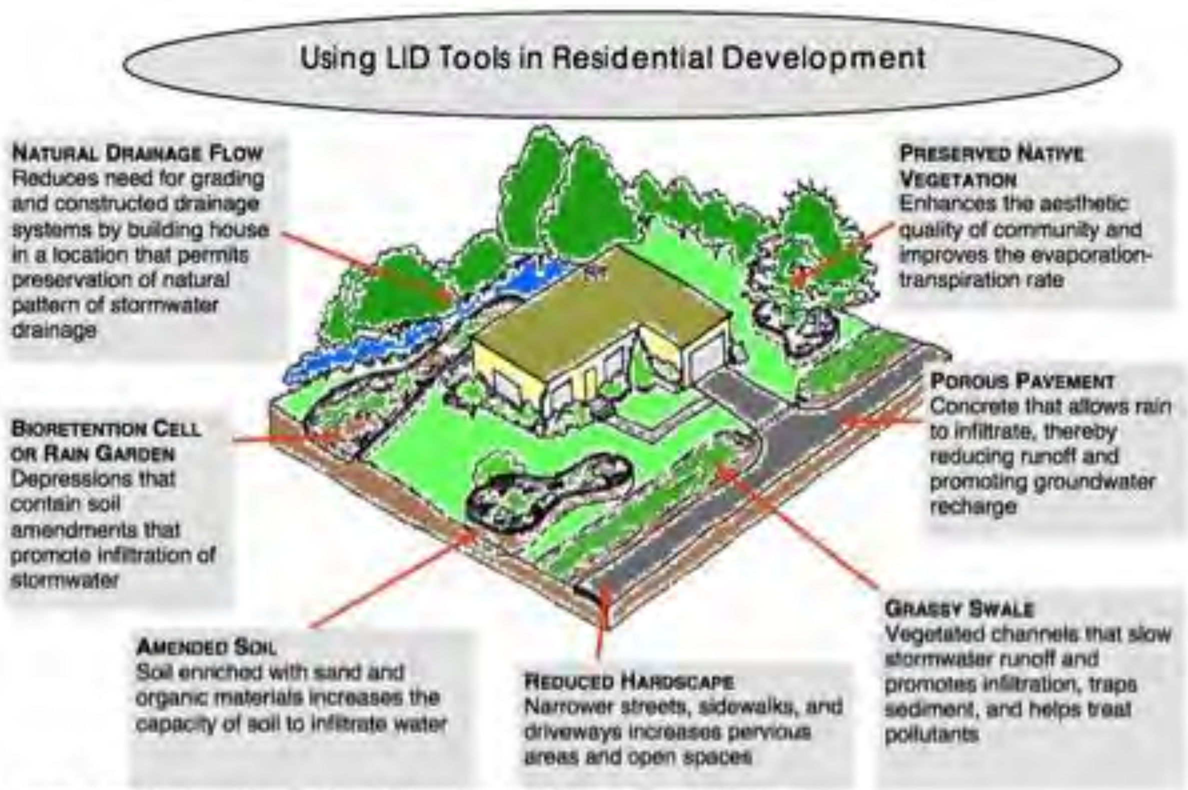

Diagram adapted from Prince George's County Maryland Low-Impact Development Design Strategies

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Structural (Mitigation)

- Retention basin
- Exfiltration trench
- Underground storage and retention
- Rain gardens
- Bioswales
- Vegetated buffers
- Permeable pavements
- Green roofs
- Stormwater harvesting
- Wet detention systems
- Filter systems
- Managed aquatic plant systems
- Biofiltration systems

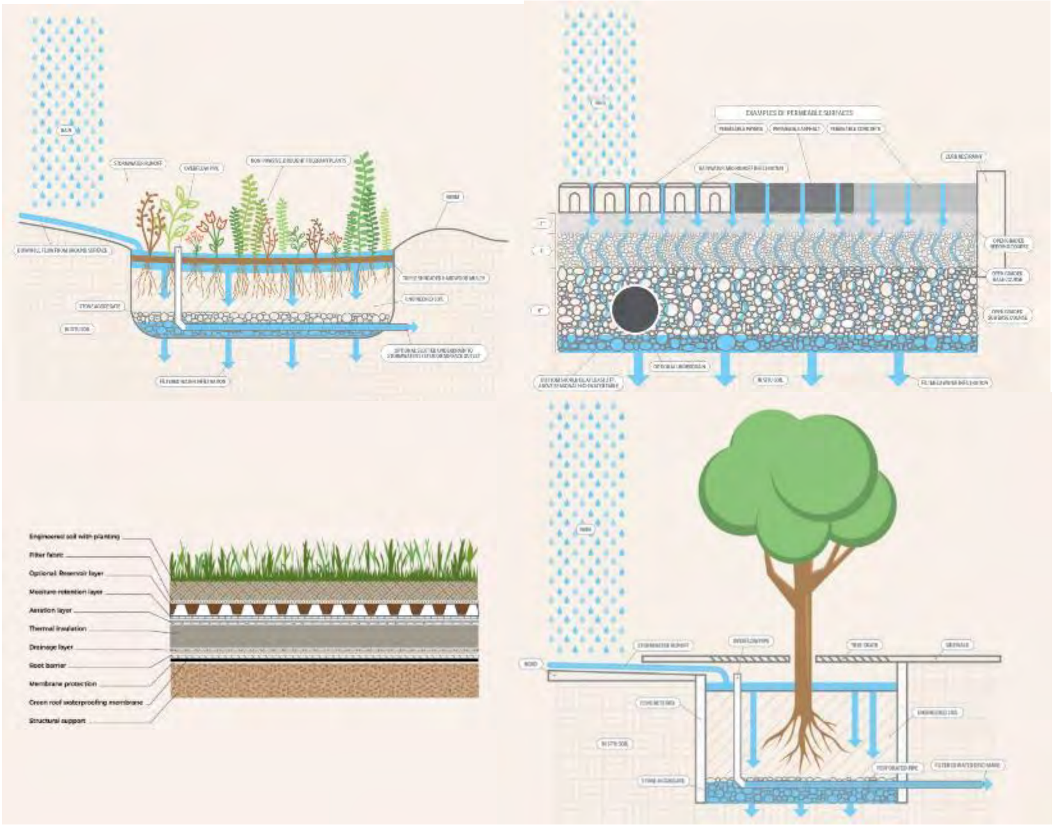

Image source: FDEP

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Low Impact Development
Best Management Practices (BMPs)

- **For the lowest impact, site planning BMPs should be prioritized.**
- **Second priority should be given to source control BMPs.**
- **Finally, as a last resort and considered more of a retrofit, structural BMPs should be implemented.**

Low Impact Development- Landscaping and Irrigation

Through Covenants Codes and Restrictions (CCR) or Utility Use Agreements on lots and common areas:

- **Prohibit permanent landscape irrigation**
- **Prohibit irrigation wells**
- **Require native and/or Florida Friendly Landscaping™**
- **Require Soil amendments**

Next Steps

- Attend future City of Alachua public meetings and hearing related to any of the mentioned development projects to retain affected party status
- Meet with City staff to discuss concerns and propose strategies to address these concerns with existing applications
- Meet with development representatives and WMD
- Provide updates to the BOCC on status of projects moving forward

Looking Ahead

- **Evaluate effectiveness of Stormwater Code (Article IV of Water Quality Code) and self-certification process.**
- **Continue assessing properties in the watershed for acquisition.**
- **Improve collaboration with municipalities to involve staff earlier in project development.**
  - **Formal agreement (interlocal agreement, etc.)?**

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6510 Lake Shore Drive
Gainesville, Florida 32641
(352) 538-1857 cell
Geosolutions86@yahoo.com

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

GeoSolutions Inc., Gainesville, Florida: President and Principal Hydrogeologist, September 1986 to March 2017

Founded and managed hydrogeologic and engineering consulting firm specializing in environmental consulting, remediation design and implementation, and regulatory reporting and compliance.
Scope of professional work also includes: hydrogeologic investigations; geophysical investigations; aerial photo interpretation; fracture trace analysis; karst groundwater dye trace investigations, spring watershed delineations, groundwater quality assessments; hazardous waste assessments and cleanups; landfill permitting and closure monitoring; expert testimony, sewage treatment plant permitting/geotechnical design; sinkhole investigations; storage tank closure audits; contamination assessments, remedial actions; and real estate transactional audits;

Handex Corporation, Odenton, Maryland: Senior Hydrogeologist, March 1986 to September 1986

Responsibilities involved supervising and coordinating hydrocarbon groundwater contamination assessments and remediation operations.

Groundwater Technology, Inc., A Division of Oil Recovery Systems, Tampa, Florida: Senior Hydrogeologist and Manager, Southeastern Regional Office, Tampa, April 1984 to March 1986

Developed and managed the southeastern regional consulting office for ORS-GT. Hired and supervised a staff of 16. Designed, installed, and monitored product recovery and groundwater quality restoration programs for gasoline spills; directed hazardous waste site investigations, assessments and buried drum removals; and applied geophysical methods for geologic and waste site mapping as well as performed environmental permitting and consent order development for industrial clients.

Florida Department of Environmental Regulation, Tallahassee and Tampa, Florida: 1978 - 1984

Hydrogeologist, DER Southwest District, Tampa, Oct. 1982 to April 1984
Technical advisor on all groundwater issues; expert witness in circuit court and administrative hearings; groundwater program development; permit and enforcement case review; site investigations and assessment as well as staff training.

--Hydrogeologist, DER Groundwater Section, Tallahassee - Feb. 1980 to Oct. 1982
Responsible for hydrogeologic and geophysical field investigations of groundwater contamination sites including spills, landfills, and impoundments; soil, water and hazardous materials sampling; and Superfund site assessments and geophysical investigations. Provided technical assistance to the agency's Hazardous Waste, Solid Waste, and Underground Injection Control programs, the Division of Environmental Permitting, Office of General Counsel and the Secretary; developed geophysical (electromagnetic) field methods and sampling techniques now used by the agency to
assess and characterize the impacts of waste sites on groundwater.

--Groundwater Geologist, DER Bureau of Drinking Water and Special Programs, Tallahassee - Aug. 1978 to Jan. 1980
Mapped and described the shallow aquifer systems of Florida; inventoried and assessed the pollution potential of surface impoundments situated in southern Florida.

Geophysical Service, Inc., A Subsidiary of Texas Instruments, Inc.: Geophysical Engineer, GSI, Saudi Arabia, June 1975 to April 1977

Planned, collected, and interpreted data from an uphole program, the evaluation of near-surface seismic velocities in severely weathered limestone and sand terrains; correlation of geologic conditions to seismic velocity anomalies; well shoots; seismic reflection data quality control; drill crew management; seismic field crew management.

--Geophysical Engineer, GSI Field Operations, Chickasha, OK - Jan. 1975 to May 1975
Trained in field positions related to seismic data collection, quality control and surveying.

--Geophysical Engineer - GSI Seismic Processing Center, Midland, TX - Jan. 1975 to May 1975
Vibrasize seismic data computer input, processing and quality control evaluation and final data evaluation and preparation in seismic sections.

EDUCATION

B.A.,Geology, University of South Florida, Tampa, FL 1974.
A.A., University of South Florida, Tampa, FL 1972.
Post-graduate work in groundwater geology, advanced hydrogeology, geophysics, coastal plain geology, computer programming, University of Florida, Gainesville, FL, 1977 and 1978. Course work in geophysics, groundwater geochemistry and clays, University of South Florida, Tampa, FL, 1983.

ADDITIONAL TRAINING AND CERTIFICATION

U.S. EPA -- Evaluating the groundwater pollution potential of surface impoundments, 1978.
U.S. Geological Survey -- Geophysical well logging, 1981.
U.S. EPA -- Field monitoring and sampling of hazardous materials, 1982.
OSHA -- Certificate of completion, occupational safety training 1991.

PROFESSIONAL REGISTRATIONS

State of Florida, Professional Geologist License Number 184

MEMBERSHIPS

Formerly a member National Ground Water Association

LISTINGS

Who's Who in the Science and Engineering, 1996-97
Who's Who in the South and Southwest, 1991-92
Who's Who in the World, 1994
Who's Who in the America, 1998 and 2013

PUBLICATIONS

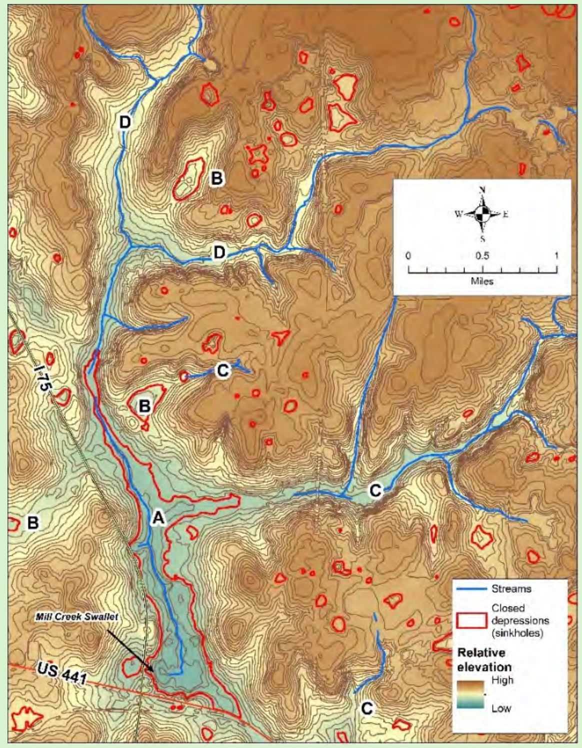
Florida Surface Impoundment Assessment Final Report, Fla. Dept. of Environmental Regulation, Jan. 1980. Co-authors, L. Bell, P. MacGill E. Nunzie and D. Stimmel.
Hydrogeologic Review of the Proposed Taylor Road Landfill, Hillsborough County, FL, Fla. Dept. of Environmental Regulation, April 1980.
Groundwater Investigation of the Cabot Carbon Site, Gainesville, FL, Fla. DER, Aug. 1980. Co-author, G. Watts.
Report of Investigation, Domestic Water Well Contamination, Capitola, Leon County, FL., Fla. Dept. of Environmental Regulation, May 1982. Co-authors, J. Gentry, G. Watts.
Hydrogeologic Review and Geophysical Investigation: Schuykill Metals Company, Tampa, FL, Fla. Dept. of Environmental Regulation, Sept. 1982.
White House Oil Pits, Duval County, Fla.: Remedial Investigation, Fla. Dept. of Environmental Regulation, Feb. 1984. Co-author, J. Gentry.
Hydrogeologic Setting of the Surficial Aquifer System Upper Etonia Creek Basin, Clay County, Florida. GeoSolutions Inc. For Clay County Board of County Commissioners, 1992.
Mill Creek and Lee Sinks Dye Trace – Alachua County, Florida, July – December, 2005. Butt, P. L., S. Boyes, T. L. Morris, 2006. Prepared for Alachua County Environmental Protection Department under contract number 42189.
……

Sidebar 12-5: HOW MUCH SEDIMENT HAS ENTERED MILL CREEK SINK CAVE?

We can estimate the volume of sediment that enters a cave over time by estimating the volume of the eroded watershed that drains into it. The figure to the right is a topographic map of the famous Mill Creek Sink in Alachua County. We will visit this sink in Chapter 24. For now, let's get a sense of how much sand and clay have entered the cave system as the sinkhole and drainage basin of Mill Creek have developed.

The Mill Creek drainage basin was once much larger and more complex. Sometime during the Pliocene or Pleistocene, a sinkhole developed at the location shown on the map as the Mill Creek swallet. Once that sinkhole developed and began to capture the flow in the creek, all the sediments eroded by the stream upstream of the swallet were either dissolved and entered the sink as chemical constituents or became sand and clay sediment that entered the cave.

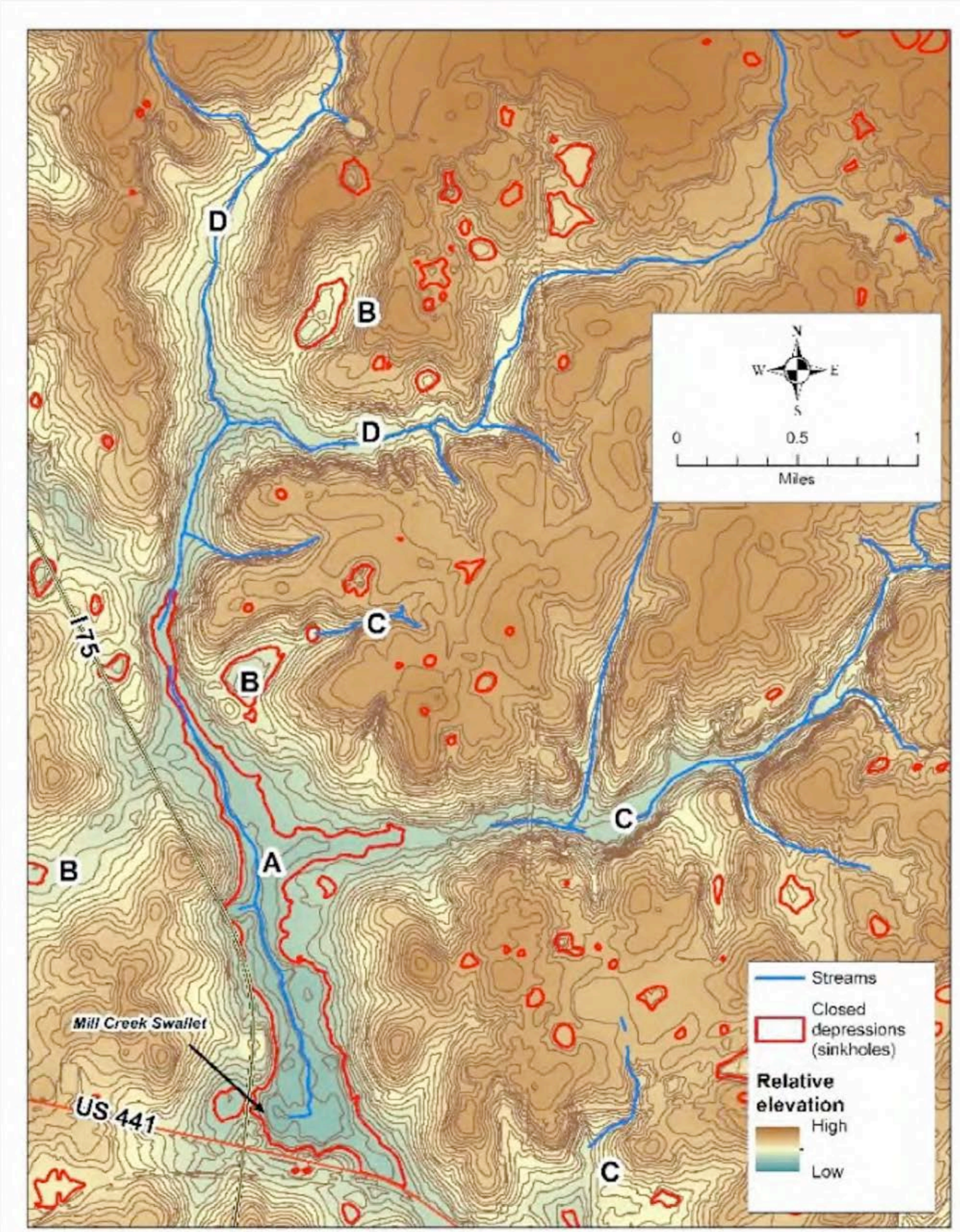
In a 2005 presentation to the Southeastern Geological Society, Sam Upchurch estimated the amount of this insoluble sediment that had gone underground. He assumed that the sediments and rocks upstream from the swallet were half carbonates, which dissolved, and half insoluble sand and clay. Based on measurements of the drainage basin volume, he estimated that the Mill Creek sinkhole and drainage basin once contained 12.6 million cubic yards of sediment, the insoluble part of which has entered the Mill Creek cave. Based on this estimate, approximately 634,000 20-yard dump trucks of sand and clay are currently found within the underlying cave system. Given the large number of caves with swallets and sinkholes in northern and central Florida, the amount of sand and clay trapped in caves of the upper Floridan aquifer has to be enormous.



Topographic map of the Mill Creek drainage basin and its many sinkholes. A is the closed depression (sinkhole) into which the creek drains. The other areas marked by B and outlined in red are also sinkholes. The stream segments shown by the letter C are parts of the Mill Creek drainage system that go underground before flowing to the main swallet. The stream segment marked by D is above the sinkholes that capture sediment.

SRB Source: Personal communication from Upchurch 2025.

Topographic map of the Mill Creek drainage basin and its many sinkholes.



Personal comunication Sam Upchurch, Sidebar 12-5, 11/14/2025 to Stephen R Boyes, P.G. Florida License PG184.

"**A** is the closed depression (sinkhole) into which the creek drains. The other areas marked by **B** and outlined in red are also sinkholes. The stream segments shown by the letter **C** are parts of the Mill Creek drainage system that go underground before flowing to the main swallet. The stream segment marked by **D** is above the sinkholes that capture sediment." Sam Upchurch 2025.


UNDER CONSTRUCTION
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Disposal
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SW 1ST AVE
SW 5TH ST
Substation
BM
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HAGUE 5 MI.
GAINESVILLE 15 MI.
LA CROSSE 8 MI.
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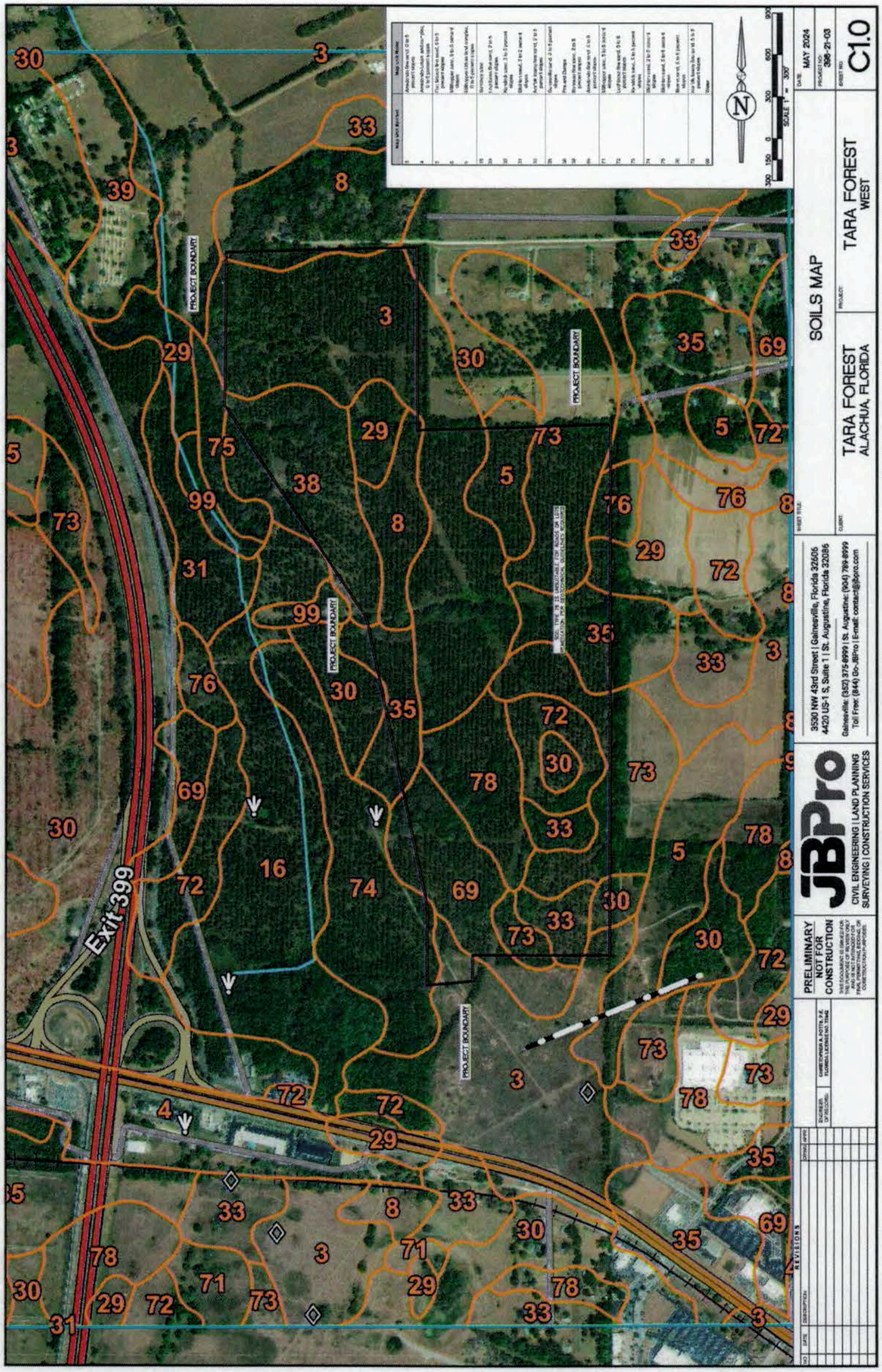
SOILS MAP
TARA FOREST
WEST
TARA FOREST
ALACHUA, FLORIDA
JBPro
CIVIL ENGINEERING | LAND PLANNING
SURVEYING | CONSTRUCTION SERVICES
3530 NW 43rd Street | Gainesville, Florida 32606
4420 US-1 S, Suite 1 | St. Augustine, Florida 32086
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MILL CREEK and LEE SINKS DYE TRACE ALACHUA COUNTY, FLORIDA JULY-DECEMBER, 2005

Prepared for:
Alachua County Environmental Protection Department
201 SE 2nd Avenue, Suite 201
Gainesville, FL 32601

Prepared by:
Peter L. Butt, Stephen Boyes, P.G. and Thomas L. Morris

Karst Environmental Services, Inc.
5779 NE County Road 340,
High Springs, FL 32643

June 7, 2006

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REPORT CERTIFICATION

**Re: Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida
July-December, 2005**

This report was prepared by Karst Environmental Services, Inc. under the supervision of Stephen R. Boyes a Florida-licensed Professional Geologist.

The information contained herein and the interpretations derived follow accepted and approved professional practice in the field of hydrogeology, and are true and correct to the best of our knowledge.

SIGNATURE: ____________________
Stephen R. Boyes, P.G.
Florida License No: 184

Date: June 7, 2006

EXECUTIVE SUMMARY

The Mill Creek and Lee Sinks Dye Trace was undertaken by Karst Environmental Services, Inc. (KES) to investigate potential connections between Mill Creek Sink and Lee Sink and springs on the Santa Fe River and wells located near and down gradient of the two disappearing stream systems. The investigation was performed under contract with the Alachua County Environmental Protection Department.

Mill Creek Sink is the swallet (sinkhole that swallows the stream) for Mill Creek, and Lee Sink is the swallet for Cellon Creek. Both sinks lie along the northwestern reach of the Cross-County Fracture Zone in northwest Alachua County. The Cross-County Fracture Zone is one of Alachua County's most prominent hydrogeologic features and extends from Orange Lake, southwest of Gainesville to the Santa Fe River area. Other significant features associated with the fracture system are Hornsby Spring, Splitrock Sink and Big Otter (Moose's Echo) Sink within the San Felasco State Preserve, the Devils Millhopper and Alachua Sink in Paines Prairie.

Twenty pounds of fluorescein dye were released at Lee Sink and twenty pounds of rhodamine WT dye were released at Mill Creek Sink on July 26, 2005 (Day Zero) by KES personnel. Water samples and charcoal dye samplers were placed, collected and replaced at scheduled intervals at eleven spring and five river monitoring locations and from thirteen water supply wells in the study area. Nine-hundred and eighteen (918) charcoal samplers and water samples were collected and of those 194 were analyzed.

The first detection of dye was rhodamine WT, from Mill Creek Sink, at Hornsby Spring and the River Ranch Well between days 12 and 13. The positive detection indicates a direct hydrologic connection between Mill Creek Sink and the Hornsby Spring Cave System. Hornsby Spring is located 6.09 miles and the River Ranch Well 5.69 miles from Mill Creek Sink.

Fluorescein dye, from Lee Sink, was detected at Hornsby Spring and the River Ranch Well between days 28 and 31. The positive detection of fluorescein dye documents a direct hydrologic connection between Lee Sink and the Hornsby Spring Cave System. Hornsby Spring is located 8.9 miles and the River Ranch Well 8.5 miles from Lee Sink.

The detection of both dyes at the River Ranch Well clearly indicates hydrologic connection of the north branch of passage in the Hornsby Cave System to both sinks. Both dyes continued to be detected at Hornsby Spring as late as Day 154, (December 27, 2005).

One water supply well sampling station, a public supply well in Santa Fe Hills Subdivision, detected the arrival of rhodamine WT between days 24 and 28. This well is located 1.27 miles from Mill Creek Sink. No dye was detected in samples collected from the Alachua and High Springs municipal supply wells.

Rhodamine WT was also detected at Darby Spring between Days 31 and 38. Darby Spring is located 6.82 miles from Mill Creek Sink. This may demonstrate a hydrologic connection between Mill Creek Sink and Darby Spring, however, observations made during the study may indicate the potential for an indirect connection.

The dye trace investigation indicates a direct hydrologic connection between two recharge features on the Cross-County Fracture Zone and a spring discharge feature on the same fracture system. The apparent measured rate of groundwater flow in the fracture system is between 1,400 to 2,400 feet per day.

ACKNOWLEDGMENTS

Karst Environmental Services, Inc. would like to acknowledge and thank the following individuals and organizations for their support and contributions to the success of this study:

Phil Yountz, Mike Hopkins, their staff and the Seventh-Day Adventist Conference in Florida for their generous assistance and access to Camp Kulaqua and Hornsby Spring.

The National Speleological Society and its Cave Diving Section for access to the Mill Creek Sink Nature Preserve.

Mike New, Scott Roane and Horace Jenkins; City of Alachua Public Works Department.

Jim Drumm, Lavern Hodge and Don Deadwiler; City of High Springs Public Works Department.

Leonard Withee; Alachua County Public Works – Santa Fe Hills Water System.

The staff of Poe Springs County Park.

Staff of the Division of Recreation and Parks; Bureau of Parks, District 2.

Randy Brown, Park Manager, and Sam Cole, Park Biologist; San Felasco State Preserve.

Dale Kendrick, Park Manager; O'Leno State Park.

Edward Bell, Copeland Farms.

Jim Fleming, Tropic Tradition, Inc.

The Alachua Progress Center; Innovation Partners and Regeneration Technologies.

Cindy Butler; for use of Mill Creek Sink Cave underwater photographs and cave information.

John Moseley; cartographic assistance.

Wayne Kinard; volunteer cave diver.

Diana Gijselaers; GIS and ArcView assistance.

Tom Mirti and the Suwannee River Water Management District.

Tom Greenhalgh and the Florida Geologic Survey.

Tim Hazlett; Hazlett-Kincaid, Inc.

John Davis, PG.; Florida Dept. of Environmental Protection NE District Office.

Stephen J. Emmons; Surveyor, Alachua County Public Works Dept.

Robin R. Hallbourg, P.G. and James L. Myles; Alachua County Environmental Protection Department.

Karst Environmental Services, Inc. staff;
Mark Long
Georgia Shemitz

INTRODUCTION

Authorization

Karst Environmental Services, Inc. (KES) was contracted by the Alachua County to perform a qualitative dye trace to determine any hydrogeologic connections of Mill Creek Sink and Lee Sink with Hornsby Spring, Poe Spring, Darby Spring and other springs along the Santa Fe River. This work was authorized by Alachua County Contract Number 42189, executed on September 30, 2004. Coordination and administration of this project for Alachua County was with the Alachua County Environmental Protection Department (ACEPD).

Purpose and Scope

The primary purpose of this study was to determine the hydrogeologic connections of Mill Creek Sink (also known as Alachua Sink) and Lee Sink with Hornsby Spring, Poe, Darby and other springs along the Santa Fe River through the use of a qualitative dye trace. Secondary goals included: determining connections with selected public and private water supply wells, determining the approximate arrival time of the dye at the springs and wells, the relative strength of dyes present, and duration of dye.

The scope of this qualitative dye trace included the following elements:

1. Dye trace design, planning and logistics: coordination and scheduling of personnel; identification of dye introduction and sampling locations/stations; development of sampling schedules; obtaining site and well access permissions (where needed); securing FDEP approvals; notification of the Alachua County Health Dept. and other public agencies.

2. Establish dye sampling stations and conduct background sampling and analysis.

3. Introduction of the dyes into the groundwater at the Mill Creek Sink and Lee Sink sites.

4. Dye sampler collection and replacement and water sample collection during the study period, along with sampler handling and preparation and shipment to the analytical laboratory.

5. Analyses of dye samplers and water samples.

6. Data management and reporting.

Personnel

This study was designed, organized and supervised by Peter L. Butt and Stephen Boyes, Florida P.G. #184. Dye release was conducted by Pete Butt, Mark Long and Tom Morris, with assistance form ACEPD staff. Charcoal sampler and water sample collection was conducted by Peter Butt, Tom Morris and KES staff. This report was prepared by Peter Butt, Stephen Boyes and Tom Morris.

Location

The study area is located in northwestern Alachua County, and includes the cities of Alachua, High Springs and surrounding area. See Figures 1 and 2. Sampling sites were also located in extreme northeast Gilchrist County and southern Columbia County. The Santa Fe River forms the boundary between Alachua and Gilchrist Counties on its south and east side with Columbia County on the north and west side in the study area. All springs in this study discharge into the Santa Fe River.

Mill Creek Sink is located approximately 1.1 miles northwest of the City of Alachua, in the northeast quadrant of the Interstate 75 and Highway 441 interchange. Lee Sink is located approximately 1.85 miles southeast of the City of Alachua, south of the Progress Center Industrial Park and within the western section of the San Felasco Hammock State Preserve. Hornsby Spring is located approximately 1.6 miles north of High Springs, and within the grounds of Camp Kulaqua. Poe Spring is located approximately 3.1 miles west of High Springs, within the Poe Springs County Park.

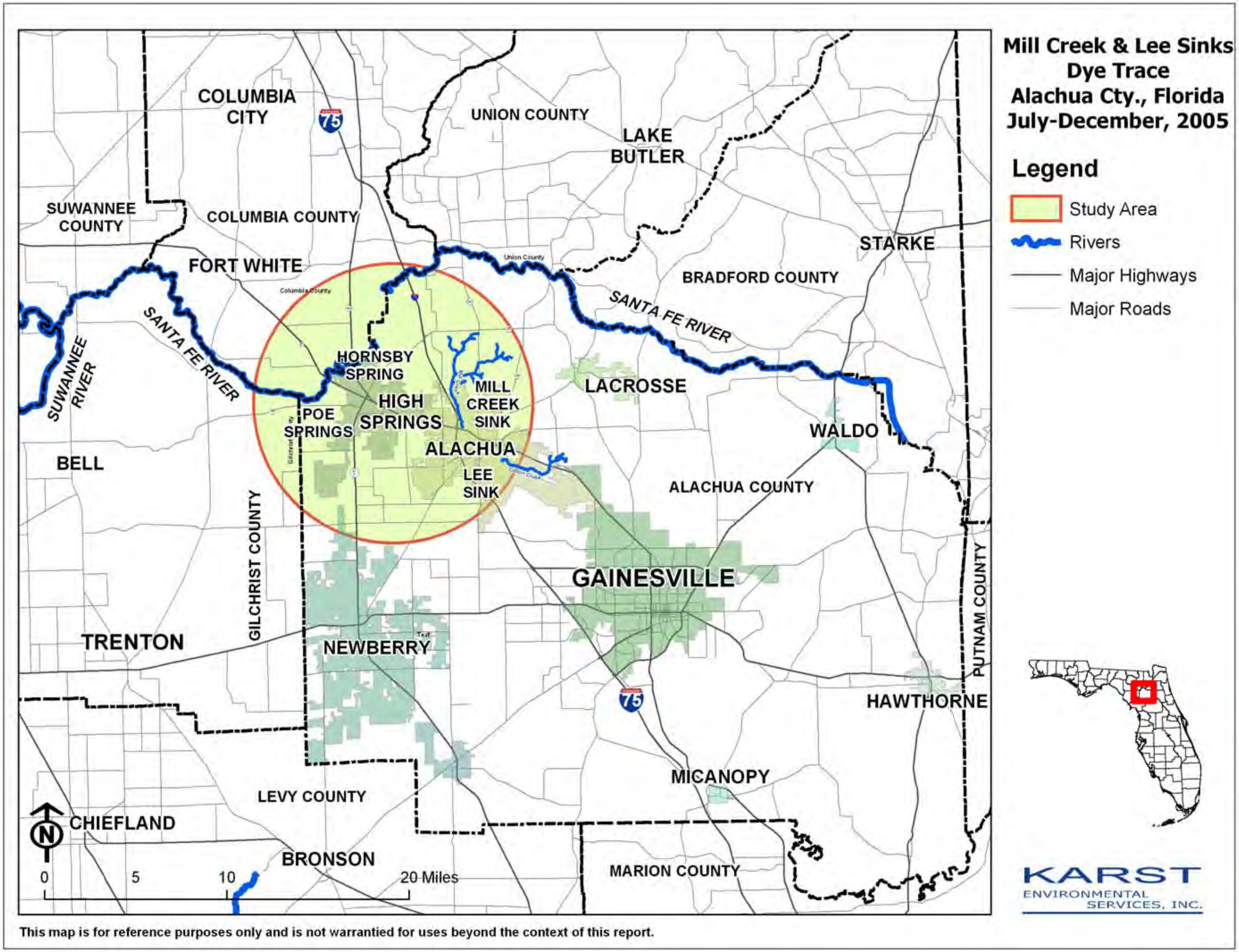

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Figure 1. Location and General Vicinity Map.

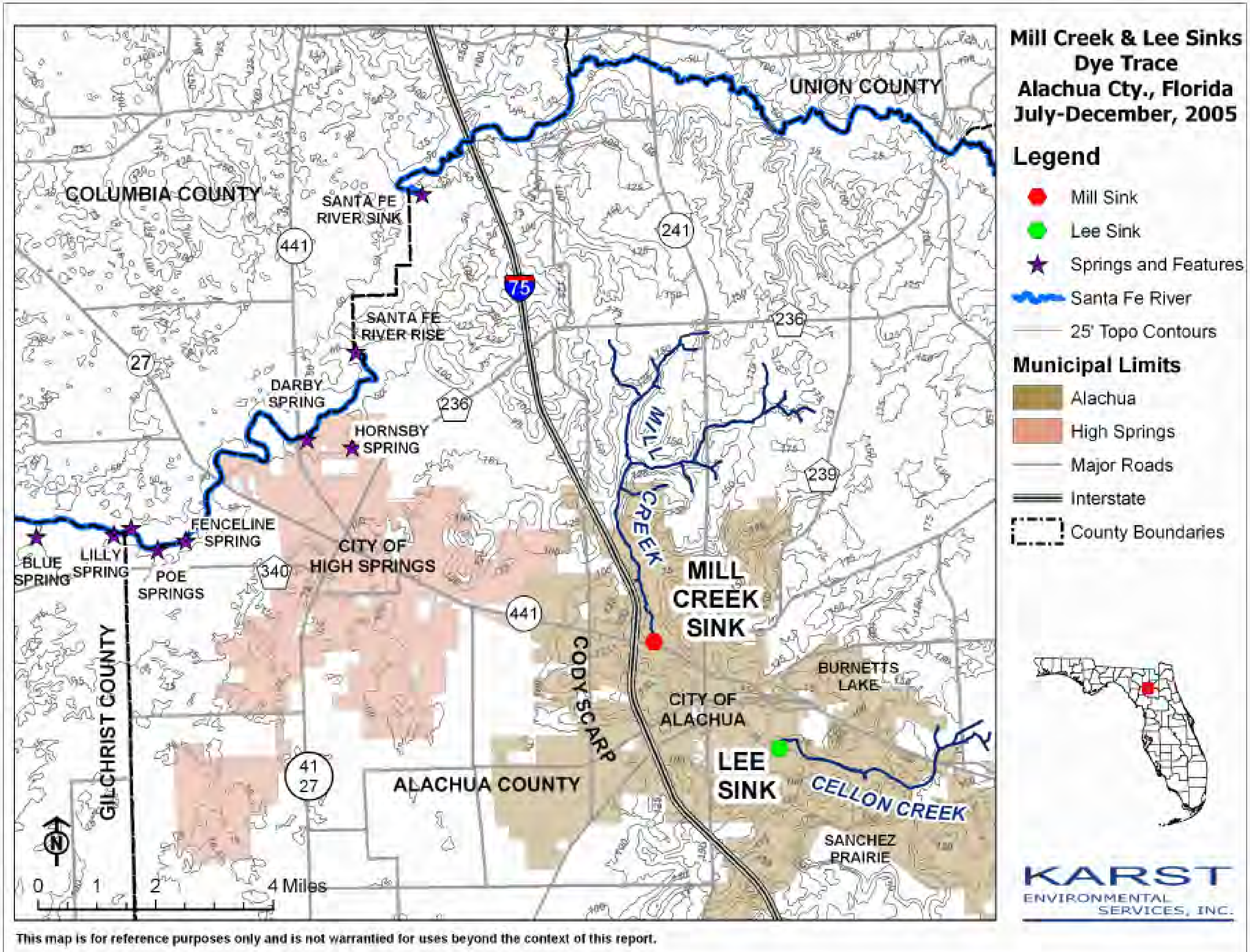

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Figure 2. Study Area Surface Features Map.

HYDROGEOLOGIC SETTING

The study area falls in the Northern Highlands Marginal Zone, the Western Valley and the High Springs Gap. " The Northern Highlands are separated from several ridges of the Central Highlands of the Florida peninsula…the Northern Highlands are separated from the northern end of the Brooksville Ridge only by the High Springs Gap some 12 miles across… All of the Highlands seem to be dissevered remnants of a once continuous residual highland" (White, 1970). "The topographic character of the Northern Highlands east of the Suwannee River is various…In general the terrain is maturely dissected in a gentle rolling manner for some 10 to 20 miles back from the toe of the (Cody) scarp zone… In the flatter undisected parts of the area toward the north, streams in general have little freeboard and flow in shallow channels essentially at the level of the surrounding terrain. In the dissected peripheral zone (dye trace study area) … the streams trend to be incised and with surprising frequency go underground into cavernous subterranean avenues as they approach the toe of the scarp" (White, 1970).

This study focuses on features located within this transition area: Mill Creek Sink, Lee Sink, Hornsby and Darby Springs, the Santa Fe River Sink and Rise, Poe Springs, and other springs on the Santa Fe River. Figure 2 provides a partial copy of the topographic map (25 foot contour interval) of the study area. Figure 3 provides a physiographic map, modified from Williams, 1977, in which the study area is located. The Northern Highlands Marginal Zone is characterized by layers of undifferentiated sediments overlying clayey sediments of the Hawthorn Group. This association of overlying sediments and limestone bedrock leads to a well defined system of streams which disappear into sinks as the streams approach the toe of the (Cody) scarp and the Hawthorn Group materials are thin and are breached by sinkholes. The Western Valley is a subdued limestone plain overlain by a thin mantle of soil and residual hills containing remnants of Hawthorn Group sediments.

The Alachua Stream System is located in the vicinity of the City of Alachua, and is a stream system dissected by the formation of sinkholes. Figure 4 provides a map of the Alachua Stream system (Williams, 1977). The system of multiple disappearing streams drains a basin of over 70 square miles. The system as a whole contains more than ten swallet holes that divert water underground and directly recharge the Floridan aquifer. The Alachua Stream System includes Mill, Cellon, Turkey, and Blues Creeks, Townsend Branch, Bad Dog Branch and others. Sinkhole and other features here include Mill Creek, Lee, Splitrock and Big Otter Swallets, and Burnetts Lake and Sanchez Prairie. Both Mill Creek and Cellon Creek emanate from and drain portions of the Northern Highlands. These creeks disappear near the Cody Scarp and the karst terrain of the Western Valley.

Investigation by Macesich, 1988 provides an interpretation of the aquifer pollution potential in Alachua County and names this transition area where streams are captured the perforated zone. "The perforated zone trends (from the northwest) southeastward in a variable, one-to-five mile wide band roughly paralleling Interstate 75. Sediments underlying the perforated zone may contain substantial thickness of clays, but are perforated by numerous karst features. These features allow direct hydraulic access to the aquifer" (Macesich, 1988).

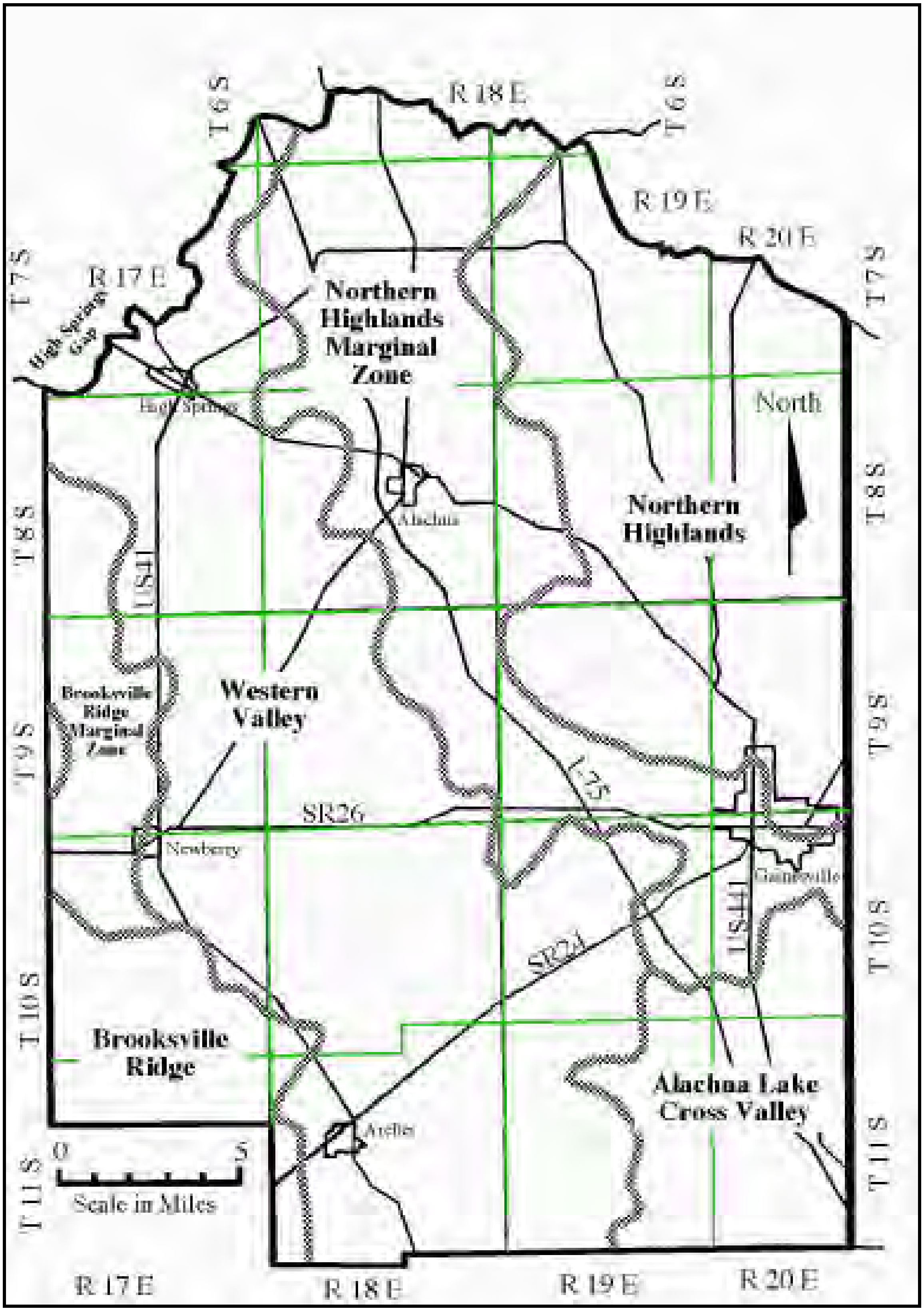

Figure 3. Physiographic Zones, Western Alachua County (after Williams, 1977, Modified).

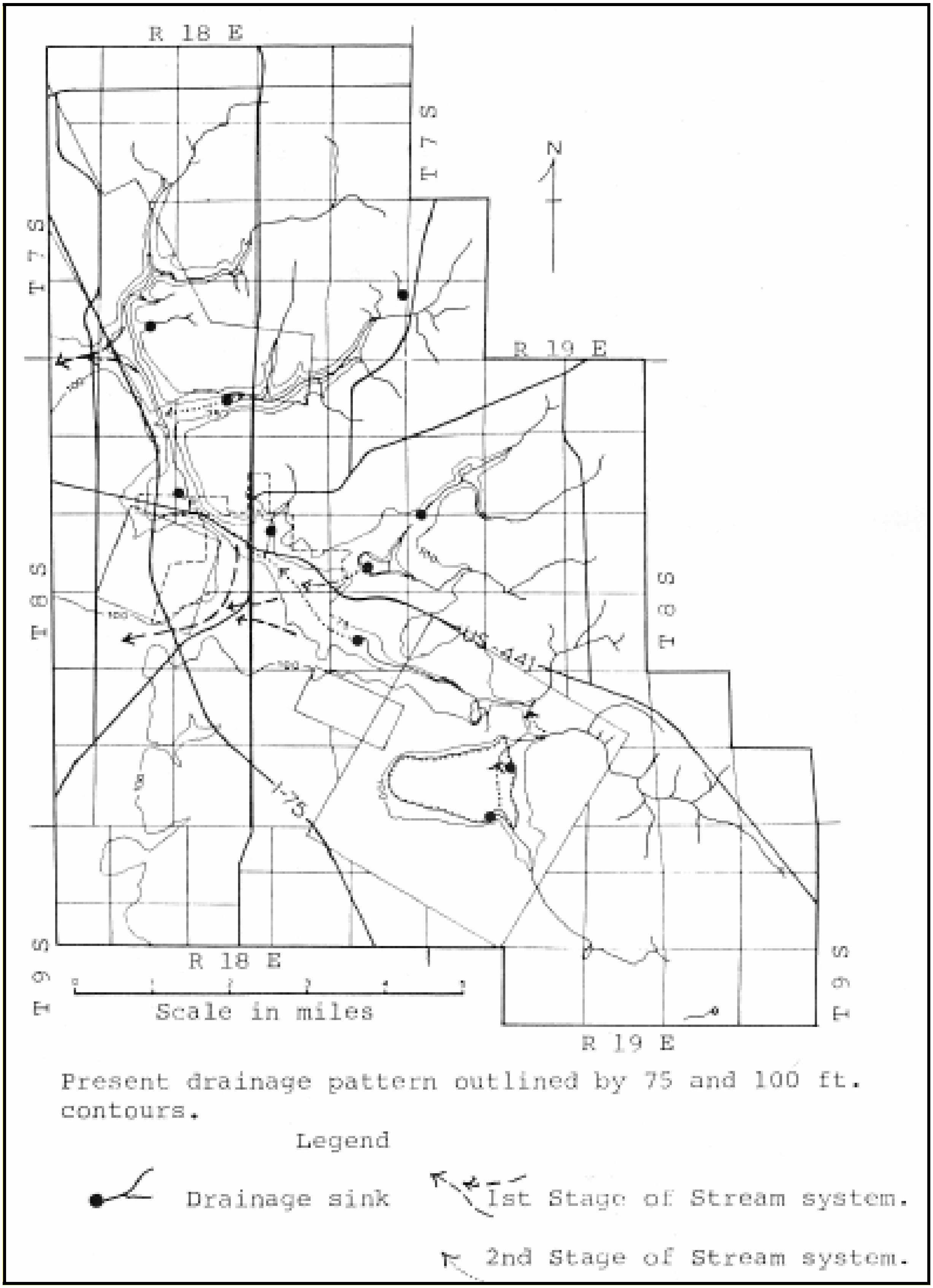

Figure 4. Alachua Stream System. Figure is from Williams, et.al., 1977; Florida Bureau of Geology Report of Investigations No. 85.

Figure 5a provides a stratigraphic column for the study area and Figure 5b provides a hydrostratigraphic column applicable for the area. In the study area, undifferentiated sediments composed of sands and clayey sands, overlie a thin to absent Hawthorn Group. The Eocene-aged Ocala Limestones (formerly “Ocala Group”) underlie the entire area. The undifferentiated sands and clays are of varying thickness and are found at the surface in both the Northern Highlands and the Gulf Coastal Lowlands. These sediments are predominantly fine and medium sands and contain discontinuous lenses of clayey sands.

The Hawthorn Group underlies the undifferentiated sediments in the Northern Highlands and is reported to be between 60 and 150 feet thick. The erosional front of the Hawthorn Group is termed the Cody Scarp and defines the boundary of the Northern Highlands and the Western Valley Gulf Coastal Lowlands.

The Hawthorn Group is comprised of clays, phosphatic sands, limestone and dolomite. In areas where the Hawthorn Group is sufficiently thick it forms the intermediate aquifer system and intermediate confining bed. The Hawthorn Group as a whole behaves as an aquitard overlying of the Floridan aquifer. In the study area the Hawthorn Group is thin to absent and where present behaves as an aquitard perching water above the regional water table, the potentiometric surface of the Floridan aquifer.

The Floridan aquifer is the only aquifer present through the entire study area. The aquifer is composed of fractured and cavernous limestones and is approximately 1,300 feet thick in the study area. The direction of groundwater flow is to the northwest toward the Santa Fe River.

In the Western Valley, High Springs Gap and the Gulf Coastal Lowlands erosion removed much of the sediments younger than the Eocene-aged Ocala Limestone and subsequent deposition created the thin veneer of undifferentiated sediments, sands and clayey sands, overlying the limestones.

The dominant structural features present in the study area are joints. Joints are vertical breaks, fractures in the limestone, that have shown no displacement. These structures provide flow paths for the movement of water in the subsurface. The joints and bedding planes present in the limestone erode and chemically dissolve by the circulation of water within them to form (secondary porosity) caverns and solution channels. The caverns and solution channels over time enlarge and become the dominant groundwater flow paths within the limestone.

Structurally the study area is impacted by the Ocala platform (formerly “uplift”) . “The crest of the uplift is extensively fractured…The western part of Alachua County is on the northeastern flank of the Ocala uplift” Williams, 1977). The Cross-County Fracture Zone is a “lineation of karst solution features within Alachua County that extends from Orange Lake to the south, northwest to the Santa Fe River Sink in a direction of N 40 W” (Williams, 1977). Figure 6 provides a map of the cross Cross-County Fracture Zone presented by Williams, 1977. The drainage sinks and discharge mapped by this investigation occur in the Cross-County Fracture Zone.

System	Series	Formation
Quaternary	Holocene	Undiferentiated Sands and Clays
	Pleistocene	
Tertiary	Pliocene	
	Miocene	Hawthorn Group
	Oligocene	absent
	Eocene	Ocala Limestone
		Avon Park Formation

Figure 5a. Stratigraphic Column for the study area. Figure is adapted from Hoenstine, et.al., 1991; Florida Geological Survey Special Publication No. 33.

Hydrostratigraphic Unit	Geologic Unit	Series
Surficial aquifer system	undiferentiated terrace, marine and fluvial deposits	Post-Miocene
Intermediate aquifer system or Intermediate confining unit	Hawthorn Group	Miocene
Floridan aquifer system	Ocala Limestone	Eocene
	Avon Park Formation	

Figure 5b. Hydrographic correlation chart for the study area (modified from Southeastern Geological Society Ad Hoc Committee, 1985). Figure is adapted from Hoenstine, et.al., 1991; Florida Geological Survey Special Publication No. 33.

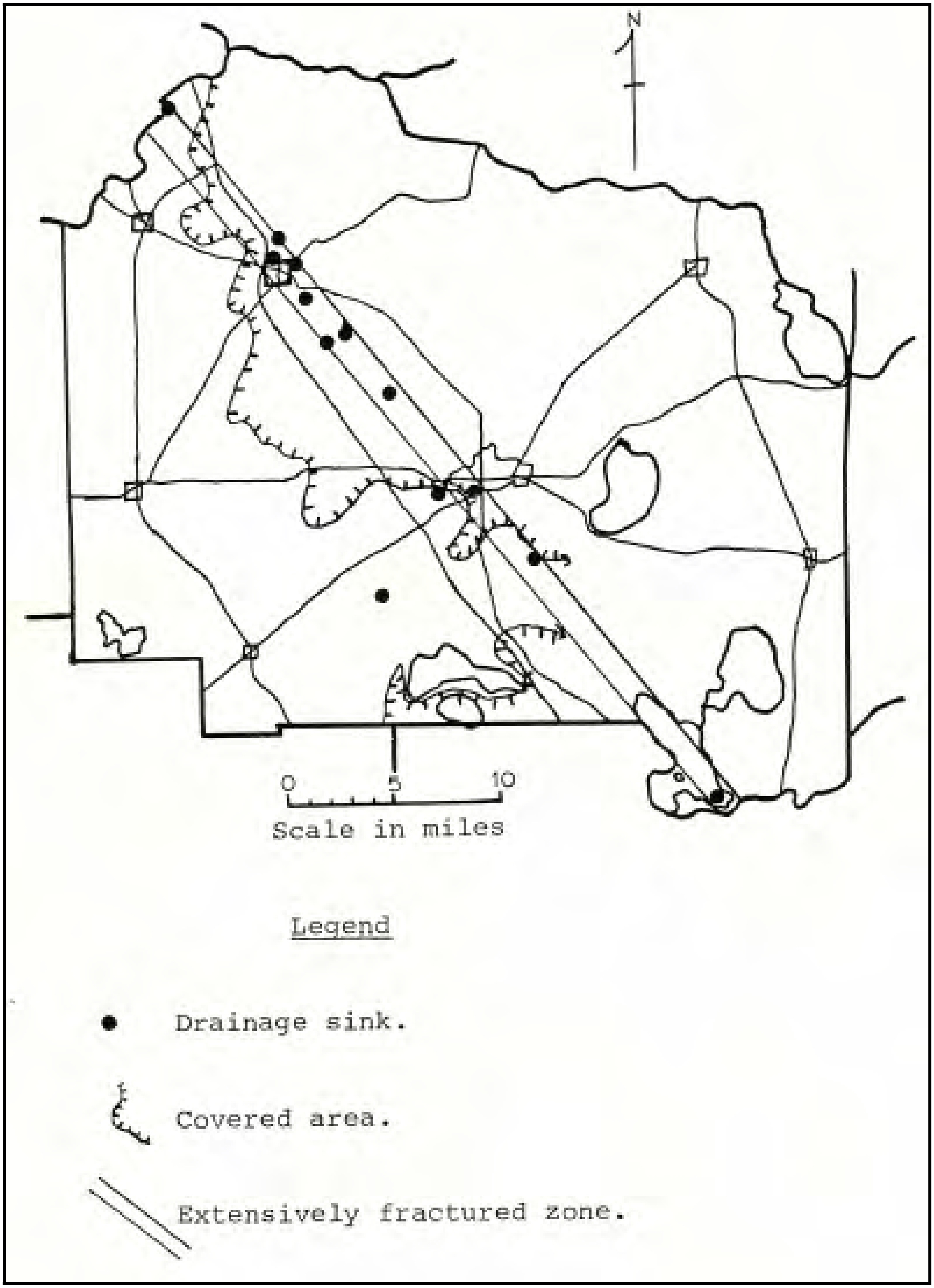

Figure 6. Cross-County Fracture Zone. Figure is from Williams, et.al., 1977; Florida Bureau of Geology Report of Investigations No. 85.

The Cross-County Fracture Zone originally formed as a result of fracturing related to the Ocala platform. In recent geologic time the fracture zone underwent extensive solution development in relation to runoff recharge flowing into it from the Northern Highlands. The Cross-County Fracture Zone is one of Alachua County's most prominent hydrogeologic features. In the county the fracture zone includes portions of the Santa Fe River (Sink and Rise), a large sink in Orange Lake 45 miles southeast of the Santa Fe River, Alachua Sink which is the predominant drain for Paynes Prairie, a number of sinks on the campus of the University of Florida, the Devils Mill Hopper and the Alachua Stream System which includes the sinks investigated in this report. The Cross-County Fracture Zone receives much of the runoff generated from the northeastern half of Alachua County.

The project area is completely underlain by the Floridan aquifer. Figures 7a and 7b provide recent potentiometric surface maps of the area. The thin veneer of undifferentiated sediments do not provide for the formation of the Surficial or Intermediate Aquifer systems, nor do they form a confining layer over the Floridan aquifer. In the study area, the Floridan aquifer is unconfined. The potentiometric surface of the aquifer and the water table are the same. The disappearing streams flow directly into the Floridan aquifer.

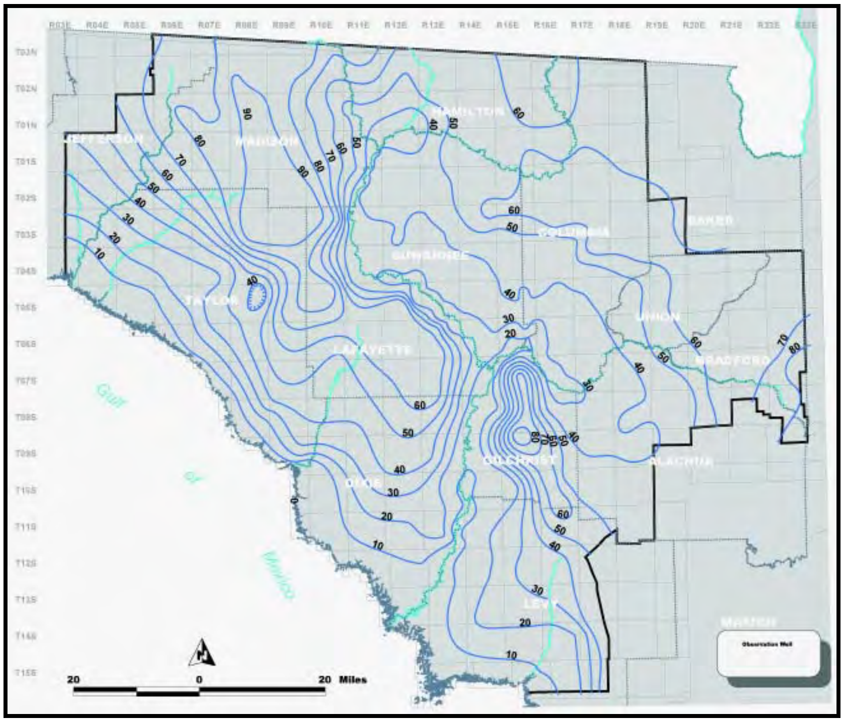

Figure 7a. Potentiometric Surface of the Upper Floridan Aquifer in the Suwannee River Water Management District, May 2005 (SRWMD, 2005).

