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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 Lower Deschutes Subwatershed?

### Current conditions

Current land-use within the Lower Deschutes sub-watershed was determined by processing Aerial photography and SPOT 10 meter satellite imagery captured in 2009. Approximately 21% of the Lower Deschutes Subwatershed is covered by urban land uses (see Figure 9.0 and 9.1 Classification Percent Totals for Lower Deschutes Subwatershed). The Lower Deschutes subwatershed includes commercial, residential, agricultural, and open spaces land-uses.

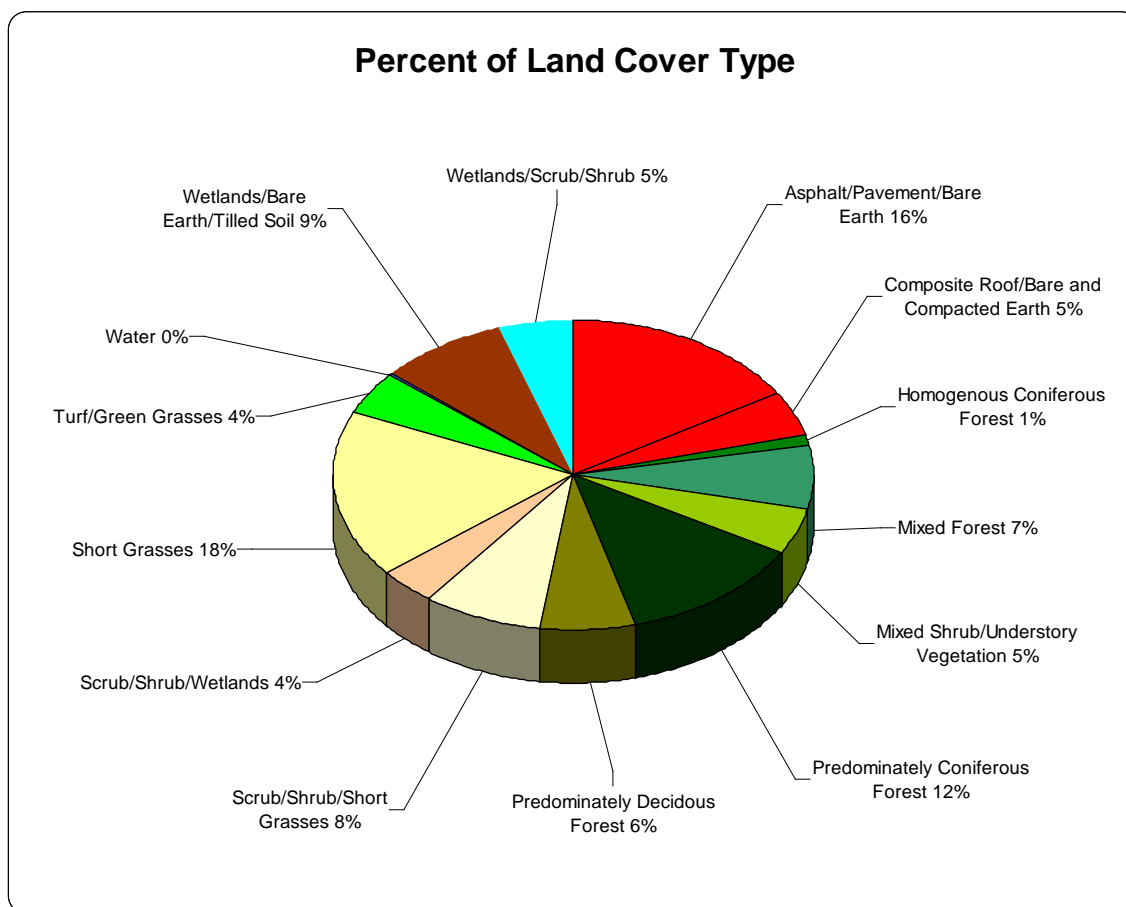


Figure 9.0 Classification Percent Totals for Lower Deschutes Subwatershed  
Land cover data from 2009 SPOT imagery.







