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Introduction

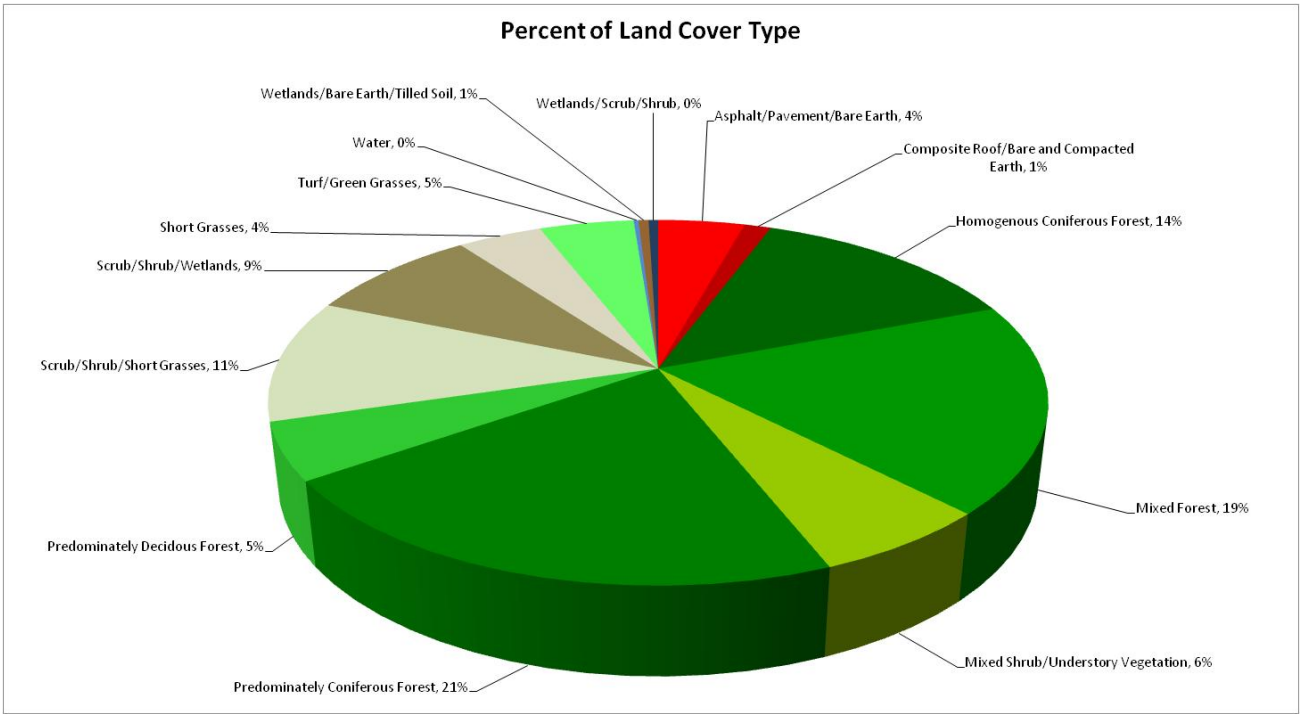
This section summarizes the analysis methods used to develop the final prioritized list of natural resource (wetlands, riparian, and floodplain) restoration and/or enhancement sites and the results of that analysis for the Thompson Creek Study Area of the Nisqually Watershed. The final stage of the watershed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

Current conditions

Current land-use within the Thompson Creek sub-watershed was determined by processing Aerial photography and SPOT 10 meter satellite imagery captured in 2009. The results are presented in Figures 5.0 and 5.1 indicate that approximately six percent of the Thompson Creek Study Area is covered by the built environment. Thompson Creek Study Area includes the City of Yelm. In recent years, the headwaters of Thompson Creek have been developed for residential homes. The mid-reach is predominately agricultural use. Much of that area was historically prairie habitat.

Figure 5.0 Classification Percent Totals for Thompson Creek Study Area
Land cover data from 2009 SPOT imagery.