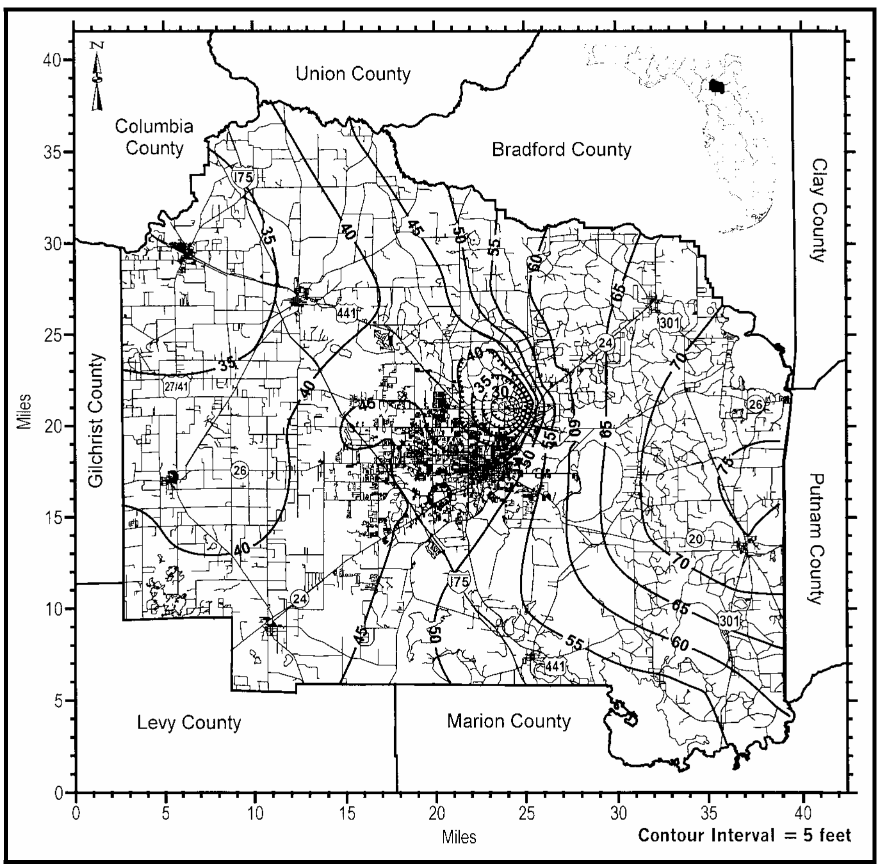

Figure 7b. May 2004 Floridan Aquifer potentiometric surface map in Alachua County (ACEPD, 2005).

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DESCRIPTION OF THE STUDY AREA

All features discussed within this report are located within Alachua County with the exception of "The Crack" and Twin Cypress Springs, which are located in Columbia County, and Lilly, Pickard and Blue Springs, which are located in Gilchrist County. Please refer to Figure 2.

Water depths presented in the following descriptions are approximate, and represent the conditions usually encountered by divers during normal water levels in these locations. The variation in the levels of the water table, creeks and the Santa Fe River will affect depth gauge readings. There are also minor variations between the individual depth gauges used.

Mill Creek Sink, Swallet and Cave

Mill Creek Sink and Swallet are the present day endpoints of Mill Creek. Mill Creek and its northern tributary, theTownsend Branch, currently drain about 13 square miles northwest of the city of Alachua. The Mill Creek drainage was part of the ancient Alachua Stream System (Williams, et.al., 1977). See Figure 4. This formerly integrated surface drainage system has been reduced to localized segments that end at swallets, including Mill, Lee, Splitrock and Big Otter swallets and Burnetts Lake. Mill Creek Sink and Swallet were the most downstream of these drainage features.

Mill Creek is an ephemeral stream with highly variable flow. It drains into a large, closed basin with several ponds, and flows through a cypress swamp and into Mill Creek Swallet. See Plate 1. The swallet connects to the Sink via an underground passage, about 200 feet long, and running at a depth of about 40 feet. This passage opens into the north side of Mill Creek Sink's large vertical passage. See Figures 8 and 18.

Mill Creek Sink, located on the north side of State Highway 441, is within 100 feet of that roadway, and the water surface is typically about 35 feet below the sinkhole rim. See Plate 2. Mill Creek Sink and Swallet are owned by the National Speleological Society (NSS), and with the surrounding property, comprise the NSS' Mill Creek Sink Nature Preserve. The NSS has installed stairs to allow divers to access the sink.

The large vertical passage, or cavern, within Mill Creek Sink is the beginning and entrance into Mill Creek Sink Cave. This cavern continues to a depth of 150 feet, where a junction divides the cave conduit into upstream and downstream passages. See Plates 3 and 4. The upstream conduit continues to the northeast from the junction for about 40 feet, where it opens into a large room. This room spans about 50 feet across and the ceiling reaches a water depth of about 70 feet. A large, partially eroded bank of clay on the floor is the salient feature dominating this room. See Plate 5.

The passage continues beyond this room, narrowing to about 10 feet wide by 7 feet high. It then opens into a second room, about 30 feet wide by 15 feet high by 50 feet long. The passage again narrows until it reaches a third room. Beyond this point, passage dimensions get smaller, and two drops in cave depth are encountered, the first to 185 feet deep, followed within 400 feet to a drop to 215 feet. The cave passage has several branches at this point, and becomes complex. The present limit of exploration and survey is in this area. Plate 6 shows passage typical of the upstream cave.

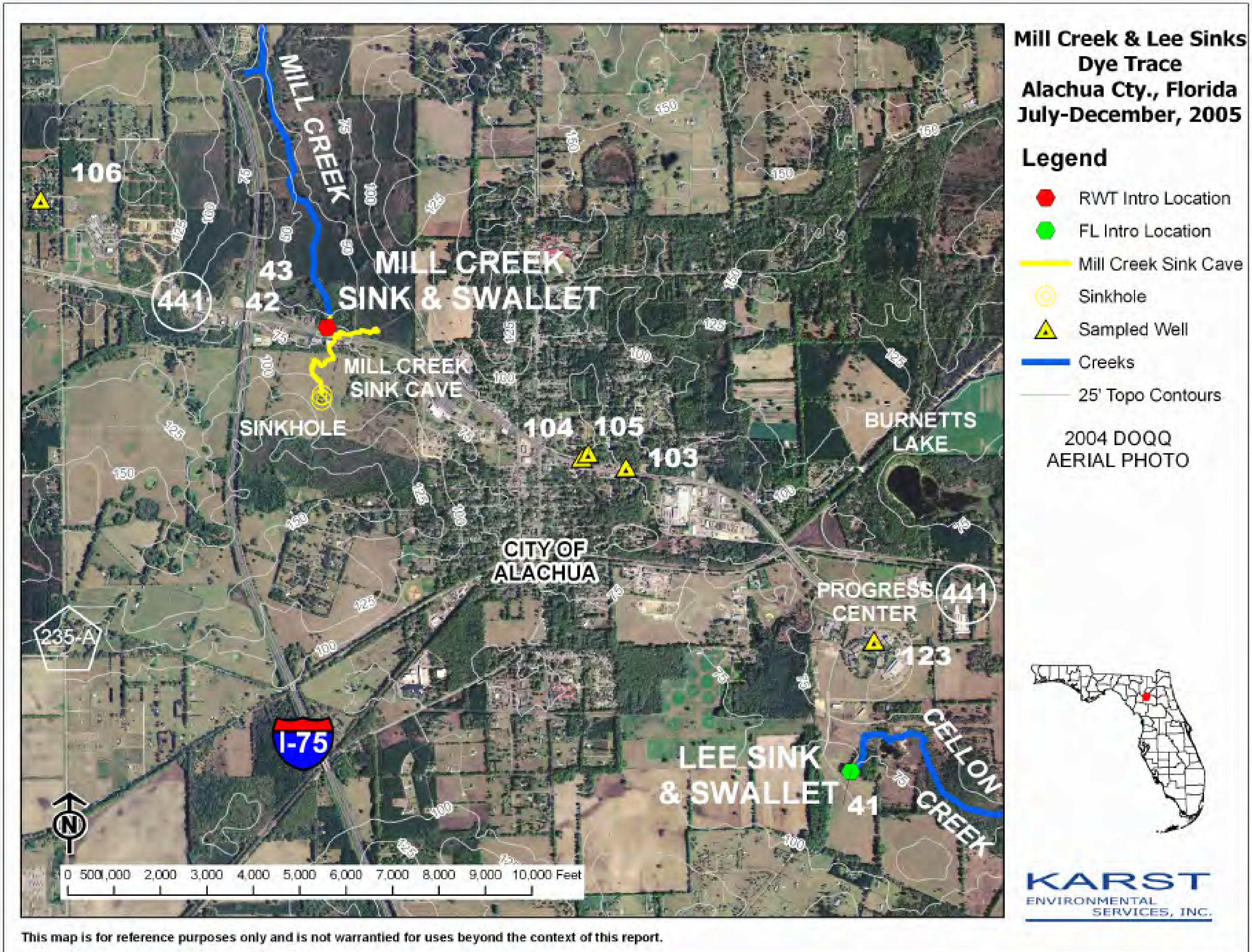

Figure 8. Mill Creek Sink Cave and Lee Sink

The downstream passage drops quickly from 150 feet deep at the junction to 190 feet deep. After a short distance (30 feet) it continues back up along a sediment bank to a depth of 120 feet, where the passage levels off. It continues at that depth for about 100 feet and then drops to 160 feet and into a section of passage known to divers as the "Subway". Beyond the Subway, the cave rises to a depth of 100 feet and runs at that depth for 300 feet until it again descends into a narrow passage about 200 feet deep. This passage continues for about 150 feet until it reaches a section that has a ceiling with narrowing walls that extends upwards to a water depth of 70 feet. There is also a breakdown or debris pile here. This section opens into the "Terminal Room", and is a complex section of this cave. This subterranean room has been recently identified through the use of a radiolocation device to be in the vicinity of a sinkhole on the surface. See Plate 7. Beyond the Terminal Room, the cave splits into three distributary passages. This area represents the present extent of exploration of the downstream section.

Lee Sink and Swallet

Lee Sink is the surface endpoint for Cellon Creek, and lies at the western end of the San Felasco Hammock State Preserve. See Figure 8 and Plate 8. The area collectively referred to as "Lee Sink" is composed of two features: the swallet where the incoming flow from Cellon Creek flows underground and the large sink immediately to the west of the swallet. These features are separated by a ridge. Casual observations during this dye trace indicated that when the swallet water level was high, the sink level was lower. There was always water in the sink.

For the purposes of this study, references made herein to Lee Sink specifically refer to the swallet portion. The swallet was the point of dye introduction. During late November, Cellon Creek ceased to flow into the swallet, and many of the normally submerged features there were exposed. See Plate 9. Two "peninsulas" jut in from both sides of the channel around the active section of the swallet, and may be man-made. It was speculated that the materials in these features were brought in to create a barrier to retard flow into the swallet, probably for agricultural water needs. This barrier is now breached, and the water flows freely into the swallet. Eyewitness accounts from prior droughts indicate that the depression in the bottom of the swallet dries up but remains covered with a mantle of alluvium.

Santa Fe River

The Santa Fe River was the primary axis for almost all of the natural features sampled during this dye trace. The portion of the Santa Fe River that was included in this study ran from just above the river sink at O'Leno State Park to the river rise (about 3 miles of natural bridge) and then downstream to Blue Springs in Gilchrist County (about 10 river miles). The river is the discharge point for all springs monitored during this study.

This river is the boundary between Alachua County and adjacent Gilchrist County on its east and southern banks, and Columbia County on its north bank. The bridges for State Highways 27 and 441 cross the river within the study site, west of the City of High Springs. The SRWMD water level gauge and recorder at the Highway 441 bridge location was utilized in this study. See Plate 10.

The Santa Fe River contains many unique features in the study area, including: the river sink, natural bridge and rise at O'Leno State Park; several river swallets and rises; and, numerous springs including Hornsby, Darby, Poe, Watermelon, Fenceline, Twin Cypress, The Crack, and

Lilly Springs. During periods of low water, this river receives most, and sometimes all, of its water from groundwater sources.

Hornsby Spring and Cave

Hornsby Spring is located on the southeast side of the Santa Fe River, with 4,200 feet of run to the river. See Plate 11. It lies within Camp Kulaqua, a privately-owned park northwest of the city of High Springs. Hornsby Spring is classed a first magnitude spring, with discharges measurements as high as 250 cubic feet per second (CFS) (Scott, et.al., 2004). The spring itself is the recreational waterfront for the park. It flows from a 35 foot deep pool surrounded by limestone ledges. The water is clear, but tends to be greenish and sometimes dark-brown in color. The run flows out into a bottomland swamp towards the Santa Fe River. Some of the water in the run enters at least four known swallets. There are two swallets, one of which is known as Treehouse Swallet, that share a cave system that has been explored by divers. This cave is extensive and runs towards the river, but with no known point of discharge. Two more swallets with relatively short caves are located further down the run. One of these discharges is at Treehouse Spring on the Santa Fe River, and the other discharges back into the lower section of the Hornsby Spring Run.

The spring is fed by a network of cave passages that have been explored and surveyed by cave divers since the 1970's. See Figure 9. Near the spring, the passage runs south and then east, where a passage splits off of the main passage and runs south. The main passage continues to run east for 1,400 feet to a large sink. This sink is open to the cave, and is often used as an entry point for explorers. This main cave passage continues to run east for about 900 feet where it splits into a north and south passage. These passages continue to run east, beyond County Road 236.

Darby Spring

Darby Spring is located on the south bank of a small island in the Santa Fe River, about 800 feet upstream from the Highway 441 bridge. See Plate 12. The spring opens to a channel on the south side of the island. This channel is part of a man-made system that is connected further upstream to the Hornsby Spring Run. The property on the south bank is owned by Camp Kulaqua.

This spring has no noticeable discharge, and is reported by cave divers to be colder than any other area springs. It opens to a small, winding passage that runs beneath the island, looping west and then back east for over 3,000 feet to beneath another small un-named spring on the Columbia County side of the river. This un-named spring is located about 350 feet northeast of Darby Spring, and has been given the catalog number of COL428981 by the Suwannee River Water Management District (SRWMD). Observations made by cave divers indicate that this smaller spring may also function as a swallet at higher river levels. The cave passage runs at depths of 60 to 80 feet deep, and is very silty.

Poe Springs Area

Poe Springs is the largest spring of a group of springs along the Santa Fe River that lie 2.5 to 4 miles west of High Springs. These springs all have a greenish color to their waters, suggesting an influence by tannin-stained surface waters. Except for Poe Spring and "The Crack", none of these springs are known to have any enterable cave passage.

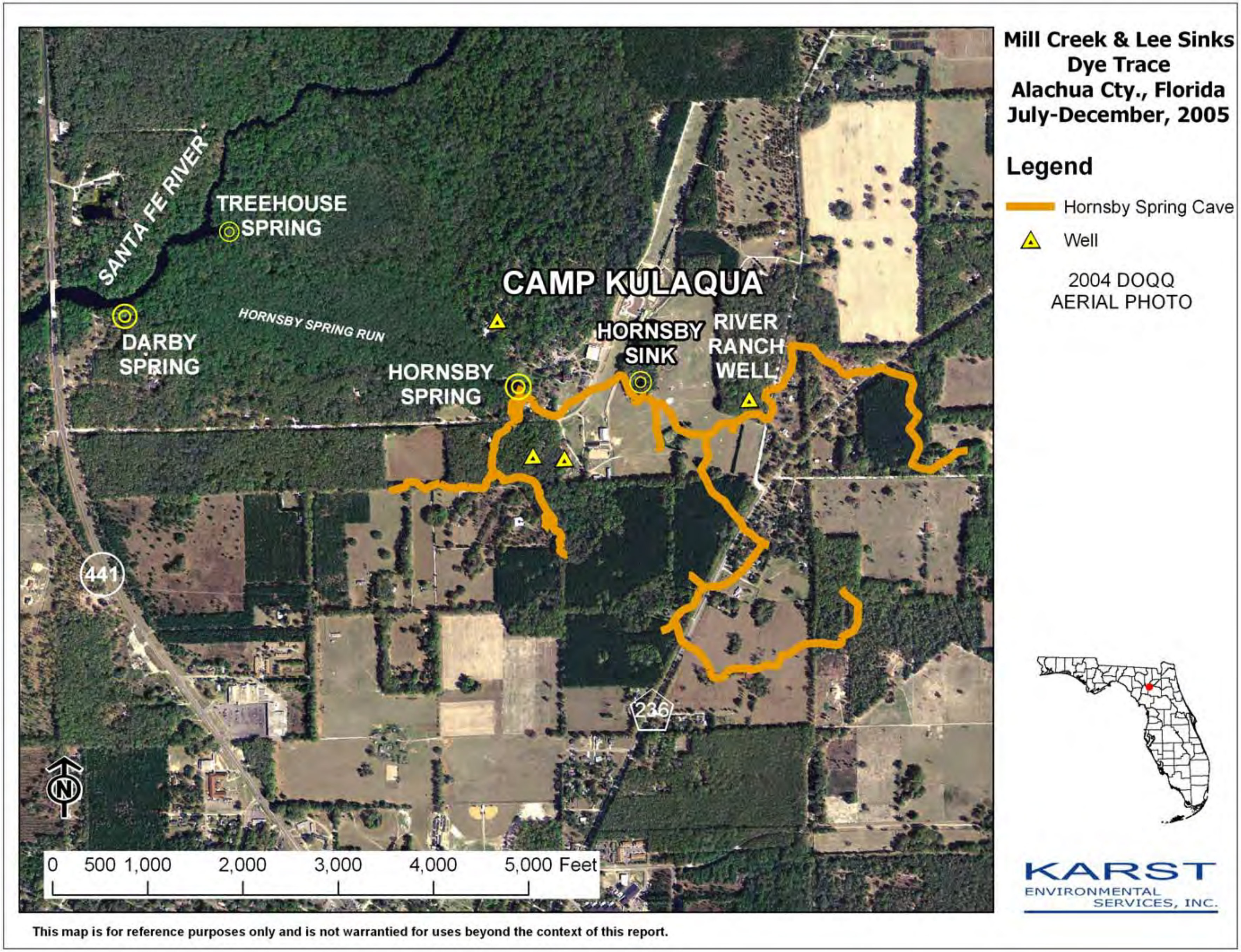

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Figure 9. Hornsby Spring Cave Map.

Poe Springs is located within Poe Springs County Park, and is the focus of recreation activities there. See Plate 13. It has a 120 foot diameter circular head pool, with a depth of about 19 feet. There are numerous vents in the exposed limestone bedrock within the head pool area. A small, restrictive cave has been explored for about 50 feet, to a depth of about 50 feet. A 75 foot run flows to the Santa Fe River. Poe Spring's discharges have been measured as high as 93.1 CFS, and as low as 6.1 CFS (Scott, et.al., 2004). The water is clear, but tends to have a greenish color.

Other springs within the park include Watermelon Spring, located about 300 feet west of Poe Spring Run. This small spring discharges into a long run that flows west and parallel to the river. Watermelon Spring #2 is a much stronger spring located on the bottom of the Santa Fe River, just out from the riverbank near Watermelon Spring. This vent produces a noticeable raised boil on the surface of the river under normal water conditions.

Upstream of Poe Spring, there are three springs identified for this study. Fenceline Spring is about 2,600 feet upstream of Poe, and discharges from the bottom of the river near the Alachua County side. "The Crack" spring is located on the Columbia County side, about 1,000 feet upstream of Poe Spring. It is a limestone fissure about 30 feet long and 30 feet deep. It has cave passages that have been explored for at least 700 feet, to a depth of about 60 feet. The cave passage is small, silty and is considered and advanced cave dive. Twin Cypress Spring discharges from the bottom of the river along the Columbia County bank, and is about 700 feet upstream of Poe Spring.

The run from Seven Sisters Spring discharges on the Columbia County side, about 3,500 feet down-river from Poe Springs. The Seven Sisters Spring is a complex group of vents that are located in the bottomland floodplain forest flanking the river, about 450 feet north of the river. The water discharged here is typically greenish-brown in color.

Lilly Spring and Pickard Spring are located 4,700 and 4,900 feet, respectively, downstream of Poe Spring, on the Gilchrist County side. Lilly Springs discharges waters with a greenish-brown color, while the waters at the nearly adjacent Pickard Springs appear to be less colored. Neither of these springs have explorable cave passage.

METHODS

Planning and Logistics

Key planning elements for this study included: the selection of appropriate dye introduction and sampling points; selection of dyes and quantity to be used; methods for dye recovery and analyses; observation and anticipation of weather and water conditions. Logistical concerns included: scheduling of staff, background sampling, dye release, and the collection, preservation and shipping of samples. Procedures generally followed those as outlined in the "Groundwater Tracing Handbook" (Aley, 1999) and "Procedures And Criteria - Analysis of Fluorescein, Eosine, Rhodamine WT, Sulforhodamine B, and Pyranine Dyes In Water and Charcoal Samplers" (Aley, 2003).

Weather and Water Conditions

The pre-conditions considered desirable for the success of this dye trace included falling river hydrographs and at least some inflow into the sinks selected for dye release. These desirable conditions were in place during July of 2005. Rainfall, that earlier in the year had raised river levels, ceased after mid-July. The total rainfall for July was measured at 5.98 inches; at least 75 percent of this amount fell during the first half of that month. The rainfall data cited here was provided by SRWMD (2006[1]), and was collected at the High Springs Forestry Tower, about six miles south of High Springs.

This previous rainfall had delivered enough water locally to maintain a flow from Cellon Creek into Lee Sink of 2.45 CFS, as measured on July 1. See Table 1. Santa Fe River levels peaked during mid-July, and began a slow drop as monitored at the Highway 441 bridge water level gauge (SRWMD, 2006[1]). This created optimal conditions for a late July or early August dye release.

Inflowing water conditions were present at Lee Sink Swallet during the dye introduction on July 26, 2005, even through the flow in Cellon Creek had dropped (0.11 CFS on July 27, 2005). There was no flow from Mill Creek into the Mill Creek Swallet on July 27, and evidence of only very minimal inflow was observed on a few occasions after that.

Rainfall was below average during the study, with 3.05 inches recorded for August, no rainfall recorded for September, 3.21 inches in October, and 1.95 inches recorded for November (SRWMD, 2006[1]). Cellon Creek maintained flow, measured once more by KES, at 0.39 CFS on October 5. See Table 1. After that, the water dropped significantly at Lee Sink. Levels dropped below the study staff gauge and the sink basin all but dryed up during late November and early December. See Plate 9.

Two routine discharge measurements were made by the SRWMD at Hornsby Spring during the study. The first was discharge measured was 190 CFS on August 24, 2005, and the second was 150 CFS, measured on October 11, 2005 (SRWMD, 2006[2]).

TABLE 1. WATER LEVEL and DISCHARGE MEASUREMENTS

Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida, July-December, 2005

Summary Table of Water Level, Rainfall and Discharge Measurements Recorded During the Study.

	441 Bridge		Mill Creek Swallet					Lee Sink Swallet			Misc.
		Gauge**		Staff Gauge*		Elevation		Staff Gauge*		Elevation	Discharge
Date:	Time:	Reading:	Time:	Reading:	NGVD:	Difference:	Time:	Reading:	NGVD:	Difference:	Msmnts.:
7/1/2005	14:00	33.32	-	-	-	-	13:35	2.02	**63.28**	**29.96**	**2.45 CFS***
7/13/2005	11:00	34.391	-	-	-	-	11:10	4.29	65.55	**31.159**	(Cellon Creek)
7/19/2005	12:00	34.199	11:42	2.43	39.11	**4.911**	11:53	4.11	65.37	**31.171**	
7/25/2005	14:00	33.57	-	-	-	-	14:04	3.4	64.66	**31.09**	
7/26/2005	11:00	33.48	12:04	2.4	39.08	**5.6**	10:48	3.3	64.56	**31.08**	
7/27/2005	14:00	33.41	11:45	2.41	39.09	**5.68**	14:30	3.11	**64.37**	**30.96**	**0.11 CFS***
8/1/2005	12:00	33.15	12:50	2.33	39.01	**5.86**	11:57	2.5	63.76	**30.61**	(Cellon Creek)
8/2/2005	16:00	33.18	15:32	2.35	39.03	**5.85**	-	-	-	-	
8/3/2005	14:00	33.18	17:59	2.41	39.09	**5.91**	14:25	2.18	63.44	**30.26**	
8/4/2005	17:00	33.16	17:00	2.41	39.09	**5.93**	-	-	-	-	
8/5/2005	14:00	33.18	-	-	-	-	13:50	1.9	63.16	**29.98**	
8/7/2005	19:00	33.26	19:15	2.41	39.09	**5.83**	-	-	-	-	
8/8/2005	14:00	33.34	-	-	-	-	13:50	3.1	64.36	**31.02**	
8/9/2005	14:00	33.381	13:53	2.38	39.06	**5.679**	-	-	-	-	
8/11/2005	16:00	33.461	-	-	-	-	16:15	3.15	64.41	**30.949**	
8/13/2005	18:00	33.381	18:05	2.36	39.04	**5.659**	-	-	-	-	
8/15/2005	16:00	33.23	-	-	-	-	16:30	2.98	64.24	**31.01**	
8/17/2005	17:00	33.1	17:27	2.34	39.02	**5.92**	-	-	-	-	
8/23/2005	16:00	32.869	-	-	-	-	15:45	2.17	63.43	**30.561**	
8/24/2005	12:00	**32.859**	-	-	-	-	-	-	-	-	**190 CFS****
8/26/2005	18:00	32.859	-	-	-	-	17:45	2.51	63.77	**30.911**	(Hornsby Spring)
8/29/2005	17:00	32.82	17:25	2.25	38.93	**6.11**	17:05	3.04	64.3	**31.48**	
8/31/2005	13:00	32.83	12:03	2.22	38.9	**6.07**	13:06	3.56	64.82	**31.99**	
9/2/2005	18:00	32.859	17:30	2.38	39.06	**6.201**	18:10	4.5	65.76	**32.901**	
9/9/2005	19:00	32.77	17:36	2.21	38.89	**6.12**	18:45	4.2	65.46	**32.69**	
9/16/2005	14:00	32.66	14:40	2.07	38.75	**6.09**	14:15	3.37	64.63	**31.97**	
9/23/2009	17:00	32.58	-	-	-	-	17:25	2.34	63.6	**31.02**	
9/30/2005	16:00	32.51	16:45	1.9	38.58	**6.07**	16:15	1.19	62.45	**29.94**	(Cellon Creek)
10/5/2005	15:00	32.5	16:32	1.93	38.61	**6.11**	15:00	0.25	**61.51**	**29.01**	**0.39 CFS***
10/11/2005	12:00	**32.82**	-	-	-	-	-	-	-	-	**150 CFS****
10/14/2005	14:00	32.779	14:03	1.78	38.46	**5.681**	13:52	1.99	63.25	**30.471**	(Hornsby Spring)
10/25/2005	13:00	32.49	13:47	1.62	38.3	**5.81**	13:30	0.84	62.1	**29.61**	
Study Averages:		**33.12**			**38.91**	**5.85**			**64.01**	**30.91**	

Monthly Rainfall Averages (2005)**	
(in inches)	
July:	**5.98**
August:	**3.05**
September:	**0**
October:	**3.21**
November:	**1.95**

(Rainfall recorded at the High Spring Forestry Tower.)

Lee Sink (Swallet) Staff Gauge:	Mill Creek Swallet Staff Gauge:
6.60' on Gauge = 67.86'	6.60' on Gauge = 43.28'
0' on Gauge = 61.26'	0' on Gauge = 36.68'
Reference monument elevation = 67.92'	Reference monument elevation = 42.68'

Elevation data for staff gauges provided by Alachua County Public Works Department.

Notes: All elevations are NGVD 1929. * Data Collected by KES. ** Unpublished data provided by SRWMD.

Water Level Elevations

Water level elevations were monitored at the dye introduction sites and at river and spring locations to observe hydrologic gradients during the study. Prior to dye release, KES installed enamel staff gauges at each swallet. Alachua County surveyors then installed elevation benchmarks, and provided an elevation conversion for each staff gauge. Water levels on these staff gauges were recorded whenever the sites were visited during the study. The record of these levels through late October are presented in Table 1, where they are compared with the simultaneous levels of the Santa Fe River at the Highway 441 Bridge water level gauge and recorder, just downstream of Hornsby Spring (SRWMD, 2006[1]).

An average of readings taken during the study indicates that the water level at Mill Creek Sink was at an elevation of about 5-6 feet higher than the water level at Hornsby Spring. These readings also showed that the Lee Sink Swallet pool water level maintained an elevation of about 30-31 feet higher than the water level at Hornsby Spring.

Dye Selection

The dyes selected for this study were rhodamine WT and fluorescein. These dyes are the most economical of all available dyes and are used routinely throughout the United States for water tracing studies. Rhodamine WT and fluorescein dyes ultimately dissipate and deteriorate in the natural environment. When these are analyzed using a synchronous scan protocol they produce separate and distinct fluorescence peaks.

Dyes for this study were supplied by Ozark Underground Laboratory (OUL) of Protem Missouri. This is also useful as OUL performed all of the sample analyses for this study. For the dye obtained from OUL, the fluorescein is a mixture of 75% dye and 25% diluent, and the rhodamine WT is a 20% solution.

A large quantity of rhodamine WT was used at O'Leno State Park during a separate and un-related dye trace in June, 2005. It was anticipated that this dye would be flushed from the cave system and Santa Fe River by the start of this trace; the results of that trace and analyses of background samples taken after its completion indicated that this was the case.

Rhodamine WT, also called Fluorescent Red, has a color index name of Acid Red 388, and is available in liquid form. Rhodamine WT was chosen for release at Mill Creek Sink Cave. Twenty pounds of liquid in pre-measured containers were obtained from OUL.

Fluorescein, also called sodium fluorescein or uranine, has a color index name of Acid Yellow 73 and comes in a powder form. In high concentrations, this dye will appear bright green under sunlight or in a beam of artificial light. Fluorescein was selected for release at Lee Sink. Fluorescein is known to have the greatest resistance to adsorption onto inorganic materials, show up better in wells, and perform better in low flow areas. Twenty pounds of powder in pre-measured containers were obtained from OUL.

Dye Release

Both dyes were released on Tuesday, July 26, 2005 (Day Zero). See Plate 14. The first dye introduction was done at Lee Sink Swallet. The weighted end of a hose was placed on the bottom of the swallet basin, and a large funnel used at the upper end to receive the dye. Twenty pounds of pre-measured fluorescein was mixed and poured via the hose into the dye introduction point beginning at 10:06 hours. Jugs of water were used to chase residual dye from the funnel and hose used for dye introduction, with release and cleanup completed by 10:30 hours. A plume of dye was visible on the surface for a relatively short period of time, with all visible traces of the dye gone by 14:00 hours, indicating that the dye had been successfully pulled underground with the incoming water from Cellon Creek.

Twenty pounds of rhodamine WT liquid, from twenty, one-pound containers was introduced into the dye introduction tube at Mill Creek Sink at 11:34 hours. See Plate 15. A system of tygon tubing previously placed by cave divers for this purpose was used to deliver the dye to the intersection of the entrance cavern and cave passage at approximately 150 feet of depth, where the dye flowed into the downstream passage. A small pump was used to assist the introduction of the dye. Jugs of water were used to chase residual dye from the mixing bucket, pump and hose used for the dye introduction. Dye release and cleanup was completed by 12:18 hours. Residual dye remained in the tubing, but no significant amount of dye was released into the sink basin.

At both dye release sites, all containers, bags, personal protective equipment and other dye-contaminated materials were collected and sealed in trash bags for proper disposal or cleaning. A mild bleach spray was used to further eliminate any dye contamination on equipment and surfaces, and all personnel involved did not have contact with any sampling sites, devices, or samplers until they had fully bathed, changed clothing and otherwise removed all traces of any residual dye.

TABLE 2. DYE INTRODUCTION SITES LOCATIONS and DISTANCES.					
Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida, July-December, 2005					
		GPS Coordinates*			
	Station	**DECIMAL MINUTES**		**Distance From:**	
STATION NAME:	**Number**	**LATITUDE**	**LONGITUDE**	**Mill Creek Sink**	**Lee Sink**
Lee Sink Swallet	**41**	N 29° 46.448'	W 82° 28.413'	2.82 Miles	-
(ridge between sink and swallet)					
Mill Creek Sink/Swallet	**42**	N 29° 48.079'	W 82° 30.518'	-	2.82 Miles
(ridge between sink and swallet)					
Mill Creek Sink Cave Entrance	**43**	N 29° 48.079'	W 82° 30.518'	-	2.82 Miles
Sinkhole in vicinity of "Terminal Room"	**-**	N 29° 47.803'	W 82° 30.542'	1750 Feet	2.64 Miles
(Determined from in-cave radiolocation.)					
*From hand-held GPS positions taken during this study, WGS 84 Map Datum; distances are estimated from these positions.					

Sampling Procedures

Charcoal packets and water sample vials were used to sample for the presence or absence of dye. Charcoal packets, containing activated carbon, were used to accumulate dye at a sampling station through the sampling interval. Analysis of the charcoal packet indicates the presence or absence of dye during that sampling interval. The packets are especially useful for performing initial qualitative traces, if the dye is present in very small concentrations, and to monitor sites with a low sampling frequency.

Charcoal packets supplied by OUL are envelopes of fiberglass window screen about two inches by four inches in size, filled with 4.25 grams of Barneby and Sutcliffe activated coconut shell carbon, size 6 to 12 mesh. The packets are heat-sealed.

At spring sites, bricks or similar weights with a large loop of stiff wire were used to secure the charcoal packets. These allowed for maximum exposure of the packet to the water flow. These samplers were either lowered into position underwater with a length of cord, or placed directly by wading or snorkeling. Efforts taken to conceal the samplers from disturbance or vandalism were successful; very few were disturbed during the study, and two were destroyed by animals.

At water-well sample stations, water was routed through a specialized PVC packet holder that facilitated packet change-out. Water flow through the holder was controlled with a gate valve, and one-way valves that prevented backflow were used as appropriate on any public water supply. The packet holders were connected upstream of any chlorinators. Water would flow through these holders only when the pump was in operation; only two wells allowed for the use of a continuous flow. Plate 16 shows the River Ranch Well (Station 111) set up for sampling.

Whirlpak® bags were used to isolate, transport, and store charcoal packets between sample locations. Each Whirlpak® bag was labeled with the sample station number. The sample station number, location, date, and time for each sample was recorded on the Sample Collection Data Sheet. Samples were isolated from sunlight in the field to prevent photodegradation of the dye.

Water samples were collected simultaneously with each charcoal packet change-out in plastic vials supplied by OUL. Analysis of the water samples will yield the concentration of dye in that water, at that location, at that point in time.

As this was a qualitative trace, analysis of the charcoal packets took priority; the water samples collected provided a back-up for the charcoal packets.

A suitable number of background samples (both charcoal and water) were collected at each sampling station to show conditions prior to any release of dye. These were available as needed for analysis. Background samples from Hornsby Spring and the River Rise were analyzed prior to dye release, and confirmed the absence of any dye that might bias sampling results. None of the other background sampler packets were analyzed because the results of any dye-positive stations were preceded by dye-negative sampler packets collected after the dyes were released. These dye-negative samplers functioned as de-facto background samples.

All samples were shipped to OUL via Federal Express, with a Sample Collection Data Sheet that was signed and returned by OUL Staff, providing a chain of custody from KES to OUL.

Sampling Frequency and Intervals

Background sampling was typically conducted in rounds of at least one week. After dye release, samples were collected at varying intervals for each category of site. Intervals used were typically semi-weekly (twice per 7 day period) or weekly (once per seven day period). Daily sampling was used at a few selected stations early in the trace, and multi-weekly intervals were used at some locations late in the trace.

As Hornsby Spring was the primary focus of this dye trace, samplers here were collected at more frequent intervals. This included a daily sampling station, along with semi-weekly intervals at most stations in this area. The semi-weekly sampling rounds continued to about Day 60, with weekly sampling continuing past Day 90. Multi-week sampling intervals continued until Day 179, the termination of the study. The River Ranch Well (Station 111) was sampled semi-weekly though Day 31, and then weekly until Day 66. Darby Spring and the other Camp Kulaqua wells were sampled at weekly intervals beyond Day 60.

The selected vents at Poe Springs and Watermelon Spring #2 were sampled on a semi-weekly basis through Day 59. Weekly sampling then continued to Day 79. Sampling at Poe Spring Run was performed weekly from Day 15 through Day 88. The surrounding upstream and downstream Poe-area springs, and Blue Springs, were sampled on a weekly basis until Day 59.

Municipal wells at three sites were sampled on a semi-weekly basis for at least 30 days. Weekly sampling continued at these sites beyond Day 66. Private wells were sampled weekly until Day 66.

Sampling stations at the Santa Fe River Sink and Rise, and at the three river locations, were sampled on a weekly basis until Day 71.

Water sampling was performed at Mill Creek Sink to observe for the fluorescein dye released to the east at Lee Sink. The injection line used to release the rhodamine WT into the cave was pumped and sampled on a nearly daily basis until Day 24, and for two additional intervals until Day 45.

The Sample Collection Data Sheets and the OUL Certificate of Analysis sheets show the exact placement and collection times for each specific sample.

Sampling Locations

Samples were collected at the following numbered stations. See Figures 10 and 11, and Tables 3 and 4. Specific information relative to each of the sites is presented, along with the number and name assigned to them during this study.

Hornsby Spring Area (Camp Kulaqua)

1) Hornsby Spring Main: Initially, the packet holder was placed on the bottom of the spring pool to the left of the diving area and tethered with a cord attached a tree on the bank. It was later moved to the floating deck were it was suspended in mid-water by a cord.

2) Hornsby Spring Canoe Landing: This station functioned as a back-up and quality control station for Station 1. The packet holder was placed on the run bottom and tethered with a cord attached to the upstream end of the canoe launch dock.

3) Hornsby Spring Daily: Charcoal and water samples were collected here at least once per day during the first eighteen days of the trace. The packet holder was suspended in mid-water from the floating dock by a cord.

4) Darby Spring: The packet holder was lowered into the entrance of the cave and tethered with a cord attached to the bank. This station was serviced by snorkeling.

5) Hornsby Spring South: This station was established after the trace began to monitor any differences in the south cave entrance. The packet holder was placed on the spring pool bottom in the south cave entrance, and tethered with a cord attached to the deck.

<u>Poe Springs Area</u>
11) Poe Spring (Shallow Vent): The packet holder was placed inside of a small, shallow vent on the east side of the spring pool. It was hidden from view, and not tethered. This station was serviced by snorkeling.

12) Poe Spring (Gauge Vent): Analysis of samples collected at this spring was contingent on the results of the Poe Springs Shallow Vent or Run. The packet holder was placed inside of a vent in front of the water level recorder on the west side of the spring pool. It was hidden from view, and not tethered. This station was serviced by snorkeling.

13) Watermelon Spring #2: Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packet holder was placed inside of a vent on the bottom of the river. It was hidden from view, and not tethered. This station was serviced by snorkeling.

17) Poe Spring Run: This station was established after the trace began to provide better collective monitoring of the Poe Springs vents. The packet holder was wired to the base of a sign on the east side of the lower end of the spring run. This station was serviced by snorkeling and wading.

14) Fenceline Spring: Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packet holder was placed on the spring vent bottom and tethered with a cord attached to a tree trunk in the river. This station was serviced by watercraft.

15) "The Crack" Spring: Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packet holder was placed on a ledge on the north wall of this vertical fissure. This station was serviced by watercraft and snorkeling.

16) Twin Cypress Spring: Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packet holder was placed on the spring vent bottom and tethered with a cord attached to a tree on the bank. This station was serviced by watercraft.

TABLE 3. SAMPLING STATION LOCATIONS and DISTANCES.								
Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida, July-December, 2005								
						Santa Fe		
		GPS Coordinates*				River		
	Station	DECIMAL MINUTES		Distance (In Miles) From:		Bank Side		SRWMD
SAMPLING STATION NAME:	Number	LATITUDE	LONGITUDE	Mill Creek Sink	Lee Sink	Position	County	Name/Number
HORNSBY SPRING AREA								
Hornsby Spring Main	1	N 29° 51.023'	W 82° 35.587'	6.09	8.9	Left	Alachua	Hornsby
Hornsby Spring Run(Canoe Launch)	2	N 29° 51.023'	W 82° 35.633'	6.13	8.94	Left	Alachua	Hornsby
Hornsby Spring Daily	4	N 29° 51.016'	W 82° 35.592'	6.09	8.9	Left	Alachua	Hornsby
Darby Spring	3	N 29° 51.147'	W 82° 36.360'	6.82	9.61	Left	Alachua	Darby
Hornsby Spring South	5	N 29° 51.008'	W 82° 35.602'	6.09	8.9	Left	Alachua	Hornsby
POE SPRINGS AREA								
Poe Spring (Shallow Vent)	11	N 29° 49.553'	W 82° 38.935'	8.58	11.11	Left	Alachua	Poe
Poe Spring (Gauge Vent)	12	N 29° 49.546'	W 82° 38.941'	8.58	11.11	Left	Alachua	Poe
Watermelon #2 Spring (in river)	13	N 29° 49.544'	W 82° 39.022'	8.65	11.17	Left	Alachua	Not Listed
Poe Spring Run	17	N 29° 49.564'	W 82° 38.961'	n/a	n/a	Left	Alachua	n/a
Fenceline Spring	14	N 29° 49.676'	W 82° 38.455'	8.14	10.7	Left	Alachua	ALA930971
"The Crack" Spring	15	N 29° 49.643'	W 82° 38.756'	8.44	10.97	Right	Columbia	COL 428982
Twin Cypress Spring	16	N 29° 49.625'	W 82° 38.838'	8.51	11.05	Right	Columbia	Not Listed
SANTA FE RIVER SITES								
Santa Fe River Sink	21	N 29° 54.840'	W 82° 34.758'	8.57	11.25	Right	Columbia	n/a
Santa Fe River Rise	22	N 29° 52.434'	W 82° 35.462'	7.06	9.88	Left	Columbia	Santa Fe Rise
Santa Fe River D/S of Poe	23	N 29° 49.588'	W 82° 39.206'	n/a	n/a	Left	Alachua	n/a
Santa Fe River at 27 Bridge	24	N 29° 50.614'	W 82° 37.856'	n/a	n/a	Right	Columbia	n/a
Santa Fe River at 441 Bridge	25	N 29° 51.158'	W 82° 36.549'	n/a	n/a	Left	Alachua	n/a
OTHER SPRINGS/FEATURES								
Lilly Spring	31	N 29° 49.780'	W 82° 39.674'	9.36	11.89	Left	Gilchrist	Lilly
Pickard Spring	32	N 29° 49.821'	W 82° 39.707'	9.4	11.94	Left	Gilchrist	Pickard
Gilchrist Blue Spring	33	N 29° 49.818'	W 82° 40.948'	10.64	13.14	Left	Gilchrist	Gilchrist Blue
Seven Sisters Springs	(34)	N 29° 49.883'	W 82° 39.376'	9.09	11.65	Right	Columbia	COL930971
Seven Sisters Run at Santa Fe River	34	N 29° 49.809'	W 82° 39.443'	n/a	n/a	Right	Columbia	COL930971
*From hand-held GPS positions taken during this study, WGS 84 Map Datum; distances are estimated from these positions.								

TABLE 4. WELL SAMPLING STATION LOCATIONS and DISTANCES.

Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida, July-December, 2005

WELL SAMPLING STATION NAME:	Station Number	GPS Coordinates** DECIMAL MINUTES LATITUDE	LONGITUDE	Approximate Distance (in miles) of station from: Mill Creek Sink	Lee Sink	Well Depth (In Feet)	Casing Depth (In Feet)	Well Diameter (In Inches)
Municipal Wells								
High Springs # 1 (West Well)	**101**	N 29° 48.831'	W 82° 34.155'	3.74	6.36	250	110	12
High Springs # 2 (East Well)	**102**	N 29° 48.818'	W 82° 34.119'	3.7	6.32	250	120	12
Alachua Well #1	**103**	N 29° 47.544'	W 82° 29.307'	1.37	1.55	220	95*	12
Alachua Well #2	**104**	N 29° 47.580'	W 82° 29.485'	1.18	1.69	<220*	unknown	12
Alachua Well #3	**105**	N 29° 47.596'	W 82° 29.460'	1.2	1.69	<220*	unknown	12
Santa Fe Hills Subdivision System Well	**106**	N 29° 48.533'	W 82° 31.673'	1.27	4.05	238	unknown	8
Camp Kulaqua Wells								
River Ranch Well	**111**	N 29° 50.985'	W 82° 35.128'	5.69	8.5	165	113	6
Main Shop Well	**112**	N 29° 51.129'	W 82° 35.626'	6.19	9	120*	68*	6
Residence 6 Well	**113**	N 29° 50.887'	W 82° 35.497'	5.93	8.73	120*	100*	4
Chalet Well	**114**	N 29° 50.893'	W 82° 35.560'	5.99	8.79	100*	80*	4
Private Wells								
Copeland Well	**121**	N 29° 49.618'	W 82° 31.914'	2.25	5.05	205*	105*	4
Tropic Traditions Well	**122**	N 29° 47.522'	W 82° 33.481'	3.03	5.21	175	105	6
Progress Center Well (1)	**123**	N 29° 46.912'	W 82° 28.309'	2.59	2860 feet	unknown	unknown	unknown

Notes: All sites located in Alachua County.

* Best estimate based on available records; may not be accurate.

**From hand-held GPS positions taken during this study, WGS 84 Map Datum; distances are estimated from these positions.

(1) System tap used; well was not located.

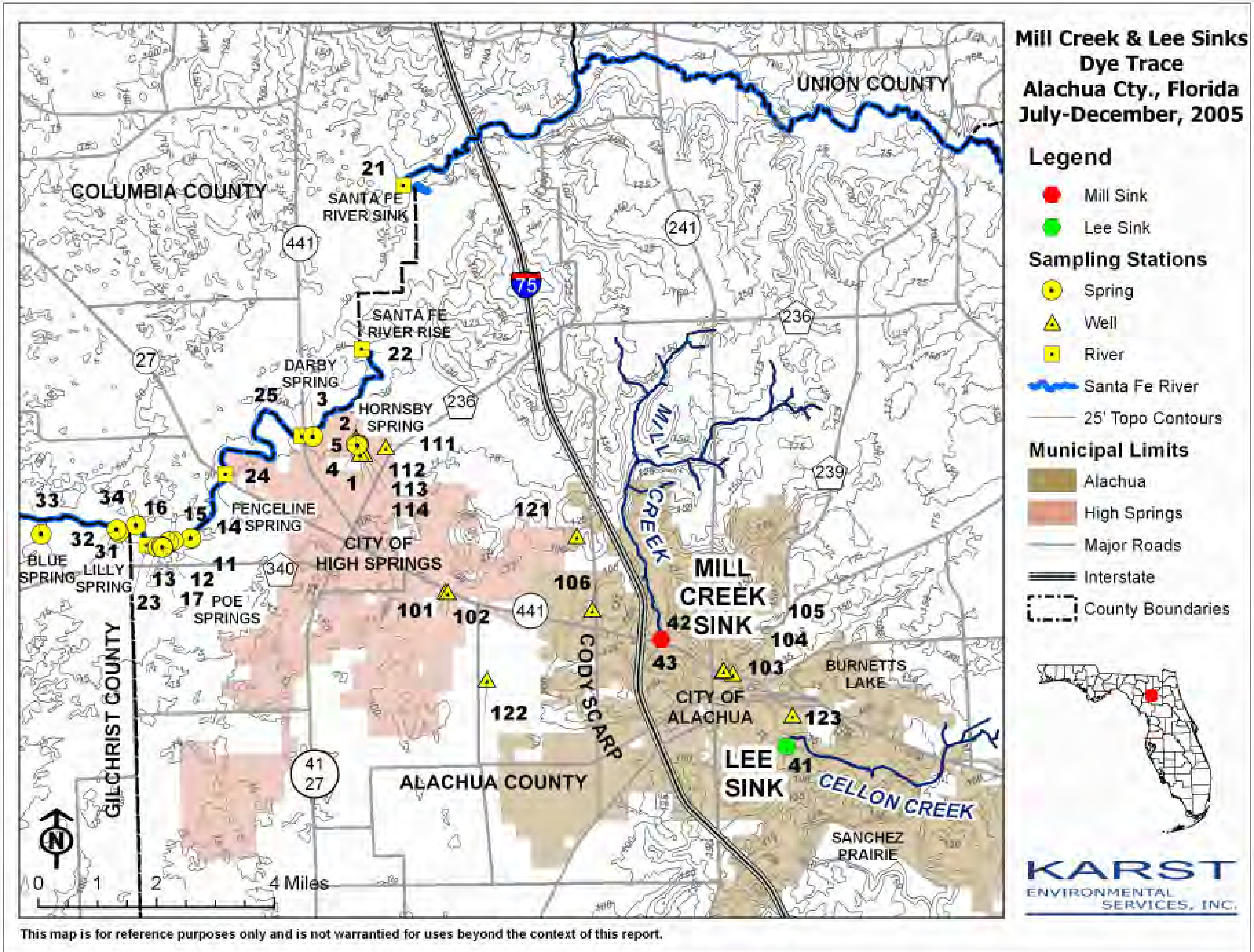

Figure 10. Sampling Stations and Dye Introduction Sites Map.

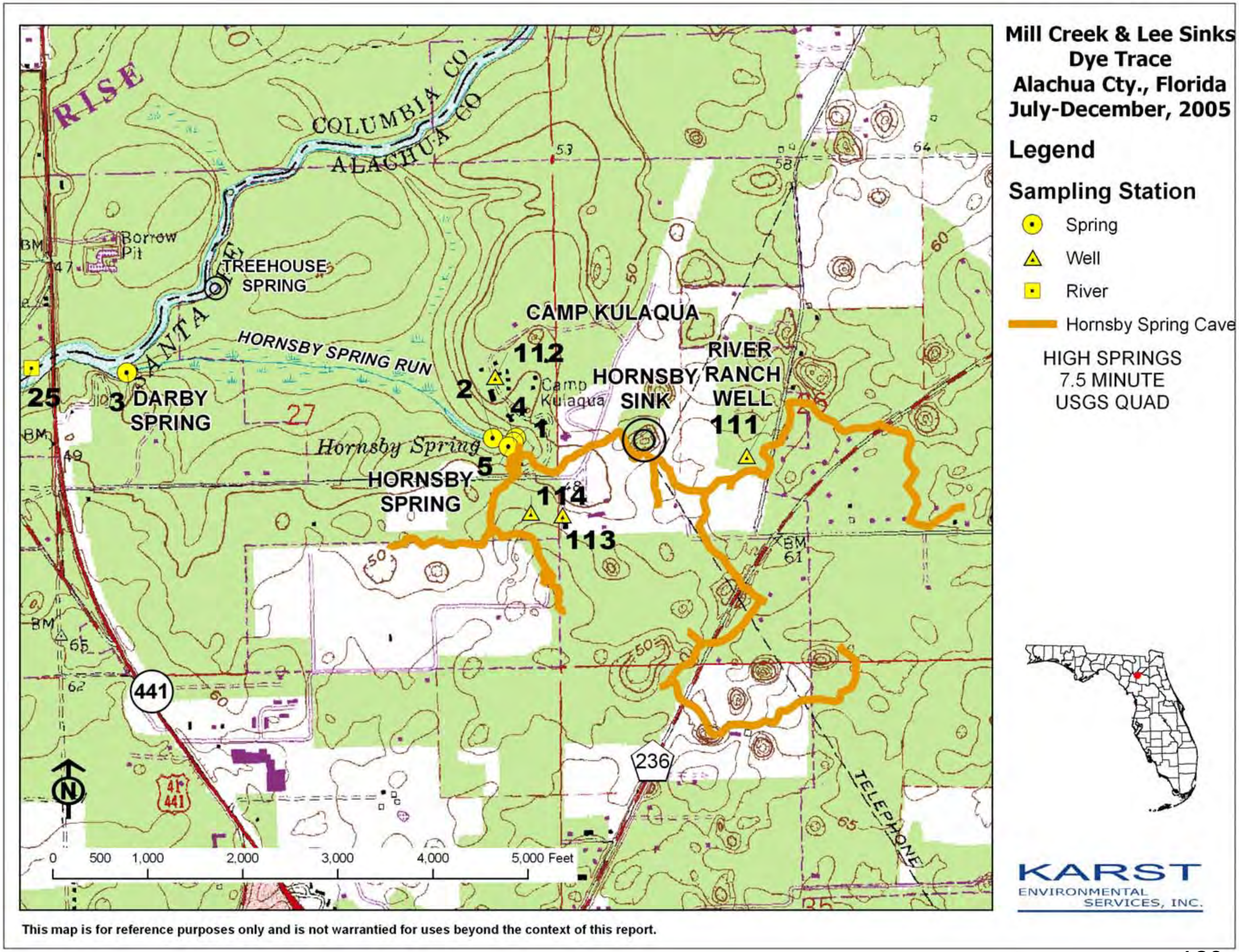

Figure 11. Sampling Stations Map, Hornsby Spring Area.

Santa Fe River Sites

21) Santa Fe River Sink: Analysis of samples collected at this station was contingent on any ambiguous results that would occur downstream. The packet holder was placed on the river bottom and tethered with a cord attached to a floating dock or tree on the bank.

22) Santa Fe River Rise: The packet holder was placed on the river bottom and tethered with a cord attached to a tree along the riverbank.

23) Santa Fe River Downstream of Poe Spring: Analysis of samples collected at this location was contingent on the results of the various springs. The packet holder was placed on the river bottom and tethered with a cord attached to a floating dock.

24) Santa Fe River at Hwy 27 Bridge: Analysis of samples collected at this location was contingent on the results of the various springs. The packet holder was placed on the river bottom and tethered with a cord attached to exposed roots along the riverbank. This station was serviced by wading.

25) Santa Fe River at Hwy 441 Bridge: Analysis of samples collected at this location was contingent on the results of the various springs. The packet holder was placed on the river bottom and tethered with a cord attached to a floating dock.

Other Springs and Features

31) Lilly Spring: Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packet holder was placed into one of the main vents in the head pool and tethered to the bank with a cord. This station was serviced by watercraft.

32) Pickard Spring: Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packet holder was placed into a vent in the spring basin and tethered to the bank with a cord. This station was serviced by watercraft.

33) Blue Spring (Gilchrist County): Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packet holder was placed into the spring run and tethered to the boardwalk with a cord.

34) Seven Sisters Spring Run: Analysis of samples collected at this spring was contingent on the results of Poe Springs. The packets were attached to a wire loop around roots on the right bank of the spring run, just upstream of the Santa Fe River. This station was serviced by watercraft and wading.

41) Lee Sink Swallet: Analysis of samples collected at this station would be contingent on any ambiguous results, should any occur downstream. The packet holder was placed in the swallet pool and tethered to the bank with a cord.

42) Mill Creek Sink Swallet: Analysis of samples collected at this station would be contingent on any ambiguous results, should any occur downstream. The packet holder was placed in the creek above the swallet and tethered to the bank with a cord.

Municipal Wells
101) High Springs #1 (West Well): This was selected as the primary sampling well. Packets were placed in a flow-through packet holder with the appropriate connections and fittings. Water usage was recorded by High Springs Department of Public Works.

102) High Springs #2 (East Well): Analysis of samples collected at this well was contingent on the results of High Springs #1 (101). Packets were placed in a flow-through packet holder with the appropriate connections and fittings. Water usage was recorded by High Springs Department of Public Works.

103) Alachua Well #1: Analysis of samples collected at this well was contingent on the results of Alachua Well #2 (104). Packets were placed in a flow-through packet holder with the appropriate connections and fittings. Water usage was recorded by High Springs Department of Public Works.

104) Alachua Well #2: This was selected as the primary sampling well. Packets were placed in a flow-through packet holder with the appropriate connections and fittings. Water usage was recorded by Alachua Department of Public Works.

105) Alachua Well #3: Analysis of samples collected at this well was contingent on the results of Alachua Well #2 (104). Packets were placed in a flow-through packet holder with the appropriate connections and fittings. Water usage was recorded by Alachua Department of Public Works.

106) Santa Fe Hills Subdivision Well (South Well): This well was selected as it was the well operating in rotation when the study began, and because of ease of hookup. Packets were placed in a flow-through packet holder with the appropriate connections and fittings. A water meter log was maintained by KES during the study.

Camp Kulaqua Wells
111) River Ranch Well: Packets were placed in a flow-through packet holder with the appropriate connections and fittings. A water meter log was maintained by KES during the study.

112) Main Shop Well: Packets were placed in a flow-through packet holder with the appropriate connections and fittings. A water meter log was maintained by KES during the study.

113) Residence #6 Well: Packets were placed in a flow-through packet holder with the appropriate connections and fittings. No water meter was available.

114) Chalet Well: Packets were placed in a flow-through packet holder with the appropriate connections and fittings. A water meter log was maintained by KES during the study.

Other Private Wells
121) Copeland Well: Packets were placed in a flow-through packet holder with the appropriate connections and fittings. No water meter was available.

122) Tropic Traditions Well: Packets were placed in a flow-through packet holder with the appropriate connections and fittings. No water meter was available.

123) Progress Center Well: The actual location of the well was never identified. Only water samples were collected here from a system bib. No water meter was available.

Sampling Inventory

A total of 918 samples were collected and logged during this study. Of this total, 533 were charcoal sampler packets and 385 were water samples.

A total of 158 charcoal samplers were analyzed. Two of these were background samples. Of these 156 samplers, a total of 51 tested positive for rhodamine WT, of which 26 tested also tested positive for fluorescein.

A total of 36 water samples were analyzed. All of these were samples where the associated charcoal sample had tested positive for dye. Of these 36 samplers, a total of nine tested positive for rhodamine WT. None tested positive for fluorescein. An additional ten samples taken at the Mill Creek Sink Cave (Station 43) tested positive for rhodamine WT; this was expected as it was the release point for that dye. The target dye there was fluorescein.

Duplicate Samples

Duplicate samples were collected from selected sites, and stored in case of shipping losses or to be analyzed in the case of ambiguous results.

Selection Rationale for Sample Analysis

This study was an initial qualitative dye trace attempting to identify as many connections as possible with the two dye release sites. There were many springs and wells that had potential for dye recovery. With dye travel rates unknown, this meant planning for a large number of samples. However, there were budget limitations governing the number of samples that could be analyzed within the scope of this study.

Therefore, strategies were designed to allow for a maximum return of information from the finite number of laboratory analyses that could be performed, without jeopardizing the study's goals. These strategies included the measures described below to provide economy while maintaining effectiveness.

Except for a few initial background sample analyses, background samples were held pending analyses of post-dye release samples. Typically, stations with positive dye results had pre-arrival samples analyzed so as to function as de-facto background samples.

Samples from stations on the Santa Fe River (23, 24 and 25) were held pending any negative results at the springs; the positive results at Hornsby Spring ultimately made all river samples redundant for the purposes of this qualitative trace. Also, as there were no anomalies seen in the samples analyzed from the River Rise (22), none of the River Swallet (21) samples collected were analyzed.

Poe Spring was selected as the primary indicator for dye arrival within the Poe Springs area group of springs. Selected vents and the run were monitored at Poe Spring, but all samples collected from Fenceline Spring downstream to Blue Spring were held pending the identification of dye at Poe. As the presence of dye was never confirmed there, the focus for analyses was shifted to the Hornsby Spring area.

Finally, at the Cities of Alachua and High Springs municipal wells, one well was selected from each group for consecutive analyses. Any positive result at these wells would have prompted the systematic analyses of the adjacent wells.

Sample Analysis

All samples were analyzed using a synchronous scan protocol on a spectrofluorophotometer at Ozark Underground Laboratory. The recovery of dye in concentrations high enough to provide a visual result was not anticipated, and no evaluations of that type were performed.

Charcoal packets collect dye by adsorbing it to the charcoal particles; therefore, prior to sample analysis the dye must be released from the charcoal. This process is known as elution. An eluent is added to the charcoal and the resulting elutant can be analyzed via "direct injection" by a spectrofluorophotometer.

A Shimadzu RF 5000U Spectrofluorophotometer operated with a synchronous scan protocol was used to analyze all samples recovered during this study. The detection limit for rhodamine WT in elutant is 0.155 part per billion, with a normal acceptable emission wavelength range of 561.7 to 568.9 nanometers. The detection limit for rhodamine WT in water is 0.007 parts per billion, with a normal acceptable emission wavelength range of 569.4 to 574.8 nanometers.

The detection limit of this instrument for fluorescein in elutant is 0.01 part per billion, with a normal acceptable emission wavelength range of 510.7 to 515.0 nanometer. The detection limit for fluorescein in water is 0.0005 parts per billion, with a normal acceptable emission wavelength range of 505.6 to 510.5 nanometers.

Results of analyses were presented by OUL as Certificates of Analysis that include a Summary of Results Table and graphs for each sample analyzed. The Certificates of Analysis and Summary of Results Table are found in Appendix IIA. The graphs for the analyses of charcoal packets are presented in Appendix IIB, and for water samples in Appendix IIC..

The results of analyses as interpreted by OUL are used as the basis for the discussion and conclusions reached in this report.

RESULTS

This study is the first fully documented dye trace performed at Mill Creek and Lee Sinks. As this was an initial qualitative dye trace, sampling periods were designed to measure a potential rapid arrival time of the dye. A dye trace was reportedly performed in this area in early 1976 but documentation is incomplete. The arrival time in that investigation was one day (Fisk and Exley, 1976).

Municipal wells near to the dye introduction sites were of special concern. The wells had the potential for a rapid and strong arrival of dye. The wells were closely monitored and there were no visible detections of dye in the municipal wells.

Results of Spectrofluorophotometer Analysis

One-hundred and fifty-eight (158) charcoal samplers and 36 water samples from selected sampling stations were analyzed. Table 5 provides a summary of the results of analysis from dye-positive stations. The numbered days in Table 5 are sequential from the day of dye introduction, Day Zero. The maps in Figures 12 and 13 show the positive results at sampling stations. Figures 14, 15 and 16 provide examples of spectrofluorophotometer analytical graphics indicating positive detections of rhodamine WT and fluorescein. Descriptions of the results from dye-positive stations are included below. Station groupings with positive results are discussed first.

The Certificates of Analysis from OUL listing the results of these analyses are presented in Appendix IIA. A complete record of all analytical graphs is included in Appendixes IIB and IIC.

The asterix (*) symbol is used in the descriptions below and in Table 5 to indicate the presence of a fluorescence peak that does not meet all the criteria for a positive dye result, but has been calculated as though it were dye.

Hornsby Spring Area Springs (Camp Kulaqua)

1) Hornsby Spring Main: No dye was detected in analyzed samples collected through August 7 (Day 12). Rhodamine WT was initially detected at a concentration of 14.4 ppb in the August 7-10 (Days 12-15) packet. During the next four semi-weekly sampling intervals, from Day 15 through Day 28 (August 23), the rhodamine WT concentration increased, with the highest concentration of 54.2 ppb being detected in the Day 24-28 packet.

