9.1 Introduction

The Hogtown Creek Watershed is located in the northwest and southwest quadrants of Gainesville (Figure 9.1). The Hogtown Creek Watershed, including Hogtown Prairie and Lake Kanapaha, encompasses approximately 20 square miles of urban and suburban Gainesville. Hogtown Creek begins north of NW 53rd Avenue and west of NW 13th Street. The creek then flows through residential neighborhoods and commercial districts before flowing through forested wetlands, where it ultimately recharges the Floridan aquifer at Haile Sink (Figure 9.2). Land surface elevations in the watershed range from 175 feet National Geodetic Vertical Datum of 1929 (NGVD) in the upper part of the watershed to 55 feet NGVD near Haile Sink.

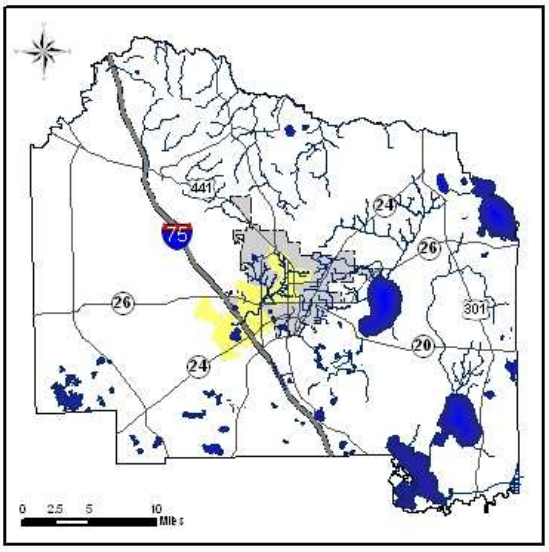


Figure 9.1 Location of the Hogtown Creek Watershed in Alachua County

The Hogtown Creek Watershed is located along the western and southern margins of the Northern Highlands physiographic province (White 1970). Relief is high in the watershed. In many areas the creek and tributaries are deeply incised, exposing Hawthorn Group formations comprised of

Hogtown Creek at SW 2nd Avenue

sands, silts, clayey sands, sandy clays, carbonates (limestone and dolostone), and phosphates. Phosphate pebbles and fossils, such as shark's teeth, dugong rib bones, and shell molds and casts, are frequently observed in the streambed and along cut banks.

Soils in the upper basin are nearly level and moderately well drained (Thomas et al. 1985). Soils become loamy at depths in proximity to the creek, then poorly drained loamy near the confluence with Possum Creek. In the lower basin near Haile Sink, soils are moderately well drained and nearly level (Thomas et al. 1985). Major soil types in the Hogtown Creek Watershed include the Millhopper sand, Kanapaha sand, Millhopper-Urban land complex, and Arredondo–Urban land complex (Thomas et al 1985). The Millhopper and Arredondo sands are moderately well drained and well drained, respectively, while the Kanapaha sand is reported to be poorly drained. Small areas of numerous other soils occur throughout the watershed. Typically, the better drained soils are present at the higher elevations, in the upper reaches of the water-

shed. The Pelham and Surrency sands, both poorly drained, are present along the creek (in the floodplain) and in shallow depressions (Thomas et al 1985). The Wauchula muck, a very poorly drained organic soil, is present in Sugarfoot and Hogtown prairies. Blichton sand, a poorly drained soil with ironstone and phosphatic limestone, is indicative of the presence of the phosphatic and carbonate units of the Hawthorn Group formations. The closed stream to sink nature of the watershed is indicative of the region's karst geology.

Approximately 65% of the land use in the Hogtown Creek Watershed is characterized as low density residential, 15% is commercial, with the remaining 20% divided between mixed hardwood forest, forested wetlands, silvicultural, agricultural, and institutional uses. Commercial establishments include shopping centers such as The Gainesville Mall, restaurants, automotive repair shops, medical, dental, and legal services, and two fire stations. Area schools include Gainesville High School, A. Quinn Jones School, and the University of Florida. Recreational and cultural facilities include golf courses, the Florida Museum of Natural History, the Harn Art Museum, Alfred A. Ring Park, and the Hogtown Greenway.

9.2 Watershed Description

Hogtown Creek consists of dredged channels, natural and recovering sinuous streams, wetlands and upland forest, seeps, and sinkholes. Hogtown Creek has numerous tributaries, with four of the largest being Possum Creek, Springstead Creek, Rattlesnake Branch, and Elizabeth Creek. These four tributaries all join Hogtown Creek in the area between NW 39th Avenue and University Avenue.

