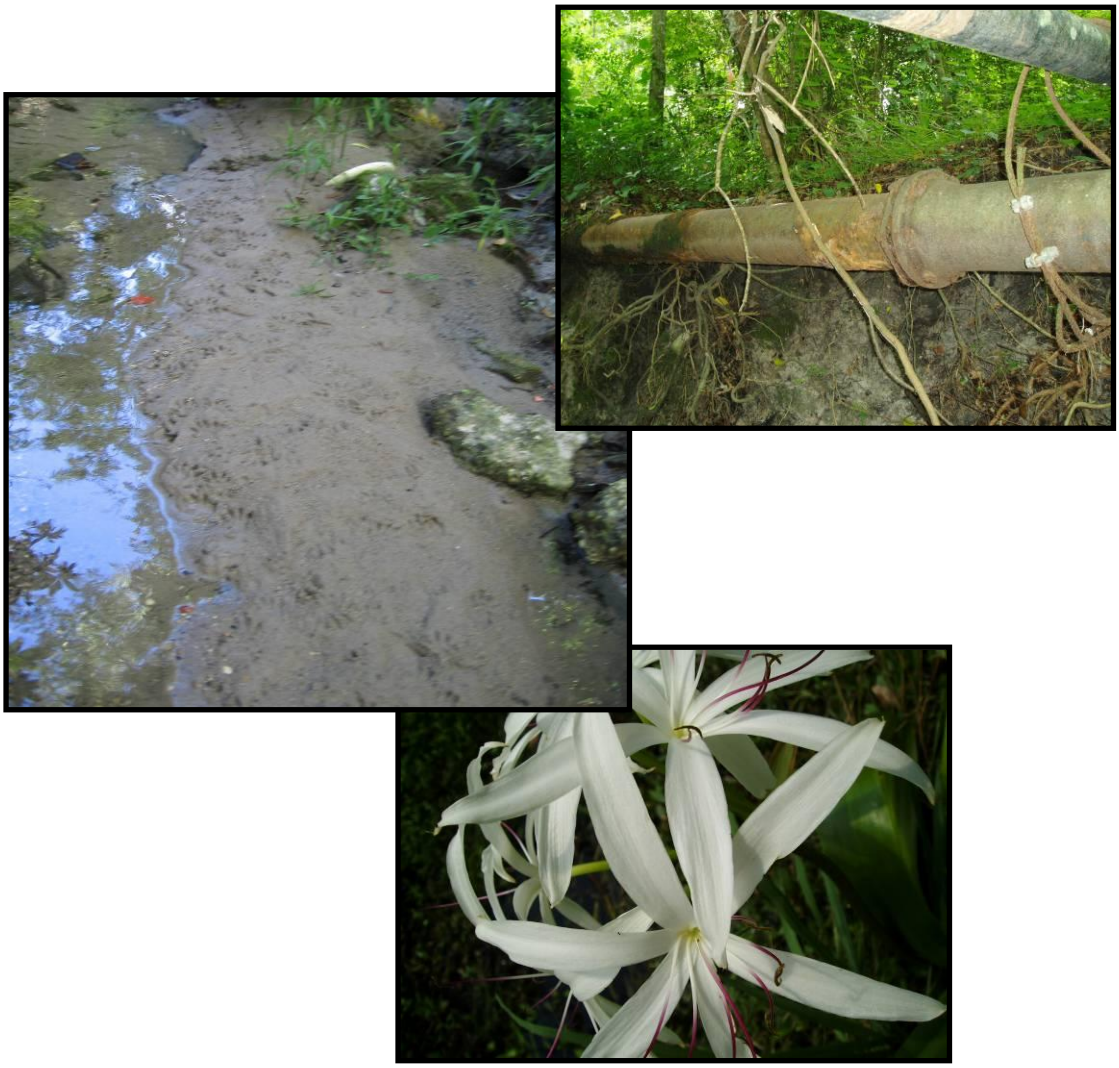
Wildlife Surveys of Fecal Coliform "Hot Spot" Segments of the Gainesville Urban Creeks July and August 2007



Prepared by
Alachua County Environmental Protection Department

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Acknowledgements

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Fecal Coliform samples were analyzed by Advanced Environmental laboratories, Inc. in Gainesville, FL. Funding for the fecal coliform analyses was provided by the Gainesville Clean Water partnership which is a partnership between the City of Gainesville, Alachua County, and the Florida Department of Transportation.

Last, but definitely not least, we would like to thank the creek neighbors that took the time to consider the health of their creeks by filling out the resident questionnaire. Ani Dubois compiled the data obtained from the resident surveys.

Executive Summary

Creek segments with elevated fecal coliform bacteria have been identified in the Gainesville urban area through Alachua County Environmental Protection Department's (ACEPD) routine water quality monitoring program. Fecal coliform are bacteria originating in the intestines of warm blooded animals and can come from many sources including: failing wastewater infrastructure and septic systems, transient populations, domestic animal waste, and wildlife. To explore the role of wildlife populations as a source of fecal coliform bacteria, ACEPD conducted biological assessments of nine creek segments.

ACEPD staff walked the creek segments and noted the location and/or condition of animals, animal tracks, scat, food scraps, pipes, riparian zones, exotic vegetation, transient camps, and other pertinent information. Animal tracks were found along most areas of the creeks where the substrate would support prints. Raccoon tracks were prevalent along the entire segment of most of the creeks and were by far the most abundant tracks observed. Armadillo, bird, dog, squirrel, and rodent were some of the other wildlife tracks observed. Deer tracks were prevalent in the control site and human, cat, bird, and dog were absent in this rural watershed. Hogtown, Possum, and Tumblin creek corridors appeared to be heavily used by wildlife and domestic animals.

ACEPD sent a questionnaire to the 249 residents identified as living adjacent to the surveyed creek segments. The questionnaire focused on what species of wildlife residents viewed around the creeks, which animal(s) they saw the most of, whether they have seen people camping in the vicinity of the creeks, if they have pets, and how they dispose of pet waste. ACEPD received completed questionnaires from 91 (37%) of the residents. Raccoons were reportedly sighted most frequently followed by birds (including songbirds, wading birds, and birds of prey), cats, and opossum. Approximately 47% (43) of the residents who completed the questionnaire owned outside pets and 23% (21) stated they left the waste on the ground. Some of these residents reported leaving all of the waste on the ground; while others used multiple disposal methods including putting it in the trash, burying it in the ground, or using a pet waste composter.

It was difficult to correlate the elevated fecal coliform concentrations to the presence of wildlife with the limited number of water samples collected. However, it was clear that wildlife and domestic animals are using the riparian creek system corridor. Both wildlife and the improper disposal of domestic animal waste are possible sources of fecal coliform in all of the urban watersheds. Due to the presence of numerous birds and other wildlife species and the abundance of animal tracks, wildlife may be a significant source of fecal coliform in some watersheds. Raccoons are likely one of the sources of fecal coliform in Gainesville's urban creeks, as they were the most frequently observed animal reportedly sighted by residents and had the most abundant tracks observed by ACEPD staff. However, it is unclear how significant of a source animals are. ACEPD will continue to look at the role of wildlife as the fecal coliform "Hot Spot" locations are investigated through a partnership with Gainesville Regional Utilities, the Alachua County Health Department, City of Gainesville Public Works Department, and the Florida Department of Environmental Protection.

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1.0 Introduction

Alachua County Environmental Protection Department (ACEPD) has monitored fecal coliform bacteria levels throughout Alachua County since the 1970s. Fecal coliform bacteria, a microbiological indicator of human and warm-blooded animal fecal pollution, are found at elevated levels in our streams. The Class III Fresh Water State Standard (Chapter 62-302 Florida Administrative Code) for fecal coliform that applies to Gainesville's urban creeks is as follows:

> *Fecal counts shall not exceed a monthly average of 200 colony forming units per 100 milliliters (CFU/100 mL), nor exceed 400 CFU/100 mL in 10% of the samples, nor exceed 800 CFU/100 mL on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period (FDEP, 2006).*

Through its routine water quality monitoring program, ACEPD has identified several locations where the state water quality standard for fecal coliform was often exceeded under ambient conditions. These areas of concern include Hogtown Creek in the vicinity of NW 23rd Avenue, an Un-named Hogtown Tributary near Gainesville High School, Rattlesnake Branch, upper Elizabeth Creek, Possum Creek upstream of NW 34th Street, Tumblin Creek at SW 5th Avenue, Sweetwater Branch at NE 10th Avenue, and Rosewood Branch (Figure 1). Although fecal coliform data clearly demonstrated high bacterial populations at the identified "Hot Spots," it did not identify the source of the bacteria. Common sources of fecal coliform bacteria include:

- exfiltration and releases from public and private centralized wastewater collection systems,
- malfunctioning septic tank systems,
- direct use of creeks for human sanitation,
- runoff from urban campsites near creeks,
- domestic animal waste, and
- wildlife populations that use riparian corridors and adjacent areas.

ACEPD has extensively investigated the human sources of fecal coliform bacteria and reported the results in the 2008 report titled "Fecal Coliform Bacteria, Florescent Whitening Agents, Bacteriological Indicators, and Microbial Source Tracking Studies in Gainesville's Urban Creeks Microbial "Hot Spots" June 2004 through August 2007." This wildlife survey will be included in this comprehensive report as Appendix IX. In an effort to further understand and identify possible non-human sources of fecal coliform, ACEPD conducted biological assessments of the identified creek segments. The locations of the creek segments surveyed for this study are described in Table 1 and displayed in Figure 1.

Table 1: Locations of Creek Segments Evaluated in the Wildlife Surveys

Creek	Detailed Survey Location	Extended Survey Location
Hogtown Creek	Confluence with Rattlesnake Branch, upstream ~100 feet	Alfred Ring Park at NW 16th Avenue to NW 23rd Boulevard
Un-named Hogtown Tributary	North of Gainesville High School, Downhill from GRU LS #70 at end of NW 22nd Circle to NW 16th Terrace	Not Conducted
Ashley Creek	Not Conducted	South of Gainesville High School, NW 16th Terrace to upstream as far as possible
Rattlesnake Branch	Confluence with Hogtown Creek, upstream ~100 feet	Confluence with Hogtown Creek to NE 12th Street
Elizabeth Creek	University Avenue ~100 feet west to University Avenue, where creek flows north	NW 7th Road to University Avenue
Possum Creek	NW 36th Drive in Rock Creek Neighborhood, upstream ~100 feet	NW 36th Drive in Rock Creek Neighborhood to NW 39th Avenue
Tumblin Creek	Behind St. Croix Apartments to SW 5th Avenue	SW 9th Street to SW 5th Avenue
Sweetwater Branch	SE 1st Avenue to University Avenue	SE 1st Avenue to NE 10th Avenue
Rosewood Branch	SE 7th Avenue, upstream ~100 feet	Confluence with Sweetwater Branch to Waldo Road and SE 4th Avenue
Hatchet Creek	Newnans Lake Conservation Area Hatchet Creek Tract, upstream ~100 feet of sampling station HATCONC	Newnans Lake Conservation Area Hatchet Creek Tract, upstream ~0.5 mile of sampling station HATCONC

The main purpose of the assessments was to qualitatively describe the wildlife populations observed in the identified segments. In conjunction with the creek assessments, ACEPD also compiled a short questionnaire to be completed by residents living adjacent to the evaluated creek segments. The goal of the questionnaire was to gain further insight into the use of the creeks by wildlife. Residents likely spend more time observing the creeks compared to the one time ACEPD survey.

2.0 Materials and Methods

2.1 Wildlife Surveys

Each segment was surveyed using two techniques: 1) A detailed survey was conducted for approximately 100 feet in which experienced biologist looked and listened for signs of wildlife 2) A broader survey in which staff walked a longer creek segment noting tracks and other signs of wildlife. All of the detailed surveys were conducted with a team of four staff, including two experienced biologists. Details such as areas of white wash (large amounts of bird waste), locations where wildlife were seen or heard, nests, and other signs of wildlife activity were recorded. Species and numbers of individuals were recorded when possible. All tracks and scat were identified and counted. Biologist's summaries for each detailed survey segment are presented in Appendix A.