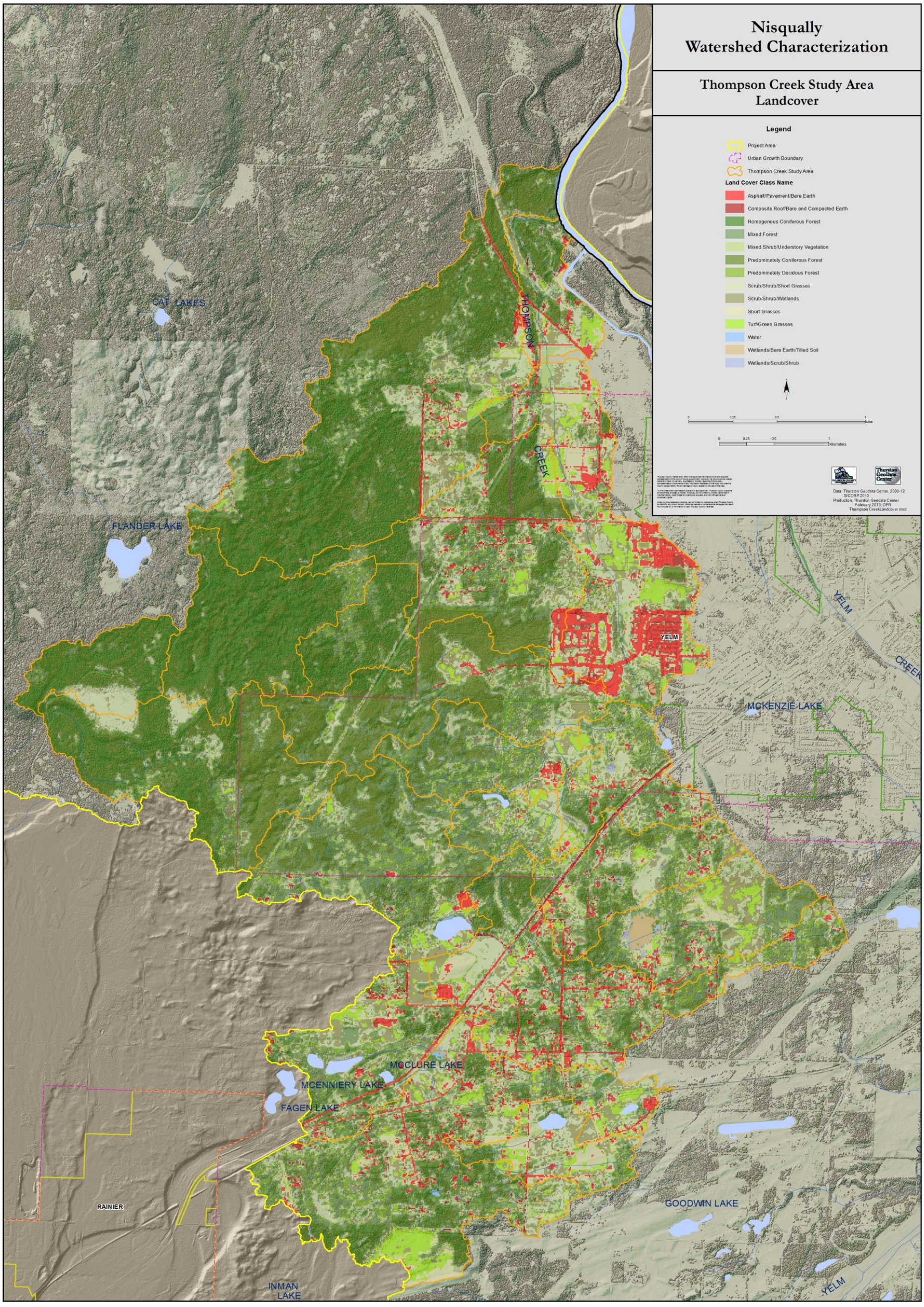


Figure 5.1 Thompson Creek Study Area Land Cover

Part II. Characterize Condition of Ecological Processes in 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 19 DAUs totaling 8,640 acres (13.5 sq miles) in the 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 5.0 describes the function level of five ecological process and habitat connectivity as PF, AR, or NPF.

