Beauval Project Earthcover Fieldwork Summary
August 25, 2004

Falls along the Clearwater River, Clearwater Provincial Park, Saskatchewan

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Acknowledgements

Efficiencies realized when conducting this fieldwork were greatly enhanced by having access to strategically placed helicopter fuel throughout the project area. The majority of fuel used for this project was made available at previously established fuel cache sites maintained by Saskatchewan Environment. The assistance of Saskatchewan Environment in providing access to this fuel is greatly appreciated including Doug Woodcock and numerous field staff who maintain the fuel cache network throughout the project area.

Introduction

The Beauval Project is a 5.3 million ha study area located in west central Saskatchewan (Figure 1). The project is comprised of three inventory components including satellite-based earthcover mapping, waterbird surveys and an inventory of water chemistry (Smith et al, 2004). This brief report provides an overview of the fieldwork undertaken to collect data to develop earth cover inventory and mapping.

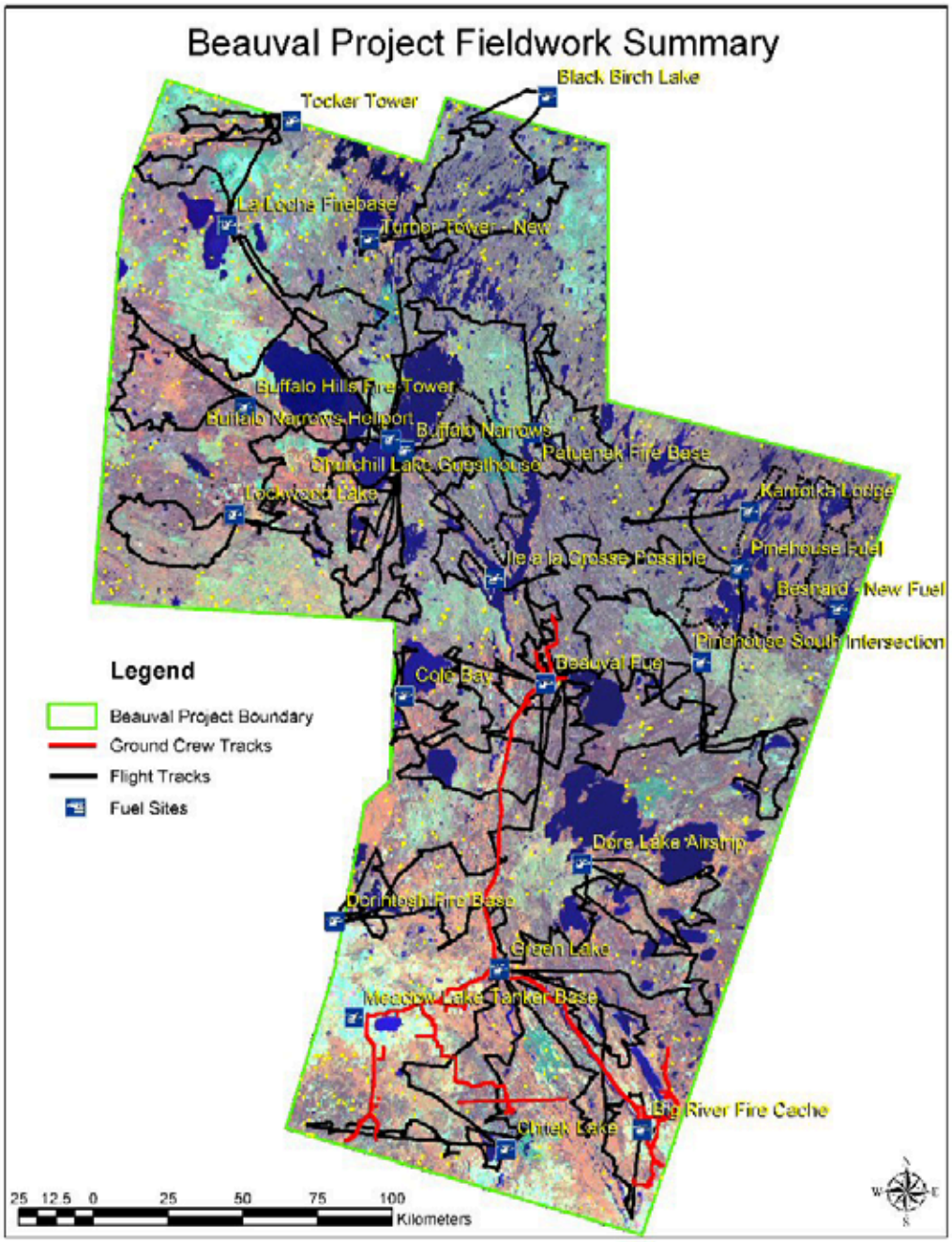


Figure 1. Flight and ground crew coverage of the Beauval Project from July 30- Aug 16.

Summary of Field Work

The field portion of the Beauval Earth Cover project started on July 30, 2004, and was completed on August 16, 2004. Crews worked out of four field camps as follows: Buffalo Narrows (July 29-August 5), Pinehouse (Aug 6-8), Beauval (August 9-12), Green Lake (August 13-17). The weather for the duration of the field collection was good, with only one down day due to rain (Aug 7).