Fluorescein was initially detected at a concentration of 1.48 ppb in the August 23-26 (Days 28-31) packet, with rhodamine WT also present at 24.8 ppb. During the next eight semi-weekly sampling intervals, from Day 31 through Day 59 (September 23), the fluorescein concentration increased, with the highest concentration of 4.85 ppb being detected in the Day 55-59 packet. Figure 14 shows the detection of both dyes in the analytical results of the Days 38-42 packet. Strong, but decreasing concentrations of rhodamine WT were also detected during this period.

After September 23 (Day 59) sampling intervals were changed from semi-weekly to weekly. Concentrations for both dyes were detected in generally decreasing amounts. After October 28 (Day 94) sampling intervals were changed to bi-weekly. Concentrations for both dyes continued to be detected in generally decreasing amounts. The final two intervals analyzed, Days 125-139 and Days 139-154, showed detections for both dyes that yielded fluorescence peaks that did not meet all the criteria for a positive dye result, but were calculated as though they were dye. The detections of dye for the final interval (Days 139-154) were 5.77 ppb * rhodamine WT and 3.17 ppb* fluorescein.

2) Hornsby Spring Canoe Landing: No dye was detected in analyzed samples collected through August 7 (Day 12). Rhodamine WT was initially detected at a concentration of 13.3 ppb in the August 7-10 (Days 12-15) packet. During the next two semi-weekly sampling intervals, from Day 15 through Day 21 (August 16), the rhodamine WT concentration increased, with the highest concentration of 38.4 ppb being detected in the Day 15-18 packet. The Day 21-24 interval was not analyzed. The remaining three sampling intervals analyzed (Days 24-34) showed a decrease in the rhodamine WT concentration. No fluorescein was detected in the samples analyzed from this station.

3) Darby Spring: No dye was detected in analyzed samples collected through August 15 (Day 20). Rhodamine WT was initially detected at a concentration of 2.27 ppb* in the August 15-19 (Days 20-24) packet. No dye was detected in the August 19-26 (Days 24-31) packet. During the next four weekly sampling intervals, from Day 31 through Day 59 (September 23), rhodamine WT was detected, with the highest concentration of 2.93 ppb being detected in the Day 31-38 packet.

4) Hornsby Spring Daily: No dye was detected in analyzed samples collected through August 7 (Day 12). Rhodamine WT was initially detected at a concentration of 4.35 ppb in the August 7-8 (Days 12-13) packet. That increased to 6.28 ppb in the August 8-9 (Days 13-14) packet. The final sample analyzed here showed a detection of 12.1 ppb in the August 9-10 (Days 14-15) packet. The results from this station provide the most accurate indication that dye arrived here at some time on Day 12 or 13.

The initial water sample that showed a positive detection for rhodamine WT was taken on August 10 (Day 15), with a concentration of 0.093 ppb. Results of the next three daily consecutive samples showed an increase in dye concentration. Figure 15 shows the detection of rhodamine WT in the analytical results of the Day 16 sample. Additional water samples were analyzed for the period of time when fluorescein arrival was confirmed in the charcoal samplers; no fluorescein was detected. A final rhodamine WT detection of 0.165 ppb* was made on August 26 (Day 31). Four additional water samples were collected and analyzed with no dye being detected. The final water sample analyzed was collected on September 9 (Day 45).

5) Hornsby Spring South: Three samples were analyzed, and all showed the presence of both dyes. Rhodamine WT was detected at the highest concentrations here of 34.5 ppb, and fluorescein at 3.26 ppb, in the August 26-September 2 (Days 31-38) packet. Concentrations for both dyes decreased in the following two samples, with final rhodamine WT and fluorescein detections of 4.31 ppb* and 1.41 ppb, respectively, being made in the September 9-15 (Day 45-51) packet.

Camp Kulaqua Wells

111) River Ranch Well: No dye was detected in samples collected through August 7 (Day 12). Rhodamine WT was initially detected at a concentration of 15.4 ppb in the August 7-10 (Days

TABLE 5. RESULTS OF DYE-POSITIVE SAMPLING STATIONS							(PAGE 1 of 3)							
Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida, July-December, 2005														
			Lee Sink Dye (fluorescein) Release:							7/26/2005		10:06 - 10:30		
	Day 0 = July 26, 2005		Mill Creek Sink Dye (rhodamine WT) Release:							7/26/2005		11:34 - 12:18		
	DAY #:	3	6	9	10	11	12	13	14	15	16	17	18	20
	DATE:	29-Jul	1-Aug	4-Aug	5-Aug	6-Aug	7-Aug	8-Aug	9-Aug	10-Aug	11-Aug	12-Aug	13-Aug	15-Aug
Station #	**Station Name:**	Friday	Monday	Thurs.	Friday	Sat.	Sun.	Monday	Tues.	Wed.	Thurs.	Friday	Sat.	Monday
1	Hornsby Spring Main;	ND	ND	ND	-	-	ND	-	-	14.4	-	-	37.2	-
	Charcoal	ND	ND	ND	-	-	ND	-	-	ND	-	-	ND	-
2	Hornsby Spring Run;	ND	ND	ND	-	-	ND	-	-	13.3	-	-	38.4	-
	Charcoal	ND	ND	ND	-	-	ND	-	-	ND	-	-	ND	-
3	Darby Spring;	-		-	-	-		-	-	-	-	-	-	
	Charcoal	-		-	-	-		-	-	-	-	-	-	
4	Hornsby Spring Daily;	na	na	na	na	ND	ND	4.35	6.28	12.1	na	na	na	na
	Charcoal	na	na	na	na	ND	ND	ND	ND	ND	na	na	na	na
4	Hornsby Spring Daily;	na	na	ND	ND	ND	ND	ND	ND	0.093	0.209	0.198	0.247	na
	Water	na	na	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	na
5	Hornsby Spring South;	-	-	-	-	-	-	-	-	-	-	-	-	-
	Charcoal	-	-	-	-	-	-	-	-	-	-	-	-	-
106	Santa Fe Hill Subdv.	ND	ND	na	-	-	ND	-	-	ND	-	-	ND	-
	System Well; Charcoal	ND	ND	na	-	-	ND	-	-	ND	-	-	ND	-
111	Camp Kulaqua River	na	na	ND	-	-	ND	-	-	15.4	-	-	-	71.1
	Ranch Well; Charcoal	na	na	ND	-	-	ND	-	-	ND	-	-	-	ND
111	Camp Kulaqua River	na	na	na	-	-	ND	-	-	0.201	-	-	-	na
	Ranch Well; Water	na	na	na	-	-	ND	-	-	ND	-	-	-	na
	DAY #:	3	6	9	10	11	12	13	14	15	16	17	18	20
Notes:	Rhodamine WT =	Top value, in red.				ND =	No Detection (of dye)							
	Fluorescein =	Bottom value, in green italic.				na =	not analyzed							
	*Indicates the presence of a fluorescence peak that does not meet all the criteria for a positive dye result, but have been calculated as though it were dye.													
	Only stations that had positive recoveries of dye are included in this table.													

TABLE 5. RESULTS OF DYE-POSITIVE SAMPLING STATIONS								(PAGE 2 of 3)					
Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida, July-December, 2005													
	DAY #:	**21**	**24**	**28**	**31**	**32**	**34**	**38**	**42**	**45**	**48**	**51**	**52**
	DATE:	**16-Aug**	**19-Aug**	**23-Aug**	**26-Aug**	**27-Aug**	**29-Aug**	**2-Sep**	**6-Sep**	**9-Sep**	**12-Sep**	**15-Sep**	**16-Sep**
Station #	**Station Name:**	Tues.	Friday	Tues.	Friday	Sat.	Monday	Friday	Tuesday	Friday	Monday	Thurs.	Friday
1	Hornsby Spring Main;	**27.9**	**30**	**54.2**	**24.8**	-	**21.2**	**27.7**	**18.1**	**7.29**	**8.24**	**5.9**	-
	Charcoal	**ND**	**ND**	**ND**	_1.48*_	-	_1.91_	_3.36_	_4.09_	_2.24_	_2.83_	_3.13_	-
2	Hornsby Spring Run;	**30.3**	-	**34.8**	**14.3**	-	**14.8**	-	-	-	-	-	-
	Charcoal	**ND**	-	**ND**	**ND**	-	**ND**	-	-	-	-	-	-
3	Darby Spring;	-	**2.27***	-	**ND**	-	-	**2.93**	-	**2.5**	-	**1.84***	-
	Charcoal	-	**ND**	-	**ND**	-	-	**ND**	-	**ND**	-	**ND**	-
4	Hornsby Spring Daily;	na	na	na	na	-	na	na	na	na	-	na	-
	Charcoal	na	na	na	na	-	na	na	na	na	-	na	-
4	Hornsby Spring Daily;	na	**0.199**	**0.128***	**0.165***	-	**ND**	**ND**	**ND**	**ND**	-	-	-
	Water	na	**ND**	**ND**	**ND**	-	**ND**	**ND**	**ND**	**ND**	-	-	-
5	Hornsby Spring South;	-	-	-	-	-	-	**34.5**	-	**14.3**	-	**4.31***	-
	Charcoal	-	-	-	-	-	-	_3.26_	-	_2.55_	-	_1.41_	-
106	Santa Fe Hill Subdv.	**ND**	**ND**	**2.49**	-	**ND**	-	**2.71**	-	**ND**	-	-	**ND**
	System Well; Charcoal	**ND**	**ND**	**ND**	-	**ND**	-	**ND**	-	**ND**	-	-	**ND**
111	Camp Kulaqua River	-	**47.3**	**30.4**	**15.3**	-	-	**42.4**	-	**21**	-	**7.98**	-
	Ranch Well; Charcoal	-	**ND**	**ND**	_0.824*_	-	-	_3.43_	-	_2.94_	-	_1.88_	-
111	Camp Kulaqua River	-	na	na	**0.145**	-	-	**ND**	-	**ND**	-	na	-
	Ranch Well; Water	-	na	na	**ND**	-	-	**ND**	-	**ND**	-	na	-
	DAY #:	**21**	**24**	**28**	**31**	**32**	**34**	**38**	**42**	**45**	**48**	**51**	**52**
Notes:	Rhodamine WT =	Top value, in red.				ND =	No Detection (of dye)						
	Fluorescein =	Bottom value, in green italic.				na =	not analyzed						
	*Indicates the presence of a fluorescence peak that does not meet all the criteria for a positive dye result, but have been calculated as though it were dye.												
	Only station that had positive recoveries of dye are included in this table.												

TABLE 5. RESULTS OF DYE-POSITIVE SAMPLING STATIONS (PAGE 3 of 3)

Mill Creek and Lee Sinks Dye Trace, Alachua County, Florida, July-December, 2005

	DAY #:	**55**	**57**	**59**	**66**	**73**	**79**	**86**	**94**	**111**	**125**	**139**	**154**
	DATE:	**19-Sep**	**21-Sep**	**23-Sep**	**30-Sep**	**7-Oct**	**13-Oct**	**20-Oct**	**28-Oct**	**14-Nov**	**28-Nov**	**12-Dec**	**27-Dec**
Station #	**Station Name:**	Monday	Wed.	Friday	Friday	Friday	Thurs.	Thurs.	Friday	Monday	Monday	Monday	Tuesday
1	Hornsby Spring Main;	**5.91**	-	**9.54**	**11**	**8.04**	**4.15**	**5.65**	**3.75**	**5.17**	**6.72**	**5.31***	**5.77***
	Charcoal	*3.32*	-	*4.85*	*4.61*	*4.28*	*2.32*	*3.11*	*2.09*	*2.74**	*3.10**	*2.75**	*3.17**
2	Hornsby Spring Run;	-	-	-	-	-	-	-	-	-	-	-	-
	Charcoal	-	-	-	-	-	-	-	-	-	-	-	-
3	Darby Spring;	-	-	**2.22***	-	-	-	-	-	-	-	-	-
	Charcoal	-	-	**ND**	-	-	-	-	-	-	-	-	-
4	Hornsby Spring Daily;	-	-	na	na	na	na	na	na	-	-	-	-
	Charcoal	-	-	na	na	na	na	na	na	-	-	-	-
4	Hornsby Spring Daily;	-	-	-	-	-	-	-	-	-	-	-	-
	Water	-	-	-	-	-	-	-	-	-	-	-	-
5	Hornsby Spring South;	-	-	-	na	na	na	na	na	-	-	-	-
	Charcoal	-	-	-	na	na	na	na	na	-	-	-	-
106	Santa Fe Hill Subdv.	-	**ND**	-	na	-	-	-	-	-	-	-	-
	System Well; Charcoal	-	**ND**	-	na	-	-	-	-	-	-	-	-
111	Camp Kulaqua River	-	-	na	**11.2**	-	-	-	-	-	-	-	-
	Ranch Well; Charcoal	-	-	na	*3.51*	-	-	-	-	-	-	-	-
111	Camp Kulaqua River	-	-	na	na	-	-	-	-	-	-	-	-
	Ranch Well; Water	-	-	na	na	-	-	-	-	-	-	-	-
	DAY #:	**55**	**57**	**59**	**66**	**73**	**79**	**86**	**94**	**111**	**125**	**139**	**154**
Notes:	Rhodamine WT =	Top value, in red.				ND =	No Detection (of dye)						
	Fluorescein =	Bottom value, in green italic.				na =	not analyzed						
	*Indicates the presence of a fluorescence peak that does not meet all the criteria for a positive dye result, but have been calculated as though it were dye.												
	Only station that had positive recoveries of dye are included in this table.												

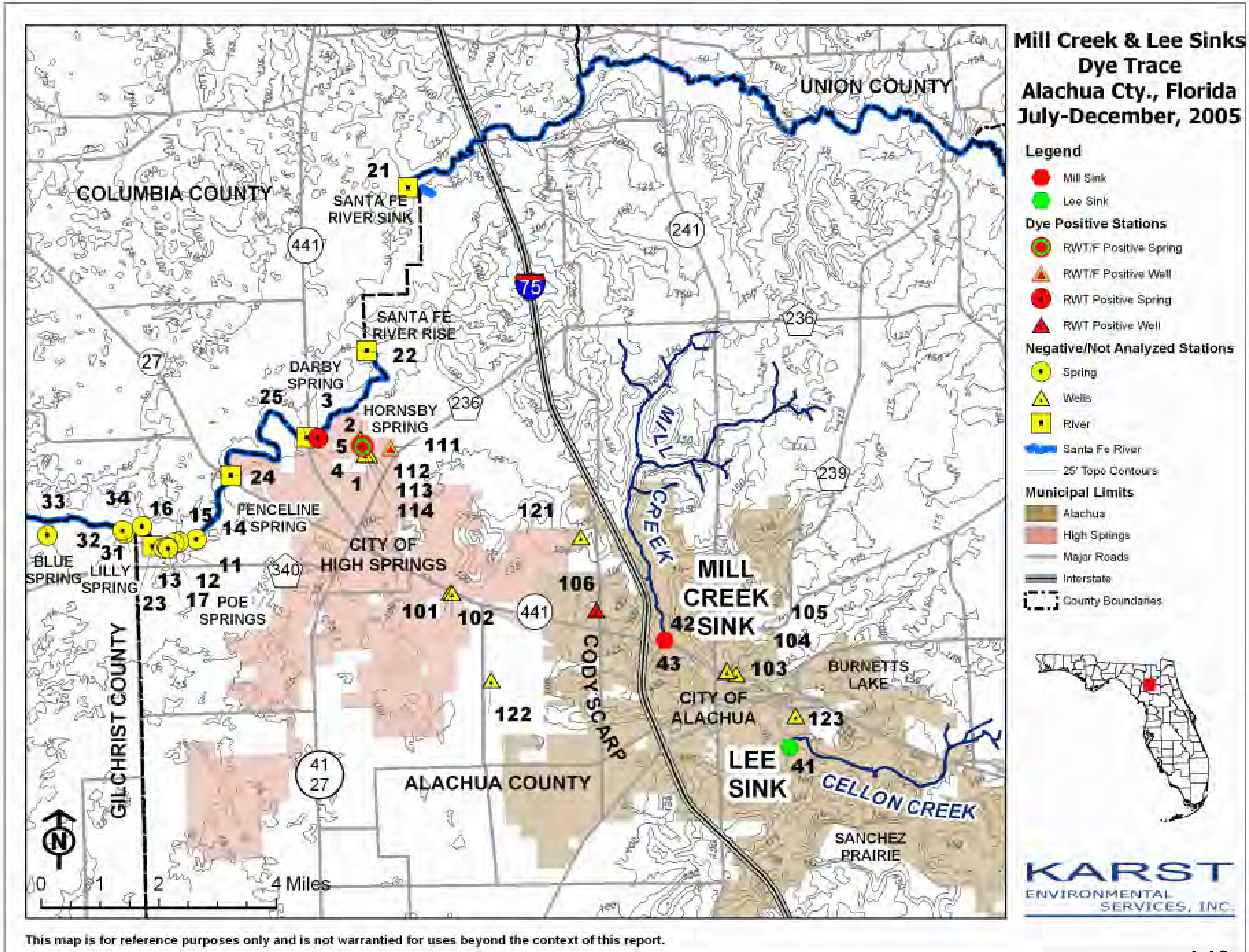

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Figure 12. Sampling Stations Results Map

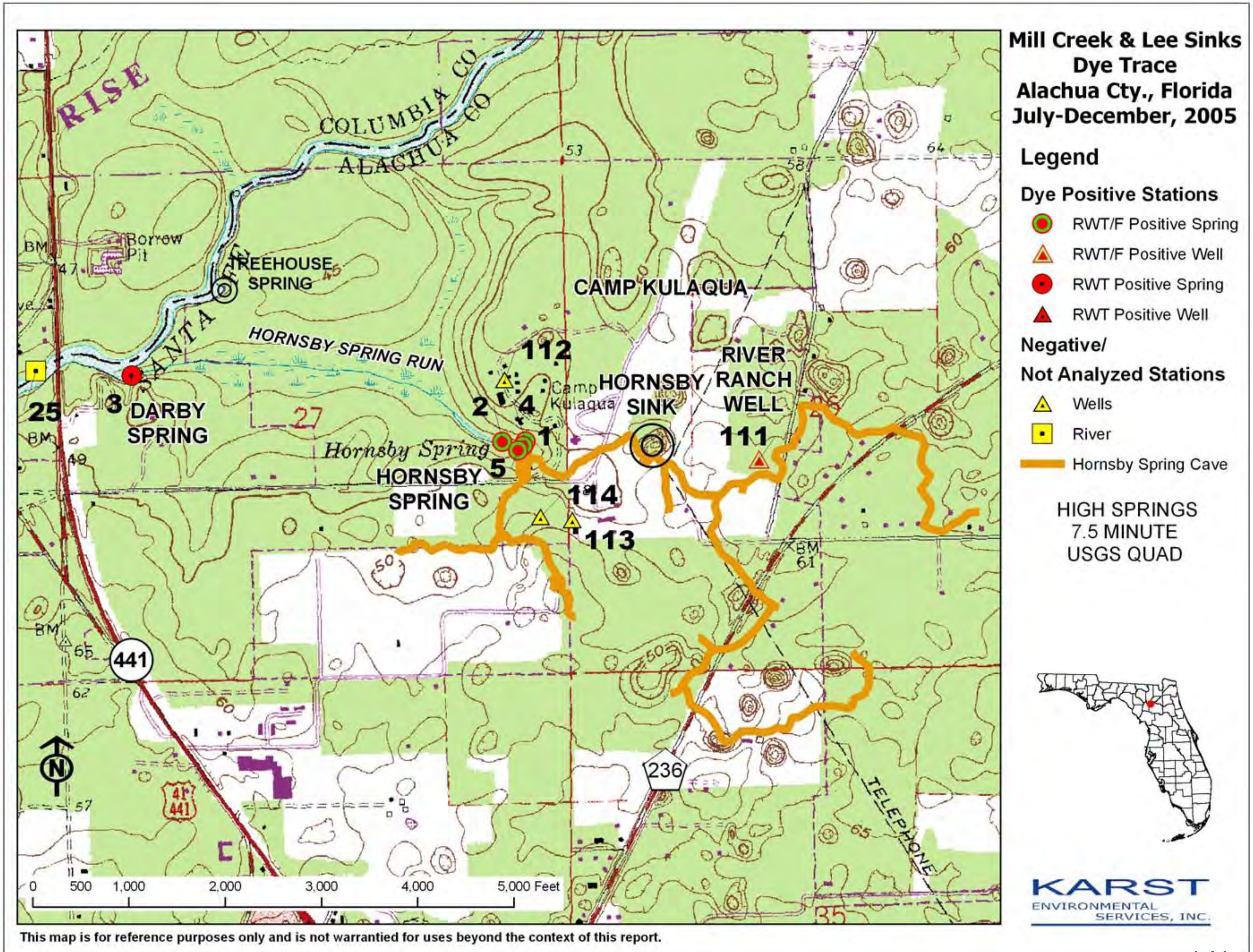

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Figure 13. Sampling Stations Results Map; Hornsby Spring Area.

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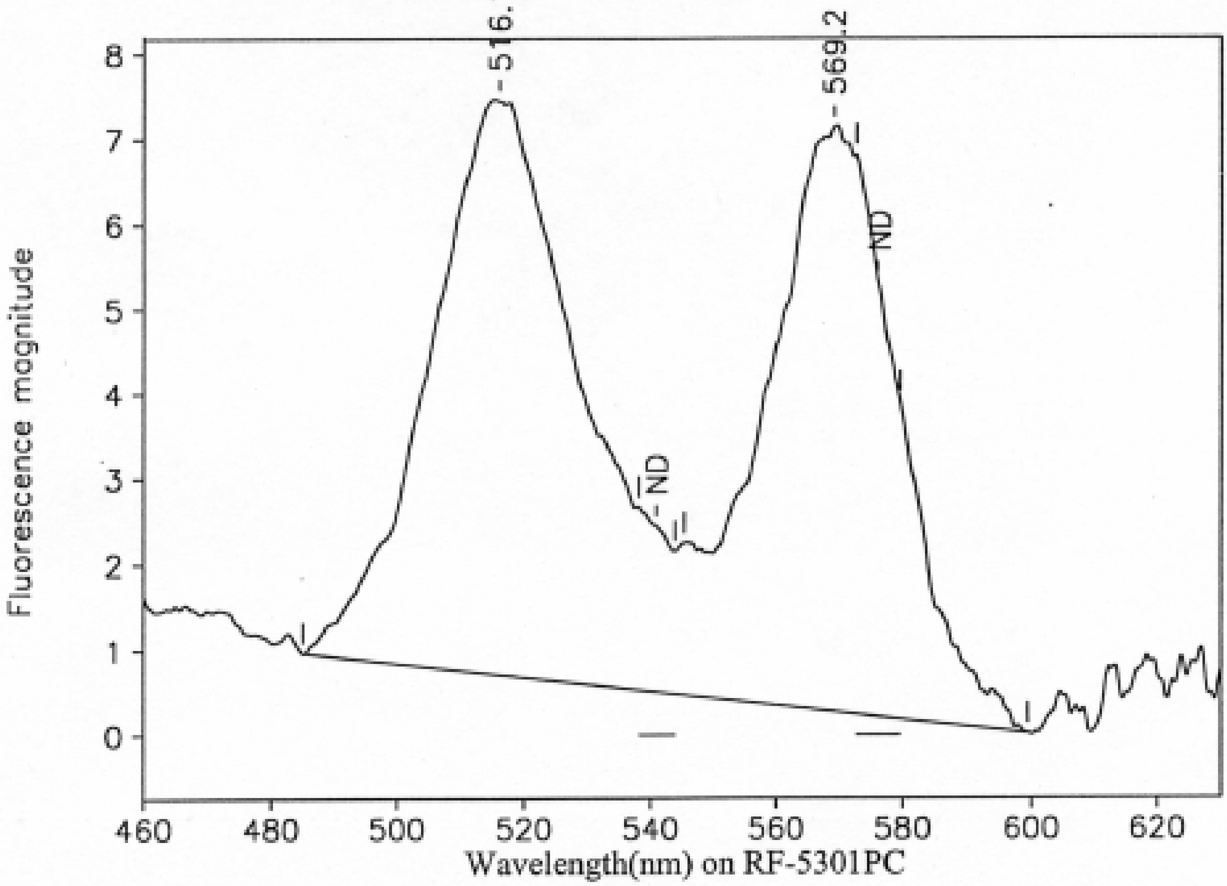

Station 1: Hornsby Spring - Main
OUL number: P3523
Matrix: Elutant
Placed: 09/02/05 1418

Analyzed: 09/14/05

Collected: 09/06/05 1623

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.1	485.0	545.4	6.74	193.75	0.03	4.09
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.2	545.4	599.4	6.87	170.31	0.04	18.1
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Figure 14. Example of Spectrofluorophotometer Analytical Graph. This graph indicates a positive detection for rhodamine WT and fluorescein dyes from a charcoal sampler placed at Hornsby Spring. The wavelength peak indicates the specific dyes present, and the fluorescence magnitude is used to calculate concentration in the sample.

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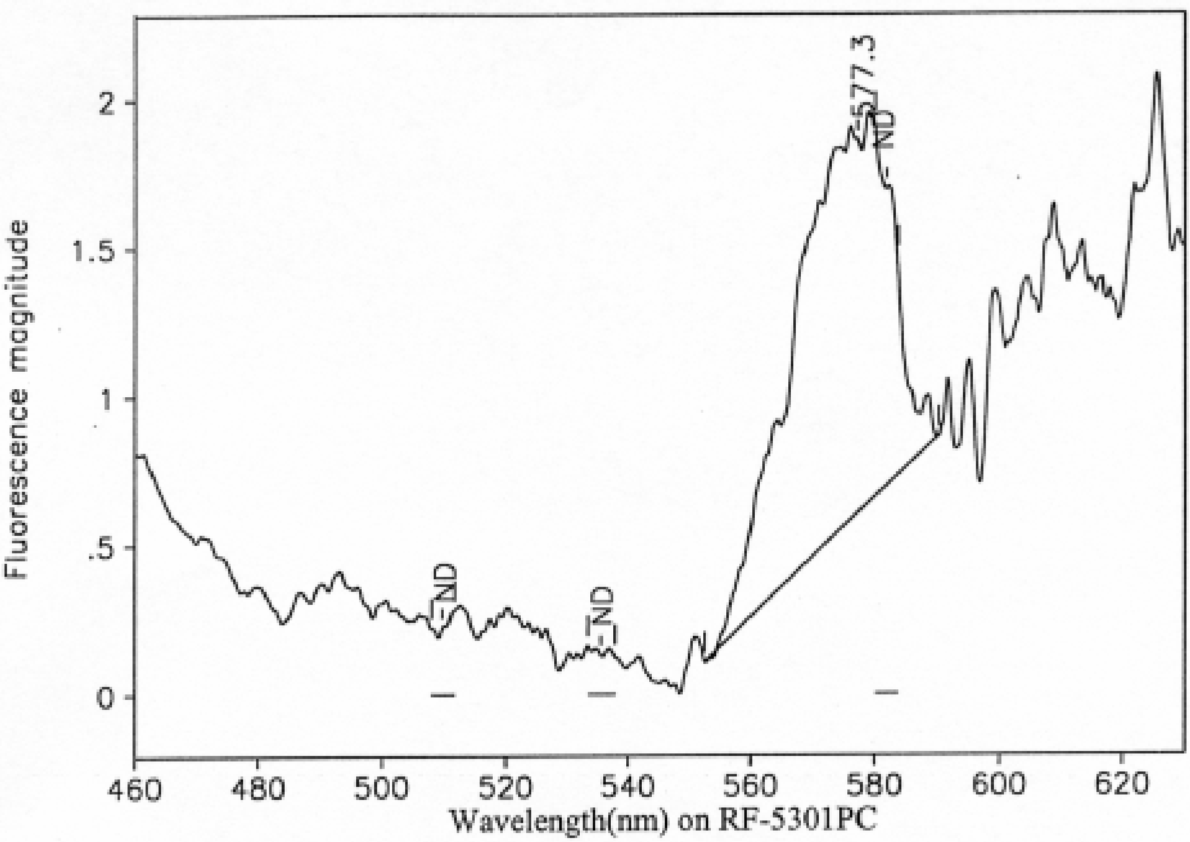

Station 4: Hornsby Spring Daily
OUL number: P3568
Matrix: Water
Collected: 08/11/05 1529

Analyzed: 09/16/05

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
577.3	552.6	590.2	1.25	24.87	0.05	0.209
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Figure 15. Example of Spectrofluorophotometer Analytical Graph. This graph indicates a positive detection for rhodamine WT dye from a water sample taken at Hornsby Spring. The wavelength peak indicates the specific dye present, and the fluorescence magnitude is used to calculate concentration in the sample.

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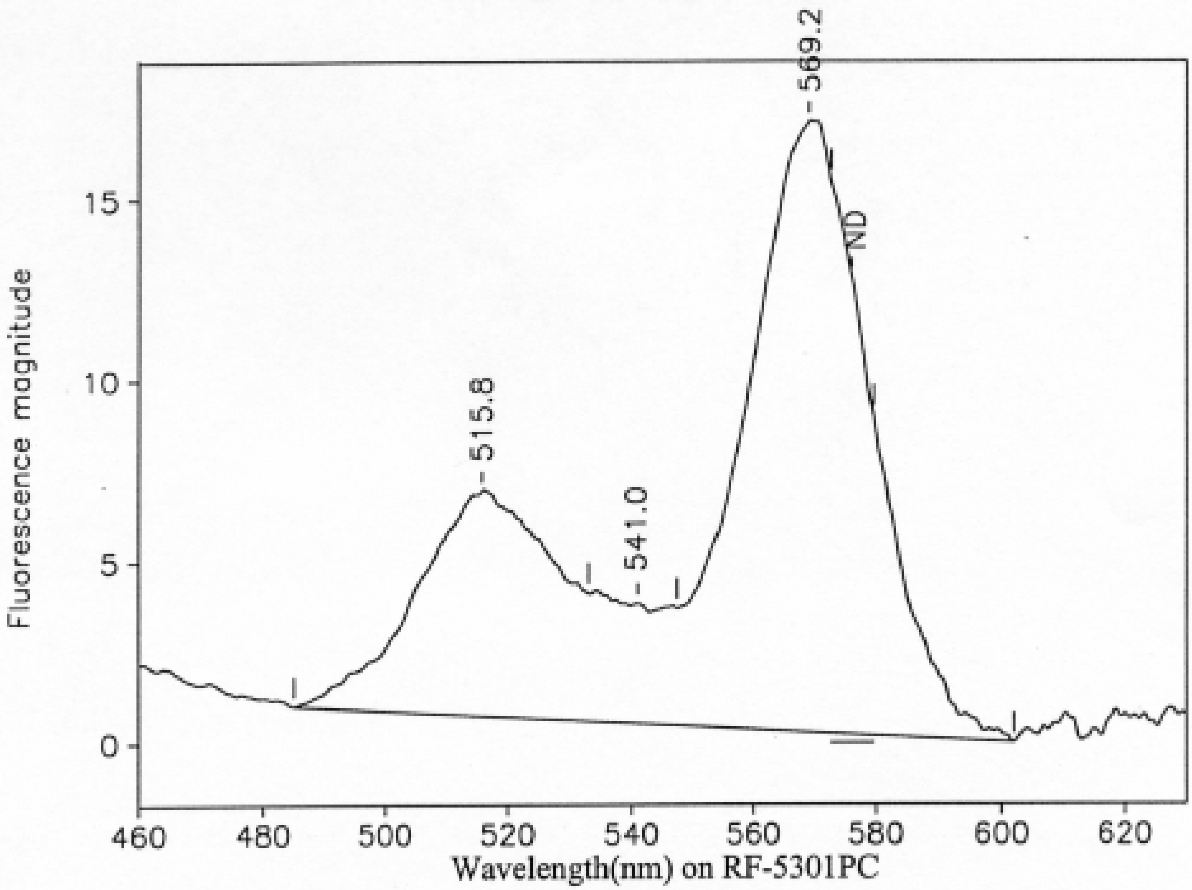

Station 111: River Ranch Well
OUL number: P3527 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/26/05 1548 Collected: 09/02/05 1443

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	485.0	533.1	6.18	162.17	0.04	3.43
541.0	533.1	547.5	3.31	48.37	0.07	~~1.39~~
569.2	547.5	602.0	16.81	399.87	0.04	42.4
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Figure 16. Example of Spectrofluorophotometer Analytical Graph. This graph indicates a positive detection for rhodamine WT and fluorescein dyes from a charcoal sampler placed at the Camp Kulaqua River Ranch Well. The wavelength peak indicates the specific dyes present, and the fluorescence magnitude is used to calculate concentration in the sample.

12-15) packet. The next semi-weekly sampling interval, Days 15-20, had the highest rhodamine WT concentration recorded here of 71.1 ppb. (This was a slightly longer than usual five-day sampling interval.) During the next three semi-weekly sampling intervals, from Day 20 through Day 31 (August 26), the rhodamine WT concentration decreased.

Fluorescein was initially detected at a concentration of 0.824 ppb* in the August 23-26 (Days 28-31) packet, with rhodamine WT also present at 15.3 ppb. The next weekly sampling interval, Days 31-38, had a fluorescein detection of 3.43 ppb. Figure 16 shows this detection along with that for rhodamine WT in the analytical results of that packet.

After August 26 (Day 31) sampling intervals were changed from semi-weekly to weekly. Concentrations for both dyes were detected in generally decreasing amounts. The dye concentrations in the final interval analyzed, Days 59-66, showed a detection of rhodamine WT of 11.2 ppb and fluorescein of 3.51 ppb (the highest detection here of fluorescein).

The initial water sample that showed a positive detection for rhodamine WT was taken on August 10 (Day 15), with a concentration of 0.201 ppb. The last detection of rhodamine WT was made on August 26 (Day 31) at 0.145 ppb. This water sample, along with the following two, were analyzed for the period of time when fluorescein arrival was confirmed in the charcoal samplers; no fluorescein was detected. The final water sample analyzed was collected on September 3 (Day 66), with no dye being detected.

This well typically pumped an average of 25,000 gallons per day during August and September. Total water pumped for August was over 830,000 gallons, and approximately 600,000 gallons for September.

112) Main Shop Well: No dye was detected in the samples analyzed.

113) Residence #6 Well: No dye was detected in the samples analyzed.

114) Chalet Well: No dye was detected in the samples analyzed.

<u>Municipal Wells</u>

101) High Springs #1 (West Well): No dye was detected in the samples analyzed.
This water system (Wells 1 and 2) typically pumped an average of 460,000 gallons per day (MGD) during the July, August, September and October. Total water pumped for August was 13.640 million gallons, 14.02 million gallons for September and 14.111 million gallons for October (HSDPW, 2006).

102) High Springs #2 (East Well): All samples were held pending positive analyses results at Station 101.

103) Alachua Well #1: No dye was detected in the samples analyzed. Remaining samples were held pending positive analyses results at Station 104.

104) Alachua Well #2: No dye was detected in the samples analyzed.

This water system (Wells 1, 2 and 3) typically pumped an average of 1.3 million gallons per day (MGD) during the July, August and September, and 1.25 MGD for October. Total water pumped for August was 41.463 million gallons, 40.864 million gallons for September and 38.792 million gallons for October (ADPW, 2006).

105) Alachua Well #3: All samples were held pending positive analyses results at Station 104.

106) Santa Fe Hills Subdivision Well (South Well): No dye was detected in samples collected through August 19 (Day 24). Rhodamine WT was initially detected at a concentration of 2.49 ppb in the August 19-23 (Days 24-28) packet. No dye was detected for the next semi-weekly interval, Days 28-32. A detection of 2.71 ppb* was made during the next sampling interval, Days 32-38 (August 27-September 2). No dye was detected in the three weekly samplers that followed Day 38. No detections of fluorescein were made at this well.

A water sample was collected from a tap supplying treated water from this system on September 21 (Day 57); no dye was detected.

This well typically pumped between 11,000 to 14,000 gallons per day during August and September. Total water pumped for August was over 400,000 gallons, and approximately 350,000 gallons for September.

<u>Poe Springs Area Springs</u>

11) Poe Spring (Shallow Vent): No dye was detected in the samples analyzed.

12) Poe Spring (Gauge Vent): No dye was detected in the samples analyzed. Remaining samples were held pending positive analyses results at Poe Spring.

13) Watermelon Spring #2: All samples were held pending positive analyses results at Poe Spring. As no dye was detected at Poe Spring, no samples from this station were analyzed.

17) Poe Spring Run: No dye was detected in the samples analyzed.

14) Fenceline Spring: No dye was detected in the samples analyzed. Remaining samples were held pending positive analyses results at Poe Spring.

15) "The Crack" Spring: All samples were held pending positive analyses results at Poe Spring. As no dye was detected at Poe Spring, no samples from this station were analyzed.

16) Twin Cypress Spring: All samples were held pending positive analyses results at Poe Spring. As no dye was detected at Poe Spring, no samples from this station were analyzed.

<u>Santa Fe River Sites</u>

21) Santa Fe River Sink: All samples were held pending any anomalous positive results found in downstream stations. As no anomalous results were seen, no samples from this station were analyzed.

22) Santa Fe River Rise: No dye was detected in the samples analyzed.

23) Santa Fe River Downstream of Poe Spring: All samples were held pending any negative results in all upstream stations. As both dyes were detected at, and discharged by, Hornsby Spring, no samples from this station were analyzed.

24) Santa Fe River at Hwy 27 Bridge: All samples were held pending any negative results in all upstream stations. As both dyes were detected at, and discharged by, Hornsby Spring, no samples from this station were analyzed.

25) Santa Fe River at Hwy 441 Bridge: All samples were held pending any negative results in all upstream stations. As both dyes were detected at, and discharged by, Hornsby Spring, no samples from this station were analyzed.

Other Springs and Features

31) Lilly Spring: All samples were held pending positive analyses results at Poe Spring. As no dye was detected at Poe Spring, no samples from this station were analyzed.

32) Pickard Spring: All samples were held pending positive analyses results at Poe Spring. As no dye was detected at Poe Spring, no samples from this station were analyzed.

33) Blue Spring (Gilchrist County): All samples were held pending positive analyses results at Poe Spring. As no dye was detected at Poe Spring, no samples from this station were analyzed.

34) Seven Sisters Spring Run: All samples were held pending positive analyses results at Poe Spring. As no dye was detected at Poe Spring, no samples from this station were analyzed.

41) Lee Sink Swallet (Cellon Creek Inflow): All samples were held pending any anomalous positive results found in down-gradient stations. As no anomalous results were seen, no samples from this station were analyzed.

42) Mill Creek Sink Swallet (Mill Creek Inflow): All samples were held pending any anomalous positive results found in down-gradient stations. As no anomalous results were seen, no samples from this station were analyzed.

43) Mill Creek Sink Cave: All samples (water only) tested were positive for rhodamine WT as was expected; this was the introduction point for that dye. No fluorescein was detected.

Other Private Wells

121) Copeland Well: No dye was detected in the samples analyzed.

122) Tropic Traditions Well: No dye was detected in the samples analyzed.

123) Progress Center Well: No water samples collected here were analyzed; this well was monitored for a visual positive with negative results.

CONCLUSIONS

The dye trace investigation indicates a direct hydrologic connection between two recharge features on the Cross-County Fracture Zone and a spring discharge feature on the same fracture system. The apparent measured rate of groundwater flow in the fracture system is between 1,400 to 2,400 feet per day.

Hornsby Spring and the River Ranch Well

The results of this study indicate that Mill Creek Sink and Lee Sink are connected to Hornsby Spring. Detections of both rhodamine WT and fluorescein that were both strong in concentration and long in duration provide confirmation of that connection. Detection of rhodamine WT in water samples provided additional confirmation, and all Hornsby Spring area sites analyzed corroborated each other regarding arrival times and relative concentrations of both dyes. Figures 17 and 18 illustrate the connections and general flow directions of the dyes.

The most definitive result was obtained from the Hornsby Spring Daily (Station 4) sampler that showed the arrival of rhodamine WT from Mill Creek Sink at some time during Days 12 and 13. This was corroborated by the samplers collected at the Hornsby Spring Landing (Station 2) and the River Ranch Well (Station 111) during the Day 12 to 15 sampling interval. An initial positive detection from water was then confirmed on Day 15 from both the Hornsby Spring Daily (Station 2) and River Ranch Well (Station 111).

The other definitive result was obtained from the Hornsby Spring Main (Station 1) sampler that showed the arrival of fluorescein from Lee Sink at some time between Days 28 and 31. This was corroborated by the positive detection of fluorescein in the sampler at the River Ranch Well (Station 111) also during the Days 28 to 31 sampling interval. As this dye appeared to arrive at a concentration much lower than the rhodamine WT, no positive detection was obtained from water samples.

A detection of both dyes was made as late as the Day 139 to Day 154 sampler at the Hornsby Spring Main (Station 1).

Santa Fe Hills Subdivision System Well

The detection of rhodamine WT during two non-consecutive sampling intervals indicates that the Santa Fe Hill Subdivision Well is connected with Mill Creek Sink. This well is located only 1.27 miles northwest of Mill Creek Sink, was under constant use and is in line with Mill Sink relative to the Cross-County Fracture Zone. This was the only public supply well that tested positive for dye in the samples analyzed.

While the results were not as definitive as those at the Camp Kulaqua River Ranch Well, this study provides evidence that the surface waters entering Mill Creek Swallet may exert an influence on some wells in this area. During this study, surface water input into the swallet was minimal or non-existent, with upstream groundwaters in the cave receiving and moving the dye. A higher inflow of stream and stormwaters into this swallet may deliver a different level of impact to this well (and the adjacent system well).

Darby Spring

The results of this study indicate that Mill Creek Sink is potentially connected to Darby Spring. However, the positive results obtained for rhodamine WT from Darby Spring may not necessarily be proof of a direct underground connection with Mill Creek Sink. Based on the results at nearby Hornsby Spring and observations made during the dye trace, three possibilities can be considered regarding the detection of dye at this location.

First, it is a possibility that dye discharged from Hornsby Spring has mixed in these waters and was picked up by the samplers at this site. The cave is silty and the water visibility limited. These conditions were not conducive to easy sampler replacement and recover, so the sampler was lowered by a cord over the spring ledge and into the colder water of the entrance. Although Darby Spring was observed to maintain a lens of colder water in and around its entrance, it has very little flow, and a channel of water from Hornsby Spring Run and the river enters the Darby Spring Pool from upstream, and then flows past the spring pool creating a potential for the mixing of these waters.

The second possibility takes into account that dye-laden waters from Hornsby Spring have entered up-gradient swallet systems, with a portion of that water making its way into the cave passages that connect to Darby Spring. There are numerous swallets located within the Hornsby Spring Run that channel waters discharged at that spring back underground. At least four swallets are known to divers, and all have extensive cave passage, with one discharging directly back into the river at Treehouse Spring upstream of Darby Spring. Darby Spring has an extensive loop of cave passage connecting to a second, smaller spring, and is located in relatively close proximity downstream of these swallets and their caves.

The third possibility is that there is a direct underground connection from Mill Creek Sink. In light of the above, it would be imprudent at this time to assume this. If future dye studies are conducted in this area, sampling procedures should take these observations into account when designing sampling protocols here.

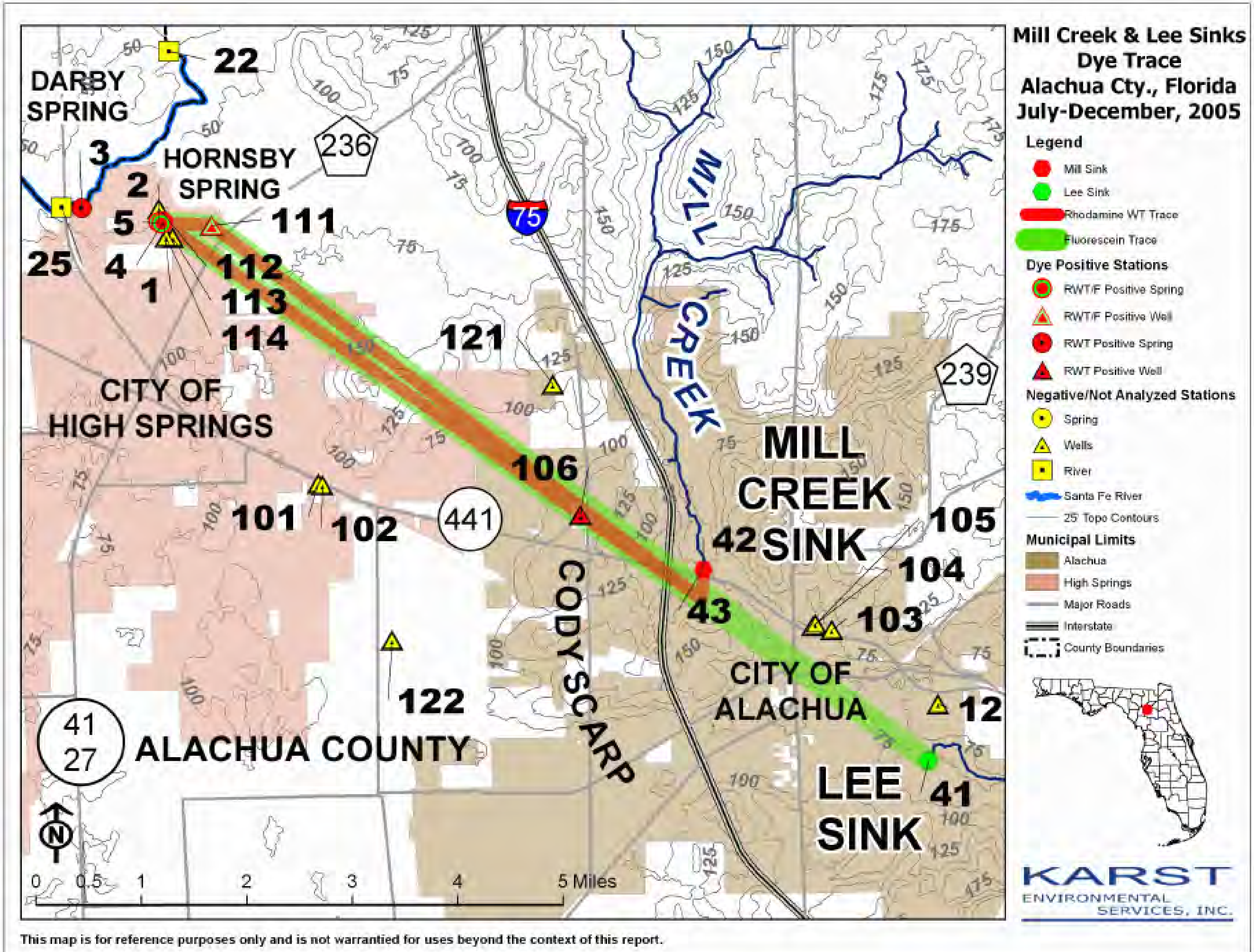

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Figure 17. Study Area Results Map.

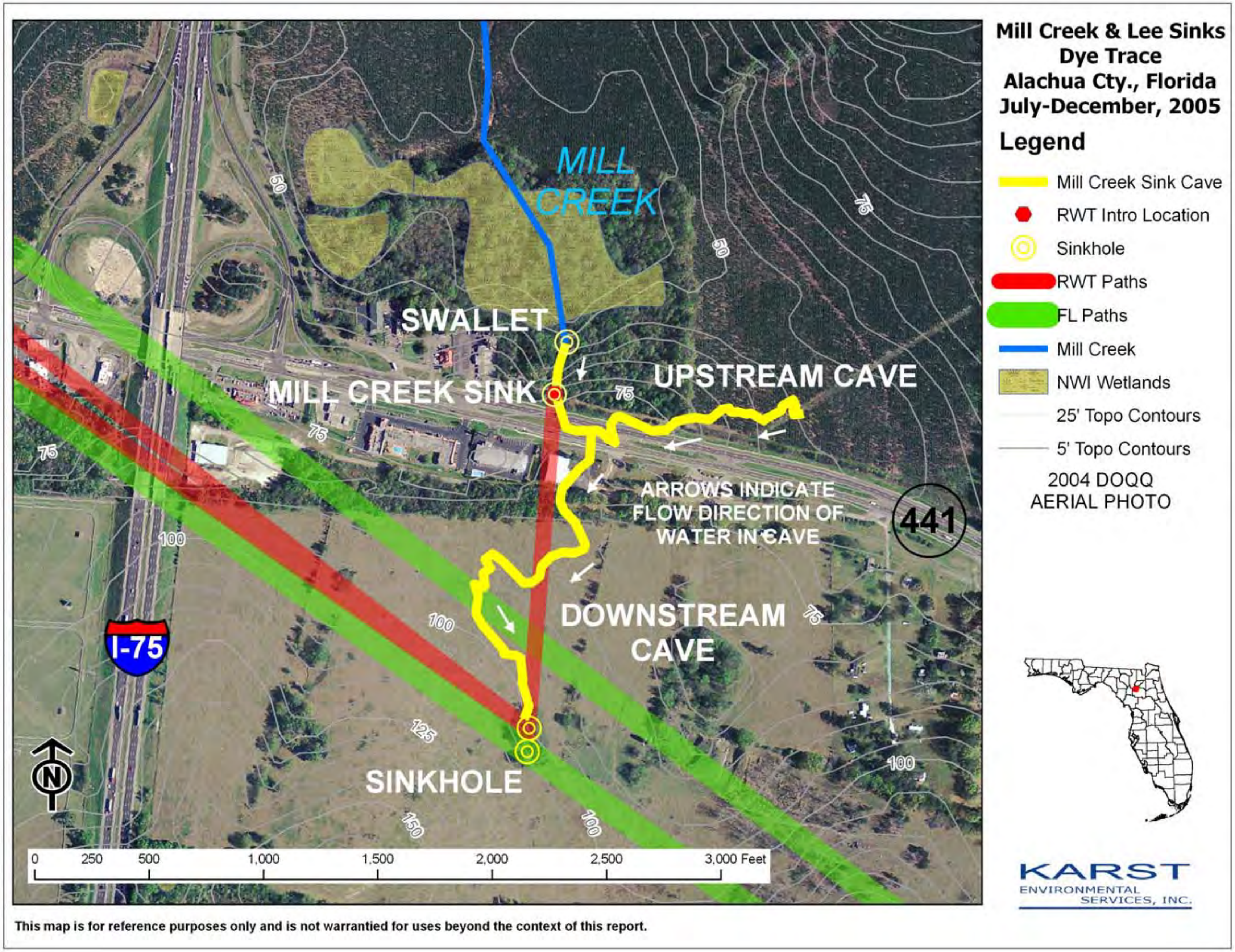

Figure 18. Study Area Results Map; Mill Creek Sink Cave Area.

RECOMMENDATIONS

The following should be considered when conducting future dye traces in this area.

1. A fracture trace analysis should be performed. This analysis would provide better identification of springs, wells and other locations that could be used as dye monitoring stations, as well as dye release locations. This would also provide a framework and hierarchy for planning consecutive dye traces.

2. As there is now a better understanding of the connections to Hornsby Spring, future dye traces may want to consider the inclusion of various in-river "rises" that occur within the Santa Fe River in this area. These may require the use of cave divers to establish sampling stations at various conduit junctions that may be present within these caves. These could include such in-river rise discharges as Columbia Spring, Alligator Rise and Treehouse Spring.

3. The authors believe that the results obtained at Darby Spring during this dye trace may not necessarily confirm a direct connection with Mill Creek Sink. There are at least two other scenarios that could explain the positive detections of dye. To address these alternative explanations, it would be prudent to conduct sampling further back into the cave to minimize the chances of dye contamination from the Santa Fe River and Hornsby Spring Run in any future trace here. To determine if there is an indirect path for dye via the various Hornsby Spring Run swallet caves, a trace could be conducted by releasing dyes directly into those swallet caves; Darby Spring could then be monitored to determine if subterranean connections exist.

4. The water level in the Lee Sink Swallet, unlike that at Mill Creek Swallet, is much more variable, and appears at times to be at an elevation higher than that of the surrounding groundwater level. It would be prudent to place an additional gauge within Lee Sink, and to utilize a nearby monitor well for depth-to-water measurements. This would be easily facilitated by the elevation bench that has been established near the Swallet.

5. Establish staff gauges and water level monitoring at all sampling and discharge locations prior to dye release and for the period of the investigation.

6. Measure the in-conduit flow rates within the upstream cave passages at Mill Creek Sink Cave and Hornsby Spring Cave.

7. Develop a mass balance for the Cross-county Fracture Zone, to better understand the quantities of water entering and being discharged.

8. Select additional water level data points for Alachua County potentiometric surface contour maps to better correlate the relationship of this area to the Santa Fe River. The staff gauge established during this study at Mill Sink Swallet can be included among such additions.

REFERENCES

ACEPD, 2004. May 2004 Floridan Aquifer Potentiometric Surface Map in Alachua County. Alachua County Environmental Protection Department, Gainesville, Florida.

ADPW, 2006. Unpublished data; monthly pumping records for municipal wells. City of Alachua Dept. of Public Works, High Springs, Florida.

Aley, T., 1999. Groundwater Tracing Handbook. Ozark Underground Laboratory, Protem, MO, 35 pp.

Aley, T., 2003. Procedures And Criteria - Analysis of Fluorescein, Eosine, Rhodamine WT, Sulforhodamine B, and Pyranine Dyes In Water and Charcoal Samplers. Ozark Underground Laboratory, Protem, MO, 21 pp.

Clark, W.E.., Musgrove, R.H., Menke, C.G., and Cagle, J.W., Jr., 1964. Water Resources of Alachua, Bradford, Clay and Union Counties, Florida. Report of Investigations No. 35, Florida Geological Survey, Tallahassee, Florida, 170 pp.

Fisk, D.W., and Exley, I.S., 1976, Unpublished report. Alachua County Environmental Protection Department file document. 2 pp.

Hoenstine, and Lane, E., 1991. Environmental Geology and Hydrogeology of the Gainesville Area, Florida. Special Publication No. 33, Florida Geological Survey, Tallahassee, Florida, 70 pp.

Hornsby, D., and Ceryak, R., 1998, Springs of the Santa Fe River Basin in Florida. WR99-02, Suwannee River Water Management District, Live Oak, Florida, 178 pp.

HSDPW, 2006. Unpublished data; monthly pumping records for municipal wells. City of High Springs Dept. of Public Works, High Springs, Florida.

Macesich, M., 1988. Geologic Interpretation of the Aquifer Pollution Potential in Alachua County, Florida. Open File Report No. 21, Florida Geological Survey, Tallahassee, Florida, 25 pp.

Rosenau, J.C., Faulkner, G.L., Hendry, C.W., Jr., and Hull, R.W., 1977, Springs of Florida. Geological Bulletin No. 31 (rev.), Florida Bureau of Geology, Tallahassee, Florida , 461 pp.

Scott, T.M., Means, G.H., Means, R.C., and Meegan, R.P., 2002, First Magnitude Springs of Florida. Open File Report No. 85, Florida Geological Survey, Tallahassee, Florida, 138 pp.

Scott, T.M., Means, G.H., Meegan, R.P., Means, R.C., Upchurch, S.B., Copeland, R E., Jones, J., Roberts, T., and Willet, A., 2004, Springs of Florida. Geological Bulletin No. 66, Florida Geological Survey, Tallahassee, Florida, 377 pp.

Southeastern Geological Society, 1986. Hydrogeological Units of Florida. Special Publication No. 28, Florida Geological Survey, Tallahassee, Florida, 9 pp.

SRWMD, 2005. Potentiometric Surface of the Upper Floridan Aquifer in the Suwannee River Water Management District, May 2005. Suwannee River Water Management District, Live Oak, Florida.

SRWMD, 2006[1]. Unpublished raw data; data from water level and rainfall recording stations. Suwannee River Water Management District, Live Oak, Florida.

SRWMD, 2006[2]. Unpublished data; Hornsby Spring discharge measurements. Suwannee River Water Management District, Live Oak, Florida.

White, W.A., 1970. The Geomorphology of the Florida Peninsula. Geological Bulletin No. 51, Florida Bureau of Geology, Tallahassee, Florida, 164 pp.

Williams, K.E., Nicola, D., and Randazzo, A.F., 1977, The Geology of the Western Part of Alachua County, Florida. Report of Investigations No. 85, Florida Bureau of Geology, Tallahassee, Florida, 98 pp.

APPENDIX I

PHOTOGRAPHIC PLATES

Plate 1. Mill Creek Sink Swallet.

Plate 2. Mill Creek Sink.

Plate 3. Mill Creek Sink Cave. Divers descending into the cavern. Photo courtesy of Cindy Butler.

Plate 4. Mill Creek Sink Cave. Bottom of the cavern at 150 feet of depth. Rhodamine WT was released into the downstream passage just beyond this location. Photo courtesy of Cindy Butler.

Plate 5. Mill Creek Sink Cave. Large room immediately upstream of the Sink, at 140 feet of depth. Note the diver hovering over a thick bank of clay and other sediments. Photo courtesy of Cindy Butler.

Plate 6. Mill Creek Sink Cave. Divers in the cave passage upstream of Sink, at 160 feet of depth. Photo courtesy of Cindy Butler.

Plate 7. Sinkhole above and in the vicinity of the Terminal Room of the Mill Creek Sink Cave.

Plate 8. Lee Sink Swallet.

Plate 9. Lee Sink Swallet during dry conditions.

Plate 10. Santa Fe River and water level gauge and recorder. View is looking upstream at the Highway 441 Bridge.

Plate 11. Hornsby Spring and Run.

Plate 12. Darby Spring.

Plate 13. Poe Spring.

Plate 14. Dye release at Lee Sink. Photo courtesy of Steve Boyes.

Plate 15. Dye release at Mill Creek Sink. Photo courtesy of Steve Boyes.

Plate 16. River Ranch Well.

APPENDIX IIA

ANALYTICAL RESULTS
(Including Certificates of Analysis)

Ozark UNDERGROUND LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

July 20, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek/Lee Sinks Dye Trace, BG-1
Analysis results for charcoal samplers shipped on July 8, 2005
Ozark Underground Laboratory (OUL) numbers P2519 through P2521.

Dear Peter:

We have completed analysis of the charcoal samplers received at the OUL on July 12, 2005. We have indicated the OUL number for each of these samplers on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal samplers
2) Sample Collection Data Sheet
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, BG-1
Samples collected by: KES staff
Date samples shipped: July 8, 2005
Date samples rec'd at OUL: July 12, 2005
Date samples analyzed by OUL: July 14, 2005

Table 1. Results for charcoal samplers analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein Results		RWT Results	
			2005	2005	Peak	Conc.	Peak	Conc.
P2519	22	Santa Fe River Rise	6/30 1653	7/7 1620	ND		ND	
P2520	Laboratory control charcoal blank							
P2521	1	Hornsby Spring - Main	6/30 1615	7/7 1455	ND		ND	

FOOTNOTES:

ND = None Detected

Ozark Underground Laboratory 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

August 10, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, Week 1
Analysis results for charcoal and water samples shipped on August 3, 2005
Ozark Underground Laboratory (OUL) numbers P2795 through P2814.