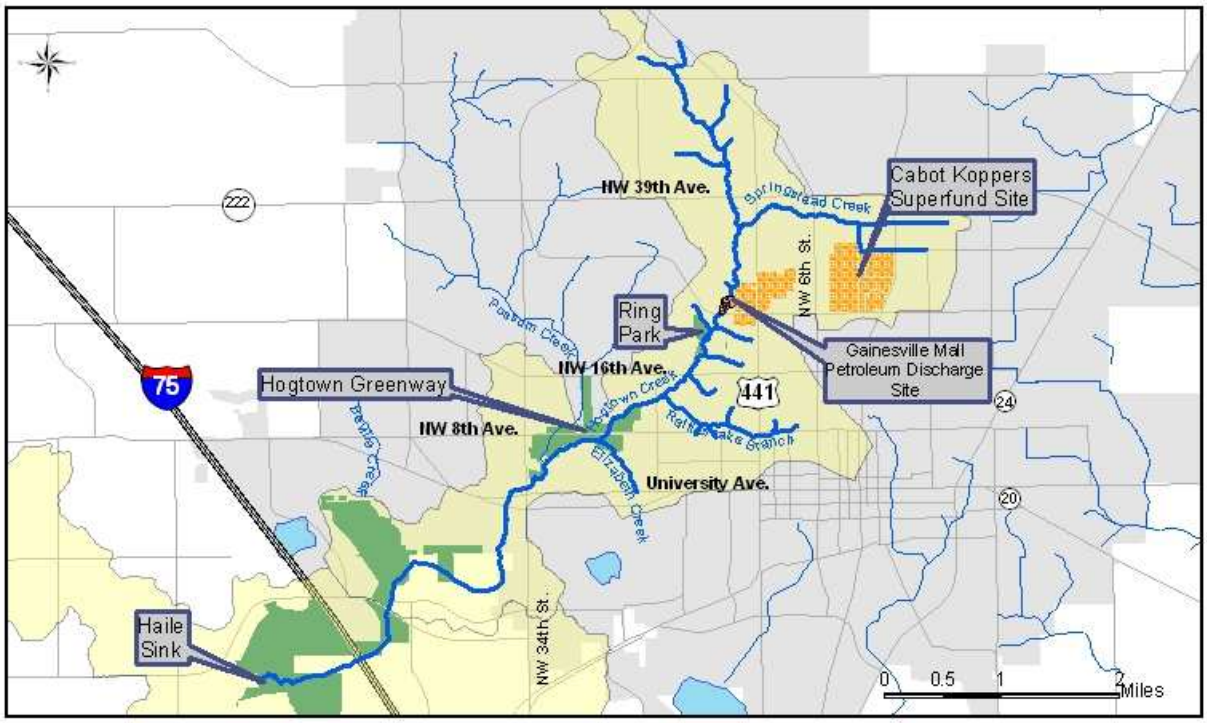


Figure 9.2 Notable features in the Hogtown Creek Watershed

Most of the creek's baseflow is contributed by springs and seeps discharging groundwater from the surficial and intermediate aquifers. Hogtown Creek flows through wetland forests, residential neighborhoods, parks, and hardwood and pine forests before terminating at Haile Sink, located west of Interstate 75 (I-75) and south of CR 30 (SW 20th Avenue).

The City of Gainesville Public Works Department and ACEPD personnel performed over 180 stream segment surveys on Hogtown Creek and its tributaries. These surveys were part of a City of Gainesville data collection effort to assess existing conditions of sedimentation and in-stream erosion in the watershed. Activities focused on in-stream sediment accumulation, bank erosion, riparian vegetation quality, and stormwater infrastructure. Data collected will be used to prepare a plan for in-stream erosion reduction in the Hogtown Creek Watershed.

9.2.1 NW 53rd to NW 39th Avenues

The main channel of Hogtown Creek emerges from a 42-inch reinforced concrete pipe (RCP) north of NW 53rd Avenue. As the channel approaches NW 53rd Avenue, it flows through open pastureland and residential neighborhoods via a 5-foot wide concrete channel that continues south of NW 53rd Avenue. As the creek flows downstream, the banks are low and moderately stable, showing little evidence of erosion.

Further downstream, the creek becomes more sinuous as it enters a hardwood wetland forest with moderate canopy cover. The riparian zone is dominated by native vegetation and widens to greater than 60 feet, prior to reaching NW 45th Avenue. The creek is deeply incised in the vicinity of NW 45th Avenue with banks reaching 10 to 13 feet high. In this section, upper units of the Hawthorn Group formations are exposed along the stream bank, and the streambed is covered with phosphate pebbles and fossils. An unnamed tributary joins Hogtown Creek from the east, north of NW 45th Avenue.

Hogtown Creek flowing in a concrete channel near NW 53rd Avenue

Between NW 45th and NW 39th avenues, Hogtown Creek is less sinuous due to past channel dredging activities. The riparian zone width becomes more variable as residential density increases. There are several apartment complexes present including Quail Creek, Floral Creek, and Cedar Creek. Predominant streambed substrates are sand and silt, with sand smothering reaching over six feet in many areas. There appears to be considerable erosion in this stream segment, as seen by the widening and deepening of the streambed. This is likely due to direct stormwater inputs from the west near Norton Elementary School. Stormwater outfalls in this area are common.

The natural riparian zone width decreases as Hogtown Creek approaches NW 39th Avenue, with many residences located along the stream banks. Two areas of severe erosion are noteworthy. A concrete stormwater conveyance structure with a manhole and an 18-inch metal pipe has collapsed into the streambed. Further downstream, a concrete and riprap retaining wall is failing and potentially threatening the integrity of a residence. Hogtown Creek is joined on the west by Quail Creek and an unnamed tributary. Bank erosion in this area continues to be severe. Just north of NW 39th Avenue, a second failing retaining wall was observed.

9.2.2 NW 39th to NW 16th Avenues

Hogtown Creek flows south under NW 39th Avenue through a predominately residential area. One of its largest tributaries, Springstead Creek, converges with Hogtown Creek southwest of the Publix Shopping Center on US 441. The riparian zone extends, on average, greater than 60 feet on either side and is moderately shaded, consisting mostly of trees with little understory vegetation. Noticeable erosional features include bare, steep banks and a streambed smothered with over six feet of sand. Tar-like sediment patches are visible along portions of exposed banks throughout this stretch. These residuals are remnants of an early 1960's discharge into Springstead Creek (see section 9.4).

