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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 Percival Creek Subwatershed?

Current conditions

Current land-use within the Percival Creek subwatershed was determined by processing Aerial photography and SPOT 10 meter satellite imagery captured in 2009. Approximately 37% of the Percival Creek Subwatershed is covered by the built environment (see Figure 10.0 and 10.1 Classification Percent Totals for Percival Creek Subwatershed). Percival Creek subwatershed land-use includes commercial and residential land-uses.

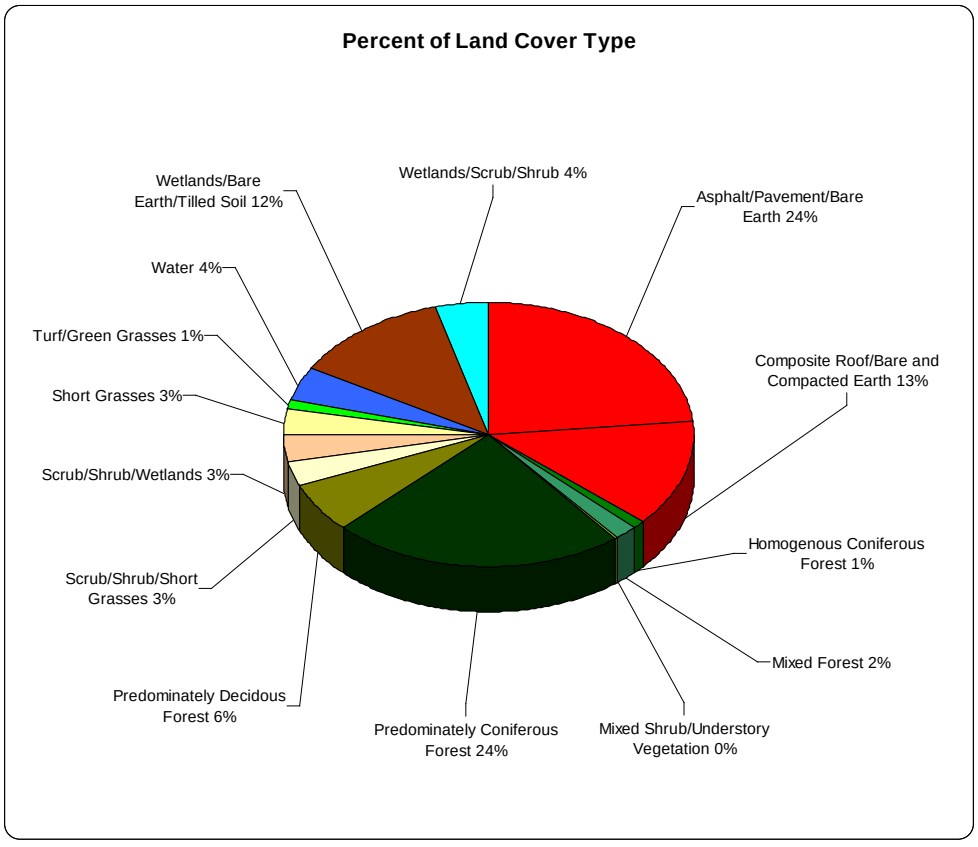

Figure 10.0 Classification Percent Totals for Percival Creek Subwatershed
Land cover data from 2009 SPOT imagery.