Table 5.0 Thompson Creek Ecological Processes and Biological Elements Function

			Ecological Processes					Biological Element
DAU Id	Acres	Sq Mi	Water	Wood	Sediment	Pollutants	Heat	Habitat Connectivity
115	958.42	1.50	AR	NPF	AR	AR	AR	NPF
96	247.64	0.39	AR	NPF	AR	AR	AR	PF
113	363.57	0.57	AR	NPF	AR	AR	PF	AR
97	132.39	0.21	AR	NPF	AR	AR	PF	AR
82	668.44	1.04	AR	AR	AR	PF	NPF	AR
70	607.91	0.95	AR	N/A	AR	N/A	AR	NPF
116	187.44	0.29	AR	NPF	PF	AR	NPF	AR
100	340.33	0.53	AR	NPF	AR	AR	NPF	NPF
99	313.70	0.49	AR	N/A	PF	N/A	AR	NPF
69	1202.82	1.88	PF	AR	AR	AR	NPF	AR
80	579.92	0.91	PF	AR	AR	PF	NPF	AR
98	565.50	0.88	PF	N/A	AR	N/A	AR	PF
112	670.88	1.05	NPF	NPF	AR	AR	PF	NPF

			Ecological Processes					Biological Element
DAU Id	Acres	Sq Mi	Water	Wood	Sediment	Pollutants	Heat	Habitat Connectivity
95	272.62	0.43	PF	AR	AR	PF	NPF	NPF
81	511.99	0.80	PF	NPF	AR	AR	NPF	PF
72	427.84	0.67	PF	N/A	AR	N/A	NPF	AR
66	183.87	0.29	PF	AR	AR	PF	PF	NPF
71	188.80	0.30	PF	N/A	AR	N/A	N/A	PF
79	203.71	0.32	PF	N/A	PF	N/A	N/A	NPF

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 5.1.

Table 5.1 Final DAU Ecological and Biological Benefit Rank

	Ecological Processes					Biological Element		
DAU Id	Water	Wood	Sediment	Pollutants	Heat	Habitat Connectivity	Total_Score	Weighted_Rank
115	3	1	1	1	0	0	6	High
96	3	1	1	1	0	0	6	High
113	3	1	1	0	0	1	6	High
97	3	1	1	0	0	1	6	High
82	3	1	0	0	1	1	6	High
70	3	1	0	1	0	0	5	Moderate
116	3	0	1	0	0	1	5	Moderate
100	3	1	1	0	0	0	5	Moderate
99	3	0	0	1	0	0	4	Moderate
69	0	1	1	0	1	1	4	Moderate
80	0	1	0	0	1	1	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 5.1 and Figure 5.2, the Thompson Creek Study Area has 11 DAUs that have restoration potential (weighted rank of high or moderate). DAUs ranked Low are listed in Appendix B.