The stream begins to lose its sinuosity and increases in width approximately one-third of a mile south of NW 39th Avenue. The sand and sandy clay banks reach heights of 8 feet. Exposed tree roots occur along the banks in this area, expressing the erosional power of storm flow in this watershed.

South of NW 29th Road, Hogtown Creek borders the heavily developed commercial district in the vicinity of the Gainesville Mall. Large storm water culverts that drain this impervious area feed into the creek from the east. The streambed is severely sand smothered, and fallen trees along collapsed banks are common. The riparian zone width is minimal in many areas. Just north of NW 23rd Avenue, a stormwater culvert discharging petroleum-contaminated groundwater was discovered along the east bank. A remediation system was put into operation at this site on March 1, 2004 (see section 9.4).

South of NW 23rd Avenue, land use is primarily residential. Here the streambed widens, with bank heights sometimes reaching 19 feet. Further downstream, Glen Springs Run converges with Hogtown Creek from the northwest. Rosenau et al. (1977) reported that the average discharge of Glen Springs Run was 0.33 cubic feet per second (cfs). The source of Glen Springs Run is the water-bearing limestone units of the intermediate aquifer system (Rosenau et al. 1977).

Serious erosion along Hogtown Creek

9.2.3 NW 16th to NW 8th Avenues

Hogtown Creek crosses beneath NW 16th Avenue via a channel armored with concrete blocks. The creek continues flowing southwest and is joined by Rattlesnake Branch just prior to crossing NW 22nd Street. The banks along this segment are moderately to severely eroded exhibiting numerous patches of exposed tree roots. The streambed remains wide and sand smothered.

The creek emerges from NW 22nd Street in a straight, dredged channel but regains some sinuosity approximately one-third of a mile downstream. The stream has moderate canopy cover and varying riparian buffer widths through this residential area. The stream banks are composed primarily of sand. Clayey sands are exposed in the streambed. Sediment deposition reaches thicknesses of six feet, and bank erosion is severe. Riprap has been added to several stream sections to reinforce the caving banks. A manhole, located in the center of the streambed, is evidence of the stream's proximity to the sanitary sewer system.

9.2.4 NW 8th Ave to NW 34th Street

Hogtown Creek passes under NW 8th Avenue through a concrete box culvert. Sand constantly fills this culvert and causes flooding problems at upstream residences. Removal of the accumulated sediment has been a costly ongoing project for the City of Gainesville Public Works Department. Possum Creek joins Hogtown Creek downstream of the 8th Avenue culvert. This area of forested floodplain consists of many residences from the Black Pines and Central Park subdivisions, and in some instances residential backyards extend to the center line of the creek.

Sand filled culvert on Hogtown Creek at NW 8th Ave

The streambed is considerably wider here and the banks are shallow. This segment was artificially channelized in the past. Berms, most likely created as spoil piles during channelization, parallel the creek. The stream is shaded by a moderate canopy cover as it flows through habitat dominated by mixed hardwood and pine forest. Understory vegetation consists primarily of exotic invasive species. In addition to heavy sand smothering, freshly deposited sand is present above the banks, which indicates the occurrence of overland sheet flow during storm events.

As Hogtown Creek nears the concrete weir above NW 34th Street, bank erosion severity increases and exposed tree roots are common. In several areas the banks are failing, including an area 125 feet long that has been reinforced with riprap in an attempt to provide stability.

In the vicinity of the weir, bank erosion remains severe, with numerous trees either leaning over or having fallen into the streambed. Banks are tall, vertical, and deeply undercut. Although riparian zone widths are adequate, the banks are not vegetated. The creek is flanked by resi-

Weir on Hogtown Creek at NW 34th Street

dential housing and commercial establishments. Sand smothering is heavy upstream of the weir, as numerous sandbars were observed.

9.2.5 NW 34th Street to Haile Sink

Hogtown Creek flows beneath a series of bridges in the vicinity of NW 34th Street, University Avenue, and SW 2nd Avenue. The stream is channelized and lacks a riparian buffer and canopy cover. The land use in the area is entirely commercial, consisting of strip malls, restaurants, and an auto repair shop. All stormwater from this heavily developed region is directed to Hogtown Creek via the municipal stormwater system. During 2003, the Florida Department of Transportation (FDOT) installed two sediment traps in Hogtown Creek to facilitate accumulated sand removal maintenance activities. One sediment trap is located between the weir and NW 34th Street and the second one is located between NW 34th Street and University Avenue. The straight channel continues south of SW 2nd Avenue between the Hawaiian Village Apartments to the east and the Creekside Mall to the west.

Hogtown Creek at Haile Sink

Downstream of Hawaiian Village Apartments, Hogtown Creek flows through a forested wetland area. Development here is limited by the presence of a forested floodplain and consists of high density apartments serving students at the University of Florida. The creek characteristics differ in these reaches as the water becomes tannic, velocity decreases due to the lack of relief, and the stream channel becomes braided. Hogtown Creek continues flowing south beneath SW 20th Avenue (CR 30), then west under I-75 to Hogtown Prairie. During high water conditions, Hogtown Prairie connects hydrologically to Lake Kanapaha to the south. Under normal to dry conditions, however, Hogtown Creek cascades down a channel lined with large chert and limestone boulders, and terminates at Haile Sink where it recharges the Floridan aquifer.