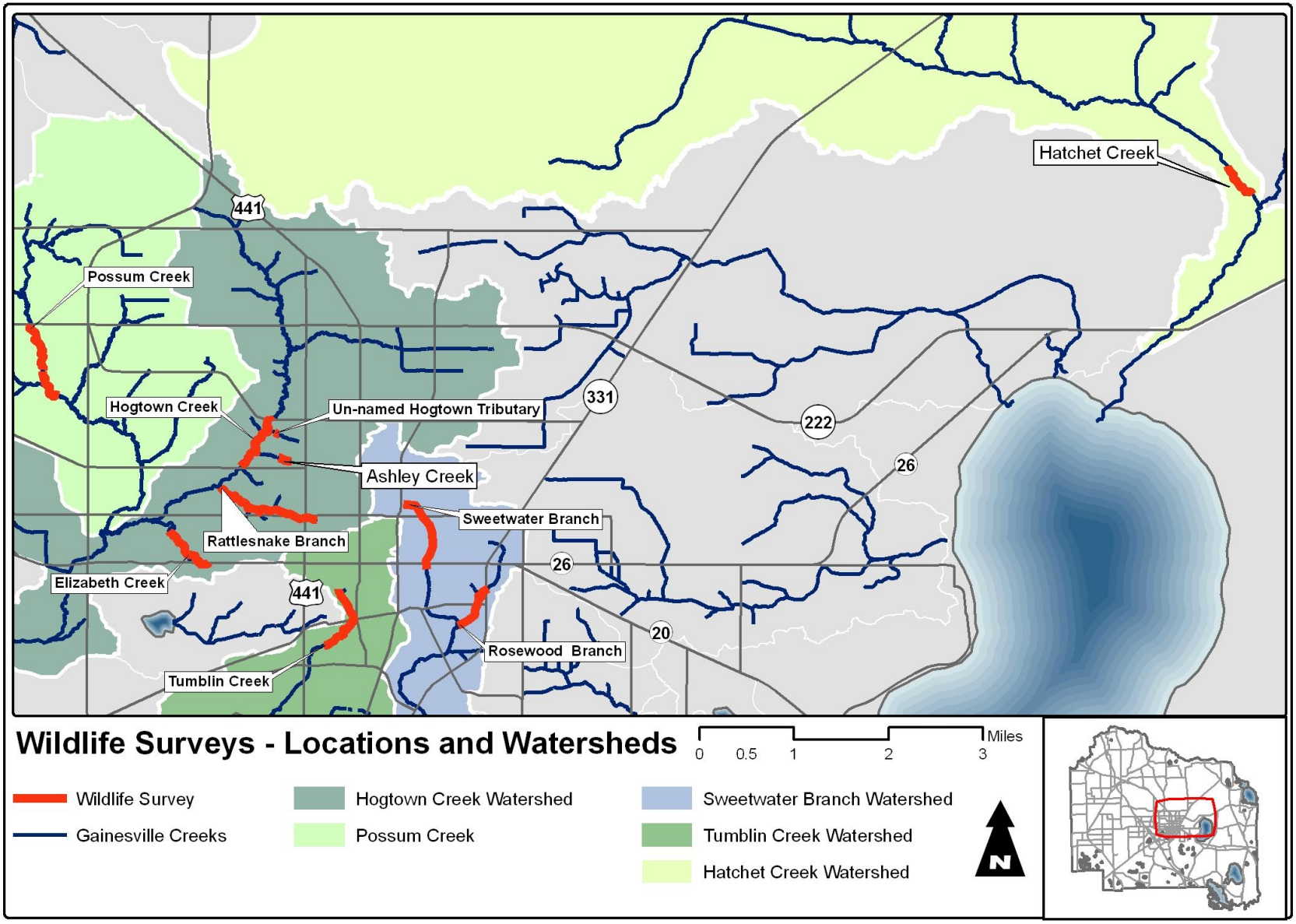


Figure 1: Location of Wildlife Surveys Conducted July and August 2007

The extended surveys were conducted over the entire selected creek segment by two staff members. The extended surveys of the creek segments were conducted using a detailed map and a corresponding legend to mark the location and/or condition of animals, animal tracks, scat, food scraps, pipes, riparian zones, exotic vegetation, transient camps, and other pertinent information. The surveys began at a road crossing and staff walked upstream covering the areas in which consistently high fecal coliform levels have been observed. One employee focused on drawing details on the map while the other noted the condition of the surrounding banks and riparian areas. Staff paid close attention to nearby yards for bird feeders, outside pets, pet waste, or any other unusual sightings. Weather conditions were noted and photographs were taken to document the surveys.

2.2 Fecal Coliform Sampling

Samples for fecal coliform analyses were collected during the wildlife assessments. Duplicate fecal coliform samples were taken from mid-depth of the water column at both the beginning point and ending point of each creek survey. Two additional samples were also collected from tributaries contributing flow at the time of the survey and any suspect locations (downstream of observed animal feces, etc). All samples were hand delivered on ice to Advanced Environmental Laboratories, Inc. (AEL) of Gainesville, FL within six hours of collection and were analyzed for fecal coliform using the membrane filtration SM9222D method. Extended dilutions were run to allow the fecal coliform results to be quantified. When possible, water velocity and cross-sectional area were estimated to approximate the flow at each sample location.

2.3 Residential Questionnaire

Using the Alachua County Property Appraisers Parcel layer in GIS, ACEPD staff was able to identify the parcels adjacent to the creek segments that were surveyed. In December 2007 a brief letter explaining the project, a questionnaire, and a self-addressed return envelope were sent to the 249 identified residents. The questionnaire focused on questions regarding what species of wildlife residents have viewed around the creek or in their yards, which animal(s) they have seen the most of, how often they spend time observing the creek, and whether or not they see people camping in the vicinity of the creek. Residents were also asked if they have pets and how they dispose of pet waste. Questions about transients and pets were asked because these are two possible sources of fecal coliform bacteria that may be controlled.

3.0 Results and Discussion

3.1 Wildlife Surveys

Most of the detailed 100-foot surveys were conducted in the mornings between 7/17/2007 and 7/31/2007; a control site outside the urban area was evaluated on 3/28/08 and two sites were re-surveyed in April 2008. After reviewing the results of the 2007 surveys it was noted that a control or reference site in a less populated watershed had not been evaluated, hence it was conducted in 2008. The local rainfall in summer 2007 was typical for the season and was frequent during the study. All surveys, with the exception of the control site, were conducted within one to two days following a rain event; therefore the tracks and other observable evidence were assumed to be recent. This was not the case for Hatchet Creek (control site) which was evaluated on 3/28/08 following at least one week without rain.

Generally, the banks and stream beds of the urban creeks were fairly similar to each other. Most segments were shaded by the overstory, had high eroding banks, and exotic vegetation was present. Most of the stream beds were composed of shifting sand, organic matter, and gravel. The Hawthorn Group formations, which contain the intermediate aquifer and confining unit, consist of a heterogeneous mix of sands, clays, and carbonates. Outcrops of the Hawthorn Group formations, typically seen in the form of the more resistant clay and carbonate materials, were readily observed in all of the Gainesville urban creeks. The majority of the creeks were meandering, with Possum Creek standing out as particularly sinuous.

Possum Creek

Raccoon Tracks in Hogtown Creek

Animal tracks were found along most areas of the creeks where the substrate was suitable for print formation. In the urban creeks, substrate was often the limiting factor for the presence of tracks, especially in Tumblin Creek, Sweetwater Branch, and Rosewood Branch where gravel, concrete rip-rap, and concrete lined channels dominate the streambeds. Raccoon tracks were prevalent along the entire segment of most of the urban creeks and were the most abundant wildlife tracks observed. The raccoon population along Gainesville's creeks appears to be large and sustaining, as several juvenile tracks were also observed. There were not many opossum tracks noted, however there is the possibility that some of the raccoon tracks recorded were actually misshapen or misidentified opossum tracks.

The number of animal tracks along each of the segments was estimated to give some indication of wildlife use. Tracks observed in one area and appearing to be from the same animal were counted as one. In areas where tracks appeared to be different sizes and from more than one animal, they were counted as such. The use of tracks to evaluate wildlife use has limitations, as it is not easy to determine the number of individuals using an area. Wildlife activity is also a confounding factor, as an area may be frequented by one or several animals many times a day. In this survey of the urban creeks, frequent summer rainfall provided a "clean slate" on which to observe fresh tracks. For Hatchet Creek it had been over a week since a rain event, therefore the large number of deer tracks was representing more than a week of activity. Table 2 presents a summary of the data obtained from the wildlife surveys. These data and detailed comments are presented in Appendix B.

Table 2: Summary of Animal Track Observations

Creek	Number of Tracks Observed							
	Raccoon	**Opossum/ Armadillo**	**Rodent/ Squirrel**	**Bird**	**Cat**	**Deer**	**Dog**	**Human**
Hogtown Creek	11	1	8	2	3	0	9	14
Hogtown Tributaries near Gainesville High School*	4	1	2	3	0	0	1	1
Rattlesnake Branch	10	0	1	0	2	0	10	11
Elizabeth Creek	10	3	8	3	5	0	3	2
Possum Creek	15	3	5	0	3	0	7	7
Tumblin Creek	9	1	5	0	5	0	6	3
Sweetwater Branch	3	0	2	0	0	0	1	1
Rosewood Branch	4	2	6	10	2	0	5	4
Hatchet Creek	6	3	4	0	0	48	0	0

*Includes detailed survey completed on the Un-named Hogtown Tributary and extended survey on Ashley Creek

There was much variability in the number of tracks and the most common animal tracks among the creeks (Figure 2). Raccoon and dog tracks were the most common animal tracks along Tumblin Creek and Possum Creek. Raccoon and rodent (including squirrel) were the most prevalent tracks along Sweetwater Branch and Elizabeth Creek. Bird and rodent tracks were most common along Rosewood Branch. Dog, raccoon, and human tracks were most common along Rattlesnake Branch. Human and raccoon tracks were most common along Hogtown Creek. Deer tracks were the most prevalent tracks along Hatchet Creek and were only noted in this undeveloped watershed. Cat, dog, and human tracks were not noted in the Hatchet Creek survey. Raccoons were one of the most commonly observed tracks in all of the watersheds, and were present in the control survey as well as all of the urban creeks. Hogtown Creek, Rattlesnake Branch, Elizabeth Creek, Possum Creek, and Tumblin Creek all had a greater number of raccoon tracks than Hatchet Creek. The total number of tracks was lowest in the Hogtown Tributaries, Sweetwater Branch, and Hatchet Creek segments for several reasons. The Hogtown Tributaries segment was very short; therefore the segment was under represented. Sweetwater Branch lacked sandy substrate available for imprints. The lower overall use of the creek corridor or lower wildlife population along Hatchet Creek likely accounted for the lower number of tracks observed in the segment.

Abundance of Raccoon Tracks Observed Along Tumblin Creek

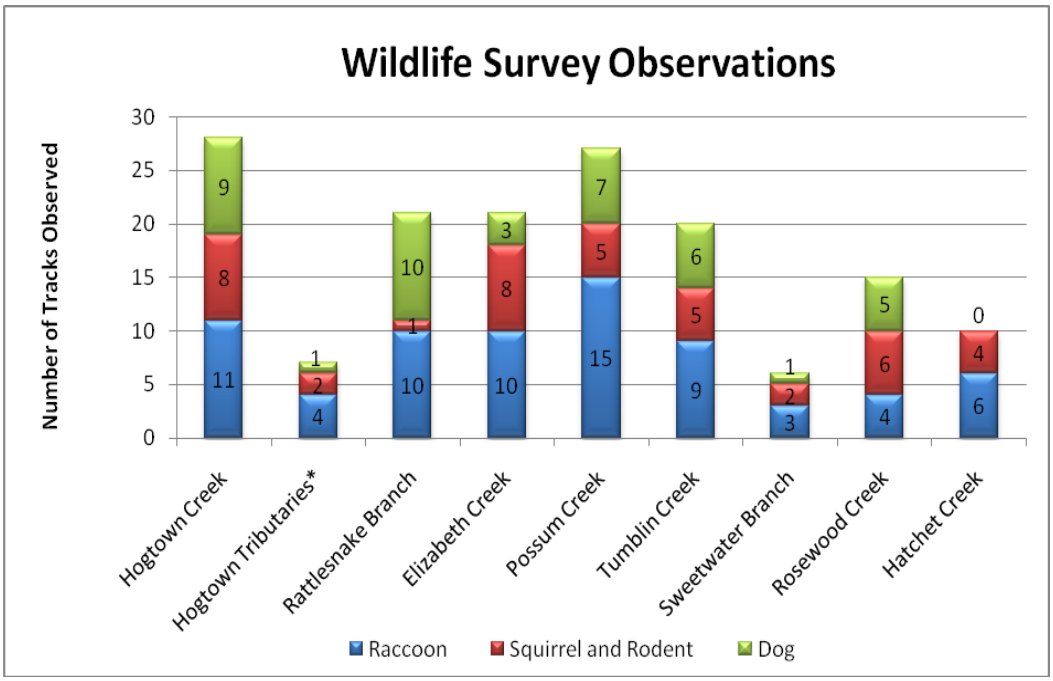
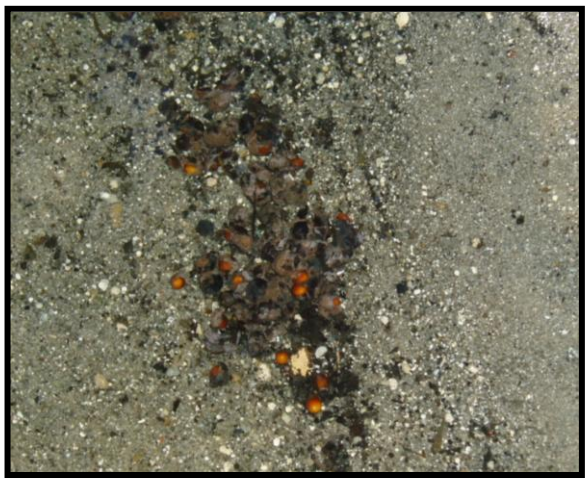


Figure 2. Summary of the Most Common Tracks Observed in the Surveyed Creek Segments
*Includes detailed survey completed on the Un-named Hogtown Tributary and extended survey on Ashley Creek

The level of human impact to each of the urban creeks differed, but all segments showed definite signs of human use. Possum Creek appeared to be the urban creek least impacted by development, with the most intact riparian buffer. The most littered creek observed in the survey was Rosewood Branch which had a large amount of trash throughout the whole segment. Broken pieces of clay pipes, concrete, and asphalt were observed in the urban creeks. Numerous old culverts and rusting pipes, either slightly buried or protruding out of the sediment, were also noted along most of the urban creeks. The Hatchet Creek control site had an intact riparian buffer and showed, by far, the least amount of human impact.

3.2 Fecal Coliform Sampling

The results from the fecal coliform samples collected during each survey are summarized in Table 3. Descriptions of sample locations, individual results, and corresponding flow estimates and rainfall data are included in Appendix C. The creek with the highest fecal coliform concentrations was Tumblin Creek with a median value of 12,400 CFU/100 mL. Possum Creek had the lowest concentration of the urban creeks, with a median value of 980 CFU/100 mL. The Hatchet Creek control site had a median value of 126 CFU/100 mL.



Raccoon Droppings along Tumblin Creek

Table 3: Summary of Fecal Coliform Data

Creek	Fecal Coliform (CFU/100 mL)			Number of Samples
	Median*	Minimum	Maximum	
Hogtown Creek	2,050	1,200	8,200	12
Un-named Hogtown Tributary (HOGGHSN)	NA	1,900	3,100	2
Ashley Creek	NA	1,300	4,700	2
Rattlesnake Branch	1,750	390	19,900	12
Elizabeth Creek	11,400	6,000	16,800	6
Possum Creek	980	272	8,800	12
Tumblin Creek**	12,400	6,000	88,000	8
Sweetwater Branch	1,250	640	2,900	4
Rosewood Branch	2,550	800	3,400	6
Hatchet Creek	126	72	152	4

* Median value cannot be determined from only two results
** Tumblin Creek values do not include resample results on 8/2/2007

As anticipated at the "Hot Spot" locations (excludes Hatchet Creek), levels of fecal coliform exceeded the FDEP single sample maximum of 800 CFU/100 mL in most of the samples collected during this study (Appendix C). The standard of 400 CFU/ 100 mL in 10% of the samples was exceeded in all of the urban creeks. None of the samples from Hogtown Creek, the Un-named Hogtown Tributary, Ashley Creek, Elizabeth Creek, or Tumblin Creek had any values that were below the single sample maximum of 800 CFU/100 mL. Elizabeth Creek and Tumblin Creek had the highest values, with most of the results above 10,000 CFU/100 mL. Possum Creek had the lowest number of exceedances out of the urban creeks, with half of the 12 samples below the single sample maximum of 800 CFU/100 mL.