Two separate field crews, one using helicopter reconnaissance for remote areas, and the other using the existing road grid to sample ground sites, combined to collect data on 1204 total field sites. Of the nearly 2000 predetermined field sites, the helicopter crew visited 1010 sites, and 89 other sites were proactively designated in the field to capture additional information. The total flight time required was 106 hours. The ground crew collected data on an additional 105 sites. A summary of the flight and ground tracks, along with the fuel locations for the Beauval Project are shown in Figure 1. The field sites visited during the field season are shown in Figure 2. The daily work logs for both crews are shown in Tables 1 and 2. Roughly two-thirds of these field sites will be used for both the training of the earthcover classification, and one-third for the accuracy assessment of the final classification. The crews assembled were as follows:

Helicopter Crew:

The primary goal of the helicopter crew was to rapidly collect data on non-road accessible field sites from an orthogonal viewing location. The helicopter used in this project was a Bell 206 Jet Ranger III.

Navigators: Kevin Smith, Brent Friedt, Nicole Hopkins, Al Richard
Vegetation Callers: Chris Smith, Kevin Smith
Alternates/Recorders: Al Richard, Glenn Mack, Nicole Hopkins, Brent Friedt, Mark Kornder, Kevin Smith
Pilots: Bob Derksen, Larry Maas; Trans-West Helicopters

Ground Crew:

The ground crews collected sites that were road accessible to provide additional information to that provided by the helicopter crew and to maximize site coverage for the project area.

Navigator/Recorder: Mike Robin, Brent Friedt
Vegetation Caller: Al Richard, Mark Kornder