Dear Peter:

We have completed analysis of the charcoal and water samples received at the OUL on August 4, 2005. We have indicated the OUL number for each of these samples on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal and water samples
2) Sample Collection Data Sheets
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Week 1
Samples collected by: KES staff
Date samples shipped: August 3, 2005
Date samples rec'd at OUL: August 4, 2005
Date samples analyzed by OUL: August 5, 2005

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein Results		RWT Results	
			2005	2005	Peak	Conc.	Peak	Conc.
P2795	1	Hornsby Spring - Main	7/25 1529	7/29 1358	ND		ND	
P2796	1	Hornsby Spring - Main	7/29 1358	8/1 1506	ND		ND	
P2797	2	Hornsby Spring Landing	7/25 1533	7/29 1407	ND		ND	
P2798	2	Hornsby Spring Landing	7/29 1407	8/1 1504	ND		ND	
P2799	11	Poe Spring Shallow Vent	7/25 1800	8/1 1856	ND		ND	
P2800	Laboratory control charcoal blank							
P2801	12	Poe Spring Gauge Vent	7/25 1757	8/1 1901	ND		ND	
P2802	101	High Springs Well # 1 (West)	7/25 1309	7/29 1506	ND		ND	
P2803	101	High Springs Well # 1 (West)	7/29 1506	8/1 1131	ND		ND	
P2804	122	Tropic Traditions Well	7/25 1324	8/1 1146	ND		ND	
P2805	103	Alachua Well # 1	7/25 1427	7/29 1628	ND		ND	
P2806	103	Alachua Well # 1	7/29 1628	8/1 1208	ND		ND	
P2807	104	Alachua Well # 2	7/25 1416	7/29 1635	ND		ND	
P2808	104	Alachua Well # 2	7/29 1635	8/1 1220	ND		ND	
P2809	106	Santa Fe Hills Subdivision Well	7/26 1620	7/29 1540	ND		ND	
P2810	106	Santa Fe Hills Subdivision Well	7/29 1540	8/1 1329	ND		ND	

(Footnotes at end of Table) (continued)

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed 2005	Date/Time Collected 2005	Fluorescein Results		RWT Results	
					Peak	Conc.	Peak	Conc.
(continued)								
P2811	121	Copeland Well	7/25 1344	8/1 1338	ND		ND	
P2812	22	Santa Fe River Rise	7/26 1740	8/1 1638	ND		ND	
P2813	43	Mill Creek Sink Cave	**Water**	7/29 1722	ND		574.1	11.3
P2814	43	Mill Creek Sink Cave	**Water**	7/31 1800	ND		574.1	5.16

FOOTNOTES:

ND = None Detected

Ozark UNDERGROUND LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

August 17, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, Week 2
Analysis results for charcoal and water samples shipped on August 10, 2005
Ozark Underground Laboratory (OUL) numbers P2899 through P2912

Dear Peter:

We have completed analysis of the charcoal and water samples received at the OUL on August 11, 2005. We have indicated the OUL number for each of these samples on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal and water samples
2) Sample Collection Data Sheets
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Week 2
Samples collected by: KES staff
Date samples shipped: August 10, 2005
Date samples rec'd at OUL: August 11, 2005
Date samples analyzed by OUL: August 12, 2005

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein Results		RWT Results	
			2005	2005	Peak	Conc.	Peak	Conc.
P2899	2	Hornsby Spring Landing	8/1 1504	8/4 1401	ND		ND	
P2900	Laboratory control charcoal blank							
P2901	2	Hornsby Spring Landing	8/4 1401	8/7 1600	ND		ND	
P2902	11	Poe Spring Shallow Vent	8/1 1856	8/4 1748	ND		ND	
P2903	11	Poe Spring Shallow Vent	8/4 1748	8/7 1432	ND		ND	
P2904	101	High Springs Well # 1 (West)	8/1 1131	8/4 1439	ND		ND	
P2905	101	High Springs Well # 1 (West)	8/4 1439	8/7 1825	ND		ND	
P2906	106	Santa Fe Hills Subdivision Well	8/4 1514	8/7 1830	ND		ND	
P2907	122	Tropic Traditions Well	8/1 1146	8/8 1458	ND		ND	
P2908	104	Alachua Well # 2	8/1 1220	8/4 1608	ND		ND	
P2909	104	Alachua Well # 2	8/4 1608	8/7 1903	ND		ND	
P2910	43	Mill Creek Sink Cave	**Water**	8/3 1759	ND		574.3	5.69
P2911	43	Mill Creek Sink Cave	**Water**	8/5 1449	ND		574.3	4.78
P2912	43	Mill Creek Sink Cave	**Water**	8/8 1710	ND		574.5	2.33

FOOTNOTES:

ND = None Detected

Ozark UNDERGROUND LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

August 31, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, Weeks 2, 3 and 4
Analysis results for charcoal and water samples shipped on August 18, 2005 and additional charcoal samplers from those shipped on August 10, 2005
Ozark Underground Laboratory (OUL) numbers P2998 through P3021 and P3171 through P3181

Dear Peter:

We have completed analysis of the charcoal and water samples you selected from those received at the OUL on August 19, 2005 and additional charcoal samplers received at the OUL on August 11, 2005 per your verbal request of August 25, 2005. We have indicated the OUL number for each of these samples on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal and water samples
2) Sample Collection Data Sheets
3) Discrepancy sheet
4) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Weeks 2, 3 and 4
Samples collected by: KES staff
Date samples shipped: August 10 and 18, 2005
Date samples rec'd at OUL: August 11 and 19, 2005
Date samples analyzed by OUL: August 24 and 31, 2005

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein Results		RWT Results	
			2005	2005	Peak	Conc.	Peak	Conc.
P2998	2	Hornsby Spring Landing	8/7 1600	8/10 1239	ND		568.8	13.3
P2999	2	Hornsby Spring Landing	8/10 1239	8/13 1536	ND		569.3	38.4
P3000	Laboratory Control Charcoal Blank							
P3001	2	Hornsby Spring Landing	8/13 1536	8/16 1310	ND		569.3	30.3
P3002	22	Santa Fe River Rise	8/7 1736	8/13 1629	ND		ND	
P3003	11	Poe Spring Shallow Vent	8/7 1432	8/10 1530	ND		ND	
P3004	11	Poe Spring Shallow Vent	8/10 1530	8/13 1432	ND		ND	
P3005	11	Poe Spring Shallow Vent	8/13 1432	8/16 1601	ND		ND	
P3006	14	Fenceline Spring	8/7 1420	8/13 1408	ND		ND	
P3007	17	Poe Spring Run	8/10 1548	8/16 1614	ND		ND	
P3008	101	High Springs Well # 1 (West)	8/7 1825	8/10 1312	ND		ND	
P3009	101	High Springs Well # 1 (West)	8/10 1312	8/13 1719	ND		ND	
P3010	101	High Springs Well # 1 (West)	8/13 1719	8/16 1326	ND		ND	
P3011	106	Santa Fe Hills Subdivision Well	8/7 1830	8/10 1353	ND		ND	
P3012	106	Santa Fe Hills Subdivision Well	8/10 1353	8/13 1842	ND		ND	
P3013	106	Santa Fe Hills Subdivision Well	8/13 1842	8/16 1450	ND		ND	

(Footnotes at end of Table) (continued)

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed 2005	Date/Time Collected 2005	Fluorescein Results		RWT Results	
					Peak	Conc.	Peak	Conc.
(continued)								
P3014	121	Copeland Well	8/8 1618	8/15 1558	ND		ND	
P3015	122	Tropic Traditions Well	8/8 1458	8/13 1728	ND		ND	
P3016	104	Alachua Well # 2	8/7 1903	8/10 1431	ND		ND	
P3017	104	Alachua Well # 2	8/10 1431	8/13 1746	ND		ND	
P3018	104	Alachua Well # 2	8/13 1746	8/16 1419	ND		ND	
P3019	43	Mill Creek Sink Cave	**Water**	8/11 1653	ND		574.7	1.84
P3020	Laboratory Control Water Blank							
P3021	43	Mill Creek Sink Cave	**Water**	8/15 1709	ND		574.3	1.67
P3171	1	Hornsby Spring - Main	8/7 1553	8/10 1230	ND		568.9	14.4
P3172	1	Hornsby Spring - Main	8/10 1230	8/13 1537	ND		570.0	37.2
P3173	1	Hornsby Spring - Main	8/13 1537	8/16 1307	ND		570.1	27.9
P3174	111	River Ranch Well	8/7 1623	8/10 1255	ND		570.1	15.4
P3175	111	River Ranch Well	8/10 1255	8/15 1445	ND		569.9	71.1
P3176	4	Hornsby Spring Daily	8/9 1248	8/10 1228	ND		570.0	12.1
P3177	4	Hornsby Spring Daily	8/8 1421	8/9 1248	ND		569.3	6.28
P3178	4	Hornsby Spring Daily	8/7 1551	8/8 1421	ND		569.5	4.35
P3179	4	Hornsby Spring Daily	8/6 1227	8/7 1551	ND		ND	
P3180	Laboratory Control Charcoal Blank							
P3181	4	Hornsby Spring Daily	8/5 1306	8/6 1227	ND		ND	

FOOTNOTES:
ND = None Detected

Ozark
UNDERGROUND
LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

September 19, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, Weeks 4-6
Analysis results for charcoal and water samples shipped on September 7, 2005.
Ozark Underground Laboratory (OUL) numbers P3517 through P3553, P3568 and P3569.

Dear Mr. Butt:

We have completed analysis of the charcoal and water samples you selected from those received at the OUL on September 9, 2005. We have indicated the OUL number for each of these samples on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal and water samples
2) Sample Collection Data Sheets
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Weeks 4-5
Samples collected by: KES staff
Date samples shipped: September 7, 2005
Date samples rec'd at OUL: September 9, 2005
Date samples analyzed by OUL: September 14 and 16, 2005

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
P3517	1	Hornsby Spring - Main	8/16/05 1307	8/19/05 1410	ND		569.5	30.0
P3518	1	Hornsby Spring - Main	8/19/05 1410	8/23/05 1423	ND		569.5	54.2
P3519	1	Hornsby Spring - Main	8/23/05 1423	8/26/05 1510	517.6 *	1.48	569.4	24.8
P3520	Laboratory control charcoal blank							
P3521	1	Hornsby Spring - Main	8/26/05 1510	8/29/05 1558	516.4	1.91	569.6	21.2
P3522	1	Hornsby Spring - Main	8/29/05 1558	9/2/05 1418	516.4	3.36	569.8	27.7
P3523	1	Hornsby Spring - Main	9/2/05 1418	9/6/05 1623	516.1	4.09	569.2	18.1
P3524	111	River Ranch Well	8/15/05 1445	8/19/05 1430	ND		569.5	47.3
P3525	111	River Ranch Well	8/19/05 1430	8/23/05 1438	ND		569.8	30.4
P3526	111	River Ranch Well	8/23/05 1438	8/26/05 1548	517.2 *	0.824	570.0	15.3
P3527	111	River Ranch Well	8/26/05 1548	9/2/05 1443	515.8	3.43	569.2	42.4
P3528	22	Santa Fe River Rise	8/13/05 1620	8/19/05 1603	ND		ND	
P3529	22	Santa Fe River Rise	8/19/05 1603	8/25/05 1612	ND		ND	
P3530	22	Santa Fe River Rise	8/25/05 1612	9/2/05 1536	ND		ND	
P3531	4	Hornsby Spring Daily	**Water**	8/5/05 1306	ND		ND	
P3532	4	Hornsby Spring Daily	**Water**	8/6/05 1227	ND		ND	
P3533	4	Hornsby Spring Daily	**Water**	8/7/05 1551	ND		ND	

(Footnotes at end of table) (continued)

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein Peak	Fluorescein Conc.	RWT Peak	RWT Conc.
(continued)								
P3534	4	Hornsby Spring Daily	**Water**	8/8/05 1421	ND		ND	
P3535	4	Hornsby Spring Daily	**Water**	8/9/05 1248	ND		ND	
P3536	4	Hornsby Spring Daily	**Water**	8/10/05 1228	ND		576.8	0.093
P3568	4	Hornsby Spring Daily	**Water**	8/11/05 1529	ND		577.3	0.209
P3569	4	Hornsby Spring Daily	**Water**	8/12/05 1509	ND		574.6	0.198
P3537	4	Hornsby Spring Daily	**Water**	8/13/05 1535	ND		575.8	0.247
P3538	17	Poe Spring Run	8/16/05 1614	8/23/05 1330	ND		ND	
P3539	17	Poe Spring Run	8/23/05 1330	8/29/05 1831	ND		ND	
P3540	Laboratory control charcoal blank							
P3541	17	Poe Spring Run	8/29/05 1831	9/6/05 1526	ND		ND	
P3542	106	Santa Fe Hills Subdivision Well	8/19/05 1710	8/23/05 1622	ND		570.6	2.49
P3543	106	Santa Fe Hills Subdivision Well	8/27/05 1411	9/2/05 1646	ND		571.6*	2.71
P3544	121	Copeland Well	8/25/05 1520	9/2/05 1632	ND		ND	
P3545	122	Tropic Traditions Well	8/25/05 1505	9/2/05 1642	ND		ND	
P3546	101	High Springs Well # 1 (West)	8/16/05 1326	8/19/05 1648	ND		ND	
P3547	101	High Springs Well # 1 (West)	8/19/05 1648	8/23/05 1458	ND		ND	
P3548	101	High Springs Well # 1 (West)	8/23/05 1458	8/26/05 1721	ND		ND	
P3549	101	High Springs Well # 1 (West)	8/26/05 1721	9/2/05 1624	ND		ND	
P3550	104	Alachua Well # 2	8/19/05 1737	8/23/05 1601	ND		ND	
P3551	104	Alachua Well # 2	8/26/05 1755	9/2/05 1709	ND		ND	
Footnotes at end of table							(continued)	

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
(continued)								
P3552	43	Mill Creek Sink Cave	**Water**	8/19/05 1750	ND		574.5	1.71
P3553	43	Mill Creek Sink Cave	**Water**	9/2/05 1730	ND		575.3	3.64

FOOTNOTES:

ND = None Detected

* = A fluorescence peak is present which does not meet all the criteria for a positive dye result. However, it has been calculated as though it were the tracer dye.

Ozark UNDERGROUND LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

September 23, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, archived samples from weeks 2-6.
Analysis results for selected archived charcoal and water samples shipped
August 10, 2005 and September 7, 2005.
Ozark Underground Laboratory (OUL) numbers P3654 through P3668.

Dear Mr. Butt:

We have completed analysis of the archived charcoal and water samples you selected from those received at the OUL on August 11 and September 9, 2005. We have indicated the OUL number for each of these samples on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal and water samples
2) Sample Collection Data Sheets
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: **Mill Creek/Lee Sinks Dye Trace, archived samples from Weeks 2-6**
Samples collected by: **KES staff**
Date samples shipped: **August 10 and September 7, 2005**
Date samples rec'd at OUL: **August 11 and September 9, 2005**
Date samples analyzed by OUL: **September 21, 2005**

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
P3654	1	Hornsby Spring - Main	8/1/05 1506	8/4/05 1353	ND		ND	
P3655	1	Hornsby Spring - Main	8/4/05 1353	8/7/05 1553	ND		ND	
P3656	111	River Ranch Well	8/1/05 1528	8/4/05 1417	ND		ND	
P3657	111	River Ranch Well	8/4/05 1417	8/7/05 1623	ND		ND	
P3658	2	Hornsby Spring Landing	8/19/05 1413	8/23/05 1427	ND		569.4	34.8
P3659	2	Hornsby Spring Landing	8/23/05 1427	8/26/05 1517	ND		569.0	14.3
P3660	Laboratory control charcoal blank							
P3661	2	Hornsby Spring Landing	8/26/05 1517	8/29/05 1600	ND		569.2	14.8
P3662	106	Santa Fe Hills Subdivision Well	8/16/05 1450	8/19/05 1710	ND		ND	
P3663	106	Santa Fe Hills Subdivision Well	8/23/05 1622	8/27/05 1411	ND		ND	
P3664	121	Copeland Well	8/15/05 1558	8/19/05 1656	ND		ND	
P3665	121	Copeland Well	8/19/05 1656	8/25/05 1520	ND		ND	
P3666	4	Hornsby Spring Daily	**Water**	8/19/05 1408	ND		577.2	0.199
P3667	4	Hornsby Spring Daily	**Water**	8/23/05 1421	ND		576.8 *	0.128
P3668	4	Hornsby Spring Daily	**Water**	8/26/05 1507	ND		577.8 *	0.165

FOOTNOTES:
ND = None Detected
* = A fluorescence peak is present which does not meet all the criteria for a positive dye result. However, it has been calculated as though it were the tracer dye.

Ozark UNDERGROUND LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

September 28, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, archived samples from weeks 7-8.
Analysis results for charcoal and water samples shipped September 22, 2005.
Ozark Underground Laboratory (OUL) numbers P3719 through P3748.

Dear Mr. Butt:

We have completed analysis of the charcoal and water samples you selected from those received at the OUL on September 23, 2005. We have indicated the OUL number for each of these samples on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal and water samples
2) Sample Collection Data Sheets
4) Discrepancy sheet
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Weeks 7-8
Samples collected by: KES staff
Date samples shipped: September 22, 2005
Date samples rec'd at OUL: September 23, 2005
Date samples analyzed by OUL: September 26, 2005

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein Peak	Fluorescein Conc.	RWT Peak	RWT Conc.
P3719	1	Hornsby Spring - Main	9/6/05 1623	9/9/05 1435	516.7	2.24	570.5	7.29
P3720	Laboratory control charcoal blank							
P3721	1	Hornsby Spring - Main	9/9/05 1435	9/12/05 1518	516.3	2.83	570.0	8.24
P3722	1	Hornsby Spring - Main	9/12/05 1518	9/15/05 1416	516.3	3.13	569.7	5.90
P3723	1	Hornsby Spring - Main	9/15/05 1416	9/19/05 1631	515.4	3.32	569.1	5.91
P3724	5	Hornsby Spring South	8/26/05 1620	9/2/05 1423	516.1	3.26	568.5	34.5
P3725	5	Hornsby Spring South	9/2/05 1423	9/9/05 1439	515.6	2.55	569.1	14.3
P3726	5	Hornsby Spring South	9/9/05 1439	9/15/05 1510	515.8	1.41	570.6	4.31 *
P3727	111	River Ranch Well	9/2/05 1443	9/9/05 1500	515.4	2.94	568.5	21.0
P3728	111	River Ranch Well	9/9/05 1500	9/15/05 1559	515.3	1.88	570.1	7.98
P3729	106	Santa Fe Hills Subdivision Well	9/2/05 1646	9/9/05 1659	ND		ND	
P3730	106	Santa Fe Hills Subdivision Well	9/9/05 1659	9/16/05 1517	ND		ND	
P3731	106	Santa Fe Hills Subdivision Well	9/16/05 1517	9/21/05 1339	ND		ND	
P3732	121	Copeland Well	9/2/05 1632	9/9/05 1648	ND		ND	
P3733	121	Copeland Well	9/9/05 1648	9/16/05 1503	ND		ND	
P3734	122	Tropic Traditions Well	9/9/05 1714	9/16/05 1348	ND		ND	
P3735	22	Santa Fe River Rise	9/2/05 1536	9/9/05 1600	ND		ND	
P3736	22	Santa Fe River Rise	9/9/05 1600	9/16/05 1625	ND		ND	
P3737	111	River Ranch Well	**Water**	8/7/05 1623	ND		ND	

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein Peak	Fluorescein Conc.	RWT Peak	RWT Conc.
P3738	111	River Ranch Well	**Water**	8/10/05 1255	ND		576.8	0.201
P3739	106	Santa Fe Hills Subdivision Well	**Water**	8/19/05 1710	ND		ND	
P3740	Laboratory control water blank							
P3741	106T	Santa Fe Hills Subdivision Well - System Tap Water	**Water**	9/21/05 1339	ND		ND	
P3742	43	Mill Creek Sink Cave	**Water**	9/9/05 1736	ND		575.2	1.46
P3743	17	Poe Spring Run	9/6/05 1526	9/12/05 1430	ND		ND	
P3744	17	Poe Spring Run	9/12/05 1430	9/19/05 1724	ND		ND	
P3745	101	High Springs Well # 1 (West)	9/2/05 1624	9/9/05 1654	ND		ND	
P3746	101	High Springs Well # 1 (West)	9/9/05 1654	9/16/05 1338	ND		ND	
P3747	104	Alachua Well # 2	9/2/05 1709	9/9/05 1740	ND		ND	
P3748	104	Alachua Well # 2	9/9/05 1740	9/16/05 1429	ND		ND	

FOOTNOTES:
ND = None Detected
* = A fluorescence peak is present which does not meet all the criteria for a positive dye result. However, it has been calculated as though it were the tracer dye.

Ozark Underground Laboratory 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

October 14, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
P. O. Box 1368
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, weeks 7-8 and 9-10.
Analysis results for additional charcoal & water samples from those shipped 9/22/2005, per telephone request from Peter Butt on 10/5/2005, & charcoal & water samples shipped 10/7/05.
Ozark Underground Laboratory (OUL) numbers P3882 through P3888 and P3904 through P3926.

Dear Mr. Butt:

We have completed analysis of the additional charcoal and water samples you selected from those received at the OUL on September 23, 2005, and for those received on October 7, 2005. We have indicated the OUL number for each of these samples on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal and water samples
2) Sample Collection Data Sheets
4) Discrepancy sheet
3) Sample analysis graphs

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Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Weeks 7-8 and 9-10
Samples collected by: KES staff
Date samples shipped: September 22 and October 6, 2005
Date samples rec'd at OUL: September 23 and October 7, 2005
Date samples analyzed by OUL: October 10 and 11, 2005

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
P3882	4	Hornsby Spring Daily	**Water**	8/29/05 1555	ND		ND	
P3883	4	Hornsby Spring Daily	**Water**	9/2/05 1415	ND		ND	
P3884	4	Hornsby Spring Daily	**Water**	9/6/05 1620	ND		ND	
P3885	4	Hornsby Spring Daily	**Water**	9/9/05 1437	ND		ND	
P3886	111	River Ranch Well	**Water**	8/26/05 1548	ND		577.4	0.145
P3887	111	River Ranch Well	**Water**	9/2/05 1443	ND		ND	
P3888	111	River Ranch Well	**Water**	9/9/05 1500	ND		ND	
P3904	1	Hornsby Spring - Main	9/19/05 1631	9/23/05 1413	515.9	4.85	568.8	9.54
P3905	1	Hornsby Spring - Main	9/23/05 1413	9/30/05 1405	516.3	4.61	568.4	11.0
P3906	3	Darby Spring	8/26/05 1635	9/2/05 1358	ND		570.1	2.93
P3907	3	Darby Spring	9/2/05 1358	9/9/05 1418	ND		570.0	2.50
P3908	111	River Ranch Well	9/23/05 1439	9/30/05 1511	516.1	3.51	568.8	11.2
P3909	112	Main Shop Well	8/26/05 1533	9/2/05 1432	ND		ND	
P3910	112	Main Shop Well	9/2/05 1432	9/9/05 1446	ND		ND	
P3911	113	Residence 6 Well	8/26/05 1538	9/2/05 1451	ND		ND	
P3912	113	Residence 6 Well	9/2/05 1451	9/9/05 1510	ND		ND	
P3913	114	Chalet Well	8/26/05 1604	9/2/05 1456	ND		ND	

(Footnotes at end of Table) (continued)

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Table 1. Results for charcoal and water samples analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb). All results are for charcoal unless otherwise indicated.

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
(continued)								
P3914	114	Chalet Well	9/2/05 1456	9/9/05 1515	ND		ND	
P3915	121	Copeland Well	9/16/05 1503	9/23/05 1635	ND		ND	
P3916	121	Copeland Well	9/23/05 1635	9/30/05 1727	ND		ND	
P3917	122	Tropic Traditions Well	9/23/05 1637	9/30/05 1541	ND		ND	
P3918	22	Santa Fe River Rise	9/16/05 1625	9/23/05 1532	ND		ND	
P3919	22	Santa Fe River Rise	9/23/05 1532	10/5/05 1408	ND		ND	
P3920	Laboratory control charcoal blank							
P3921	17	Poe Spring Run	9/19/05 1724	9/28/05 1824	ND		ND	
P3922	17	Poe Spring Run	9/28/05 1824	10/5/05 1216	ND		ND	
P3923	101	High Springs Well # 1 (West)	9/16/05 1338	9/23/05 1620	ND		ND	
P3924	101	High Springs Well # 1 (West)	9/23/05 1620	10/3/05 1543	ND		ND	
P3925	104	Alachua Well # 2	9/23/05 1658	10/3/05 1431	ND		ND	
P3926	111T	River Ranch Well Water System	**Water**	9/30/05 1507	ND		ND	

FOOTNOTES:

ND = None Detected

Ozark UNDERGROUND LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

November 1, 2005

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
5779 NE County Road 340
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, weeks 9-10 and 11-13
Analysis results for charcoal samplers shipped October 25, 2005 and additional archived charcoal samplers shipped on October 6, 2005
Ozark Underground Laboratory (OUL) numbers P4163 through P4170 and P4259 through P4262

Dear Mr. Butt:

We have completed analysis of selected charcoal samplers received at the OUL on October 26, 2005, and additional archived charcoal samplers received on October 7, 2005 per your telephone request on October 28, 2005. We have indicated the OUL number for each of these samplers on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal samplers
2) Sample Collection Data Sheets
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Weeks 9-10 and 11-13
Samples collected by: KES staff
Date samples shipped: October 6 and 25
Date samples rec'd at OUL: October 7 and 26, 2005
Date samples analyzed by OUL: October 27 and November 1, 2005

Table 1. Results for charcoal samplers analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
P4163	1	Hornsby Spring - Main	9/30/05 1405	10/7/05 1409	516.5	4.28	568.7	8.04
P4164	1	Hornsby Spring - Main	10/7/05 1409	10/13/05 1350	516.7	2.32	571.1	4.15
P4165	1	Hornsby Spring - Main	10/13/05 1350	10/20/05 1619	516.4	3.11	569.0	5.65
P4166	17	Poe Spring Run	10/5/05 1216	10/13/05 1448	ND		ND	
P4167	17	Poe Spring Run	10/13/05 1448	10/22/05 1512	ND		ND	
P4168	101	High Springs Well # 1 (West)	10/3/05 1543	10/13/05 1312	ND		ND	
P4169	101	High Springs Well # 1 (West)	10/13/05 1312	10/20/05 1554	ND		ND	
P4170	3	Darby Spring	8/19/05 1500	8/26/05 1635	ND		ND	
P4259	3	Darby Spring	9/9/05 1418	9/15/05 1627	ND		569.0 *	1.84
P4261	3	Darby Spring	8/15/05 1520	8/19/05 1500	ND		568.6 *	2.27
P4262	3	Darby Spring	9/15/05 1627	9/23/05 1355	ND		567.8 *	2.22

FOOTNOTES:

ND = None Detected\

* = A fluorescence peak is present which does not meet all the criteria for a positive dye result. However, it has been calculated as though it were the tracer dye.

Ozark UNDERGROUND LABORATORY 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

January 18, 2006

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
5779 NE County Road 340
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace, weeks 14+
Analysis results for charcoal samplers shipped January 10, 2006
Ozark Underground Laboratory (OUL) numbers P5526 through P5530

Dear Mr. Butt:

We have completed analysis of charcoal samplers received at the OUL on January 12, 2006. We have indicated the OUL number for each of these samplers on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal samplers
2) Sample Collection Data Sheet
3) Discrepancy sheet
4) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace, Weeks 14+
Samples collected by: KES staff
Date samples shipped: January 10, 2006
Date samples rec'd at OUL: January 12, 2006
Date samples analyzed by OUL: January 16, 2006

Table 1. Results for charcoal samplers analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
P5526	1	Hornsby Spring - Main	10/20/05 1619	10/28/05 1342	516.2	2.09	567.8	3.75
P5527	1	Hornsby Spring - Main	10/28/05 1342	11/14/05 1624	516.4 *	2.74	566.8	5.17
P5528	1	Hornsby Spring - Main	11/14/05 1624	11/28/05 1535	515.6 *	3.10	566.5	6.72
P5529	1	Hornsby Spring - Main	11/28/05 1535	12/12/05 1435	515.7 *	2.75	566.4 *	5.31
P5530	1	Hornsby Spring - Main	12/12/05 1435	12/27/05 1338	516.5 *	3.17	566.0 *	5.77

FOOTNOTES:

ND = None Detected\

* = A fluorescence peak is present which does not meet all the criteria for a positive dye result. However, it has been calculated as though it were the tracer dye.

Ozark Underground Laboratory 1572 Aley Lane Protem, MO 65733 (417) 785-4289 fax (417) 785-4290 oul@tri-lakes.net

April 3, 2006

CERTIFICATE OF ANALYSIS

Mr. Peter Butt
Karst Environmental Services, Inc.
5779 NE County Road 340
High Springs, Florida 32643

RE: Mill Creek / Lee Sinks Dye Trace
Analysis results for archived charcoal samplers shipped October 25, 2005
Ozark Underground Laboratory (OUL) numbers P6528 through P6529

Dear Mr. Butt:

We have completed the analysis you requested of two archived charcoal samplers from those received at the OUL on October 26, 2005. We have indicated the OUL number for each of these samplers on the enclosed table.

The fluorescein and rhodamine WT (RWT) dye concentrations are based upon standards routinely used at the OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the RWT is a 20% solution. The concentrations are based upon the as-sold weight of the dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

Thomas J. Aley, PHG and RG

Enclosures:
1) Table 1 - Analysis results for charcoal samplers
2) Sample Collection Data Sheet
3) Sample analysis graphs

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Water and Land Use Investigations

Ozark Underground Laboratory, Inc. for
Karst Environmental Services, Inc.

Project name: Mill Creek/Lee Sinks Dye Trace
Samples collected by: KES staff
Date samples shipped: October 25, 2005
Date samples rec'd at OUL: October 26, 2005
Date samples analyzed by OUL: archived samples on March 31, 2006

Table 1. Results for archived charcoal samplers analyzed for the presence of fluorescein and rhodamine WT (RWT) dyes.
Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

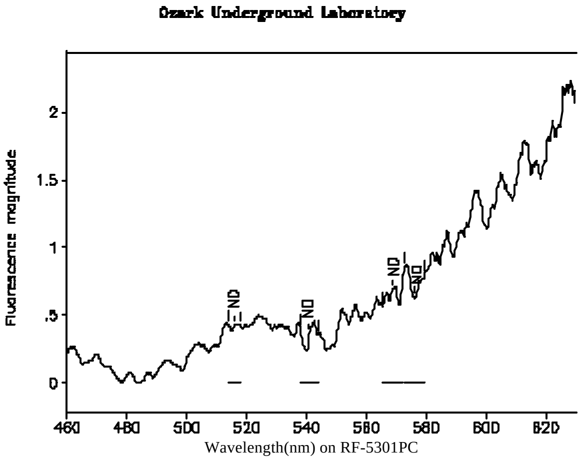
OUL #	Stn. #	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		RWT	
					Peak	Conc.	Peak	Conc.
P6528	3	Darby Spring	8/1/05 1708	8/7/05 1531	ND		ND	
P6529	3	Darby Spring	8/7/05 1531	8/15/05 1520	ND		ND	

FOOTNOTES:

ND = None Detected

APPENDIX IIB

ANALYTICAL GRAPHS OF ANALYZED CHARCOAL SAMPLES

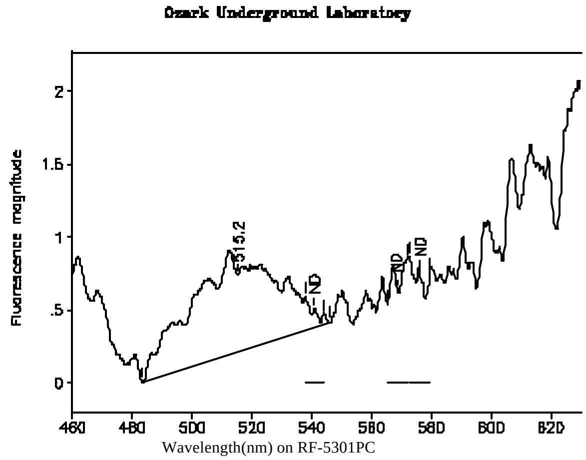


Station 1: Hornsby Spring - Main
OUL number: P2521 Analyzed: 07/14/05
Matrix: Elutant
Placed: 06/30/05 1615 Collected: 07/07/05 1455

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

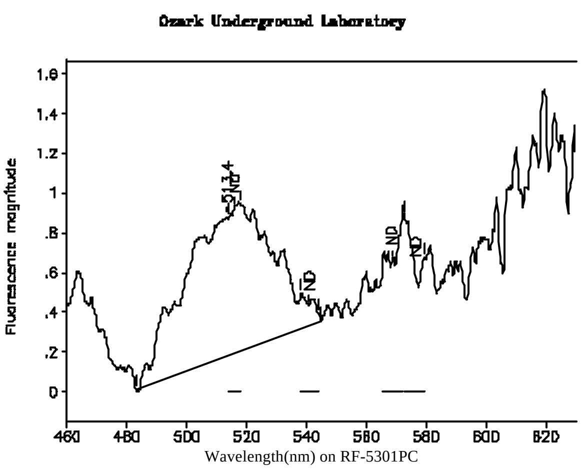


Station 1: Hornsby Spring - Main
OUL number: P2795 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1529 Collected: 07/29/05 1358

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.2	483.2	546.0	0.52	22.94	0.02	0.468
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



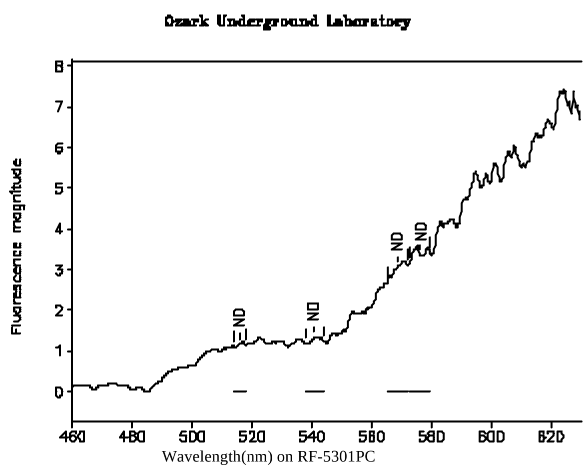
Station 1: Hornsby Spring - Main
OUL number: P2796 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/29/05 1358 Collected: 08/01/05 1506

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

513.4	483.2	545.0	0.70	25.97	0.03	0.530

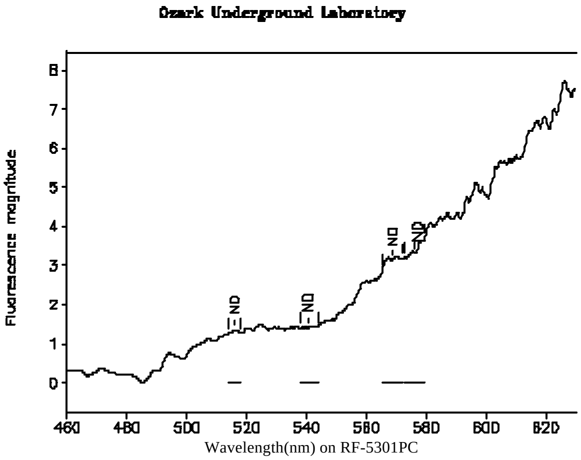


Station 1: Hornsby Spring - Main
OUL number: P3654 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/01/05 1506 Collected: 08/04/05 1353

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

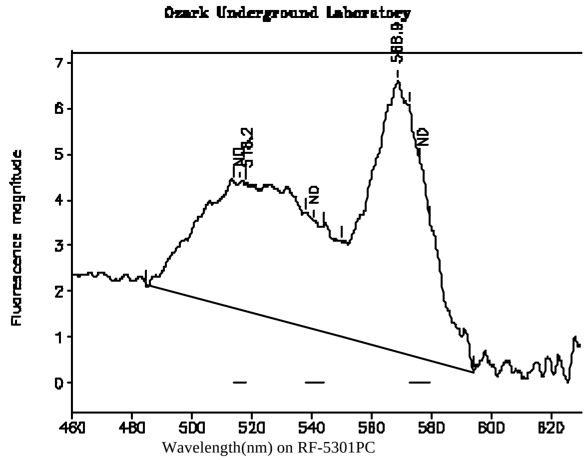


Station 1: Hornsby Spring - Main
OUL number: P3655 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/04/05 1353 Collected: 08/07/05 1553

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

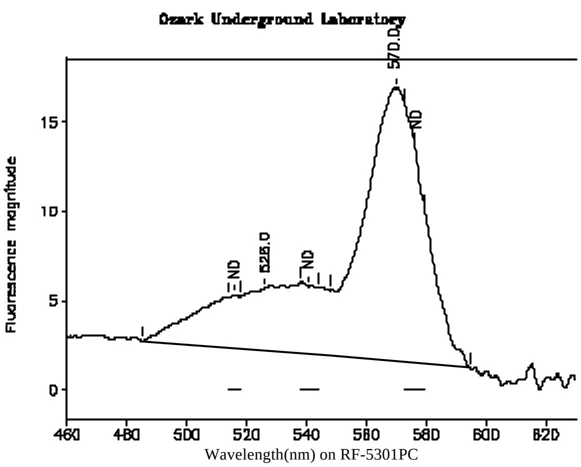
Peaks close to the normal range of tracer dyes:



Station 1: Hornsby Spring - Main
OUL number: P3171 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/07/05 1553 Collected: 08/10/05 1230

Peaks within the normal range of tracer dyes:

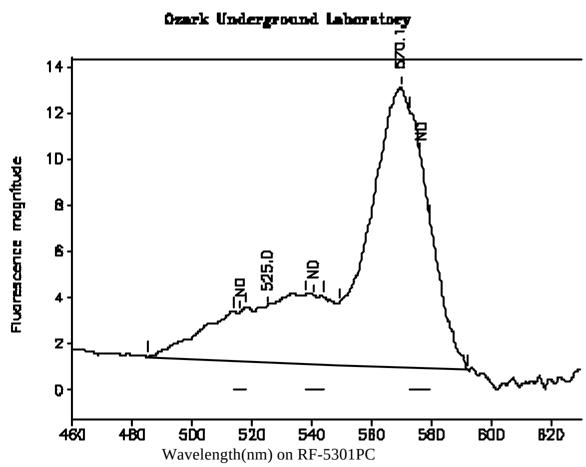
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.9	550.3	594.2	5.92	138.87	0.04	14.4
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
518.2	484.6	550.3	2.82	135.87	0.02	2.82



Station 1: Hornsby Spring - Main
OUL number: P3172 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/10/05 1230 Collected: 08/13/05 1537

Peaks within the normal range of tracer dyes:

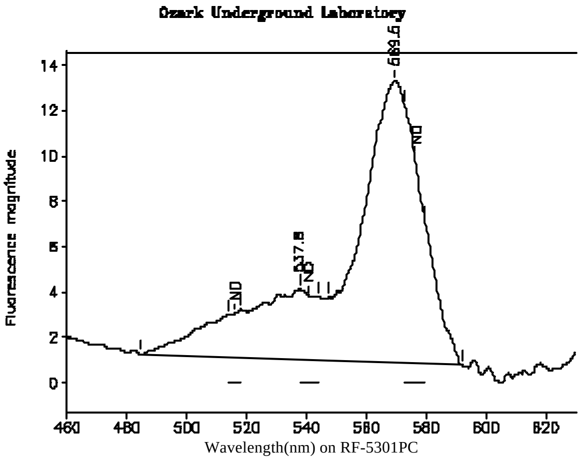
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.0	547.9	594.6	15.31	359.53	0.04	37.2
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
526.0	485.2	547.9	3.52	163.47	0.02	3.40



Station 1: Hornsby Spring - Main
OUL number: P3173 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/13/05 1537 Collected: 08/16/05 1307

Peaks within the normal range of tracer dyes:

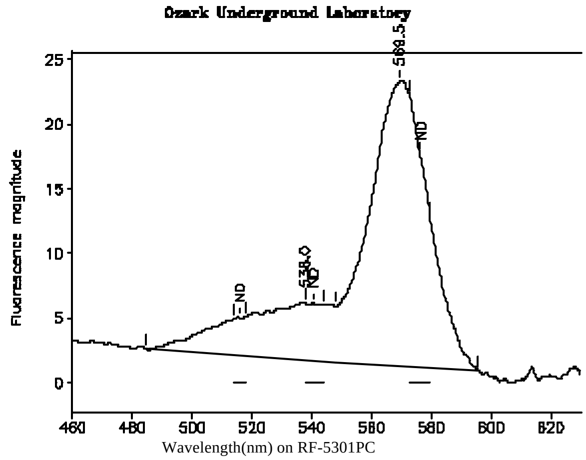
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.1	549.1	592.4	12.11	270.29	0.04	27.9
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
525.0	485.0	549.1	2.41	121.84	0.02	2.53



Station 1: Hornsby Spring - Main
OUL number: P3517 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/16/05 1307 Collected: 08/19/05 1410

Peaks within the normal range of tracer dyes:

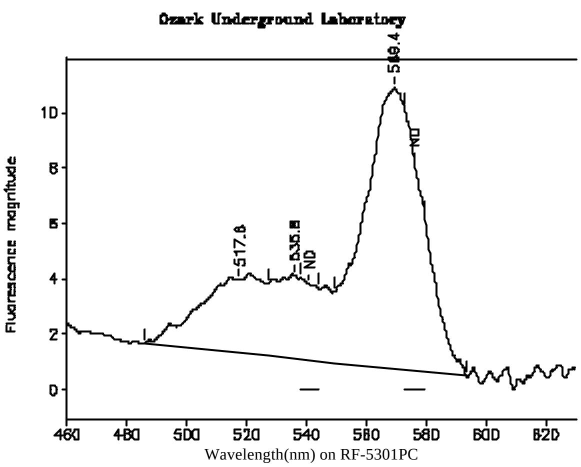
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.5	547.1	592.0	12.41	282.55	0.04	30.0
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
537.8	484.4	547.1	3.11	109.74	0.03	3.16



Station 1: Hornsby Spring - Main
OUL number: P3518 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/19/05 1410 Collected: 08/23/05 1423

Peaks within the normal range of tracer dyes:

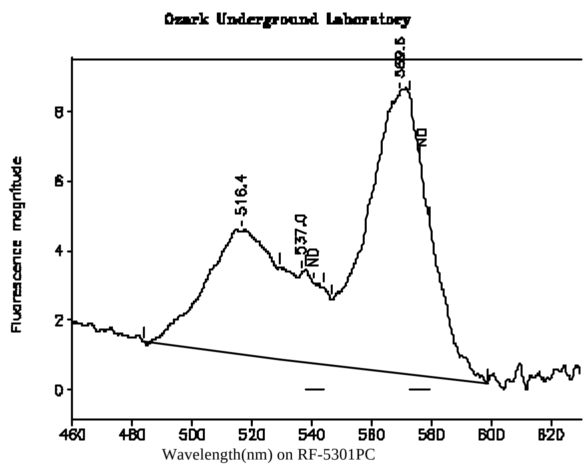
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.5	548.2	595.8	22.01	511.08	0.04	54.2
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
538.0	484.6	548.2	4.36	167.86	0.03	4.83



Station 1: Hornsby Spring - Main
OUL number: P3519 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/23/05 1423 Collected: 08/26/05 1510

Peaks within the normal range of tracer dyes:

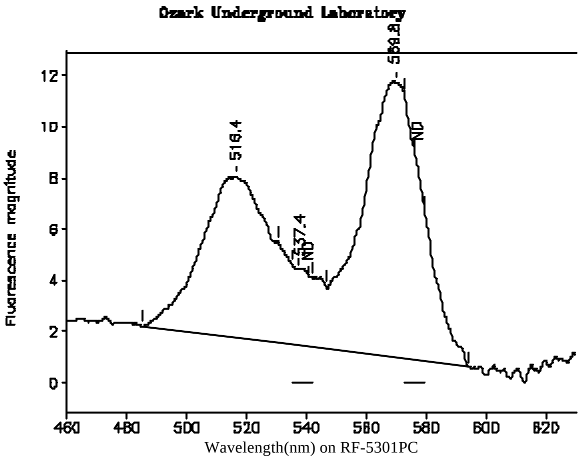
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.6	485.8	527.1	2.67	69.86	0.04	1.48
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.4	549.1	593.6	10.14	234.28	0.04	24.8
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
535.8	527.1	549.1	3.02	61.81	0.05	1.78



Station 1: Hornsby Spring - Main
OUL number: P3521 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/26/05 1510 Collected: 08/29/05 1558

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.4	484.0	529.2	3.55	90.28	0.04	1.91
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.6	546.6	598.8	8.07	200.28	0.04	21.2
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
537.0	529.2	546.6	2.59	42.15	0.06	1.21



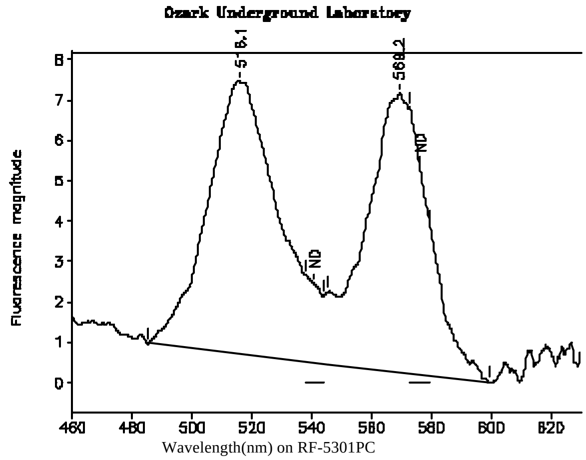
Station 1: Hornsby Spring - Main
OUL number: P3522 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/29/05 1558 Collected: 09/02/05 1418

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.4	485.2	530.6	6.30	159.22	0.04	3.36
541.0	535.2	541.8	0.00	0.00	0.00	ND
569.8	546.6	594.2	10.79	260.84	0.04	27.7
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

537.4	530.6	546.6	2.99	49.17	0.06	1.41

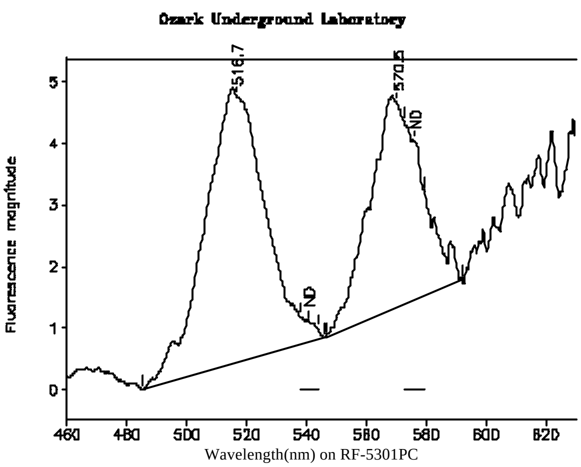


Station 1: Hornsby Spring - Main
OUL number: P3523 Analyzed: 09/14/05
Matrix: Elutant
Placed: 09/02/05 1418 Collected: 09/06/05 1623

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.1	485.0	545.4	6.74	193.75	0.03	4.09
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.2	545.4	599.4	6.87	170.31	0.04	18.1
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

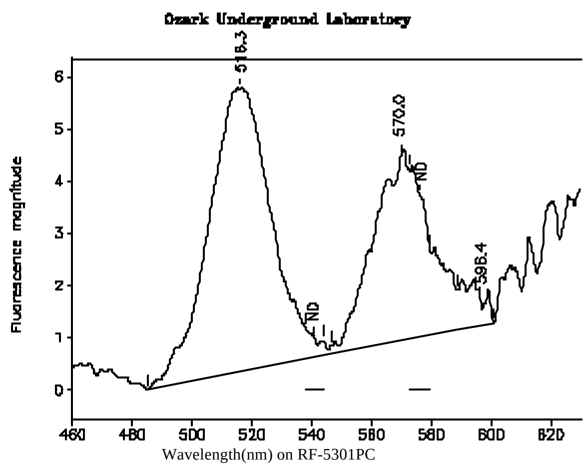


Station 1: Hornsby Spring - Main
OUL number: P3719 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/06/05 1623 Collected: 09/09/05 1435

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.7	485.4	546.2	4.34	105.06	0.04	2.24
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.5	546.4	592.2	3.31	69.99	0.05	7.29
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



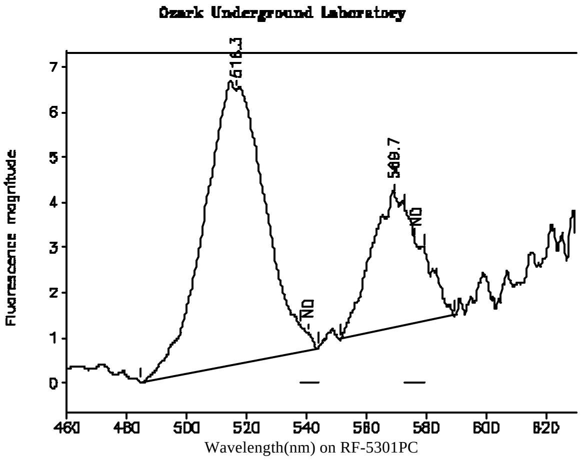
Station 1: Hornsby Spring - Main
OUL number: P3721 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1435 Collected: 09/12/05 1518

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.3	485.0	547.0	5.43	132.53	0.04	2.83
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.0	547.0	589.0	3.54	79.07	0.04	8.24
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

596.4	589.0	600.8	0.53	7.46	0.07	0.000

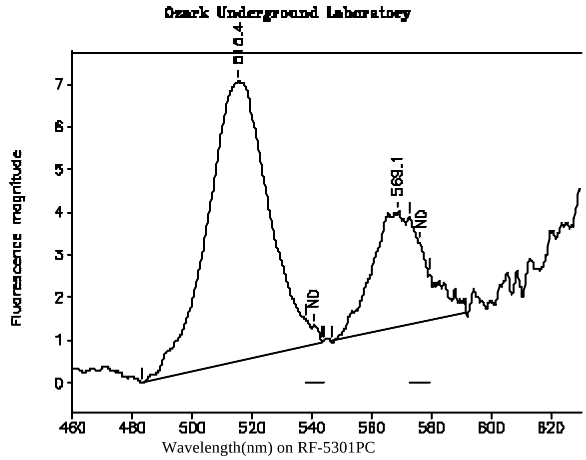


Station 1: Hornsby Spring - Main
OUL number: P3722 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/12/05 1518 Collected: 09/15/05 1416

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.3	484.6	543.8	6.07	146.56	0.04	3.13
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.7	551.4	589.4	2.94	56.64	0.05	5.90
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

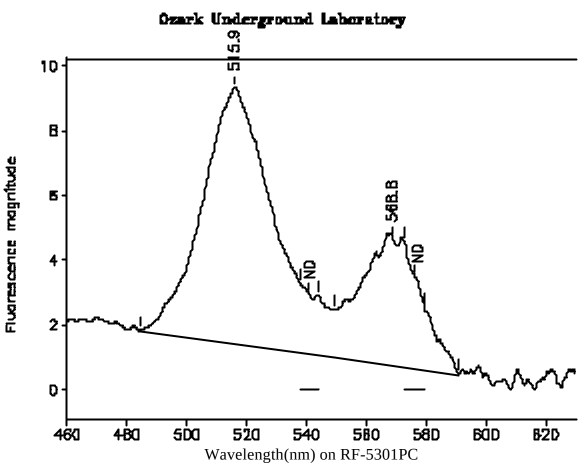


Station 1: Hornsby Spring - Main
OUL number: P3723 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/15/05 1416 Collected: 09/19/05 1631

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.4	483.4	543.6	6.56	155.63	0.04	3.32
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.1	546.6	591.8	2.69	56.70	0.05	5.91
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

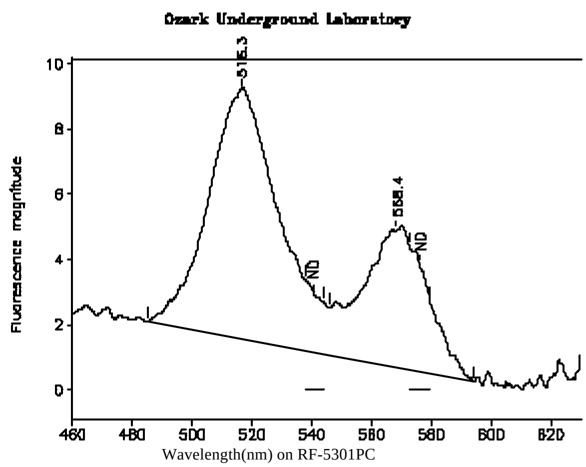


Station 1: Hornsby Spring - Main
OUL number: P3904 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/19/05 1631 Collected: 09/23/05 1413

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.9	484.2	549.1	7.92	226.57	0.03	4.85
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.8	549.1	591.0	3.96	96.53	0.04	9.54
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

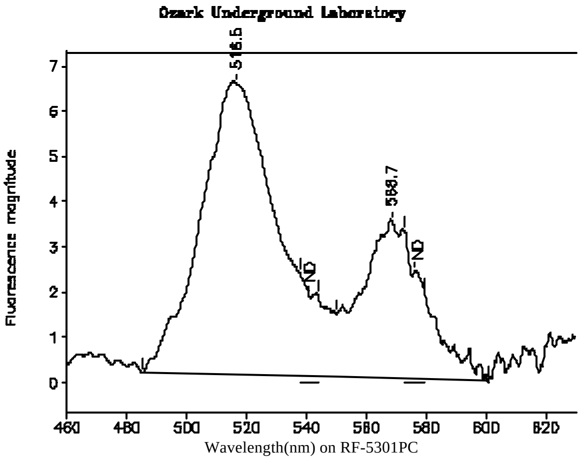


Station 1: Hornsby Spring - Main
OUL number: P3905 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/23/05 1413 Collected: 09/30/05 1405

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.3	485.0	546.1	7.65	215.37	0.04	4.61
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.4	546.1	594.2	4.22	110.93	0.04	11.0
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

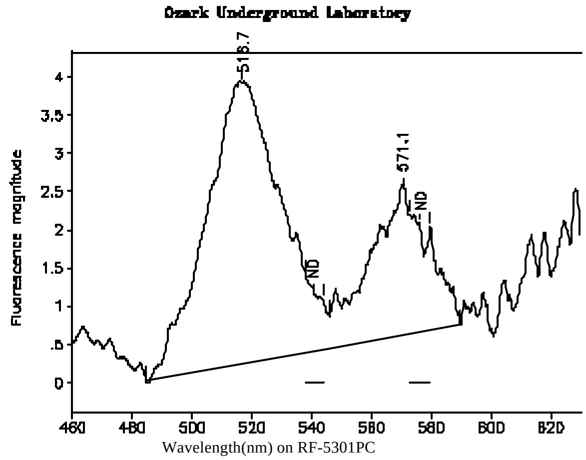


Station 1: Hornsby Spring - Main
OUL number: P4163 Analyzed: 10/27/05
Matrix: Elutant
Placed: 09/30/05 1405 Collected: 10/07/05 1409

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.5	485.0	550.0	6.44	200.49	0.03	4.28
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.7	550.0	601.0	3.46	86.92	0.04	8.04
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

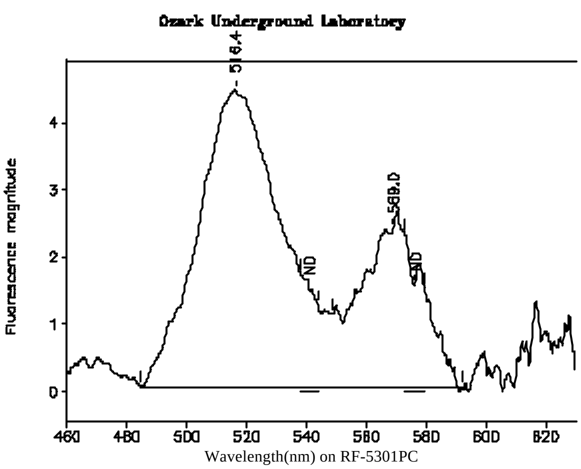


Station 1: Hornsby Spring - Main
OUL number: P4164 Analyzed: 10/27/05
Matrix: Elutant
Placed: 10/07/05 1409 Collected: 10/13/05 1350

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.7	484.6	546.2	3.67	108.72	0.03	2.32
540.9	538.1	543.9	0.00	0.00	0.00	ND
571.1	546.2	589.8	1.91	44.91	0.04	4.15
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

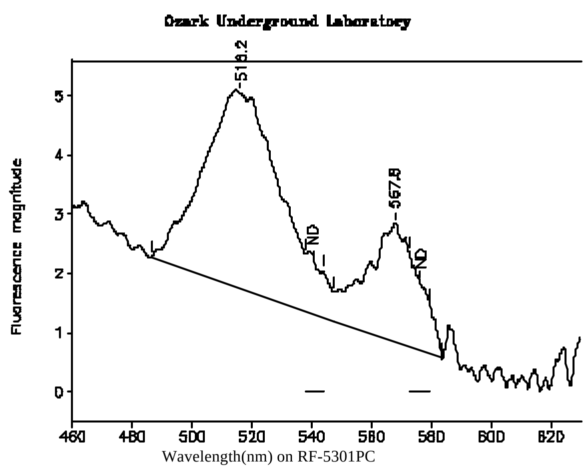


Station 1: Hornsby Spring - Main
OUL number: P4165 Analyzed: 10/27/05
Matrix: Elutant
Placed: 10/13/05 1350 Collected: 10/20/05 1619

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.4	484.8	548.9	4.41	145.72	0.03	3.11
540.9	538.1	543.9	0.00	0.00	0.00	ND
569.0	548.9	592.0	2.36	61.16	0.04	5.65
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

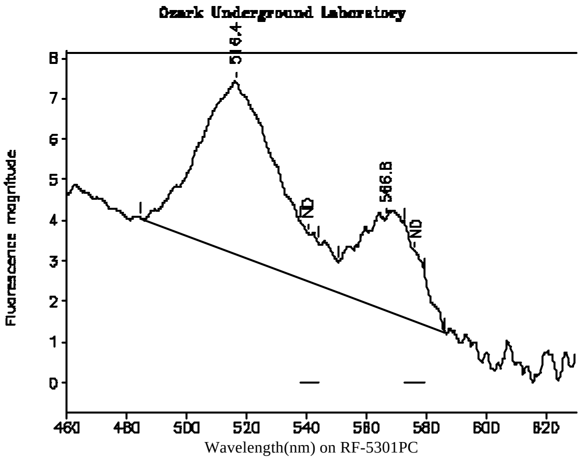


Station 1: Hornsby Spring - Main
OUL number: P5526 Analyzed: 01/16/06
Matrix: Elutant
Placed: 10/20/05 1619 Collected: 10/28/05 1342

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.2	486.2	547.4	3.31	103.54	0.03	2.09
540.9	538.1	543.9	0.00	0.00	0.00	ND
567.8	547.4	583.6	1.99	40.61	0.05	3.75
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

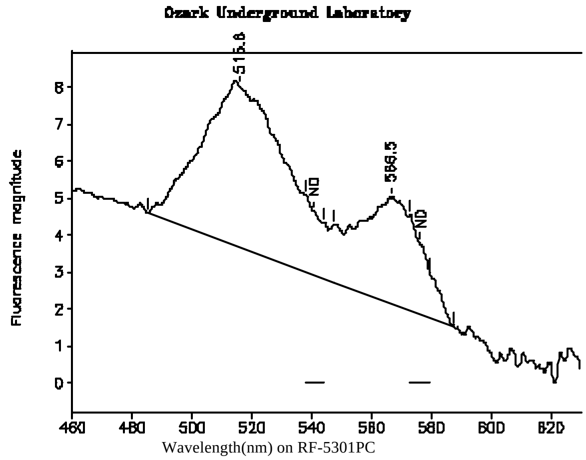


Station 1: Hornsby Spring - Main
OUL number: P5527 Analyzed: 01/16/06
Matrix: Elutant
Placed: 10/28/05 1342 Collected: 11/14/05 1624

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.4	484.6	550.8	4.24	135.58	0.03	2.74
540.9	538.1	543.9	0.00	0.00	0.00	ND
566.8	550.8	586.4	2.27	55.91	0.04	5.17
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

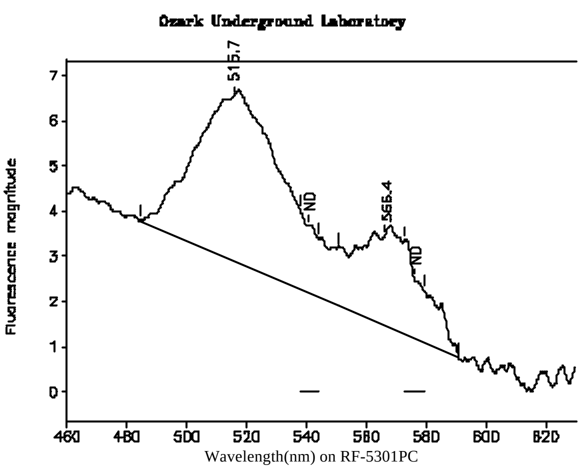


Station 1: Hornsby Spring - Main
OUL number: P5528 Analyzed: 01/16/06
Matrix: Elutant
Placed: 11/14/05 1624 Collected: 11/28/05 1535

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.6	485.2	547.6	4.36	153.24	0.03	3.10
540.9	538.1	543.9	0.00	0.00	0.00	ND
566.5	547.6	587.8	2.86	72.70	0.04	6.72
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

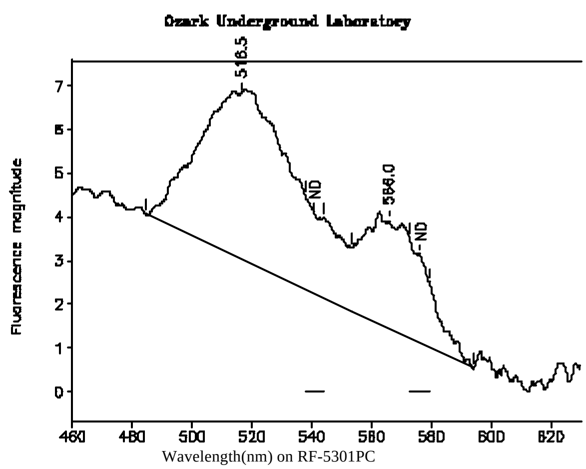


Station 1: Hornsby Spring - Main
OUL number: P5529 Analyzed: 01/16/06
Matrix: Elutant
Placed: 11/28/05 1535 Collected: 12/12/05 1435

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.7	484.6	550.5	3.63	136.25	0.03	2.75
540.9	538.1	543.9	0.00	0.00	0.00	ND
566.4	550.5	591.0	2.02	57.50	0.04	5.31
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

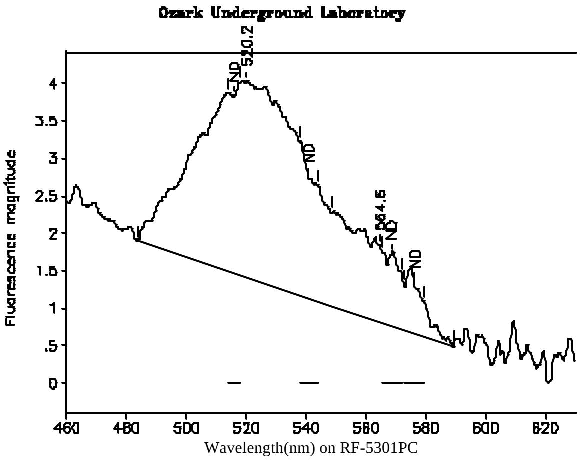


Station 1: Hornsby Spring - Main
OUL number: P5530 Analyzed: 01/16/06
Matrix: Elutant
Placed: 12/12/05 1435 Collected: 12/27/05 1338

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.5	484.4	553.4	3.79	156.61	0.02	3.17
540.9	538.1	543.9	0.00	0.00	0.00	ND
566.0	553.4	594.2	2.46	62.48	0.04	5.77
576.1	572.8	579.6	0.00	0.00	0.00	ND

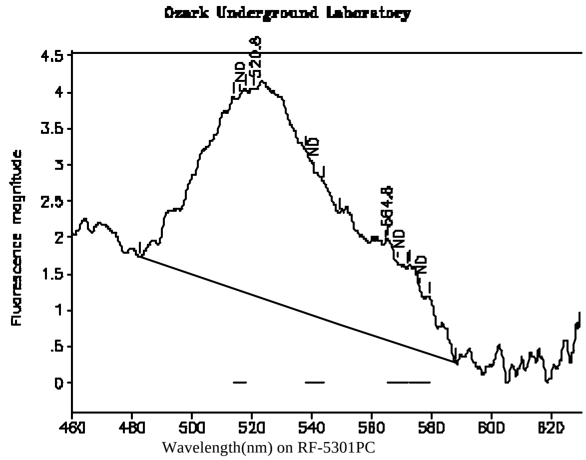
Peaks close to the normal range of tracer dyes:



Station 2: Hornsby Spring Landing
OUL number: P2797 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1533 Collected: 07/29/05 1407

Peaks within the normal range of tracer dyes:

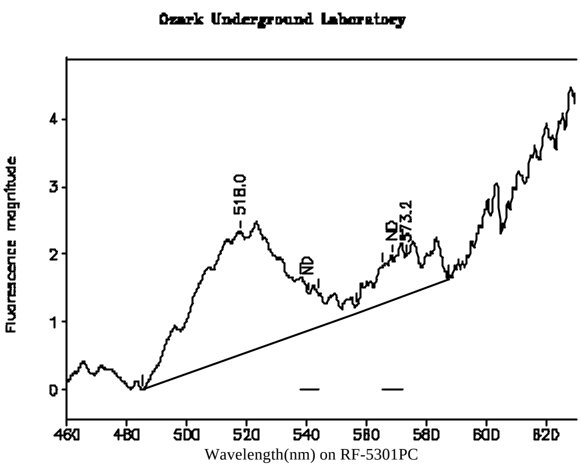
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
520.2	483.6	549.0	2.62	111.28	0.02	2.27
564.6	549.0	589.2	1.02	30.45	0.03	2.89



Station 2: Hornsby Spring Landing
OUL number: P2798 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/29/05 1407 Collected: 08/01/05 1504

Peaks within the normal range of tracer dyes:

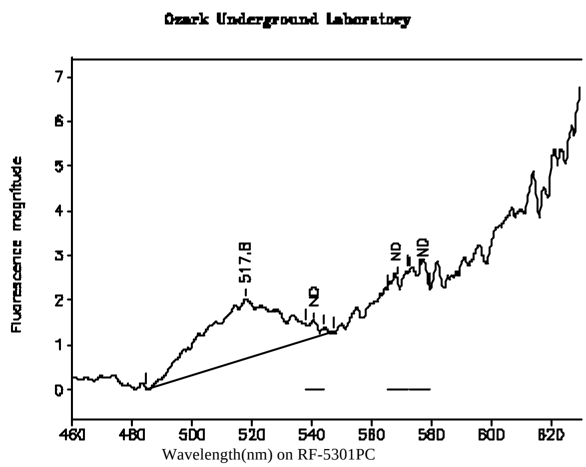
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
520.8	482.2	549.4	2.84	125.05	0.02	2.55
564.8	549.4	588.4	1.36	40.74	0.03	3.87