Hatchet Creek, the control site, had much lower levels of fecal coliform bacteria. All four samples obtained from Hatchet Creek during the March 2008 assessment were below 200 CFU/100 mL, meeting both FDEP fecal coliform standards. There are a number of factors likely affecting the lower fecal coliform levels in Hatchet Creek including preceding rainfall, the undeveloped nature of the watershed, and the lack of wastewater infrastructure (septic and collection systems).

Stream flow can also be a factor affecting levels of fecal coliform. In the Gainesville urban area there is considerable wastewater collection system infrastructure and septic tank systems in close proximity to the creeks which may serve as sources of fecal coliform. When stream flow is low, these sources are not diluted and may result in increased concentrations of fecal coliform bacteria. The stream flow in the urban creeks ranged from too low to measure to 3.28 cubic feet per second (cfs), with the highest estimated flow reported for Sweetwater Branch. For comparison, the flow at Hatchet Creek was estimated to be 0.32 cfs.

3.3 Residential Questionnaire

The letter of explanation and residential questionnaire was sent to 249 creekside residences in December 2007 (Appendix D). ACEPD received 91 completed questionnaires and ten questionnaires came back returned as undeliverable either due to an insufficient address or vacant houses. The 37% response rate is high for a citizen survey. The largest number of resident

responses came from Possum Creek with 21 resident responses and Sweetwater Branch with 20 responses (Table 4). ACEPD received only one response from Rosewood Branch residents. A summary of the questionnaire results are provided in Appendix E.

Table 4: Most Commonly Observed Animals Based on the Residential Questionnaire

Creek	Most Commonly Observed Animals			Number of Survey Respondents
	First	Second	Third	
Hogtown Creek	Raccoons	Birds	Squirrels	14
Hogtown Tributaries near Gainesville High School	Cats	Raccoons	Opossums	7
Rattlesnake Branch	Raccoons	Birds	Opossums	15
Elizabeth Creek	Raccoons	Birds	Opossums/ Squirrels	6
Possum Creek	Raccoons/ Birds	Opossums	Cats	21
Tumblin Creek	Cats	Birds	Dogs/ Raccoons	4
Sweetwater Branch	Birds	Cats	Dogs	20
Rosewood Branch	Cats/Dogs	NA	NA	1

NA = Not Applicable
Birds includes songbirds, wading birds, and birds of prey
The creek system could not be determined for three of the surveys.

Raccoons were reportedly sighted most frequently followed by birds (including songbirds, wading birds, and birds of prey), cats, and opossum. Other wildlife observed included: dogs, rodents (mice, rats, and squirrels), rabbit, fox, deer, turkey, coyote, armadillo, tortoise, snakes, and a few sightings of otters and alligators. Domestic animals (cats and dogs) were most frequently observed in the Sweetwater Branch watershed (Figure 3). This is likely in part due to the parks and common areas present along the creek. Figure 3 shows how common wildlife sightings are along the urban creeks, respondents indicating that wildlife sightings are more common than domestic pets in all but two watersheds, Tumblin Creek and Rosewood Branch.

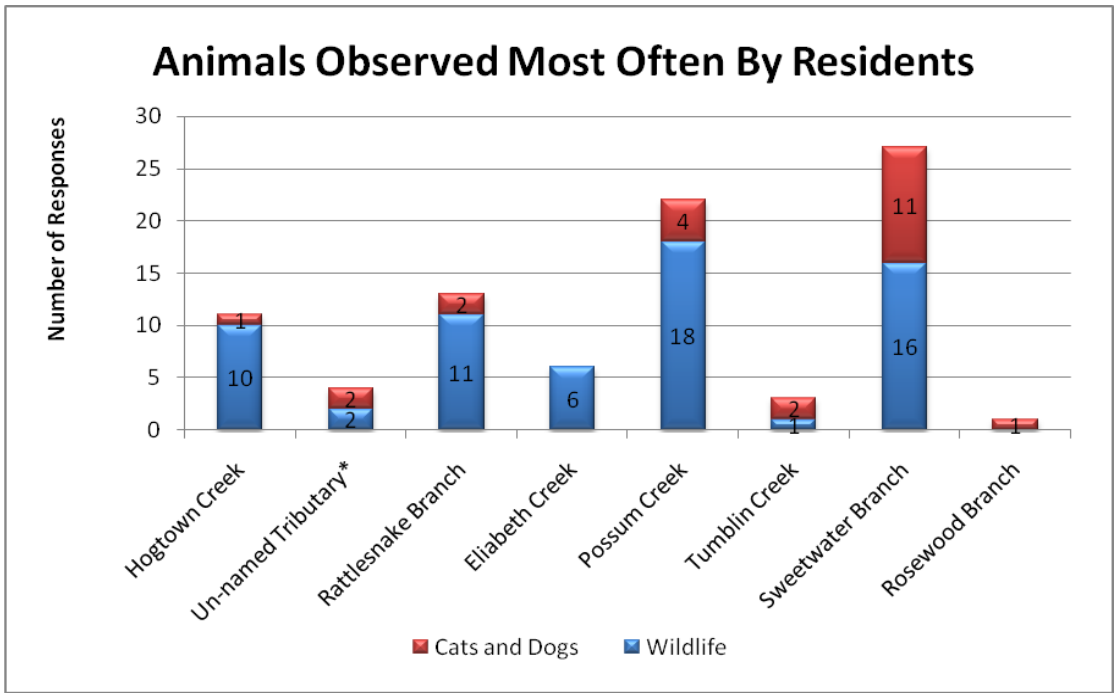


Figure 3. Summary of the animals observed most often by residents
*Un-named Hogtown Tributary near Gainesville High School

Among the residents who completed the questionnaire, 43 respondents (47%) stated they have outside dogs and/or outside cats (Appendix E). Residents responded with a variety of pet waste disposal methods. Of the methods used to dispose of pet waste 12 stated they left the waste on the ground, 11 respondents stated they put their pet waste in the trash, five buried it, two used litter boxes (cats), and one used a pet waste composter. Combinations of these disposal methods are used by 12 residents.

Area residents observed transient camps near the creeks. It was reported that 21 people, approximately 23%, have seen some sort of transient activity along these sections of the creeks (Appendix E). Transient camps were observed mostly along Sweetwater Branch, Rattlesnake Branch, and Elizabeth Creek near the Arboretum. Wildlife survey and residential questionnaire results varied among the creek segments and are addressed on a creek by creek basis in the following sections.

3.4 Hogtown Creek

The detailed survey was conducted on 7/31/2007 and began at the confluence with Rattlesnake Branch (upstream of NW 22nd Street) and continued upstream approximately 100 feet.

Hogtown Creek Upstream of the Confluence with Rattlesnake Branch

Although the survey did not officially begin until the confluence, staff noted many tracks from raccoons, dogs, squirrels, a titmouse, and an armadillo near the bridge at NW 22nd Street. Upstream of the confluence with Rattlesnake Branch, most of the creek was shaded by a moderate canopy cover. The banks were high, eroded, and vegetated with exotics and natives. The bottom of the creek was comprised of shifting sand, silt, pebbles, root mats, and outcrops of the Hawthorn Group. The tracks observed were three raccoon tracks, an armadillo, a titmouse, a grey squirrel, a small bird, bucket prints, and three human footprints with one person walking barefoot. Some trash was found along the 100-foot section, mainly bottles (glass and plastic), small bags, and wrappers. Table 5 presents a limited list of wildlife either seen or heard during the detailed survey; original field notes for this site were misplaced. Hogtown Creek was re-evaluated at NW 16th Avenue, the location where the extended survey began, and field notes from this second detailed survey are included in Appendix A.

Table 5: Wildlife Species Identified During Detailed Survey of Hogtown Creek on 7/31/2007

Identified Wildlife Species
Yellow-billed coo-coos
Woodpecker
Cardinal
Ruby spot damselfly
Swallowtail butterfly
Cicadas

The extended survey was conducted on 8/6/2007 and began at Alfred Ring Park at ACEPD's routine monitoring station (HOGNW16) and continued approximately 0.7 miles upstream to the bridge at NW 23rd Avenue near Creeks Edge Condominiums (HOGNW23), which is also a routine monitoring station. This segment of Hogtown Creek was surrounded by a well developed overstory and an understory dominated by palmettos and ferns. On the west side of the creek, a cleared foot path and boardwalk segments were within five feet of the creek. There were also many heavily used side trails that led to the creek. The banks were vegetated with invasive exotic species as well as some natives. The creek bottom was composed of shifting

sand, silt, some pebbles, and organic matter. Toward the end of the survey, staff observed exposed Hawthorn Group outcrops and root mats.

It was difficult to determine the number of raccoons, but tracks of varying size were found along the entire creek segment. Human, squirrel or rodent, dog, cat, and possible opossum tracks were noted. The total number of tracks observed included approximately 11 sets of raccoon tracks, nine sets of dog prints, eight squirrel or small rodent tracks, three sets of cat tracks, two bird tracks, one set of opossum tracks, and many human footprints. Tracks along this walk were an accumulation of two days of use since the last rain event occurred two days prior to the survey. Three or more cardinals were also observed. Several large fish, two frogs, odonate larvae, and Asiatic clams were also seen; however these do not contribute to fecal coliform levels.

Raccoon Droppings near Hogtown Creek

Sign Posted on Boardwalk in Alfred Ring Park, Advising Visitors to Clean up their Pet's Waste

Compared to the other surveyed creeks, Hogtown Creek appeared to have the most direct human contact but appeared to be softly used in most areas. One person walked from NW 16th Avenue to the Glen Springs Tributary barefoot with a dog. Staff heard a few dogs barking from several different locations in close proximity to the creek. Staff also observed two people walking dogs along the foot path in the park; one of the dogs had recently been swimming in the creek. The litter along the creek was minimal, however decaying shopping carts, tennis balls, basketballs, tires, part of a television, wrappers, bottles, and other bits of junk were observed.

Twelve water samples from Hogtown Creek were analyzed for fecal coliform, all of which exceeded the state's one time maximum standard of 800 CFU/100 mL. The median fecal coliform value was 2,050 CFU/100 mL. The minimum value was 1,200 CFU/100 mL and the maximum was 8,200 CFU/100 mL.

Fourteen residents living along Hogtown Creek returned completed surveys, comprising 15% of the total number of surveys received by ACEPD. The most observed wildlife included (in descending order): raccoons, songbirds, owls, squirrels, and cats. A few residents also stated they have seen birds of prey, an armadillo, and opossum. Only three of the 14 residents (21%) stated they have outside pets. All three reported disposing of pet waste by leaving it on the ground and /or putting it in the trash.

3.5 Hogtown Tributaries near Gainesville High School

3.5.1 Un-named Hogtown Tributary

The detailed survey was conducted on 7/31/2007 on an Un-named Hogtown Tributary located north of Gainesville High School. The detailed 100-foot section survey began in the Hobbit's Glen neighborhood at one of ACEPD's routine monitoring stations (HOGGHSN). The creek was surrounded by a forested riparian area with an understory dominated by palmetto and ferns. The banks were hilly, slightly eroded, and covered with vegetation dominated by exotic air potato. The creek bottom was composed of shifting sands and pebbles. Due to the lack of sand bars, not many tracks were found. Tracks staff did observe belonged to raccoons (including juveniles), birds, squirrels, and an armadillo. Also a nearby dog was heard. Very little trash was found during the survey. The detailed survey was terminated at the culvert at NW 16th Terrace where the creek became a large pool. Table 6 presents a limited list of wildlife either seen or heard during the detailed survey; original field notes for this site were misplaced. The site was re-evaluated and field notes from this detailed survey are included in Appendix A.

Un-named Hogtown Tributary at HOGGHSN

Table 6: Wildlife Species Identified During Detailed Survey of the Un-named Hogtown Tributary on 7/31/2007

Identified Wildlife Species
Morning doves
Carolina wren
American crow
Cardinals
Damselflies
Dragonflies
Jewel winged dancer
Bluetop dancer
Odonate larvae
Butterflies
Bronze Frog

3.5.2 Ashley Creek

The extended survey was conducted on 8/6/2007 on Ashley Creek, a tributary of Hogtown Creek located south of Gainesville High School. The two small tributaries are very close in characteristics and surrounding land use. The survey began upstream of NW 16th Terrace and continued as far upstream as staff could access. The creek was surrounded by dense forested riparian vegetation and the banks were steep and eroded throughout most of the segment. The creek bottom consisted of sand, silt, and organic matter near NW 16th Terrace and was covered by rocks and concrete rubble upstream. Several raccoon tracks and one set of human footprints and clothing were found along the creek. One frog was also seen in the creek; however frogs do not contribute to fecal coliform levels.

Ashley Creek Upstream of NW 16th Terrace

3.5.3 Fecal Coliform Sampling and Residential Questionnaire

The samples collected at ACEPD's routine monitoring station HOGGHSN resulted in values of 1,900 and 3,100 CFU/100 mL. The samples collected from the end of the extended survey in Ashley Creek resulted in values of 1,300 and 4,700 CFU/100 mL. All of these values exceed the state's one time maximum standard of 800 CFU/100 mL.

ACEPD received seven completed questionnaires from residents living along the Un-named Hogtown Tributary, comprising approximately eight percent of all residents who responded to the survey. The animals residents most observed along this section were cats, raccoons, and opossums. Only one person stated they owned a pet and that they leave their pet's waste on the ground. One person stated seeing transients along this section of the creek.

3.6 Rattlesnake Branch

The detailed survey of Rattlesnake Branch was conducted on 7/23/2007 and began at the confluence with Hogtown Creek (RATUSHOG) and continued upstream approximately 100 feet. The canopy cover in this area was dense and dominated by natives, including oak and hickory. The banks were steep and eroded with many biking and hiking trails on the upper portions of the banks. The creek bottom in this section was comprised of shifting sand, pebbles, and outcrops of the Hawthorn Group. One set of raccoon tracks and one set of squirrel tracks were noted. This area is commonly used by off road bicyclists and hikers, however little trash was observed. The wildlife seen or heard is listed in Table 7.

