

Table of Contents

Part I.	What are the Landscape Conditions in the Powell Creek Study Area?	1
Part II.	Characterize Condition of Ecological Processes in the Study Area	3
Part III.	Characterize Natural Resource Sites in Study Area	6
Part IV.	Assess Potential Sites within the DAU	6

List of Tables

Table 2.0	Powell Creek Ecological Processes and Biological Element Function	3
Table 2.1	Final DAU Ecological and Biological Benefit Rank	4
Table 2.2	Powell Creek Environmental Benefit Ranking of Natural Resource Sites	6
Table 2.3	Wetland Sites	7
Table 2.4	Riparian Sites	10

Table of Figures

Figure 2.0	Classification Percent Totals for Powell Creek Study Area	1
Figure 2.1	Powell Creek Study Area Land Cover	2
Figure 2.2	Powell Creek Study Area Ecological Function	5
Figure 2.3	Powell Creek Study Area Ecological Processes and Site Ranking – Wetlands	9
Figure 2.4	Powell Creek Study Area Ecological Processes and Site Ranking - Riparian	12
Figure 2.5	Powell Creek Study Area Ecological Processes and Site Ranking - Floodplain	14

Introduction

This section summarizes the methods used to develop the final prioritized list of natural resource (wetlands, riparian, and floodplain) restoration and/or enhancement sites and the results of that analysis for the Powell Creek Study Area of the Nisqually Watershed. 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 Study Area.

Part I. What are the Landscape Conditions in the Powell Creek Study Area?

Current conditions

Current land-use within the Powell Creek Study Area was determined by processing Aerial photography and SPOT 10 meter satellite imagery captured in 2009. The results presented in Figures 2.0 and 2.1 indicate that approximately one percent of the Powell Creek Study Area is covered by the built environment. The primary land-use in the Powell Creek Study Area is long-term commercial forestry.

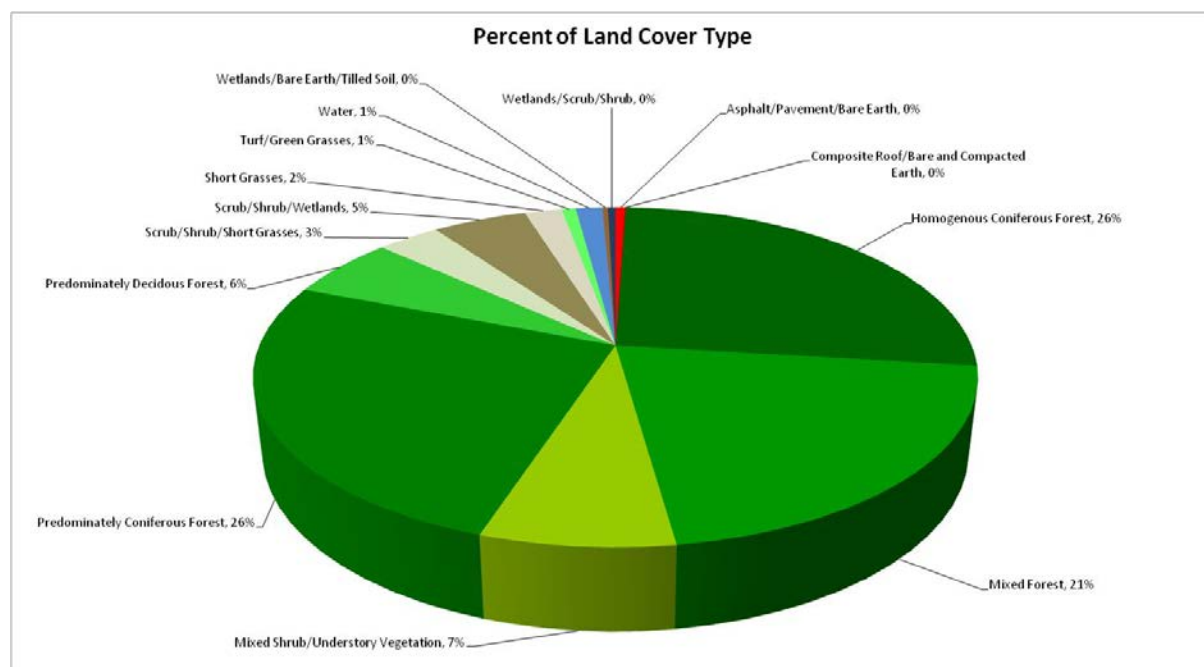


Figure 2.0 Classification Percent Totals for Powell Creek Study Area
Land cover data from 2009 SPOT imagery.