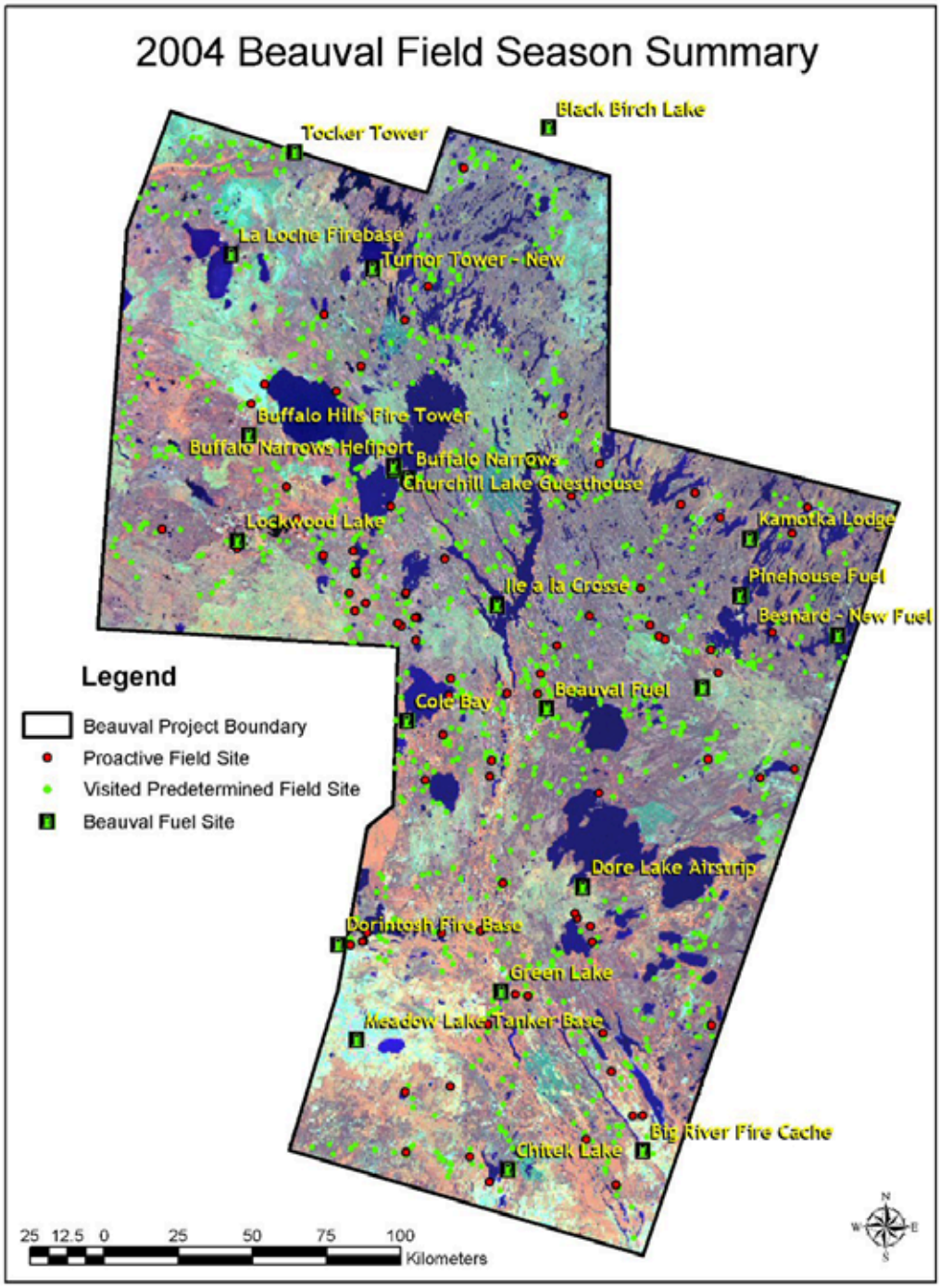


Figure 2. Field sites visited during the 2004 field season.

Table 1. Helicopter Crew Field Work Log

Date	# of Sites	Hours Flown	Sites/Hr
07/30/04	21	3.2+ 2 Ferry	6.6
07/31/04	72	7.2	10
08/01/04	70	6.9	9.7
08/02/04	76	8.0	9.5
08/03/04	72	6.9	10.4
08/04/04	78	7.2	10.8
08/05/04	77	7.6	10.1
08/06/04	53	5.1	10.4
08/07/04	0	0	0
08/08/04	59	5.1	11.6
08/09/04	71	6.5	10.9
08/10/04	85	6.6	12.9
08/11/04	64	6.5	9.8
08/12/04	52	5.0	10.6
08/13/04	60	6.0	10
08/14/04	64	6.2	10.3
08/15/04	63	6.1	10.3
08/16/04	63	5.9	10.6
08/17/04	0	1.0	Pilot Ferry
	1100	106 + 3 Ferry	10.4

Table 2. Ground Crew Field Work Log

Date	Number of Sites
08/12/04	27
08/13/04	14
08/14/04	22
08/15/04	30
08/16/04	12
Total	105

Data Collection

The data collected at each field site included a complete list of species observed, tree/shrub heights, total percent cover, slope, drainage and assigned the earth cover class as per the Beauval Decision Tree (Appendix A). Each lowland site was classified to the appropriate lowland class as per the Saskatchewan Ecosystem Classification system for the mid-boreal ecoregion (Beckingham et al., 1996). In addition, information was collected to classify all wetlands as per the Canadian Wetland Classification System including bog, fen, swamp, marsh (National Wetlands Working Group, 1997), and the Northwestern Ontario wetland classification system for cross-reference (Harris et al., 1996). A minimum of four high-resolution (3.2 Megapixel) digital photos were taken of each site (low overhead, high overhead, oblique angle, and contextual shots). GPS

locations of each site were recorded, along with tracklogs of each flight and ground sampling track.