Wastewater Line Crossing Rattlesnake Branch

Table 7: Wildlife Species Identified During Detailed Survey of Rattlesnake Branch on 7/23/2007

Identified Wildlife Species
Red-bellied woodpecker
Northern cardinal
Tufted titmouse
Carolina wren
Blue jay
Gambusia (mosquito fish)
Odonate larvae in sandy areas
Damselflies - variable dancer, ebony
Jewelwing, purple dancer

The extended survey continued upstream to NW 12th Street (RATGSHUT) and was a little over a mile long. The entire segment was similar to the shorter section in geologic and landscape features, although portions of the creek were gorge like with high walls of Hawthorn Group materials and a narrow creek bed. These areas had very little surface area for tracks. The other areas along the creek segment had a large number of sand bars which provided staff with tracks to identify. Tracks from one squirrel or rodent, two cats, possibly eleven dogs and eleven humans, and ten or more raccoons were noted. All of these tracks were fresh due to rainfall the day prior to the

Section of Rattlesnake Branch with Gorge like Walls

survey. One dead animal was found in the creek and was likely a domestic cat. A rabbit den with rabbits inside was noted along with one large barred owl. Two frogs, crayfish, and odonate larvae were also observed, however these do not contribute to fecal coliform levels.

The litter accumulation along the creek was fairly minimal until the end of the survey where staff observed large amounts of glass and plastic bottles, bags, clothes, shopping carts, tires, and blankets. Based on the type of debris and local knowledge, this area was identified as a transient camp, although it is unknown if it was populated during the survey.

Microbial Growth in Tributary of Rattlesnake Branch

One tributary located near a wastewater line crossing had a pinkish microbial growth. The fecal coliform samples from this tributary were high (RATNW8TRIB = 19,900 and 9,900 CFU/100 mL). A wastewater release from the collection system was not reported; however staff notified Gainesville Regional Utilities (GRU) and asked them to investigate the integrity of the wastewater collection system in this area. The median fecal coliform value of the 12 samples collected for Rattlesnake Branch was 1,750 CFU/100 mL. The minimum value was 390, while the maximum was 19,900 CFU/100 mL. One third of the samples were below the one time maximum standard of 800 CFU/100 mL.

Fifteen residents living along this section of the creek responded to the resident surveys. Wildlife most observed by residents included (in descending order): raccoons, birds, opossums, rabbits, and dogs. Ten of the fifteen respondents (67%) stated they own outside pets, four of these residents responded that they leave their pet's waste on the ground, and four put it in the trash. Evidence of transients was reportedly observed by six of the fifteen residents (40%).

Owl Observed during Rattlesnake Branch Wildlife Survey

3.7 Elizabeth Creek

The detailed survey was conducted on 7/30/2007 and began where Elizabeth Creek emerges from a culvert on the south side of University Avenue (ELIZUNIVUS) and proceeded downstream to the culvert at University Avenue where the creek flows to the north back under the road (ELIZUNIV). Covered canopy areas had a combination of native and nonnative trees; however portions of the canopy were cleared as part of a manicured yard. The creek banks were low with large amounts of sandy sediments from road construction and recent rain events. The creek bottom was mostly sandy with small amounts of trash. This section of the creek winds behind the President's house on the University of Florida campus. There was a concrete patio located adjacent to the creek, and the ground beneath it was eroded. The manicured yard encroached upon the creek, and there were foot bridges and trails winding around the creek. There were also various pipes, likely roof drains, located next to the creek patio. An armadillo was spotted walking next to the creek, and a deceased armadillo was also found next to the culvert at the end of the detailed survey. The tracks observed were from raccoons, armadillos, a heron, squirrel, songbird, and a human (possibly from construction). Table 8 presents the wildlife heard or seen during the detailed survey.

Concrete Patio behind University of Florida President's House

Table 8: Wildlife Species Identified During Detailed Survey of Elizabeth Creek on 7/30/2007

Identified Wildlife Species
Armadillo – one alive and one deceased
Blue-grey gnatcatcher
Northern mockingbird
Tufted titmouse
Downy woodpecker
Northern cardinal
Carolina wren
Great-crested flycatcher
Gambusia (mosquito fish)
Small nonnative orange-yellow fish
Grey squirrel
Brown anole
Five-lined skink
Small spirral aquatic snails
Ebony jewelwing

Water and Wastewater Lines Crossing Over Elizabeth Creek

The extended survey began at NW 7th Road (ELIZNW7) and extended approximately half a mile upstream to the arboretum at University Avenue. This section of the creek is generally surrounded by a well developed overstory and understory. However, several houses are located close to the creek and have manicured yards five to ten feet away from the creek. There were several locations in the riparian areas that were either covered in vines, had large bamboo stands, or had an understory dominated by ferns. The banks were steep and eroded with exposed roots; there were also several attempts at bank reinforcement near the houses. A limited amount of trash was observed in Elizabeth creek.

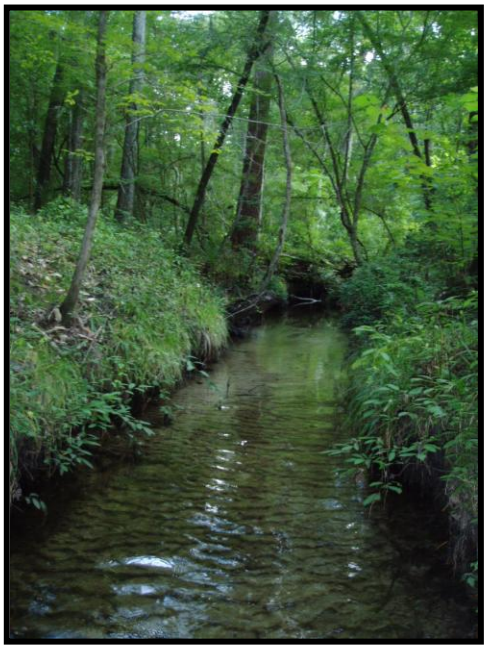
The tracks noted appeared to come from approximately ten or more raccoons (possibly a few families), three armadillos, three dogs, five cats, eight squirrels or rodents, and a possible fox or coyote. Staff also observed a squirrel, a dog (in a fenced yard close to the creek), and a burrow. Odonate larvae, crayfish, and dragonflies were also observed; however they do not contribute to fecal coliform bacteria.

Wading Bird Tracks from Detailed Survey

Most of the tributaries or small springs and seeps were dry or too low and slow moving to collect water column samples or velocity measurements. At the one tributary with adequate flow (ELIZTRIB1), staff collected water samples which had high fecal coliform results (10,800 and 12,000 CFU/100 mL). This tributary is part of ACEPD's routine water quality monitoring program, but is usually sampled further upstream. Elizabeth Creek at University Avenue (ELIZUNIVUS) also had high fecal coliform results (16,800 and 12,400 CFU/100 mL). The median fecal coliform value for the 6 samples collected on Elizabeth Creek was 11,400 CFU/100 mL. The minimum value was 6,000 and the maximum was 16,800 CFU/100 mL. All of the samples exceeded the state's one time maximum standard of 800 CFU/100 mL.

Six neighborhood residents returned completed questionnaires. Wildlife most often observed by residents were raccoons and songbirds with a few residents stating they had also seen a number of squirrels, owls, opossums, and hawks. Four out of the six respondents reportedly owned outside pets. Some of the methods of pet waste disposal included leaving it on the ground, putting it in the trash, and burying it. Three residents responded as having seen evidence of transients around the creek, especially around the arboretum.

3.8 Possum Creek



Possum Creek Upstream of NW 36th Drive

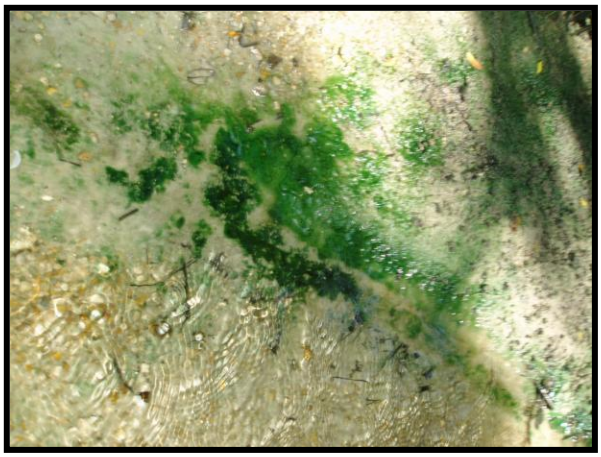
The detailed survey of the Possum Creek section was conducted on 7/23/2007 and began at NW 36th Drive (POSNW36) in the Rock Creek neighborhood and continued upstream approximately 100 feet. During the detailed survey, staff noticed the creek was virtually free of trash. The absence of trash was in stark contrast to some of the previously surveyed urban creeks. This section of the creek was surrounded by a dense canopy cover of mostly native trees, such as sugarberry and hickory. There was a large buffer between the creek and residential areas. The creek banks were steep and eroded. The bottom was sandy and rocky; however there were limited areas to observe tracks. Recent raccoon tracks and possible armadillo tracks were observed under and close to the culvert at NW 36th Drive. These tracks were fresh due to rain the evening before the survey. Table 9 presents the wildlife staff observed or heard during the detailed survey.

Table 9: Wildlife Species Identified During Detailed Survey of Possum Creek on 7/23/2007

Identified Wildlife Species
Red-eyed vireo
Red-bellied woodpecker
Northern cardinal
Tufted titmouse
Carolina wren
Gambusia (mosquito fish)
Crayfish
Grey squirrel
Bronze frog
Brown anole
Green anole
Water striders
Asiatic clams
Odonate larvae in sandy areas

The extended survey, conducted on 7/25/2007, began at NW 36th Drive (POSNW36) and ended approximately one mile upstream at NW 39th Avenue (POSNW39). A resident of the Rock Creek subdivision spoke with staff and told them his dog often played in the creek. The creek was meandrous and shaded by a wooded overstory. The banks were steep, high, eroded, and vegetated with natives as well as exotics (taro). Woody vegetative debris snags were found in the creek throughout the entire survey. The creek bottom was a mixture of shifting sand, silt, organic matter, and pebbles with outcrops of the Hawthorn Group along the bank and streambed.

There were areas with large amounts of organic matter which often caused staff to sink deep into the substrate. Many areas of the creek had a strong sulfur smell, indicating low oxygen levels, and in some areas bright green algae were growing on sand bars or around culverts.



Green Algae Growing on Sand in Possum Creek

Raccoon tracks and evidence of scratching were found throughout the walk, indicating high raccoon activity. A large number of empty clam shells were observed near the raccoon tracks. Dog tracks were found but mainly in areas near houses. Cat, squirrel, rodent, and human tracks were also observed. The largest number of tracks was from raccoons, followed by dogs and humans. Water striders and Asiatic clams were found in abundance; however they do not contribute to fecal coliform bacteria.

There were some houses located near the creek and a few right next to the creek. There were a few large wooden platforms and patios built at the creeks edge, as well as many pipes leading to the creek. Many of the pipes were PVC, approximately 2 inches in diameter, and are likely for pumping water from the creek to nearby yards for irrigation purposes. Overall the houses along the surveyed creek section were scarce and the creek had a natural vegetated buffer. Bank deterioration was observed as staff began to approach the end of the survey near NW 39th Avenue. Also noted was an increase in the volume of trash and number of houses located closer to the creek in this area.

Staff noticed feces, likely dog, in the creek and took a sample downstream of it (POS39DS) to see if it would result in elevated fecal coliform results. The duplicate values were both 8,800 CFU/100 mL, which was high compared to the other samples collected in this creek (272 to 3,000 CFU/100 mL). The median fecal coliform value was the lowest (980 CFU/100 mL) for Possum Creek compared to the other urban watersheds surveyed. Six of the 12 samples collected exceeded the state's one time maximum standard of 800 CFU/100 mL.

Twenty one completed questionnaires were returned by residents living around the surveyed segment of Possum Creek. This response rate comprises 23% of the total surveys received by ACEPD. Residents stated seeing a wide variety of wildlife including: raccoons, opossums, songbirds, owls, cats, birds of prey, squirrels, turkey, fox, deer, snakes, armadillo, and rabbits. Of the 21 respondents, 12 stated they owned outside pets and disposed of pet wastes in a variety of ways. Disposal methods included burying it, throwing it in the trash, leaving it on the ground, composting it, or flushing it down the toilet. Only three (14%) residents stated they observed transients around the creek.

3.9 Tumblin Creek

The detailed 100-foot section of the Tumblin Creek survey was conducted on 7/30/2007 and was started just south of the St. Croix Apartment complex off of SW 5th Avenue and extended upstream to the culvert at SW 5th Avenue (TUMSW5). The apartment complex is on the east side of the creek and several older homes are on the west side of the creek. A bird feeder was spotted in a tree on the edge of the riparian zone and there were several areas where human use was obvious. The shade creating canopy consisted of mainly exotic trees (chinaberry and loquat) with some natives (sugarberry and hickory). The understory was covered by exotic vines. The creek banks were steep and highly eroded with exposed roots. The creek bottom was covered with brick, construction debris, and trash. A sulfur smell was observed in this area. The root mats along the creek bottom were thickly coated with silt and sediment. Tracks observed included at least five raccoons, four cats, and one squirrel. Table 10 presents the wildlife seen or heard during the detailed survey.