## 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 is 24 DAUs totaling 9,076 acres (14 sq miles) in the Lower Deschutes 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 9.0 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 9.0 Lower Deschutes Ecological and Biological Function Rank**

DAU Id	Acres	Sq Mi	Aquatic Integrity	Habitat Connectivity	Water	Sediment	Wood	Pollutants	Heat
70	350	0.55	N/A	AR	NPF	AR	NPF	AR	AR
72	236	0.37	N/A	NPF	NPF	AR	N/A	N/A	N/A
73	513	0.80	N/A	AR	NPF	AR	N/A	N/A	N/A
78	238	0.37	N/A	AR	AR	AR	AR	N/A	AR
79	168	0.26	N/A	AR	AR	PF	AR	N/A	AR
80	265	0.41	N/A	NPF	AR	AR	NPF	N/A	AR
81	1078	1.68	N/A	AR	NPF	AR	NPF	N/A	AR
84	475	0.74	N/A	NPF	NPF	AR	NPF	AR	AR
85	223	0.35	N/A	AR	NPF	AR	AR	N/A	NPF
88	284	0.44	N/A	NPF	AR	AR	PF	N/A	AR
89	397	0.62	N/A	AR	AR	AR	AR	N/A	AR
90	303	0.47	N/A	AR	AR	AR	NPF	N/A	AR
91	458	0.72	N/A	PF	AR	AR	PF	N/A	AR



DAU Id	Acres	Sq Mi	Aquatic Integrity	Habitat Connectivity	Water	Sediment	Wood	Pollutants	Heat
92	615	0.96	N/A	PF	AR	AR	N/A	N/A	N/A
94	260	0.41	N/A	NPF	AR	AR	N/A	N/A	N/A
96	275	0.43	N/A	AR	AR	AR	N/A	N/A	N/A
97	351	0.55	N/A	PF	NPF	AR	N/A	N/A	N/A
98	759	1.19	N/A	AR	AR	AR	NPF	N/A	NPF
101	350	0.55	N/A	AR	NPF	AR	AR	N/A	NPF
102	428	0.67	N/A	AR	AR	PF	AR	N/A	AR
110	264	0.41	N/A	AR	NPF	PF	N/A	N/A	N/A
112	187	0.29	N/A	AR	AR	AR	N/A	N/A	N/A
115	161	0.25	N/A	AR	PF	PF	AR	N/A	AR
116	447	0.70	N/A	AR	AR	AR	NPF	N/A	NPF

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 9.1 illustrates the final ecological and biological function rank of each DAU.

**Table 9.1 Final DAU Ecological and Biological Benefit Rank**

DAU Id	Ecological Processes					Biological Elements		Total Score	Rank
	Water	Sediment	Wood	Pollutants	Heat	Aquatic Integrity	Habitat		
78	3	1	2	0	1	0	1	8	High
89	3	1	2	0	1	0	1	8	High
79	3	0	2	0	1	0	1	7	High
102	3	0	2	0	1	0	1	7	High
90	3	1	0	0	1	0	1	6	Moderate
80	3	1	0	0	1	0	0	5	Moderate
88	3	1	0	0	1	0	0	5	Moderate
91	3	1	0	0	1	0	0	5	Moderate
96	3	1	0	0	0	0	1	5	Moderate
98	3	1	0	0	0	0	1	5	Moderate
112	3	1	0	0	0	0	1	5	Moderate
116	3	1	0	0	0	0	1	5	Moderate
70	0	1	0	1	1	0	1	4	Moderate
85	0	1	2	0	0	0	1	4	Moderate
92	3	1	0	0	0	0	0	4	Moderate
94	3	1	0	0	0	0	0	4	Moderate
101	0	1	2	0	0	0	1	4	Moderate
115	0	0	2	0	1	0	1	4	Moderate
81	0	1	0	0	1	0	1	3	Moderate
84	0	1	0	1	1	0	0	3	Moderate

DAU Id	Ecological Processes					Biological Elements		Total Score	Rank
	Water	Sediment	Wood	Pollutants	Heat	Aquatic Integrity	Habitat		
73	0	1	0	0	0	0	1	2	Low
72	0	1	0	0	0	0	0	1	Low
97	0	1	0	0	0	0	0	1	Low
110	0	0	0	0	0	0	1	1	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. Lower Deschutes has 24 DAUs that have restoration potential (Figure 9.2 Lower Deschutes Subwatershed Ecological Function).