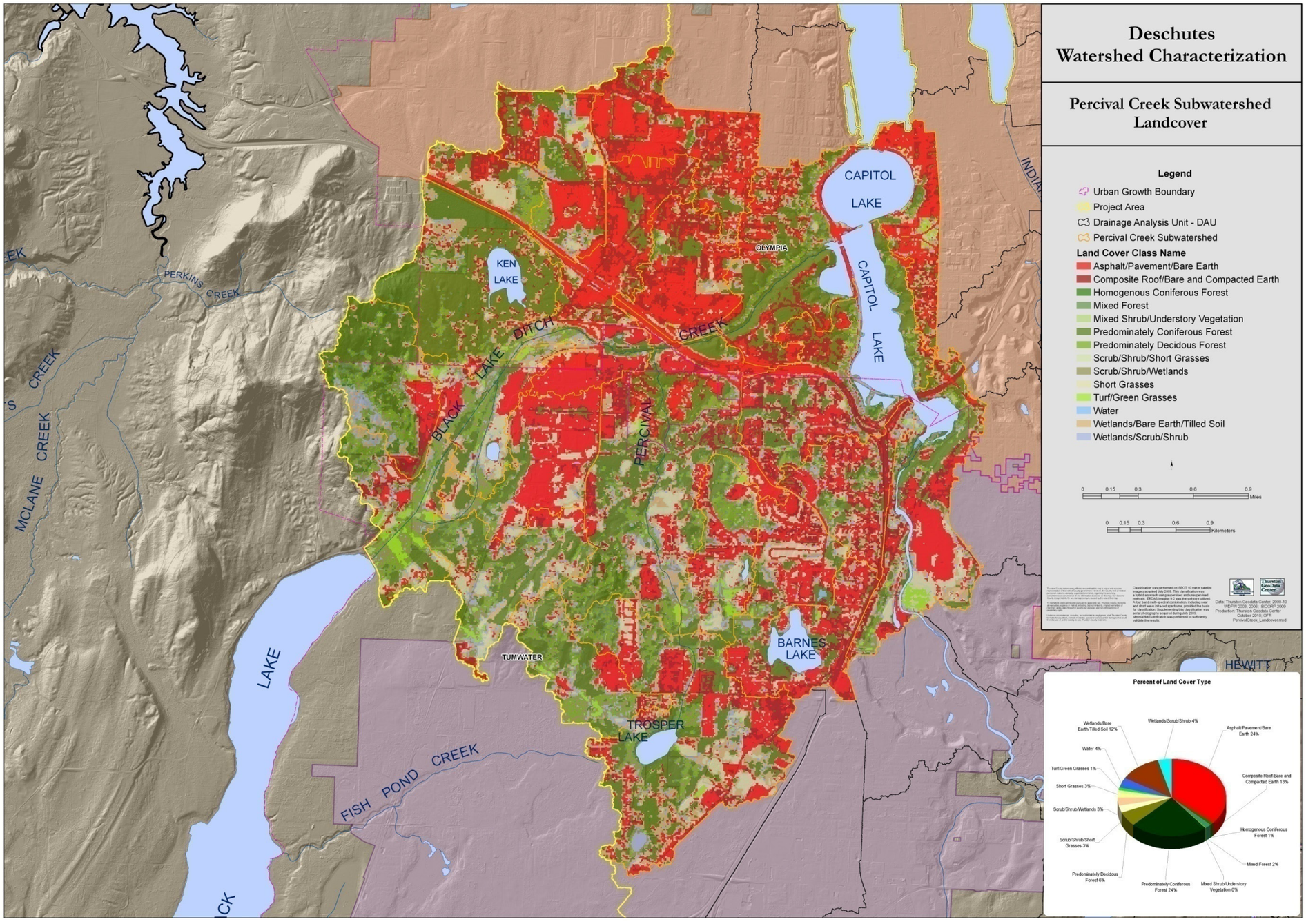

Figure 10.1 Percival Creek Subwatershed Land Cover

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 21 DAUs totaling 6,429 acres (10 sq miles) in the Percival Creek 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 10.0 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 10.0 Percival Creek Ecological and Biological Function

DAU Id	Acres	Sq Mi	Aquatic Integrity	Habitat Connectivity	Water	Sediment	Wood	Pollutants	Heat
31	615	0.96	N/A	AR	NPF	AR	NPF	NPF	AR
33	289	0.45	N/A	NPF	NPF	AR	N/A	N/A	N/A
35	111	0.17	N/A	AR	NPF	AR	NPF	N/A	AR
37	243	0.38	N/A	AR	NPF	AR	N/A	N/A	N/A
42	350	0.55	NPF	AR	NPF	AR	NPF	N/A	AR
43	205	0.32	N/A	AR	NPF	AR	NPF	N/A	AR
44	648	1.01	NPF	AR	NPF	AR	AR	N/A	NPF
45	398	0.62	N/A	AR	PF	AR	AR	AR	AR
46	187	0.29	NPF	AR	AR	PF	NPF	N/A	AR
48	194	0.30	N/A	AR	NPF	AR	NPF	N/A	AR
49	370	0.58	N/A	NPF	NPF	AR	NPF	AR	AR
52	474	0.74	N/A	AR	NPF	AR	NPF	AR	AR
53	246	0.38	NPF	AR	AR	AR	AR	N/A	AR

DAU Id	Acres	Sq Mi	Aquatic Integrity	Habitat Connectivity	Water	Sediment	Wood	Pollutants	Heat
54	209	0.33	NPF	AR	AR	AR	NPF	N/A	AR
58	249	0.39	NPF	AR	NPF	AR	NPF	N/A	AR
61	259	0.41	N/A	AR	AR	AR	AR	N/A	AR
65	615	0.96	NPF	NPF	NPF	AR	AR	AR	NPF
66	192	0.30	NPF	NPF	NPF	AR	NPF	N/A	AR
67	164	0.26	NPF	NPF	NPF	AR	NPF	N/A	AR
68	226	0.35	NPF	NPF	NPF	AR	NPF	N/A	AR
74	188	0.29	N/A	AR	AR	AR	AR	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 10.1 illustrates the final ecological and biological function rank of each DAU.