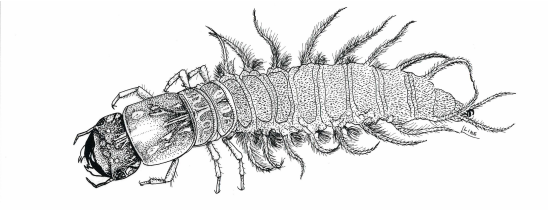
9.3 Physical Habitat and Biology

Approximately 80% of Hogtown Creek flows through urban residential and commercial areas of Gainesville and intermittent areas of natural forest or wetland. Instream erosion is a serious problem in the

Severe sand deposition in Hogtown Creek floodplain north of 8th Avenue

lower reaches. Deposited sediment mobilizes during storm events and drops out further downstream. Without a stable substrate, in-stream aquatic vegetation is largely non-existent. Sand smothering of the streambed is common, occurring even in the natural, forested areas of the watershed.

Five Habitat Assessments and BioRecons were completed in the Hogtown Creek Watershed by WAV and ACEPD personnel between 2001 and 2002. Surveys were completed on Hogtown Creek at NW 45th Avenue, NW 29th Road, upstream of Haile Sink, and on two tributaries, Springstead Creek at NW 2nd Street and Rattlesnake Creek upstream of its confluence with Hogtown Creek. In addition, FDEP personnel completed a Habitat Assessment and BioRecon on Hogtown Creek at CR 30 (SW 20th Avenue) in 1999. The upper and lower reaches of Hogtown Creek were found to be the healthiest, based on both Habitat Assessment and BioRecon scores (Table 9.1). The results for each site are discussed in the following paragraphs.



Larval dobsonfly (*Corydalis cornutus*) - a macroinvertebrate species found in Hogtown Creek

9.3.1 Hogtown Creek at NW 45th Ave.

This site (HOGNW45), located in the upper region of the watershed, surpassed the target values for all three BioRecon metrics, rendering this segment healthy. The Habitat Assessment resulted in a score of 113, or 71% of the maximum assessment score. Most point deductions were related to low velocity and bank instability. The quality of the riparian buffer in this reach rated in the optimal category.

9.3.2 Springstead Creek at NW 2nd St.

This site (SPRNW2) scored a 103 out of 160 possible points on the Habitat Assessment. Water velocity was the only category to receive an optimal score with the others rating in the suboptimal and marginal range. This site was classified as impaired by the BioRecon because none of the metric targets were met.

9.3.3 Hogtown Creek at NW 29th Road

This site (HOGNW29), located downstream of the Springstead Creek confluence, scored a 111 out of 160 possible points on the Habitat Assessment, similar to HOGNW45. Low points were assigned to substrate (habitat) availability, habitat smothering, and bank stability categories. This site was deemed suspect by the BioRecon as the EPT metric target value was not achieved. Sand smothering of potential habitat was most likely the dominant force inhibiting the establishment of a healthy macroinvertebrate population.

Table 9.1 BioRecon results for six sites in the Hogtown Creek Watershed

Metric	Target Value	HOGNW45	SPRNW2	HOGNW29	RSB	HOG30	HOGSINK
Taxa Richness	≥18	24	15	18	17	21	24
EPT	≥4	4	2	3	1	3	8
FL Index	≥10	17	7	12	10	11	10
Metrics Passed		3	0	2	1	2	3
Biological Condition		Healthy	Impaired	Suspect	Suspect	Suspect	Healthy

9.3.4 Rattlesnake Branch

Rattlesnake Branch (RSB) assessment results were similar to those for Springstead Creek for both the Habitat Assessments and BioRecons. This segment scored a 104 or 65% on the Habitat Assessment, receiving low scores in the substrate (habitat) availability, habitat smothering, and bank stability categories. Rattlesnake Branch was classified as suspect by the BioRecon, meeting only the metric target value for the Florida Index.

9.3.5 Hogtown Creek at CR 30

This site (HOG30), located in the lower portion of the watershed within natural, forested wetlands, received a 142 on the Habitat Assessment (FDEP, 2000). All categories scored in the optimal range with the exception of habitat (substrate) diversity and availability and habitat smothering which scored in the suboptimal range. It received a suspect rating on the BioRecon as it failed the EPT metric by one organism.

Rattlesnake Branch upstream from confluence with Hogtown Creek

9.3.6 Hogtown Creek at Haile Sink

This site (HOGSINK) is located at the far downstream end of the stream corridor. Biological and habitat survey results indicate that this segment is healthy. HOGSINK received one of the highest Habitat Assessment scores, 141, of the sites assessed within the watershed, and also passed all three of the BioRecon metrics. The forested wetlands west of I-75, in Hogtown Prairie, act as pollution filters and sediment traps protecting downstream habitat and providing optimal water quality for pollution-sensitive macroinvertebrates.

Based on the Habitat Assessment results, it is clear that erosion and sedimentation are the main contributors to habitat insufficiencies in the watershed. Only the very upper and lower reaches of Hogtown Creek are in a healthy condition. Severe erosion and sedimentation occur in the

middle reaches and tributaries of the watershed. Continued development will exacerbate the existing problems, and may cause deterioration in the few remaining healthy segments of Hogtown Creek.