Station 2: Hornsby Spring Landing
OUL number: P2899 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/01/05 1504 Collected: 08/04/05 1401

Peaks within the normal range of tracer dyes:

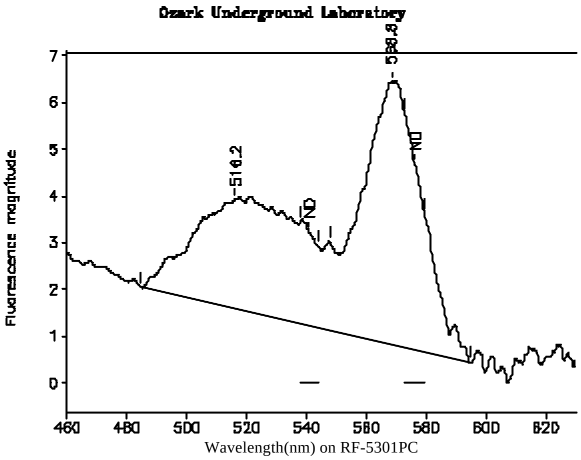
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
518.0	485.0	556.4	1.81	67.20	0.03	1.37
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
573.2	556.4	587.4	0.57	14.49	0.04	0.828
Peaks close to the normal range of tracer dyes:						



Station 2: Hornsby Spring Landing
OUL number: P2901 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/04/05 1401 Collected: 08/07/05 1600

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.8	484.8	547.4	1.33	41.78	0.03	0.855
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						

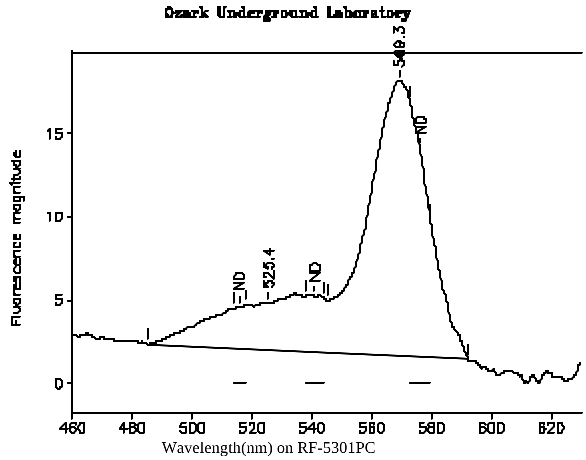


Station 2: Hornsby Spring Landing
OUL number: P2998 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/07/05 1600 Collected: 08/10/05 1239

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.2	484.8	547.7	2.33	106.66	0.02	2.21
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.8	547.7	594.8	5.61	133.75	0.04	13.3
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



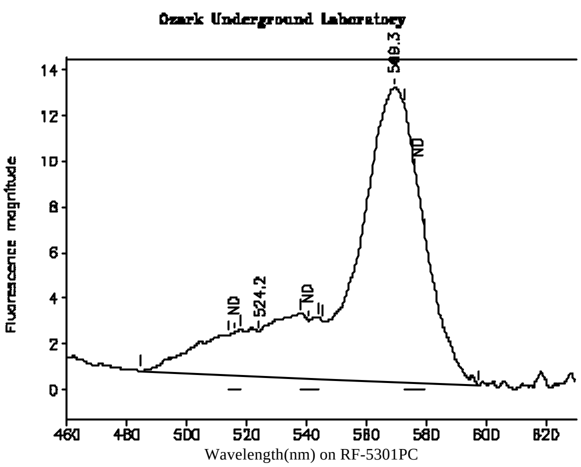
Station 2: Hornsby Spring Landing
OUL number: P2999 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/10/05 1239 Collected: 08/13/05 1536

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.3	545.3	592.2	16.52	385.95	0.04	38.4
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

525.4	485.2	545.3	2.83	128.10	0.02	2.65



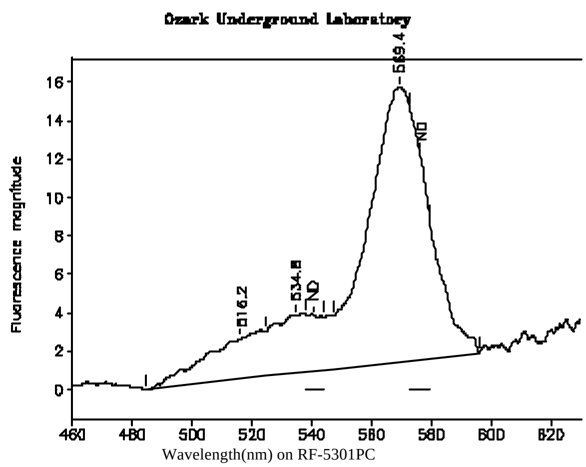
Station 2: Hornsby Spring Landing
OUL number: P3001 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/13/05 1536 Collected: 08/16/05 1310

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.3	545.6	597.4	12.85	305.00	0.04	30.3
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

524.2	484.6	545.6	1.94	100.60	0.02	2.08



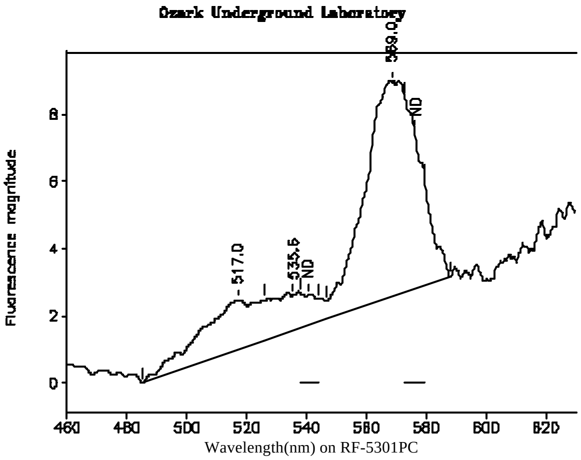
Station 2: Hornsby Spring Landing
OUL number: P3658 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/19/05 1413 Collected: 08/23/05 1427

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.2	484.6	524.8	2.08	52.61	0.04	1.12
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.4	547.2	596.0	14.24	331.61	0.04	34.8
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

534.8	524.8	547.2	2.97	63.30	0.05	1.83



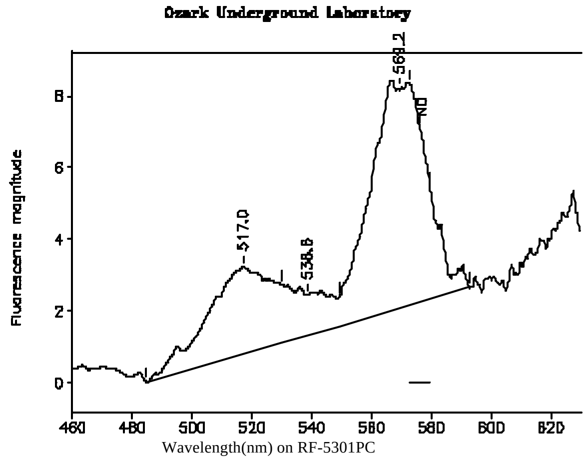
Station 2: Hornsby Spring Landing
OUL number: P3659 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/23/05 1427 Collected: 08/26/05 1517

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.0	485.2	526.1	1.47	34.86	0.04	0.741
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.0	546.6	588.0	6.39	136.24	0.05	14.3
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

535.6	526.1	546.6	1.07	20.13	0.05	0.582

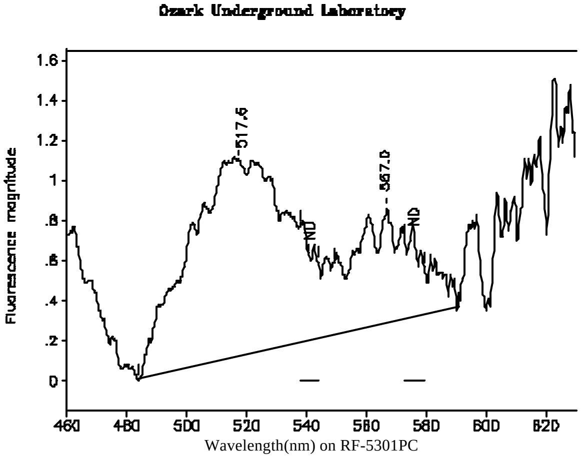


Station 2: Hornsby Spring Landing
OUL number: P3661 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/26/05 1517 Collected: 08/29/05 1600

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.0	484.8	529.8	2.43	61.07	0.04	1.30
538.6	529.8	549.1	1.12	22.74	0.05	0.657
569.2	549.1	592.8	6.13	141.30	0.04	14.8
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

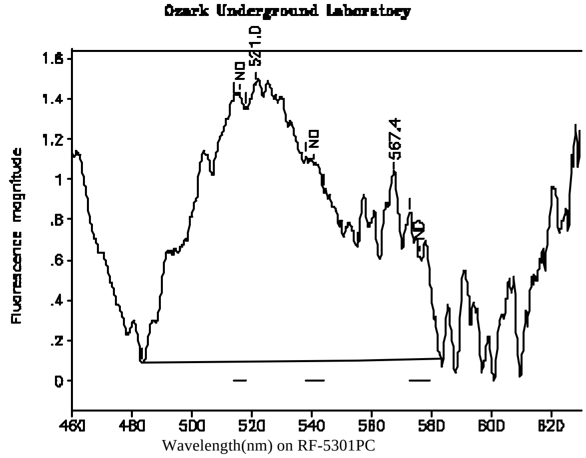


Station 3: Darby Spring
OUL number: P6528 Analyzed: 03/31/06
Matrix: Elutant
Placed: 08/01/05 1708 Collected: 08/07/05 1531

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.6	484.0	549.1	0.98	40.78	0.02	0.822
540.9	538.1	543.9	0.00	0.00	0.00	ND
567.0	549.1	590.6	0.57	14.07	0.04	1.18
576.1	572.8	579.6	0.00	0.00	0.00	ND

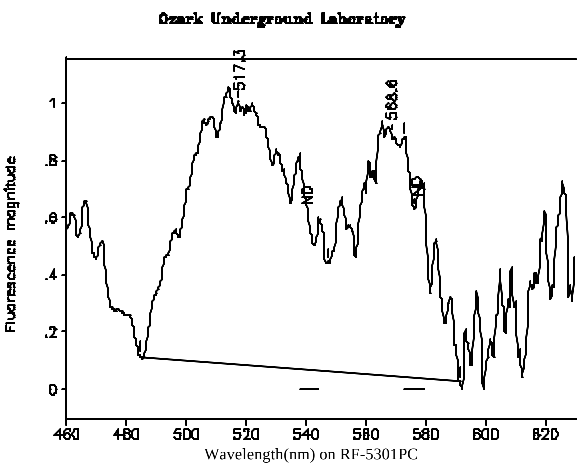
Peaks close to the normal range of tracer dyes:



Station 3: Darby Spring
OUL number: P6529 Analyzed: 03/31/06
Matrix: Elutant
Placed: 08/07/05 1531 Collected: 08/15/05 1520

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.9	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
567.4	555.3	584.0	0.93	16.93	0.05	1.42
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
521.0	483.2	555.3	1.38	65.73	0.02	1.32

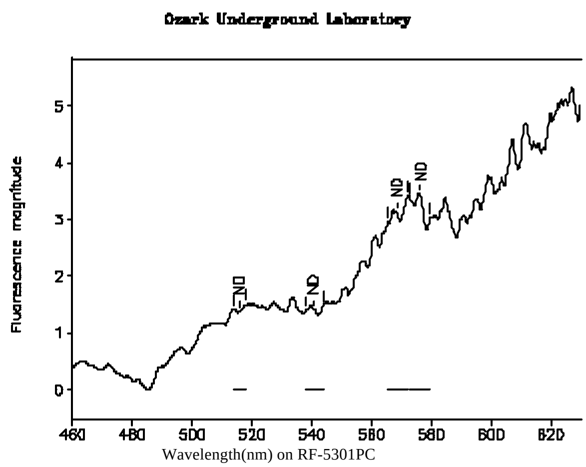


Station 3: Darby Spring
OUL number: P4261 Analyzed: 11/01/05
Matrix: Elutant
Placed: 08/15/05 1520 Collected: 08/19/05 1500

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.3	484.8	547.5	0.92	39.55	0.02	0.844
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	547.5	591.6	0.84	24.82	0.03	2.27
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

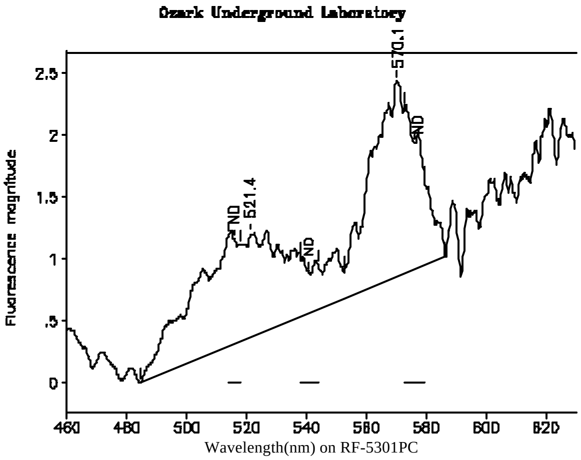


Station 3: Darby Spring
OUL number: P4170 Analyzed: 10/27/05
Matrix: Elutant
Placed: 08/19/05 1500 Collected: 08/26/05 1635

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.9	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND

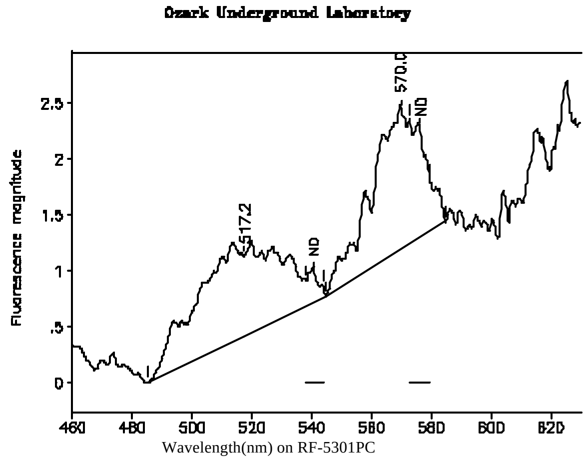
Peaks close to the normal range of tracer dyes:



Station 3: Darby Spring
OUL number: P3906 Analyzed: 10/11/05
Matrix: Elutant
Placed: 08/26/05 1635 Collected: 09/02/05 1358

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
570.1	552.4	586.4	1.58	29.61	0.05	2.93
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
521.4	484.4	552.4	0.83	35.07	0.02	0.000

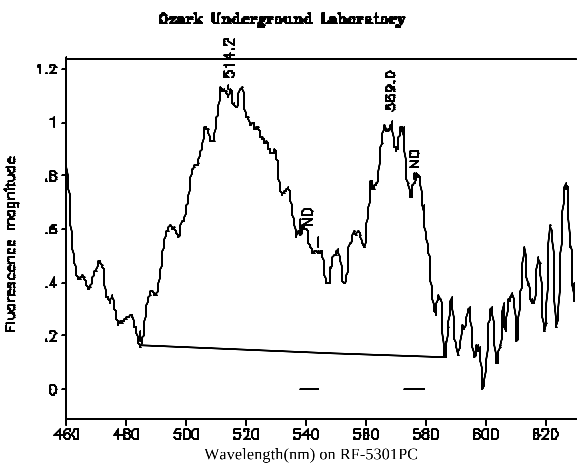


Station 3: Darby Spring
OUL number: P3907 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/02/05 1358 Collected: 09/09/05 1418

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.2	485.0	544.8	0.71	28.69	0.02	0.614
540.9	538.1	543.9	0.00	0.00	0.00	ND
570.0	544.8	584.6	1.24	25.33	0.05	2.50
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

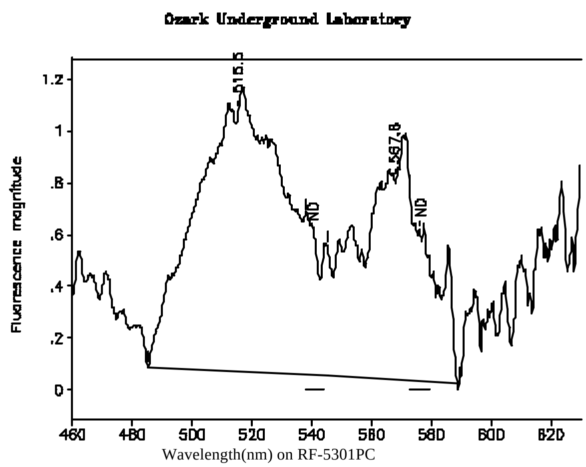


Station 3: Darby Spring
OUL number: P4259 Analyzed: 11/01/05
Matrix: Elutant
Placed: 09/09/05 1418 Collected: 09/15/05 1627

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.2	484.2	547.8	0.95	37.76	0.03	0.806
540.9	538.1	543.9	0.00	0.00	0.00	ND
569.0	547.8	586.6	0.84	20.14	0.04	1.84
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

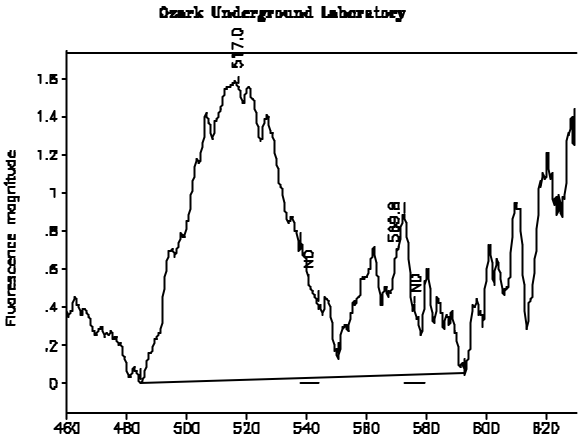


Station 3: Darby Spring
OUL number: P4262 Analyzed: 11/01/05
Matrix: Elutant
Placed: 09/15/05 1627 Collected: 09/23/05 1355

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.5	485.2	545.2	1.01	40.01	0.03	0.854
540.9	538.1	543.9	0.00	0.00	0.00	ND
567.8	545.2	589.2	0.77	24.34	0.03	2.22
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

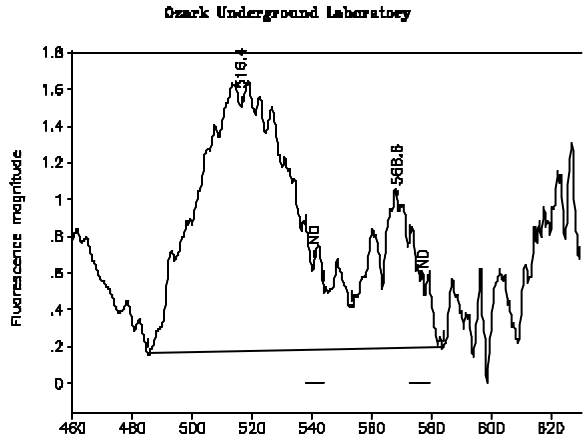


Station 4: Hornsby Spring Daily
OUL number: P3181 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/05/05 1306 Collected: 08/06/05 1227

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.0	484.4	550.6	1.54	59.60	0.03	1.24
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.8	550.6	593.0	0.61	17.20	0.04	1.78
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

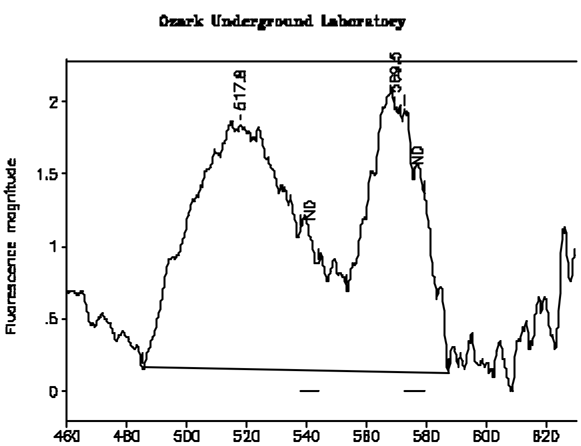


Station 4: Hornsby Spring Daily
OUL number: P3179 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/06/05 1227 Collected: 08/07/05 1551

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.4	485.0	553.4	1.33	55.48	0.02	1.15
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.6	553.4	584.0	0.80	14.13	0.06	1.46
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

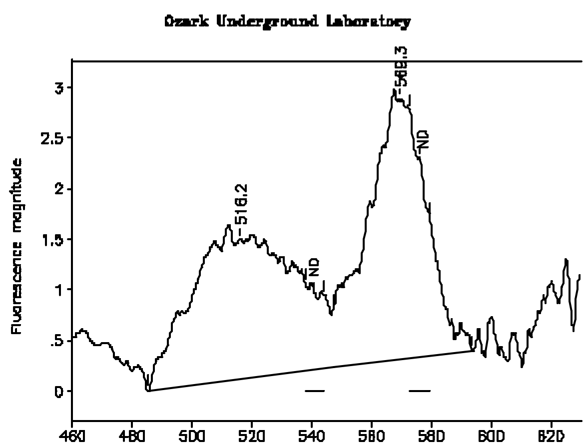


Station 4: Hornsby Spring Daily
OUL number: P3178 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/07/05 1551 Collected: 08/08/05 1421

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.8	485.0	553.4	1.69	73.12	0.02	1.52
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.5	553.4	587.4	1.84	42.03	0.04	4.35
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

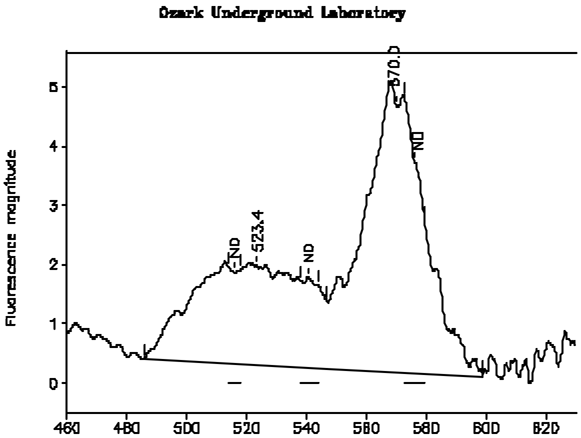


Station 4: Hornsby Spring Daily
OUL number: P3177 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/08/05 1421 Collected: 08/09/05 1248

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.2	485.0	547.1	1.38	60.69	0.02	1.26
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.3	547.1	593.8	2.57	60.75	0.04	6.28
576.2	572.8	579.6	0.00	0.00	0.00	ND

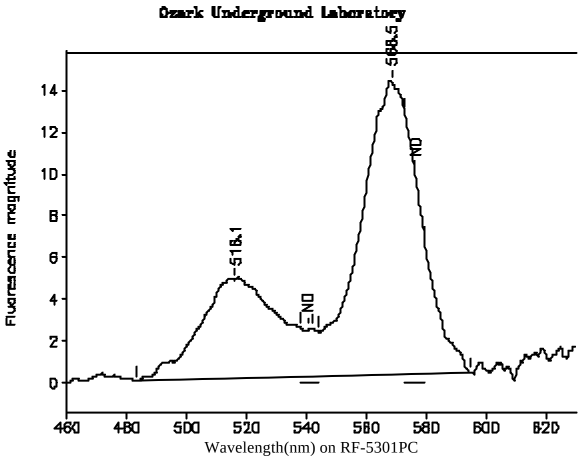
Peaks close to the normal range of tracer dyes:



Station 4: Hornsby Spring Daily
OUL number: P3176 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/09/05 1248 Collected: 08/10/05 1228

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.0	546.8	599.0	4.49	116.73	0.04	12.1
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
523.4	485.8	546.8	1.67	77.42	0.02	1.61

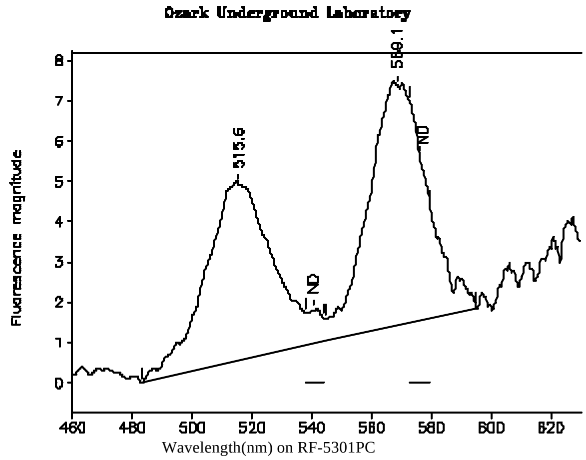


Station 5: Hornsby Spring South
OUL number: P3724 Analyzed: 09/26/05
Matrix: Elutant
Placed: 08/26/05 1620 Collected: 09/02/05 1423

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.1	483.2	541.8	4.76	152.58	0.03	3.26
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.5	541.8	594.6	14.03	331.04	0.04	34.5
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

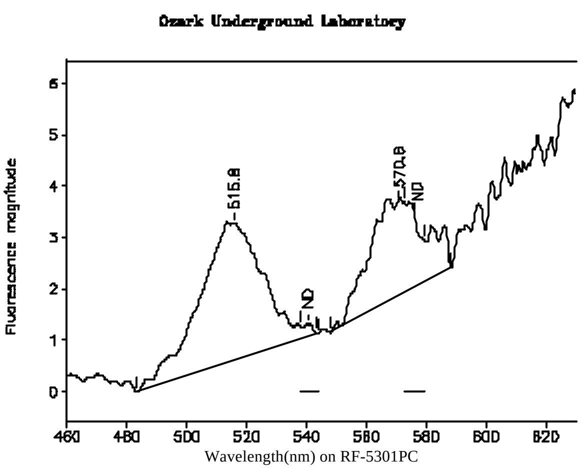


Station 5: Hornsby Spring South
OUL number: P3725 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/02/05 1423 Collected: 09/09/05 1439

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.6	483.4	544.7	4.39	119.38	0.04	2.55
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.1	544.7	595.2	5.94	137.32	0.04	14.3
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

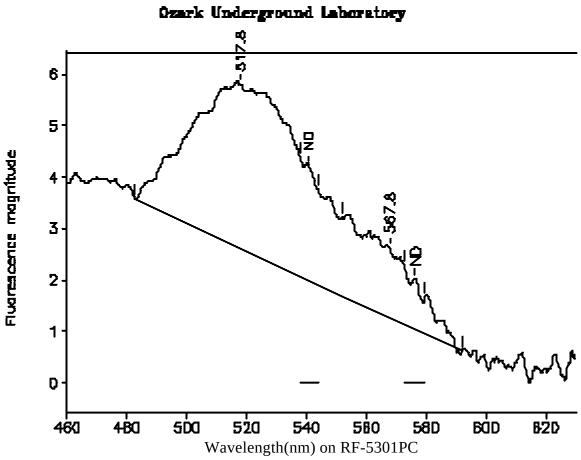


Station 5: Hornsby Spring South
OUL number: P3726 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1439 Collected: 09/15/05 1510

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	483.4	543.2	2.65	66.09	0.04	1.41
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.6	548.2	588.4	1.85	41.35	0.04	4.31
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

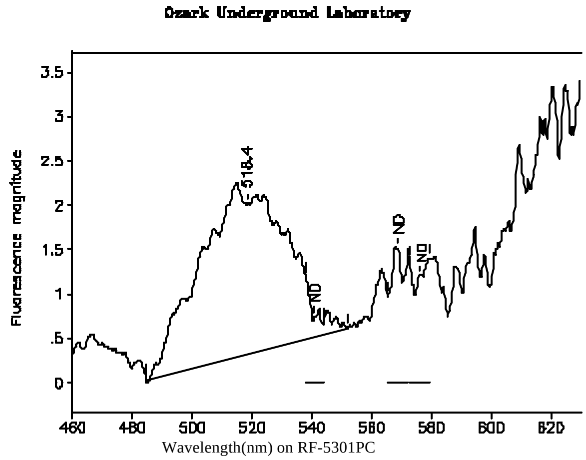


Station 11: Poe Spring Shallow Vent
OUL number: P2799 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1800 Collected: 08/01/05 1856

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.8	482.8	552.2	3.18	146.25	0.02	2.99
541.0	538.1	543.9	0.00	0.00	0.00	ND
567.8	552.2	592.0	1.36	38.50	0.04	3.66
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

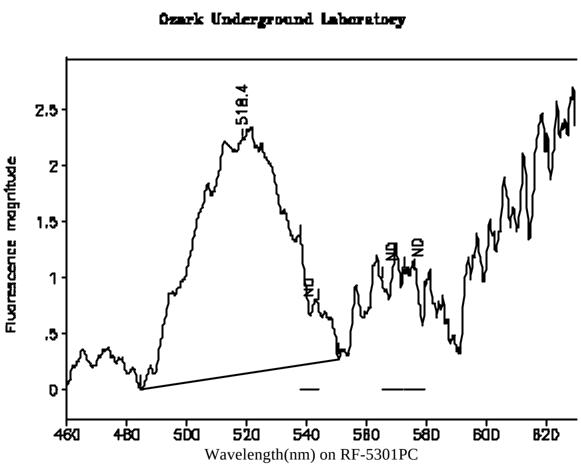


Station 11: Poe Spring Shallow Vent
OUL number: P2902 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/01/05 1856 Collected: 08/04/05 1748

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
518.4	484.6	551.8	1.69	64.66	0.03	1.32
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

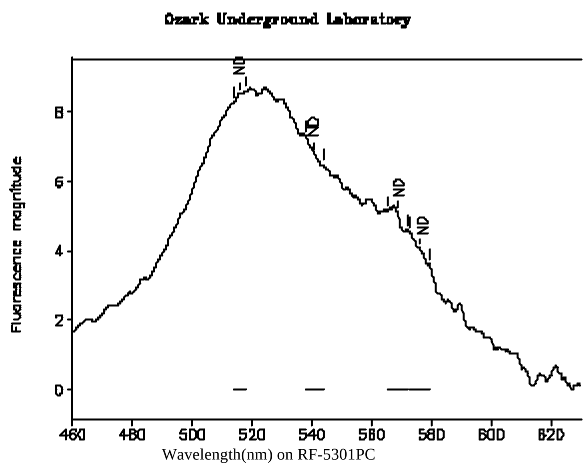


Station 11: Poe Spring Shallow Vent
OUL number: P2903 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/04/05 1748 Collected: 08/07/05 1432

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
518.4	484.6	551.0	2.09	78.88	0.03	1.61
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

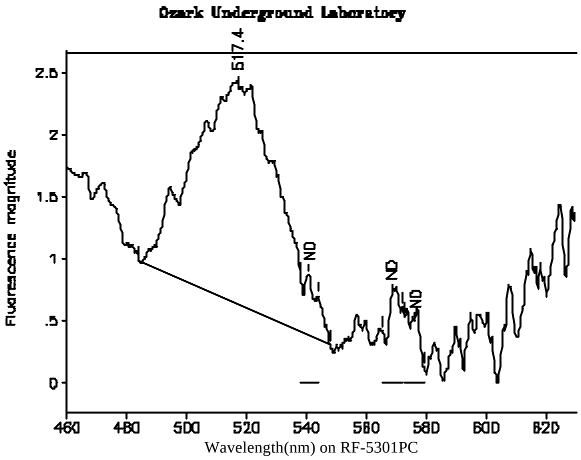


Station 11: Poe Spring Shallow Vent
OUL number: P3003 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/07/05 1432 Collected: 08/10/05 1530

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

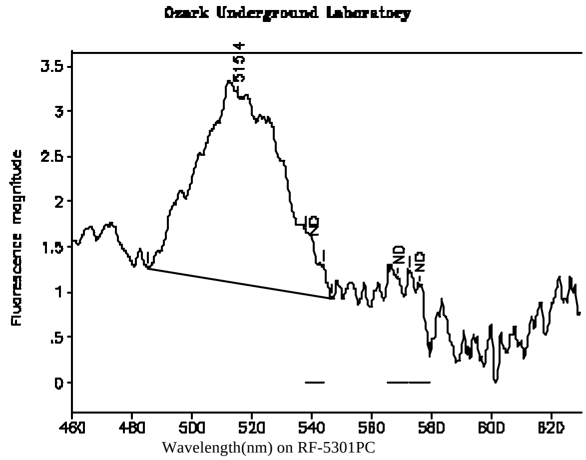


Station 11: Poe Spring Shallow Vent
OUL number: P3004 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/10/05 1530 Collected: 08/13/05 1432

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.4	484.0	547.8	1.75	59.62	0.03	1.23
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

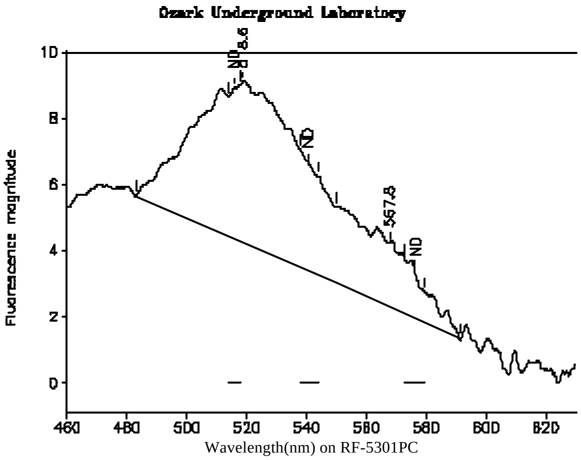


Station 11: Poe Spring Shallow Vent
OUL number: P3005 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/13/05 1432 Collected: 08/16/05 1601

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.4	485.2	546.4	2.06	72.52	0.03	1.50
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

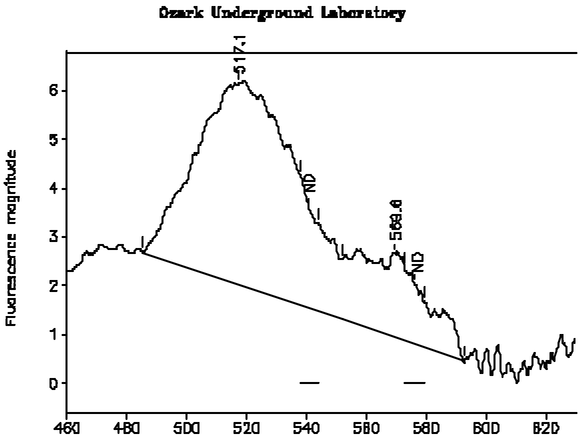
Peaks close to the normal range of tracer dyes:



Station 12: Poe Spring Gauge Vent
OUL number: P2801 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1757 Collected: 08/01/05 1901

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
567.8	549.8	591.8	1.94	63.30	0.03	6.02
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
518.6	483.0	549.8	4.84	210.13	0.02	4.29

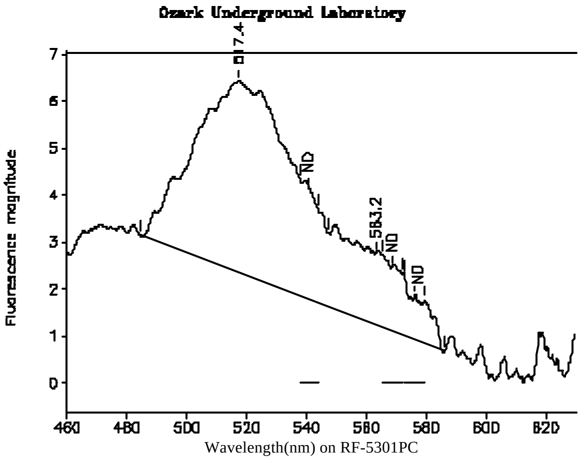


Station 14: Fenceline Spring
OUL number: P3006 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/07/05 1420 Collected: 08/13/05 1408

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.1	485.2	551.8	4.11	167.79	0.02	3.47
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.6	551.8	593.0	1.71	47.69	0.04	4.74
576.2	572.8	579.6	0.00	0.00	0.00	ND

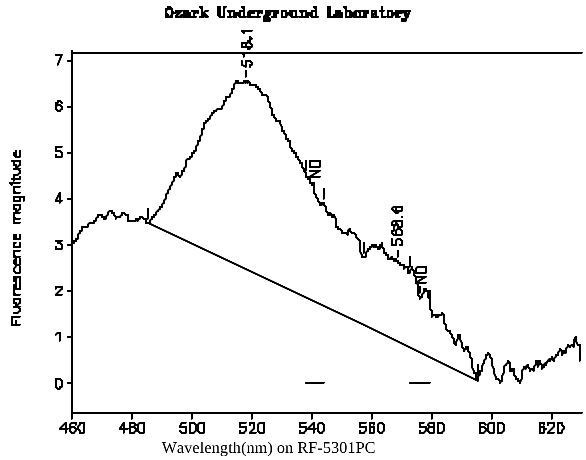
Peaks close to the normal range of tracer dyes:



Station 17: Poe Spring Run
OUL number: P3007 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/10/05 1548 Collected: 08/16/05 1614

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.4	484.2	547.6	4.09	162.24	0.03	3.36
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
563.2	547.6	586.2	1.53	48.05	0.03	4.78

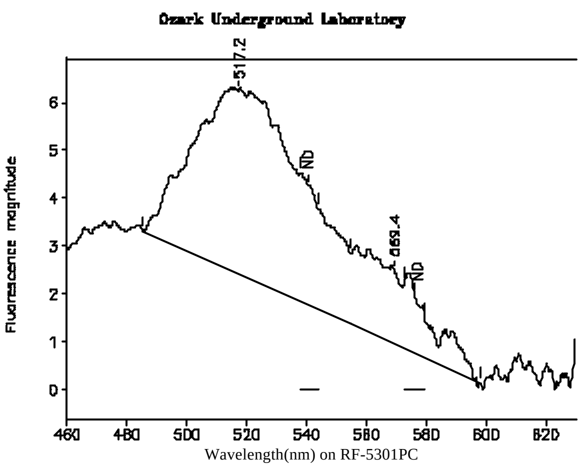


Station 17: Poe Spring Run
OUL number: P3538 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/16/05 1614 Collected: 08/23/05 1330

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
518.1	485.2	557.3	4.09	182.92	0.02	3.86
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.6	557.3	595.4	1.75	48.04	0.04	5.09
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

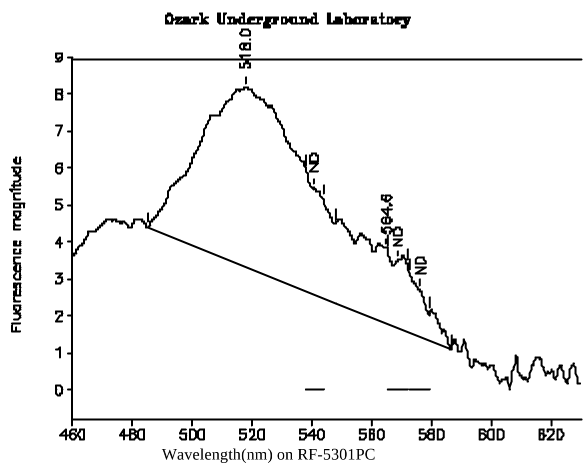


Station 17: Poe Spring Run
OUL number: P3539 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/23/05 1330 Collected: 08/29/05 1831

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.2	485.4	554.7	3.83	172.77	0.02	3.65
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.4	554.7	598.2	1.53	45.89	0.03	4.87
576.2	572.8	579.6	0.00	0.00	0.00	ND

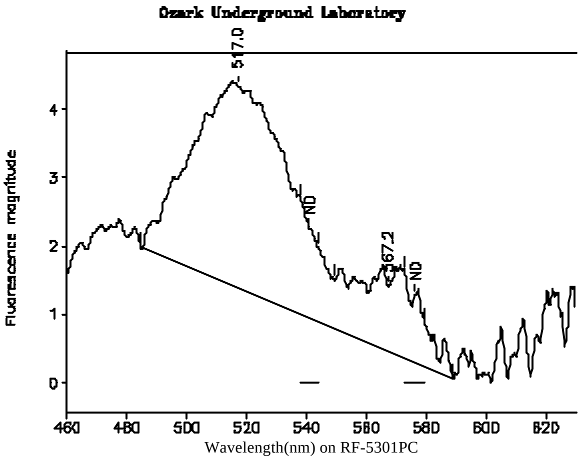
Peaks close to the normal range of tracer dyes:



Station 17: Poe Spring Run
OUL number: P3541 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/29/05 1831 Collected: 09/06/05 1526

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
518.0	485.0	547.7	4.85	196.69	0.02	4.15
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
564.6	547.7	586.6	2.02	61.33	0.03	6.50

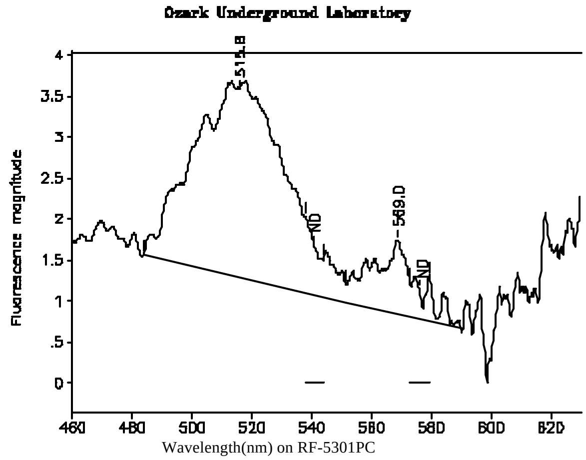


Station 17: Poe Spring Run
OUL number: P3743 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/06/05 1526 Collected: 09/12/05 1430

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.0	484.6	549.6	2.95	117.52	0.03	2.51
541.0	538.1	543.9	0.00	0.00	0.00	ND
567.2	549.6	588.8	0.95	32.00	0.03	3.33
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

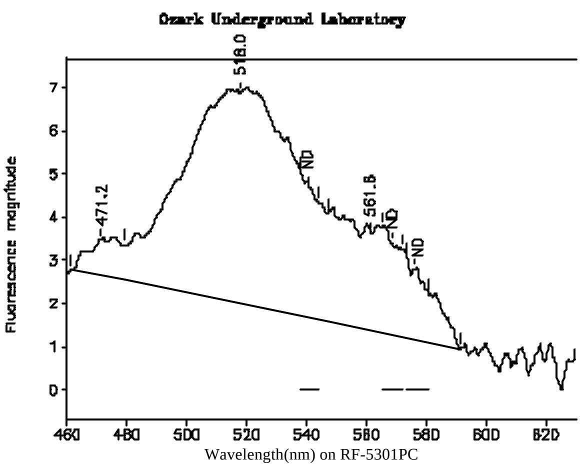


Station 17: Poe Spring Run
OUL number: P3744 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/12/05 1430 Collected: 09/19/05 1724

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	483.6	551.6	2.29	87.61	0.03	1.87
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.0	551.6	590.6	0.90	15.67	0.06	1.63
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



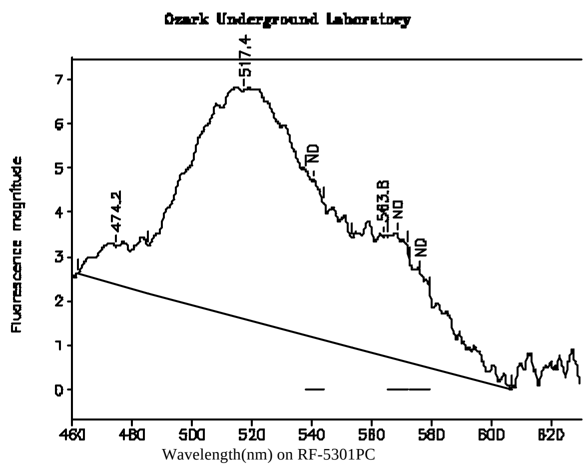
Station 17: Poe Spring Run
OUL number: P3921 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/19/05 1724 Collected: 09/28/05 1824

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
518.0	479.1	547.2	4.89	227.54	0.02	4.87
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	573.8	580.8	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

471.2	461.4	479.1	0.83	10.64	0.08	0.000
561.6	547.2	591.6	2.27	79.65	0.03	0.000



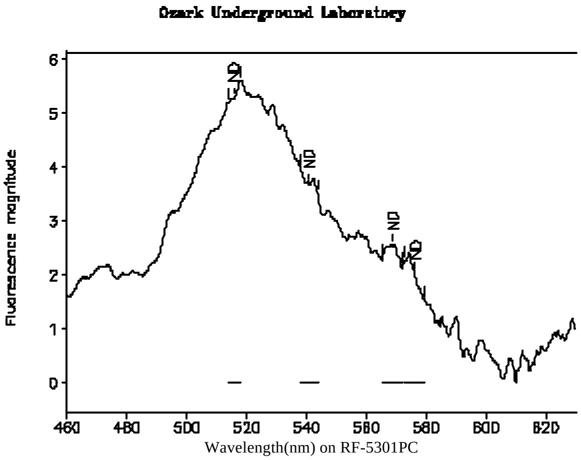
Station 17: Poe Spring Run
OUL number: P3922 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/28/05 1824 Collected: 10/05/05 1216

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.4	485.4	553.6	5.15	253.69	0.02	5.43
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

474.2	461.6	485.4	0.86	17.58	0.05	0.000
563.8	553.6	606.8	2.68	85.85	0.03	0.000

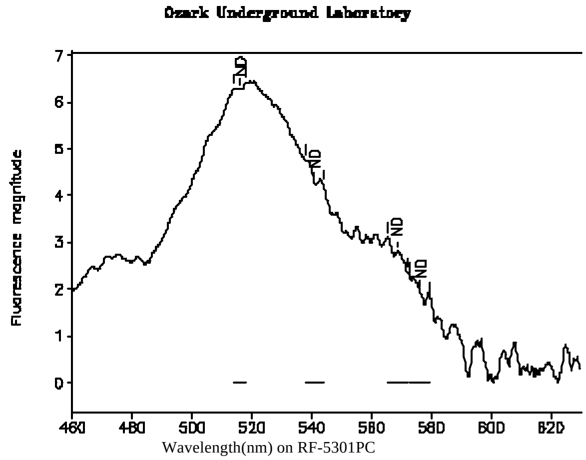


Station 17: Poe Spring Run
OUL number: P4166 Analyzed: 10/27/05
Matrix: Elutant
Placed: 10/05/05 1216 Collected: 10/13/05 1448

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.9	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

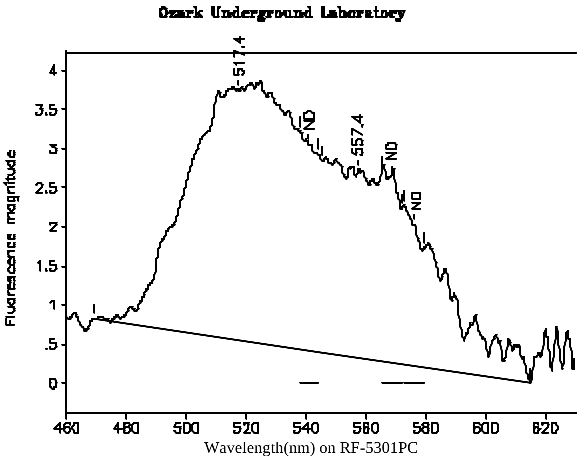


Station 17: Poe Spring Run
OUL number: P4167 Analyzed: 10/27/05
Matrix: Elutant
Placed: 10/13/05 1448 Collected: 10/22/05 1512

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.9	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND

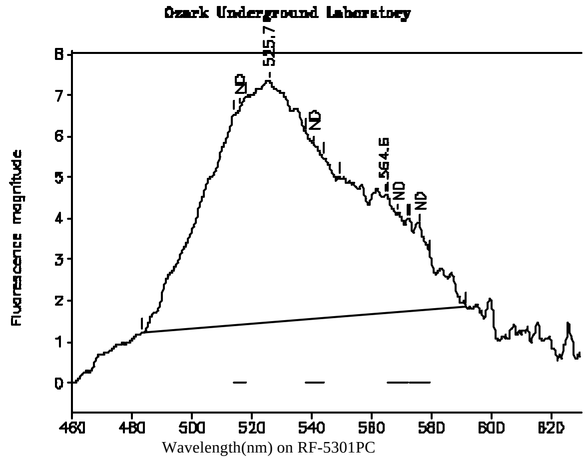
Peaks close to the normal range of tracer dyes:



Station 22: Santa Fe River Rise
OUL number: P2519 Analyzed: 07/14/05
Matrix: Elutant
Placed: 06/30/05 1653 Collected: 07/07/05 1620

Peaks within the normal range of tracer dyes:

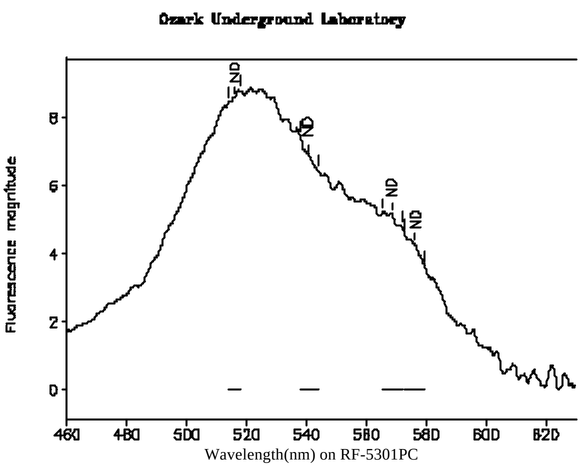
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.4	469.0	545.4	3.20	149.72	0.02	3.00
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
557.4	545.4	615.2	2.39	101.41	0.02	0.000



Station 22: Santa Fe River Rise
OUL number: P2812 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/26/05 1740 Collected: 08/01/05 1638

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
525.7	483.0	549.3	5.88	247.49	0.02	5.05
564.6	549.3	591.8	2.89	88.46	0.03	8.41

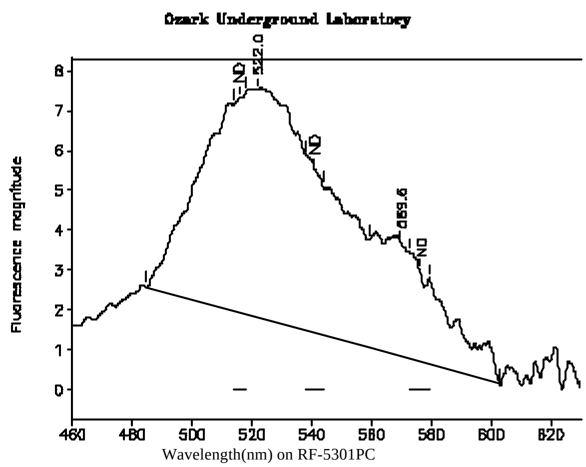


Station 22: Santa Fe River Rise
OUL number: P3002 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/07/05 1736 Collected: 08/13/05 1629

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

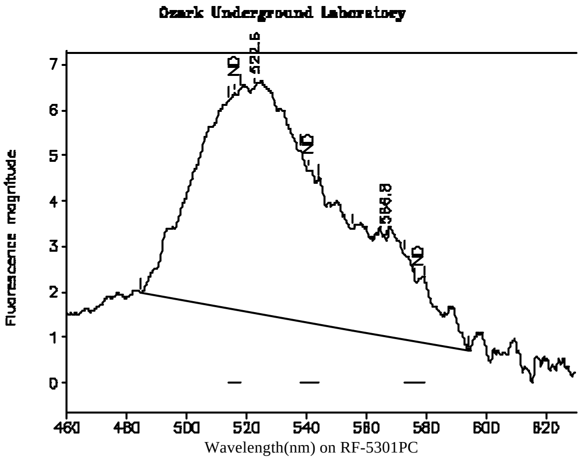
Peaks close to the normal range of tracer dyes:



Station 22: Santa Fe River Rise
OUL number: P3528 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/13/05 1620 Collected: 08/19/05 1603

Peaks within the normal range of tracer dyes:

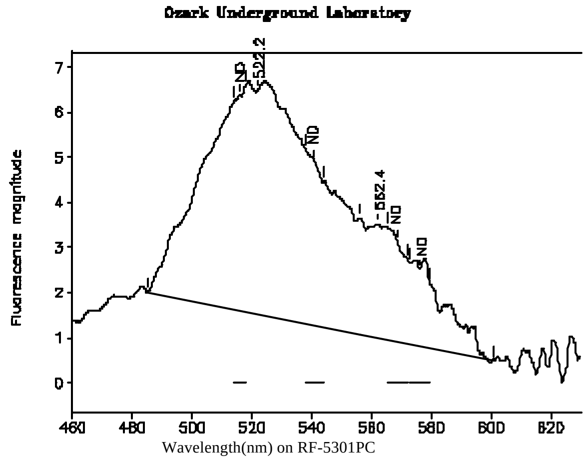
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.6	559.4	602.8	2.88	79.25	0.04	8.40
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
522.0	484.2	559.4	5.71	282.83	0.02	5.97



Station 22: Santa Fe River Rise
OUL number: P3529 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/19/05 1603 Collected: 08/25/05 1612

Peaks within the normal range of tracer dyes:

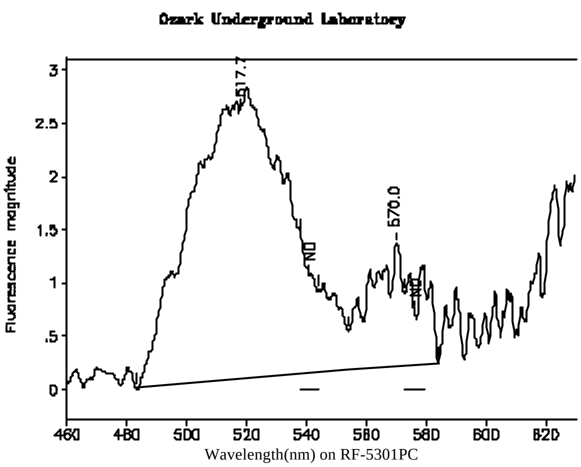
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
566.8	555.3	594.4	2.12	60.26	0.04	6.39
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
522.6	484.6	555.3	4.97	230.87	0.02	4.88



Station 22: Santa Fe River Rise
OUL number: P3530 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/25/05 1612 Collected: 09/02/05 1536

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
522.2	485.0	556.1	4.98	236.62	0.02	5.00
562.4	556.1	601.2	2.53	65.15	0.04	6.91

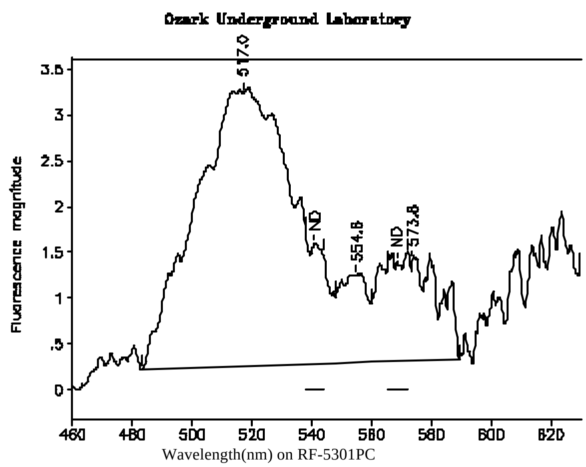


Station 22: Santa Fe River Rise
OUL number: P3735 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/02/05 1536 Collected: 09/09/05 1600

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.7	483.0	554.1	2.53	106.63	0.02	2.28
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.0	554.1	584.0	1.15	21.27	0.05	2.22
576.2	572.8	579.6	0.00	0.00	0.00	ND

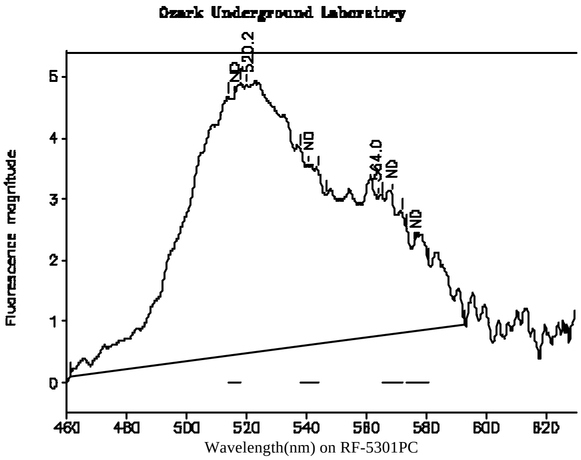
Peaks close to the normal range of tracer dyes:



Station 22: Santa Fe River Rise
OUL number: P3736 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1600 Collected: 09/16/05 1625

Peaks within the normal range of tracer dyes:

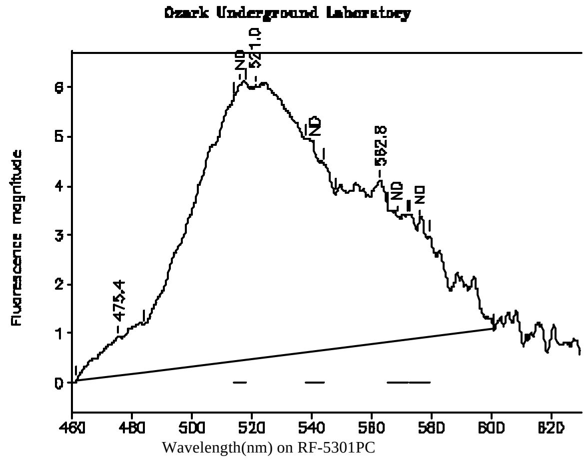
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.0	483.2	547.8	2.98	118.24	0.03	2.52
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
573.8	560.1	589.4	1.09	26.24	0.04	1.56
Peaks close to the normal range of tracer dyes:						
554.6	547.8	560.1	0.95	10.76	0.09	0.000



Station 22: Santa Fe River Rise
OUL number: P3918 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/16/05 1625 Collected: 09/23/05 1532

Peaks within the normal range of tracer dyes:

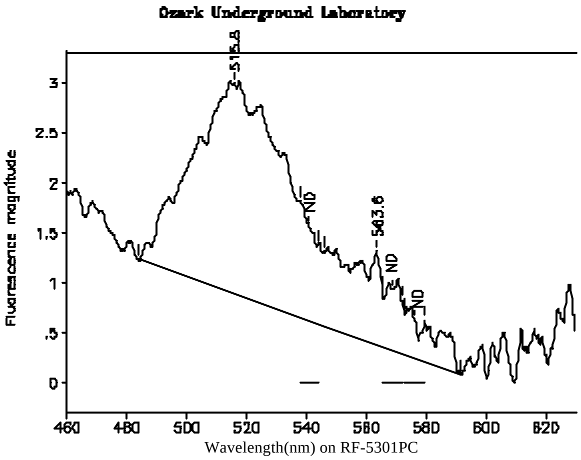
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	573.8	580.8	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
520.2	460.8	546.6	4.38	201.04	0.02	4.30
564.0	546.6	593.2	2.27	81.83	0.03	8.09



Station 22: Santa Fe River Rise
OUL number: P3919 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/23/05 1532 Collected: 10/05/05 1408

Peaks within the normal range of tracer dyes:

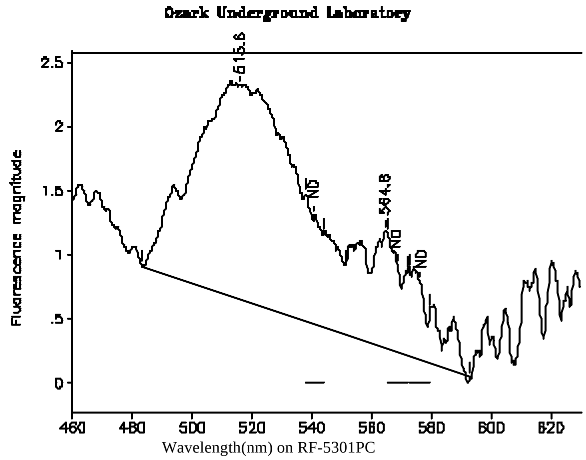
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
475.4	461.2	483.8	0.78	13.79	0.06	0.000
521.0	483.8	547.8	5.52	256.25	0.02	5.48
562.8	547.8	601.0	3.30	111.66	0.03	0.000



Station 101: High Springs Well # 1 (West)
OUL number: P2802 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1309 Collected: 07/29/05 1506

Peaks within the normal range of tracer dyes:

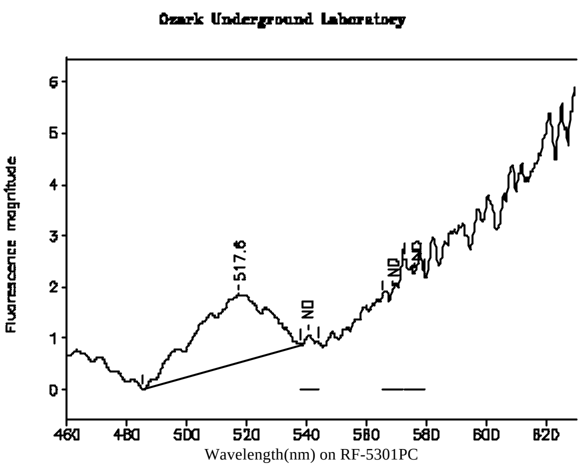
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	484.0	546.1	2.10	79.42	0.03	1.62
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
563.6	546.1	591.8	0.94	24.59	0.04	2.34



Station 101: High Springs Well # 1 (West)
OUL number: P2803 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/29/05 1506 Collected: 08/01/05 1131

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.6	483.2	551.2	1.66	71.31	0.02	1.46
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
564.8	551.2	593.0	0.91	22.19	0.04	2.11

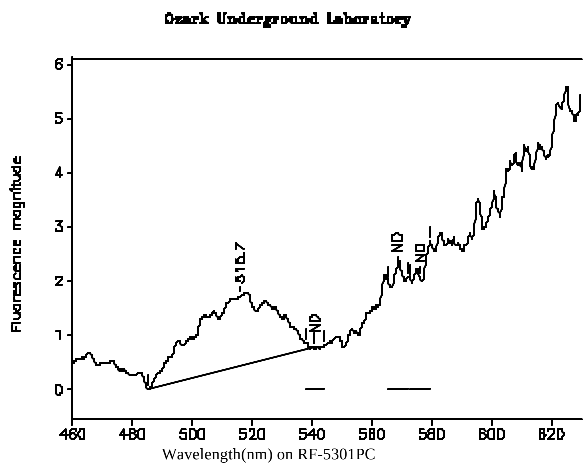


Station 101: High Springs Well # 1 (West)
OUL number: P2904 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/01/05 1131 Collected: 08/04/05 1439

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.6	485.2	538.2	1.31	37.85	0.03	0.774
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

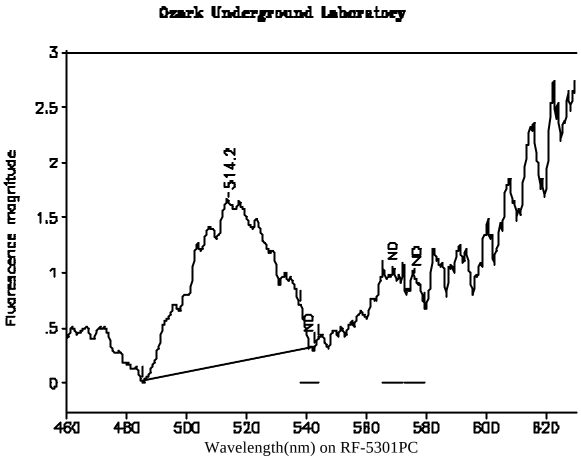


Station 101: High Springs Well # 1 (West)
OUL number: P2905 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/04/05 1439 Collected: 08/07/05 1825

