

Table of Contents

Part I.	What are the Landscape Conditions in the Spurgeon Creek Subwatershed?	1
Part II.	Characterize Condition of Ecological Processes in Study Area	3
Part III.	Characterize Natural Resource Sites in Study Area	7
Part IV.	Identify and Assess Potential Sites With in the Context of the Landscape	7

List of Tables

Table 7.0	Spurgeon Ecological Processes Function	3
Table 7.1	Final DAU Ecological Benefit Rank	4
Table 7.2	Spurgeon Environmental Benefit Ranking of Natural Resource Sites	7
Table 7.3	Combined Ranking Score	8
Table 7.4	Wetland Sites	8
Table 7.5	Riparian Sites	13
Table 7.6	Floodplain Sites	15

Table of Figures

Figure 7.0	Classification Percent Totals for Spurgeon Subwatershed	1
Figure 7.1.	Spurgeon Creek Subwatershed Land Cover	2
Figure 7.2	Spurgeon Creek Subwatershed Ecological Function.....	6
Figure 7.3	Spurgeon Creek Subwatershed Ecological Processes and Site Ranking – Wetlands	12
Figure 7.4	Spurgeon Creek Subwatershed Ecological Processes and Site Ranking - Riparian.	14
Figure 7.5	Spurgeon Creek Subwatershed Ecological Processes and Site Ranking - Floodplain.	16

Introduction

This section summarizes the methods used to develop the final list of natural resource (wetlands, riparian, and floodplain) restoration and/or enhancement sites. The final stage of the watershed characterization analysis combines the ecological benefits of each DAU and the environmental benefits of each natural resource site to develop a list of natural resource sites that will provide the greatest functional “lift” in the subwatershed.

Part I. What are the Landscape Conditions in the Spurgeon Creek Subwatershed?

Current conditions

Current land-use within the Offut lake sub-watershed was determined by processing Aerial photography and SPOT 10 meter satellite imagery captured in 2009. Approximately 5% of the Spurgeon Subwatershed is covered by the built environment (see Figure 7.0 Classification Percent Totals for Spurgeon Subwatershed and 7.1 Classification Percent Totals for Spurgeon Creek Subwatershed Landcover). The Spurgeon Creek subwatershed is predominantly in forest cover. Also, previous agricultural use is being converted to residential land-use.

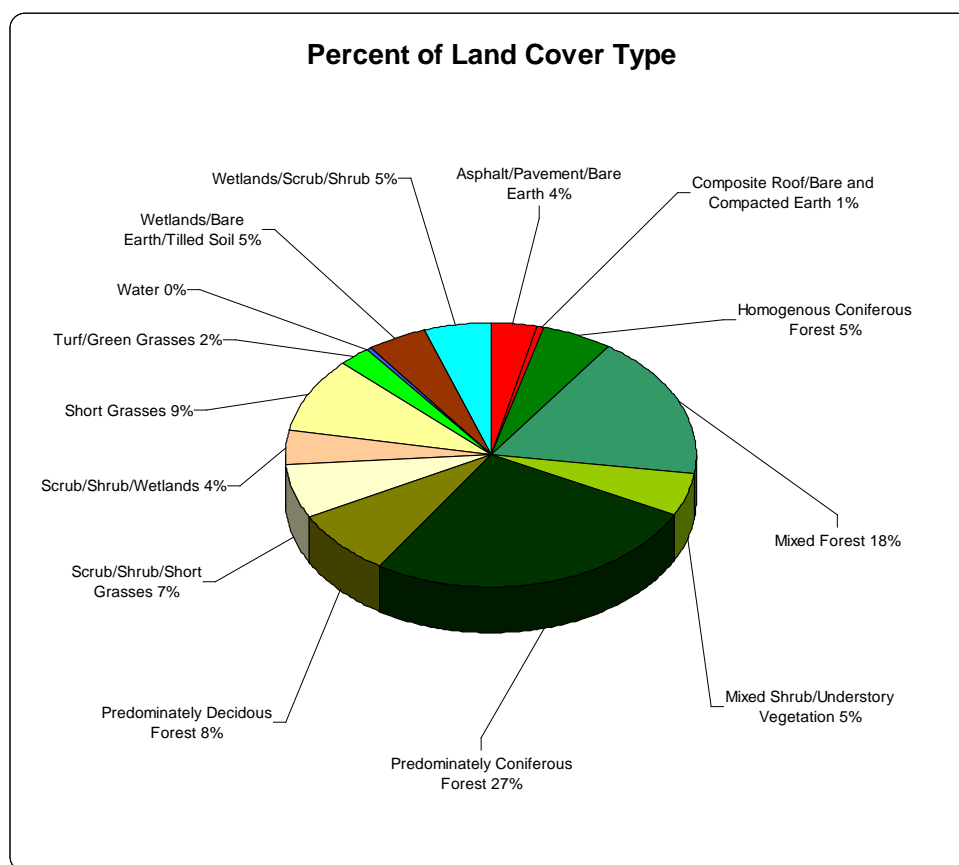


Figure 7.0 Classification Percent Totals for Spurgeon Subwatershed
Land cover data from 2009 SPOT imagery.