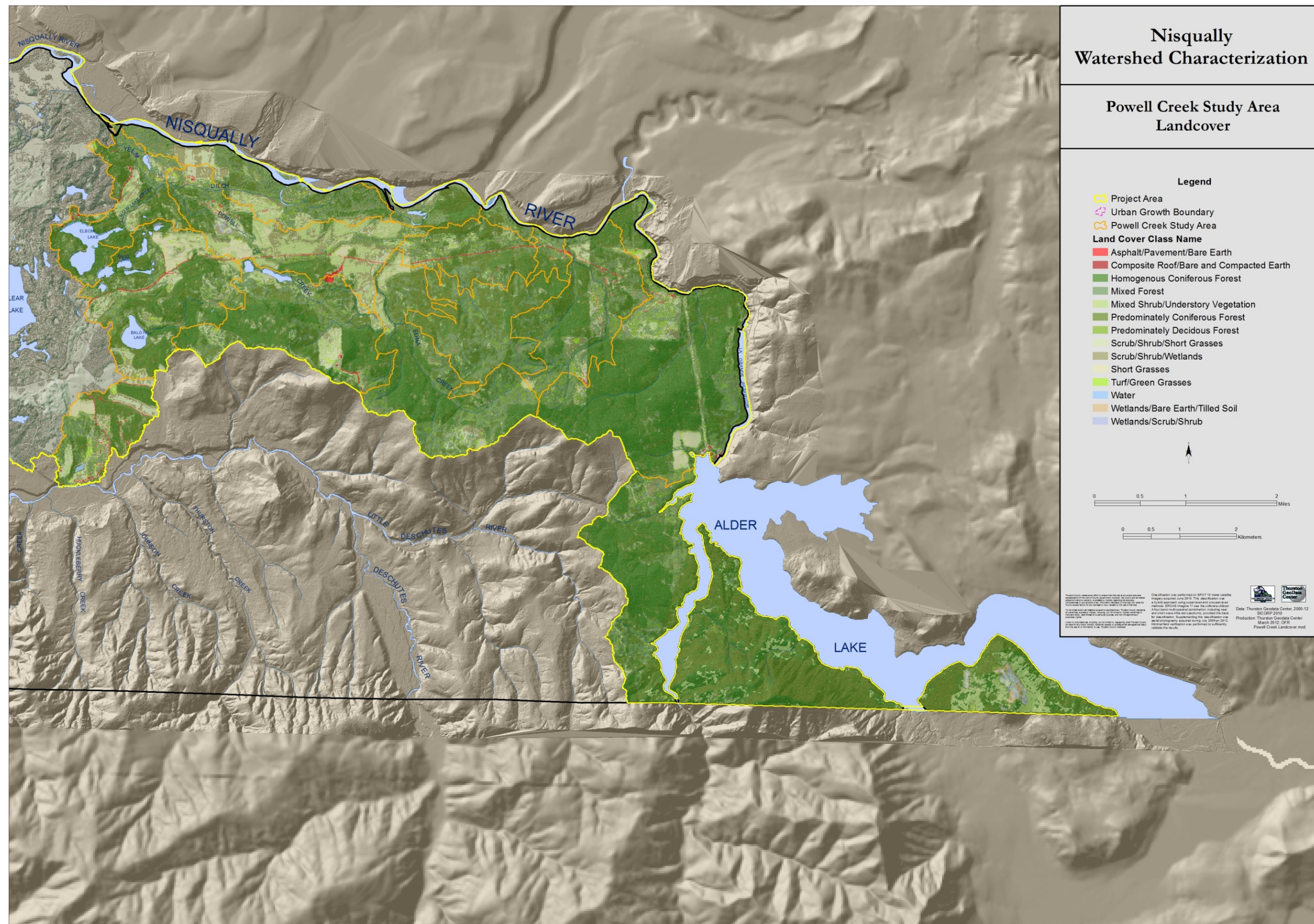


Figure 2.1 Powell Creek Study Area Land Cover

Part II. Characterize Condition of Ecological Processes in the Study Area

Five ecological processes and habitat connectivity were assessed. The five ecological processes include the delivery and movement of water, sediment, wood, pollutants, and heat. As outlined in the Methods Document (Appendix A of this document) 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 habitat connectivity, the Rules and Assumptions (Tables 3-8 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 2 in the Methods document. For complete details of the Rules and Assumptions, please consult Tables 3 through 8 in the Methods document.