Table 10.1 Final DAU Ecological and Biological Benefit Rank

	Ecological Processes					Biological Elements			
DAU Id	Water	Sediment	Wood	Pollutants	Heat	Aquatic Integrity	Habitat	Total Score	Rank
24	3	1	2	1	1	1	1	10	High
16	3	1	2	0	1	1	1	9	High
22	3	1	2	0	1	1	1	9	High
23	3	1	2	0	1	1	1	9	High
1	3	1	2	0	1	0	1	8	High
4	3	1	2	0	1	0	1	8	High
10	3	1	2	0	1	0	1	8	High
13	3	1	2	0	1	0	1	8	High
15	3	1	2	0	1	0	1	8	High
20	3	1	2	0	1	0	1	8	High
21	3	1	2	0	1	0	1	8	High
14	3	1	0	1	1	0	0	6	Moderate
27	3	1	0	1	1	0	0	6	Moderate
2	3	1	0	0	1	0	0	5	Moderate
3	3	1	0	0	1	0	0	5	Moderate
5	3	1	0	0	1	0	0	5	Moderate
6	3	1	0	0	1	0	0	5	Moderate
11	3	1	0	0	0	0	1	5	Moderate
19	0	1	2	0	1	0	1	5	Moderate
7	0	1	0	1	1	0	0	3	Moderate
9	0	1	0	1	1	0	0	3	Moderate

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. Upper Percival Creek subwatershed has 21 DAUs that have restoration potential.
(Figure10.2 Percival Subwatershed Ecological Function).