Part II. Characterize Condition of Ecological Processes in Study Area

Five ecological processes and two biological elements were assessed: the delivery and movement of water, sediment, wood, pollutants, and heat. The biological elements include aquatic integrity and habitat connectivity. The Matrix of Pathways and Indicators (MPI) was used to determine the function of each ecological process and biological indicator at the DAU scale. Following the assessment of each individual ecological process and biological element, Rules and Assumptions (Tables 8-14 in the Methods document) were used to rank each DAU as Properly Functioning (PF), At Risk (AR), or Not Properly Functioning (NPF). For complete details of the values used in the MPI, please consult Table 7 in the Methods document. For complete details of the Rules and Assumptions, please consult Tables 8 through 14 in the Methods document. Appendix A of this document contains the Methods document.

There are 28 DAUs totaling 11,167 acres (17 sq miles) in the subwatershed.

Determine the Ecological Benefit of the DAU

Following the assessment of each individual ecological process and biological elements using the indicators above and the application of the Rules and Assumptions, the resulting final ranking of each DAU yields a baseline condition of ecological health for each DAU. All DAUs within the study area having ecological processes that are considered "At Risk" under current land use conditions are identified for further consideration. DAUs in the "At Risk" category for multiple key ecological processes are assumed to provide the greatest potential to maximize environmental benefits when natural resource sites are restored.

Table 7.0 includes each ecological process and biological element with the resulting function level. Subsequently, an aggregation of these processes and elements are used to provide an overall function level and ranking of the DAU.

Table 7.0 Spurgeon Ecological Processes and Biological Elements Function

DAU Id	Acres	Sq Mi	Aquatic Integrity	Habitat Connectivity	Water	Sediment	Wood	Pollutants	Heat
93	440	0.69	N/A	AR	AR	AR	NPF	N/A	AR
95	691	1.08	N/A	AR	AR	AR	NPF	N/A	NPF
99	401	0.63	N/A	AR	PF	PF	NPF	N/A	AR
100	441	0.69	N/A	AR	AR	AR	AR	N/A	AR
103	273	0.43	N/A	AR	AR	AR	NPF	N/A	NPF
104	244	0.38	N/A	AR	AR	PF	NPF	N/A	AR
105	175	0.27	N/A	AR	AR	PF	NPF	N/A	AR
106	453	0.71	N/A	AR	AR	AR	PF	N/A	AR
107	278	0.43	N/A	AR	AR	PF	AR	N/A	AR
108	414	0.65	N/A	AR	AR	AR	NPF	N/A	NPF
109	392	0.61	N/A	PF	PF	PF	PF	N/A	PF
111	665	1.04	N/A	AR	AR	AR	AR	N/A	AR
113	206	0.32	N/A	AR	AR	AR	AR	N/A	AR

DAU Id	Acres	Sq Mi	Aquatic Integrity	Habitat Connectivity	Water	Sediment	Wood	Pollutants	Heat
114	253	0.40	N/A	AR	PF	AR	AR	N/A	AR
117	967	1.51	N/A	PF	PF	AR	PF	N/A	AR
118	270	0.42	N/A	AR	AR	AR	NPF	N/A	AR
119	206	0.32	N/A	PF	PF	PF	PF	N/A	AR
120	567	0.89	N/A	PF	PF	AR	PF	N/A	AR
121	217	0.34	N/A	PF	PF	AR	N/A	N/A	N/A
123	340	0.53	N/A	PF	PF	AR	PF	N/A	AR
126	785	1.23	N/A	AR	AR	PF	AR	N/A	AR
127	477	0.75	N/A	AR	PF	AR	AR	AR	AR
128	198	0.31	N/A	PF	PF	AR	AR	N/A	AR
129	485	0.76	N/A	PF	PF	AR	PF	N/A	AR
130	541	0.84	N/A	AR	PF	AR	AR	N/A	AR
134	218	0.34	N/A	PF	PF	AR	N/A	N/A	N/A
139	237	0.37	N/A	PF	PF	PF	N/A	N/A	N/A
141	338	0.53	N/A	PF	PF	AR	PF	N/A	AR

Once the DAU ecological processes and biological function levels are ascertained, the function levels are translated to a ranking scheme. Ecological processes and biological elements which have been identified as "At Risk" are scored higher based upon the potential for enhancement from restored/rehabilitated marginal function levels. The ecological process scores are then ranked according to the weight criteria, and converted to a High, Moderate, or Low process rank.

Table 7.1 illustrates the final ecological benefit rank of each DAU.