There are 18 DAUs totaling 14,511 acres (23 sq miles) in the Powell Creek Study Area.

Determine the Ecological Benefit of the DAU

The assessment of each individual ecological process and habitat connectivity using the indicators listed in Chapter One and the Methods MPI, and the application of the Rules and describe a baseline condition of ecological health for each DAU. All DAUs 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 within that DAU. A N/A indicates that there is no data for that DAU.

Table 2.0 describes the function level of five ecological process and habitat connectivity as PF, AR, or NPF.

Table 2.0 Powell Creek Ecological Processes and Biological Element Function

DAU Id	Ecological Processes							Biological Element
	Acres	Sq Mi	Water	Wood	Sediment	Pollutants	Heat	Habitat Connectivity
179	1016.95	1.59	AR	NPF	AR	AR	AR	AR
178	760.18	1.19	AR	AR	AR	AR	AR	PF
173	540.69	0.84	AR	N/A	AR	N/A	AR	NPF
183	497.41	0.78	PF	AR	AR	AR	AR	AR
191	606.14	0.95	AR	N/A	AR	N/A	N/A	PF
180	1132.97	1.77	PF	AR	AR	AR	AR	PF
185	257.66	0.40	PF	AR	AR	AR	AR	PF
186	88.03	0.14	PF	AR	AR	AR	N/A	PF
182	787.61	1.23	PF	PF	AR	PF	AR	PF
181	1188.86	1.86	PF	PF	AR	PF	AR	PF
184	112.13	0.18	PF	PF	AR	PF	PF	AR
175	1175.13	1.84	PF	AR	AR	NPF	NPF	PF
188	2231.24	3.49	PF	AR	AR	NPF	N/A	PF

DAU Id	Ecological Processes						Biological Element	
	Acres	Sq Mi	Water	Wood	Sediment	Pollutants	Heat	Habitat Connectivity
177	489.22	0.76	PF	AR	PF	NPF	PF	AR
190	1313.32	2.05	PF	PF	AR	PF	N/A	PF
189	1162.39	1.82	PF	PF	AR	PF	N/A	PF
187	918.46	1.44	PF	PF	AR	PF	N/A	PF
176	232.26	0.36	PF	PF	AR	NPF	NPF	PF

An aggregation of the function level of these processes and habitat connectivity are then used to provide an overall function level and ranking of each DAU as described in the following Table 2.1.

Table 2.1 Final DAU Ecological and Biological Benefit Rank

DAU Id	Ecological Processes					Biological Element	Total Score	Weighted Rank
	Water	Wood	Sediment	Pollutants	Heat	Habitat Connectivity		
179	3	0	1	1	1	1	7	High
178	3	1	1	1	1	0	7	High
173	3	0	1	0	1	0	5	Moderate
183	0	1	1	1	1	1	5	Moderate
191	3	0	1	0	0	0	4	Moderate
180	0	1	1	1	1	0	4	Moderate
185	0	1	1	1	1	0	4	Moderate
186	0	1	1	1	0	0	3	Moderate

The weighted rank is used in the evaluation of potential restoration and enhancement sites when the DAUs and resource sites are combined to provide a prioritized list of natural resource sites.

As shown in Table 2.1 and Figure 2.2, the Powell Creek Study Area has 8 DAUs that have restoration potential (weighted rank of high or moderate). DAUs ranked Low are listed in Appendix B.