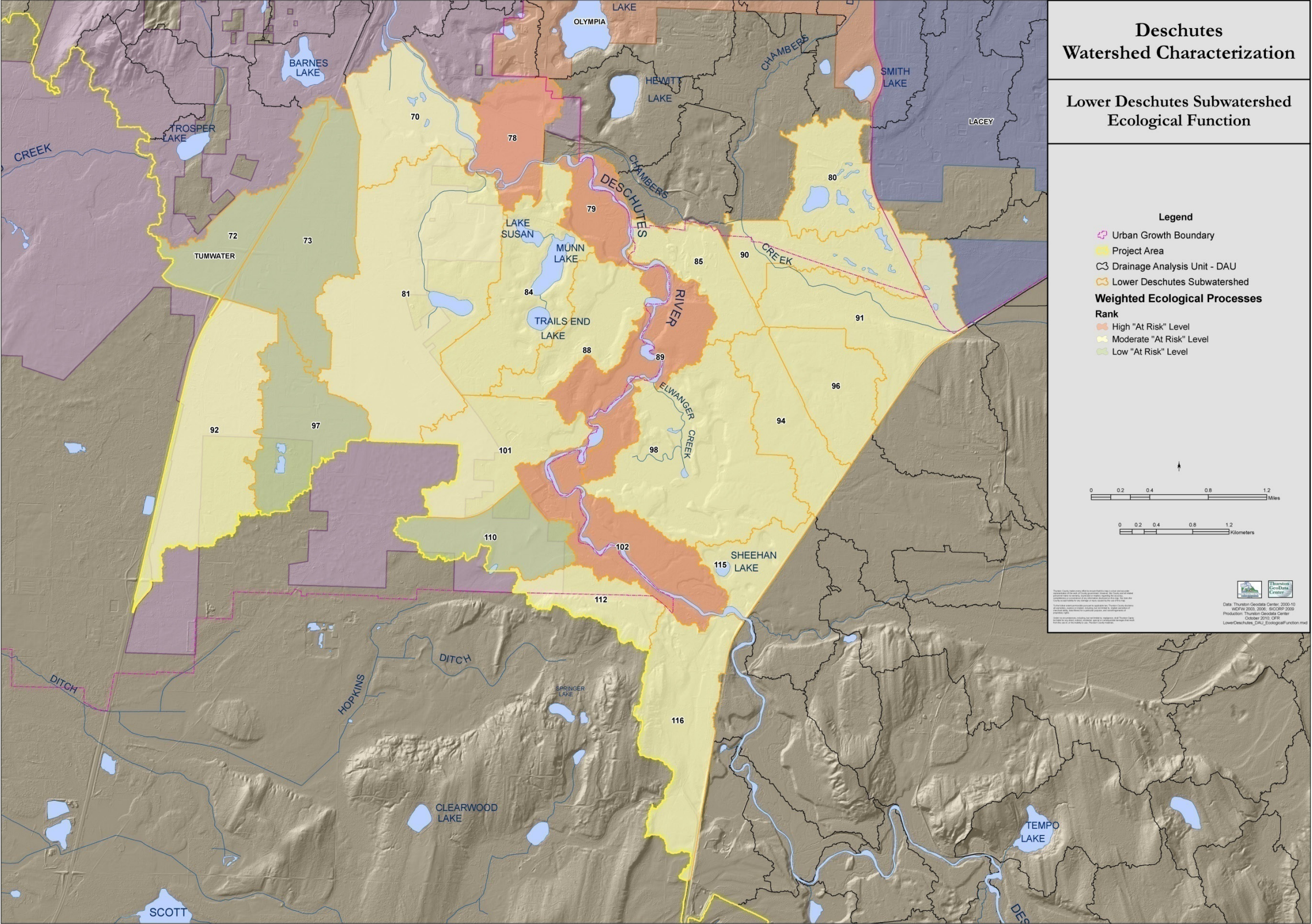


Figure 9.2 Lower Deschutes Subwatershed Ecological Function



### 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 317 potential restoration or enhancement sites for their environmental benefit if restored. Table 9.1 details the results.

**Table 9.1 Lower Deschutes Environmental Benefit Ranking of Natural Resource Sites**

<b>Lower Deschutes Potential Restoration Sites</b>				
Rank	Wetland	Riparian	Floodplain	Total
High	60	9	1	70
Medium	158	8	8	174
Low	73	0	0	73

### 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 9.2 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 9.2 Combined Ranking Score**

<b>Ecological Benefit (DAU)</b>	<b>Environmental Benefit (Resource Site)</b>	<b>Total Score</b>
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 244 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 Condition**

Table 9.3 presents the results of wetland restoration site ranking taking into account the combined wetland restoration potential and the DAU ranking. Figure 9.4 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 9.3 Wetland Sites**

<b>Site ID</b>	<b>Wetlands Rank</b>	<b>Combined DAU Site Score</b>	<b>Acres</b>
Wetland 2794	High	6	22.64
Wetland 922	High	6	18.96
Wetland 2797	High	6	9.83
Wetland 866	High	6	1.43
Wetland 1180	High	6	1.07
Wetland 1145	High	6	0.69
Wetland 1214	High	6	0.08
Wetland 2788	High	6	25.95
Wetland 816	High	6	11.22
Wetland 829	High	6	4.84
Wetland 2787	High	6	3.25
Wetland 2791	High	6	0.00
Wetland 891	High	6	13.79
Wetland 811	High	6	8.13