A total of 49 earth cover classes were sampled during the field season, indicating that a wide number of earth cover classes were sampled Table 3. Twenty-five earth cover classes had a sample size greater than or equal to 15, which is the minimum requirement to perform the accuracy assessment procedure. This means that individual accuracies will be determined for most of the major (most commonly occurring) earth cover classes, and will provide a good assessment of the accuracy of the final classification map. While some of the classes had a high number of samples (eg., closed spruce with 89, closed pine with 80), these classes covered a large portion of the study area, and allow for a better assessment of the spectral variation within these classes. Conversely, some of the classes had a lower number of samples. This is mainly because the classes were fairly rare (open poplar, open fir, etc.) or because the classes are spectrally unique (rock/gravel, agriculture, clear water).

Table 3. Field site breakdown by calculated earth cover class.

Calculated Class	# Sites	Calculated Class	# Sites
Aquatic Bed	51	Open Mixed Needleleaf/Moss	34
Clear Water	10	Open Mixed Needleleaf/Other	20
Closed Aspen	65	Open Mixed Needleleaf-Decid/Other	12
Closed Birch	2	Open Mixed Neeleleaf-Decid/Lichen	2
Closed Fir	1	Open Pine/Lichen	31
Closed Low Shrub	6	Open Pine/Moss	11
Closed Mixed Deciduous	24	Open Pine/Other	9
Closed Mixed Needleleaf	72	Open Spruce/Lichen	4
Closed Mixed Needleleaf-Deciduous	63	Open Spruce/Moss	69
Closed Pine	80	Open Spruce/Other	22
Closed Spruce	89	Open Tall Shrub/Moss	1
Closed Tall Shrub	20	Open Tall Shrub/Other	35
Closed Tamarack	40	Open Tamarack/Moss	33
Dwarf Shrub Other	24	Open Tamarack/Other	40
Emergent Vegetation	10	Open Tamarack/Wet Graminoid	13
Mesic/Dry Forb	7	Other	39
Mesic/Dry Graminoid	35	Rock/Gravel	1
Moss	12	Sparse Vegetation	7
Non-Vegetated Soil	6	Turbid Water	4
Open Aspen	16	Wet Forb	4
Open Birch	3	Wet Graminoid	72
Open Low Shrub/Moss	2	Woodland Needleleaf/Lichen	1
Open Low Shrub/Other	27	Woodland Needleleaf/Moss	32
Open Mixed Deciduous	8	Woodland Needleleaf/Other	32
Open Mixed Needleleaf/Lichen	3	Total Fieldsites	1204

Future Work

Over the next year, processing will be ongoing for the Beauval earth cover classification, which will be completed in December 2005. In addition to the earth cover classification, a detailed wetland classification (following Canadian Wetland Inventory wetland classes) will be created for the project area, and included with the final products.

References

Beckingham, J.D., D.G. Nielsen, and V.A. Futoranshy. 1996. *Field Guide to the ecosites of the mid-boreal ecoregions of Saskatchewan*. Nat. Resour. Can., Can. For. Serv., Northwest Reg., North. For. Cent., Edmonton, Alberta. Spec. Rep. 6.

Harris, A.G., S.C. McMurray, P.W.C. Uhlig, J.K. Jeglum, R.F. Foster and G.D. Racey. 1996. *Field Guide to the Wetland Ecosystem Classification for Northwestern Ontario*. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. 74 pp.

