

1.0 INTRODUCTION

1.1 Background

The North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (NCDENR-EEP), previously known as the North Carolina Wetlands Restoration Program (NCWRP), was formally established in 2003 to provide a comprehensive, natural resource enhancement program that identifies ecosystem needs at the local watershed level and preserves, enhances, and restores ecological functions within target watersheds. EEP contracted with AMEC Earth and Environmental, Inc. to develop a technical assessment of two 14-digit hydrologic units (HUs) in the Upper Neuse River Basin as part of their Local Watershed Planning initiative. This document represents that analysis, which will serve as a foundation of future planning efforts in the Upper Neuse Basin.

The area of interest in this assessment comprises the upper Swift Creek watershed in Wake County, NC (HU #'s 03020201110010 and 03020201110020), and encompasses approximately 66 square miles. Upper Swift Creek is on the 303(d) List due to biological impairment, and was the focus of a recent investigation by NC DENR Division of Water Quality (DWQ) to look specifically at causes of impairment. Goals of the Local Watershed Planning effort are to complement existing efforts to identify problems in the watershed, help local communities further their watershed improvement objectives, and identify specific watershed improvement projects, some of which can be implemented as part of compensatory mitigation for permitted impacts.

1.2 Watershed Overview

1.2.1 Project Setting/Location

The study area for this Local Watershed Plan involves the portion of the Swift Creek Watershed that is located in the southern portion of Wake County, North Carolina (as indicated in Figure 1-1). The watershed is approximately 66 square miles. The headwaters of the watershed begin in the Town of Cary and the Town of Apex, due west of US 1 (Figure 1-2) and the watershed terminates/discharges at the dam of Lake Benson in the Town of Garner. In addition to Cary and Apex, the watershed encompasses southern portions of the City of Raleigh and Garner, and in unincorporated areas of Wake County. This portion of the piedmont area is in the developing crescent between Raleigh, Greensboro, and Winston-Salem.

The study area is located in the Upper Neuse River Basin, as illustrated in Figure 1-3. The primary water features include: Swift Creek, Dutchmans Creek, Long Branch, Williams Creek, Lake Wheeler, Lake Benson, Yates Mill Pond, MacGregor Downs Lake, Silver Lake, Lochmere Lake, and Regency Lake. The watershed is located in the central piedmont physiographic province, which is known for its rolling terrain, dendritic patterned streams, V-shaped valleys, forested hillsides, and fine textured soils.

Notable landmarks in the watershed include: the North Carolina State Agricultural Labs, Lochmere Planned Community, Apex High School, Regency Park, MacGregor Village/Downs, and Hemlock Bluffs State Natural Area. General land use patterns (developed areas, open areas, streams, lakes, roads major highways, etc.) can be assessed from the 2002 aerial photograph of the watershed in Figure 1-4. This figure illustrates the high concentration of development in the incorporated areas of Apex, Cary, and Garner. The Raleigh portion of the study area is not highly developed because this is where the North Carolina State Agricultural Laboratories are located. In addition, the figure illustrates locations of major highways (including US 1, US 64 and US 401). A more detailed illustration of the transportation network (roads and highways) in the watershed is illustrated in Figure 1-5.

1.2.2 Swift Creek Study Area

The study area consists of two stream segments of Swift Creek (including Lake Wheeler and Lake Benson) and the tributaries to these segments, which all lie within the Upper Neuse River Basin (USGS CU- 03020201, HU-110010, and HU-110020). Note that lower Swift Creek, below Lake Benson, is not included in the scope of this study. For purposes of this report, the terms "Swift Creek Watershed" and "watershed" refer to the study area within Wake County in the Upper Neuse River Basin.

The upper segment, stream index 27-43-(1), includes Lake Wheeler. It begins at the source of Swift Creek in the Town of Cary and extends approximately 9.2 miles to a point approximately 0.6 miles upstream of Wake County SR 1006 (Old Stage Road). The lower segment, stream index 27-43-(5.5), begins at a point approximately 0.6 miles upstream of SR1006 and extends to the Lake Benson dam in the Town of Garner.

Primary tributaries to this portion of Swift Creek are listed in Table 1-1:

Table 1-1: Primary Tributaries of Swift Creek	
<i>(Source: BIMS database, NC Division of Water Quality)</i>	
Tributary	Stream Index #
Williams Creek	27-43-2
MacGregor Downs Lake (and connecting stream)	27-43-2.2
Regency Park Lake (and connecting stream)	27-43-2.5
Long Branch	27-43-2.8
Lynn Branch (Meadow Creek, Lochmere Lake)	27-43-3
Speight Branch	27-43-4
Dutchmans Branch	27-43-4.5
Silver Lake	27-43-5-(1)
Yates Mill Pond	27-43—5-(1.5)
Yates Mill Pond connecting stream	27-43-5-(2)
Buck Branch	27-43-6-(1) and (2)
Reedy Branch	27-43-7-(1) and (2)

1.2.3 General Watershed Condition

In general, the Swift Creek Watershed has been impacted by development (and associated stressors) and portions of the watershed have been listed as “impaired” by NCDENR. The Swift Creek watershed is located in a rapidly developing portion of Wake County. The latest US Census data available for the County (2001 estimates) shows sustained growth in excess of 4% annually for that area; more than twice the population growth rate for North Carolina as a whole. More detailed information on the conditions of

the watershed is presented in Section 2.2.2, Existing Data. In addition, Section 2.2.3 presents information on land use and historical trends in the watershed.