Table 7.1 Final DAU Ecological and Biological Benefit Rank

DAU Id	Ecological Processes					Biological Elements		Total Score	Rank
	Water	Sediment	Wood	Pollutants	Heat	Aquatic Integrity	Habitat		
100	3	1	2	0	1	0	1	8	High
111	3	1	2	0	1	0	1	8	High
113	3	1	2	0	1	0	1	8	High
107	3	0	2	0	1	0	1	7	High
126	3	0	2	0	1	0	1	7	High
93	3	1	0	0	1	0	1	6	Moderate
106	3	1	0	0	1	0	1	6	Moderate
118	3	1	0	0	1	0	1	6	Moderate
127	0	1	2	1	1	0	1	6	Moderate
95	3	1	0	0	0	0	1	5	Moderate
103	3	1	0	0	0	0	1	5	Moderate
104	3	0	0	0	1	0	1	5	Moderate
105	3	0	0	0	1	0	1	5	Moderate
108	3	1	0	0	0	0	1	5	Moderate
114	0	1	2	0	1	0	1	5	Moderate
130	0	1	2	0	1	0	1	5	Moderate

DAU Id	Ecological Processes					Biological Elements		Total Score	Rank
	Water	Sediment	Wood	Pollutants	Heat	Aquatic Integrity	Habitat		
128	0	1	2	0	1	0	0	4	Moderate
99	0	0	0	0	1	0	1	2	Low
117	0	1	0	0	1	0	0	2	Low
120	0	1	0	0	1	0	0	2	Low
123	0	1	0	0	1	0	0	2	Low
129	0	1	0	0	1	0	0	2	Low
141	0	1	0	0	1	0	0	2	Low
119	0	0	0	0	1	0	0	1	Low
121	0	1	0	0	0	0	0	1	Low
134	0	1	0	0	0	0	0	1	Low
109	0	0	0	0	0	0	0	0	Low
139	0	0	0	0	0	0	0	0	Low

The final rank is used in the identification of potential restoration and enhancement sites when the DAUs and resource sites are combined to provide a final list of natural resource sites. Spurgeon Creek subwatershed has 28 DAUs that have restoration potential (Figure 7.2 Spurgeon Creek Subwatershed Ecological Function)