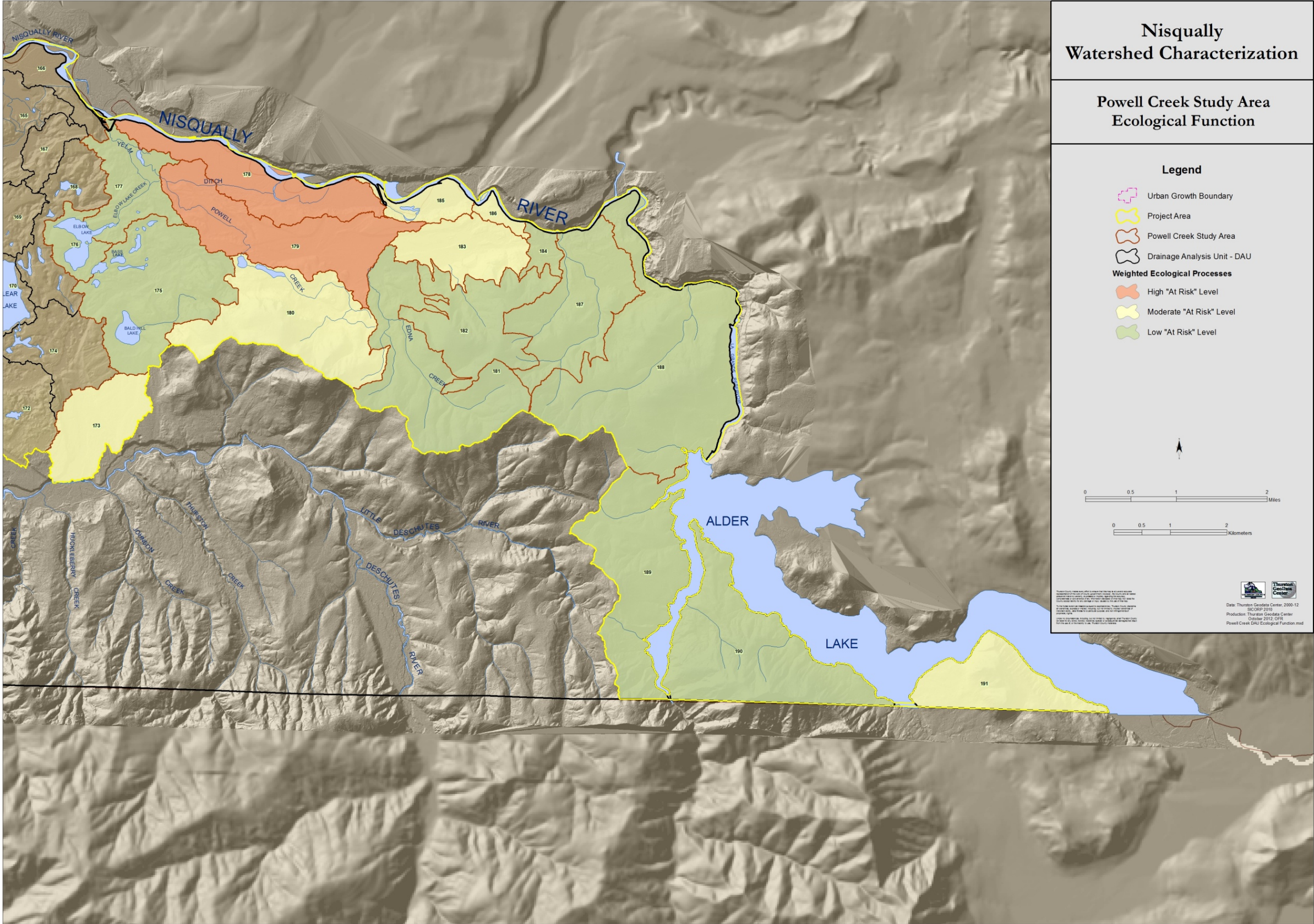


Figure 2.2 Powell Creek Study Area Ecological Function

Part III. Characterize Natural Resource Sites in Study Area

This section evaluates natural resource sites within the study area. The watershed characterization methods do not assess potential restoration sites at the parcel or jurisdictional boundary. The methods focus on the landscape only. The purpose is to determine natural resource sites that can be restored or enhanced in the surrounding landscape that will provide the greatest functional lift. The analysis is conducted concurrently with the analyses of the ecological processes and the one biological element, habitat connectivity. Upon completion of the DAU and natural resource site analysis, the sites identified are ranked within their corresponding DAU.

Determine the Environmental Benefit of the Resource Sites

The natural resource sites are evaluated based on the attributes during site assessment using Tables 13 to 15 in the Methods document. The sites are then assigned an environmental benefit final score.

Following the conversion of natural resource sites from a numerical score to a rank of Low, Moderate, or High rank, there were a total of 268 potential restoration or enhancement sites. Table 2.2 details the results.