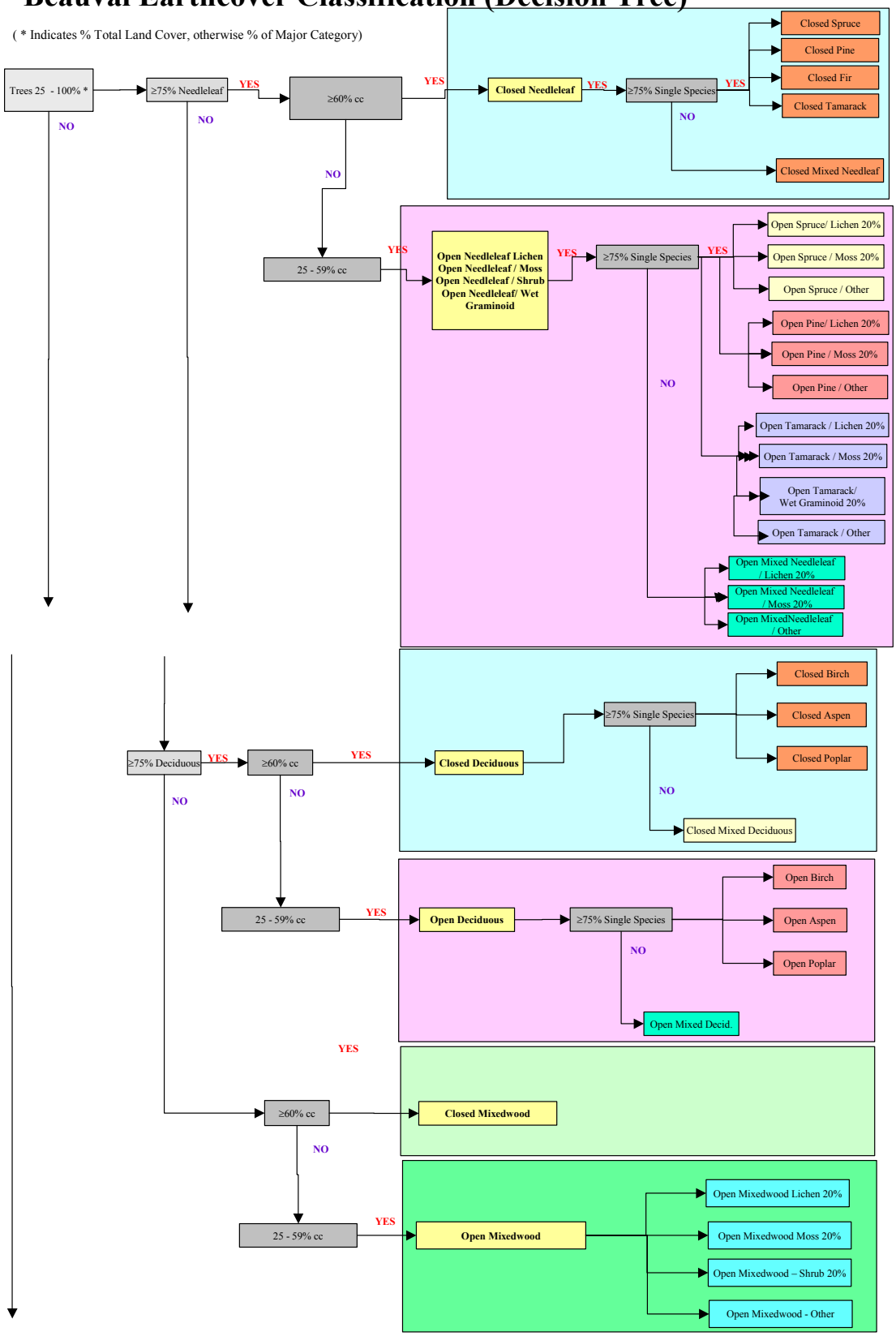
National Wetlands Working Group. 1997. *The Canadian Wetland Classification System* (Second Edition). Wetlands Research Centre, University of Waterloo, Waterloo, Ontario. 68 pp.