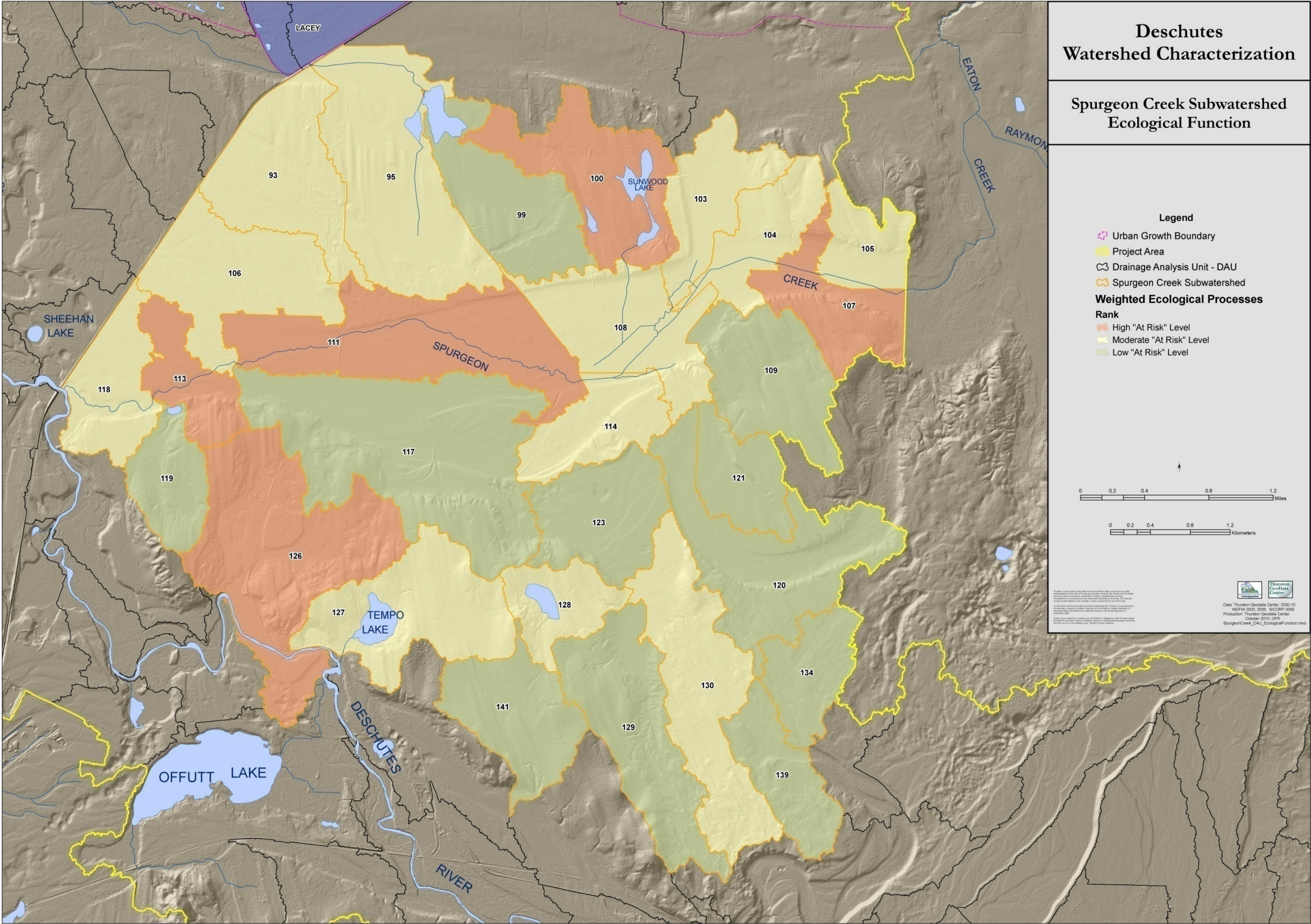


Figure 7.2 Spurgeon Creek Subwatershed Ecological Function

Part III. Characterize Natural Resource Sites in Study Area

This section evaluates natural resource sites within the study area. The purpose is to determine natural resource sites that can be restored or enhanced in the surrounding landscape that will provide the greatest ecological benefit. This analysis is conducted concurrently with the analyses of the ecological processes. Upon completion of the DAU analysis and the natural resource site analysis, the sites identified are ranked in the context of the DAU and subwatershed landscape.

Determine the Environmental Benefit of the Resource Sites

The natural resource sites are evaluated based on the attributes assigned during site assessment using Tables 22 to 24 in the Methods document to assign an environmental benefit final score. Once all the attributes have been evaluated, the following ranking criteria are used to rank the sites High, Moderate, and Low.

Following the conversion of natural resource sites from a score to Low, Moderate, or High rank, there were a total of 255 potential restoration or enhancement sites for their environmental benefit if restored. Table 7.1 details the results.

Table 7.1 Spurgeon Environmental Benefit Ranking of Natural Resource Sites

Spurgeon Potential Restoration Sites				
Rank	Wetland	Riparian	Floodplain	Total
High	61	13	0	74
Moderate	87	10	0	97
Low	79	4	1	84

Part IV. Assess Potential Sites within the DAU

This section presents the results of a ranking process for all potential natural resource restoration sites. The ranking of a natural resource restoration site is based on the ranking of each site individually combined with the ranking of the DAU within which the restoration site is located. The result is a final combined score from 0 to 6, with a score of 6 representing those sites with the greatest potential for environmental benefit if restored.

Table 7.2 is used to score the natural resource sites in the context of the DAU. A site with a Low environmental benefit is a preservation site or completely degraded site that would provide a minimal environmental benefit if restored.

Table 7.2 Combined Ranking Score

Ecological Benefit (DAU)	Environmental Benefit (Resource Site)	Total Score
High	High	6
High	Moderate	5
Moderate	High	4
Moderate	Moderate	3
Low	High	2
Low	Moderate	1
N/A	Low	0

Thus, the Ecological Benefit (DAU) and the Environmental Benefit (Resource Sites) are ranked to provide a final score from 0 to 6. Following evaluation, a total of 255 sites were ranked within the corresponding DAU.

Results of natural resource restoration site ranking for wetlands, riparian and floodplain (where present) areas are described in the following sections.

The following wetlands, riparian and floodplain sections describe the final combined ecological benefit and environmental benefit ranking of natural resource sites.

Wetlands

Table 7.3 presents the results of wetland restoration site ranking taking into account the combined wetland restoration potential and the DAU ranking. Figure 7.4 shows the location of each wetland restoration site. Wetland sites ranked Low and less than one acre are not included in the table, but are ranked and available in appendix B.

Table 7.3 Wetland Sites

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 1164	High	6	88.45
Wetland 2803	High	6	8.79
Wetland 1202	High	6	53.23
Wetland 1218	High	6	4.07
Wetland 1237	High	6	3.19
Wetland 1246	High	6	0.13
Wetland 1207	High	6	21.97
Wetland 1364	High	6	8.29
Wetland 1259	High	6	5.28
Wetland 1413	High	6	0.55
Wetland 1185	High	6	19.51
Wetland 1212	High	6	11.41
Wetland 1116	High	6	9.99
Wetland 1232	High	6	2.79