Table 2.2 Powell Creek Environmental Benefit Ranking of Natural Resource Sites

Powell Creek Potential Restoration Sites				
Rank	Wetland	Riparian	Floodplain	Total
High	6	21	0	27
Moderate	47	16	0	63
Low	123	53	2	178

Part IV. Assess Potential Sites within the DAU

This section presents the results of a ranking process for all potential natural resource restoration sites within the DAU. This ranking of a natural resource restoration site is based on a combination of each site's individual site rank combined with the ranking of the DAU within which the restoration site is located. The result of this combination is a final score from 0 to 6, with a score of 6 representing those sites with the greatest potential for environmental benefit if restored. See Chapter 1 Part III and the Methods document for a description of the methodology used.

Following evaluation, a total of 268 sites in the Powell Creek Study Area were ranked within their corresponding DAU. Of those 268 sites, there were 90 sites that had high or moderate restoration value.

A site with a Low environmental benefit is a preservation site or completely degraded site that would provide a minimal environmental benefit if restored.

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

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

Wetlands

Table 2.3 presents the results of wetland site ranking. The wetland rank is the result of the combined wetland restoration potential and the DAU ranking. There are 53 sites that ranked high or moderate.

Wetland sites ranked Low or less than one acre are not included in Table 2.3. However, they have been ranked and are listed in Appendix C. Figure 2.3 shows the location of each wetland restoration site.

Table 2.3 Wetland Sites

Site ID	Wetlands Rank	Combined DAU and Site Score	Acres
Wetland2041	High	6	1.99
Wetland2048	High	6	11.15
Wetland2092	High	6	30.05
Wetland2045	High	2	3.50
Wetland2026	Moderate	5	1.32
Wetland2028	Moderate	5	2.85
Wetland2031	Moderate	5	5.00
Wetland2036	Moderate	5	6.16
Wetland2049	Moderate	5	3.12
Wetland2050	Moderate	5	5.44
Wetland2052	Moderate	5	2.33
Wetland2056	Moderate	5	11.43
Wetland2198	Moderate	5	18.02
Wetland2055	Moderate	3	2.36
Wetland2057	Moderate	3	16.89
Wetland2061	Moderate	3	1.07
Wetland2067	Moderate	3	1.55
Wetland2068	Moderate	3	1.36
Wetland2074	Moderate	3	3.96
Wetland2079	Moderate	3	2.13
Wetland2100	Moderate	3	9.55
Wetland2117	Moderate	3	2.79

Site ID	Wetlands Rank	Combined DAU and Site Score	Acres
Wetland2132	Moderate	3	2.23
Wetland2133	Moderate	3	4.82
Wetland2037	Moderate	1	8.75
Wetland2044	Moderate	1	3.82
Wetland2080	Moderate	1	3.46
Wetland2089	Moderate	1	2.13
Wetland2101	Moderate	1	1.37
Wetland2162	Moderate	1	4.32
Wetland2174	Moderate	1	7.98
Wetland2175	Moderate	1	1.41
Wetland2186	Moderate	1	1152
Wetland2191	Moderate	1	1316

The following figures appear cluttered when printed at a scale less than 33 x 44 inches (the format it was developed for). The maps are best viewed electronically where the viewing area is easily enlarged.