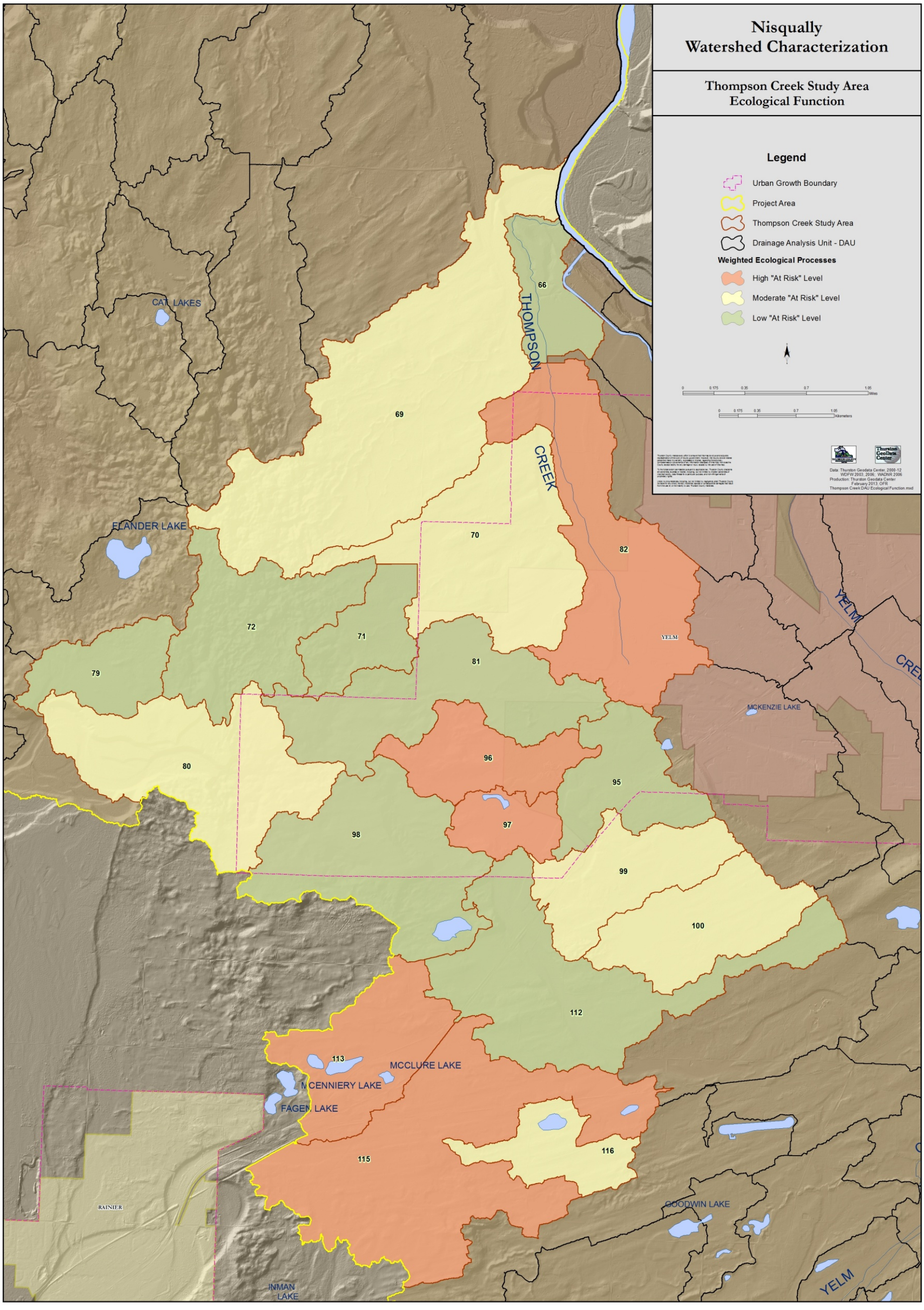


Figure 5.2 Thompson Creek Study Area Ecological Function

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 364 potential restoration or enhancement sites. Table 5.2 details the results.

Table 5.2 Thompson Creek Environmental Benefit Ranking of Natural Resource Sites

Thompson Creek Potential Restoration Sites				
Rank	Wetland	Riparian	Floodplain	Total
High	79	21	0	100
Moderate	39	16	0	55
Low	154	53	2	209

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 sites in the Thompson Creek Study Area were ranked within their corresponding DAU. Of those 364 sites, there were 155 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.

Wetland Sites

Table 5.3 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 118 sites that ranked high or moderate.

Wetland sites ranked Low or less than one acre are not included in Table 5.3. However, they have been ranked and are listed in Appendix C. Figure 5.3 shows the location of each wetland restoration site.