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 862	High	6	5.94
Wetland 2861	High	6	2.50
Wetland 1187	High	6	1.13
Wetland 1193	High	6	0.89
Wetland 924	High	6	1.46
Wetland 1203	High	6	0.48
Wetland 1204	High	6	0.38
Wetland 2847	Moderate	5	17.65
Wetland 1069	Moderate	5	4.23
Wetland 959	Moderate	5	3.66
Wetland 808	Moderate	5	3.36
Wetland 881	Moderate	5	3.07
Wetland 1059	Moderate	5	1.01
Wetland 1029	Moderate	5	0.94
Wetland 1058	Moderate	5	0.91
Wetland 1110	Moderate	5	0.87
Wetland 1048	Moderate	5	0.87
Wetland 898	Moderate	5	0.40
Wetland 1062	Moderate	5	0.34
Wetland 864	Moderate	5	0.19
Wetland 1211	Moderate	5	0.17
Wetland 1077	Moderate	5	0.17
Wetland 851	Moderate	5	30.17
Wetland 1140	Moderate	5	5.45
Wetland 1151	Moderate	5	2.67
Wetland 1007	Moderate	5	1.11
Wetland 813	Moderate	5	0.77
Wetland 843	Moderate	5	0.44
Wetland 1015	Moderate	5	0.07
Wetland 915	Moderate	5	0.04
Wetland 2851	Moderate	5	5.04
Wetland 906	Moderate	5	4.45
Wetland 877	Moderate	5	3.02
Wetland 1142	Moderate	5	1.46
Wetland 1111	High	4	48.74
Wetland 909	High	4	41.30
Wetland 1105	High	4	12.71
Wetland 1146	High	4	8.45
Wetland 1068	High	4	2.45
Wetland 962	High	4	2.15
Wetland 953	High	4	1.84
Wetland 1117	High	4	1.49
Wetland 951	High	4	0.96
Wetland 940	High	4	0.89
Wetland 798	High	4	0.85
Wetland 1088	High	4	0.82
Wetland 1287	High	4	0.57



Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 825	High	4	0.53
Wetland 918	High	4	0.47
Wetland 1138	High	4	0.39
Wetland 1076	High	4	0.14
Wetland 1074	High	4	0.11
Wetland 990	High	4	0.10
Wetland 768	High	4	0.04
Wetland 2798	High	4	67.50
Wetland 2795	High	4	19.32
Wetland 1165	High	4	18.43
Wetland 1160	High	4	4.52
Wetland 986	High	4	1.07
Wetland 1247	High	4	0.92
Wetland 797	High	4	0.14
Wetland 774	High	4	1.80
Wetland 805	High	4	0.88
Wetland 982	High	4	0.81
Wetland 1047	High	4	0.29
Wetland 781	High	4	0.26
Wetland 2854	High	4	5.14
Wetland 1159	High	4	1.35
Wetland 901	Moderate	3	12.62
Wetland 968	Moderate	3	9.77
Wetland 1030	Moderate	3	9.06
Wetland 2793	Moderate	3	8.74
Wetland 1038	Moderate	3	7.84
Wetland 1276	Moderate	3	6.68
Wetland 1041	Moderate	3	6.24
Wetland 1289	Moderate	3	5.45
Wetland 1001	Moderate	3	4.80
Wetland 1037	Moderate	3	3.94
Wetland 933	Moderate	3	3.86
Wetland 1234	Moderate	3	3.76
Wetland 997	Moderate	3	3.44
Wetland 1096	Moderate	3	2.19
Wetland 942	Moderate	3	1.33
Wetland 966	Moderate	3	1.21
Wetland 1356	Moderate	3	0.92
Wetland 1018	Moderate	3	0.71
Wetland 1243	Moderate	3	0.62
Wetland 1013	Moderate	3	0.62
Wetland 1094	Moderate	3	0.60
Wetland 1008	Moderate	3	0.48
Wetland 1365	Moderate	3	0.47
Wetland 2845	Moderate	3	0.42
Wetland 1056	Moderate	3	0.33
Wetland 1101	Moderate	3	0.26