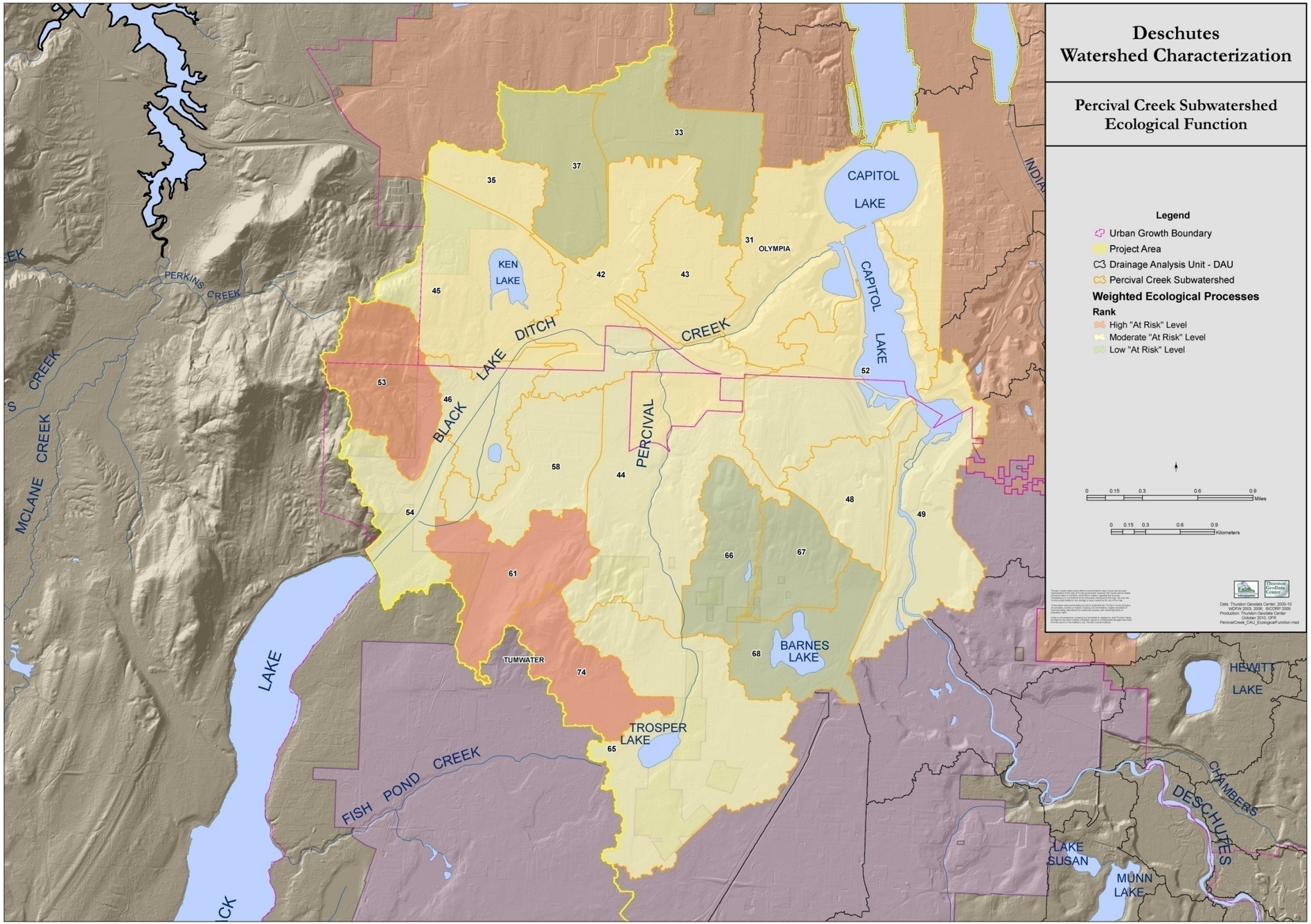

Figure 10.2 Percival Creek Subwatershed Ecological Function

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 289 potential restoration or enhancement sites for their environmental benefit if restored. Table 10.1 details the results.

Table 10.1 Percival Creek Environmental Benefit Ranking of Natural Resource Sites

Percival Creek **Potential Restoration Sites**				
Rank	Wetland	Riparian	Floodplain	Total
High	111	4	0	115
Moderate	111	6	1	118
Low	48	8	0	56

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 10.2 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 10.2 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 10.3 presents the results of wetland restoration site ranking taking into account the combined wetland restoration potential and the DAU ranking. Figure 10.4 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 10.3 Wetland Sites

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 453	High	4	0.13
Wetland 457	High	4	0.16
Wetland 581	High	4	5.35
Wetland 258	High	4	72.50
Wetland 259	High	4	22.15
Wetland 283	High	4	70.68
Wetland 300	High	4	48.29
Wetland 310	High	4	1.17
Wetland 357	High	4	3.71
Wetland 366	High	4	0.35
Wetland 428	High	4	12.44
Wetland 429	High	4	3.23
Wetland 458	High	4	0.82
Wetland 460	High	4	0.14

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 468	High	4	0.49
Wetland 472	High	4	1.52
Wetland 485	High	4	0.30
Wetland 486	High	4	0.19
Wetland 488	High	4	0.31
Wetland 262	High	4	1.15
Wetland 348	High	4	7.69
Wetland 355	High	4	0.67
Wetland 373	High	4	0.20
Wetland 385	High	4	0.06
Wetland 396	High	4	0.47
Wetland 404	High	4	2.32
Wetland 409	High	4	1.13
Wetland 410	High	4	0.15
Wetland 424	High	4	0.39
Wetland 431	High	4	0.38
Wetland 432	High	4	2.01
Wetland 434	High	4	0.57
Wetland 436	High	4	0.05
Wetland 439	High	4	0.59
Wetland 440	High	4	0.77
Wetland 452	High	4	0.99
Wetland 493	High	4	0.08
Wetland 508	High	4	1.74
Wetland 579	High	4	13.85
Wetland 624	High	4	0.26
Wetland 290	High	4	17.21
Wetland 294	High	4	4.53
Wetland 359	High	4	19.77
Wetland 392	High	4	8.10
Wetland 398	High	4	0.25
Wetland 474	High	4	5.84
Wetland 498	High	4	6.28
Wetland 591	High	4	0.29
Wetland 610	High	4	0.20
Wetland 676	High	4	1.15
Wetland 685	High	2	0.65
Wetland 702	High	2	3.41
Wetland 814	High	4	3.62
Wetland 852	High	4	0.26
Wetland 882	High	4	5.15
Wetland 296	High	4	8.70
Wetland 360	High	4	0.09
Wetland 367	High	4	0.24
Wetland 379	High	4	2.69
Wetland 427	High	4	2.25

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 462	High	4	2.97
Wetland 503	High	4	7.86
Wetland 511	High	4	3.37
Wetland 518	High	4	0.60
Wetland 535	High	4	2.12
Wetland 549	High	4	2.05
Wetland 562	High	4	1.44
Wetland 614	High	4	3.24
Wetland 625	High	4	6.70
Wetland 630	High	4	0.53
Wetland 631	High	4	8.17
Wetland 654	High	4	0.40
Wetland 666	High	6	4.13
Wetland 679	High	4	0.78
Wetland 698	High	2	2.55
Wetland 704	High	4	1.10
Wetland 725	High	2	0.54
Wetland 736	High	2	0.84
Wetland 765	High	2	0.43
Wetland 279	High	4	2.26
Wetland 312	High	4	0.59
Wetland 361	High	4	0.19
Wetland 391	High	4	0.16
Wetland 417	High	4	0.42
Wetland 519	High	4	0.07
Wetland 590	High	4	1.42
Wetland 596	High	4	2.96
Wetland 606	High	6	0.54
Wetland 613	High	6	0.76
Wetland 639	High	4	0.87
Wetland 648	High	2	0.99
Wetland 655	High	6	0.31
Wetland 672	High	2	0.50
Wetland 680	High	2	0.56
Wetland 684	High	2	0.81
Wetland 699	High	2	0.41
Wetland 705	High	2	0.22
Wetland 709	High	2	0.38
Wetland 710	High	2	0.26
Wetland 717	High	2	0.25
Wetland 734	High	2	0.49
Wetland 740	High	2	0.08
Wetland 743	High	2	0.09
Wetland 745	High	2	0.24
Wetland 770	High	4	1.92
Wetland 772	High	4	2.83