Hogtown Creek upstream of Haile Sink

9.4 Pollution Sources

9.4.1 Point Sources

Two significant point sources of pollution were identified in the watershed; petroleum contamination entering Hogtown Creek via a stormwater collection system at the Gainesville Mall and contaminated sediments in Springstead and Hogtown creeks. While sediment accumulation in streams is typically considered a nonpoint type of pollution, the contamination in these particular sediments originates from one or more point sources. Other point sources of pollution may also exist in this urbanized watershed.

In November 2001, petroleum constituents (benzene, ethylbenzene, and naphthalene) were detected entering Hogtown Creek through the stormwater system behind the Gainesville Mall on NW 13th Street (ACEPD 2001b). The contaminated water was discharging to the creek through a 30-inch corrugated metal pipe (CMP) culvert that drains groundwater beneath the south

Hogtown Creek petroleum remediation site on the west side of the Gainesville Mall

end of the mall parking lot. The Florida Department of Environmental Protection (FDEP) made this a priority site, and in December 2001 OHM Remediation Services Corp. began conducting soil and water sampling to identify the source of the contaminants. A system was designed to treat the contaminated water prior to its discharge to Hogtown Creek. The treatment system was activated March 1, 2004. The identification of the sources of the contaminants continues. There are a number of facilities in the area that currently or historically stored underground fuel.

Since 1994, the ACEPD has received a number of complaints regarding the presence of contaminated sediments in the form of “tar-like” materials in Springstead and Hogtown creeks. ACEPD personnel have collected samples and have had laboratory analyses conducted for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and selected metals. Analytical results showed the presence of compounds including ethylbenzene, toluene, xylenes, ace-

naphthene, acenaphthylene, benzo(a) anthracene, chrysene, 2,4-dimethylphenol, naphthalene, phenanthrene, and pyrene (Appendix B)

.

In February 2000, FDEP staff reported data from Springstead Creek sediment analyses that showed five constituents that violate leachability criteria (62-777 FAC), ethylbenzene, naphthalene, toluene, 1,2,4-trimethylbenzene, and xylenes. In October 2000, ACEPD staff located a sump in the Hogtown Creek floodplain on property previously owned by Guy Cleveland. This sump was used in the 1960's to collect discharges that resulted from breaching the dikes of impoundments on the former Cabot portion of the Cabot/Koppers property. The materials in the sump contained constituents similar to the "tar-like" material found in the creeks.

The ACEPD recommended to the U.S. Environmental Protection Agency (EPA) that sediment assessment and removal efforts be conducted at Springstead and Hogtown creeks. The ACEPD is confident that this work can be performed with minimal disturbance to the creek. Additionally, the ACEPD requested the following; (1) that contaminated sediment removal activities be conducted in a manner that minimizes disturbance of the natural ecosystems of Springstead and Hogtown creeks, (2) that a sump reportedly dug in the vicinity of the City of Gainesville Public Works Compound on Springstead Creek be located and assessed, and (3) that any contaminated materials remaining in the former sumps be assessed and either removed or remediated.

Sediments in Springstead Creek from nearby Cabot/ Koppers Site

9.4.2 Nonpoint Sources

Because Hogtown Creek flows through mostly urban and developed areas, the major source of nonpoint source pollution is runoff from the impervious areas in the watershed. The parking lots of many shopping centers lie adjacent to the creek and runoff from these areas contains oil and petroleum residues. The high density residential areas along the creek further contribute runoff that can contain high levels of nutrients and chemicals from the use of fertilizers and herbicides on lawns and gardens.

9.5 Baseflow Water Quality

ACEPD personnel have been sampling water quality on a monthly basis at three sites on Hogtown Creek since February 1998. These three sites include Hogtown Creek at NW 22nd Street (HOGNW22), at SW 20th Avenue/CR 30 (HOG30), and upstream of Haile Sink (HOGSINK) off SW 67th Street. Monthly water quality has been monitored on Hogtown Creek at SW 2nd Avenue since October 2002.

9.5.1 Field Parameters

Parameters measured in the field include water temperature, pH, specific conductance, turbidity, and dissolved oxygen.

Median values for these field parameters in Hogtown Creek are comparable to those in other urban streams in this study (Table 9.2). Specific conductance in Hogtown Creek is similar to that in Possum Creek, but is lower than specific conductance in both Tumblin Creek and Sweetwater Branch. The baseflow source for Hogtown Creek is springs and seeps from the surficial and intermediate aquifers. Both Tumblin Creek and Sweetwater Branch receive baseflow contributions from the Floridan aquifer which has a higher conductivity than water from the surficial and intermediate aquifers.

Table 9.2 Comparison of baseflow water quality data among the four sites on Hogtown Creek.

Parameter	HOG NW22	HOG SW2	HOG30	HOG SINK
Water Temp (ºC)	21.0	19.0	21.0	21.8
pH	7.78	7.68	7.14	7.31
Sp. Cond. (µS/cm)	281	257	261	245
Turbidity (NTU)	1.8	3.7	1.8	1.5
DO (mg/L)	8.37	9.29	6.00	7.48

9.5.2 Nutrients

Dissolved nitrate plus nitrite (NO_x-D) concentrations were similar in Hogtown Creek to both Tumblin Creek and to Sweetwater Branch upstream from the GRU Main Street Water Reclamation Facility (WRF). NO_x-D concentrations were substantially lower, however, than those in Possum Creek (Figure 9.3). NO_x-D concentrations also decreased from sites in the upper part of the Hogtown Creek Watershed to those in the lower part, most likely due to the presence of extensive wetlands located in the lower reaches.