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.7	485.2	540.6	1.28	42.18	0.03	0.863
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

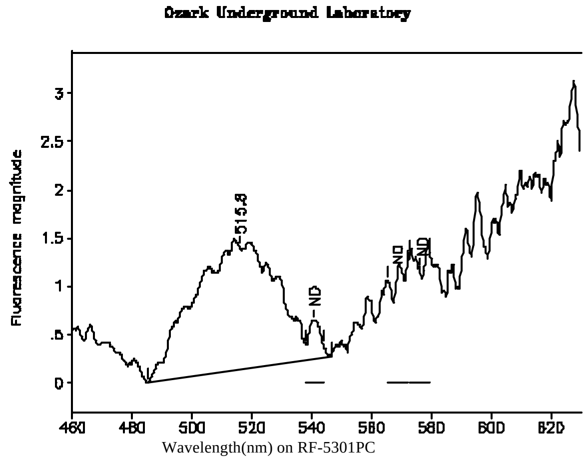


Station 101: High Springs Well # 1 (West)
OUL number: P3008 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/07/05 1825 Collected: 08/10/05 1312

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.2	485.0	542.8	1.40	47.15	0.03	0.976
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

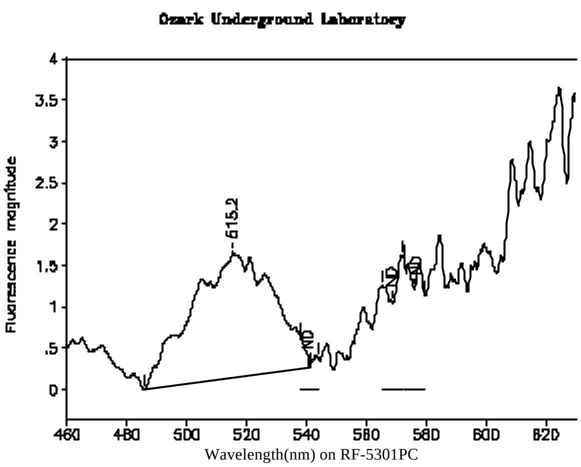


Station 101: High Springs Well # 1 (West)
OUL number: P3009 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/10/05 1312 Collected: 08/13/05 1719

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	485.2	546.4	1.27	44.63	0.03	0.923
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

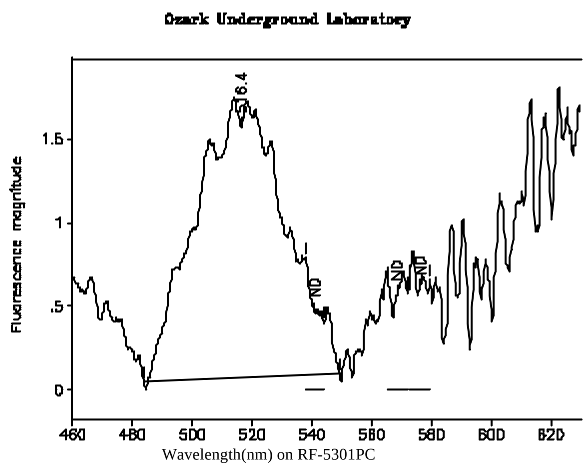


Station 101: High Springs Well # 1 (West)
OUL number: P3010 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/13/05 1719 Collected: 08/16/05 1326

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.2	485.6	541.2	1.51	48.02	0.03	0.994
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

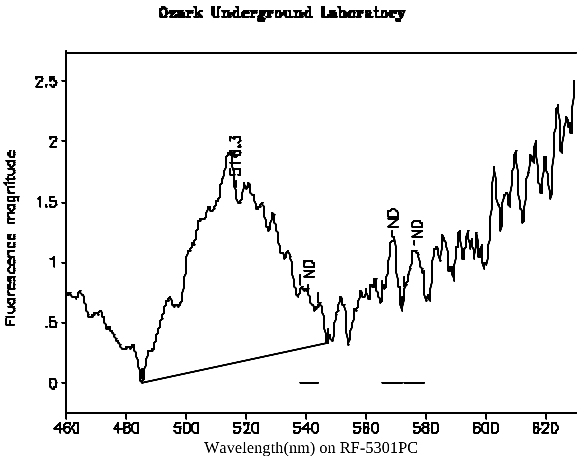


Station 101: High Springs Well # 1 (West)
OUL number: P3546 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/16/05 1326 Collected: 08/19/05 1648

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.4	483.8	549.4	1.50	58.44	0.03	1.23
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

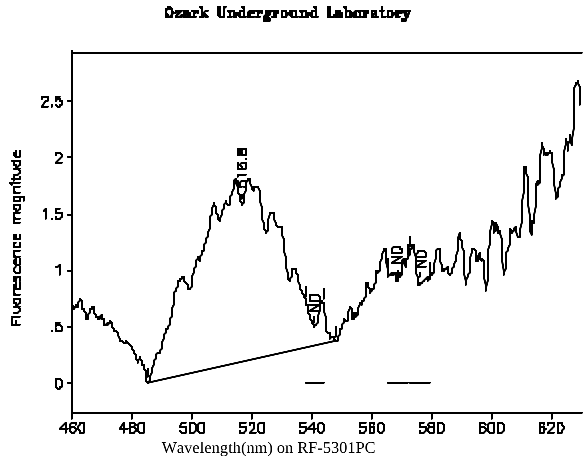


Station 101: High Springs Well # 1 (West)
OUL number: P3547 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/19/05 1648 Collected: 08/23/05 1458

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.3	485.0	547.2	1.42	55.33	0.03	1.17
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

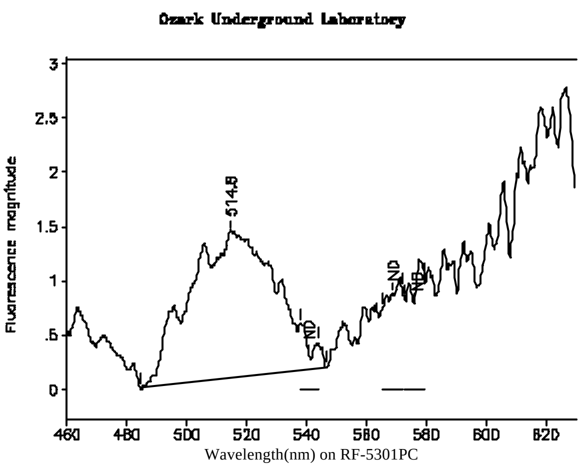


Station 101: High Springs Well # 1 (West)
OUL number: P3548 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/23/05 1458 Collected: 08/26/05 1721

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.8	485.4	548.0	1.40	54.62	0.03	1.15
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

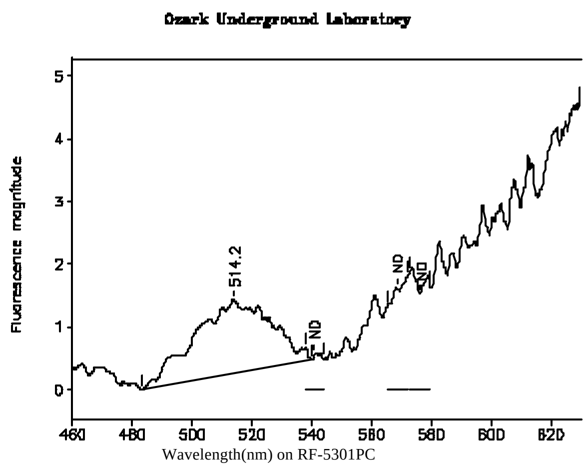


Station 101: High Springs Well # 1 (West)
OUL number: P3549 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/26/05 1721 Collected: 09/02/05 1624

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.8	484.2	547.0	1.34	45.54	0.03	0.962
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

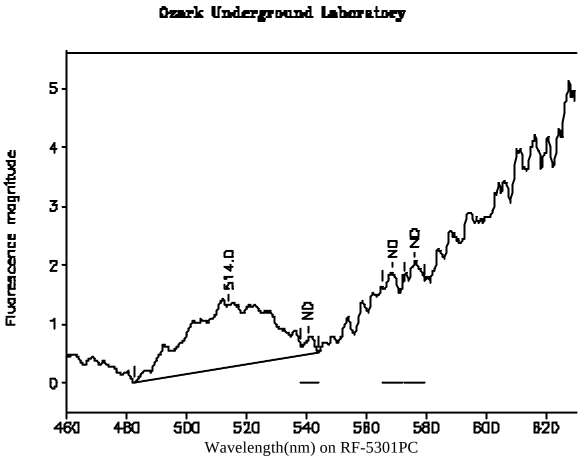


Station 101: High Springs Well # 1 (West)
OUL number: P3745 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/02/05 1624 Collected: 09/09/05 1654

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.2	483.2	540.0	1.18	34.65	0.03	0.740
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

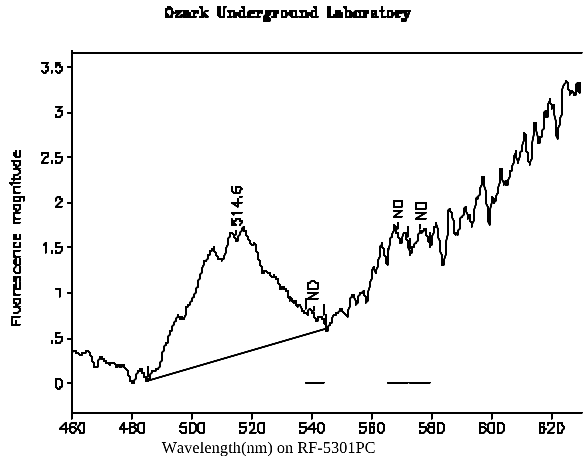


Station 101: High Springs Well # 1 (West)
OUL number: P3746 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1654 Collected: 09/16/05 1338

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.0	482.8	544.2	1.04	37.47	0.03	0.800
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

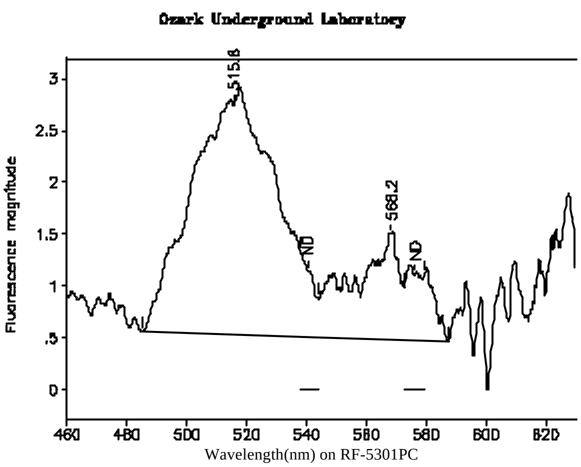


Station 101: High Springs Well # 1 (West)
OUL number: P3923 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/16/05 1338 Collected: 09/23/05 1620

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.6	485.0	544.8	1.28	42.62	0.03	0.912
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

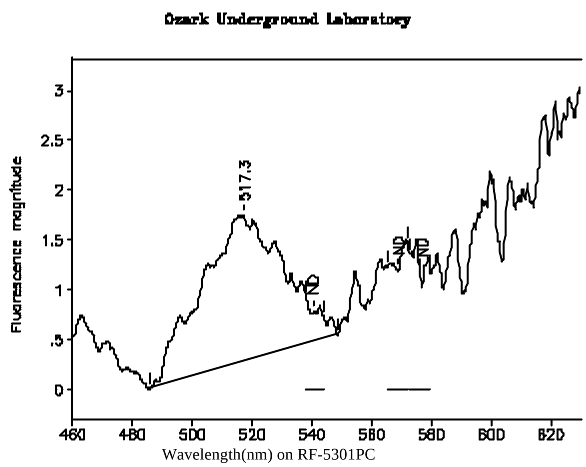


Station 101: High Springs Well # 1 (West)
OUL number: P3924 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/23/05 1620 Collected: 10/03/05 1543

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	485.0	543.8	2.22	78.17	0.03	1.67
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.2	543.8	587.2	1.01	25.43	0.04	2.51
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



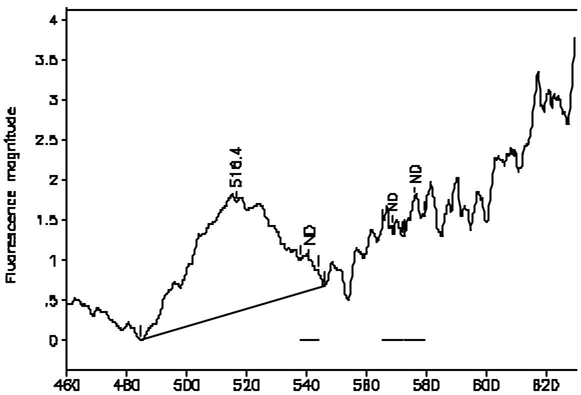
Station 101: High Springs Well # 1 (West)
OUL number: P4168 Analyzed: 10/27/05
Matrix: Elutant
Placed: 10/03/05 1543 Collected: 10/13/05 1312

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.3	486.0	548.4	1.46	47.01	0.03	1.00
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Ozark Underground Laboratory



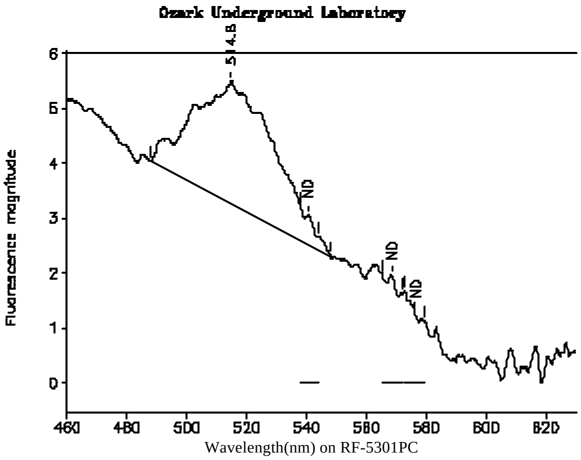
Wavelength(nm) on RF-5301PC

Station 101: High Springs Well # 1 (West)
OUL number: P4169 Analyzed: 10/27/05
Matrix: Elutant
Placed: 10/13/05 1312 Collected: 10/20/05 1554

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.4	484.8	546.2	1.38	48.17	0.03	1.03
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

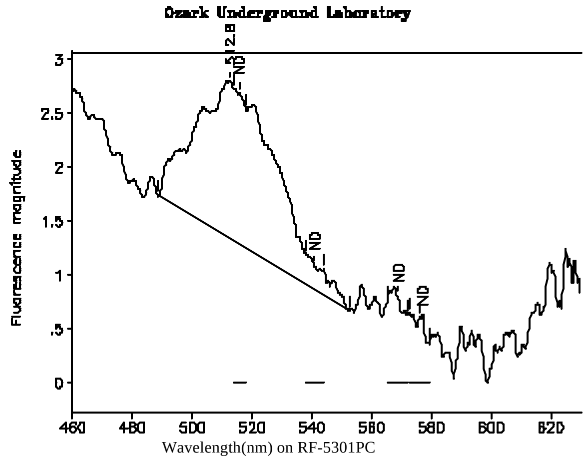


Station 103: Alachua Well # 1
OUL number: P2805 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1427 Collected: 07/29/05 1628

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.8	487.6	548.2	2.23	70.44	0.03	1.44
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



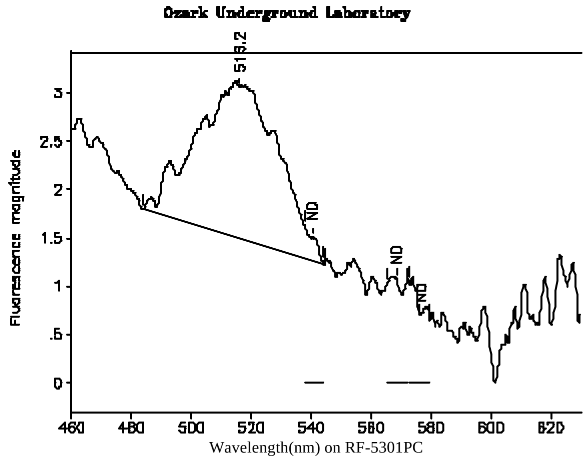
Station 103: Alachua Well # 1
OUL number: P2806 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/29/05 1628 Collected: 08/01/05 1208

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
512.8	488.6	552.6	1.46	47.21	0.03	0.964

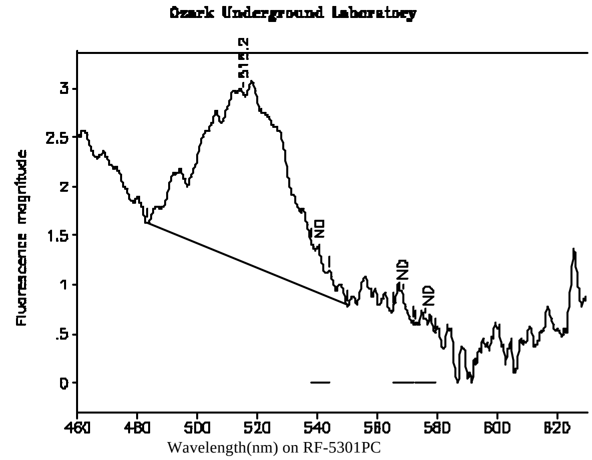


Station 104: Alachua Well # 2
OUL number: P2807 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1416 Collected: 07/29/05 1635

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.2	483.6	544.4	1.56	51.35	0.03	1.05
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

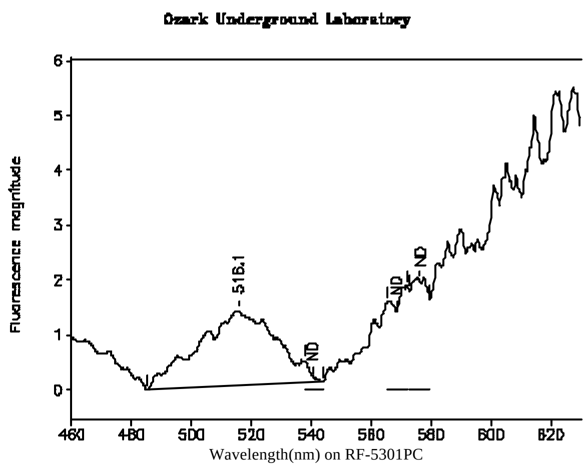


Station 104: Alachua Well # 2
OUL number: P2808 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/29/05 1635 Collected: 08/01/05 1220

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.2	483.2	550.2	1.73	61.54	0.03	1.26
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

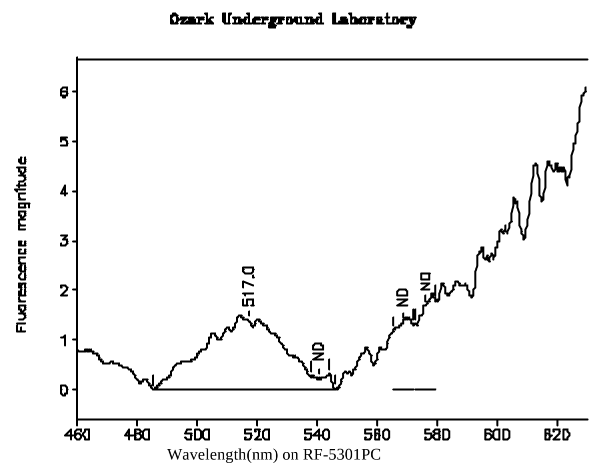


Station 104: Alachua Well # 2
OUL number: P2908 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/01/05 1220 Collected: 08/04/05 1608

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.1	485.3	543.8	1.36	41.68	0.03	0.853
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

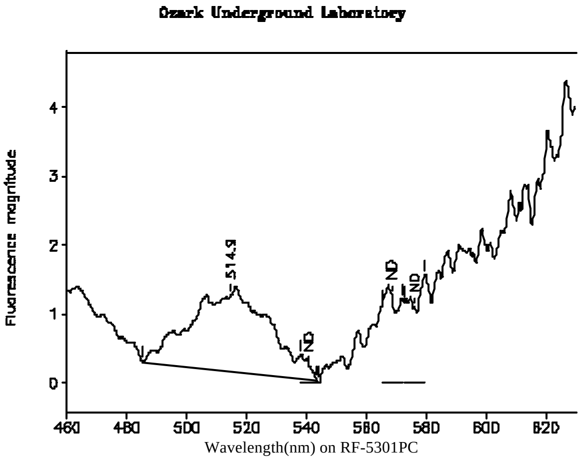


Station 104: Alachua Well # 2
OUL number: P2909 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/04/05 1608 Collected: 08/07/05 1903

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.0	485.4	546.0	1.38	46.39	0.03	0.949
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

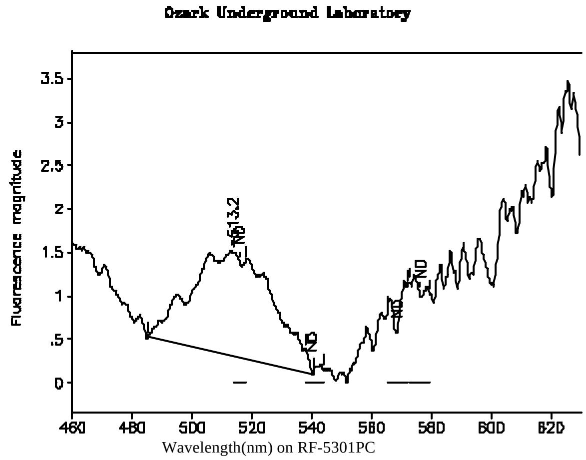


Station 104: Alachua Well # 2
OUL number: P3016 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/07/05 1903 Collected: 08/10/05 1431

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.9	485.2	543.4	1.10	36.39	0.03	0.753
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



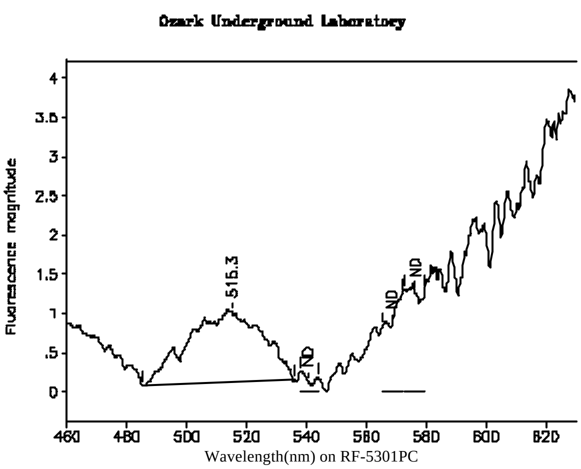
Station 104: Alachua Well # 2
OUL number: P3017 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/10/05 1431 Collected: 08/13/05 1746

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

513.2	485.0	540.4	1.22	38.67	0.03	0.800

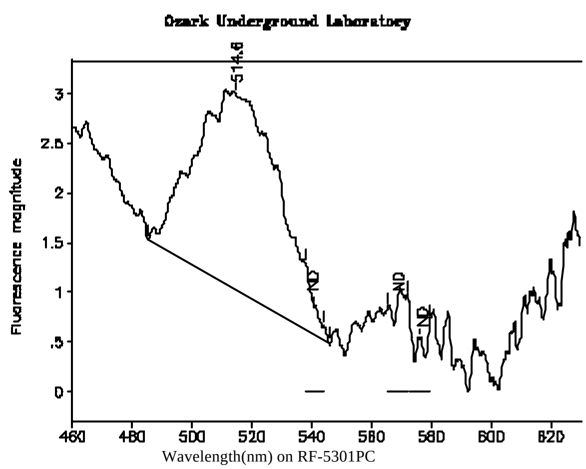


Station 104: Alachua Well # 2
OUL number: P3018 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/13/05 1746 Collected: 08/16/05 1419

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.3	485.2	536.2	0.89	26.89	0.03	0.556
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

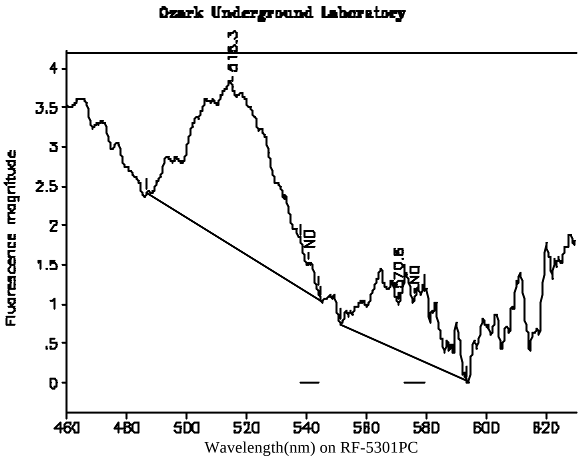


Station 104: Alachua Well # 2
OUL number: P3550 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/19/05 1737 Collected: 08/23/05 1601

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.6	485.4	545.8	1.97	66.29	0.03	1.40
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

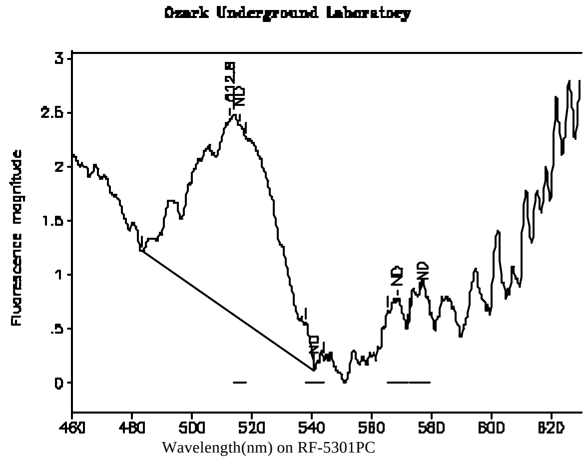


Station 104: Alachua Well # 2
OUL number: P3551 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/26/05 1755 Collected: 09/02/05 1709

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.3	486.6	544.8	2.03	65.25	0.03	1.38
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.6	551.4	593.6	0.60	23.81	0.03	2.52
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



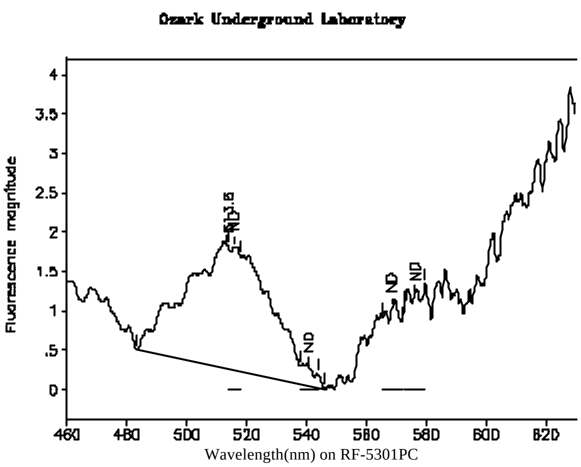
Station 104: Alachua Well # 2
OUL number: P3747 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/02/05 1709 Collected: 09/09/05 1740

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

512.8	483.0	541.0	1.79	57.50	0.03	1.23



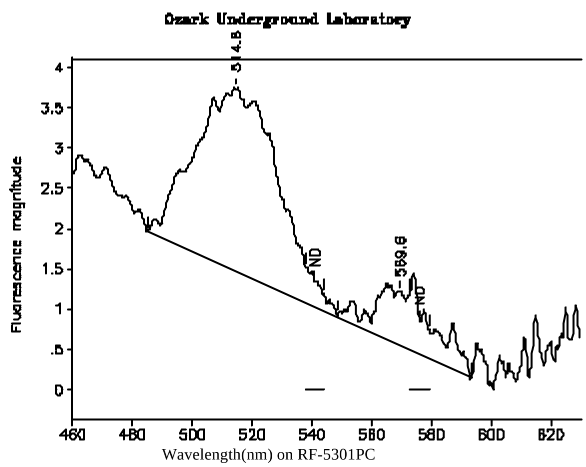
Station 104: Alachua Well # 2
OUL number: P3748 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1740 Collected: 09/16/05 1429

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

513.6	483.2	546.0	1.56	52.19	0.03	1.11

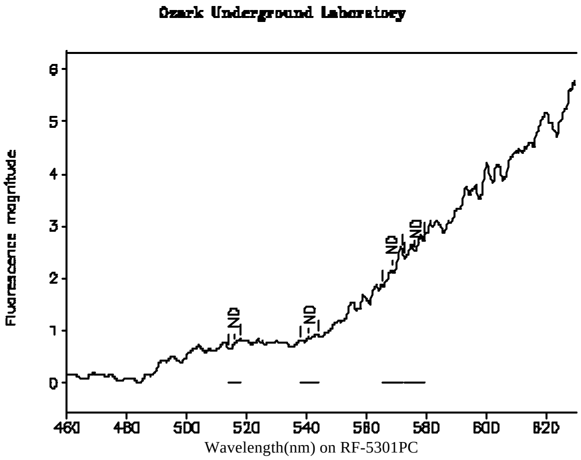


Station 104: Alachua Well # 2
OUL number: P3925 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/23/05 1658 Collected: 10/03/05 1431

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.8	485.0	548.7	2.27	74.51	0.03	1.59
540.9	538.1	543.9	0.00	0.00	0.00	ND
569.6	548.7	593.4	0.67	17.62	0.04	1.74
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

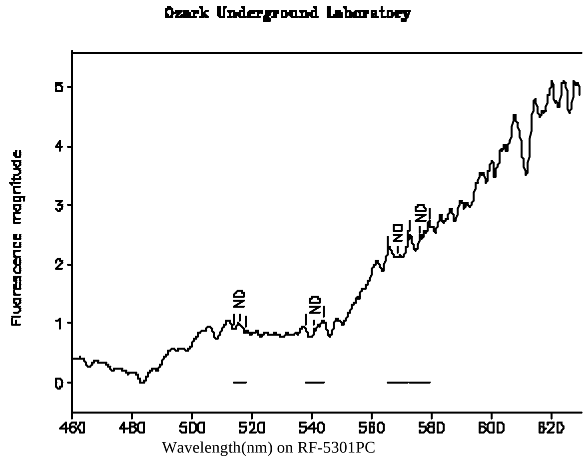


Station 106: Santa Fe Hills Subdivision Well
OUL number: P2809 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/26/05 1620 Collected: 07/29/05 1540

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

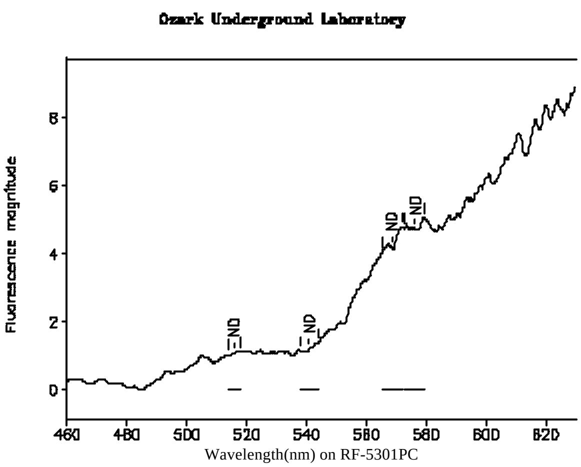


Station 106: Santa Fe Hills Subdivision Well
OUL number: P2810 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/29/05 1540 Collected: 08/01/05 1329

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

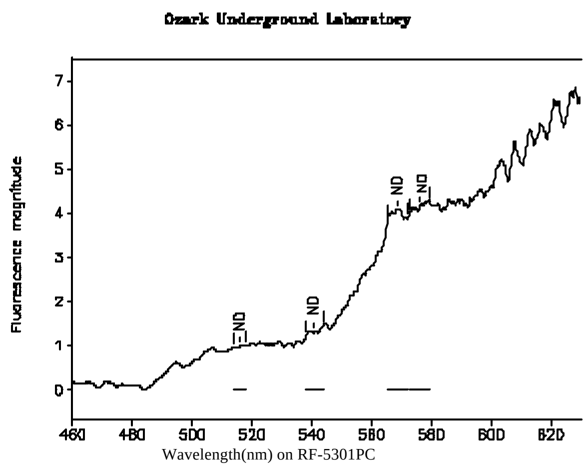


Station 106: Santa Fe Hills Subdivision Well
OUL number: P2906 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/04/05 1514 Collected: 08/07/05 1830

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

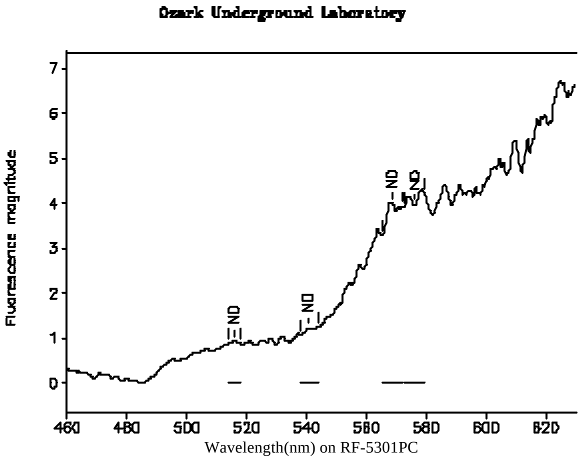


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3011 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/07/05 1830 Collected: 08/10/05 1353

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

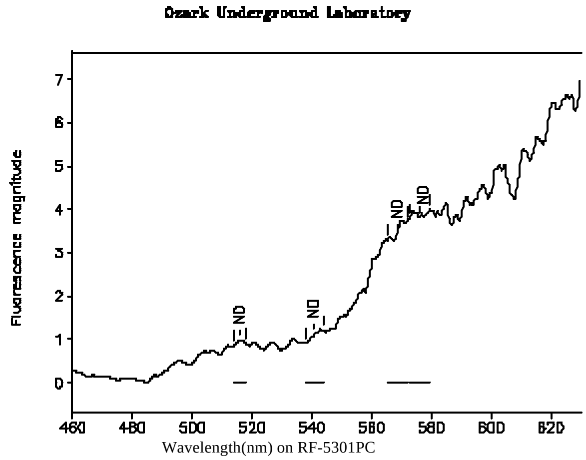


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3012 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/10/05 1353 Collected: 08/13/05 1842

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

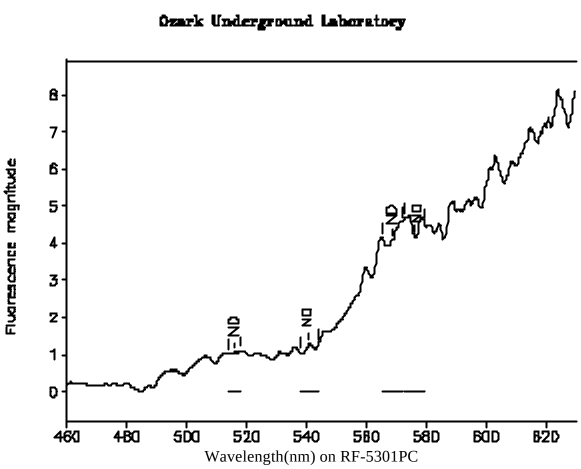


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3013 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/13/05 1842 Collected: 08/16/05 1450

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

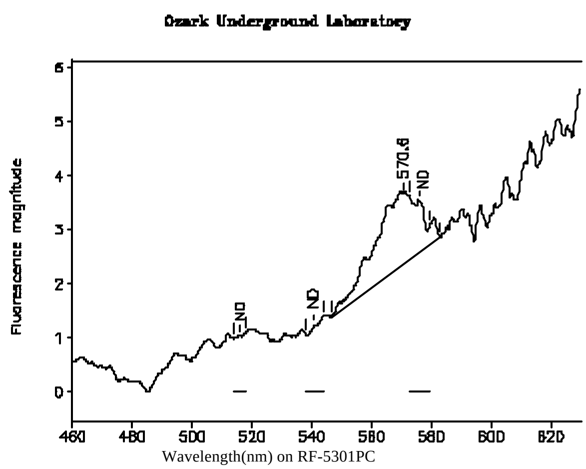


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3662 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/16/05 1450 Collected: 08/19/05 1710

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

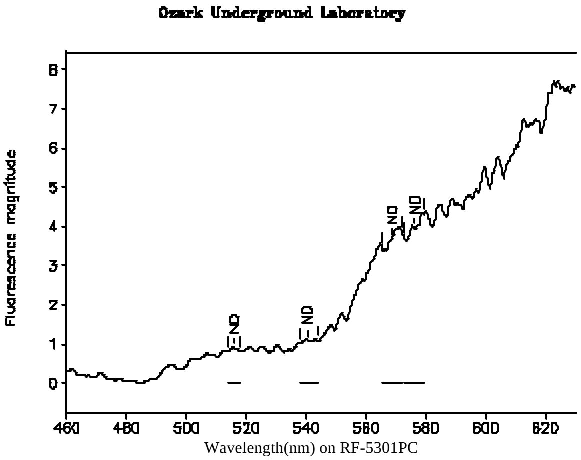


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3542 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/19/05 1710 Collected: 08/23/05 1622

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.6	546.4	582.8	1.29	23.52	0.05	2.49
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

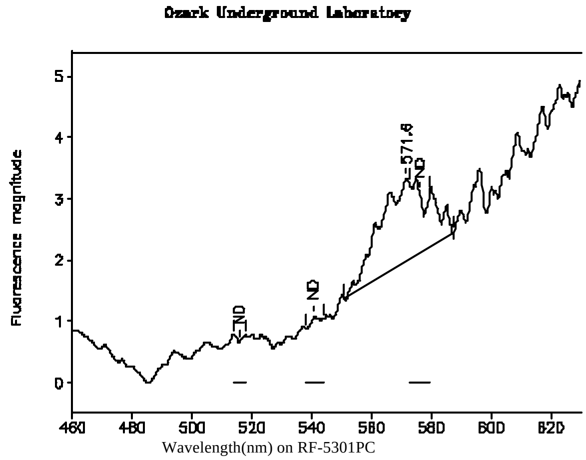


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3663 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/23/05 1622 Collected: 08/27/05 1411

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

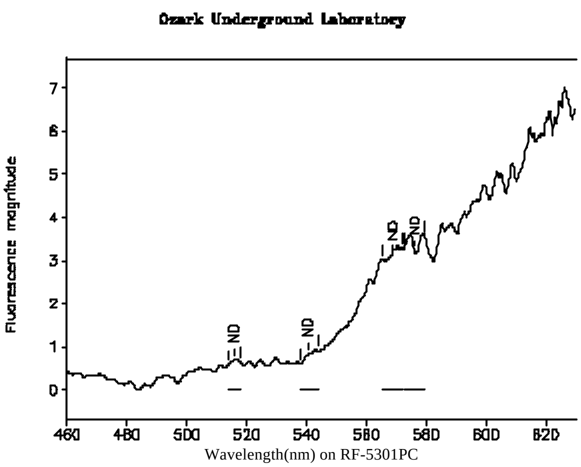


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3543 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/27/05 1411 Collected: 09/02/05 1646

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
571.6	551.0	587.8	1.36	25.60	0.05	2.71
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

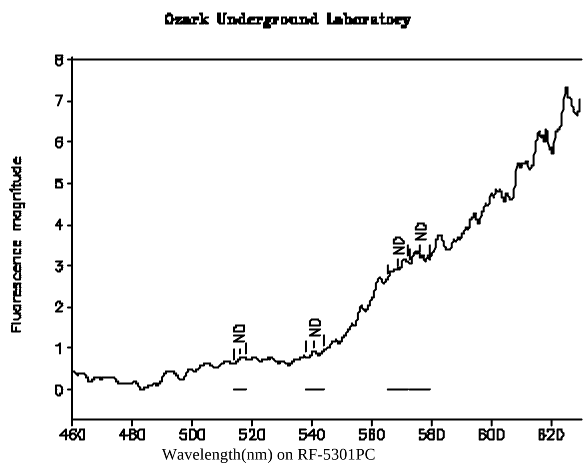


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3729 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/02/05 1646 Collected: 09/09/05 1659

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

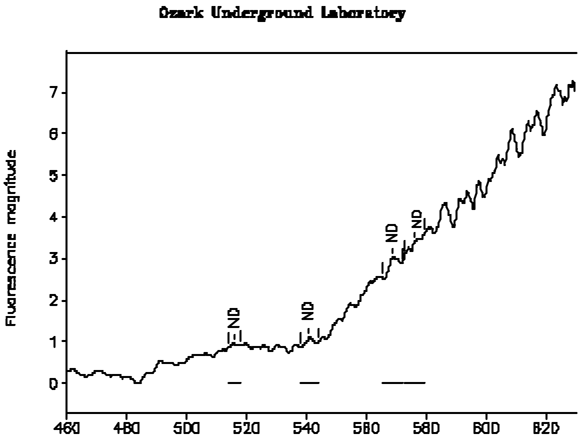


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3730 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1659 Collected: 09/16/05 1517

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

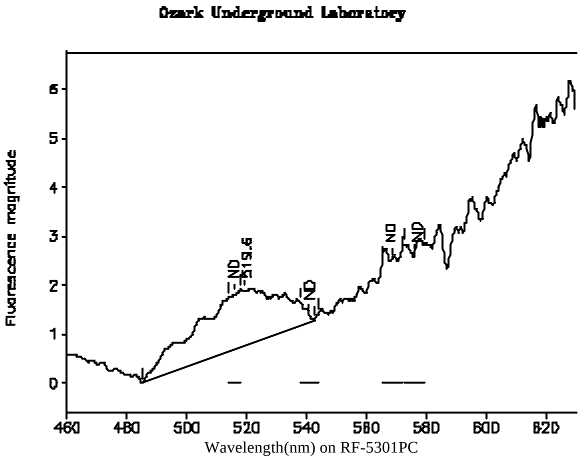


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3731 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/16/05 1517 Collected: 09/21/05 1339

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

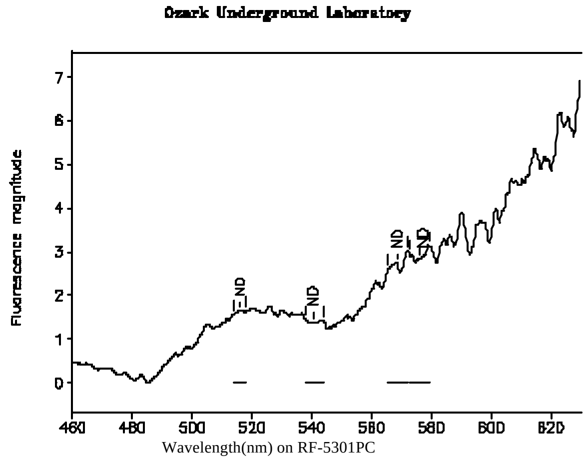
Peaks close to the normal range of tracer dyes:



Station 111: River Ranch Well
OUL number: P3656 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/01/05 1528 Collected: 08/04/05 1417

Peaks within the normal range of tracer dyes:

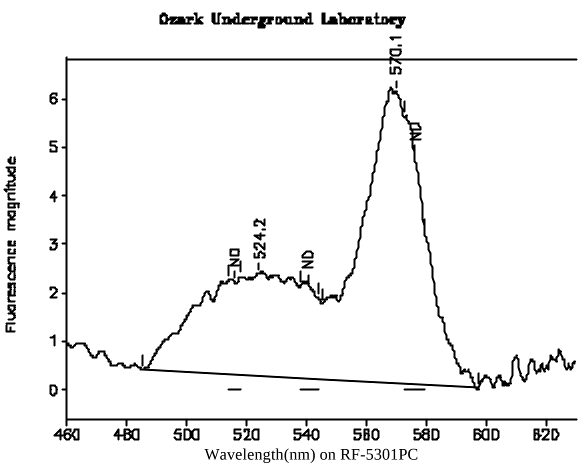
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
519.6	485.0	542.4	1.12	39.75	0.03	0.845



Station 111: River Ranch Well
OUL number: P3657 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/04/05 1417 Collected: 08/07/05 1623

Peaks within the normal range of tracer dyes:

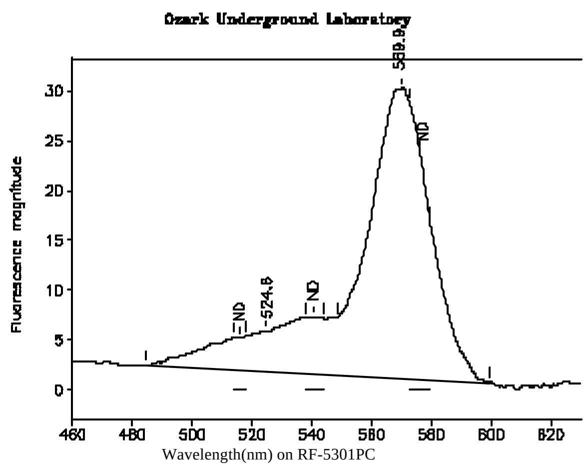
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						



Station 111: River Ranch Well
OUL number: P3174 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/07/05 1623 Collected: 08/10/05 1255

Peaks within the normal range of tracer dyes:

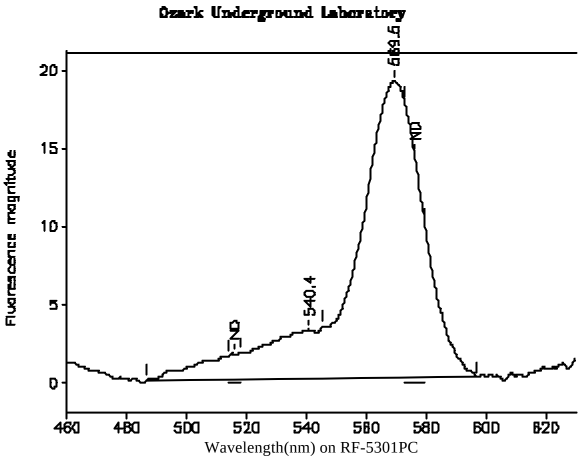
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.1	545.3	597.8	6.01	148.72	0.04	15.4
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
524.2	485.2	545.3	2.09	91.71	0.02	1.91



Station 111: River Ranch Well
OUL number: P3175 Analyzed: 08/31/05
Matrix: Elutant
Placed: 08/10/05 1255 Collected: 08/15/05 1445

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
569.9	548.4	599.4	29.09	687.67	0.04	71.1
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
524.6	484.2	548.4	4.03	207.78	0.02	4.32

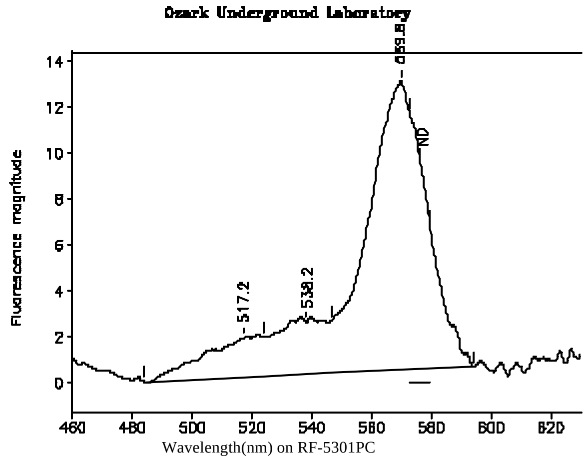


Station 111: River Ranch Well
OUL number: P3524 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/15/05 1445 Collected: 08/19/05 1430

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.4	486.8	545.5	3.12	97.38	0.03	2.80
569.5	545.5	596.8	18.96	446.16	0.04	47.3
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

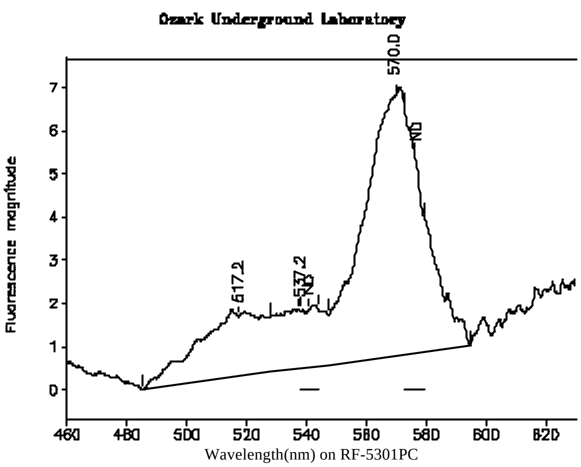


Station 111: River Ranch Well
OUL number: P3525 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/19/05 1430 Collected: 08/23/05 1438

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.2	484.0	524.0	1.72	40.38	0.04	0.853
538.2	524.0	546.6	2.30	49.73	0.05	1.43
569.8	546.6	594.0	12.60	287.06	0.04	30.4
576.2	572.8	579.6	0.00	0.00	0.00	ND

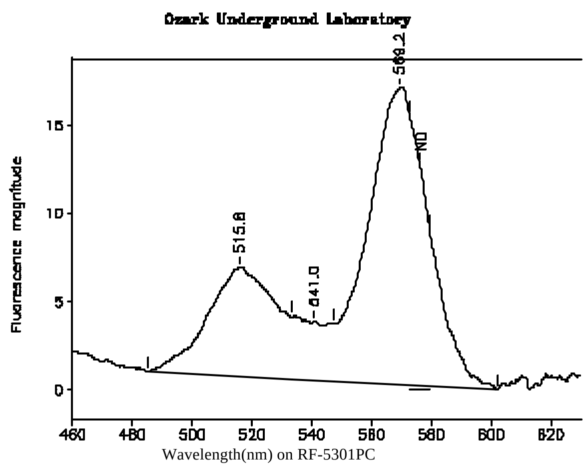
Peaks close to the normal range of tracer dyes:



Station 111: River Ranch Well
OUL number: P3526 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/23/05 1438 Collected: 08/26/05 1548

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
517.2	485.0	527.7	1.38	39.01	0.04	0.824
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.0	547.3	594.6	6.03	144.41	0.04	15.3
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
537.2	527.7	547.3	1.36	25.96	0.05	0.747

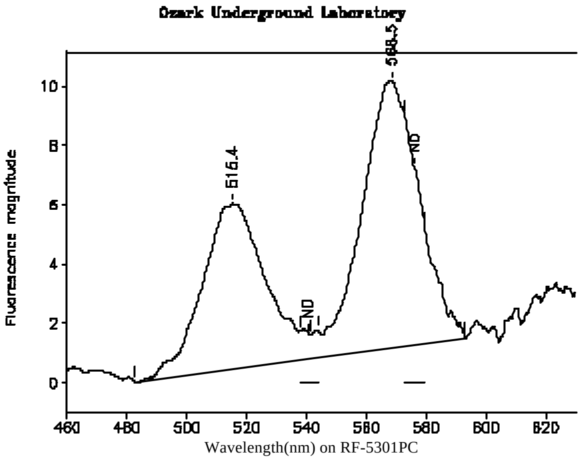


Station 111: River Ranch Well
OUL number: P3527 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/26/05 1548 Collected: 09/02/05 1443

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	485.0	533.1	6.18	162.17	0.04	3.43
541.0	533.1	547.5	3.31	48.37	0.07	1.39
569.2	547.5	602.0	16.81	399.87	0.04	42.4
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

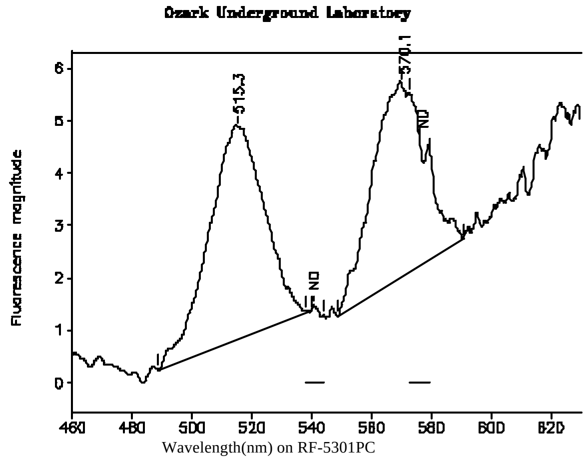


Station 111: River Ranch Well
OUL number: P3727 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/02/05 1443 Collected: 09/09/05 1500

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.4	482.5	541.6	5.57	137.75	0.04	2.94
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.5	541.7	593.2	8.97	201.74	0.04	21.0
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

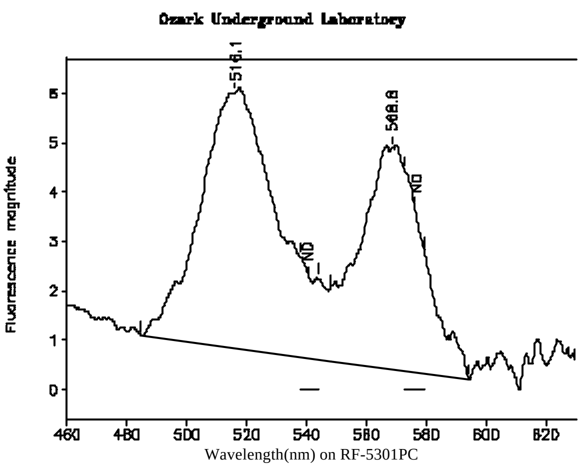


Station 111: River Ranch Well
OUL number: P3728 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1500 Collected: 09/15/05 1559

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.3	488.6	539.8	4.05	87.89	0.05	1.88
541.0	538.1	543.9	0.00	0.00	0.00	ND
570.1	548.6	590.8	3.68	76.56	0.05	7.98
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

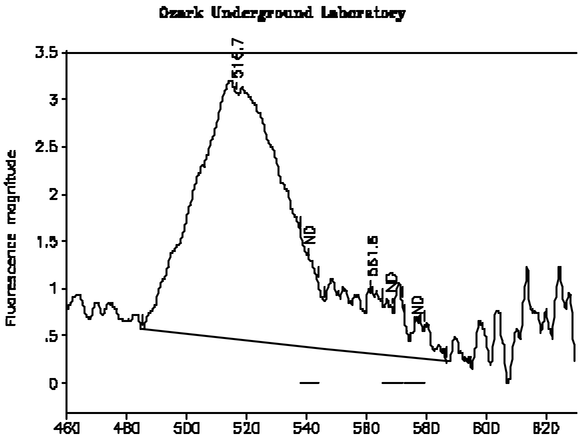


Station 111: River Ranch Well
OUL number: P3908 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/23/05 1439 Collected: 09/30/05 1511

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.1	484.6	547.7	5.17	164.01	0.03	3.51
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.8	547.7	594.4	4.49	113.71	0.04	11.2
576.1	572.8	579.6	0.00	0.00	0.00	ND

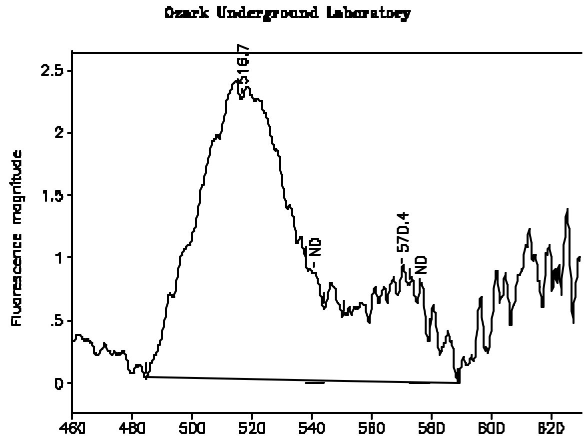
Peaks close to the normal range of tracer dyes:



Station 112: Main Shop Well
OUL number: P3909 Analyzed: 10/11/05
Matrix: Elutant
Placed: 08/26/05 1533 Collected: 09/02/05 1432

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.7	485.0	546.1	2.60	94.54	0.03	2.02
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
561.6	546.1	586.6	0.67	19.04	0.04	0.000

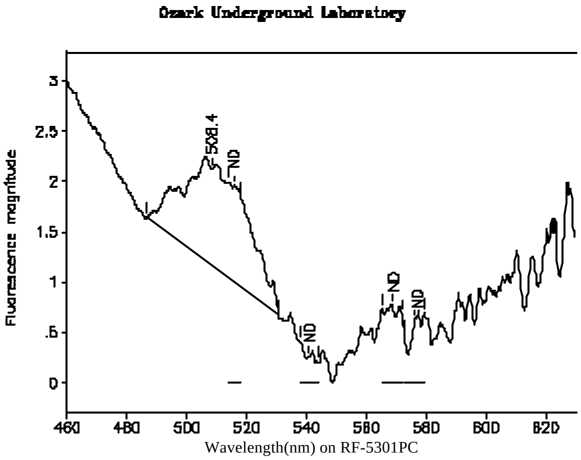


Station 112: Main Shop Well
OUL number: P3910 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/02/05 1432 Collected: 09/09/05 1446

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.7	484.2	550.6	2.24	87.99	0.03	1.88
540.9	538.1	543.9	0.00	0.00	0.00	ND
570.4	550.6	589.0	0.91	22.53	0.04	2.23
576.1	572.8	579.6	0.00	0.00	0.00	ND

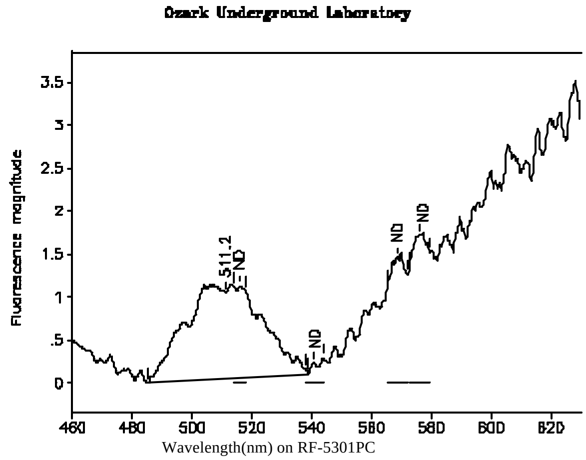
Peaks close to the normal range of tracer dyes:



Station 113: Residence 6 Well
OUL number: P3911 Analyzed: 10/11/05
Matrix: Elutant
Placed: 08/26/05 1538 Collected: 09/02/05 1451

Peaks within the normal range of tracer dyes:

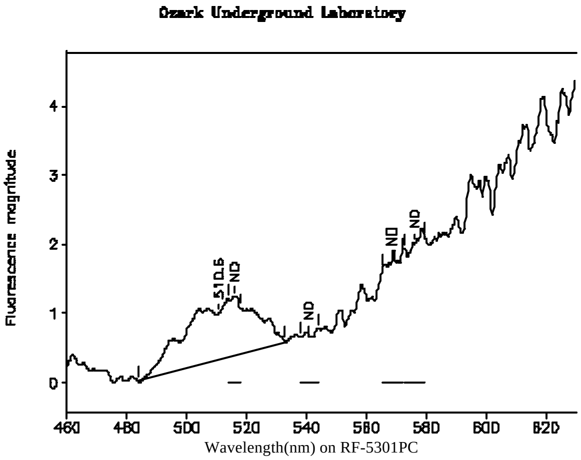
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
508.4	486.4	530.8	0.96	26.62	0.04	0.570



Station 113: Residence 6 Well
OUL number: P3912 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/02/05 1451 Collected: 09/09/05 1510

Peaks within the normal range of tracer dyes:

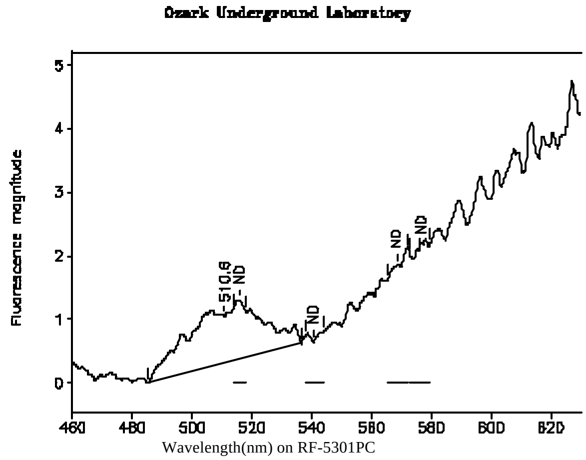
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
511.2	485.0	538.8	1.00	33.21	0.03	0.711



Station 114: Chalet Well
OUL number: P3913 Analyzed: 10/11/05
Matrix: Elutant
Placed: 08/26/05 1604 Collected: 09/02/05 1456

Peaks within the normal range of tracer dyes:

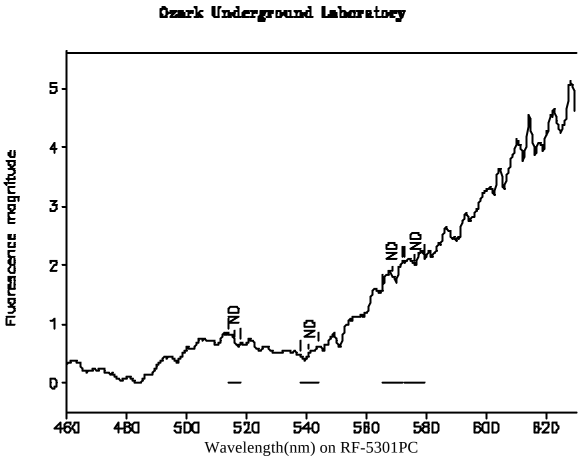
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
510.6	483.6	532.6	0.82	23.53	0.03	0.504



Station 114: Chalet Well
OUL number: P3914 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/02/05 1456 Collected: 09/09/05 1515

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
510.6	485.0	536.4	0.75	26.89	0.03	0.575

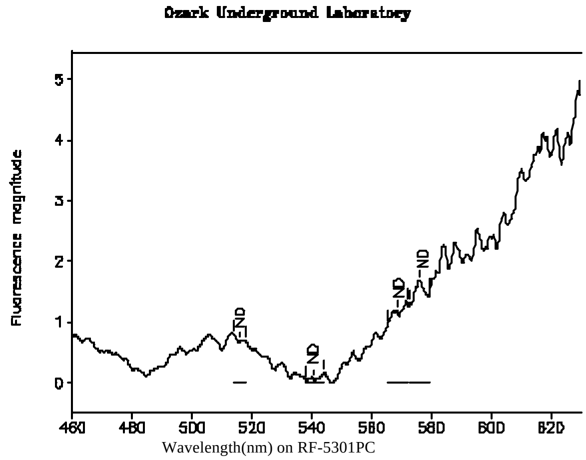


Station 121: Copeland Well
OUL number: P2811 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1344 Collected: 08/01/05 1338