1.2.4 Sub-watershed Delineation

For the purpose of this project, the study area (including the two 14-digit HUs of 110010 and 110020) was delineated into sub-watersheds ranging in size from 1.6 to 6.1 square miles in area. The delineation follows guidance from the Watershed Needs Assessment Team that “the assessment of the 14-digit HUCs should include dividing the management unit into smaller sub-watersheds for evaluation” (WNAT, 2003).

Note that the watershed name designation used in this report is consistent with direction from the WNAT and is described below:

- ❖ River Basin Level (1,000-10,000 square miles) **Neuse River Basin**
- ❖ 8 digit Cataloguing Unit (500-2,000 square miles) **Neuse River Basin Catalogue Unit 03020201**
- ❖ 14 digit Hydrologic Unit (10-100 square miles) **Hydrologic Units 110010 and 110020**
- ❖ Sub-watersheds (1-10 square miles) **(Described below)**
- ❖ Catchment (0.05-0.5 square miles) **(Not included in the scope of Phase I but may be appropriate for following phases)**

In addition, the delineation criteria included the following:

- ❖ Primary Watersheds
- ❖ Secondary Watersheds
- ❖ Municipal Jurisdictions, and
- ❖ General Land Use

The sub-watershed delineation was completed in a series of three steps or tiers (Tiers 1-3). The base data, which was utilized for the delineations, included the Wake County hydrologic and digital elevation model (DEM) data for Tiers 1 and 2; and included municipal jurisdictions, aerial photography and land use data for Tier 3.

The three tiers of delineation are described below:

Tier 1 – Primary Watershed Delineation (illustrated in Figure 1-6), based on major stream systems, including:

- 1 Lake Benson
- 2 Yates Branch (Yates Mill Pond)
- 3 Lake Wheeler
- 4 Swift Creek Headwaters (including Long Branch, Lynn Branch and Speight Branch)
- 5 Dutchmans Creek

Tier 2 – Secondary Watershed Delineation (illustrated in Figure 1-7), defining dominant tributaries, including:

- 1 A-E:** Lake Benson (total of 5 Tier 2 sub-watersheds)
- 2 A-B:** Yates Branch (total of 2 Tier 2 sub-watersheds)
- 3 A-B:** Lake Wheeler (total of 2 Tier 2 sub-watersheds)
- 4 A-E:** Swift Creek Headwaters (total of 5 Tier 2 sub-watersheds)
- 5:** Dutchmans Creek (total of 1 Tier 2 sub-watersheds)

Note that since the Dutchmans Creek watershed was not divided further, an “X” is included as the second digit in the sub-watershed nomenclature (as opposed to A, B, C, etc.) to indicate no further delineation for the Tier 2 criteria.

Tier 3 –Sub-watersheds were further divided if the delineation was warranted from a municipal jurisdiction management and land use perspective (illustrated in Figure 1-8):

1AX-1EX:	Lake Benson (total of 5 Tier 3 sub-watersheds since no further delineation based Tier 3 criteria)
2A1-2A3; 2B1-2B2:	Yates Branch (total of 5 Tier 3 sub-watersheds since 2A and 2B further delineated)
3AX-3BX:	Lake Wheeler (total of 2 Tier 3 sub-watersheds since no further delineation based on Tier 3 criteria)
4A1-4A2; 4BX; 4CX; 4DX; 4E1-4E2:	(Total of 7 Tier 3 sub-watersheds since 4A and 4E further delineated)
5XX	(Total of 1 Tier 3 sub-watershed since no further delineation based on Tier 3 criteria)

Table 1-2 presents information on the size of the sub-watersheds in acres and square miles.

Table 1-2 Sub-watershed Areas		
Sub-watershed ID	Area (acres)	Area (square miles)
1AX	1,919.31	3.00
1BX	1,162.17	1.82
1CX	1,309.68	2.05
1DX	1,364.05	2.13
1EX	1,148.39	1.79
2A1	887.18	1.39
2A2	2,173.51	3.40
2A3	943.89	1.47
2B1	2,931.09	4.58
2B2	1,709.32	2.67
3AX	3,884.61	6.07
3BX	3,706.03	5.79
4A1	1,458.85	2.28
4A2	2,477.91	3.87
4BX	3,131.47	4.89
4CX	2,298.22	3.59
4DX	3,102.00	4.85
4E1	2,192.08	3.43
4E2	1,143.44	1.79
5XX	3,320.84	5.19
Total # = 20	42,264.06	66.0

As indicated in the table, there are a total of 20 sub-watersheds, which range in size from 1.4 to 6.1 square miles (887-3,885 acres). Additional information is provided on the sub-watershed characteristics (including total areas, land use breakdown, geology, water quality classifications, impaired streams, unbuffered streams, point source discharges, wetlands, hydric soils, floodplains, elevations, rare, threatened and endangered (RTE) species, habitat, public lands) in Section 2, Data Assessment.

1.3 Phase I Characterization Overview

The purpose of this report is to present the results of Phase I of the Local Watershed Plan for characterization of the Swift Creek watershed (Hydrologic Units 110010 and 110020 within Catalogue Unit 03020201). NCDENR-EEP has specified that a Catalog Unit-wide analysis is not included in the Phase I Characterization scope and that the scope includes the following tasks:

- (1) Compilation and review of existing data,
- (2) Initial visual assessment of the watershed,
- (3) Delineation of target sub-watersheds, and
- (4) Preparation of a draft and final preliminary findings and recommendations report.