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 782	High	2	0.47
Wetland 786	High	2	0.43
Wetland 832	High	4	7.67
Wetland 841	High	4	6.81
Wetland 846	High	4	0.11
Wetland 255	Moderate	1	12.46
Wetland 356	Moderate	3	0.13
Wetland 362	Moderate	3	1.05
Wetland 371	Moderate	3	1.45
Wetland 388	Moderate	3	0.87
Wetland 426	Moderate	3	4.37
Wetland 450	Moderate	3	1.97
Wetland 491	Moderate	3	0.57
Wetland 512	Moderate	3	1.74
Wetland 529	Moderate	3	0.11
Wetland 542	Moderate	3	2.27
Wetland 559	Moderate	3	0.35
Wetland 560	Moderate	3	1.77
Wetland 573	Moderate	3	0.37
Wetland 578	Moderate	5	0.83
Wetland 592	Moderate	3	1.13
Wetland 645	Moderate	1	0.36
Wetland 651	Moderate	3	0.53
Wetland 678	Moderate	1	0.53
Wetland 692	Moderate	5	0.40
Wetland 701	Moderate	5	3.43
Wetland 720	Moderate	1	0.07
Wetland 724	Moderate	1	1.10
Wetland 727	Moderate	1	3.27
Wetland 733	Moderate	5	4.74
Wetland 750	Moderate	3	0.98
Wetland 760	Moderate	1	0.09
Wetland 761	Moderate	1	0.47
Wetland 767	Moderate	1	0.24
Wetland 790	Moderate	1	0.81
Wetland 791	Moderate	3	1.06
Wetland 800	Moderate	3	0.73
Wetland 807	Moderate	5	1.39
Wetland 826	Moderate	3	0.48
Wetland 831	Moderate	3	0.24
Wetland 854	Moderate	3	1.26
Wetland 260	Moderate	1	0.25
Wetland 261	Moderate	1	0.26
Wetland 276	Moderate	3	0.35
Wetland 284	Moderate	3	0.20
Wetland 285	Moderate	3	0.44

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 301	Moderate	1	0.18
Wetland 378	Moderate	3	3.61
Wetland 397	Moderate	3	1.00
Wetland 416	Moderate	3	0.40
Wetland 455	Moderate	3	1.13
Wetland 456	Moderate	3	0.52
Wetland 464	Moderate	3	0.24
Wetland 469	Moderate	3	0.19
Wetland 473	Moderate	3	1.67
Wetland 475	Moderate	3	1.02
Wetland 479	Moderate	3	0.56
Wetland 496	Moderate	3	0.19
Wetland 510	Moderate	3	0.07
Wetland 513	Moderate	3	0.41
Wetland 514	Moderate	3	0.21
Wetland 515	Moderate	3	0.18
Wetland 517	Moderate	3	0.38
Wetland 536	Moderate	3	0.61
Wetland 541	Moderate	3	0.37
Wetland 563	Moderate	3	0.38
Wetland 567	Moderate	3	1.40
Wetland 574	Moderate	5	6.00
Wetland 600	Moderate	5	0.35
Wetland 603	Moderate	3	0.61
Wetland 611	Moderate	5	0.60
Wetland 616	Moderate	3	0.66
Wetland 627	Moderate	5	5.79
Wetland 628	Moderate	3	4.14
Wetland 649	Moderate	1	1.05
Wetland 660	Moderate	1	4.81
Wetland 671	Moderate	1	2.21
Wetland 674	Moderate	3	1.24
Wetland 677	Moderate	1	0.45
Wetland 711	Moderate	1	0.04
Wetland 726	Moderate	1	0.90
Wetland 729	Moderate	1	0.79
Wetland 730	Moderate	1	0.06
Wetland 732	Moderate	1	0.09
Wetland 737	Moderate	1	0.08
Wetland 741	Moderate	1	0.10
Wetland 748	Moderate	1	0.03
Wetland 763	Moderate	3	1.18
Wetland 799	Moderate	5	1.49
Wetland 802	Moderate	5	1.17
Wetland 815	Moderate	5	2.86
Wetland 828	Moderate	5	4.59