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

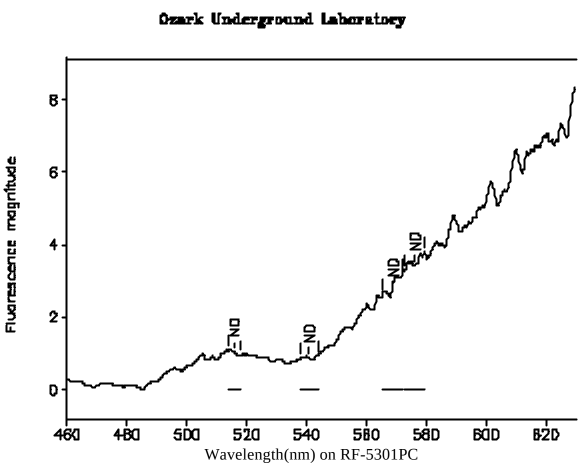


Station 121: Copeland Well
OUL number: P3014 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/08/05 1618 Collected: 08/15/05 1558

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

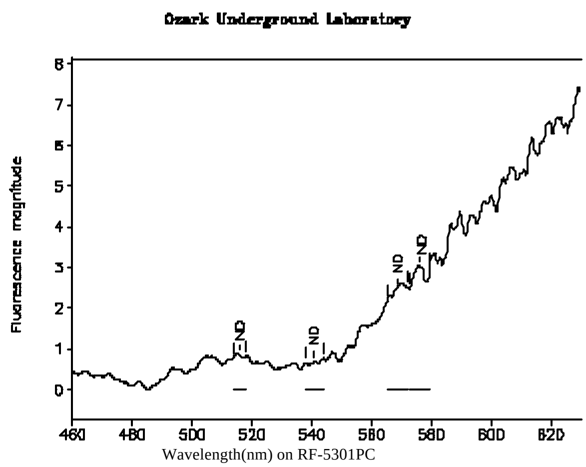


Station 121: Copeland Well
OUL number: P3664 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/15/05 1558 Collected: 08/19/05 1656

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

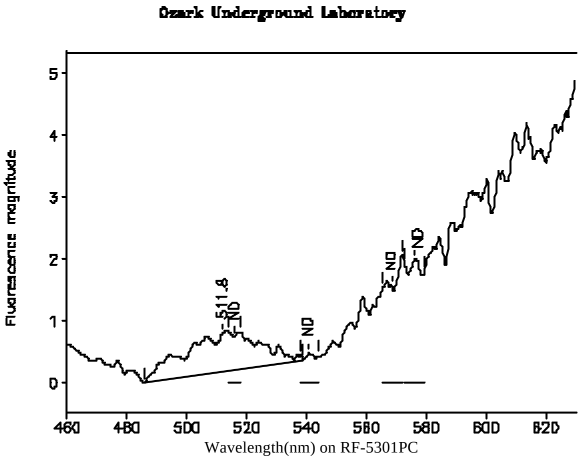


Station 121: Copeland Well
OUL number: P3665 Analyzed: 09/21/05
Matrix: Elutant
Placed: 08/19/05 1656 Collected: 08/25/05 1520

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

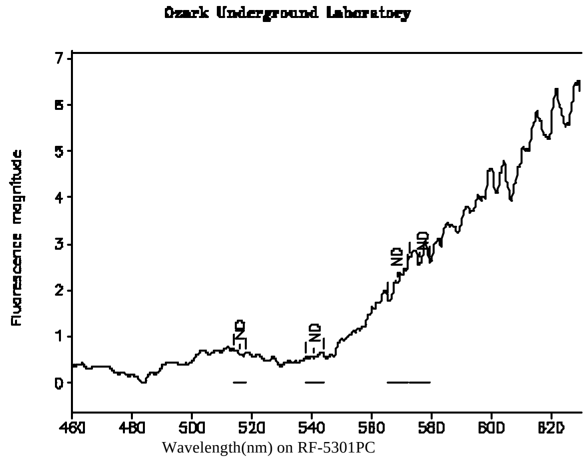
Peaks close to the normal range of tracer dyes:



Station 121: Copeland Well
OUL number: P3544 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/25/05 1520 Collected: 09/02/05 1632

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
511.8	485.8	539.0	0.61	18.83	0.03	0.398

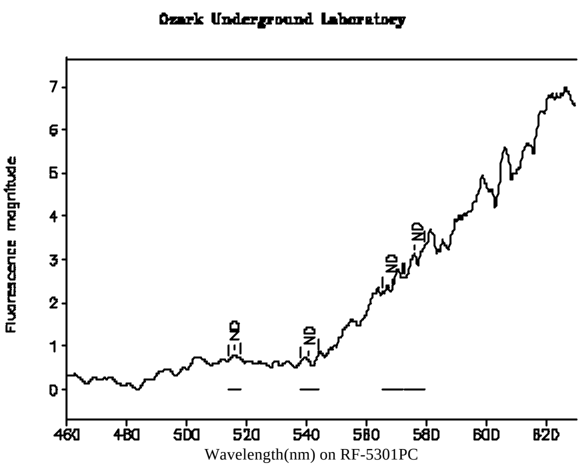


Station 121: Copeland Well
OUL number: P3732 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/02/05 1632 Collected: 09/09/05 1648

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

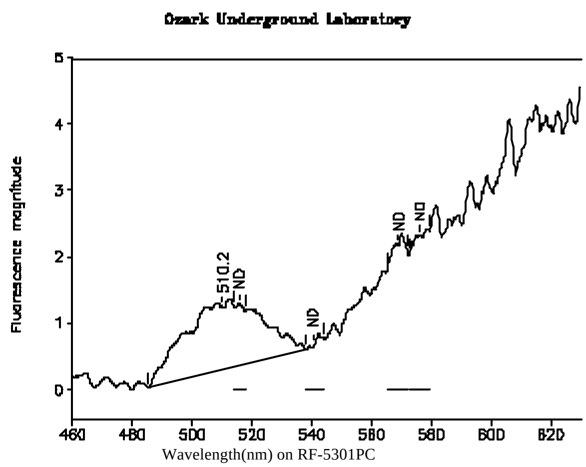


Station 121: Copeland Well
OUL number: P3733 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1648 Collected: 09/16/05 1503

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

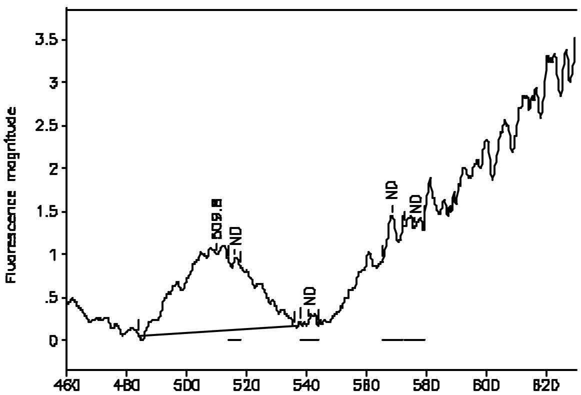


Station 121: Copeland Well
OUL number: P3915 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/16/05 1503 Collected: 09/23/05 1635

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
510.2	485.2	538.0	0.94	31.32	0.03	0.670

Ozark Underground Laboratory

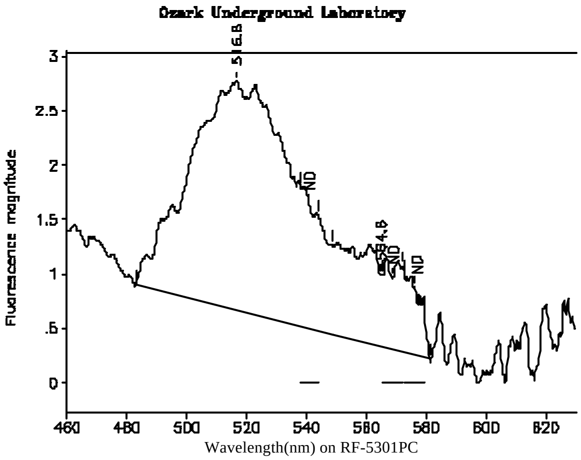


Wavelength(nm) on RF-5301PC

Station 121: Copeland Well
OUL number: P3916 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/23/05 1635 Collected: 09/30/05 1727

Peaks within the normal range of tracer dyes:

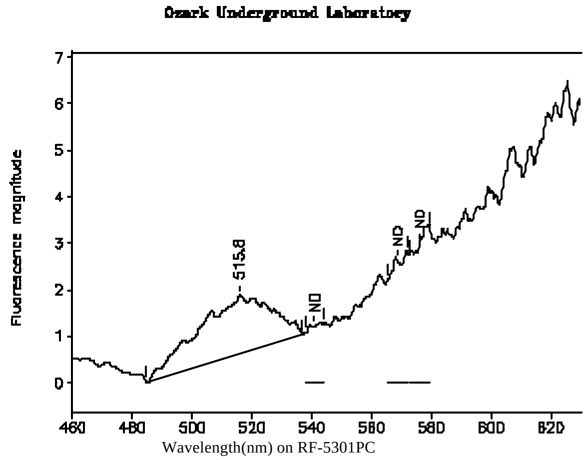
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	514.0	518.1	0.00	0.00	0.00	ND
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	565.4	572.0	0.00	0.00	0.00	ND
576.1	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
509.8	483.8	536.0	0.90	27.05	0.03	0.579



Station 122: Tropic Traditions Well
OUL number: P2804 Analyzed: 08/05/05
Matrix: Elutant
Placed: 07/25/05 1324 Collected: 08/01/05 1146

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.8	483.0	548.5	2.11	87.44	0.02	1.78
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
564.6	548.5	581.2	0.66	23.91	0.03	2.27

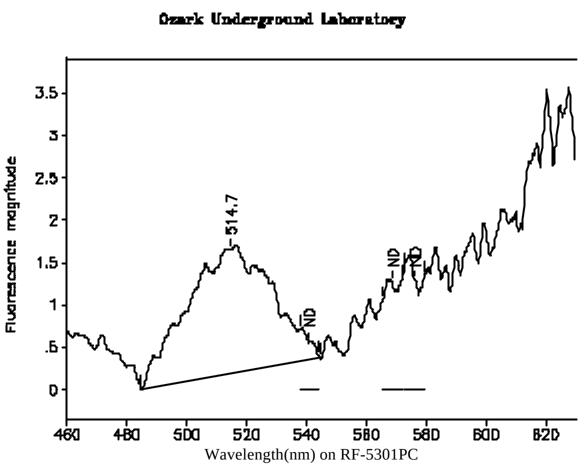


Station 122: Tropic Traditions Well
OUL number: P2907 Analyzed: 08/12/05
Matrix: Elutant
Placed: 08/01/05 1146 Collected: 08/08/05 1458

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	484.6	537.0	1.26	36.21	0.03	0.741
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

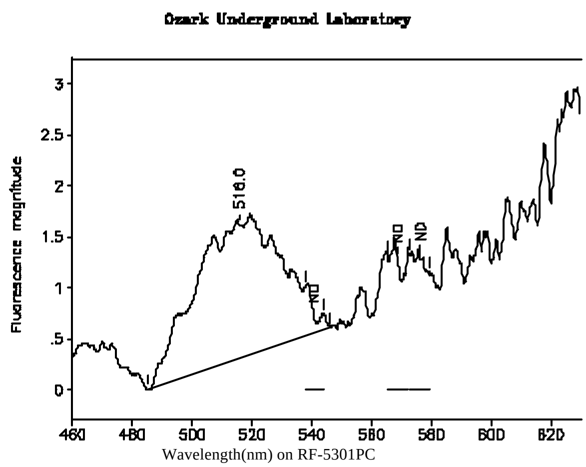


Station 122: Tropic Traditions Well
OUL number: P3015 Analyzed: 08/24/05
Matrix: Elutant
Placed: 08/08/05 1458 Collected: 08/13/05 1728

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
514.7	484.8	544.8	1.46	49.57	0.03	1.03
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

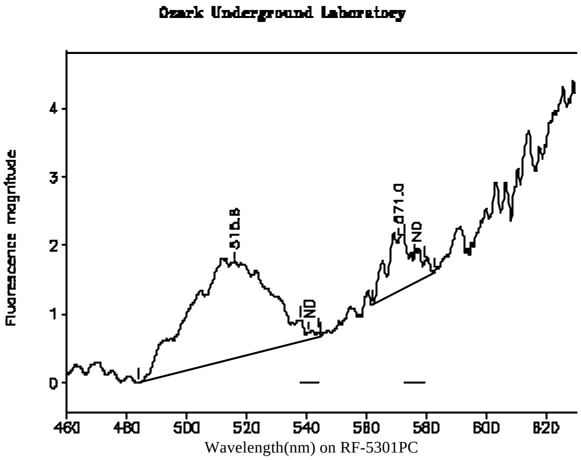


Station 122: Tropic Traditions Well
OUL number: P3545 Analyzed: 09/14/05
Matrix: Elutant
Placed: 08/25/05 1505 Collected: 09/02/05 1642

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
516.0	485.4	546.2	1.31	46.87	0.03	0.990
541.0	538.1	543.9	0.00	0.00	0.00	ND
568.7	565.4	572.0	0.00	0.00	0.00	ND
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

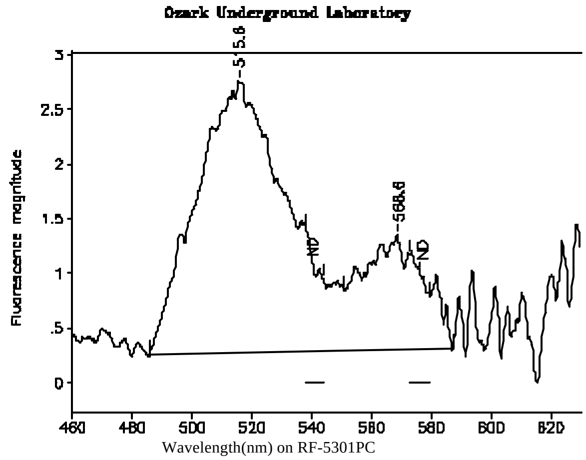


Station 122: Tropic Traditions Well
OUL number: P3734 Analyzed: 09/26/05
Matrix: Elutant
Placed: 09/09/05 1714 Collected: 09/16/05 1348

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.8	484.0	544.8	1.39	45.45	0.03	0.970
541.0	538.1	543.9	0.00	0.00	0.00	ND
571.0	562.0	582.6	0.75	8.49	0.09	0.885
576.2	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



Station 122: Tropic Traditions Well
OUL number: P3917 Analyzed: 10/11/05
Matrix: Elutant
Placed: 09/23/05 1637 Collected: 09/30/05 1541

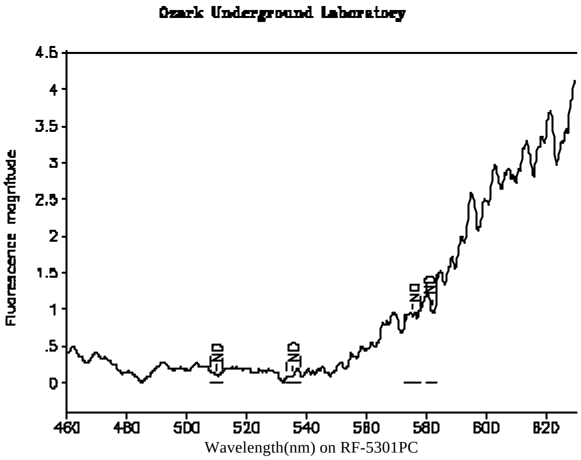
Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
515.6	485.6	551.0	2.50	89.19	0.03	1.91
540.9	538.1	543.9	0.00	0.00	0.00	ND
568.6	551.0	587.2	1.05	25.56	0.04	2.53
576.1	572.8	579.6	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

APPENDIX IIC

ANALYTICAL GRAPHS OF ANALYZED WATER SAMPLES

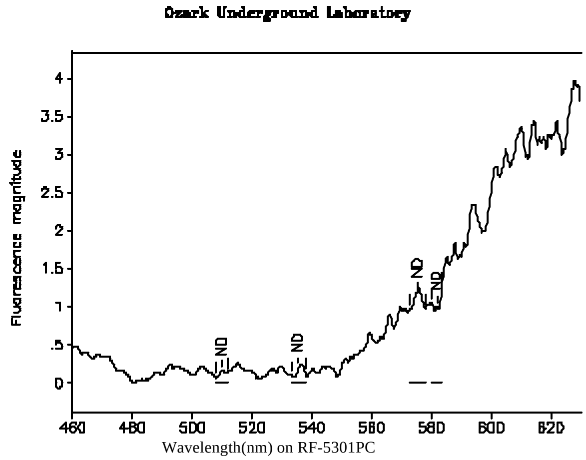


Station 4: Hornsby Spring Daily
OUL number: P3531 Analyzed: 09/14/05
Matrix: Water
Collected: 08/05/05 1306

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

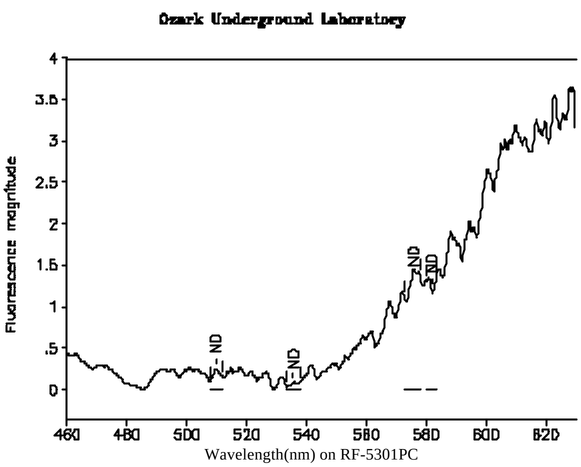


Station 4: Hornsby Spring Daily
OUL number: P3532 Analyzed: 09/14/05
Matrix: Water
Collected: 08/06/05 1227

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

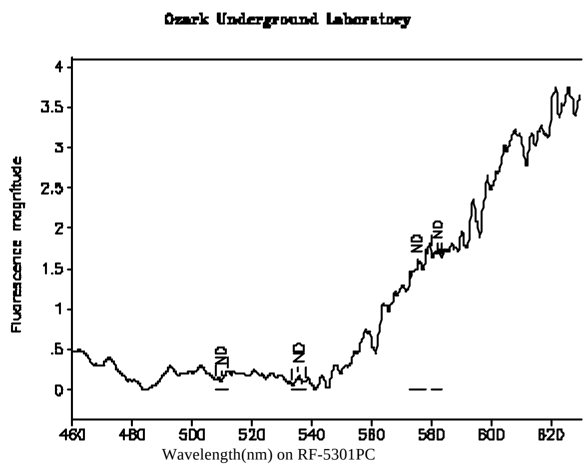


Station 4: Hornsby Spring Daily
OUL number: P3533 Analyzed: 09/14/05
Matrix: Water
Collected: 08/07/05 1551

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

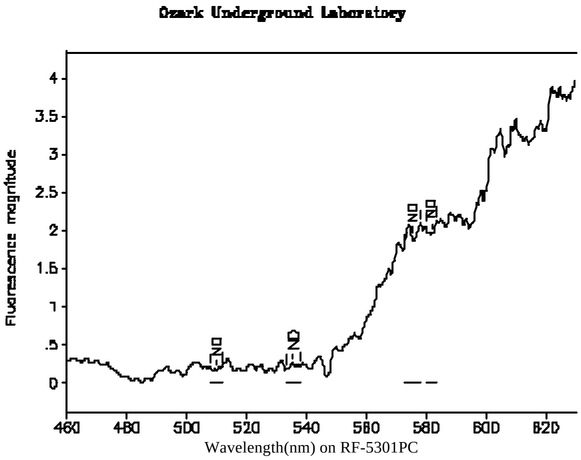


Station 4: Hornsby Spring Daily
OUL number: P3534 Analyzed: 09/14/05
Matrix: Water
Collected: 08/08/05 1421

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

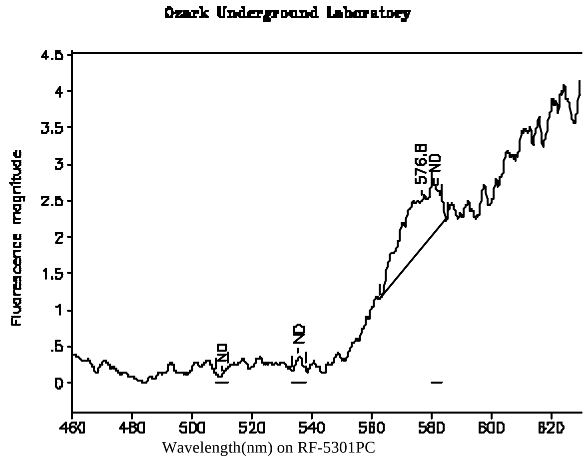


Station 4: Hornsby Spring Daily
OUL number: P3535 Analyzed: 09/14/05
Matrix: Water
Collected: 08/09/05 1248

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

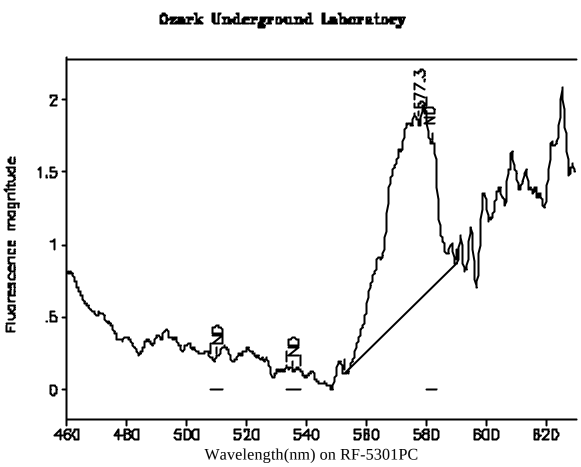


Station 4: Hornsby Spring Daily
OUL number: P3536 Analyzed: 09/14/05
Matrix: Water
Collected: 08/10/05 1228

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
576.8	563.0	585.4	0.66	10.96	0.06	0.093
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

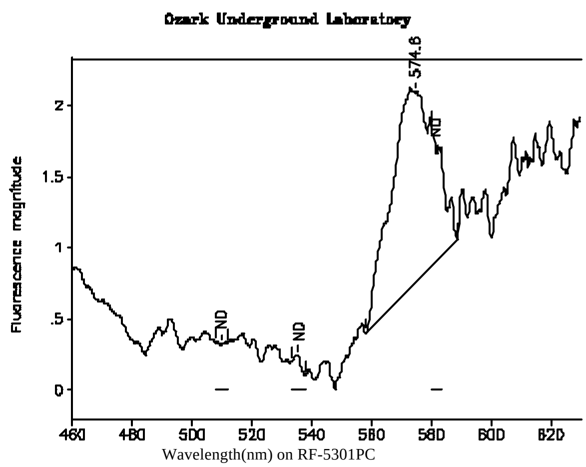


Station 4: Hornsby Spring Daily
OUL number: P3568 Analyzed: 09/16/05
Matrix: Water
Collected: 08/11/05 1529

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
577.3	552.6	590.2	1.25	24.87	0.05	0.209
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

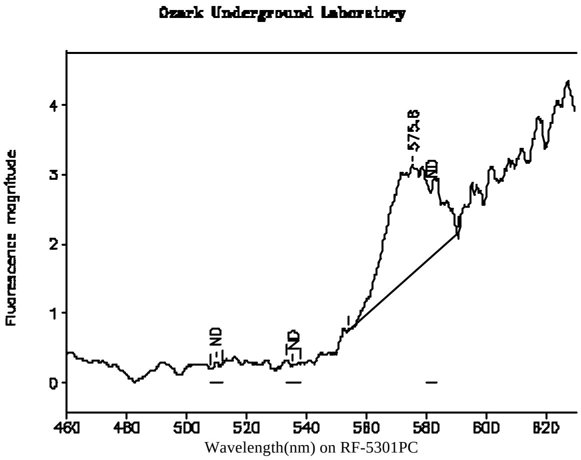


Station 4: Hornsby Spring Daily
OUL number: P3569 Analyzed: 09/16/05
Matrix: Water
Collected: 08/12/05 1509

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.6	558.2	588.8	1.34	23.51	0.06	0.198
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

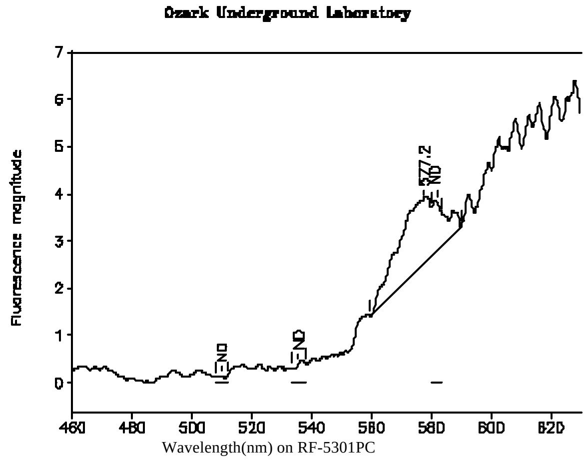


Station 4: Hornsby Spring Daily
OUL number: P3537 Analyzed: 09/14/05
Matrix: Water
Collected: 08/13/05 1535

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.8	554.0	591.2	1.53	29.23	0.05	0.247
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

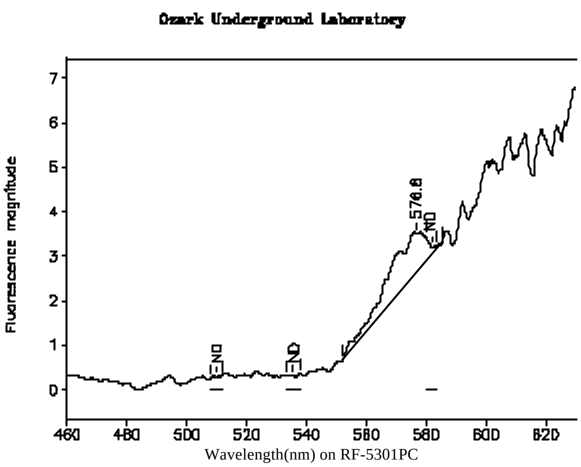


Station 4: Hornsby Spring Daily
OUL number: P3666 Analyzed: 09/21/05
Matrix: Water
Collected: 08/19/05 1408

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
577.2	559.6	590.0	1.36	23.59	0.06	0.199
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

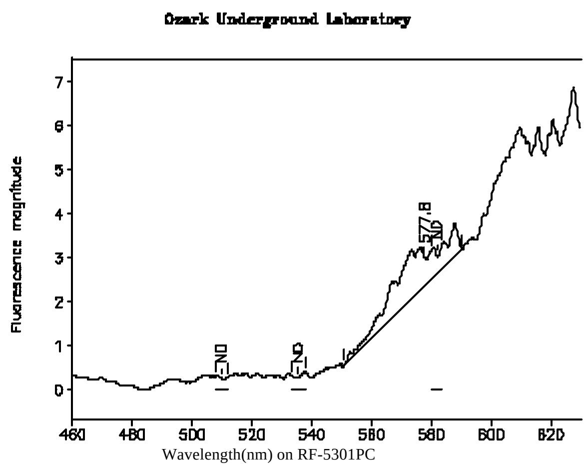


Station 4: Hornsby Spring Daily
OUL number: P3667 Analyzed: 09/21/05
Matrix: Water
Collected: 08/23/05 1421

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
576.8	552.2	585.4	0.88	15.20	0.06	0.128
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



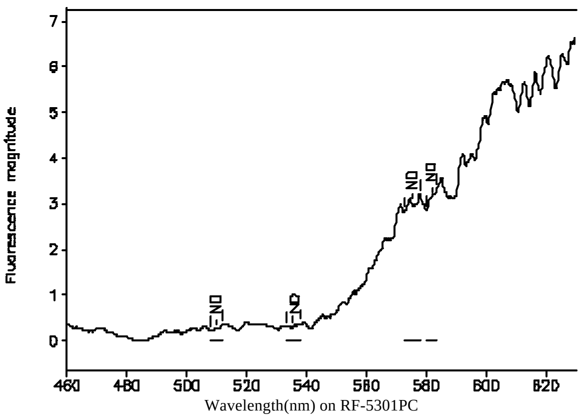
Station 4: Hornsby Spring Daily
OUL number: P3668 Analyzed: 09/21/05
Matrix: Water
Collected: 08/26/05 1507

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
577.8	551.0	590.2	0.65	19.54	0.03	0.165
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Ozark Underground Laboratory



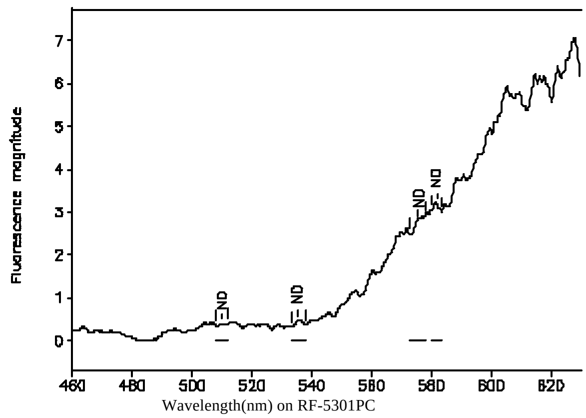
Station 4: Hornsby Spring Daily
OUL number: P3882 Analyzed: 10/10/05
Matrix: Water
Collected: 08/29/05 1555

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Ozark Underground Laboratory



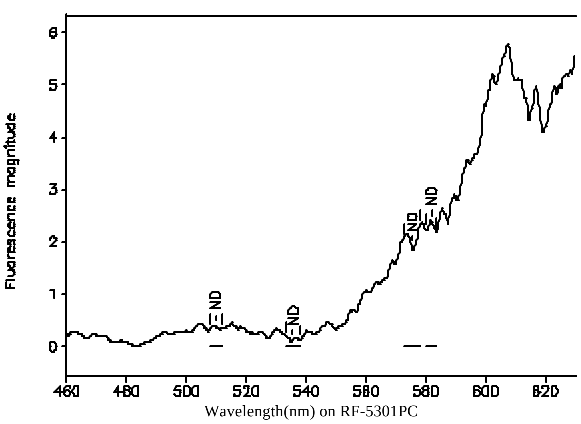
Station 4: Hornsby Spring Daily
OUL number: P3883 Analyzed: 10/10/05
Matrix: Water
Collected: 09/02/05 1415

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Ozark Underground Laboratory

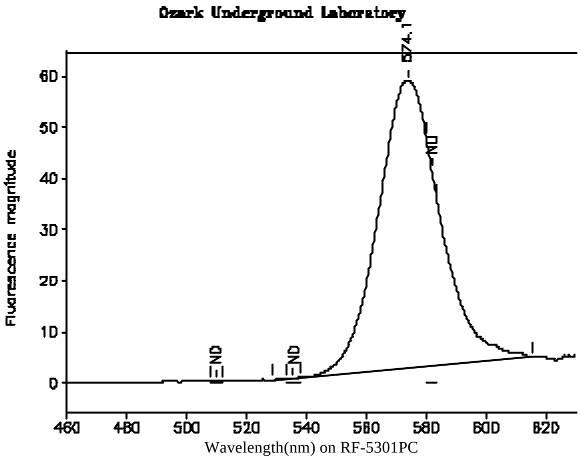


Station 4: Hornsby Spring Daily
OUL number: P3885 Analyzed: 10/11/05
Matrix: Water
Collected: 09/09/05 1437

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

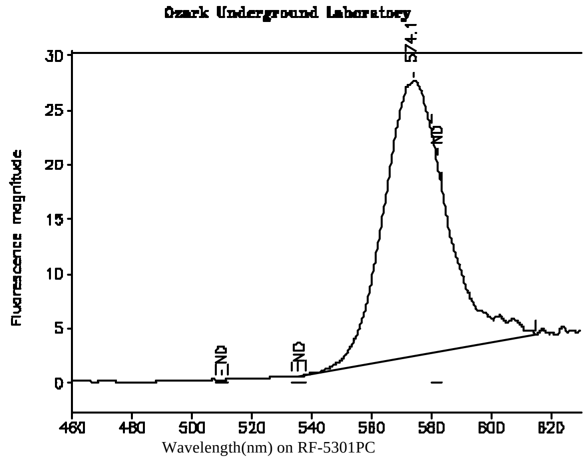


Station 43: Mill Creek Sink Cave
OUL number: P2813 Analyzed: 08/05/05
Matrix: Water
Collected: 07/29/05 1722

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.1	528.8	615.4	56.17	1,353.33	0.04	11.3
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

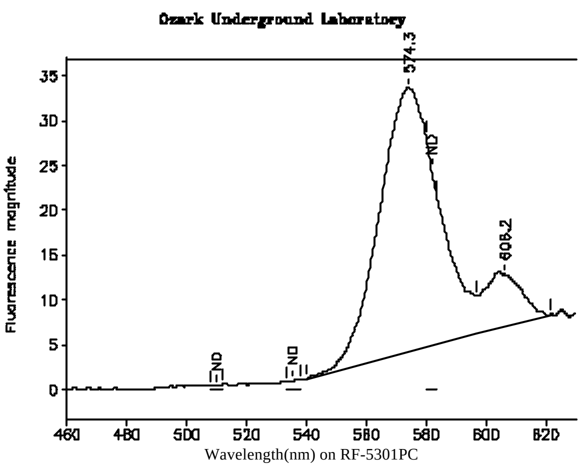


Station 43: Mill Creek Sink Cave
OUL number: P2814 Analyzed: 08/05/05
Matrix: Water
Collected: 07/31/05 1800

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.1	535.2	615.2	25.15	617.38	0.04	5.16
581.9	580.1	583.7	0.00	0.00	0.00	ND

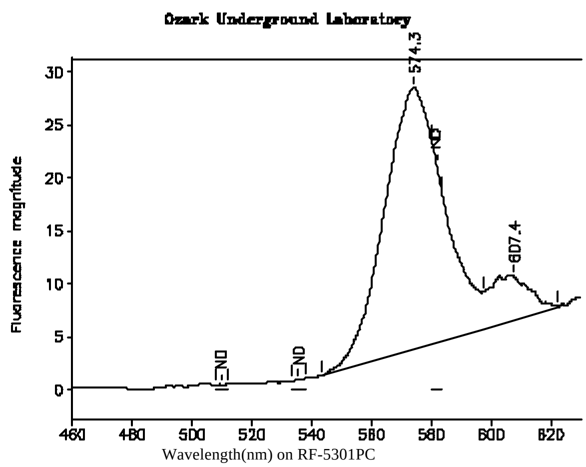
Peaks close to the normal range of tracer dyes:



Station 43: Mill Creek Sink Cave
OUL number: P2910 Analyzed: 08/12/05
Matrix: Water
Collected: 08/03/05 1759

Peaks within the normal range of tracer dyes:

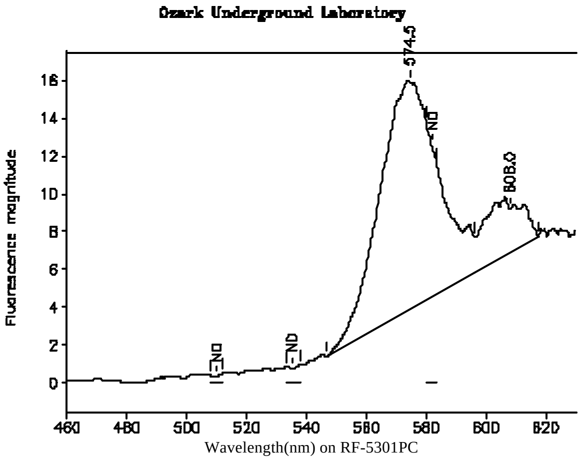
Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.3	539.8	596.6	29.42	675.83	0.04	5.69
581.9	580.1	583.7	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
606.2	596.6	621.4	5.85	90.31	0.06	0.000



Station 43: Mill Creek Sink Cave
OUL number: P2911 Analyzed: 08/12/05
Matrix: Water
Collected: 08/05/05 1449

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.3	543.2	597.4	24.66	568.30	0.04	4.78
581.9	580.1	583.7	0.00	0.00	0.00	ND
Peaks close to the normal range of tracer dyes:						
607.4	597.4	622.6	4.20	67.47	0.06	0.000



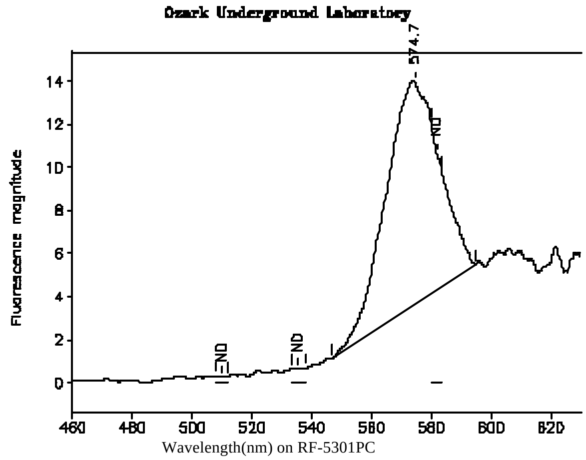
Station 43: Mill Creek Sink Cave
OUL number: P2912 Analyzed: 08/12/05
Matrix: Water
Collected: 08/08/05 1710

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.5	546.6	596.2	12.06	276.66	0.04	2.33
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
608.0	596.2	617.6	2.36	45.24	0.05	0.000

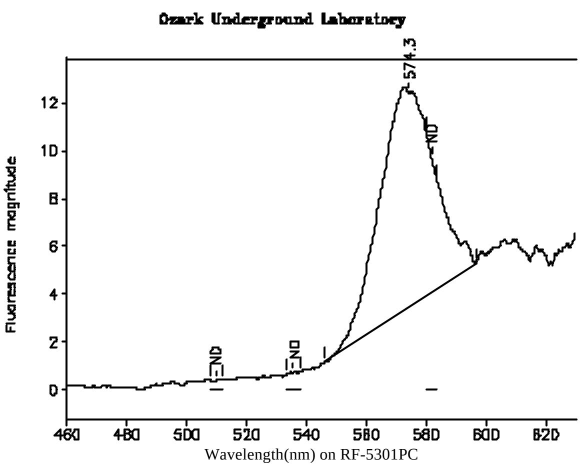


Station 43: Mill Creek Sink Cave
OUL number: P3019 Analyzed: 08/24/05
Matrix: Water
Collected: 08/11/05 1653

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.7	546.4	595.0	10.30	216.42	0.05	1.84
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

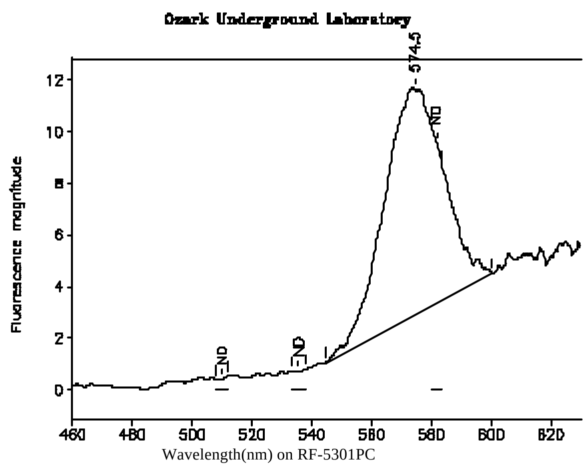


Station 43: Mill Creek Sink Cave
OUL number: P3021 Analyzed: 08/24/05
Matrix: Water
Collected: 08/15/05 1709

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.3	546.0	596.6	8.96	196.59	0.05	1.67
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

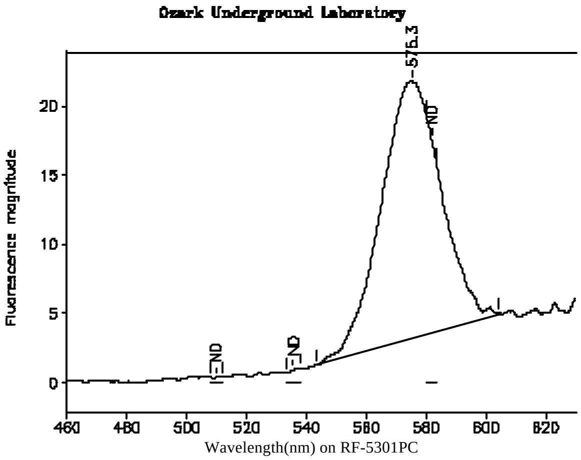


Station 43: Mill Creek Sink Cave
OUL number: P3552 Analyzed: 09/14/05
Matrix: Water
Collected: 08/19/05 1750

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
574.5	544.8	600.4	8.77	202.54	0.04	1.71
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

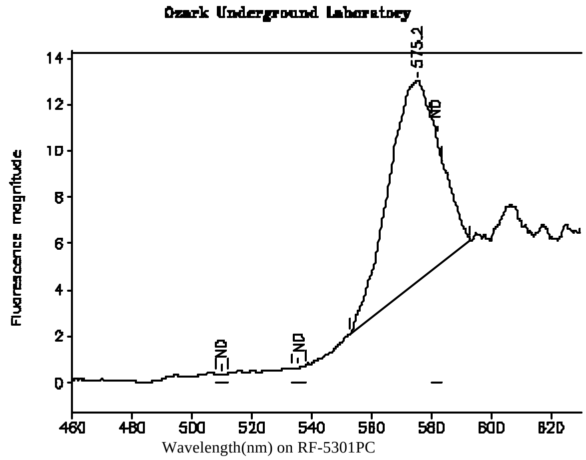


Station 43: Mill Creek Sink Cave
OUL number: P3553 Analyzed: 09/14/05
Matrix: Water
Collected: 09/02/05 1730

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	543.4	604.2	18.57	430.81	0.04	3.64
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

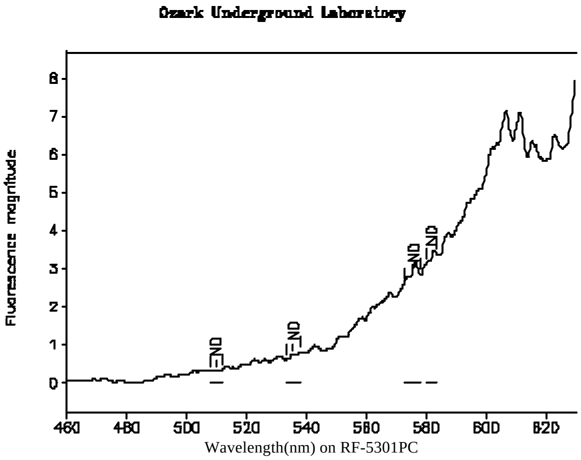


Station 43: Mill Creek Sink Cave
OUL number: P3742 Analyzed: 09/26/05
Matrix: Water
Collected: 09/09/05 1736

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.2	553.0	593.2	8.65	172.74	0.05	1.46
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

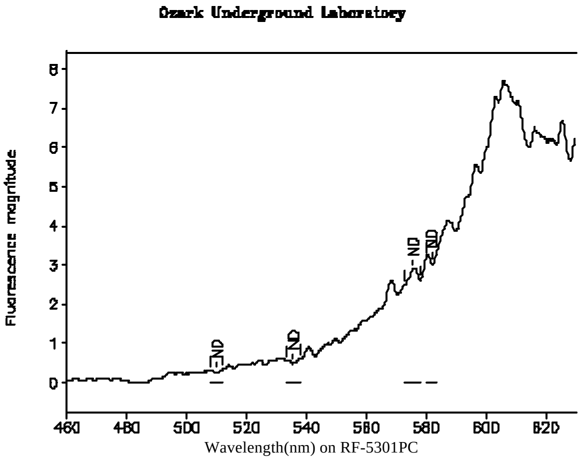


Station 106: Santa Fe Hills Subdivision Well
OUL number: P3739 Analyzed: 09/26/05
Matrix: Water
Collected: 08/19/05 1710

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

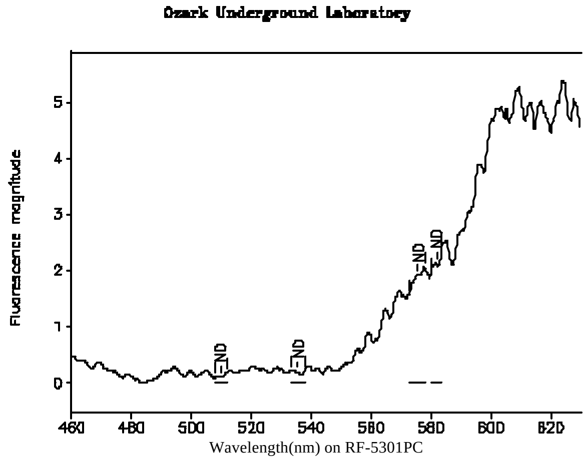


Station 106T: Santa Fe Hills Subdivision Well - System Tap Water
OUL number: P3741 Analyzed: 09/26/05
Matrix: Water
Collected: 09/21/05 1339

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

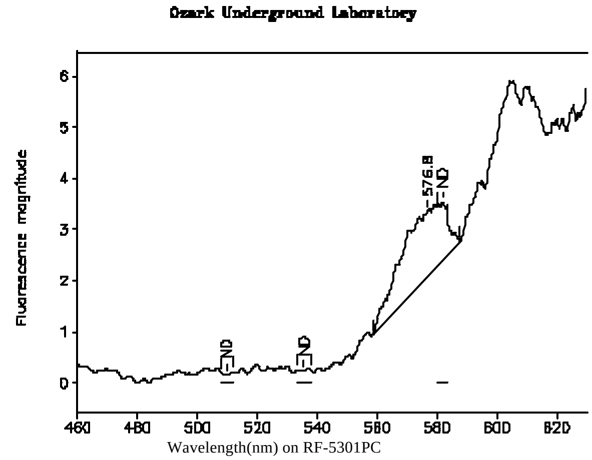


Station 111: River Ranch Well
OUL number: P3737 Analyzed: 09/26/05
Matrix: Water
Collected: 08/07/05 1623

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

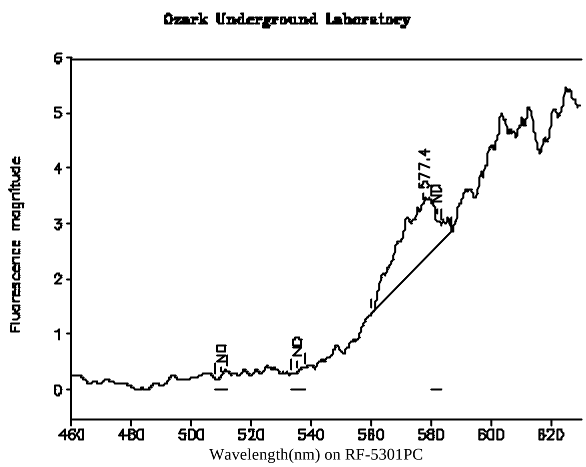


Station 111: River Ranch Well
OUL number: P3738 Analyzed: 09/26/05
Matrix: Water
Collected: 08/10/05 1255

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
576.8	558.6	587.8	1.29	23.85	0.05	0.201
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

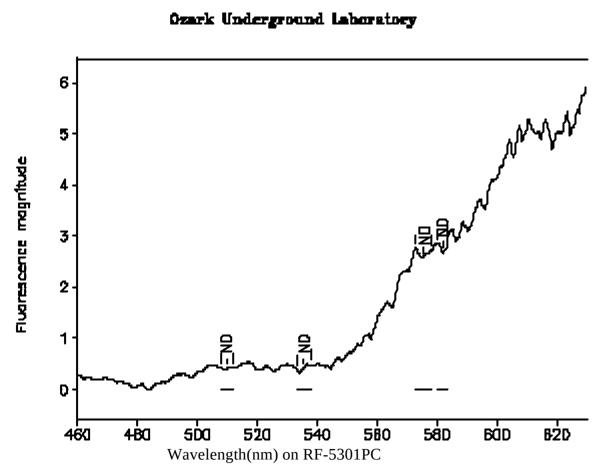


Station 111: River Ranch Well
OUL number: P3886 Analyzed: 10/11/05
Matrix: Water
Collected: 08/26/05 1548

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
577.4	560.2	587.0	1.04	16.93	0.06	0.145
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

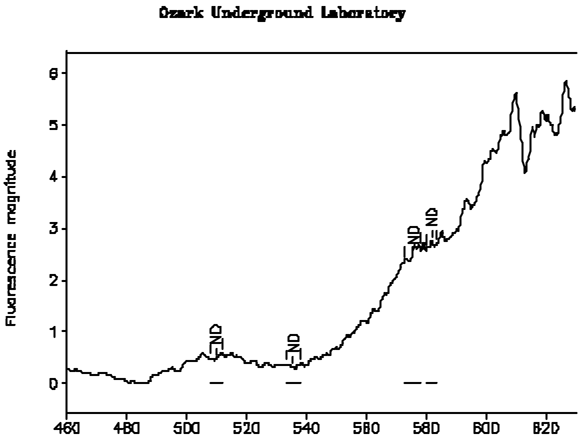


Station 111: River Ranch Well
OUL number: P3887 Analyzed: 10/11/05
Matrix: Water
Collected: 09/02/05 1443

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:



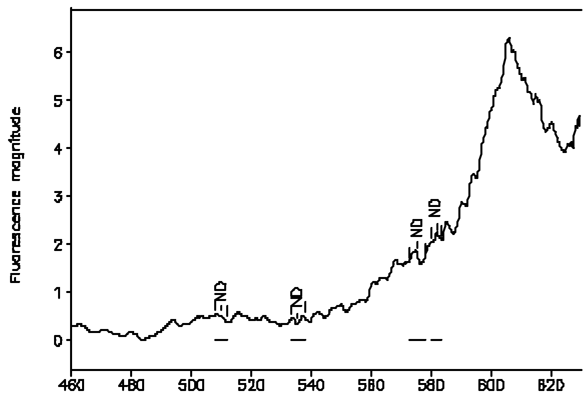
Station 111: River Ranch Well
OUL number: P3888 Analyzed: 10/11/05
Matrix: Water
Collected: 09/09/05 1500

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

Ozark Underground Laboratory



Wavelength(nm) on RF-5301PC

Station 111T: River Ranch Well Water System
OUL number: P3926 Analyzed: 10/11/05
Matrix: Water
Collected: 09/30/05 1507

Peaks within the normal range of tracer dyes:

Peak nm	Left X	Right X	Height	Area	H/A	Conc.
509.8	508.0	511.7	0.00	0.00	0.00	ND
535.6	533.4	537.9	0.00	0.00	0.00	ND
575.3	572.7	578.0	0.00	0.00	0.00	ND
581.9	580.1	583.7	0.00	0.00	0.00	ND

Peaks close to the normal range of tracer dyes:

APPENDIX III

MISCELLANEOUS DOCUMENTS

SRWMD Discharge Msmt. Notes; Hornsby Spring, August 24, 2005.
SRWMD Discharge Msmt. Notes; Hornsby Spring, October 11, 2005.
KES Discharge Measurement; Cellon Creek, July 1, 2005.
KES Discharge Measurement; Cellon Creek, July 27, 2005.
KES Discharge Measurement; Cellon Creek, October 5, 2005.
Alachua County Public Works Dept.; letter with staff gauge elevation data.
Alachua County Environmental Protection Department file document (2 pages); unpublished report referencing 1976 dye trace by D.W. Fisk and I.S. Exley.

SRWMD
Dec. 1979

Meas. No. e46

Comp. by

DISCHARGE MEASUREMENT NOTES

Checked by

P. 2

Sta. No. HORO10C1

Hornsby Spring @ Camp Kulaqua

Date 8.24.2005 Party BK/KT

Width 67 Area 240 Vel. 0.79 G. H. Disch. 190

Method No. secs. G. H. change in hrs. Susp. Rod

Method coef. Hor. angle coef. Susp. coef. Meter No.

GAGE READINGS				
Time	R.P.	Recorder	Inside	Outside
0847	0.81			
1047	0.81			
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Type of meter Price Pygmy STZ

Date rated for rod, other.

Meter ft. above bottom of weight.

Spin before meas. OK after OK

Meas. plots % diff. from rating

Wading, cable, ice, boat, upstr., downstr., side bridge ~120 feet, mile, above, below gage, and Vent

Check-bar, found

changed to at

Correct

Levels obtained

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section

Flow Weather

Other Air °F@

Gage Water °F@

Record removed Intake flushed

Observer

Control TR5 [illegible]

Remarks Flow with 65.50

G. H. of zero flow ft.

SW-302A

NO. 6438 P. 2
SRWMD 386-362-1056
APR. 17. 2006 11:20AM

SRWMD
Dec. 1979

Meas. No. e47

Comp. by

DISCHARGE MEASUREMENT NOTES

Checked by

...ı. No. HOR0100I

Hornsby Springs @ Camp Kulaqua

...te 10-11-2005 19 Party BG/ET

...dth 72.0' Area 224 Vel. 0.67 G. H. ____ Disch. 150

...thod 2,6,8 No. secs. ____ G. H. change ____ in ____ hrs. Susp. Rod

Method coef. ____ Hor. angle coef. ____ Susp. coef. ____ Meter No. ____

GAGE READINGS				
Time		Recorder	Inside	Outside
1129	0.98			
1341	0.98			
Weighted M. G. H.				
... correction				
...t M. G. H.				

Type of meter Price AA 1:1 STZ

Date rated ____ for rod, other.

Meter ____ ft. above bottom of weight.

Spin before meas. OK after OK

Meas. plots ____ % diff. from rating ____

Wading, cable, ice, boat, upstr., downstr., side bridge ≈ 110 feet, mile, above, below gage, and vent.

Check-bar, found ____

changed to ____ at ____

Correct ____

Levels obtained ____

...urement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following ...ditions: Cross section ____

____ Weather ____

____ Air ____°F@ ____

____ Water ____°F@ ____

____ Record removed ____ Intake flushed ____

...bserver ____

...l ____

...a Trans. 2 REW-LEW

Flow Width 63'

...f zero flow ____ ft.

SW-309A

	KARST ENVIRONMENTAL SERVICES, INC.							
	DISCHARGE MEASUREMENT							
	Location:	**Cellon Creek**		**San Felasco State Preserve**				
	CFS:	**2.45**				**Date:**	**7/1/2005**	
	MGD:	**1.58**				**Time Start:**	**12:53**	
	GPM:	**1099**				**Time End:**	**13:15**	
	Total Width:		**11.7**	Feet		**Side Start:**	**REW**	
	Total Area:		**2.94**	Square Feet		**Personnel:**	**PLB,ML**	
	Avg. Velocity:		**0.83**	Ft./Sec.		**Access:**	**Wading**	
	No. of Secs.:							
	Method:		**0.6**					
	Instrument:		**Marsh Mcbirney Flo-Mate Model 2000**					
			Electronic flowmeter					
	Lee Sink Staff Gauge:		**Time:**	**13:25**	**Reading:**	**2.02**	**FSL,NGVD:**	**63.28**
Station #	**DIP**	**Station Width**	**Depth**	**OD**	**PV**	**Mean PV**	**Area**	**Discharge**
0	0							
1	0.5	0.75	0.3	0.6		0.78	0.225	0.1755
2	1	0.5	0.35	0.6		0.96	0.175	0.168
3	1.5	0.375	0.35	0.6		1.18	0.13125	0.154875
4	1.75	0.25	0.35	0.6		1.19	0.0875	0.104125
5	2	0.25	0.35	0.6		1.17	0.0875	0.102375
6	2.25	0.25	0.35	0.6		1.19	0.0875	0.104125
7	2.5	0.375	0.35	0.6		1.09	0.13125	0.1430625
8	3	0.5	0.3	0.6		0.95	0.15	0.1425
9	3.5	0.5	0.3	0.6		0.83	0.15	0.1245
10	4	0.5	0.3	0.6		0.84	0.15	0.126
11	4.5	0.5	0.3	0.6		0.86	0.15	0.129
12	5	0.5	0.35	0.6		0.97	0.175	0.16975
13	5.5	0.5	0.3	0.6		0.82	0.15	0.123
14	6	0.5	0.25	0.6		0.7	0.125	0.0875
15	6.5	0.5	0.25	0.6		0.75	0.125	0.09375
16	7	0.5	0.2	0.6		0.65	0.1	0.065
17	7.5	0.5	0.2	0.6		0.62	0.1	0.062
18	8	0.5	0.2	0.6		0.58	0.1	0.058
19	8.5	0.5	0.15	0.6		0.61	0.075	0.04575
20	9	0.5	0.2	0.6		0.56	0.1	0.056
21	9.5	0.5	0.15	0.6		0.62	0.075	0.0465
22	10	0.5	0.15	0.6		0.58	0.075	0.0435
23	10.5	1.45	0.15	0.6		0.57	0.2175	0.123975
	11.7	END						
	Stream Cross-section located at:							
	N 29° 46.275'							
	W 82° 27.945'							

	KARST ENVIRONMENTAL SERVICES, INC.							
	DISCHARGE MEASUREMENT							
	Location:	**Cellon Creek**		**San Felasco State Preserve**				
	CFS:	**0.11**				**Date:**	**7/27/2005**	
	MGD:	**0.07**				**Time Start:**	**13:50**	
	GPM:	**47**				**Time End:**	**16:03**	
	Total Width:		**2.8**	Feet		**Side Start:**	**REW**	
	Total Area:		**0.59**	Square Feet		**Personnel:**	**PLB,TLM**	
	Avg. Velocity:		**0.16**	Ft./Sec.		**Access:**	**Wading**	
	No. of Secs.:		**10**					
	Method:		**0.6**					
	Instrument:		**Marsh Mcbirney Flo-Mate Model 2000**					
			Electronic flowmeter					
	Lee Sink Staff Gauge:		**Time:**	**14:30**	**Reading:**	**3.11**	**FSL,NGVD:**	**64.37**
Station #	**DIP**	**Station Width**	**Depth**	**OD**	**PV**	**Mean PV**	**Area**	**Discharge**
0	0							
1	0.25	0.25	0.1	0.6		0	0.025	0
2	0.5	0.25	0.2	0.6		0.01	0.05	0.0005
3	0.75	0.25	0.2	0.6		0.09	0.05	0.0045
4	1	0.25	0.25	0.6		0.18	0.0625	0.01125
5	1.25	0.25	0.25	0.6		0.19	0.0625	0.011875
6	1.5	0.25	0.275	0.6		0.22	0.06875	0.015125
7	1.75	0.25	0.3	0.6		0.23	0.075	0.01725
8	2	0.25	0.3	0.6		0.24	0.075	0.018
9	2.25	0.25	0.3	0.6		0.26	0.075	0.0195
10	2.5	0.25	0.2	0.6		0.14	0.05	0.007
	2.8	END						
	Stream Cross-section located at:							
	N 29° 46.275'							
	W 82° 27.945'							

	KARST ENVIRONMENTAL SERVICES, INC.							
	DISCHARGE MEASUREMENT							
	Location:	**Cellon Creek**		**San Felasco State Preserve**				
	CFS:	**0.39**				**Date:**	**10/5/2005**	
	MGD:	**0.25**				**Time Start:**	**15:41**	
	GPM:	**177**				**Time End:**	**15:57**	
	Total Width:		**3.9**	Feet		**Side Start:**	**REW**	
	Total Area:		**0.97**	Square Feet		**Personnel:**	**PLB**	
	Avg. Velocity:		**0.34**	Ft./Sec.		**Access:**	**Wading**	
	No. of Secs.:		**15**					
	Method:		**0.6**					
	Instrument:		**Marsh Mcbirney Flo-Mate Model 2000**					
			Electronic flowmeter					
	Lee Sink Staff Gauge:		**Time:**	**15:00**	**Reading:**	**0.25**	**FSL,NGVD:**	**61.51**
Station #	**DIP**	**Station Width**	**Depth**	**OD**	**PV**	**Mean PV**	**Area**	**Discharge**
0	0							
1	0.25	0.375	0	0		0	0	0
2	0.5	0.25	0.2	0.6		0.04	0.05	0.002
3	0.75	0.25	0.2	0.6		0.12	0.05	0.006
4	1	0.25	0.25	0.6		0.3	0.0625	0.01875
5	1.25	0.25	0.25	0.6		0.52	0.0625	0.0325
6	1.5	0.25	0.3	0.6		0.59	0.075	0.04425
7	1.75	0.25	0.35	0.6		0.54	0.0875	0.04725
8	2	0.25	0.35	0.6		0.55	0.0875	0.048125
9	2.25	0.25	0.35	0.6		0.6	0.0875	0.0525
10	2.5	0.25	0.35	0.6		0.59	0.0875	0.051625
11	2.75	0.25	0.35	0.6		0.43	0.0875	0.037625
12	3	0.25	0.3	0.6		0.3	0.075	0.0225
13	3.25	0.25	0.25	0.6		0.27	0.0625	0.016875
14	3.5	0.25	0.2	0.6		0.23	0.05	0.0115
15	3.75	0.275	0.15	0.6		0.07	0.04125	0.0028875
	3.9	END						
	Stream Cross-section located at:							
	N 29° 46.275'							
	W 82° 27.945'							

ALACHUA COUNTY

ALACHUA COUNTY
PUBLIC WORKS DEPARTMENT
TRANSPORTATION & DEVELOPMENT DIVISION

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September 20, 2005

Jim Myles
Senior Environmental Specialist
Alachua County Environmental Protection Department
201 SE 2nd Ave. Suite 201
Gainesville, Fl. 32601

Subject: Requested Elevation Information

Dear Jim,

The elevations at the 3 sites requested are as follows:

1) **Olson Well:**

Top of 4" well casing = 143.94

2) **Lee Sink:**

Elevation at "6.60" at top of staff gauge = 67.86

Top of set concrete monument which bears N 80° W, 119.02' from staff gauge = 67.92

3) **Mill Creek Sink:**

Elevation at "6.60" at top of staff gauge = 43.28

Top of set concrete monument which bears East, 27.61' from staff gauge = 42.68

Note: All elevations are based on NGVD 1929 Datum.

Stephen J. Emmons, P.L.S.
Senior Survey Technician
Public Works Department

File - groundwater

The attached time schedule for a proposed rhodamine WT dye tracer project in western Alachua County is based on conclusions drawn after an independent tracer study from Alachua Sink (west) to Hornesby Springs on February 6-10, 1976. This test was conducted independently of SRWMD by D. W. Fisk and I. S. Exley for the sole purpose of determining if a hydrologic connection of Alachua Sink and Hornesby Springs exists. The data collected from that study are listed below.

Distance from Alachua Sink to Hornesby Springs - approx. 6 mi.
Estimated velocity of water - 0.5 ft/sec.
Dye released at - rhodamine WT 6:05 PM 2/8/76
- flourescien 7:50 PM 2/8/76

Results of Sampling

Rhodamine		Time of Sample	Approximate Elapsed Time from Release	ppm
	2/9/76	1:30 PM	19.5 hrs.	0.0
		5:30 PM	23.5 hrs.	.17
	2/10/76	8:00 AM	38 hrs.	0.0
Flouresien	2/9/76	1:30 PM	17.3 hrs.	0.0
		5:30 PM	21.3 hrs.	.42
	2/10/76	8:00 AM	36.3 hrs.	.32
		1:00 PM	41.3 hrs.	0.0

From this data, an assumed minimum time of travel of 20 hours is made for dye traveling from Alachua Sink to Hornesby Springs. The flouresien dye was released in a surface stream which connects to the Alahcua-Hornesby System via the Mill Creek Ponor at a point between the sink and the spring, about 100 yards downstream from the sink. From an assumed travel time of 20 hours and distrance of 6 miles, a maximum velocity of .3 mph was obtained.