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 1043	Moderate	3	0.21
Wetland 1162	Moderate	3	0.21
Wetland 964	Moderate	3	0.16
Wetland 973	Moderate	3	0.12
Wetland 1034	Moderate	3	0.11
Wetland 1011	Moderate	3	0.10
Wetland 1039	Moderate	3	0.08
Wetland 969	Moderate	3	0.07
Wetland 907	Moderate	3	0.06
Wetland 928	Moderate	3	0.04
Wetland 2789	Moderate	3	14.02
Wetland 988	Moderate	3	11.75
Wetland 948	Moderate	3	7.81
Wetland 1102	Moderate	3	5.00
Wetland 2790	Moderate	3	3.08
Wetland 1024	Moderate	3	1.36
Wetland 905	Moderate	3	1.04
Wetland 1083	Moderate	3	0.97
Wetland 1085	Moderate	3	0.90
Wetland 1175	Moderate	3	0.87
Wetland 963	Moderate	3	0.76
Wetland 979	Moderate	3	0.76
Wetland 1123	Moderate	3	0.75
Wetland 939	Moderate	3	0.73
Wetland 1035	Moderate	3	0.72
Wetland 996	Moderate	3	0.69
Wetland 985	Moderate	3	0.62
Wetland 1108	Moderate	3	0.49
Wetland 984	Moderate	3	0.42
Wetland 938	Moderate	3	0.42
Wetland 1031	Moderate	3	0.38
Wetland 1000	Moderate	3	0.37
Wetland 921	Moderate	3	0.36
Wetland 1005	Moderate	3	0.34
Wetland 1249	Moderate	3	0.32
Wetland 983	Moderate	3	0.23
Wetland 865	Moderate	3	0.18
Wetland 971	Moderate	3	0.15
Wetland 1106	Moderate	3	0.13
Wetland 1063	Moderate	3	0.13
Wetland 927	Moderate	3	0.10
Wetland 1051	Moderate	3	0.09
Wetland 960	Moderate	3	0.09
Wetland 925	Moderate	3	0.07
Wetland 954	Moderate	3	0.07
Wetland 934	Moderate	3	0.06
Wetland 1098	Moderate	3	0.06

Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 903	Moderate	3	0.03
Wetland 943	Moderate	3	36.44
Wetland 1004	Moderate	3	20.51
Wetland 793	Moderate	3	17.68
Wetland 967	Moderate	3	16.98
Wetland 1167	Moderate	3	11.73
Wetland 944	Moderate	3	7.79
Wetland 1046	Moderate	3	7.45
Wetland 896	Moderate	3	6.62
Wetland 899	Moderate	3	5.56
Wetland 958	Moderate	3	4.63
Wetland 1141	Moderate	3	3.81
Wetland 1065	Moderate	3	3.20
Wetland 904	Moderate	3	3.16
Wetland 1027	Moderate	3	2.85
Wetland 935	Moderate	3	2.84
Wetland 1080	Moderate	3	2.59
Wetland 1045	Moderate	3	1.78
Wetland 932	Moderate	3	1.54
Wetland 801	Moderate	3	1.12
Wetland 1054	Moderate	3	0.98
Wetland 957	Moderate	3	0.91
Wetland 974	Moderate	3	0.87
Wetland 890	Moderate	3	0.86
Wetland 1028	Moderate	3	0.85
Wetland 1295	Moderate	3	0.78
Wetland 980	Moderate	3	0.76
Wetland 878	Moderate	3	0.72
Wetland 956	Moderate	3	0.70
Wetland 946	Moderate	3	0.70
Wetland 975	Moderate	3	0.67
Wetland 1050	Moderate	3	0.59
Wetland 1084	Moderate	3	0.59
Wetland 1082	Moderate	3	0.58
Wetland 1026	Moderate	3	0.57
Wetland 919	Moderate	3	0.55
Wetland 949	Moderate	3	0.51
Wetland 999	Moderate	3	0.44
Wetland 1112	Moderate	3	0.40
Wetland 874	Moderate	3	0.36
Wetland 1057	Moderate	3	0.34
Wetland 926	Moderate	3	0.29
Wetland 863	Moderate	3	0.29
Wetland 1033	Moderate	3	0.28
Wetland 914	Moderate	3	0.19
Wetland 1014	Moderate	3	0.16
Wetland 1156	High	2	0.31



Site ID	Wetlands Rank	Combined DAU Site Score	Acres
Wetland 1155	High	2	0.22
Wetland 1215	High	2	7.47
Wetland 1150	High	2	2.44
Wetland 1137	High	2	2.24
Wetland 1206	Moderate	1	0.32
Wetland 1198	Moderate	1	0.31
Wetland 803	Moderate	1	0.20
Wetland 1201	Moderate	1	0.04
Wetland 1168	Moderate	1	0.99
Wetland 1044	Moderate	1	0.28
Wetland 1190	Moderate	1	0.27
Wetland 1042	Moderate	1	0.08
Wetland 1196	Moderate	1	0.07
Wetland 1179	Moderate	1	0.05
Wetland 1178	Moderate	1	0.03
Wetland 1189	Moderate	1	1.10