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 837	Moderate	3	0.46
Wetland 264	Moderate	3	11.52
Wetland 265	Moderate	3	0.04
Wetland 266	Moderate	3	0.05
Wetland 2845	Moderate	3	2.81
Wetland 298	Moderate	3	0.11
Wetland 347	Moderate	3	0.13
Wetland 390	Moderate	3	1.02
Wetland 401	Moderate	3	0.04
Wetland 402	Moderate	3	0.07
Wetland 497	Moderate	3	0.28
Wetland 499	Moderate	3	0.60
Wetland 605	Moderate	5	0.07
Wetland 663	Moderate	1	0.24
Wetland 696	Moderate	5	2.58
Wetland 707	Moderate	1	18.87
Wetland 721	Moderate	5	4.92
Wetland 762	Moderate	1	0.44
Wetland 780	Moderate	5	0.19
Wetland 806	Moderate	5	1.19
Wetland 812	Moderate	5	7.00
Wetland 830	Moderate	3	0.45
Wetland 835	Moderate	3	18.22
Wetland 930	Moderate	3	4.56

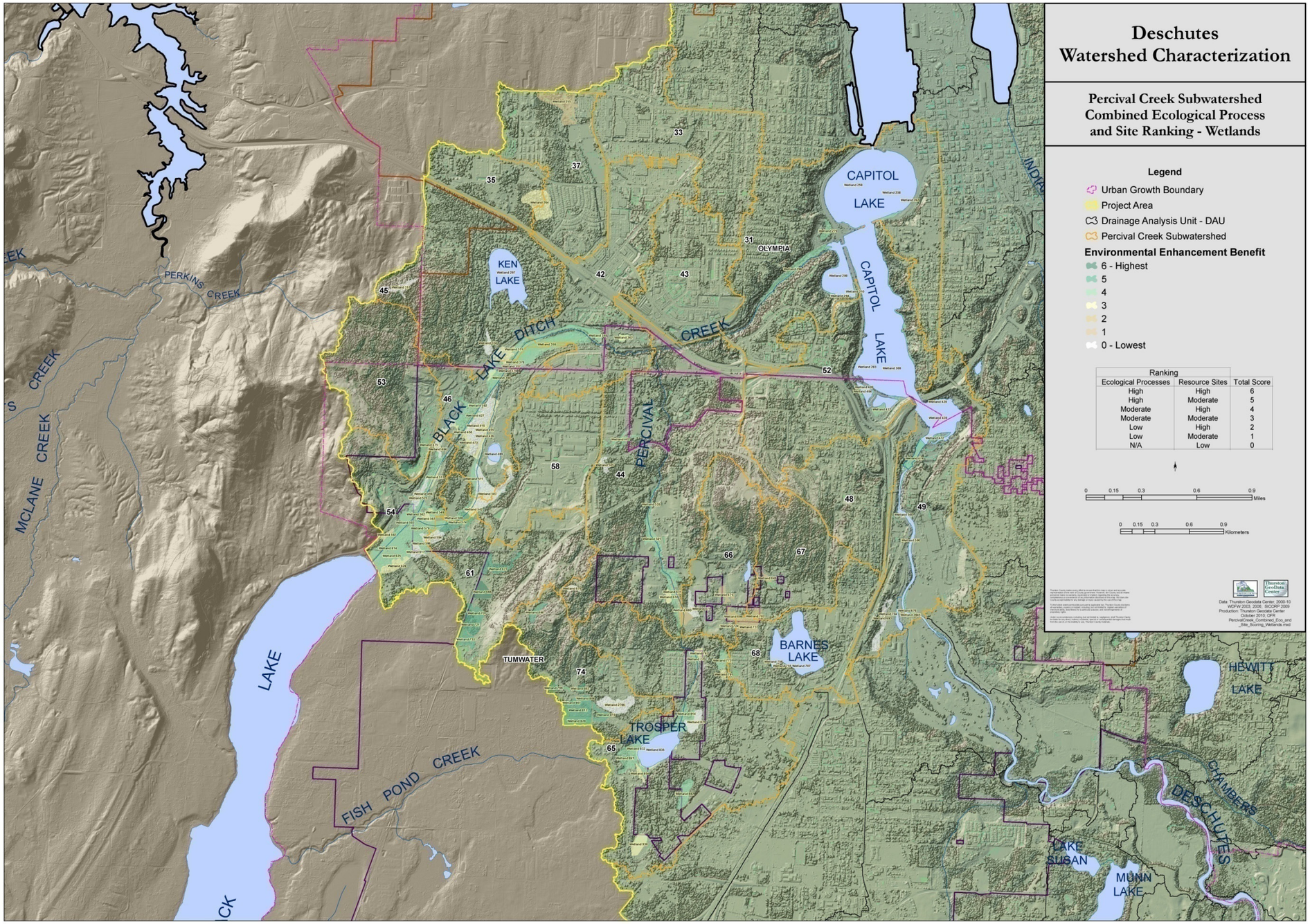

Figure 10.3 Percival Creek Subwatershed Ecological Processes and Site Rank – Wetlands