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 1223	High	6	2.25
Wetland 1125	High	6	2.14
Wetland 1239	High	6	1.66
Wetland 1338	High	6	1.51
Wetland 1194	High	6	1.10
Wetland 1333	High	6	1.09
Wetland 1228	High	6	0.80
Wetland 1384	High	6	0.70
Wetland 1340	High	6	0.42
Wetland 1192	High	6	0.39
Wetland 1299	High	6	0.39
Wetland 1121	High	6	0.33
Wetland 1370	High	6	0.29
Wetland 1339	High	6	0.16
Wetland 1184	High	6	0.10
Wetland 1363	High	6	0.10
Wetland 1233	High	6	0.10
Wetland 1186	High	6	0.09
Wetland 1410	High	6	0.00
Wetland 1115	Moderate	5	26.84
Wetland 2802	Moderate	5	4.51
Wetland 1342	Moderate	5	1.19
Wetland 1308	Moderate	5	0.86
Wetland 2800	Moderate	5	0.67
Wetland 1337	Moderate	5	0.22
Wetland 1371	Moderate	5	0.15
Wetland 1216	Moderate	5	8.57
Wetland 1220	Moderate	5	4.18
Wetland 1373	Moderate	5	2.26
Wetland 1315	Moderate	5	1.38
Wetland 1349	Moderate	5	1.17
Wetland 1314	Moderate	5	0.98
Wetland 1230	Moderate	5	0.93
Wetland 1329	Moderate	5	0.91
Wetland 1348	Moderate	5	0.89
Wetland 1311	Moderate	5	0.59
Wetland 1324	Moderate	5	0.55
Wetland 1290	Moderate	5	0.33
Wetland 1412	Moderate	5	0.22
Wetland 1310	Moderate	5	0.20
Wetland 1312	Moderate	5	0.11
Wetland 1306	Moderate	5	0.03
Wetland 1097	Moderate	5	4.54
Wetland 1149	Moderate	5	4.27
Wetland 1221	Moderate	5	1.99
Wetland 1323	Moderate	5	1.09
Wetland 1166	Moderate	5	0.81

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 1428	Moderate	5	0.51
Wetland 1331	Moderate	5	0.42
Wetland 1406	Moderate	5	0.19
Wetland 1423	Moderate	5	0.04
Wetland 1177	High	4	14.65
Wetland 1169	High	4	4.93
Wetland 1161	High	4	136.48
Wetland 1170	High	4	0.61
Wetland 1163	High	4	0.46
Wetland 1118	High	4	92.37
Wetland 1089	High	4	3.61
Wetland 1091	High	4	0.40
Wetland 1191	High	4	6.29
Wetland 1266	High	4	3.75
Wetland 1260	High	4	1.97
Wetland 1090	High	4	0.95
Wetland 1173	High	4	0.32
Wetland 1242	High	4	0.07
Wetland 2799	High	4	12.06
Wetland 1154	High	4	5.37
Wetland 1070	High	4	5.00
Wetland 1132	High	4	2.86
Wetland 1135	High	4	1.66
Wetland 1229	High	4	1.54
Wetland 1263	High	4	1.35
Wetland 1157	High	4	0.90
Wetland 1248	High	4	0.47
Wetland 1240	High	4	0.11
Wetland 1061	Moderate	3	23.70
Wetland 1136	Moderate	3	20.40
Wetland 1167	Moderate	3	8.44
Wetland 1277	Moderate	3	7.86
Wetland 1073	Moderate	3	6.18
Wetland 1055	Moderate	3	5.36
Wetland 1113	Moderate	3	3.62
Wetland 1172	Moderate	3	2.68
Wetland 1199	Moderate	3	2.30
Wetland 1255	Moderate	3	1.62
Wetland 1171	Moderate	3	1.03
Wetland 1053	Moderate	3	0.79
Wetland 1479	Moderate	3	0.73
Wetland 1195	Moderate	3	0.36
Wetland 1200	Moderate	3	0.30
Wetland 1262	Moderate	3	0.29
Wetland 1264	Moderate	3	0.20
Wetland 1119	Moderate	3	39.18
Wetland 1372	Moderate	3	29.73

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 1079	Moderate	3	5.07
Wetland 1503	Moderate	3	2.22
Wetland 1398	Moderate	3	1.87
Wetland 1258	Moderate	3	1.39
Wetland 1272	Moderate	3	0.96
Wetland 1256	Moderate	3	0.76
Wetland 1265	Moderate	3	0.37
Wetland 1049	Moderate	3	0.27
Wetland 1181	Moderate	3	0.16
Wetland 1257	Moderate	3	0.12
Wetland 1529	Moderate	3	0.09
Wetland 1253	Moderate	3	0.00
Wetland 1362	Moderate	3	8.25
Wetland 1087	Moderate	3	2.08
Wetland 1086	Moderate	3	1.43
Wetland 1197	Moderate	3	0.05
Wetland 1283	High	2	2.43
Wetland 1498	High	2	2.92
Wetland 1451	High	2	0.58
Wetland 1490	High	2	0.34
Wetland 1078	Moderate	1	9.34
Wetland 1225	Moderate	1	4.05
Wetland 1473	Moderate	1	0.55
Wetland 1486	Moderate	1	0.22
Wetland 1226	Moderate	1	0.20
Wetland 1250	Moderate	1	65.71
Wetland 1484	Moderate	1	1.59
Wetland 1432	Moderate	1	0.74
Wetland 1468	Moderate	1	0.64
Wetland 1374	Moderate	1	34.10
Wetland 1244	Moderate	1	29.70
Wetland 1320	Moderate	1	22.57
Wetland 1347	Moderate	1	6.68
Wetland 1288	Moderate	1	3.94
Wetland 1282	Moderate	1	3.48
Wetland 1292	Moderate	1	1.18
Wetland 1281	Moderate	1	0.92
Wetland 1269	Moderate	1	0.77
Wetland 1270	Moderate	1	0.59
Wetland 1271	Moderate	1	0.42