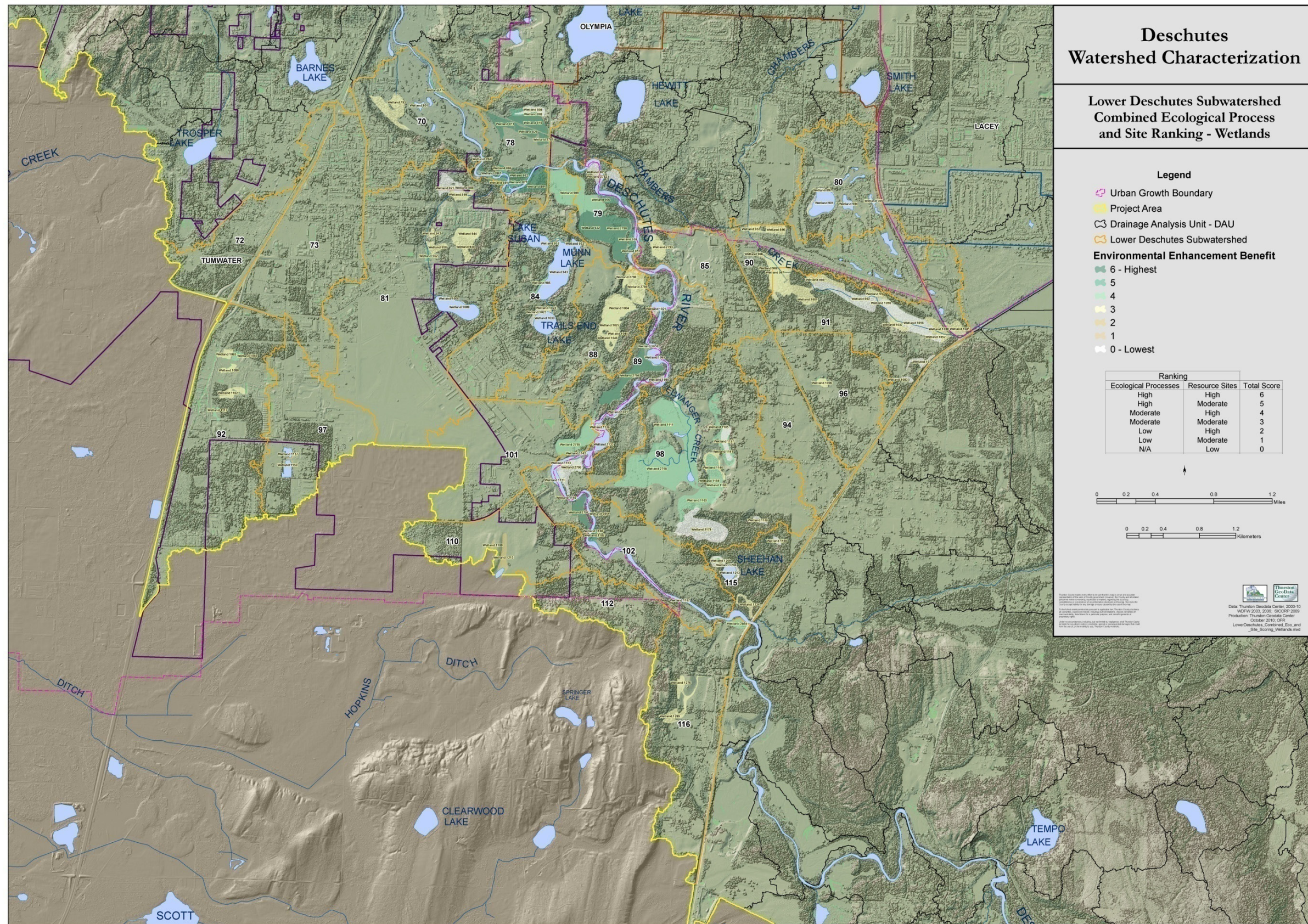


Figure 9.3 Lower Deschutes Subwatershed Ecological Processes and Site Ranking - Wetlands



### Riparian condition

The resulting combined score of the natural resource site within the context of the DAU were scored and displayed on Figure 9.4 Lower Deschutes 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 9.4      Riparian Sites**