Wastewater Line Crossing Tumblin Creek at TUMSW5

Table 10: Wildlife Species Identified During Detailed Survey of Tumblin Creek on 7/30/2007

Identified Wildlife Species
Blue-grey gnatcatcher
Northern mockingbird
Northern cardinal
House finch
Carolina wren
American crow
Gambusia (mosquito fish)
Small nonnative orange-yellow fish (probably a platy of some kind)
Crayfish (3)
Grey squirrel
Brown anole
Small spirral aquatic snails
Odonate larvae in sandy areas
Asiatic clam

The extended survey was conducted on 7/31/2007 at ACEPD's routine water quality monitoring station just upstream of SW 9th Street (TUMSW9) and continued upstream to TUMSW5 where the creek disappears under the Shands at AGH parking lot. The survey segment was approximately 0.8 miles. The culvert at TUMSW9 was extremely rusted (leaving it looking like Swiss cheese). There were several apartment buildings with manicured yards and parking lots at the top of the banks. Trees located along the banks provided shade for the creek. The creek

banks were high, steep, and eroded with exposed roots throughout. There were several areas with concrete bank stabilization and a large amount of concrete rubble was located directly downstream of the culvert at Depot Avenue. The stream bottom consisted of rock, gravel, and bricks, with shifting sand, silt, and brownish algae.

White Wash Observed Along Tumblin Creek

Staff observed a turtle, six large frogs, a cattle egret, and a koi or goldfish. Many tracks were found along the portions of the creek with substrate suitable to support prints. There appeared to be at least one family of raccoons (with young), squirrels or rodents, an armadillo, many different human tracks, at least two different dog tracks, possibly a few cat tracks, and some bird tracks. Many birds, including a hawk, were heard throughout the survey. The actual number of tracks along this section was extremely hard to estimate due to the large volume of tracks found and the high use of these areas by wildlife and humans.

This area appeared to be used by the transient population, as evident by a person sleeping on a blanket and a sleeping bag hanging in the trees. While walking the section near the tributary in Tumblin Park (TUMPARKTRIB), staff observed a temporary GRU sign (appearing old and weathered) warning of a sewage release and possible contamination to the creek. This sign was cautioning people to stay out of the creek for health reasons. Large volumes of trash were found scattered along the entire section of the creek.

Fecal coliform results were extremely high downstream of Depot Avenue at TUMBPDS on 7/31/2007 (71,600 and 88,000 CFU/100 mL). The samples were colleted downstream of a spillway directing runoff from the parking lot of an apartment complex. Numbers this high are usually indicative of recent fecal contamination. The site was re-sampled on 8/2/2007 (8,400 and 4,900 CFU/100 mL). Although the fecal coliform results remained high, they were an order of magnitude lower compared to the first sample date. The median fecal coliform value for the eight samples collected on Tumblin Creek on 7/31/2007 was 12,400 CFU/100 mL. All of the samples exceeded the state's one time maximum standard of 800 CFU/100 mL with the minimum concentration of 6,000 and the maximum of 88,000 CFU/100 mL.

Orange Growth, Likely Iron Bacteria, at Spillway Outfall with Elevated Fecal Coliform Concentrations (TUMBPDS)

ACEPD received four completed questionnaires from Tumblin Creek residents. The wildlife most often observed by residents included cats, birds, raccoons, and dogs. Two of the four were pet owners and both of the pet owners stated that they leave their pet's waste on the ground. Only one resident stated that they had seen some evidence of transient activity in the creek.

3.10 Sweetwater Branch

ACEPD Staff Conducting Detailed Survey of Sweetwater Branch

The detailed wildlife survey of Sweetwater Branch was conducted on 7/17/2007 and began at SE 1st Avenue (SWBSE1) and continued approximately 100 feet upstream to University Avenue. This section of the creek is located in Sweetwater Branch Park and was surrounded by an open canopy of live oaks, pines, and sweetgums. The banks were steep and covered with vegetation, both native and exotic. The creek bottom in this segment was mostly composed of concrete rubble with rooted vegetation. The physical characteristics of this streambed made it difficult to observe wildlife tracks. However, raccoon tracks, squirrel or rodent tracks, human footprints, and breadcrumbs were observed next to and in the culvert at University Avenue. Clothing, shopping carts, and blankets were noted along the banks, indicating the use of this area by the transient community. Table 11 lists the wildlife seen or heard during the detailed survey.

Table 11: Wildlife Species Identified During Detailed Survey of Sweetwater Branch on 7/17/2007

Identified Wildlife Species
Blue jay
Mockingbird
House finch
Carolina wren
Mockingbird or blue jay nest
Gambusia
Nonnative small fish (probably a platy of some kind)
Large tadpoles
Grey squirrel (2)
Large numbers of small aquatic snails

The extended survey was continued to NW 10th Avenue and NE 2nd Street (SWBNE2) and was approximately 0.85 miles in length. This section of the creek is located in a residential area. There were few trees and five to ten feet of mowed grass between the streets and the creek. The banks were generally low with large rocks lining both sides of the creek in many areas. The creek bottom was mostly sand or concrete rubble.

Bird's Nest Observed near Sweetwater Branch

Wastewater Line Cleanout next to Sweetwater Branch

Three people were seen walking their dogs in the vicinity of the creek. The total number of observable raccoon tracks appeared to be from two different raccoons. There were also pinecone scales in the creek and on the bank, likely left behind by squirrels. Many birds were seen and heard along with one nest in close proximity to the creek. No bird tracks or bird waste were observed during the survey. However, the majority of this creek segment was not conducive for track finding due to the lack of sandbars and/or fine-grained Hawthorn Group derived sediments.

Between NE 4th Street and NE 5th Street there was a cleanout pipe for a lateral wastewater line with its cap removed. There was evidence that wastewater had recently been released from this pipe into the creek. ACEPD worked with the homeowner and GRU to see that the pipe was repaired. Unfortunately, a fecal coliform sample was not collected directly downstream of this wastewater line cleanout.

The median value of the four samples collected from Sweetwater Branch was 1,250 CFU/100 mL. The minimum value was 640 and the maximum was 2,900 CFU/100 mL. Half of the samples exceeded the state's one time maximum standard of 800 CFU/100 mL.

Sweetwater Branch residents had one of the largest neighborhood responses with 20 completed questionnaires returned to ACEPD. Of the residents who responded to the survey, half of them owned outside pets and the majority of them stated that they dispose of their pet's waste by putting it in the trash. Area residents also noted the observation of transients near the creek. Six of the 20 residents (30%) stated they have seen evidence of possible transient camps. Wildlife most often seen by residents included birds, cats, and dogs.

3.11 Rosewood Branch

Trash Accumulated along Rosewood Branch

Rosewood Branch flows through southeastern Gainesville and was by far the most littered creek in this study. Trash found in and around the creek included a vacuum cleaner, microwave, old culverts, a large volume of coffee cans, bike tires, televisions, a refrigerator, dead fish (non-native to the creek), crab claws, chicken bones, old cages, shopping carts, car tires, a large amount of cans, glass, and plastic bottles, and other random objects. It did not appear that there were many transients living along this creek, although some assorted items of clothing were found.

Rosewood Branch Upstream of SW 7th Avenue

The detailed survey was conducted on 7/17/2007 and began at SW 7th Avenue and continued upstream for approximately 100 feet. The canopy contained live oaks, laurel oaks, pecans, and sweetgums. The majority of mid and understory species were nonnative. There was a very high level of human impact with yards and fences adjacent to creek banks. Large amounts of trash were found in the water and on the banks. A mobile home was parked next to the creek with a trail and a PVC pipe leading towards the creek. The pipe was investigated at a later date and appeared to be inactive. Several dogs and cats were in the area during the detailed survey. Several pecan trees along the banks appeared to be supporting large numbers of walnut moths or similar species of caterpillars that were depositing large amounts of waste into the creek; however this does not contribute to fecal coliform concentrations. The total number of tracks identified during the detailed survey included: three dogs, one or more raccoons, one or more cats (and cat scat found), at least one set of human foot prints, and one set of possible fox prints. Table 12 lists the wildlife that was either seen or heard during the detailed survey.

Table 12: Wildlife Species Identified During Detailed Survey of Rosewood Branch on 7/17/2007

Identified Wildlife Species
Squirrel
Leopard frog
Gambusia and exotic fish (orange platy?)
Dead fish (possibly a warmouth)
Domestic dogs (3)
Domestic cat
Northern cardinal
Bluejay
Great-crested flycatcher
Red-bellied woodpecker

The extended survey began at the confluence with Sweetwater Branch and extended upstream to SR 331 and was approximately half a mile in length. Many areas of the creek were surrounded by a well developed canopy and understory; however there were also several houses near the creek with manicured yards adjacent to the creek bank. The banks were generally steep and vegetated, dominated by exotic species. The creek bottom was mostly sand throughout the entire section. Tracks noted included at least one (probably more) set of raccoon tracks, a few dog prints (and several dogs were heard), a large number of bird tracks, two sets of armadillo tracks, and roughly six sets of squirrel or rodent tracks.

Five of the six fecal coliform samples collected on Rosewood Branch exceeded the state's one time maximum standard of 800 CFU/100 mL. The median fecal coliform value was 2,550 CFU/100 mL. The minimum value was 800 and the maximum was 3,400 CFU/ 100 mL. The fecal coliform results downstream of the caterpillar waste (2,300 and 3,100 CFU/100 mL) were similar to the results elsewhere in Rosewood Branch. As expected, the insect fecal matter did not appear to have any impact on fecal coliform bacteria concentrations

Only one resident survey for Rosewood Branch was returned answered. The resident was a non-pet owner, spent time observing the creek once or twice a week, had not seen any evidence of transient camps, and most often observed cats and dogs around the creek.

3.12 Hatchet Creek

For comparison purposes, a section of Hatchet Creek in the Newnans Lake Conservation Area Hatchet Creek Tract was surveyed on 3/28/2008. The detailed survey began at ACEPD's sampling station HATCONC extended approximately 100 feet upstream. This area is very rural in character and was chosen to serve as a control location. The floodplain forest buffering the creek was in good condition. The canopy coverage was about 70 – 80% in the study area and consisted of bald cypress, swamp laurel oak, sweetgum, pop ash, black gum, red maple, and swamp bay (all native species). The wildlife throughout the detailed survey was very diverse. Based on the animal tracks observed and scat, deer were the most abundant wildlife, followed by raccoons and rodents. Three piles of deer scat were observed within five feet of the creek and one was 15 feet away. Wildlife seen or heard during the detailed survey is listed in Table 13. No trash was observed during the detailed survey; however one old bottle was found during the extended survey.

Hatchet Creek at HATCONC

Table 13: Wildlife Species Identified During Detailed Survey of Hatchet Creek on 3/8/2008

Identified Wildlife Species
Grey squirrel
Gambusia (mosquito fish)
Red-eyed vireo
Northern parula
Great-crested flycatcher
Blue-grey gnatcatcher
Tufted titmouse
Downy woodpecker
Northern cardinal
Carolina wren
Red-shouldered hawk
Red-bellied woodpecker
Bluejay
White-eyed vireo
Carolina chickadee
Ruby-crowned kinglet
Ruby-throated hummingbird
Belted kingfisher
Wood duck (Two in creek)
Palamedes swallowtail
Viola's wood-satyr
Lots of mosquitos and ticks

The extended survey was conducted on the creek for approximately 0.5 mile upstream of HATCONC. The entire section meandered through a wide floodplain with evidence of high stage braided channels, some dry and some with water. There were several small tributaries; however they were either disconnected or not flowing at this time. The riparian area had a good canopy cover with an understory dominated by spike grass near the creek and palmetto 10 to 20 feet away from the creek. Also observed near the creek were: two kinds of moss, swamp lily, and fetterbush. Further upstream, live oaks became more dominant. Banks were generally two to three feet high, steep, and covered with spike grass. Several areas had low banks sloping into the creek with sand bars exposed. The creek bottom consisted of a mix of mud and sand and was covered with silt and organic matter. The water was tannic. There were limited areas to observe tracks along the creek's edge but many areas within the floodplain had exposed muddy ground to look for animal tracks.

Forested Floodplain Surrounding Hatchet Creek

Two water samples were collected at the beginning and at the end of the survey. The results for the two samples from the downstream end of the survey were 124 and 128 CFU/100 mL. The results for the two samples from the upstream end of the survey were 72 and 152 CFU/10 mL. All of the samples were below the state's one time maximum standard of 800 CFU/100 mL. There were no residents in this area; therefore there were no questionnaire results.

Deer Rub on Trees along Hatchet Creek

Deer Scat near Hatchet Creek

4.0 Summary and Conclusions

The wildlife survey provided a snap shot in time and combined fecal coliform analyses of water samples with observational data in an attempt to determine the relative level of use of the creek corridors by animals that could be sources of fecal coliform bacteria. Many of the areas appeared to have large wildlife populations as evident by the tracks and/or other signs observed in the area. It appeared that most of the animals in the creek vicinity were seeking food, water, and shelter. Hogtown, Possum, and Tumblin creeks appeared to be heavily used by wildlife.

Biodiversity was decreased in the urban areas, but the species present appeared to dominate with high numbers of individuals. There are few predators to reduce urban wildlife populations and food sources are abundant, therefore populations of raccoons and other small mammals can be much greater in urban areas compared to rural areas. With ample food sources these opportunists have high birthrates due to better maternal nutrition and suffer less juvenile mortality, both adding to increased populations in urban areas. Uncovered dumpsters, unlimited access to pet food, litter, and feeding by the general public all add to the increasing number of nuisance wildlife species in the urban creek corridors.

Raccoons appeared to be the largest users of the urban creek corridor with 28% of the observed tracks identified as raccoon; however raccoons were not observed during the surveys due to their nocturnal habits and the limited time staff were in the creek corridors (Figure 4). Suburban and urban areas can support high-density raccoon populations (Prange, et al., 2003). Raccoons may be a significant source of fecal coliform. In the development of the fecal coliform Total Maximum Daily Load (TMDL) of Four Mile Run in northern Virginia, DNA profiles of *Escherichia coli* showed that 21% of the isolate matches were from raccoons. While this could be a significant source of fecal coliform, it is not a controllable source. Controllable sources are human and domestic animal sources. Domestic dogs and humans were the second highest users of the urban creeks with 18% of the observed tracks identified as each (Figure 4).