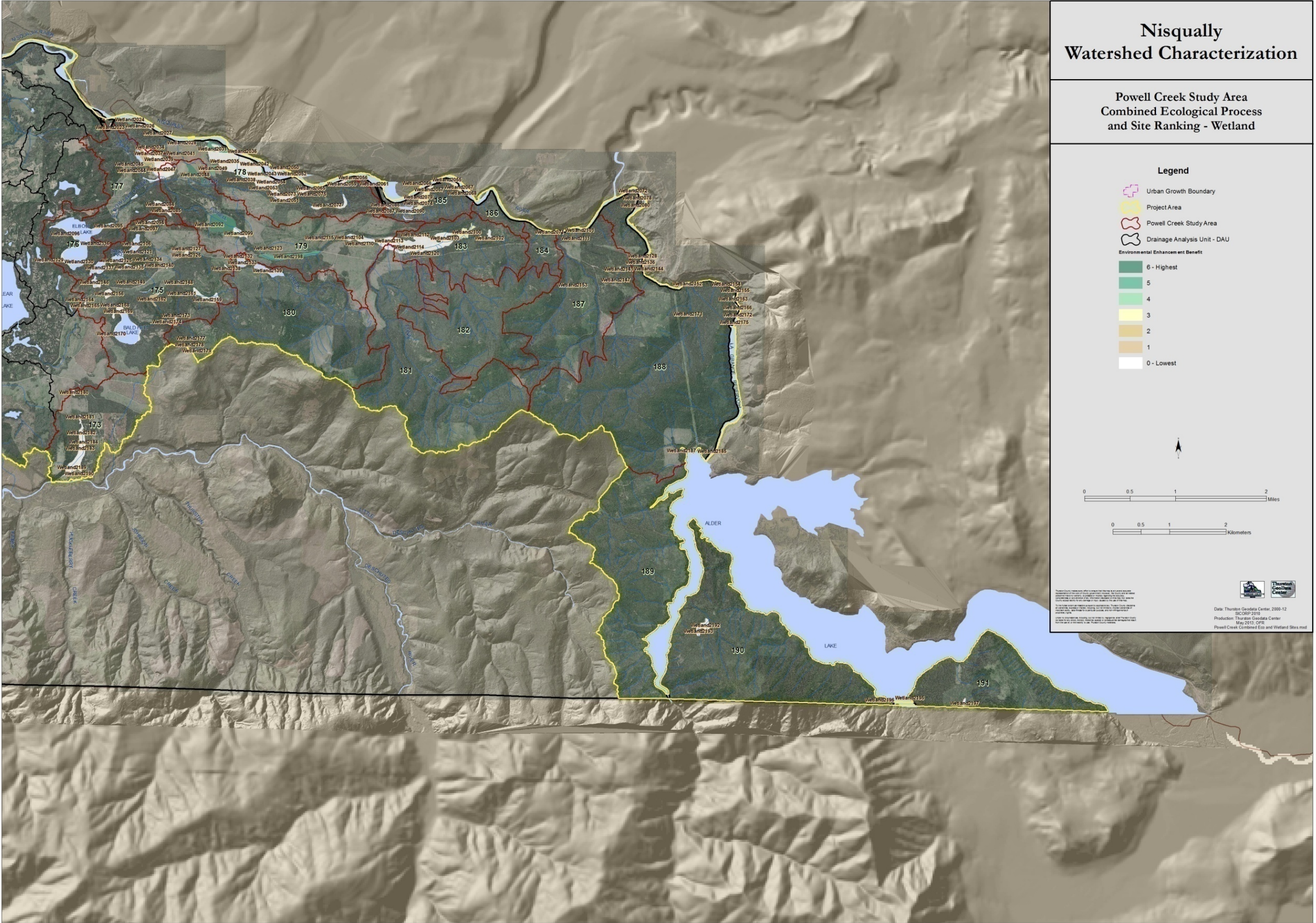


Figure 2.3 Powell Creek Study Area Ecological Processes and Site Ranking – Wetlands

Riparian condition

Table 2.4 presents the results of riparian restoration site ranking taking into account the combined riparian restoration potential and the DAU ranking. There are 37 riparian sites that ranked high or moderate. The resulting combined score of the natural resource sites within the context of the DAU were scored and are displayed on Figure 2.4.

Riparian sites ranked Low are not included in Table 2.4. However, they have been ranked and are listed in Appendix C.

Table 2.4 Riparian Sites

Site ID	Riparian Rank	Combined DAU and Site Score	Acres
Riparian62	High	6	54.26
Riparian172	High	6	44.01
Riparian174	High	6	67.36
Riparian175	High	6	32.03
Riparian217	High	6	44.97
Riparian218	High	6	32.15
Riparian219	High	6	30.05
Riparian220	High	6	48.79
Riparian320	High	6	36.48
Riparian8	High	4	129.38
Riparian72	High	4	8.20
Riparian77	High	4	34.35
Riparian177	High	4	26.13
Riparian7	High	2	69.40
Riparian68	High	2	22.23
Riparian70	High	2	29.59
Riparian71	High	2	42.94
Riparian75	High	2	24.57
Riparian122	High	2	27.12
Riparian171	High	2	186.11
Riparian221	High	2	33.54
Riparian64	Moderate	5	18.65
Riparian222	Moderate	5	36.47
Riparian66	Moderate	3	16.86
Riparian89	Moderate	3	24.45
Riparian271	Moderate	3	103.39
Riparian6	Moderate	1	178.80
Riparian90	Moderate	1	147.05
Riparian95	Moderate	1	130.54
Riparian98	Moderate	1	45.45