Site ID	Riparian Rank	Combined DAU and Site Score	Acres
Riparian 235	High	6	54.86
Riparian 226	High	4	35.31
Riparian 274	High	4	1.16
Riparian 221	High	6	19.52
Riparian 222	High	6	67.68
Riparian 172	High	4	24.68
Riparian 200	High	6	9.92
Riparian 245	High	4	60.82
Riparian 3254	High	6	77.53
Riparian 209	Moderate	5	28.22
Riparian 214	Moderate	3	22.15
Riparian 224	Moderate	3	97.88
Riparian 256	Moderate	3	0.13
Riparian 3424	Moderate	3	61.12
Riparian 3454	Moderate	5	63.81
Riparian 149	Moderate	3	47.41
Riparian 3230	Moderate	5	41.69



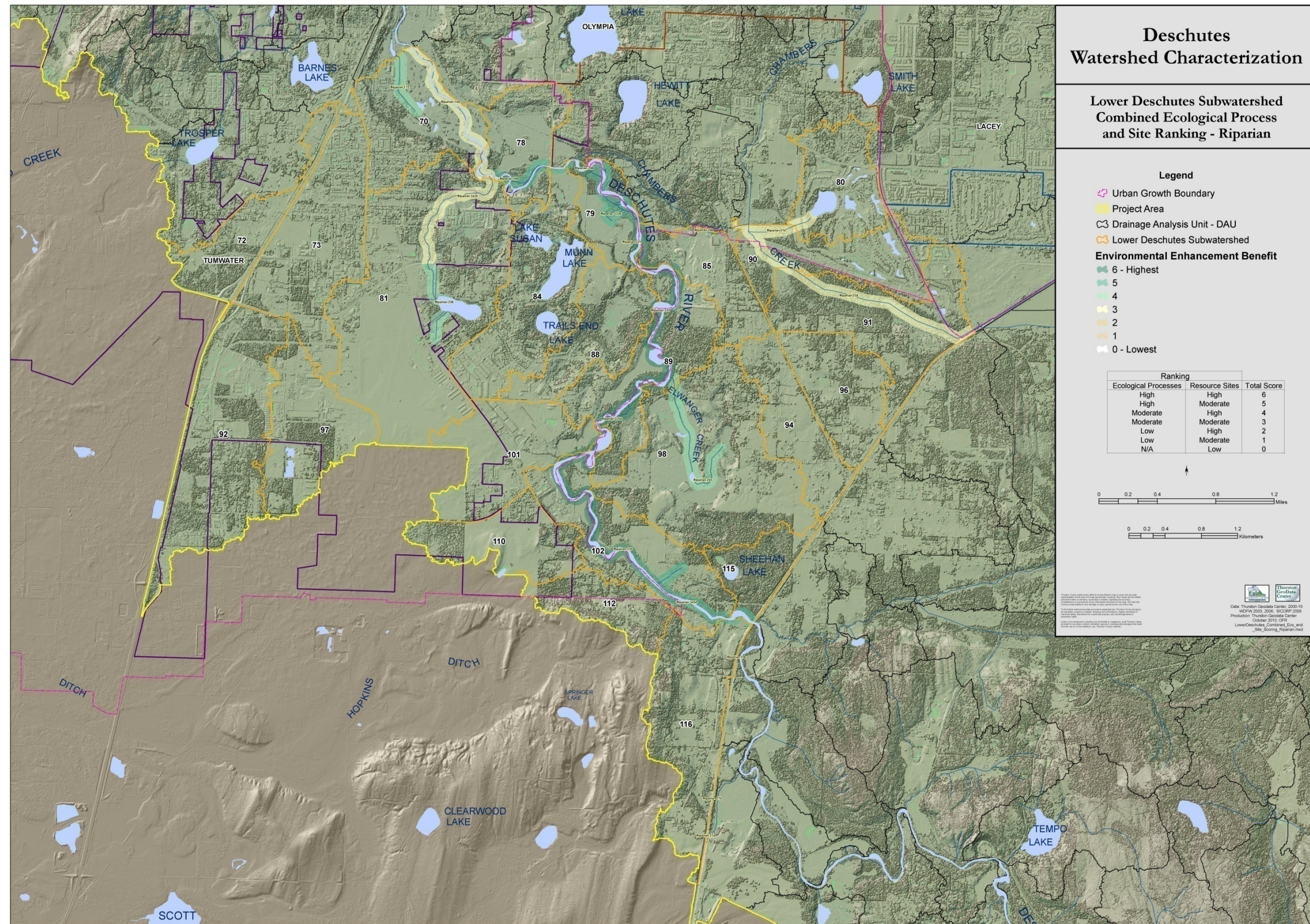


Figure 9.4 Lower Deschutes Subwatershed Ecological Processes and Site Ranking – Riparian