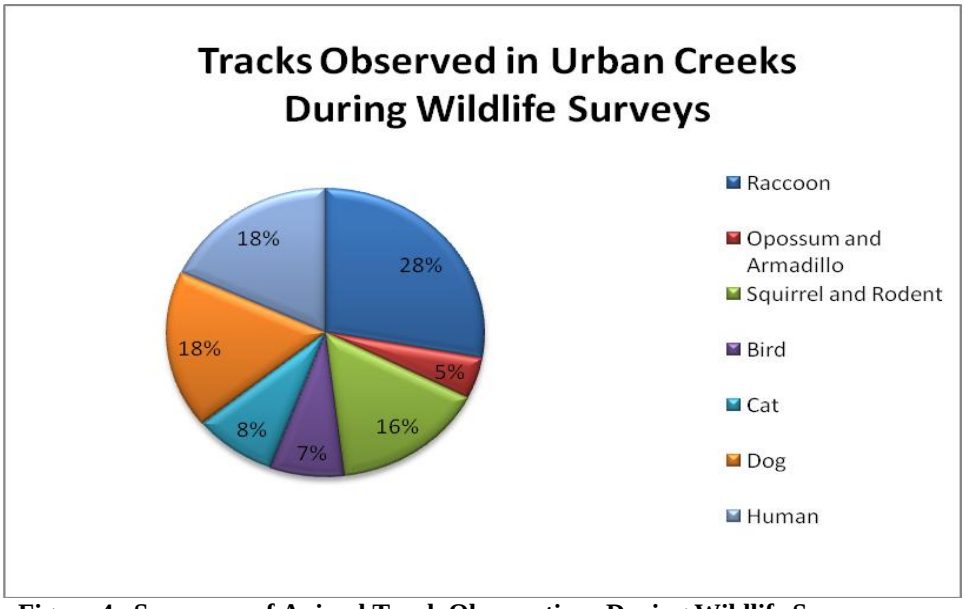


Figure 4. Summary of Animal Track Observations During Wildlife Surveys

The input of the citizens that completed the resident questionnaires provided valuable information that augmented ACEPD's observations. As illustrated in Figure 5, raccoons were sighted most frequently (31%) by residents followed by birds (28%- both wading and songbirds) and then cats (14%). Birds comprised 28% of the wildlife observed by residents and only 7% of the tracks observed by staff. This difference is likely due to the fact that most birds are not walking and leaving tracks in the substrate along the creeks and are most active outside of the hours included in the survey. Almost 50% of the responding residents have outside pets and almost one quarter of these people reported that they leave pet waste on the ground as a potential source of fecal coliform bacteria to our urban creeks.

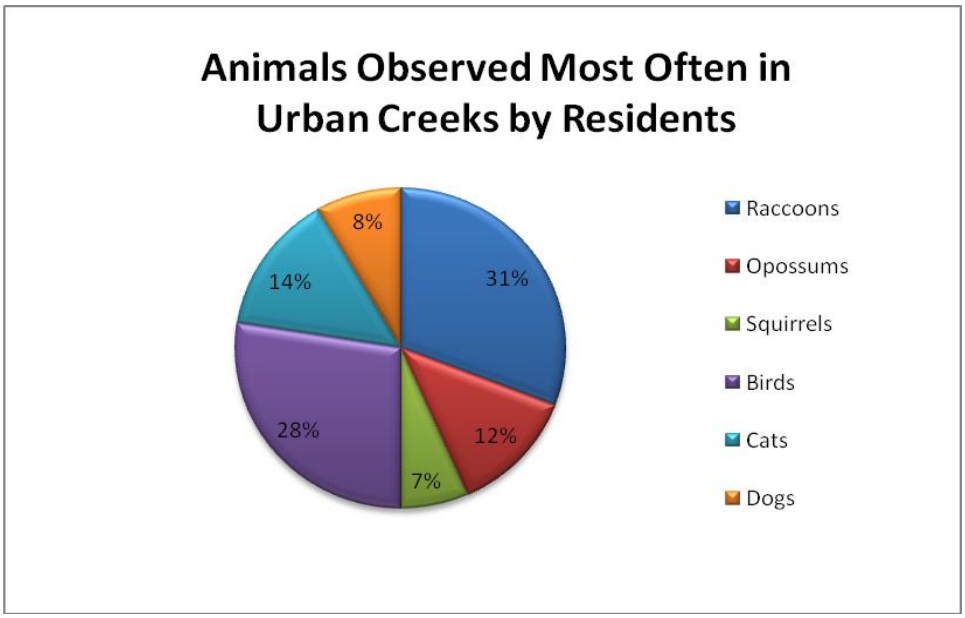


Figure 5. Summary of Resident Observations from Residential Questionnaire

It is clear that wildlife and domestic animals are using the creek systems and are a source of fecal coliform bacteria. GRU conducted ribotyping analysis in Sweetwater Branch, Hogtown Creek, and Tumblin Creek and their results indicated that 17% of the fecal coliform bacteria in these creeks originated from birds, 16% from dogs, and 16% from other animals (CH2MHILL and Biological Consulting Services 2007). Management strategies for reducing fecal coliform bacteria levels in our creeks vary depending on the dominant sources. Detecting and eliminating illicit discharges is an essential part of improving water quality. ACEPD will begin conducting rapid outfall screening to identify problem outfalls and develop a more sophisticated monitoring program to identify illicit discharges and eliminate them as a source of fecal coliform in the creeks. Locating and repairing leaky wastewater infrastructure and septic systems can be timely and expensive, but is an achievable reduction strategy. Additionally, human sources pose the greatest human health risk, as they can contain more human pathogens.

Another achievable reduction strategy is the proper disposal of pet waste and reduction of feral populations. Pet waste should be disposed of in a way that would prevent surface water or groundwater contamination. This could be achieved through a public outreach campaign accompanied by an effective enforcement program. Feral populations should be removed, as not

only are they a controllable source of fecal coliform, they are also a threat to local native wildlife and a vector of rabies and other diseases. The only effective way of reducing contributions from wildlife sources is to reduce the wildlife population by removing the anthropogenic food sources that are supporting the current population density. These sources include: garbage and food scraps from unsecured receptacles such as dumpsters and trash cans, gardens, direct feeding by humans, and litter. Requiring dumpsters and trash cans to be secured at all times and enforcing those rules are the best options for eliminating a major food source.

ACEPD will continue to evaluate each fecal coliform "Hot Spot" utilizing an approach that evaluates outfalls in these areas to narrow the sources of fecal coliform. Further investigations will occur through a partnership with GRU, the Alachua County Health Department, the City of Gainesville Public Works Department, and the Florida Department of Environmental Protection. The partnership will evaluate each "Hot Spot" independently which will allow for concentrated sampling in a location over a specified time period. Collectively, this work will include septic tank system surveys and inspecting the integrity of the stormwater and wastewater collection systems. Additional sampling, which may include techniques to identify the contributions from wildlife, dog waste, and human sources, will be conducted and appropriate corrective action plans will be developed.

References

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Appendix A: Biologist Notes from Detailed Surveys

Hogtown Creek – NW 16th Avenue (Ring Park) – Stephen Hofstetter & Stacie Greco
April 21, 2008 (2:00 – 2:25 PM) 83 degrees F, clear

Note: The original notes from this survey were misplaced, so the survey was redone in April in a different section of Hogtown Creek than reported in the text.

Tracks:
Grey squirrel – 1 set
Unknown rodent
Raccoon – 2 (or more) sets
Human – 1 set
Domestic dog – 2 sets
Armadillo tail mark?
Lots of markers and tracks in the sand, appeared heavily used

Observed species:
Northern cardinal
Tufted titmouse
Northern parula
Great-crested flycatcher
Red-tailed hawk
Yellow-rumped warbler
Gambusia (mosquito fish)
Sunfish/bluegills
Bass
Unknown large fish (sunfish size)
Odonate larvae in sandy areas.
Damselflies - Variable dancer, ebony jewelwing, blue-tipped dancer

Conditions - low levels of trash within surveyed area, canopy open in areas (maple, sugarberry, hickory, swamp chestnut oak, magnolia, & sweetgum). Several deep pockets in the creek but lots of sandy areas along the creek to see tracks.

Hogtown Creek – GHSN trib segment – Stephen Hofstetter & Stacie Greco
April 21, 2008 (1:30 – 1:50 PM) 82 degrees F, clear

Note: The original notes from this survey were misplaced, so the survey was redone in April in a different section of Hogtown Creek than reported in the text.

Tracks:
Grey Squirrel – 1 set
Raccoon – 2 sets
Human – 2 set
Domestic cat – 2 sets
Armadillo burrow
Bird droppings (two areas, small amounts)

Observed species:
Northern cardinal
Tufted titmouse
Great-crested flycatcher
American crow
Gambusia (mosquito fish)
Unknown platy (yellow with darker orange tail)
Odonate larvae in sandy areas.
Damselflies - Variable dancer, ebony jewelwing, blue-tipped dancer

Conditions - low levels of trash, thick canopy, mid-story and understory (sugarberry, hickory, swamp chestnut oak, magnolia, & sweetgum). Some exotic species (ardisia and air potato). Many sandy areas to see tracks. There were a few seepy clay areas along the bank and drainage piles from the neighboring yards.

Rattlesnake Branch where it intersects with Hogtown – 10:25am to 11:10am - Stephen Hofstetter, Michael Drummond, Ani DuBois, & Stacie Greco
July 23, 2007 – SH notes

Rained around 4:30 pm on previous day.

Site description – creek banks are steep with sandy/rocky bottom. Several areas with exposed clay layer. Dense canopy cover with mostly native trees (oak and hickory). Large extensive buffer to residential lots. Small amounts of trash and a few mountain bike trails

Tracks:
Raccoon – 1 set
Squirrel – 1

Observed species:
Red-bellied woodpecker
Northern cardinal
Tufted titmouse
Carolina wren
Blue jay
Gambusia (mosquito fish)
Odonate larvae in sandy areas.
Damselflies - Variable dancer, ebony jewelwing, purple dancer

In terms of wildlife, it seemed surprisingly quite.

Elizabeth Creek behind UF president's house south of Univ. Avenue – 10:15am to 10:55am - Stephen Hofstetter, Michael Drummond, Ani DuBois, & Pearl Breckenridge
July 30, 2007 – SH notes

Rained 36 hours before survey. This was a heavy rain that may have been as much as six inches.

Site description – creek banks are shallow with large amounts of sandy sediments from road construction and recent rain events. The creek bottom is mostly sandy with some small amounts of trash. Portions of the canopy have been cleared as part of backyard. Covered canopy areas have a mix of native and nonnative trees. Creek runs by a concrete slab with a barbaque grill. Several silt fenses were not functioning (photos taken).

Tracks:
Raccoon – 2+ set
Armadillo – 2 sets
Squirrel – 2 set
Human (probably from street construction site)
Small bird
Large wading bird

Observed species:
Armadillo (walking near creek)
Dead armadillo
Blue-grey gnatcatcher
Northern mockingbird
Tufted titmouse
Downy woodpecker
Northern cardinal
Carolina wren
Great-crested flycatcher
Gambusia (mosquito fish)
Small nonnative orange-yellow fish (probably a platy of some kind)
Grey squirrel
Brown anole
Five-lined skink
Small spirral aquatic snails
Odonate larvae in sandy areas.
Ebony jewelwing

Possum Creek through Rock Creek Subdivision – 9:40am to 10:15am - Stephen Hofstetter, Michael Drummond, Ani DuBois, & Stacy Greco
July 23, 2007 – SH notes

Rained around 4:30 pm on previous day.

Site description – creek banks are steep with sandy/rocky bottom. Dense canopy cover with mostly native trees (sugarberry and hickory). Large extensive buffer to residential lots. There were limited sandy areas for finding tracks

Tracks:
Raccoon – 2 sets
Armadillo - 1
Squirrel – 1

Observed species:
Red-eyed vireo
Red-bellied woodpecker
Northern cardinal
Tufted titmouse
Carolina wren
Gambusia (mosquito fish)
Crayfish
Grey squirrel
Bronze frog
Brown anole
Green anole
Water striders
Asiatic clams
Odonate larvae in sandy areas

Tumblin Creek behind apartment complex – 9:30am to 10:05am - Stephen Hofstetter, Michael Drummond, Ani DuBois, & Pearl Breckenridge
July 30, 2007 – SH notes

Rained 36 hours before survey. This was a heavy rain that may have been as much as six inches.

Site description – creek banks are steep and mainly supported by tree roots with most of soil removed. The creek bottom mostly consists of brick and construction debris and trash. Covered canopy consisting of mostly exotics trees – chinaberry and loquat with some native trees (sugarberry and hickory). Several exotic vines in understory. Little buffer to appartment complex and residential lots.

Tracks:
Raccoon – 5+ set (large number of tracks scattered over all sandy areas)
Domestic cat – 4 sets
Squirrel – 1 set

Raccoon scat (made up of smilax berries)

Observed species:
Blue-grey gnatcatcher
Northern mockingbird
Northern cardinal
House finch
Carolina wren
American crow
Gambusia (mosquito fish)
Small nonnative orange-yellow fish (probably a platy of some kind)
Crayfish - 3
Grey squirrel
Brown anole
Small spirral aquatic snails
Odonate larvae in sandy areas.

Sweetwater Branch between SE 1st and University – 10:15am to 10:40am - Stephen Hofstetter, Michael Drummond, Ani DuBois, & Pearl Breckenridge
July 17, 2007

Tracks:
Raccoon – 1 set
Human – 1 set
Squirrel – 1 set

Bird scat (small bird species)

Observed species:
Blue jay
Mockingbird
House finch
Carolina wren
Mockingbird or blue jay nest in elderberry bush along bank (currently empty)
Gambusia
Nonnative small fish (probably a platy of some kind)
Large tadpoles
Grey squirrel (2)
Human (two people sitting on benches nearby)
Signs of homeless use near bank (blanket and bags of clothing)
Large numbers of small aquatic snails

Conditions – park setting, relatively open canopy with live oaks, pines, and sweetgums. Steep banks vegetated with native and nonnative vegetation. Very few sandy areas to look for tracks. Small amount of trash in water. Rained the night before survey.

Rosewood Branch at SE 7th & 11th (Started on northside of SE 7th Avenue) – 9:30am to 10:10am – Stephen Hofstetter, Michael Drummond, Ani DuBois, & Pearl Breckenridge
July 17, 2007

Tracks:
Dog – at least 3 sets
Fox – possible set?
Raccoon – at least 1 set
Cat – at least 1 set
Human – at least 1 set
Unidentied small bird – 2 sets

Cat scat (fresh)
Large number of (walnut moth) caterpiller fras

Observed species:
Squirrel
Leopard frog
Gambusia and exotic fish (orange platy?)
Dead fish (possibly a warmouth)
Domestic dogs (3)
Domestic cat (1)
Northern cardinal
Bluejay
Great-crested flycatcher
Red-bellied woodpecker

Site conditions – very high level of human impact. Yards and fences right up to creek bank. Large amounts of trash in water and on banks. Observed dead fish and crab parts. Trailer parked to next to creek with clear trail into creek. Several dogs and cats in area. Several pecan trees along banks appear to be supporting large numbers of walnut moths or similar species of caterpillers that are depositing large amounts of fras into creek. Majority of mid and understory species are nonnative. Canopy contained live oaks, lauren oaks, pecans, & sweetgums. Rained the night before survey.