PROPOSED TIME SCHEDULING FOR DYE TRACING STUDY

OF WESTERN ALACHUA COUNTY, FLORIDA

Monday, March 2	Begin collection daily background samples at Hornesby Springs (continue through Saturday, March 7)
Friday, March 6 PM	All Dunn Bug filters and sampling equipment in place. Key to Sanches Prairie gates secured from DNR.
Saturday, March 7 4:00 PM	Release 10 pounds of rhodamine WT at Split Rock Sink and 10 pounds of rhodamine WT at Alachua Sink simultaneously
12:00 PM	Begin collection of 1 hour samples from Alachua Sink (end sampling at 6:00 PM, March 8)
Sunday, March 8	
5:30 AM	Minimum expected time for dye released from Split Rock Sink to reach Alachua Sink (maximum hour estimated at 10:00 AM, March 8)
8:00 AM	Begin collection of 30 minute samples from Hornesby Springs (end sampling 12:00 noon, March 9)
12:00 noon	Minimum expected time for dye released from Alachua Sink to reach Hornesby Spring (maximum hour estimated at 4:00 PM, March 8)
Monday, March 9	
1:30 AM	Minimum expected time for dye released from Split Rock Sink to reach Hornesby Spring via Alachua Sink (maximum hour estimated at 10:00 AM, March 9)
4:00 PM	End all sampling Collect all filters Disassemble all sampling equipment

Curriculum Vitae
Thomas R. Sawicki, Ph.D.

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Education

- Ph.D. Ecological Sciences, May 2004, Old Dominion University, Department of Biological Sciences, Norfolk, VA. GPA 3.99.
- B.S. Biology, May 1998, Eastern Connecticut State University, Department of Biology, Willimantic, CT. GPA 4.0.

Employment and Appointments

- Florida Agricultural and Mechanical University. Department of Biological Sciences Associate Chair for Graduate Studies. August 2021–Present.
- Florida Agricultural and Mechanical University. Department of Biological Sciences Associate Professor of Biology. August 2020–Present.
- Florida Agricultural and Mechanical University. Assistant Professor of Biology. Fall 2014–July 2020.
- Yale Peabody Museum, Division of Invertebrate Zoology. Curatorial Affiliate. Fall 2013–Present.
- Middle Georgia State University (formerly Macon State College). Assistant Professor of Biology. August 2009–July 2014.
- Converse College. Graduate Adjunct Professor, Summer 2007.
- Spartanburg Community College. Instructor of Biology. August 2004–July 2009.
- Old Dominion University. Adjunct Professor, Summer 2004.
- Old Dominion University. Teaching Assistantship. January 2001–May 2004.

Courses taught

Undergraduate:

Introductory Biology for nonmajors
General Biology I and II for majors
Introduction to Ecology
Evolutionary Biology
Senior/Professional Seminar

Graduate:

Evolutionary Biology

Publications: Peer-Reviewed

(*Bold text indicates students—current and previous—and TRS; *indicates corresponding author*)

28. **Smith, L.**, R. A. Long, & **T. R. Sawicki*.** (In preparation). Molecular phylogenetic data suggests the common ancestor of *Gammarus lecroyae* and *G. mucronatus* (Crustacea:

Amphipoda) speciated because of terrigenous siliciclastics covering the Florida carbonate platform during the Miocene. To be submitted to the journal Organisms, Diversity and Evolution.

27. **Cannizzaro, A. G., T. R. Sawicki,** D. A. Lieb, D. J. Berg. (In Submission). Secrets of the spring-keepers: phylogeographic analyses of a freshwater amphipod uncover dispersal pathways in eastern North America. Submitted to the Journal of Biogeography, November 11, 2025.
26. **Sawicki, T. R[*].**, P. Callomon, **B. Celikbaş**, & **A. G. Cannizzaro**. (In submission). Case xxxx– *Gammarus minus* Say, 1818 (Amphipoda; Gammaridae): proposed replacement of unidentifiable name-bearing type by a neotype. Submitted to the Bulletin of Zoological Nomenclature, October 8, 2025.
25. **Coppock, N. H., A. G. Cannizzaro,** K. D. Grant, & **T. R. Sawicki[*].** (In Review). The Florida Peninsula as an Engine of Estuarine Evolution: Insights from *Gammarus daiberi* (Crustacea: Amphipoda). Submitted to the Journal of Biogeography, 9 July 2025.
24. [*]**Sawicki, T. R., A. G. Cannizzaro** & S. Dowd**. (**2025). Florida man exonerated: an amphipod case study on the implications of cryptic species complexes and global invasions. Biological Invasions, 27:189. https://doi.org/10.1007/s10530-025-03644-y.
23. **Smith, L.**, R. A. Long, **A. G. Cannizzaro**, & **T. R. Sawicki[*]**. 2024. Molecular phylogenetic analyses of estuarine *Gammarus* species (Crustacea: Amphipoda) provides support for cryptic diversity created by the formation of the Labrador Current. Invertebrate Systematics, 38, IS24003. https://doi.org/10.1071/IS24003.
22. [*]Niemiller, M. L., **A. G. Cannizzaro**, **T. R. Sawicki**, & D. C. Culver. 2024. A new species of *Stygobromus* Cope, 1872 (Amphipoda: Crangonyctidae) from a hypotelminorheic seepage spring in Washington, D.C., USA. Journal of Subterranean Biology, 48: 117–146. doi:10.3897/subtbiol.48.112984.
21. **Sisco, J. M.** & **T. R. Sawicki[*]**. 2023. Molecular and morphological analyses reveal a new hypogean species of amphipod in the genus *Crangonyx* Bate, 1859 (Crustacea: Crangonyctidae) within the *floridanus* species complex, from Suwannee County, Florida. Journal of Natural History, 57: 1257–1286. https://doi.org/10.1080/00222933.2023.2247155.
20. **Cannizzaro, A. G.**, **J. M. Sisco**, & **T. R. Sawicki[*].** 2022. Reappraisal of the *Crangonyx floridanus* species complex, with the description of a new species of *Crangonyx* Bate, 1859 (Amphipoda: Crangonyctidae) from northern Florida, USA. Journal of Crustacean Biology, 42: 1–19. https://doi.org/10.1093/jcbiol/ruac027.
19. **Cannizzaro, A. G[*].**, J. R. Gibson, & **T. R. Sawicki**. 2020. A new enigmatic genus of subterranean amphipod (Amphipoda: Bogidielloidea) from Terrell County, Texas, with the establishment of Parabogidiellidae fam. nov. and notes on the family Bogidellidae. Invertebrate Systematics, 34: 504–518. https://doi.org/10.1071/IS19061.
18. **Cannizzaro, A. G.**, D. Balding, E. A. Lazo-Wasem, & **T. R. Sawicki[*]**. 2020. A new species rises from beneath Florida: molecular phylogenetic analyses reveal cryptic diversity among the metapopulation of *Crangonyx hobbsi* Shoemaker, 1941 (Amphipoda: Crangonyctidae). Organisms Diversity & Evolution, 20: 387–404. https://doi.org/10.1007/s13127-020-00433-4.
17. **Cannizzaro, A. G.**, & **T. R. Sawicki[*]**. 2019. Two new species of the genus *Crangonyx* Bate, 1859 (Amphipoda: Crangonyctidae) from the St. Marks River Basin with notes on the "*Crangonyx floridanus* complex". Zootaxa, 4691(4): 301–332. https://doi.org/10.11646/zootaxa.4691.4.1
16. **Cannizzaro, A. G.**, D. Balding, E. A. Lazo-Wasem, & **T. R. Sawicki[*]**. 2019. A

redescription of Hobbs'cave amphipod *Crangonyx hobbsi* Shoemaker, 1941 (Amphipoda: Senticaudata: Crangonyctidae) including genetic sequence data for mitochondrial and nuclear genes and notes on its ecology. Proceedings of the Biological Society of Washington, 132(1): 73–95.

15. **Cannizzaro, A. G.**, D. Balding, M. Stine, & **T. R. Sawicki**[*]. 2019. A new syntopic species of *Stygobromus* Cope, 1872 (Amphipoda: Crangonyctidae) from the Dougherty Karst Plain; with notes on *Stygobromus floridanus* Holsinger & Sawicki, 2016. Journal of Crustacean Biology, 39(4): 407–418. doi:10.1093/jcbiol/ruz034.
14. **Cannizzaro, A. G.**, D. Balding, E. A. Lazo-Wasem, & **T. R. Sawicki**[*]. 2019. Morphological and molecular analyses reveal a new species of stygobitic amphipod in the genus *Crangonyx* (Crustacea: Crangonyctidae) from Jackson County, Florida, with a redescription of *Crangonyx floridanus* and notes on its taxonomy and biogeography. Journal of Natural History, 53(7–8): 425–473. doi:10.1080/00222933.2019.1584341.
13. **Cannizzaro, A. G.**, D. Balding, E. A. Lazo-Wasem, & **T. R. Sawicki**[*]. 2018. A Redescription of the Stygobitic Amphipod *Crangonyx grandimanus* (Amphipoda: Crangonyctidae) Including Phylogenetically Significant Sequence Data for Mitochondrial and Nuclear Genes. Bulletin of the Peabody Museum of Natural History, 59(2): 109–125.
12. [*]**Sawicki, T. R.**, J. R. Holsinger, E. A. Lazo-Wasem, & R. A. Long. 2017. A new species of subterranean amphipod (Amphipoda: Gammaridae: Crangonyctidae) from Florida, with a genetic analysis of associated microbial mats. Journal of Crustacean Biology, 37(3): 285–295.
11. Lewis, J. J., & **T. R. Sawicki**[*]. 2016. *Mexistenasellus floridensis*, new species, the first stenasellid isopod discovered from the Floridan aquifer (Crustacea: Isopoda: Asellota). Subterranean Biology, 17:121–132.
10. Holsinger, J. R., & **T. R. Sawicki**[*]. 2016. A new species of the subterranean genus *Stygobromus* (Amphipoda: Crangonyctidae) from a cave spring in northern Florida, USA. Zootaxa, 4067(1): 88–94.
9. Yabut, M. G., & **T. R. Sawicki**[*]. 2015. *Idunella verrilli*, a New Species of Subterranean Crustacean (Amphipoda: Gammaridea: Liljeborgiidae) from Green Bay Cave, Bermuda. Bulletin of the Peabody Museum of Natural History, 56(2): 245–253.
8. [*]Holsinger, J. R., **T. R. Sawicki**, & G. O. Graening. 2006. *Bactrurus speleopolis*, a new species of subterranean amphipod crustacean (Crangonyctidae) from caves in northern Arkansas. Proceedings of the Biological Society of Washington, 119 (1): 15–24.
7. **Sawicki, T. R.** & J. R. Holsinger[*]. 2005. New species and new records of weckeliid amphipod crustaceans (Hadziidae) from caves in northern Mexico, with descriptions of two new genera *Paraholsingerius* and *Tamaweckelia*. Proceedings of the Biological Society of Washington, 118: 285–305.
6. **Sawicki, T. R.**, J. R. Holsinger[*] & T. M. Iliffe. 2005. New species of amphipod crustaceans in the genera *Tegano* and *Melita* (Hadzioidea: Melitidae) from subterranean groundwaters in Guam, Palau, and the Philippines. Journal of Crustacean Biology, 25: 49–74.
5. **Sawicki, T. R.**, J. R. Holsinger[*] & B. Sket. 2005. Redescription of the subterranean amphipod crustacean *Flagitopisa philippensis* (Hadzioidea: Melitidae), with notes on its unique morphology and clarification of the taxonomic status of *Psammogammarus fluviatilis*. The Raffles Bulletin of Zoology, 53: 59–68.
4. **Sawicki, T. R.** & J. R. Holsinger[*]. 2004. Systematics of the subterranean amphipod genus *Bahadzia* (Hadziidae), with description of a new species, redescription of *B. yagerae*, and analysis of phylogeny and biogeography. Journal of Natural History, 38: 1397–1414.
3. **Sawicki, T. R.**, J. R. Holsinger[*] & T. M. Iliffe. 2004. Four new species of the subterranean amphipod genus *Hadzia* (Hadziidae) from caves in the western Pacific, with a re-evaluation

of the taxonomic status of the genus. Subterranean Biology, 2: 65–90.

2. [*]Ruffo, S., J. R. Holsinger & **T. R. Sawicki**. 2003. *Indoweckelia stocki* n. sp. from subterranean waters of Northern Oman: the second weckeliid amphipod crustacean (Hadziidae) described from the Middle East. Bollettino del Museo Civico di Storia Naturale di Verona, 27:3–11.
1. **Sawicki, T. R.**, J. R. Holsinger[*], M. Ortiz & A. Pérez. 2003. *Bahadzia patilarga*, a new species of subterranean amphipod (Hadziidae) from Cuba. Proceedings of the Biological Society of Washington, 116: 198–205.

Grants (funded/pending)

19. PI: **T. R. Sawicki** & Co-PI D. A. Lieb: Determining the Distribution and Conservation Status of Pennsylvania's Rare Amphipod Species. Pennsylvania Department of Conservation and Natural Resources, Wild Resource Conservation Program. January, 2026– December 2026; total funding, $46,550.00 for post-doctoral research position.
18. PI: C. C. Tudge: The Subterranean Fauna of Seepage Springs in National Capital Parks East (NACE). U.S. Department of the Interior, National Park Service. November, 1 2025–October 31, 2026, total funding $61,299.00. **T. R. Sawicki** received subaward of $20,000 for morphological identifications and formal taxonomic descriptions.
17. PI: D. Culver: The Subterranean Fauna of Seepage Springs in National Capital Parks East (NACE). U.S. Department of the Interior, National Park Service. October 15, 2024–December 30, 2025; total funding, $89,930.00. **T. R. Sawicki** received subaward of $20,000.00 for morphological identifications and formal taxonomic descriptions.
16. PI: D. A. Lieb: Determining the taxonomy, biogeography, and conservation status of newly discovered amphipod species. Pennsylvania Department of Conservation and Natural Resources, Wild Resource Conservation Program. May 2, 2024–September 30, 2026; total funding, $42,663.65. **T. R. Sawicki** received subaward of $33,187.00 for the molecular and morphological analyses of newly discovered amphipod species in Pennsylvania.
15. PI: D. Culver: A Survey of the Fauna of Seepage Springs in National Capital Parks East (NACE). U.S. Department of the Interior, National Park Service. September 19, 2023–July 31, 2024; total funding, $29,375.00. **T. R. Sawicki** received subaward of $5000.00 for the morphological description of *Stygobromus tenuis potomacus* group species *Stygobromus anacostensis*.
14. PI: L. Robinson et al. Co-PI: **T. R. Sawicki** et al.: National Oceanic and Atmospheric Administration, Center for Coastal and Marine Ecosystems-II; NOAA Educational Partnership Program with Minority Serving Institutions (EPP/MSI) Award # NA16SEC4810004. Funding $30,000,000 (2021–2026) to recruit, educate, train, and graduate a new generation of scientists, particularly from underrepresented communities.
13. PI: **T. R. Sawicki**. Florida A&M University Division of Academic Affairs Faculty Travel Grant. Funding $911.12 for travel to the Florida Academy of Sciences Annual Conference held on March 8 and 9, 2019.
12. PI: R. A. Long & Co-PI: **T. R. Sawicki**. Spatial and Temporal Microbial Community Composition, Canaries of the Aquifers. National Groundwater Association Foundation. October 1, 2018; one-year funding $6,000.00 for materials and supplies and Next Generation DNA sequencing.
11. PI: **T. R. Sawicki**. Understanding the Species Diversity Within and the Biological Connectedness Between Cave Systems of the Floridan Aquifer. Florida's State Wildlife Grants Program. July 1, 2015; three-year funding $84,834.31.

10. PI: **T. R. Sawicki**. Examination of the morphological and molecular characteristics of the stygobitic species (especially amphipod species) found living throughout the Floridan aquifer. APUS Faculty Research Grant. March 2013; funded $5,000.
9. PI: **T. R. Sawicki**. A morphological and molecular analysis of *Crangonyx* spp. (Amphipoda) as factors for the study of the biological interconnectedness of caves within the Floridan aquifer. Dogwood City Grotto. December 2012; funded $250.
8. PI: **T. R. Sawicki**. A Morphological and Molecular Analysis of *Crangonyx grandimanus* and *C. hobbsi* (Amphipoda) as Factors for the Study of the Biological Interconnectedness of Caves within the Floridan Aquifer. Macon State College Foundation. March 2012; funded $2,000.
7. PI: **T. R. Sawicki**. Examination of the morphological and molecular characteristics of the stygobitic species (especially amphipod species) found living throughout the Floridan aquifer. APUS Research Grant. January 2012; funded $5,000.
6. PI: **T. R. Sawicki**. A detailed morphological and molecular analysis of the Floridan aquifer Amphipoda as factors for the study of the ecology and conservation of Florida's aquifers. The Cave Conservancy Foundation. December 2011; funded: $11,500.
5. PI: **T. R. Sawicki**. Systematics of the Fauna of the Floridan Aquifer. Macon State College Foundation. January 2011; funded $1,000.
4. PI: **T. R. Sawicki**. Examination of the morphological and molecular characteristics of the stygobitic species (especially amphipod species) found living throughout the Floridan aquifer. APUS Research Grant. January 2011; funded $5,000.
3. PI: **T. R. Sawicki**. Comparative Systematics of Subterranean Amphipod Crustaceans in the Families Hadziidae and Melitidae. Cave Research Foundation. September 2001; funded $1,000.00.
2. PI: **T. R. Sawicki**. Collection of Cuban Hadziid Amphipods. Cave Conservancy Foundation. August 1999; funded $500.00.
1. PI: **T. R. Sawicki**. Bermudian Anchialine Macrocrustaceans. Project AWARE Foundation. January 1997; funded $250.00.

<u>Grants (submitted-not funded)</u>

5. PI: **T. R. Sawicki** and CO-PI Richard Long Assessing natural and anthropogenic effects on groundwater invertebrate macrocrustacean SGCN species and their associated community structure. Submitted July 1, 2023; funding requested for two years $76,885.60.
4. PI: **T. R. Sawicki**. Assessing the role of amphipods in the trophic movement of micro and nanoplastics in seagrass habitats. Submitted November 4, 2022; funding requested for two years $14,971.00.
3. PI: **T. R. Sawicki** and CO-PIs: R. A. Long and J. R. Blanchard. Search for Jewels: Monitoring of Florida spring systems for the highly invasive African Jewelfish (*Hemichromis letourneuxi*) with environmental DNA (eDNA). Fish and Wildlife Foundation of Florida, Protect Florida's Springs Grants. Submitted July 31, 2019; funding requested for two years $74,588.
2. PI: R. A. Long and CO-PI: **T. R. Sawicki**. Spatial and Temporal Microbial Community Composition of Peacock Springs Cave Fish and Wildlife Foundation of Florida, Protect Florida's Springs Grants. Submitted July 30, 2018; funding requested for 1.5 years $63,578.00.
1. PI: **T. R. Sawicki** and CO-PIs: P. Reneau and R. A. Long. Elucidating the community trophic structure of three cave systems across the Floridan aquifer using environmental DNA and next

generation DNA sequencing National Science Foundation, HBCU-UP Excellence in Research Grant. Submitted February 28, 2018; funding requested for three years $500,128.73.

Conference Presentations and Invited Seminars

25. **Sawicki, T. R.** Florida Man Exonerated: An Amphipod Case Study on the Implications of Cryptic Species Complexes and Global Invasions. Invited Seminar Speaker, National Speleological Society-Cave Diving Section, 2025 Winter Workshop; 18 January 2025.
24. **Sawicki, T. R.** Discoveries in the Floridan aquifer. Santa Fe Springs Protection Forum; 12 April 2024.
23. **Sawicki, T. R.** In defense of *Crangonyx floridanus* (Crustacea: Amphipoda): is it globally invasive? Florida State University Ecology and Evolutionary Biology Seminar Series, Tallahassee, FL; 5 April 2024.
22. **Sawicki, T. R.** Mysteries of the Floridan aquifer. Invited Seminar Speaker, National Speleological Society-Cave Diving Section, 2023 Winter Workshop; 14 January 2023.
21. **Sawicki, T. R.** Freshwater amphipod diversity within a cryptic species complex. Invited Seminar Speaker, Invertebrate Species with Active Research and Management (iSWARM), Florida Fish and Wildlife Conservation Commission Virtual Meeting; 25 October 2022.
20. **Sawicki, T. R.** Freshwater amphipod diversity within cryptic species complexes. Invited Seminar Speaker, Miami University Biology Department Seminars, Oxford, OH; 5 May 2022.
19. **Sisco, J. M.** & **T. R. Sawicki**. 2022. Discovery and investigation of the *Crangonyx floridanus* (Crustacea: Amphipoda) cryptic species complex with the description of a new species from a prairie lake in North Florida [abstract]. In: 2022 Annual Meeting of the Florida Academy of Sciences; 2022 March 11 (virtual): Florida Scientist, 85(2): 57–58.
18. **Arshad, S., & T. R. Sawicki.** 2022. Molecular phylogenetic and morphological analyses of *Hyalella* spp. in Florida and Georgia: Taxonomic Implications for the *Hyalella azteca* (Crustacea: Amphipoda) cryptic species complex [abstract]. In: 2022 Annual Meeting of the Florida Academy of Sciences; 2022 March 11; (virtual): Florida Scientist, 85(2): 57–58.
17. **Sawicki, T. R.** Exploring Florida's Caves: Life in the Dark. Challenger Center RAZOR Lecture Series. 2019 November 5.
16. **Sawicki, T. R.** Amphipod Diversity in the Floridan Aquifer. Invited Seminar Speaker, 2019 National Speleological Society-Cave Diving Section International Cave Diving Conference, Lake City, FL; 25 May 2019.
15. **Cannizzaro, A. G.**, & **T. R. Sawicki**. 2019. Molecular genetic data reveals cryptic diversity among stygobitic amphipod species within the Floridan aquifer [abstract]. In: 2019 Annual Meeting of the Florida Academy of Sciences; 2019 March 8-9; Melbourne (FL): Florida Scientist, 82(1): 26–27.
14. **Sawicki, T. R.**, **& A. G. Cannizzaro**. 2019. New stygobitic amphipod and isopod species from the Floridan aquifer [abstract]. In: 2019 Annual Meeting of the Florida Academy of Sciences; 2019 March 8-9; Melbourne (FL): Florida Scientist, 82(1): 26.
13. **Sawicki, T. R.** New Species Discoveries in the Floridan Aquifer. Invited Seminar Speaker, Florida State University Ecology and Evolutionary Biology Seminar Series, Tallahassee, FL; 8 February 2019.
12. **Cannizzaro, A. G.**, & **T. R. Sawicki**. 2018. Phylogenetic and Morphological Analyses of the Crangonyctid Amphipods of Florida [abstract]. In: 2018 Annual Meeting of the Florida Academy of Sciences; 2018 Mar 9–10; Miami (FL): Florida Scientist, 81(1): 27.

11. **Sawicki, T. R.** The Crangonyctid Amphipods of the Floridan Aquifer. Invited Seminar Speaker, Florida A&M University, School of the Environment Seminar Series, Tallahassee FL; 23 February 2018.
10. **Sawicki, T. R**., R. A. Long, and M. Stine. 2016. Physiochemical differences in water sources within De Leon Springs, Florida, and their potential effect on cave biota [abstract]. In: 2016 International Conference on Subterranean Biology; 2016 June 13–17; Fayetteville, AR, ICSB Abstracts: 2016: 93.
9. **Sawicki, T. R.** A morphological and molecular analysis of the troglobitic Amphipoda of the Floridan Aquifer. Center for Teaching and Learning Brown Bag Colloquium, American Public University, Charleston West Virginia; January 2014.
8. **Sawicki, T. R.** A Morphological and Molecular Analysis of *Crangonyx grandimanus* and *C. hobbsi* (Amphipoda) as Factors for the Study of the Biological Interconnectedness of Caves within the Floridan Aquifer. Invited Seminar Speaker, First Friday Science Seminar Series, Middle Georgia State University, Macon, GA; April 2013.
7. **Sawicki, T. R.** A Morphological and Molecular Analysis of *Crangonyx grandimanus* and *C. hobbsi* (Amphipoda) as Factors for the Study of the Biological Interconnectedness of Caves within the Floridan Aquifer. Invited Seminar Speaker, Science Seminar Series, Valdosta State University, Valdosta, GA; October 2012.
6. **Sawicki, T. R.** A Morphological and Molecular Analysis of *Crangonyx grandimanus* and *C. hobbsi* (Amphipoda) as Factors for the Study of the Biological Interconnectedness of Caves within the Floridan Aquifer. Invited Seminar Speaker, North Florida Springs Alliance, Florida Springs Science Symposium, Ichetuknee Springs State Park; April 2012.
5. **Sawicki, T. R.** Growth and Sustainability: An Ecological Perspective. Invited Seminar Speaker, Spartanburg Intercollegiate Green Alliance 2008 Earth Day Conference, Spartanburg, SC; April 2008.
4. **Sawicki, T. R.** Global Considerations: Conservation and Ecology. Invited Seminar Speaker, Global Underwater Explorers 2006 Conference, Gainesville, FL; November 2006.
3. J. R. Holsinger & **Sawicki, T. R.** An Overview of the remarkable Subterranean Amphipod Diversity in Southern Texas and Northeastern Mexico. Plenary lecture at the 17th International Symposium on Biospeleology in Raipur, India, 25–30; November 2004.
2. **Sawicki, T. R.** Overview of the Subterranean Amphipod Database. Invited Seminar Speaker, Mapping Cave Resources Workshop, St. Louis, MI; May 2003.
1. **Sawicki, T. R.** A taxonomic and biogeographic review of *Paranebalia longipes* (Phyllocarida, Leptostraca, Nebaliacea) in the southwest Atlantic and Caribbean. Oral paper, Tri-Beta Regional Presentations, Worcester, MA; April 1998.

Poster Presentations

10. **Sisco, J.M.**, & **T. R. Sawicki**. 2022. Examination of the *floridanus* cryptic species complex (Crustacea: Amphipoda) and discovery of a new species from a submerged cave system in Suwannee County, Florida. Florida A&M University Research Forum. October 26, Tallahassee, FL.
9. **Smith, L.**, K. Castle, **T.R. Sawicki**, & R.A. Long. 2022. Characterization of Prokaryotic Epibionts Inhabiting *Gammarus tigrinus*. NOAA EPP-MSI 10th Biennial Forum. April 5–8.
8. **Sisco, J.M.**, and **T.R. Sawicki**. 2022. Examination of the *floridanus* cryptic species complex (Crustacea: Amphipoda) and discovery of a new species from a submerged cave system in Suwannee County, Florida. Florida A&M University Graduate Appreciation Week. March 7-10, Tallahassee, FL.
7. **Eden, D., J. Hover**, **J. Lumpkin**, & **T. R. Sawicki**. 2018. Morphometric analyses of two

populations of *Hyalella* cf. *azteca* from Connecticut & Nebraska [abstract]. In: 2018 Annual Meeting of the Florida Academy of Sciences; 2018 Mar 9–10; Miami (FL): Florida Scientist, 81(1): 38.

6. **Lumpkin, J.**, **J. Hover**, **D. Eden**, & **T. R. Sawicki**. 2018. A population genetic analysis of *Hyalella* cf. *azteca* from several localities across Florida & Georgia [abstract]. In: 2018 Annual Meeting of the Florida Academy of Sciences; 2018 Mar 9–10; Miami (FL): Florida Scientist, 81(1): 38.
5. **MacMackin, T. A.**, **K. Oh**, & **T. R. Sawicki**. 2014. Morphological comparison of two populations of *Hyalella azteca* from freshwater springs in Florida, U.S.A [abstract]. In: 2014 Annual Meeting of the Georgia Academy of Science; 2014 Mar 29-30; Augusta (GA): Georgia Journal of Science, 72(1): 41.
4. **Probadora J.** & **T. R. Sawicki**. 2014. Morphological analysis and comparison of a population of *Hyalella azteca* collected from a spring basin in De Leon Springs State Park, De Land, Florida, U.S.A. to specimens described form the type locality in Vera Crus, Mexico [abstract]. In: 2014 Annual Meeting of the Georgia Academy of Science; 2014 Mar 29–30; Augusta (GA): Georgia Journal of Science, 72(1): 41.
3. **Sawicki, T. R.** Phylogeny and Biogeography of the Subterranean Amphipod Genus *Bahadzia* (Hadziidae). Poster presentation, PEET III: The Monographic Process, Washington, D.C., March 2000.
2. **Sawicki, T. R.**, E. A. Lazo-Wasem, & M. F. Gable. 1998. A taxonomic and systematic comparison of Bermudian and West Indian *Paranebalia* (Phyllocarida, Leptostraca, Nebaliacea). Poster presentation, Fourth International Crustacean Congress; July 19–24, 1998; Amsterdam, The Netherlands.
1. **Sawicki, T. R.**, E. A. Lazo-Wasem, & M. F. Gable. 1998. Possible troglobitic *Paranebalia* (Crustacea, Leptostraca, Nebaliacea): A systematic comparison of cave dwelling specimens to their open water counterparts [abstract]. In: Society for Integrative and Comparative Biology 1998 Annual Meeting; January 3-7, 1998; Boston (MA): American Zoologist, 37(5): 53A.

Research Mentorship

Students mentored:

Undergraduate:

More than 30 undergraduate students mentored. Students with accomplishments of note listed below:

- Shaima Arshad: oral presentation 2022 annual meeting Florida Academy of Sciences.
- Britney Bernard: abstract accepted for 2020 annual meeting Florida Academy of Sciences (meeting canceled due to COVID-19 pandemic).
- Justin Hover: poster presentation 2018 annual meeting Florida Academy of Sciences.
- Doney Eden: poster presentation 2018 annual meeting Florida Academy of Sciences.
- Janna Lumpkin: poster presentation 2018 annual meeting Florida Academy of Sciences.
- Jane Probadora: poster presentation 2014 annual meeting Georgia Academy of Sciences.

Graduate:

- Zonnelle Hanley: (Committee Member); August 2025–Present.

- Christopher Weider: (Advisor); August 2025–Present.
- Eric Maxwell: (External Committee Member; University of Alabama in Huntsville); October 2024–Present.
- Beyza Celikbaş: (Advisor); January 2025–Present.
- Nicholas Coppock: (Advisor); August 2024–Present.
- Liyah Smith: (Co-Advisor with Dr. Richard Long); graduated with a Master of Science in Biology December 2023; currently conducting an internship with the National Oceanic and Atmospheric Administration (NOAA) Hollings Marine Laboratory.
- Joshua Sisco: (Advisor); graduated with a Master of Science in Biology, May 2023; currently working as an Environmental Specialist for the Florida Department of Environmental Protection.
- Andrew Cannizzaro: (Advisor); graduated with a Master of Science in Biology, December 2019; currently a Ph.D. candidate at Miami University of Ohio.

Publications: Non-Peer Reviewed (Outreach)

22. **Sawicki, T.R.** 2021. Major Environmental Issues of the 21st Century: Civilization at the Precipice. Quest 22(2): 7–11.
21. **Sawicki, T.R.** 2020. The Discovery of a New Cave-Dwelling Amphipod, *Crangonyx manubrium*. Quest 21(2): 9–12.
20. **Sawicki, T. R.** 2017. Carbon Dioxide's Other Side: Ocean Acidification. Quest 18(3): 13–15.
19. **Sawicki, T. R.** 2017. What Lies Beneath: A New Species Emerges from the Dark Waters of the Floridan Aquifer. Quest, 18(1): 8–10.
18. **Sawicki, T. R.** 2017. Amphipods serve as "dye-trace" in the Floridan aquifer. North Florida Springs Alliance Newsletter, 1:5.
17. **Sawicki, T. R.** 2016. Reflections on Climate Change. Quest, 17(3): 15–19.
16. **Sawicki, T. R.** 2016. Troglomorphisms: Life in Caves. Underwater Speleology, 43(1): 12–14.
15. **Sawicki, T. R.** 2013. An Introduction to Cave Biology for the New Cave Diver: Part III. Quest, 14(3): 8–14.
14. **Sawicki, T. R.** 2013. An Introduction to Cave Biology for the New Cave Diver: Part II. Quest, 14(1): 10–13.
13. **Sawicki, T. R.** 2012. An Introduction to Cave Biology for the New Cave Diver: Part I. Quest, 13(4): 8–12.
12. **Sawicki, T. R.** 2012. Evolution: A Biology Primer- Part III. Quest 13(1): 7–10.
11. **Sawicki, T. R.** 2011. Evolution: A Biology Primer-Part II. Quest 12(3): 11–14.
10. **Sawicki, T. R.** 2011. Evolution: A Biology Primer-Part I. Quest 12(2): 7–10.
9. **Sawicki, T. R.** 2010. Checking Earth's Vital Signs: Ocean Acidification. Quest, 11(2): 6–9.
8. **Sawicki, T. R.** 2008. Anthropogenic Influences on the Nitrogen Cycle and Their Connection to Climate Change. Quest, 9(3): 8–11.
7. **Sawicki, T. R.** 2007. Growth and Sustainability: An Ecological Perspective Part III. Quest, 8(1): 12–15.
6. **Sawicki, T. R.** 2006. Growth and Sustainability: An Ecological Perspective Part II. Quest, 7(3): 8–11.
5. **Sawicki, T. R.** 2006. Growth and Sustainability: An Ecological Perspective. Quest, 7(1): 32–34.
4. **Sawicki, T. R.** 2004. Understanding Population Structure and its Role in the "Extinction Vortex." Quest, 4(4): 8–10.

3. **Sawicki, T. R.** 2003. Anchialine caves and their ecology. Quest, 4(1): 8–10.
2. **Sawicki, T. R.** 2002. Ecology, Conservation and Extinction. Quest, 3: 14–15.
1. **Sawicki, T. R.** 2000. Cuba's Caves: An Overview of their Biology and Geology. Quest, 2: 27–28.

Professional Service

Subject Editor: Journal of Subterranean Biology
Manuscript Editor: Southeastern Naturalist

Ad-hoc reviewer for several scientific journals:

- BioInvasions Records
- CBM-Cahiers de Biologie Marine
- Ecology and Evolution
- Journal of Biogeography
- Journal of Cave and Karst Studies
- Journal of Crustacean Biology
- Subterranean Biology
- Thalassas: An International Journal of Marine Science
- Zoological Journal of the Linnean Society
- Zootaxa

Served on the peer review committee regarding the draft Species Status Assessment (SSA) for the U.S. Fish and Wildlife Service—for the Endangered Species Act (ESA)

- Committee was tasked with reviewing the SSA for the Georgia blind salamander *Eurycea wallacei*

Awards and Scholarships

- Florida A&M University, "2025 CeDAR Honors Award" July 2025.
- 2024–2025 Post-Tenure Review, Evaluation: "Exceeds Expectations".
- Florida A&M University, "2018 Emerging Scholar Award." April 2018.
- Macon State College (now Middle Georgia State University), "Award For Outstanding Teaching for 2012." April 2012.
- Spartanburg Community College, Department of Sciences "Outstanding Science Faculty Member of the Year." August 2008.
- Spartanburg Community College, Department of Sciences "Performance Award." August 2008.
- Spartanburg Community College, Department of Sciences "Performance Award." May 2007.
- Spartanburg Community College, Department of Sciences "Performance Award." May 2006.
- Old Dominion University, Department of Biological Sciences "Outstanding Teaching Assistant," March 2004.
- Old Dominion University, "Dominion Scholar," May 1998; May 1999; May 2000.
- Eastern Connecticut State University Department of Biology, "Outstanding Biologist Award," May 1998.
- Eastern Connecticut State University Department of Biology, "Exemplary Performance in Research Award," May 1998.
- Eastern Connecticut State University Department of Biology, "Senior Biology Major Attaining the Highest Academic Achievement," May 1998.
- Connecticut State University System, "Henry Barnard Award," April 1998.

- Eastern Connecticut State University Foundation, Inc., "Adopt-A-Student Scholarship," May 1997.
- Eastern Connecticut State University "Tropical Biology-Bermuda Scholarship," March 1997.
- Eastern Connecticut State University Department of Physical Sciences "Outstanding Student for Work in Chemistry and Physics," May 1997.
- Eastern Connecticut State University Department of Biology, "Special Recognition Certificate for Achievement in the Biology Department and Program," May 1997. [For role in helping to found a chapter of Beta Beta Beta at ECSU.]
- Eastern Connecticut State University Department of Biology, "Junior Biology Major Attaining the Highest Academic Achievement," May 1997.
- The National Italian-American Foundation New England Regional Scholarship, November 1996.
- Eastern Connecticut State University Department of Biology, "Sophomore Biology Major Attaining the Highest Academic Achievement," April 1996.
- Eastern Connecticut State University Department of Biology, "High Academic Achievement," May 1995; April 1996; May 1997; May 1998.

Media Interviews/Coverage

"Newly Discovered Crustacean Species Found Only in Lake Jackson" WFSU Public Media Ecology Blog, by Rob Diaz De Villegas. https://blog.wfsu.org/blog-coastal-health/2022/07/newly-discovered-crustacean-species-found-only-in-lake-jackson/; July 12, 2022.

"Cave Creature Discovered/Mysteries of the Floridan Aquifer" WFSU Public Media Ecology Blog, by Rob Diaz De Villegas. https://blog.wfsu.org/blog-coastal-health/?p=13526; August 30, 2019.

"Discovering New Species and University Research" Podcast Interview with Betsy Couch, Think TLH Podcast, Knight Creative Communities Institute. https://kccitallahassee.com/2018/11/01/think-tlh-07-discovering-new-species-and-university-research-with-dr-tom-sawicki/; November 1, 2018.

"New Stygobitic Species" WAMC Northeast Public Radio *Academic Minute*; http://wamc.org/post/dr-thomas-sawicki-american-public-university-new-stygobitic-species; January 2014.

"Global Warming" Radio interview, Charlotte Talks with Mike Collins, WFAE, National Public Radio, Charlotte N.C.; July 13, 2007.

Book Reviews

Campbell, N. A., J. B. Reece, L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky & R. B. Jackson. 2008. Biology 8th Ed. Pearson-Benjamin Cummings. Review of Chapters 16 "The Molecular Basis of Inheritance" and 32 "An Introduction to Animal Diversity".

Co-curricular Activities

- Faculty advisor for the Florida A&M University Biological Student Organization (BSO). Fall 2015 to Spring 2021.
- Faculty advisor for the Macon State College/Middle Georgia State College Aquanutz Marine Biology Club. Fall 2009-Fall 2013.
- Faculty advisor for the Spartanburg Community College Science Club. Fall 2004–July 2009.
- Eta Omega Chapter of the Beta Beta Beta National Biological Honor Society, co-founder, Induction February 1997. Elected President (Fall 1997–Spring 1998).

Professional Memberships and Certifications

- Society for the Study of Evolution (SSE), 4344 Shaw Blvd., St. Louis Missouri, 63110. Member since 2023.
- Florida Academy of Sciences (FAS), P.O. Box 149766 Orlando, FL 32814-9766. Member since 2017.
- American Association of University Professors (AAUP), 1133 Nineteenth Street, N.W., Suite 200 Washington, DC 20036. Member since 2013.
- Council on Undergraduate Research, 734 15th St., NW, Suite 550 Washington, DC 20005. Member since 2011.
- The Crustacean Society, PO Box 7065 Lawrence, KS 66044. Member since 2010.
- Global Underwater Explorers, 15 South Main St., High Springs, FL 32643. Member since 1998. National Speleological Society-Cave Diving Section, 295 NW Commons Loop, Suite 15-317, Lake City, FL 32055. Member since 1998.
- SCUBA Instructor: Scuba Schools International (SSI) AOWI #9754. Certified, February 2002.
- Mixed Gas Diver: Global Underwater Explorers (GUE). Certified, March 1998.
- Oxygen First Aid Instructor: Divers Alert Network (DAN) #007632. Certified, April 1998.
- SCUBA Instructor: Technical Diving International (TDI) #1863. Certified, April 1998.
- SCUBA Instructor: National Association of Underwater Instructors (NAUI) #25357. Certified, February 1998.
- Full Cave Diver: National Speleological Society-Cave Diving Section (NSS-CDS). Certified, March 1997, & National Association of Cave Divers (NACD) Certified, March 1997.
- SCUBA Instructor: Professional Association of Diving Instructors (PADI) Master Scuba Diver Trainer (MSDT) #66460. Certified September 1993, 250+ students taught.
- First Aid Instructor: PADI Medic First Aid #66460. Certified September 1993.

FLORIDA AGRICULTURAL AND MECHANICAL UNIVERSITY

Florida Agricultural and Mechanical University

Tallahassee, Florida 32307-3700

Dr. Thomas R. Sawicki, Ph.D.
Associate Professor of Biology & Associate Chair
Department of Biological Sciences
Florida A&M University

15 November 2025

To the Members of the City of Alachua Planning and Zoning Board:

I am writing in my capacity as a biological scientist with more than twenty-five years of research and professional experience in subterranean biodiversity, groundwater ecosystems, and the Floridan aquifer. My research focuses on the taxonomy, evolution, and conservation of stygobitic crustaceans—species that inhabit groundwater and cave systems. I have authored more than two dozen peer-reviewed publications describing the biodiversity of Florida's subterranean habitats and have extensive field and technical diving experience in karst environments throughout the state and internationally.

I have been asked to provide an expert assessment regarding the proposed construction of a stormwater management facility near Mill Creek Sink, a direct hydrological window into the Floridan aquifer. This site is exceptionally sensitive to surface contamination, and the scientific evidence strongly indicates that the biological community within Mill Creek Sink is more diverse than previously documented.

The only biological survey published of nearby caves in this region, Franz et al. (1992), reported low species numbers, in part because cave community structure is notoriously difficult to assess using traditional methods. As noted in my accompanying presentation, Franz et al. (1992) documented only three species in Herzog Cave, a system located approximately twelve miles south of Mill Creek Sink. However, more recent collections and analyses—including those made by Florida Fish and Wildlife Conservation Commission biologist Paul Moler in 2018—demonstrate that this earlier work significantly underestimates true biodiversity, revealing species such as *Crangonyx hobbsi*, *Caecidotea hobbsi*, copepods, and ostracods that were not originally reported.

Further, modern molecular research (e.g., Cannizzaro et al., 2020) shows that *Crangonyx hobbsi*, a species once thought to be broadly distributed across the Floridan aquifer, is composed of multiple cryptic species, each with restricted geographic ranges and potentially narrow ecological tolerances. My lab is discovering similar findings relative to *C. grandimanus*, another stygobitic species once thought to have a broad distribution across the aquifer, in which unpublished molecular data reveals hidden species-level diversity.

The biological communities associated with Mill Creek Sink do not merely represent academic interest—they are key components of a functioning groundwater ecosystem. Amphipods such as

Crangonyx hobbsi, *C. parhobbsi*, and *C. grandimanus* are considered keystone species whose presence and health reflect the ecological integrity of the aquifer. Groundwater microbial communities are likewise central to natural water purification processes, and emerging research demonstrates that surface contamination can disrupt these communities, introducing pathogens and antibiotic-resistant genes into groundwater.

These concerns are amplified by the conservation status of the likely inhabitants of Mill Creek Sink. Multiple species documented in similar caves are ranked as near threatened, vulnerable, or imperiled by the International Union for Conservation of Nature (IUCN) and the Florida Natural Areas Inventory (FNAI), including the crayfish *Procambarus pallidus* and *Troglocambarus maclanei*, the amphipods *Crangonyx hobbsi*, and *C. grandimanus*, and the isopod *Caecidotea hobbsi*. The presence of such species suggests that Mill Creek Sink may house highly sensitive fauna whose survival is dependent on maintaining water quality free from anthropogenic disturbance.

Given these findings, it is my scientific opinion that placing a stormwater management facility near Mill Creek Sink poses a substantial ecological risk. The introduction of untreated or partially treated runoff—containing sediment, nutrients, pollutants, microbial contaminants, or chemical residues—has the potential to alter the biological, chemical, and microbial integrity of a uniquely sensitive and poorly understood groundwater ecosystem. Importantly, because the biodiversity of this system has historically been underestimated, the true extent of potential harm is likely greater than existing published literature suggests.

In conclusion, the evidence strongly indicates that Mill Creek Sink is biologically significant, ecologically fragile, and insufficiently characterized to justify construction of stormwater infrastructure in close proximity. Until a comprehensive modern survey—including molecular analyses—is conducted, the precautionary principle should guide land-use decisions affecting this site.

Respectfully submitted,
Thomas R. Sawicki, Ph.D.
Associate Professor of Biology
Florida A&M University

Mill Creek Sink Biology

Thomas R. Sawicki, Ph.D.

Dr. Thomas R. Sawicki
Expert Credentials

- Associate Professor of Biology & Associate Chair, Florida A&M University
- Ph.D. in Ecological Sciences, Old Dominion University, 2004
- Curatorial Affiliate, Yale Peabody Museum
- 25+ years of research on subterranean biodiversity and Floridan aquifer fauna
- 28+ peer-reviewed publications; multiple new species described
- Funded by NPS, NOAA, DCNR, FWC, and other agencies
- 30+ years as a cave diver, technical diver, and SCUBA instructor
- Specialist in groundwater ecology, taxonomy, cave biology, and conservation

Cave Community Structure is Difficult to Ascertain Often Resulting in Underrepresentation

Video: Kristi Bernot

For Instance, Franz et al., 1992 only notes three species in Herzog Cave (located approximately 12 miles south of Mill Creek Sink)

According to Franz et al., 1992


Procambarus pallidus


Troglocambarus maclanei


Crangonyx grandimanus

Additional species from Herzog Cave in Sawicki collections—collections made by Paul Moler of the FWC in 2018

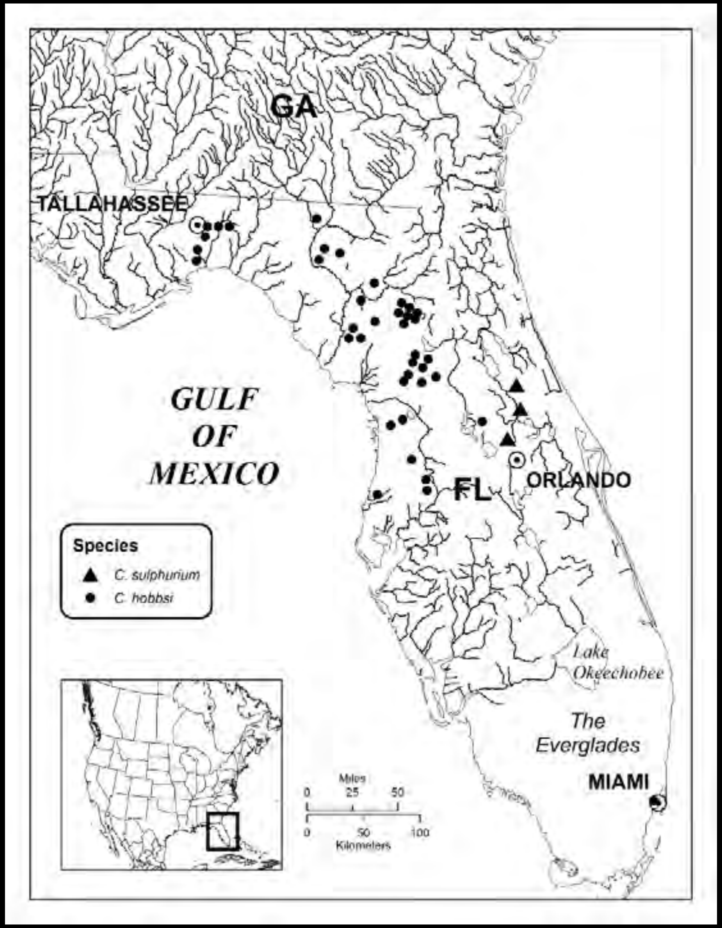

Ostrocod sp.


Crangonyx hobbsi


Copepod sp.

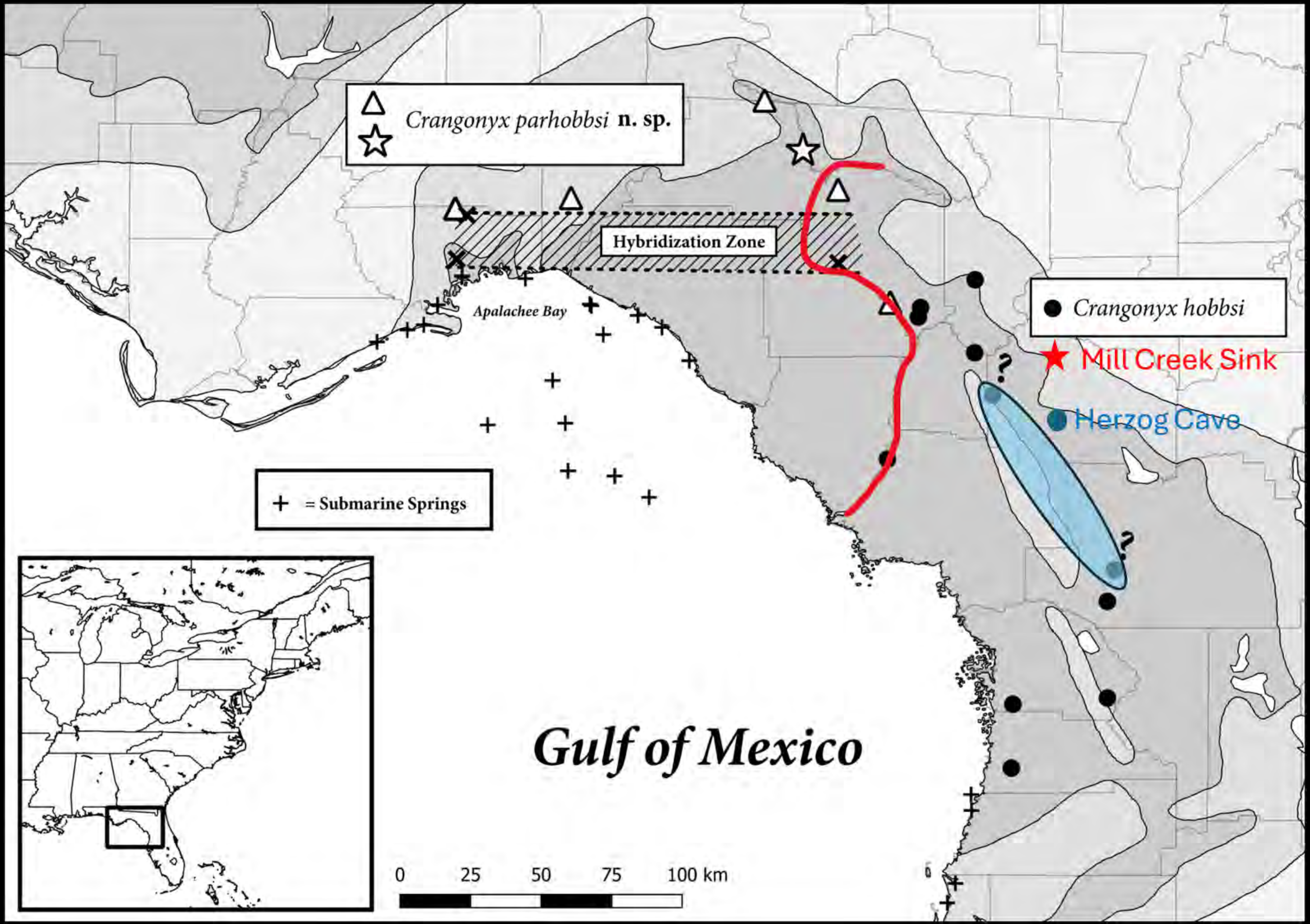

Caecidotea hobbsi

In addition, recent genetic studies have demonstrated hidden species diversity

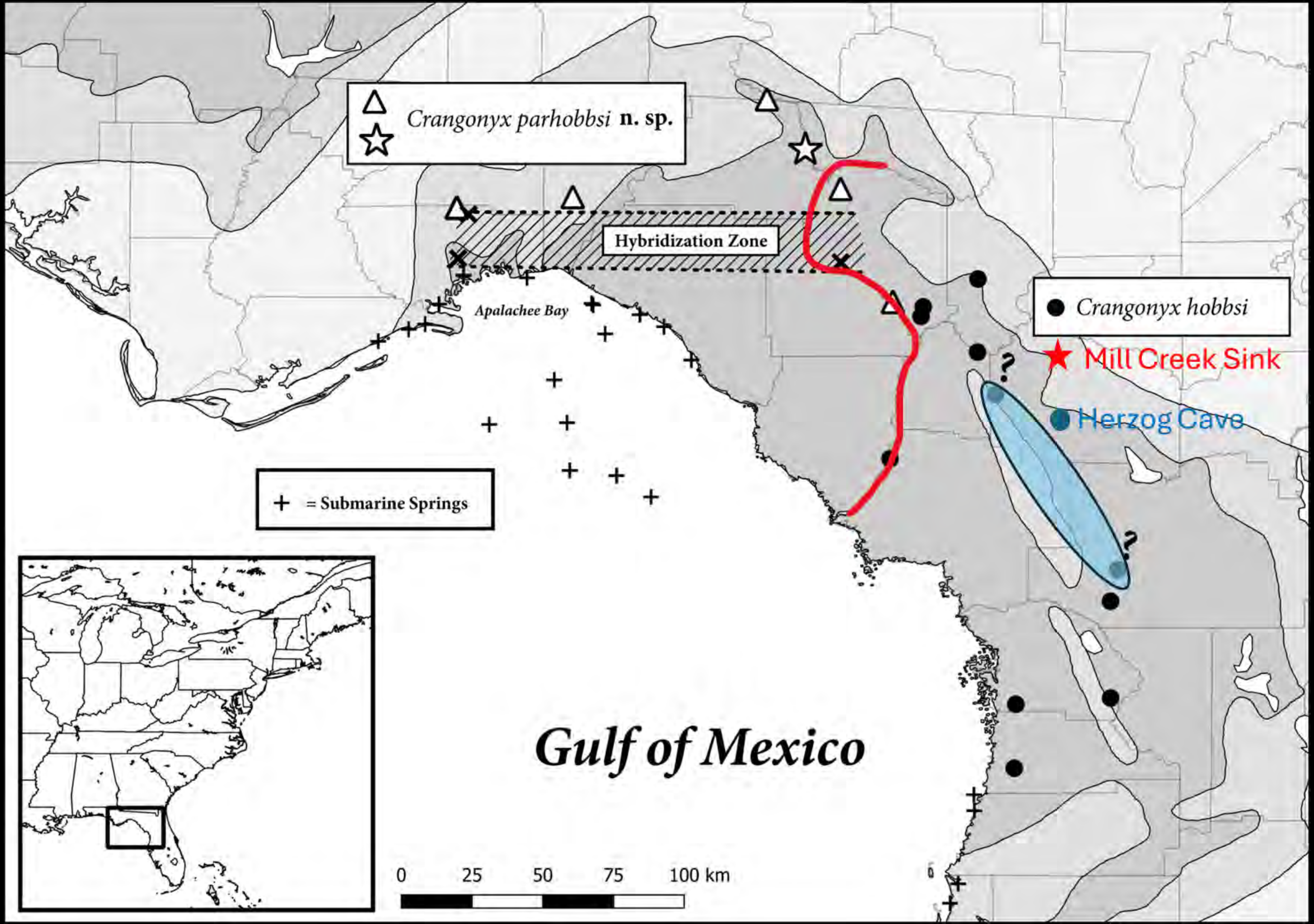


Geographic distribution of *C. hobbsi* as noted by Zhang and Holsinger, 2003

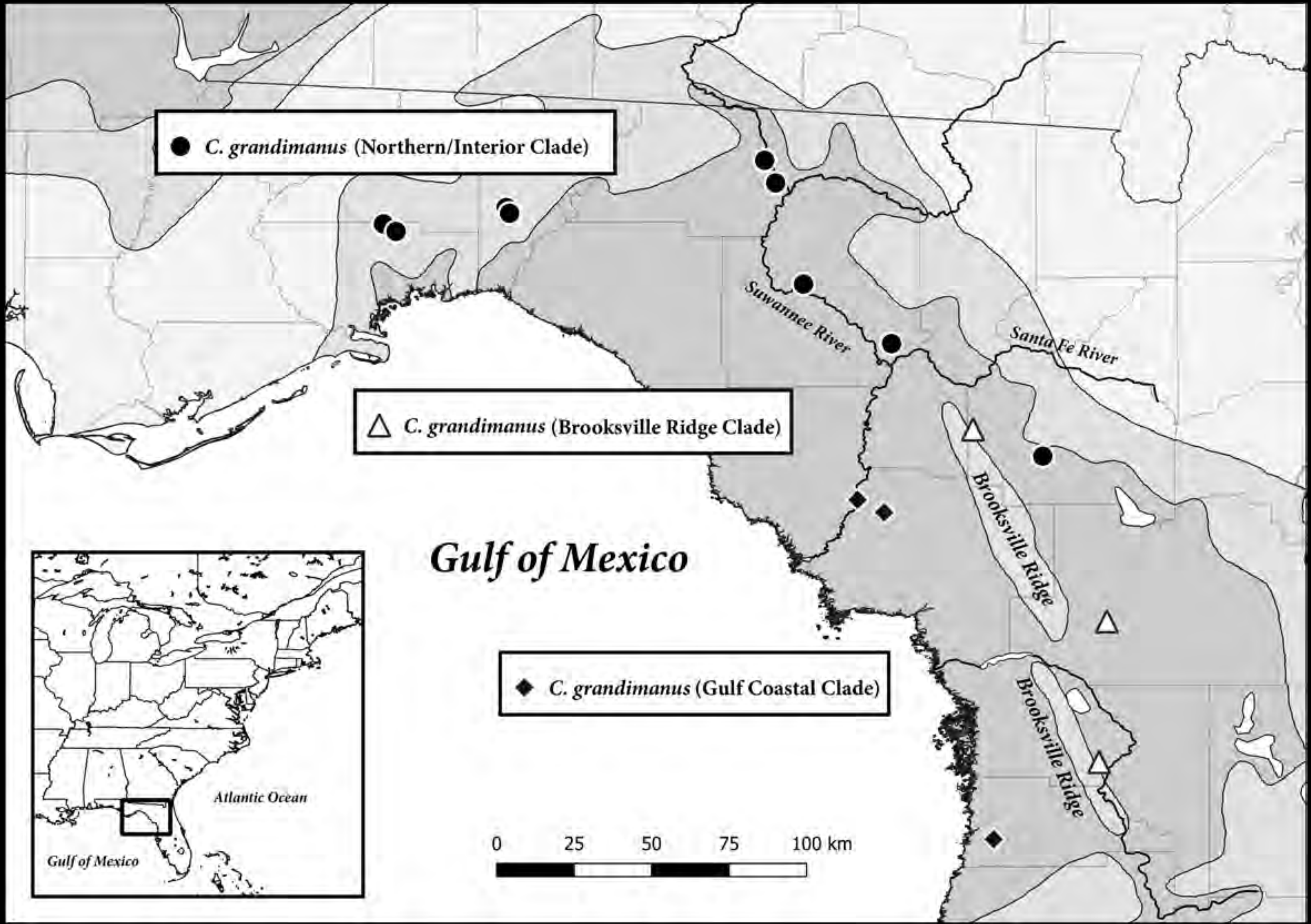
What was thought to be one widely distributed species is now known to be at least two



A third potential species has been discovered from Newberry Bat Cave in Alachua County and Indian Cave in Marion County—the exact distribution of this species is not known (Cannizzaro et al., 2020).



In addition, unpublished data is showing a similar pattern for *Crangonyx grandimanus*



The importance of Groundwater Flora and Fauna

- Groundwater microbial communities play important roles in purification of water, but surface water contamination can alter the microbiome of these communities, introducing pathogens and antibiotic-resistant genes (Wu et al., 2025)
- Millions of people in Florida and tens of thousands in Alachua County use wells for their drinking water
- Groundwater fauna are indicator species for the health of a cave ecosystem (Griebler and Avramov, 2015)
- In particular amphipods such as *Crangonyx hobbsi*, C. parhobbsi, and *C. grandimanus* are considered keystone species in cave and spring habitats (Glazier, 2009)

In Conclusion: The diversity of life in Mill Creek Sink is likely much more than reported by Franz et al., 1992

In addition, species most likely found in the cave are also listed by the International Union for Conservation of Nature (IUCN) and the Florida Natural Areas Inventory (FNAI):

- *Procambarus pallidus*
    - IUCN—near threatened; FNAS S1 (critically imperiled) S2 (imperiled)
- *Crangonyx hobbsi*
    - IUCN—vulnerable; FNAS—S2 (imperiled) S3 (vulnerable)
- *Crangonyx grandimanus*
    - IUCN—vulnerable; FNAS—S2 (imperiled) S3 (vulnerable)
- *Caecidotea hobbsi*
    - IUCN—not listed; FNAS — S1 (critically imperiled) S2 (imperiled)
- *Troglocambarus maclanei*
    - (IUCN—near threatened; FNAS — S1 (critically imperiled) S2 (imperiled)

In addition: Section 2.4.4(D)(4) requires that Design minimizes environmental impact.

According to the staff report:

- "The proposed special exception minimizes environmental impacts and does not cause significant deterioration of light, water and air resources, wildlife habitat, stormwater management, scenic resources, and other natural resources."

- "Evaluation & Findings: The proposed special exception use, i.e., stormwater management facilities, does not pose a significant deterioration of light or air resources, water resources in terms of flood control, wildlife habitat, scenic resources, and/or other natural resources found at ground surface. *Additional data will be required at the infrastructure plan stage concerning minimization of environmental impacts, if any, to the subsurface conditions of the subject property.*"

The data presented here demonstrates that there is not sufficient data at this stage to know of the impacts on subsurface conditions.

Thus, there needs to be additional analysis on potential impacts before this project can move forward.

References

Cannizzaro, A. G., D. Balding, E. A. Lazo-Wasem, & T. R. Sawicki. 2020. A new species rises from beneath Florida: molecular phylogenetic analyses reveal cryptic diversity among the metapopulation of *Crangonyx hobbsi* Shoemaker, 1941 (Amphipoda: Crangonyctidae). Organisms Diversity & Evolution, 20: 387–404. https://doi.org/10.1007/s13127-020-00433-4.

Franz, R., J. Bauer, & T. Morris. 1992. Review of Biologically Significant Caves and their Faunas in Florida and South Georgia. Brimleyana, 20: 1–109.

Glazier, D.S. 2009. Amphipoda. In: Likens, G.E. (Ed.), Encyclopedia of Inland Waters. Elsevier, Amsterdam, pp. 89 115.

Griebler C., & M. Avramov. 2015. Groundwater ecosystem services: a review. Freshwater Science. 34(1): 355–367.

Wu D, Bai H, He L-Y, He L-X, Gao F-Z, Liu C-X, Van den Brink PJ, Smidt H, Ying G-G. 2025. From river to groundwater: Antibiotics pollution, resistance prevalence, and source tracking. Environ International. 196:109305.

Zhang J. & Holsinger J.R. (2003) Systematics of the freshwater amphipod genus *Crangonyx* (Crangonyctidae) in North Ameri ca. Virginia Museum of Natural History, Virginia, 274 pp.