Table 5.3 Wetland Sites

Site ID	Wetlands Rank	Combined DAU and Site Score	Acres
Wetland1002	High	6	5.40
Wetland1013	High	6	1.01
Wetland717	High	6	1.17
Wetland734	High	6	1.26
Wetland742	High	6	2.32
Wetland744	High	6	24.14
Wetland747	High	6	3.55
Wetland753	High	6	2.07
Wetland754	High	6	2.98
Wetland768	High	6	2.76
Wetland769	High	6	17.82
Wetland784	High	6	13.95
Wetland789	High	6	1.16
Wetland853	High	6	4.67
Wetland854	High	6	23.06
Wetland855	High	6	8.70
Wetland857	High	6	3.15
Wetland1148	High	6	3.56
Wetland882	High	6	2.34
Wetland902	High	6	8.52
Wetland913	High	6	3.30
Wetland980	High	6	2.79
Wetland1066	High	4	3.80
Wetland804	High	4	20.59
Wetland830	High	4	21.13

Site ID	Wetlands Rank	Combined DAU and Site Score	Acres
Wetland834	High	4	11.57
Wetland907	High	4	4.68
Wetland908	High	4	1.54
Wetland922	High	4	5.15
Wetland926	High	4	1.81
Wetland973	High	4	6.72
Wetland976	High	4	3.43
Wetland978	High	4	3.22
Wetland711	High	2	2.01
Wetland761	High	2	1.86
Wetland766	High	2	1.52
Wetland776	High	2	4.12
Wetland790	High	2	5.24
Wetland835	High	2	6.61
Wetland845	High	2	1.00
Wetland847	High	2	1.53
Wetland859	High	2	2.94
Wetland718	High	4	2.12
Wetland755	Moderate	5	2.66
Wetland757	Moderate	5	4.02
Wetland772	Moderate	5	2.00
Wetland793	Moderate	5	5.05
Wetland883	Moderate	5	3.31
Wetland884	Moderate	5	6.43
Wetland886	Moderate	5	4.51
Wetland974	Moderate	5	3.38
Wetland750	Moderate	3	1.66
Wetland1058	Moderate	3	22.91
Wetland1067	Moderate	3	1.78
Wetland1225	Moderate	3	10.75
Wetland1614	Moderate	3	204.12
Wetland957	Moderate	3	1.66
Wetland709	Moderate	1	6.03
Wetland760	Moderate	1	22.25
Wetland765	Moderate	1	2.51
Wetland803	Moderate	1	7.04
Wetland840	Moderate	1	3.01
Wetland849	Moderate	1	2.17
Wetland851	Moderate	1	3.67
Wetland979	Moderate	1	1.98