## Floodplain Condition

The resulting combined score of the natural resource site within the context of the DAU were scored and displayed on the map Figure 9.5 Lower Deschutes 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 9.5      Floodplain Sites**

Site ID	Floodplain Rank	Combined DAU Site Score	Acres
Floodplain 6	High	6	24.65
Floodplain 1	Moderate	3	242.10
Floodplain 2	Moderate	3	16.41
Floodplain 4	Moderate	3	0.07
Floodplain 5	Moderate	5	77.19
Floodplain 7	Moderate	3	120.56
Floodplain 8	Moderate	3	24.39
Floodplain 9	Moderate	5	53.76
Floodplain 10	Moderate	3	5.66



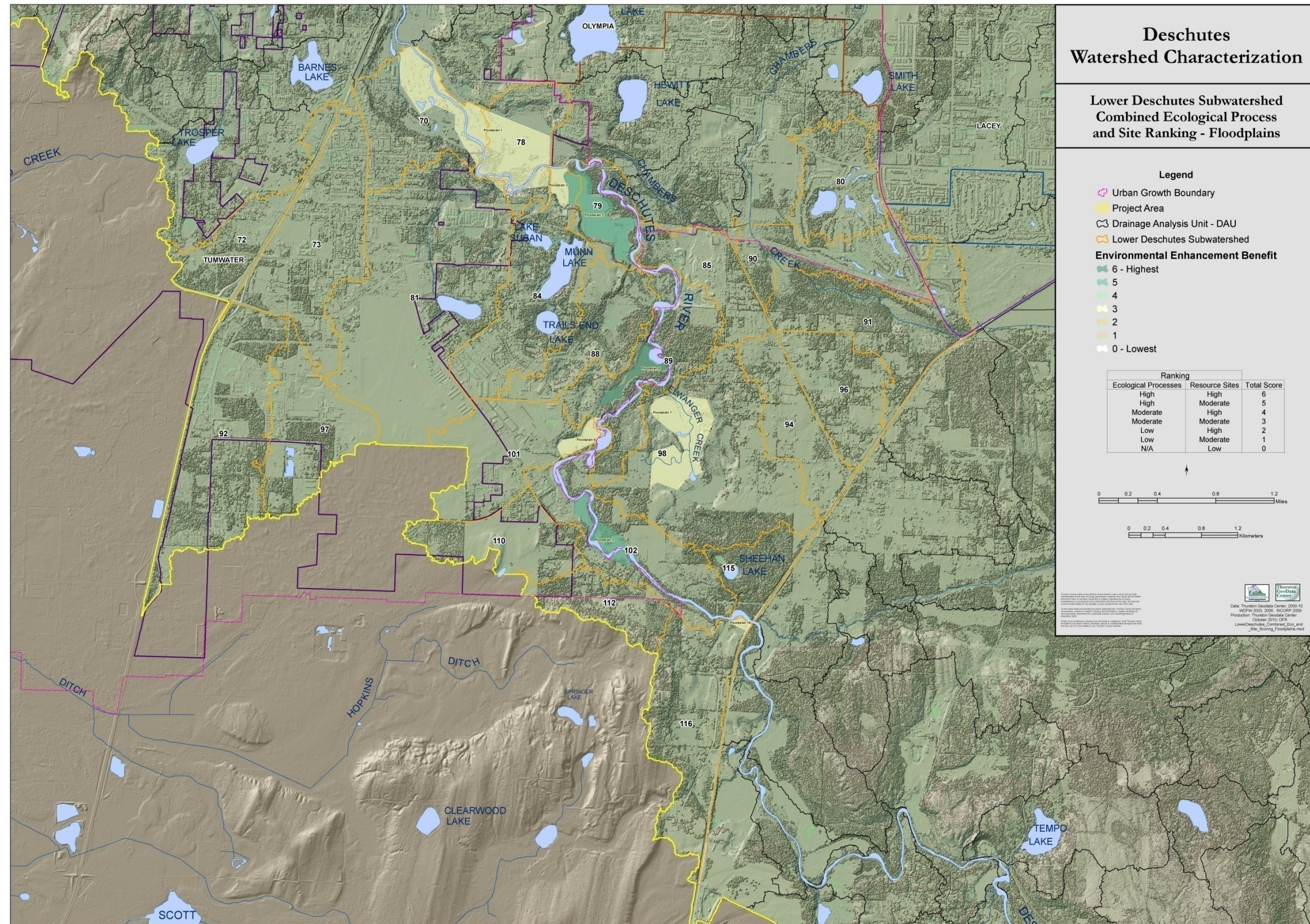


Figure 9.5 Lower Deschutes Subwatershed Ecological Processes and Site Ranking - Floodplain