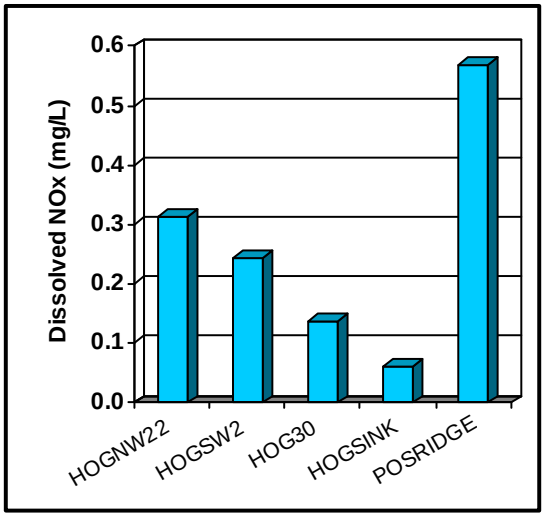


Figure 9.3 Comparison of median dissolved nitrate plus nitrite (NO_x-D) concentrations for the sites on Hogtown Creek and Possum Creek

Dissolved orthophosphate (PO_4-D) concentrations were significantly higher in Hogtown Creek than in both Tumblin Creek and in Sweetwater Branch upstream from the GRU Main Street WRF. However, median dissolved orthophosphate concentrations were substantially lower in Hogtown Creek than concentra-

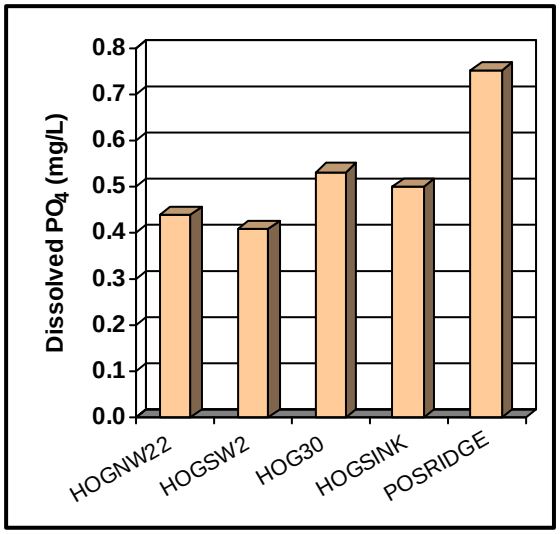


Figure 9.4 Comparison of median dissolved orthophosphate (PO_4-D) concentrations for the sites on Hogtown Creek and Possum Creek.

tions in Possum Creek (Figure 9.4). Total phosphorus (TP-T) concentrations showed similar patterns (Figure 9.5). The source of orthophosphate in Hogtown Creek is, in part, from erosion of phosphatic materials in the Hawthorn Group formations in the watershed. Both orthophosphate and nitrate plus nitrite also likely enter Hogtown Creek in surface runoff from residential landscape and garden fertilization.

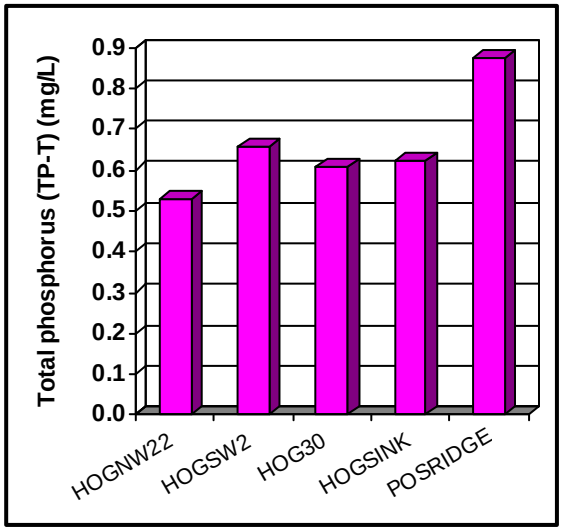


Figure 9.5 Comparison of median total phosphorus (TP-T) concentrations for the four sites on Hogtown Creek and Possum Creek

9.5.3 Coliform Bacteria

Samples for fecal coliform bacteria were collected from Hogtown Creek in 2001 and 2002. All Hogtown sites have exceeded the Class III water quality standard one-time maximum of 800 colony forming units (CFU)/100mL at least once. The range of data collected from Hogtown Creek was 80 to 13,000 CFU/100mL. Possible sources of the bacteria include animal waste (wild and domestic), faulty private sanitary sewer connections, leaky sanitary sewer lines, and failing septic tanks.

9.6 Stormwater

Stormwater samples were collected from Hogtown Creek in 2001 at HOGNW22 and HOGSW2. Stormflow changes in most parameters were typical of other streams in this study. The sediment load, however, increased significantly and to different degrees between the two Hogtown Creek sites (Figure 9.6).

Total suspended solids (TSS) increased at the upstream site (HOGNW22) by about 280%, from a median baseflow concentration of 5 mg/L to a median stormflow concentration of 19 mg/L. Further downstream at SW 2nd Avenue, TSS concentrations increased from a median baseflow concentration of 5 mg/L to a median stormflow concentration of 45.5 mg/L, an 810% increase.