Site ID	Riparian Rank	Combined DAU and Site Score	Acres
Riparian99	Moderate	1	36.85
Riparian102	Moderate	1	55.58
Riparian104	Moderate	1	26.59
Riparian106	Moderate	1	56.59
Riparian110	Moderate	1	30.90
Riparian114	Moderate	1	45.87
Riparian119	Moderate	1	11.85

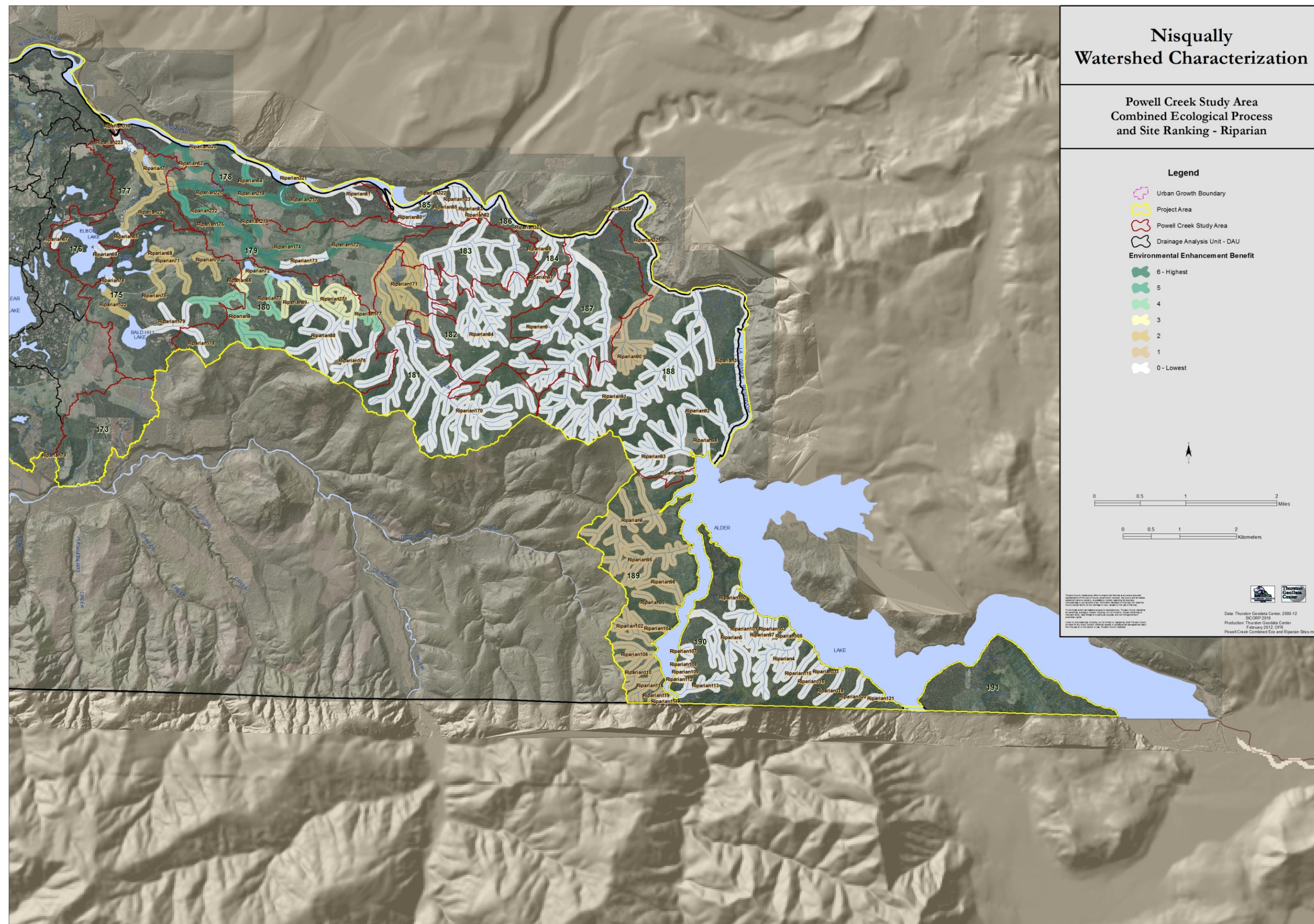


Figure 2.4 Powell Creek Study Area Ecological Processes and Site Ranking - Riparian

Floodplain Condition

There were only two floodplain sites and both were ranked Low. They are listed in Appendix C.