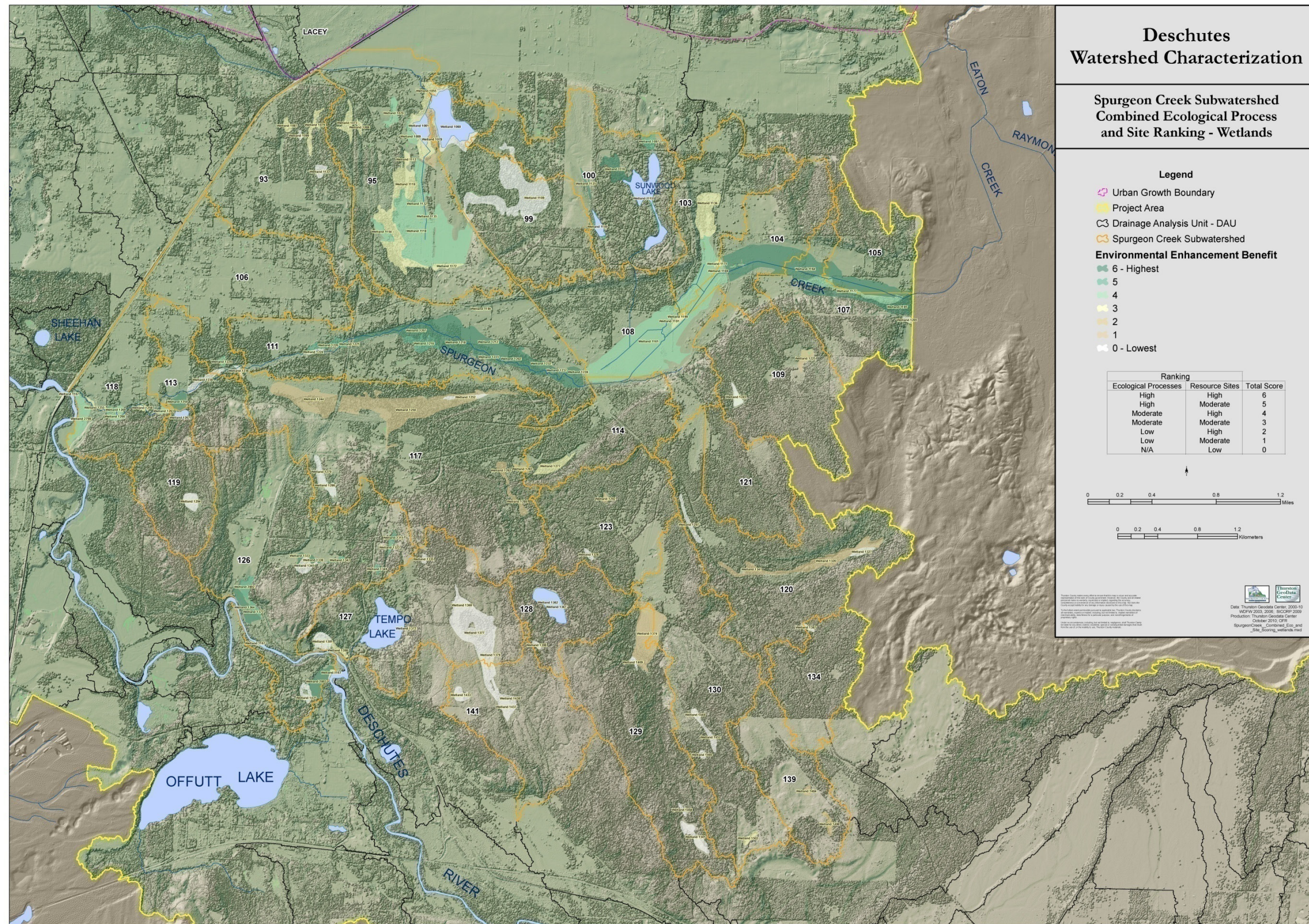


Figure 7.3 Spurgeon Creek Subwatershed Ecological Processes and Site Ranking – Wetlands

Riparian condition

The resulting combined score of the natural resource site within the context of the DAU were scored and displayed on the map Figure 7.4 Spurgeon Creek Subwatershed Ecological Processes and Site Ranking – Riparian. Riparian sites ranked Low are not included in the table, but are ranked and available in appendix B.