Hatchet Creek (Control Site) – 9:40am to 10:15am - Pearl Breckenridge, Michael Drummond, Stephen Hofstetter, & Jim Myles
March 28, 2008 – SH notes

Last rain event - ?. Weather conditions – mostly clear, warm in upper 70's to low 80's.

Site description – Floodplain forest in good condition. Creek banks were steep but shallow, banks were usually vegetated with mostly grasses and sedges. There were limited areas to observe tracks along creek edge but many areas within the floodplain area with exposed muddy ground to look for animal tracks. The creek bottom consisted on a mix of mud and sand with no trash observed (one old bottle was found upsteam of the study area). The canopy coverage was about 70 – 80 % in the study area and consisted of bald cypress, swamp laural oak, sweetgum, pop ash, black gum, red maple, and swamp bay (all native species).

Tracks within survey area:
Raccoon – 1 set
Armadillo – 1 set
White-tailed deer – 3 sets

Observed species in survey area:
Grey squirrel
Gambusia (mosquito fish)
Red-eyed vireo
Northern parula
Great-crested flycatcher
Blue-grey gnatcatcher
Tufted titmouse
Downy woodpecker
Northern cardinal
Carolina wren
Red-shouldered hawk
Red-bellied woodpecker
Bluejay
White-eyed vireo
Carolina chickadee
Ruby-crowned kinglet
Ruby-throated hummingbird
Belted kingfisher
Wood duck – pair was in the creek when we approached the sampling site
Palamedes swallowtail
Viola's wood-satyr
Lots of mosquitos and ticks

Additional wildlife observations in area (not within 100' survey area):
Yellow-throated vireo
Turkey vulture
American goldfinch
Pileated woodpecker
Yellow-rumped warbler
Sparkling jewelwing
Gemmed satyr
Tiger swallowtail
Zebra swallowtail

Appendix B: Summary of Wildlife Survey Observations

Creek	Number of Tracks Observed*								Estimated Segment Length (miles)	Trash Description	Additional Comments
	Raccoon	Opossum/ Armadillo	Rodent/ Squirrel	Bird	Cat	Deer	Dog	Human			
Hogtown Creek	11	1	8	2	3	0	9	14	0.73	**Mild:** creek was fairly clean,found some tires, shopping carts, plastic/glass bottles/cans	Observed two people walking dogs one had no leash and was wet from playing in creek
Hogtown Tributaries near Gainesville High School[$]	4	1	2	3	0	0	1	1	0.17	**Moderate:** heavy behind GHS, accumulated there clogging culvert	hawthorne clay made it hard to observe tracks, lots of storm debris blocking creek/piled on banks
Rattlesnake Branch	10	0	1	0	2	0	10	11	1.1	**Heavy:** large amount of trash mainly bottles/wrappers, a few transient items near creek	Observed an owl, a rabbit den, several bronze frogs, and possible transient area
Elizabeth Creek	10	3	8	3	5	0	3	2	0.38	**Moderate:** Overall not much trash	A dead decaying armadillo next to creek, heavy rains washed away culvert construction material
Possum Creek	15	3	5	0	3	0	7	7	1.02	**Moderate:** not too heavy except along NW 39th Ave.	Asiatic clam shells found, dog feces, dog bone, caterpillar waste, organic matter in creek, slight sulfer smell.
Tumblin Creek	9	1	5	0	5	0	6	3	0.83	**Mild:** old bricks, old pipes/culverts, bottles, cans	Transients observed, koi or goldfish in creek at 72' culvert, limited opportunities to seee tracks due to steep banks/clay outcrops.
Sweetwater Branch	3	0	2	0	0	0	1	1	0.85	**Mild:** Shopping carts, clothing, blankets, bottles/cans	No bird tracks observed, people/dogs observed around creeek, a blue jay nest in tree next to creek.
Rosewood Creek	4	2	6	10	2	0	5	4	0.55	**Heavy:** An obscene amount was found along entire section	Deer prints, cat scat, possible fox tracks, chicken bones, dead fish, and some white wash on leaves
Hatchet Creek	6	3	4	0	0	48	0	0	0.5	**None:** with the exception of one glass bottle	Good canopy and understory, spike grass near the creek. Rare Gemmed sader (butterfly) and Sparkling jewlwing (damsel fly) were observed.

* These are estimates of the number of individuals in the creek in the day or two prior to the survey and are based on observed tracks. This is only a semi-quantitative table because these numbers are affected by the substrate, prior weather, and length of the segment walked.

[$] Includes detailed survey completed on the Un-named Tributary and extended survey on Ashley Creek

Appendix C. Fecal Coliform Data for Wildlife Surveys

Creek	Sample	Location Description	Date Sampled	Time Sampled	Fecal Coliform (CFU/100 mL)[1]	Estimated Flow[2]		Rainfall (in.)[3]	
						cms	cfs	Past 5 Days	Day of Sampling
Hogtown Creek	HOGNW16	Beginning of survey, upstream of NW 16th	8/6/2007	9:35	1,800	SJRWMD gage		1.95	0.00
	HOGNW16	Avenue in Ring Park	8/6/2007	9:36	1,300				
	HOG16SW	culvert from west side of creek, draining from	8/6/2007	10:22	1,200	too low			
	HOG16SW	NW 20th Way	8/6/2007	10:23	2,500				
	HOGASH	Ashley Creek, Downstream from HOGGHSS	8/6/2007	10:30	3,900	too low			
	HOGASH		8/6/2007	10:31	8,200				
	GLENSP	Glen Springs Run, tributary from west	8/6/2007	11:13	1,800	too low			
	GLENSP		8/6/2007	11:14	2,900				
	HOGGHSTRIB	Un-named Hogtown Tributary, Downstream	8/6/2007	11:33	2,200	too low			
	HOGGHSTRIB	from HOGGHSN	8/6/2007	11:34	2,500				
	HOGNW23	End of survey, downstream of NW 23rd	8/6/2007	12:08	1,300	too low			
	HOGNW23	Boulevard	8/6/2007	12:09	1,900				
				median	2,050				
Un-named Hogtown Tributary Ashley Creek	HOGGHSN	Beginning of survey in Hobbit's Glen neighborhood at LS#70, Hogtown Tributary	8/6/2007	13:18	3,100	too low		1.95	0.00
	HOGGHSN	North of Gainesville High School	8/6/2007	13:19	1,900				
	HOGGHSS	End of survey, east of NW 16th Terrace,	8/6/2007	13:44	1,300	too low			
	HOGGHSS	Hogtown Tributary South of Gainesville High	8/6/2007	13:45	4,700				
Rattlesnake Branch	RATUSHOG	Beginning of suvey, upstream of the	7/23/2007	10:30	770	0.009	0.32	0.06	0.00
	RATUSHOG	confluence with Hogtown Creek	7/23/2007	10:31	1,200				
	RAT18TRIB	small tributary downstream of NW 18th	7/23/2007	12:05	570	0.001	0.04		
	RAT18TRIB	Terrace from south side of creek	7/23/2007	12:06	530				
	RAT18TRIB2	small tributary upstream of NW 18th Terrace	7/23/2007	12:20	850	too low			
	RAT18TRIB2	from south side of creek	7/23/2007	12:21	390				
	RATTRIBNW8	small tributary from south side of creek	7/23/2007	12:30	3,100	0.001	0.04		
	RATTRIBNW8		7/23/2007	12:31	2,300				
	RATNW8TRIB	small tributary from east, downstream of	7/23/2007	13:35	19,900	too low			
	RATNW8TRIB	white and pink growth	7/23/2007	13:36	9,900				
	RATGSHUT	End of survey, at the Girl Scout Hut on NW	7/23/2007	14:10	4,300	0.0003	0.01		
	RATGSHUT	8th Avenue	7/23/2007	14:11	3,700				
				median	1,750				

Appendix C. Fecal Coliform Data for Wildlife Surveys

Creek	Sample	Location Description	Date Sampled	Time Sampled	Fecal Coliform (CFU/100 mL)[1]	Estimated Flow[2]		Rainfall (in.)[3]	
						cms	cfs	Past 5 Days	Day of Sampling
Elizabeth Creek	ELIZNW7	Beginning of survey, upstream of NW 7th Road	7/30/2007	11:05	6,200	0.008	0.28	2.55	0.00
	ELIZNW7		7/30/2007	11:06	6,000				
	ELIZTRIB1	small tributary from east, north of UF Arboretum	7/30/2007	12:38	10,800	too low			
	ELIZTRIB1		7/30/2007	12:39	12,000				
	ELIZUNIVUS	End of survey, upstream of UF President House	7/30/2007	10:15	16,800	0.044	1.55		
	ELIZUNIVUS		7/30/2007	10:16	12,400				
				median	8,500				
Possum Creek	POSNW36	Beginning of survey, upstream of NW 36th Drive	7/25/2007	9:20	272	0.015	0.53	0.16	0.30
	POSNW36		7/25/2007	9:21	314				
	POSTRIB1	small tributary from west	7/25/2007	9:57	2,000	too low			
	POSTRIB1		7/25/2007	9:58	3,000				
	POS36US	downstream of catepillar droppings, strong sulfur odor in area	7/25/2007	10:22	378	too low			
	POS36US		7/25/2007	10:23	510				
	POSTRIB2	small tributary from west	7/25/2007	10:49	1,500	too low			
	POSTRIB2		7/25/2007	10:50	1,400				
	POS39DS	downstream of dog feces in creek	7/25/2007	12:52	8,800	too low			
	POS39DS		7/25/2007	12:53	8,800				
	POSNW39	End of survey, upstream of NW 39th Avenue	7/25/2007	13:30	560	too low			
	POSNW39		7/25/2007	13:31	550				
				median	980				
Tumblin Creek	TUMSW9	Beginning of survey, upstream of SW 9th Street	7/31/2007	12:47	24,800	0.01	0.35	2.25	0.10
	TUMSW9		7/31/2007	12:48	6,000				
	TUMBPDS	downstream of Depot Avenue, culvert draining apartment parking lot east of creek, orange goo at culvert discharge	7/31/2007	13:15	71,600	too low			
	TUMBPDS		7/31/2007	13:16	88,000				
	TUMPARKTRIB	small tributary in Tumblin Creek Park	7/31/2007	14:18	7,000	too low			
	TUMPARKTRIB		7/31/2007	14:19	11,200				
	TUMSW5	End of survey, downstream of SW 5th Avenue	7/31/2007	14:40	13,600	0.004	0.14		
	TUMSW5		7/31/2007	14:40	6,400				
				median	12,400				
Tumblin Creek	TUMBPDS*	Downstream of Depot Avenue, culvert draining apartment parking lot east of creek	8/2/2007	11:25	8,400	NM		2.40	0.68
	TUMBPDS*		8/2/2007	11:26	4,900				
	TUMSW9*	Beginning of survey, upstream of SW 9th Street	8/2/2007	11:30	1,890				
	TUMSW9*		8/2/2007	11:31	1,670				
				median	3,395				

Appendix C. Fecal Coliform Data for Wildlife Surveys

Creek	Sample	Location Description	Date Sampled	Time Sampled	Fecal Coliform (CFU/100 mL)[1]	Estimated Flow[2]		Rainfall (in.)[3]	
						cms	cfs	Past 5 Days	Day of Sampling
Sweetwater Branch	SWBSE1	Beginning of survey, upstream of SE 1st Avenue	7/17/2007	10:15	2,900	0.093	3.28	1.05	0.00
	SWBSE1		7/17/2007	10:16	1,700				
	SWBNE2	End of survey, downstream of NE 10th Avenue and NE 2nd Street	7/17/2007	14:40	640	too low			
	SWBNE2		7/17/2007	14:41	800				
				median	1,250				
Rosewood Branch	ROSESE10	Beginning of survey, upstream of confluence with Sweetwater Branch at SE 10th Avenue	7/17/2007	15:25	800	0.002	0.07	1.05	0.00
	ROSESE10		7/17/2007	15:26	1,200				
	ROSESE7	upstream of SE 7th Avenue, downstream of catepillar droppings	7/17/2007	15:10	2,300	0.004	0.14		
	ROSESE7		7/17/2007	15:11	3,100				
	ROSESE2	End of survey, downstream of SE 2nd Avenue	7/17/2007	14:55	3,400	too low			
	ROSESE2		7/17/2007	14:56	2,800				
				median	1,750				
Hatchet Creek	HATCONC	Beginning of survey	3/28/2008	9:45	124	0.15	0.32	0.00	0.00
	HATCONC		3/28/2008	9:46	128				
	HATCONCUS	End of survey, approximately 0.5 mile upstream	3/28/2008	11:00	72				
	HATCONCUS		3/28/2008	11:01	152				
				median	126				

1 All results from Advanced Environmental Laboratories, Membrane Filtration (MF) analysis, SM9222D

2 Flow was estimated based on surface velocity and cross-sectional area; too low = water level or velocity was to low to measure; NM = not measured; SJRWMD gage not recording during this time

3 Rainfall data collected at Gainesville Regional Utilites John R. Kelly Generating Station; the last recorded rainfall prior to the Hatchet Creek Wildlife Survey and sample collection was 0.3 inches on 3/20/2008

* These sites were resampled due to high initial values

Alachua County
Environmental Protection Department

Chris Bird, *Director*

Dear Creek Neighbor,

You may have noticed Alachua County Environmental Protection Department (ACEPD) staff walking in the creek you live near. We have been conducting a survey to determine what types of wildlife use our creeks, and now we need YOUR help. The survey on the back of this letter will only take you a couple of minutes (if that) to complete and will GREATLY help us in gaining a better understanding of the role of wildlife in our local creeks.