Figure 2.5 illustrates the resulting combined score of the Floodplain natural resource sites within the context of the DAU.

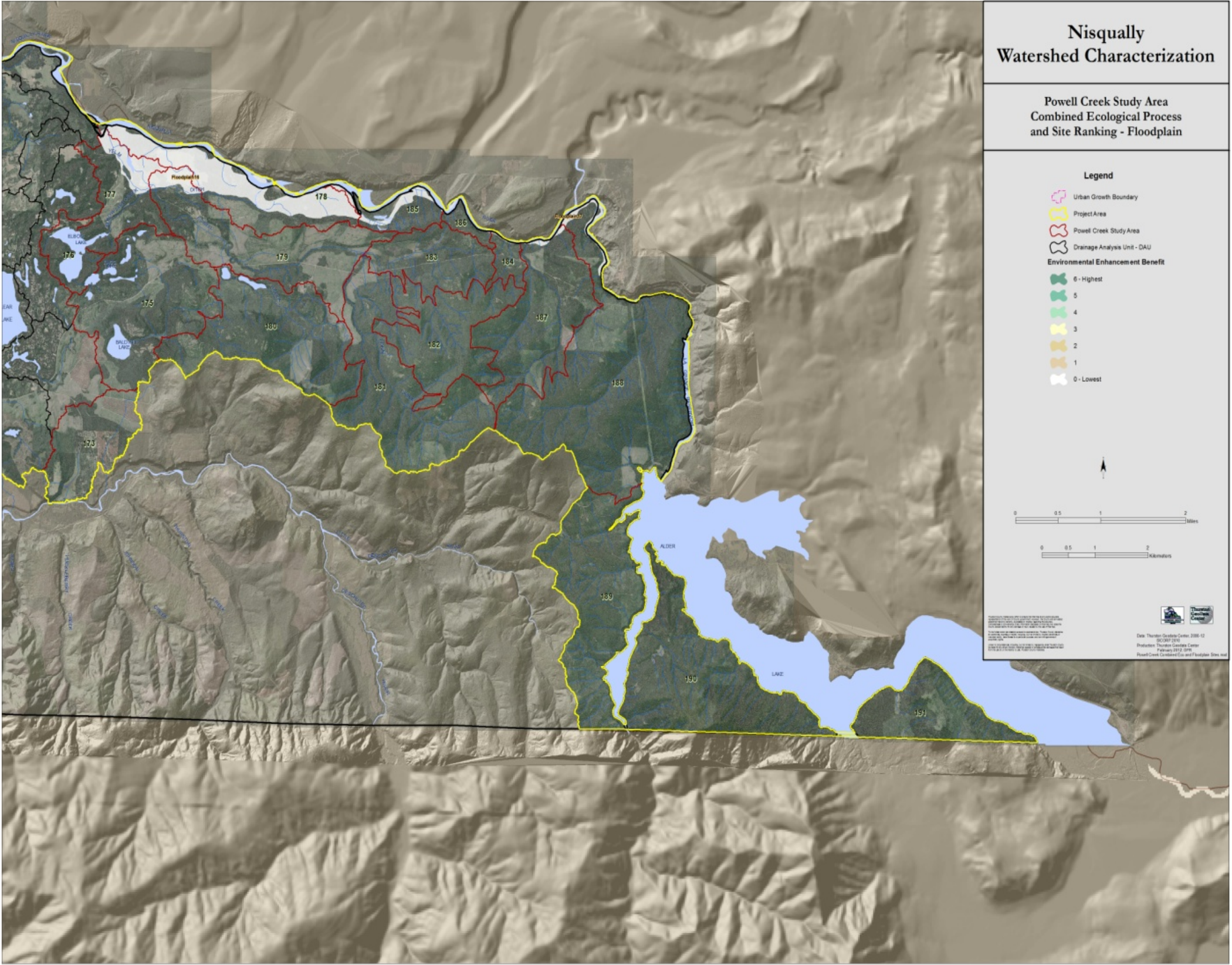


Figure 2.5 Powell Creek Study Area Ecological Processes and Site Ranking - Floodplain