Riparian condition

The resulting combined score of the natural resource site within the context of the DAU were scored and displayed on Figure 10.4 Percival 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 10.4 Riparian Sites

Site ID	Riparian Rank	Combined DAU and Site Score	Acres
Riparian 26	High	4	145.39
Riparian 164	High	4	24.61
Riparian 172	High	4	4.16
Riparian 3263	High	4	17.72
Riparian 103	Moderate	3	60.69
Riparian 144	Moderate	5	79.64
Riparian 149	Moderate	3	84.31
Riparian 163	Moderate	3	88.32
Riparian 161	Moderate	1	54.14
Riparian 192	Moderate	3	34.03

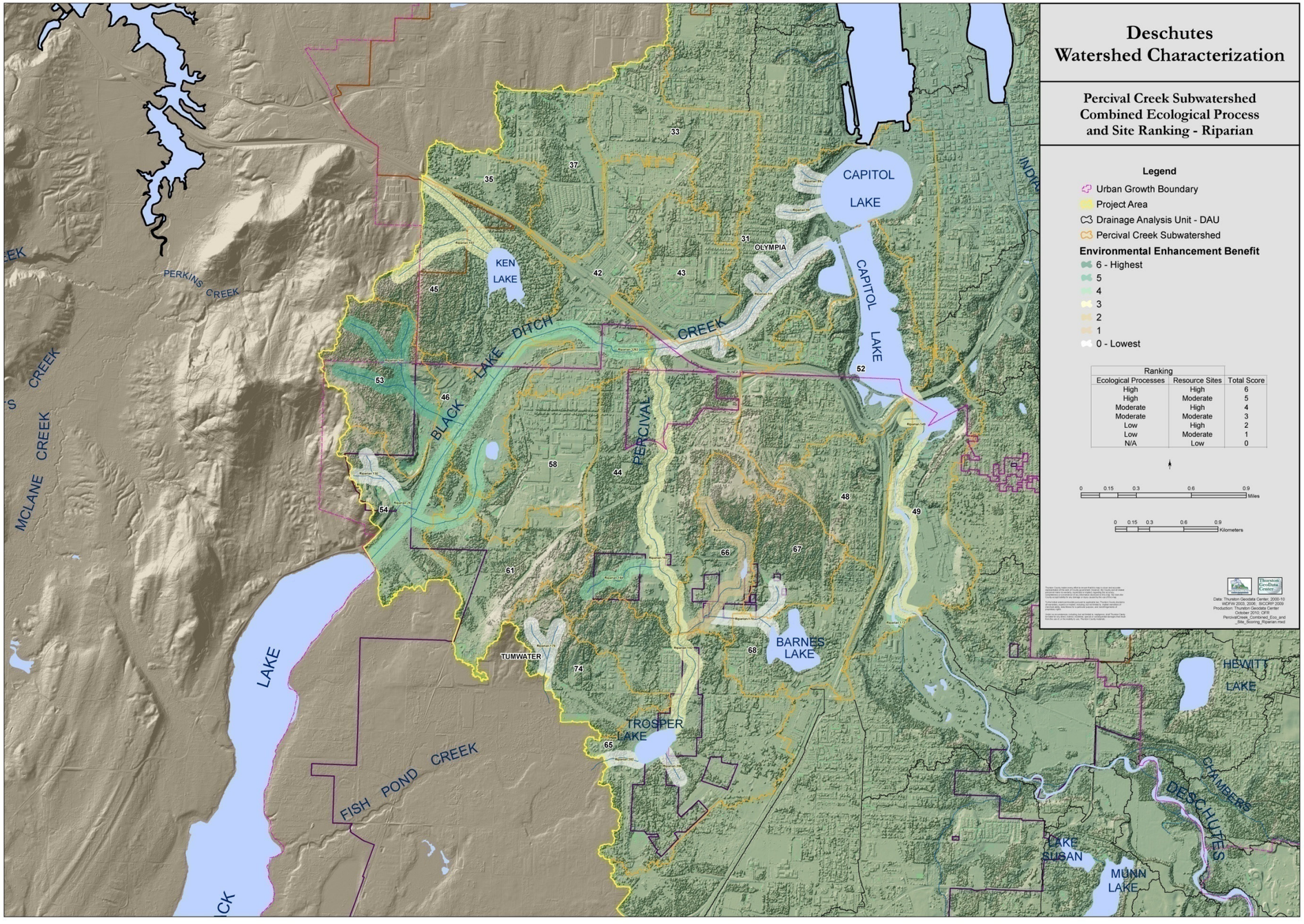

Figure 10.4 Percival Creek Subwatershed Ecological Processes and Site Rank – Riparian