Table 7.4 Riparian Sites

Site ID	Riparian Rank	Combined DAU and Site Score	Acres
Riparian 266	High	6	99.44
Riparian 238	High	6	20.53
Riparian 263	High	6	30.00
Riparian 291	High	6	0.18
Riparian 3269	High	6	0.02
Riparian 3292	High	6	129.47
Riparian 236	Moderate	5	60.75
Riparian 259	Moderate	5	53.83
Riparian 3265	Moderate	5	7.32
Riparian 3454	Moderate	5	1.06
Riparian 281	Moderate	5	55.64
Riparian 230	High	4	44.36
Riparian 246	High	4	48.42
Riparian 233	High	4	9.76
Riparian 267	High	4	0.27
Riparian 224	Moderate	3	2.46
Riparian 256	Moderate	3	37.85
Riparian 3300	Moderate	3	17.58
Riparian 272	Moderate	3	21.30
Riparian 255	High	2	371.06
Riparian 3462	High	2	40.31
Riparian 3302	High	2	139.90
Riparian 3303	Moderate	1	159.83

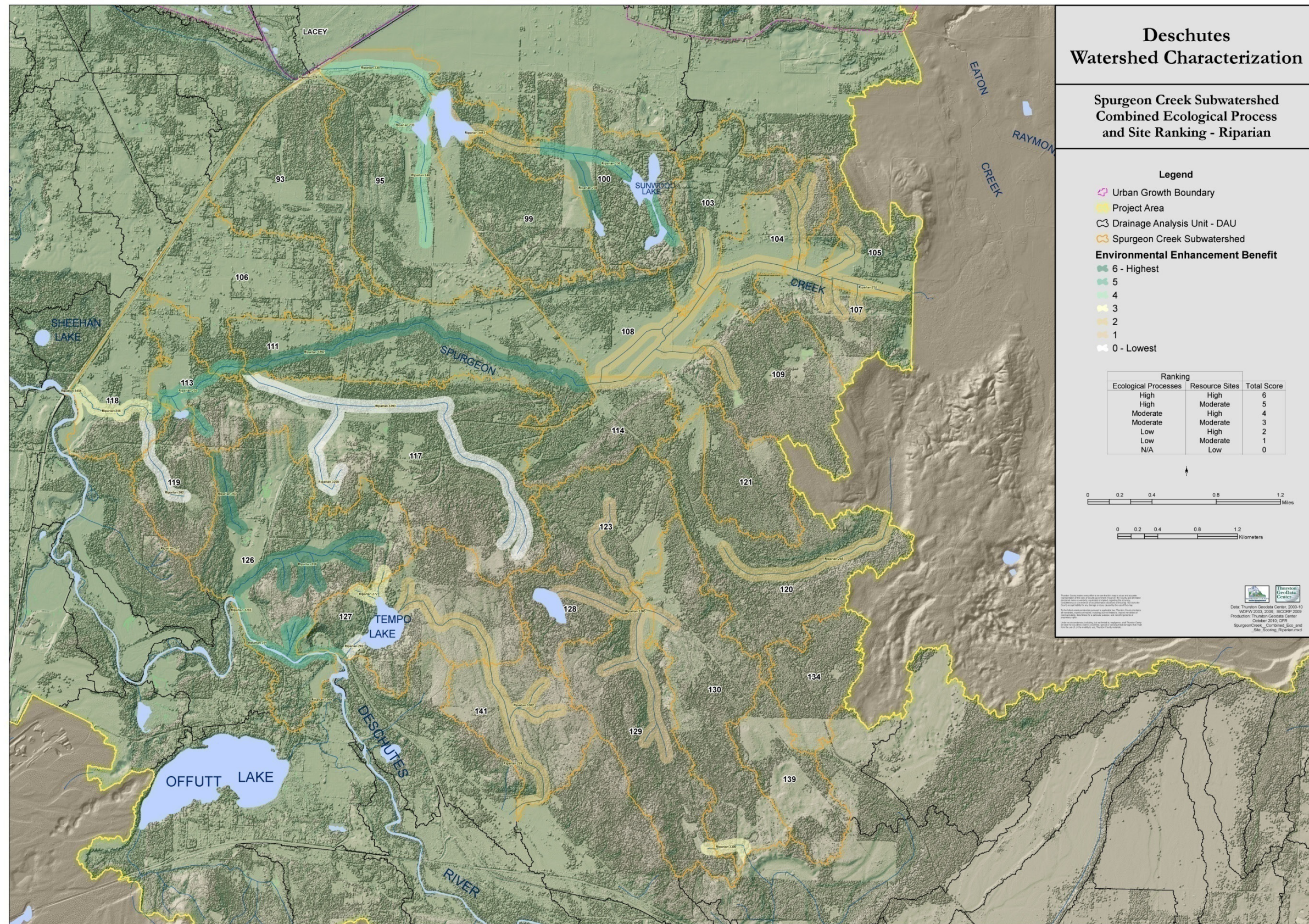


Figure 7.4 Spurgeon Creek Subwatershed Ecological Processes and Site Ranking - Riparian.