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

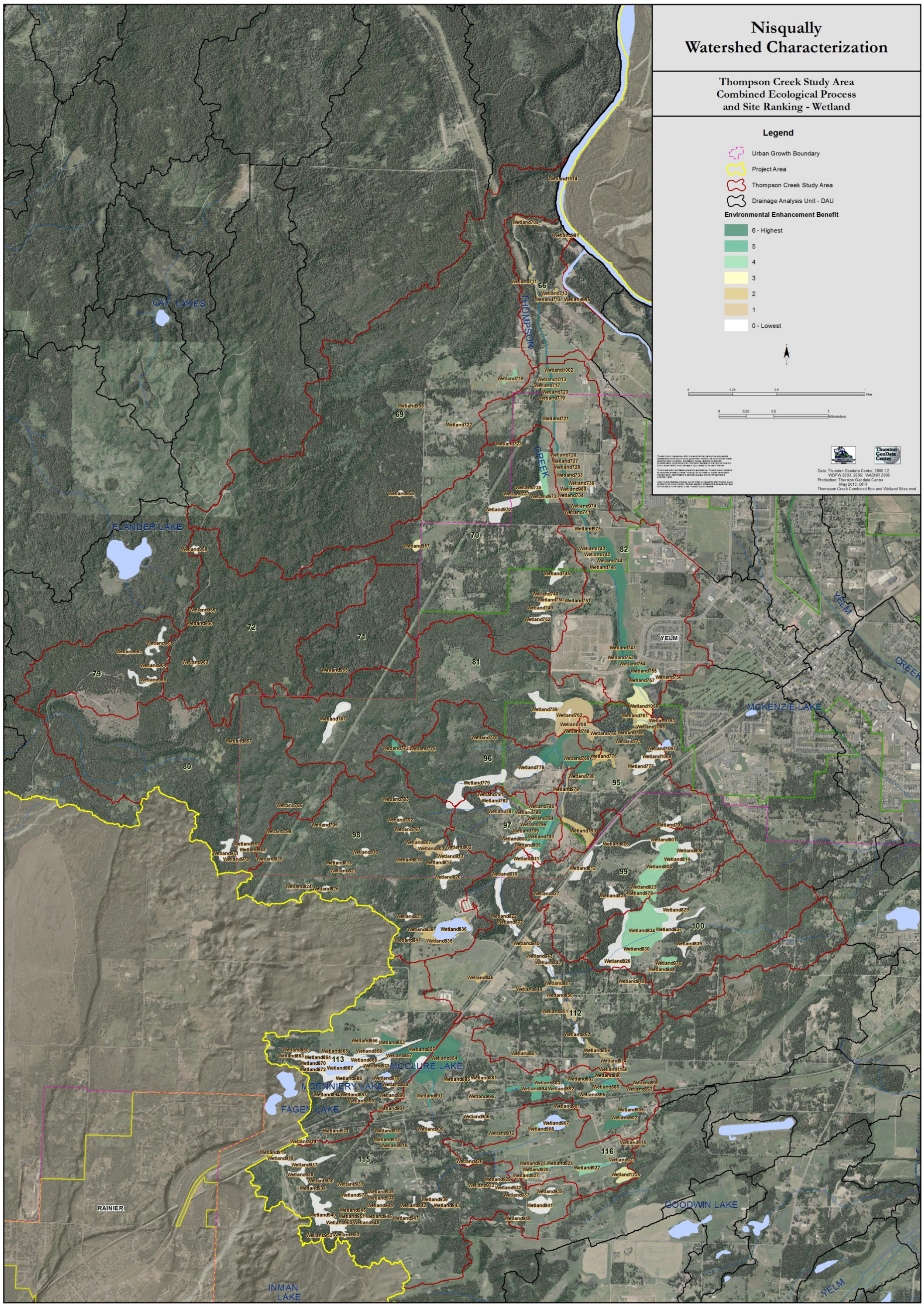


Figure 5.3 Thompson Creek Study Area Ecological Processes and Site Ranking – Wetlands

Riparian condition

Table 5.4 presents the results of riparian restoration site ranking taking into account the combined riparian restoration potential and the DAU ranking. There are 20 riparian sites that ranked high or moderate. The resulting combined score of the natural resource sites within the context of the DAU are shown in Figure 5.4.

Riparian sites ranked Low are not included in Table 5.4. However, they have been ranked and are listed in Appendix C.

Table 5.4 Riparian Sites

Site ID	Riparian Rank	Combined DAU and Site Score	Acres
Riparian12	High	6	21.49
Riparian197	High	6	113.36
Riparian198	High	2	35.12
Riparian201	High	6	24.75
Riparian202	High	4	55.79
Riparian205	High	4	15.61
Riparian207	High	2	46.97
Riparian208	High	2	19.51
Riparian209	High	2	52.97
Riparian211	High	4	35.82
Riparian214	High	4	31.96
Riparian215	High	6	12.60
Riparian216	High	6	15.85
Riparian244	High	6	1.59
Riparian59	Moderate	5	79.12
Riparian196	Moderate	1	43.91
Riparian199	Moderate	5	15.40
Riparian212	Moderate	5	21.41
Riparian294	Moderate	3	24.44
Riparian295	Moderate	3	1.04