Floodplain Condition

The resulting combined score of the natural resource site within the context of the DAU were scored and displayed on the map Figure 10.5 Percival Creek Subwatershed Ecological Processes and Site Ranking - Floodplain. Floodplain sites ranked Low are not included in the table, but are ranked and available in appendix B

Table 10.5 Floodplain Sites

Site ID	Floodplain Rank	Combined DAU Site Score	Acres
Floodplain 1	Moderate	3	68.54

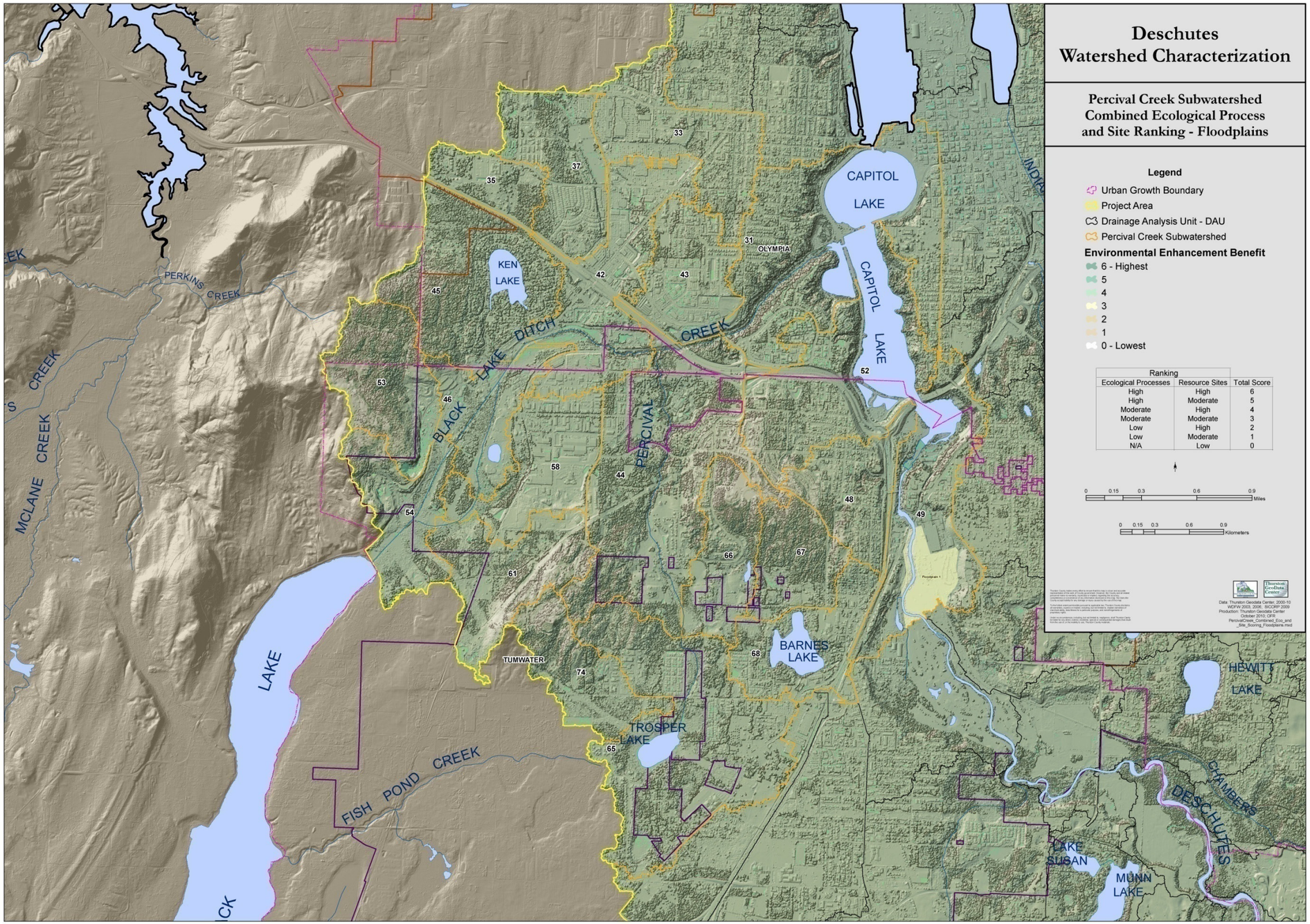

Figure 10.5 Percival Creek Subwatershed Ecological Processes and Site Rank - Floodplain