Floodplain Condition

The resulting combined score of the natural resource site within the context of the DAU were scored and displayed on Figure 7.6 Spurgeon Creek Subwatershed Ecological Processes and Site Ranking-Floodplain. There was only one site ranked Low and it is in Table 7.6

Table 7.6 Floodplain Sites

Site ID	Floodplain Rank	Combined DAU Site Score	Acres
Floodplain 11	Low	0	25.18

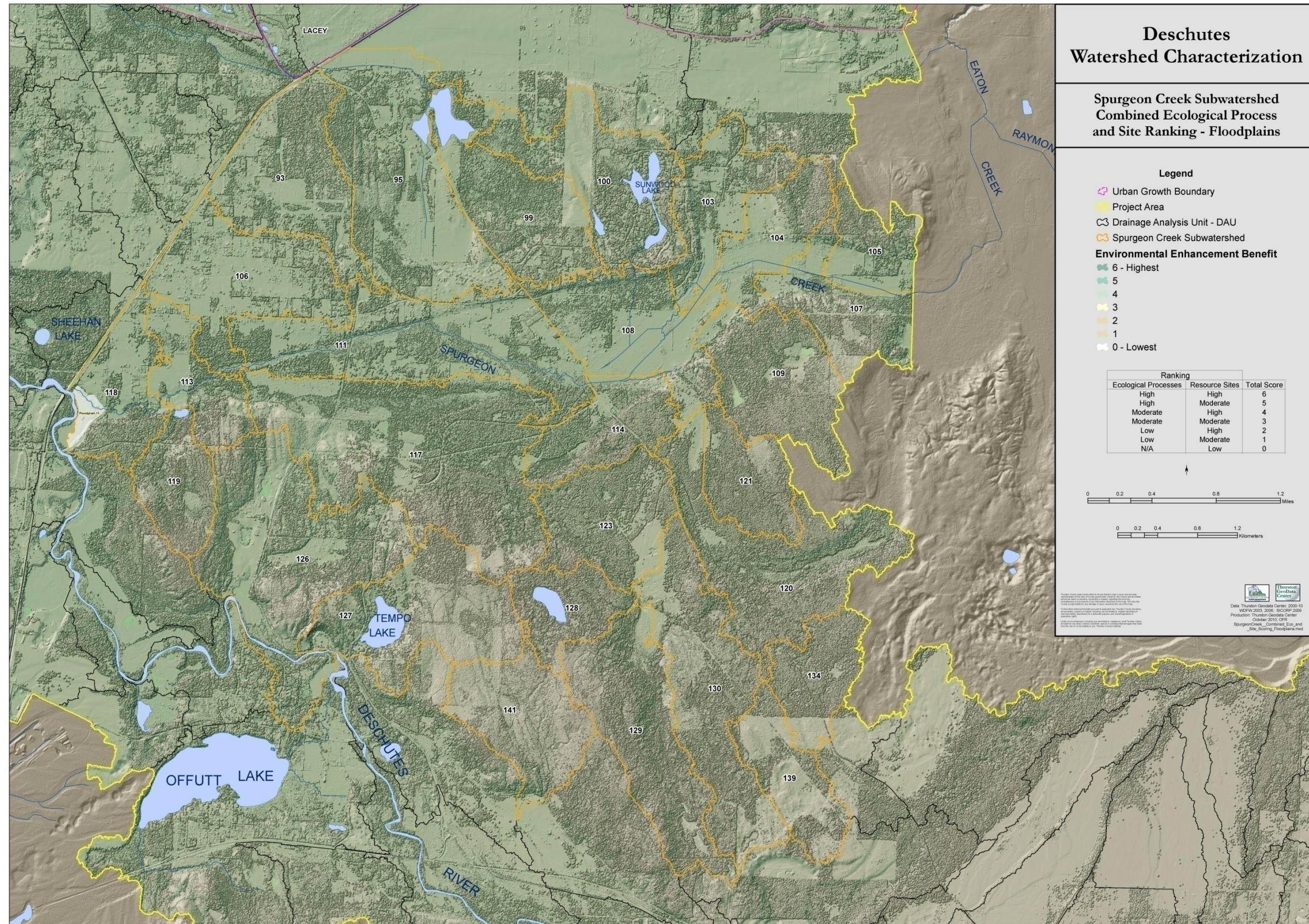


Figure 7.5 Spurgeon Creek Subwatershed Ecological Processes and Site Ranking - Floodplain.