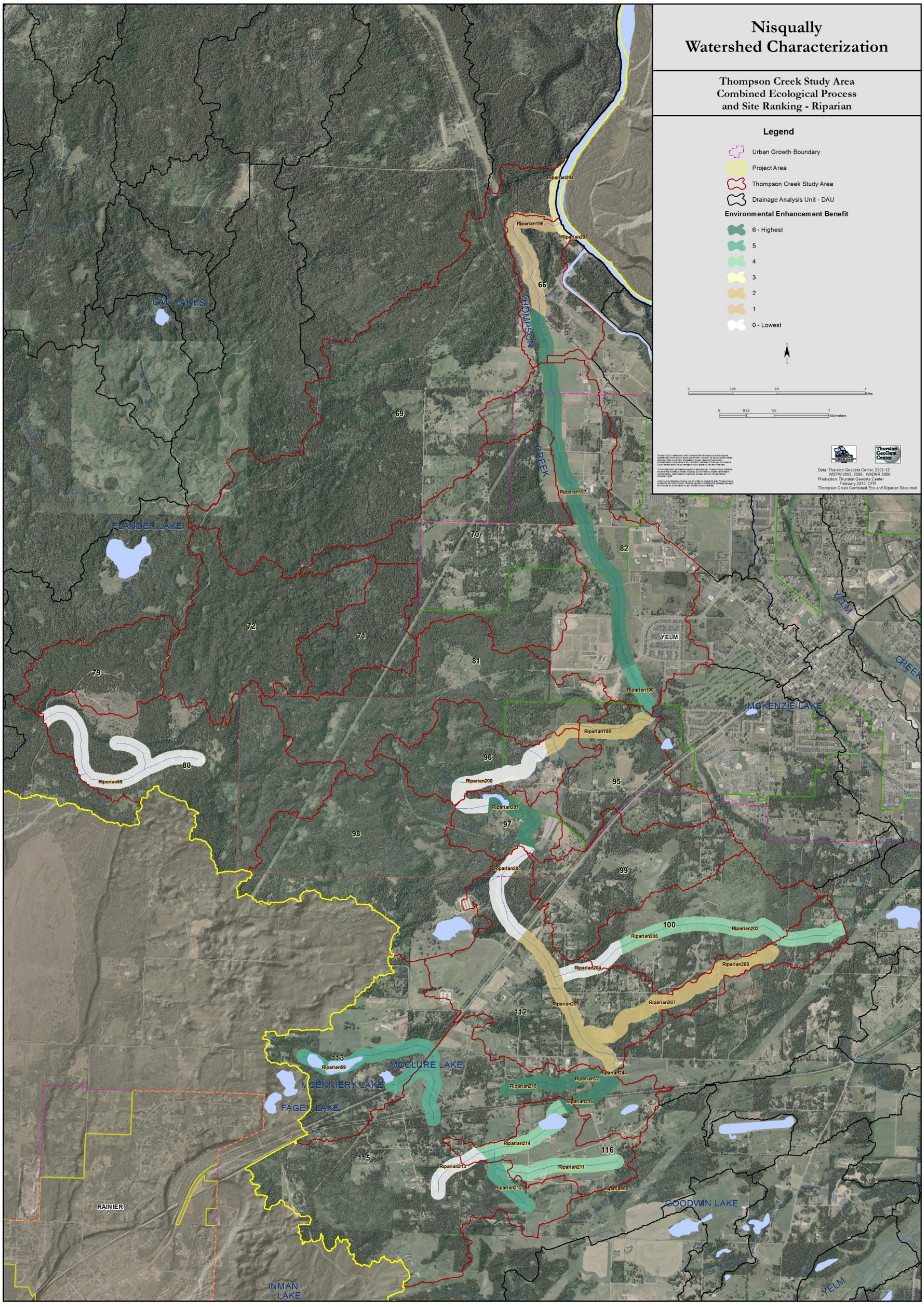


Figure 5.4 Thompson Creek Study Area Ecological Processes and Site Ranking - Riparian.

Floodplain Condition

There were three floodplain areas ranked. Only one was moderate. The three sites can be viewed on Figure 5.5. Floodplain sites ranked Low are not included in Table 5.5, however, they are ranked and listed in Appendix C.