A major cause of the higher TSS concentrations at the HOGSW2 during stormflows is likely related to sediment resuspension from sediment accumulated between the weir, NW 34th Street, and SW 2nd Avenue. Additional sediment loads

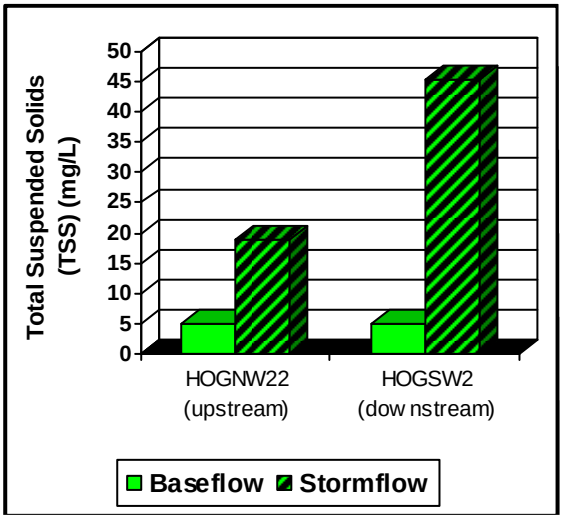


Figure 9.6 Comparison of total suspended solids (TSS) concentrations at two sites on Hogtown Creek during baseflow and stormflow periods

may come from Possum Creek, which joins Hogtown Creek after HOGNW22 but before HOGSW2. HOGSW2 also receives considerable surface runoff from major roadways in the area. These high storm-flow TSS concentrations are indicative of the large volume of sediment in both Hogtown and Possum creeks.

9.7 Ecosystem Health

9.7.1 Biological Integrity

There is a scarcity of quality habitat available to benthic macroinvertebrates in Hogtown Creek from NW 45th Avenue downstream to the forested wetlands south of SW 2nd Avenue. Streambed and bank erosion have scoured the creek bed causing steeper banks. Eroded sediment is deposited in flatter segments further downstream. This sediment deposition has resulted in significant smothering of in-stream habitats in Hogtown Creek.

Riparian vegetative communities in the watershed consist of residential lawns and landscapes, upland hardwood with mixed pine forest, floodplain forest, wetlands, and open land or pasture. Upland hardwood mixed forest includes loblolly pine (*Pinus taeda*), ironwood (*Carpinus caroliniana*), hickory (*Carya* sp.), and sweetgum (*Liquidambar styraciflua*). Floodplain forests contain species such as red maple (*Acer rubrum*), diamond leaf oak (*Quercus laurifolia*), winged elm (*Ulmus alata*), and southern magnolia (*Magnolia grandiflora*).

Non-forested wetland plants found in the watershed include sedges (*Cyperus* spp. and *Carex* spp.), buttonbush (*Cephalanthus occidentalis*), water hemlock (*Cicuta mexicana*), wild rice (*Zizania aquatica*), and softstem rushes (*Scirpus* spp.).

Shrub and brushland in the northern part of the basin are likely successional or disturbed areas that were formerly pasture. Some species in these areas include live oak (*Quercus virginiana*), wax myrtle (*Myrica cerifera*), blueberry (*Vaccinium* sp.), blackberry (*Rubus* spp.), and fennel (*Eupatorium* spp.).

Hogtown Creek understory species include rare sightings of Solomon's seal (*Polygonatum biflorum*), cabbage palm (*Sabal palmetto*), dwarf palmetto (*Sabal minor)*, swamp dogwood (*Cornus foemina*), southern elderberry (*Sambucus canadensis*), and the exotic glossy privet (*Ligustrum lucidum*).

Aquatic macrophyte species include native bamboo (*Arundinaria gigantea*), lizard's tail (*Saururus cernuus*), never wet or golden club (*Orontium aquaticium*), rushes (*Juncus* spp.), and exotic species such as hydrilla (*Hydrilla verticillata*), alligatorweed (*Alternanthera philoxeroides*) and parrot feather (*Myriophyllum aquaticum*). Other exotics found in the Hogtown Creek Watershed include elephant ear (*Alocasia spp.*), Mexican petunia (*Ruellia brittoniana*), coral Ardisia (*Ardisia crenata*), English ivy (*Hedera helix*), wandering jew (*Tradescantia zebrine*), air potato (*Dioscorea bulbifera*), Chinese tallow (*Sapium sebiferum*), *Clematis* spp., and heavenly bamboo (*Nandina domestica*).

9.7.2 Physical Integrity

Bank and channel erosion from NW 45th Avenue downstream to the forested wetlands south of SW 2nd Avenue has negatively impacted the physical condition of the streambed and banks. Streambed erosion and sediment deposition are severe.

Failing banks and exposed tree roots are common. Erosion problems in the tributaries, including Springstead Creek, compound the severity of sedimentation in Hogtown Creek. The integrity of home foundations and other structures located along Springstead Creek east of NW 6th Street is threatened by bank instability.

Flooding is another problem in the watershed in the area of NW 34th Street and SW 2nd Avenue. The lack of storage for the large volumes of stormwater that enter the stream system during rain events, coupled with the relatively high relief in the watershed, causes severe erosion. This erosion and subsequent sediment deposition not only impacts ecosystem health, but may pose structural stability problems for residences, roads, and bridges. In the past, water has topped the bridge on NW 34th Street and flooded residences in the area. Due to concerns for flooding and the problems with sediment accumulation in this area, the Florida Department of Transportation (FDOT) has constructed two sediment traps (one upstream and one downstream of NW 34th Street) to facilitate sediment removal in order to minimize flooding and protect infrastructure stability.