We want to know about wildlife as part of a larger project looking at high fecal coliform bacteria concentrations in some of our creeks. High fecal coliform bacteria counts mean that fecal matter is present in the water. Likely sources include failing septic tanks and wastewater collection pipes, domestic animals, transient populations, and you guessed it- wildlife. It is expensive to determine which source is affecting a waterbody, so we are trying to gather as much local knowledge as possible before we move forward.

Although you can get sick from water contaminated with fecal matter, I don't want to scare you away from our creeks. As with most nature, it is best to enjoy it at a distance. If you are in the water make sure to clean up with an anti-microbial soap and to avoid contact with your eyes, mouth, and any open sores.

If you would like to learn more about your creeks visit the following websites www.gainesvillecreeks.org and www.environment.alachuacounty.us or contact ACEPD at 352-264-6800.

Please complete the survey on the back of this letter and send it to us in the enclosed self addressed postage paid return envelope. Thank you for participating in our study and for caring about our creeks!

Yours Truly,

Stacie Greco
Alachua County Environmental Protection Department
sgreco@alachuacounty.us
352-264-6829

1) **What kinds of animals have you seen around the creeks or in your yard?** *(circle all that apply)*

Cats dogs rats opossums raccoons rabbits foxes
owls songbirds birds of prey wading birds alligators snakes otters Other:_____

2) **What animals do you see most often around the creek?**

3) **How often do you spend time around or observing the creek?** *(circle)*

More then 3 times a day 1-3 times a day 1-2 times a week 1-2 times a month 1-2 times a year Never
Other:_____

4) **Do you see people camping (or evidence of) around the creeks?** *(circle)*

None Some Lots
Comments:_____

5) **Do you have any pets that go outside? If so, what kind and how many**? (*fill in below)*

Dog _____(number)
Cat _____(number)
Other _____(number

6) **What do you do with your pet's outdoor solid waste?** *(circle all that apply)*

Leave it on the ground Put it in the trash Put it in the toilet Bury it Put it in a pet waste composter other:_____

7) **Would you be willing to discuss wildlife in the creeks with Alachua County staff on the telephone or in person? If so please list your contact information below.**

Name: _____
Phone Number: _____
Email Address:_____

Thanks for Participating!

Appendix E: Resident Questionnaire Summary

Creek	Animals Observed Most Often	Time Spent Around Creek	Number of People Observed Camping Near Creek	Number of Outside Pets	Pet Waste Disposal Method	Additional Information
Hogtown Creek	N/A	1-2 times a year	none	none	n/a	none
Hogtown Creek	raccoons	1-2 times a month	none	none	n/a	none
Hogtown Creek	songibrds, owls, raccoons	1-3 times a day; usually in coolest weather	none	none	n/a	none
Hogtown Creek	we don't really go down to the creek	1-2 times a year	none	1 dog, 2 cats	put it in the trash	none
Hogtown Creek	n/a	1-2 times a year	some, see lights @night & hear people	2 dogs	leave it on the ground/put in the trash	hear motor cycles and lots of young people who form levies
Hogtown Creek	raccoons	1-2 times a month	none	n/a	n/a	none
Hogtown Creek	squirrels	1-2 times a month	none	2 dogs	leave it on the ground	dog is in yard, sometimes waters pet waste into the soil
Hogtown Creek	raccoons	1-2 times a month	none	none	n/a	none
Hogtown Creek	rabbit, owl, birds	1-2 times a week	some	n/a	n/a	none
Hogtown Creek	N/A	1-2 times a month	n/a	n/a	n/a	none
Hogtown Creek	birds of prey	1-2 times a week	none	none	n/a	none
Hogtown Creek	raccoons, songbirds, cats	1-3 times a day	none	none	n/a	not now, thanks
Hogtown Creek	raccoons, owls, birds, squirrels, armildillos, opossums	1-2 times a week	none	none	n/a	none
Hogtown Creek	raccoons, squirrels	1-2 times a week	none	none	n/a	none
Un-named Hogtown Tributary	n/a	1-2 times a month	none	none	n/a	n/a
Un-named Hogtown Tributary	n/a	n/a	none	n/a	n/a	n/a
Un-named Hogtown Tributary	cats	never	none	n/a	n/a	no knowledge that would be helpful.

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Creek	Animals Observed Most Often	Time Spent Around Creek	Number of People Observed Camping Near Creek	Number of Outside Pets	Pet Waste Disposal Method	Additional Information
Un-named Hogtown Tributary	raccoons, Opossums	1-2 times a year	some	none	n/a	the animals spotted were in his yard
Un-named Hogtown Tributary	cats - lots of feral cats	can't actually see the creek, veg. in way	none	none	n/a	none
Un-named Hogtown Tributary	raccoons	1-2 times a week	none	none	n/a	thanks for all you do to help protect mother earth. Happy Holidays!
Un-named Hogtown Tributary	don't directly see creek from house	1-2 times a month	none	1 dog	leave it on the ground	none
Rattlesnake Branch	rabbits, raccoons, owls	1-2 times a week	some, not recently, several about 10 yrs ago	1 dog	leave it on the ground	email is the best way to reach me.
Rattlesnake Branch	dogs	1-2 times a week	none	1 dog	put it in the trash	none
Rattlesnake Branch	None, we never go down there	never	we hear people sometimes. A neighbor found marjuana plants, saw people carrying a cage to trap raccoons	1 dog, 1 cat	leave it on the ground/put in the trash	none
Rattlesnake Branch	Raccoons	1-2 times a year	none	none	n/a	spends time around creek when grandchildren visit
Rattlesnake Branch	Owls, raccoons, dogs, rabbits	1-2 times a month	none	1 dog, 2 cats	leave it on the ground	none
Rattlesnake Branch	People, birds	1-2 times a week	none, butl lots of people look for sharks teeth and some ride their bikes	1 dog (in fenced yard)	bury it, pick it up if in public domain	read survey, lots to say
Rattlesnake Branch	opossums, raccoons, owls, songbirds	1-3 times a day	some, not @our house but near 8th Ave.	1 dog, 1 cat	leave it on the ground	none
Rattlesnake Branch	Raccoons	1-3 times a day	none	1 dog, 1 cat	put it in the trash	none
Rattlesnake Branch	None	1-2 times a month	not lately	none	n/a	none
Rattlesnake Branch	Raccons, owls	1-3 times a day	some	n/a	n/a	none
Rattlesnake Branch	raccoons	1-2 times a year	none	1 cat	he prefers to use his littler box	none
Rattlesnake Branch	N/A	n/a	n/a	none	n/a	I do not go back to the creek because it is very wooded - I have to use a walker so it is too difficult to manage.

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Creek	Animals Observed Most Often	Time Spent Around Creek	Number of People Observed Camping Near Creek	Number of Outside Pets	Pet Waste Disposal Method	Additional Information
Rattlesnake Branch	raccoons, opossums	daily	some, people searching for sharks teeths	none	n/a	none
Rattlesnake Branch	Birds, opossums, raccoons	1-2 times a year	some	6 dogs, 1 cat	leave it on the ground	for Rattlesnake Branch
Rattlesnake Branch	Raccoons, Opossums, rabbits	1-2 times a week	none	1 dog	put it in the trash	none
Elizabeth Creek	raccoons	1-3 times a day	none	none	n/a	n/a
Elizabeth Creek	raccoons (tracks)	1-2 times a week	some	2 dogs	leave it on the ground/put in the trash	when walking I pick up dog waste; there maybe old sewerlines needing to be replaces, would love to help clean up the creek
Elizabeth Creek	birds	1-2 times a month	none, the creek is in our backyard	1 dog	leave it on the ground/put in the trash	n/a
Elizabeth Creek	raccoons, squirrels	1-2 times a year	none	n/a	n/a	n/a
Elizabeth Creek	opossums, raccoons,	1-2 times a month	some homeless people in the arboretum @ Univ. Ave/NW 23rd St.	2 dogs, 1 cat	leave it on the ground	n/a
Elizabeth Creek	raccoons, owls hawks, songbirds	1-2 times a week	some because of the arboretum	1 dog, 2 cats	leave it on the ground/put in the trash/cats bury theirs - picks up dogs	n/a
Possum Creek	cats	1-2 times a month	none	1 cat	litter box	more kids in creek than wildlife in our section of the creek
Possum Creek	raccoons, owls, songbirds, birds of prey	1-2 times a week	none	n/a	n/a	none
Possum Creek	raccoons	1-2 times a year	none	none	n/a	none
Possum Creek	songbirds, hawks, opossums	1-2 times a week	none	indoor cat	n/a	thank You!
Possum Creek	opossums, raccoons, cats	1-2 times a week	none	1 cat	leave it on the ground/put in the trash	none
Possum Creek	squirrels	1-2 times a week	none	1 dog	leave it on the ground/put in the trash	none

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Creek	Animals Observed Most Often	Time Spent Around Creek	Number of People Observed Camping Near Creek	Number of Outside Pets	Pet Waste Disposal Method	Additional Information
Possum Creek	n/a	never	none	none	n/a	none
Possum Creek	turkey	1-3 times a day	some	1 dog	bury it	none
Possum Creek	fox, deer, snakes, opossum, & turkey on occasion	n/a	none	2 cats	put it in the trash	just moved in; cats use litter box
Possum Creek	cats, raccoons, birds, snakes, opossum	1-2 times a month	none	none	n/a	none
Possum Creek	birds, including owls & birds of prey, raccoons, opossums	Everyday; 1-3 times a day	none	1 dog, 3 cats	put it in the trash	none
Possum Creek	squirrels	1-2 times a month	none	none	n/a	none
Possum Creek	raccoon	daily	none	none	n/a	none
Possum Creek	don't go around the creek	see the creek from the road- can see children but I don't go down to it.	some; children getting sharks teeth	1 stray cat who has adopted her, had him neutered & ear chipped	leave it on the ground	don't think I'd be much help!
Possum Creek	owls	6 times per year	none	1 cat	cat buries it	none
Possum Creek	birds	1-2 times a month	none	1 dog	leave on ground/bury it/put in a pet waste composter/put it in the toilet	none
Possum Creek	armadillos, owls	1-2 times a week	none	2 dogs	leave it on the ground	none
Possum Creek	owls, squirrels	1-2 times a month	none	n/a	n/a	what's the time frame?
Possum Creek	raccoons, song birds,	daily; 1-3 times a day	none, children playing or wading in creek, some but not too many	n/a	n/a	none
Possum Creek	opossums, raccoons, cats	1-2 times a week	none	1 cat - limited to around the house	put in a pet waste composter	none
Possum Creek	opossums, raccoons	more than 3 times a day	some, one instance in particular	1 dog	bury it	none
Tumblin Creek	cats and dogs	1-2 times a week	some	none	n/a	does not have much to report
Tumblin Creek	Cats and birds	1-3 times a day	none	1 dog	leave it on the ground	none

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Tumblin Creek	raccoons, birds	1-2 times a week	none, lots of people at night w/lights & trash from daily people	none	n/a	none
Tumblin Creek	n/a	1-2 times a year	none	1 dog	leave it on the ground	none
Sweetwater Branch	dogs, wading birds, owls, birds of prey	1-3 times a day	None, not in the area I live	1 cat - stays in back yard	cat buries it	none
Sweetwater Branch	rats, opossums, snakes	more then 3 times a day	none	1 cat	put it in the trash	none
Sweetwater Branch	raccoons, hawks, owls	1-3 times a day	some, people sometimes sleep in yard of Kirby Admin. Building	none	n/a	none
Sweetwater Branch	Dogs, squirrels	1-3 times a day	none	none	n/a	n/a
Sweetwater Branch	Cats	my front windows face the west end of the Duck Pond, so a lot	none	1 dog, always on a leash	put in the trash/put it in the toilet	found a big frog a cat had chewed a leg off of; she threw it back into the pond
Sweetwater Branch	birds	more then 3 times a day	none	1 dog	put it in the trash	there is a rusty sewage pipe going across the creek
Sweetwater Branch	raccoons, owls	1-2 times a month	none	2 cats	put it in the trash	none
Sweetwater Branch	birds	1-3 times a day	none	1 cat	leave it on the ground	none
Sweetwater Branch	n/a	1-2 times a week	none	n/a	put it in the trash	none
Sweetwater Branch	cats, dogs, songbirds, wading birds	1-3 times a day	some on Sweetwater between NW 14th & 16th Ave.	n/a	put it in the trash	none
Sweetwater Branch	squirrels, cats, dogs	more than 3 times a day	none	2 dogs, 1 cat	put it in the trash	none
Sweetwater Branch	wading birds	1-2 times a week	none	1 dog	put it in the trash	none
Sweetwater Branch	feral cats	1-3 times a day	none	n/a	n/a	would prefer to be contacted in person; attached a typed list of others
Sweetwater Branch	cats, dogs, wading birds	more then 3 times a day	some, usually sleeping, but just during the day	none	n/a	none
Sweetwater Branch	cats, songbirds, wading birds	always, I live right on the blvd.	some, they leave beer bottles, lots of trash and take out garbage on the road/green way	2 inside cats	n/a	I see people who walk their dogs on the greenway & leave pet waste, I clean it up in our yard too.

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Sweetwater Branch	birds	more then 3 times a day	lots	1 dog	leave on ground/bury it/put in a pet waste composter	none
Sweetwater Branch	cats during the day, raccoons at night	more then 3 times a day	some, mostly in park behind Matheson Museum	none - Does provide food/water for several cat-nipped, feral cats	bury any found in yard	none
Sweetwater Branch	dogs w/owners, cats, sometimes a raccoon	more then 3 times a day	none	none	n/a	n/a
Sweetwater Branch @Duck Pond	cats	1-2 times a week	none	1 dog (on leash), 1 inside cat	put in trash/bury	they want ducks
Sweetwater Branch @Duck Pond	birds - wading	more then 3 times a day	none	n/a	n/a	n/a
Rosewood Branch	cats and dogs	1-2 times a week	none	n/a	n/a	does not want you to contact him
Forest Creek	birds, aligators, snakes	1-2 times a month	none	n/a	n/a	n/a
Unknown	n/a	n/a	n/a	n/a	n/a	when GRU quits dumping sewage in the creeks then I will talk about animals around creeks!
Unknown	raccoons, opossums, armadillos, cats	1-2 times a week	none, I see fossil hunters	none	n/a	none

n/a = not answered