Table 5.5 Floodplain Sites

Site ID	Floodplain Rank	Combined DAU and Site Score	Acres
Floodplain11	Moderate	5	71.53

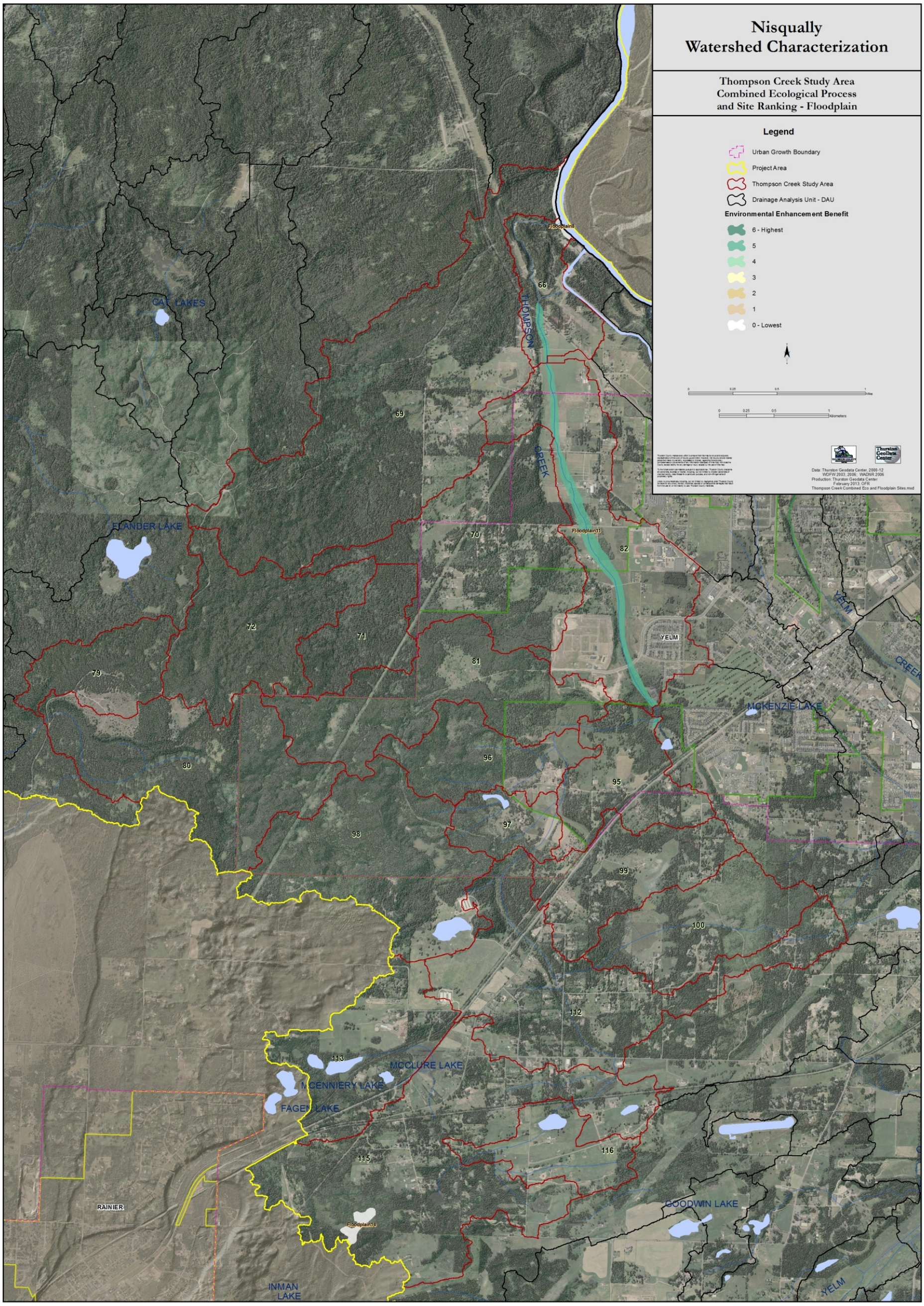


Figure 5.5 Thompson Creek Study Area Ecological Processes and Site Ranking - Floodplain