Evidence of stormwater erosion along Hogtown Creek

Eroded banks near a stormwater inflow

9.8 Hydrology

Streamflow data were collected extensively on Hogtown Creek at SW 20th Avenue (HOG30) by the U.S. Geological Survey (Appendix F) dating back to 1971. Monthly streamflow data were collected by ACEPD personnel on Hogtown Creek at NW 22nd Street (HOGNW22) over a five-year period, and more recently at SW 2nd Avenue (HOGSW2ND).

The mean streamflow at HOG30 is 18.59 cubic feet per second (cfs), which is nearly equal to the mean streamflow at HOGSW2ND (18.45 cfs). While the similarity in mean streamflows makes sense, as there are no major tributaries entering Hogtown Creek between the two monitoring sites, it should be noted that these means are based on over a 30-year data record for HOG30 and a 6-month data record for HOGSW2ND. The mean flows in Hogtown Creek are the highest of all streams in Gainesville (Appendix F).

The maximum streamflow recorded at HOG30 over the 30-year period of record was 860 cfs in September 1988. Stormflows at HOG30, indexed here as those flows exceeded only 5% of the time over the period of record, were 61.0 cfs and above (based on the percent exceedance cures, Appendix G).

Streamflow at HOGNW22, in the middle of the watershed, averaged 4.6 cfs from 1998 to 2003. The maximum streamflow recorded here was 28.1 cfs, but measurements were made only on a monthly basis, so the vast majority of stormflow events were likely not measured. Stormflows at HOGNW22, based on percent exceedance curves and the 5% exceedance index for stormflow, were 15.3 cfs and above.

Flow at HOG30 is less than 5.0 cfs about 25% of the time, while it is less than 2.0 cfs only about 5% of the time, based on the flow exceedance curves in Appendix G. Further upstream in the watershed, flow at HOGNW22 is less than 5.0 cfs about 73% of the time, while it is less than 2.0 cfs about 24% of the time. The contribution of baseflow from Possum Creek and from springs and seeps on Hogtown Creek downstream from HOGNW22 is a major component of baseflow at HOG30.

9.9 Summary

Most of the Hogtown Creek Watershed is urbanized. In many areas, residential development has encroached on the creek. In several areas, the floodplain has been filled for development and the stream channelized. Sand smothering is very severe in the main channel between NW 45th Avenue to the forested wetlands south of SW 2nd Avenue. In this area, the creek is devoid of aquatic vegetation, and contains large amounts of accumulated sediment (primarily sand) that is eroded and transported downstream during storm events.

The stream is healthy in the upper and lower parts of the watershed, but it is biologically impaired in the large, urbanized middle portion. Nitrogen species are similar in concentration to those in Tumblin Creek and in Sweetwater Branch (upstream of the GRU Main Street WRF), while phosphorus compounds are higher in concentration in Hogtown Creek than in those two streams. Total suspended solids concentrations are significantly elevated during storm events, particularly at the SW 2nd Avenue site.

The greatest restoration need in the Hogtown Creek Watershed is the reduction of bank erosion and in-stream sediment transport and deposition. More upper basin stormwater storage is needed to attenuate runoff from rainfall events. Lowering the rate and volume at which stormwater enters the creek system will reduce bank erosion and sediment transport and deposition.

A wide section of the creek, with low banks and some sinuosity

The restoration of floodplain functions would provide significant benefits to reducing stream bank erosion and downstream channel sedimentation. Where possible, creek stormflows should be allowed to flow over the banks and onto the floodplain, where velocities would be reduced and sediment deposited. The design of these floodplain and stream bank reconfiguration projects is critical, as is flood protection in the watershed. Natural stream channel design criteria should guide these floodplain and channel restoration projects.

Continuing to educate the public in the merits of best management practices (BMPs) for home landscaping is important for maintaining and improving water quality in Hogtown Creek. This effort should be continued through WAV, Adopt A River, and similar programs. Point sources of pollution, including the petroleum discharge to Hogtown Creek on the southwest side of the Gainesville Mall and the contaminated sediments in Springstead and Hogtown creeks, should continue to be remediated.

Stream sign on NW 22nd Street at Hogtown Creek

Major restoration activities requiring significant capital expenditures are grouped below:

- Property acquisition and addition of stormwater basins throughout the watershed for water treatment and storage to attenuate the volume and rate at which stormwater enters the creek
- Repair and maintenance of existing stormwater culverts and other municipal stormwater system infrastructure that are in disrepair
- Restoration of floodplain functions and hydraulic connections of the floodplain to the stream channel, to reduce stormflow velocities, to increase floodplain sediment deposition, and to reduce stream bank erosion
- Further evaluation and design of remedial strategies to reduce erosion, sediment transport, and downstream sediment deposition

In order to improve the ecosystem of Hogtown Creek, it is essential to improve the quality of the existing buffers, facilitate the removal of invasive exotics, improve macroinvertebrate habitat by reducing in-stream erosion and sedimentation, and provide greater upper basin storage for stormwater. Continued efforts should be made by the City of Gainesville to develop plans for reducing in-stream sedimentation and correcting stormwater infrastructure problems.