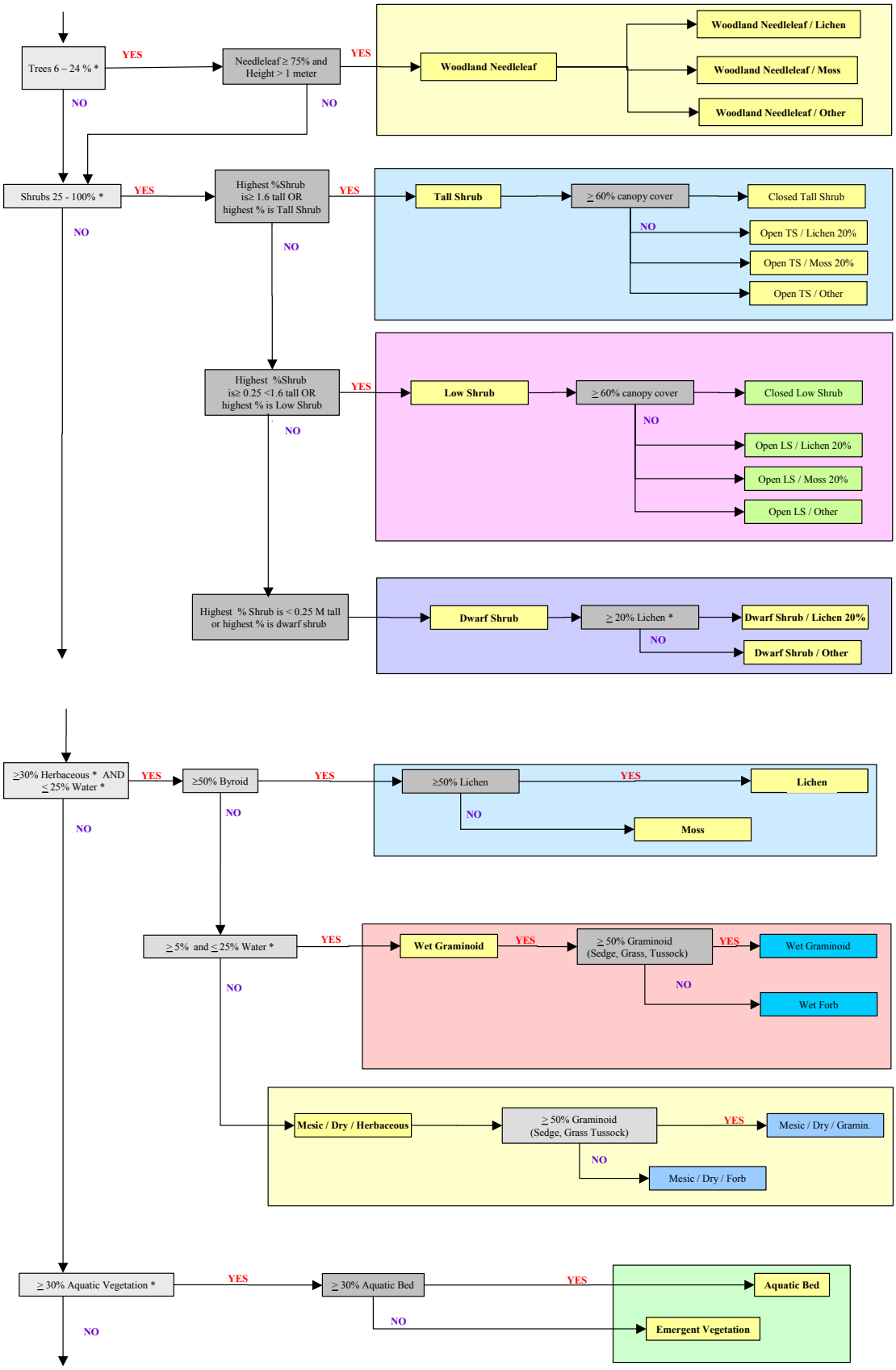
Smith, C.E., A.J. Richard, and G.R. Stewart. 2004. *Beauval Project Proposal*. Western Boreal Program, Ducks Unlimited Canada, Edmonton, AB. 50 pp.

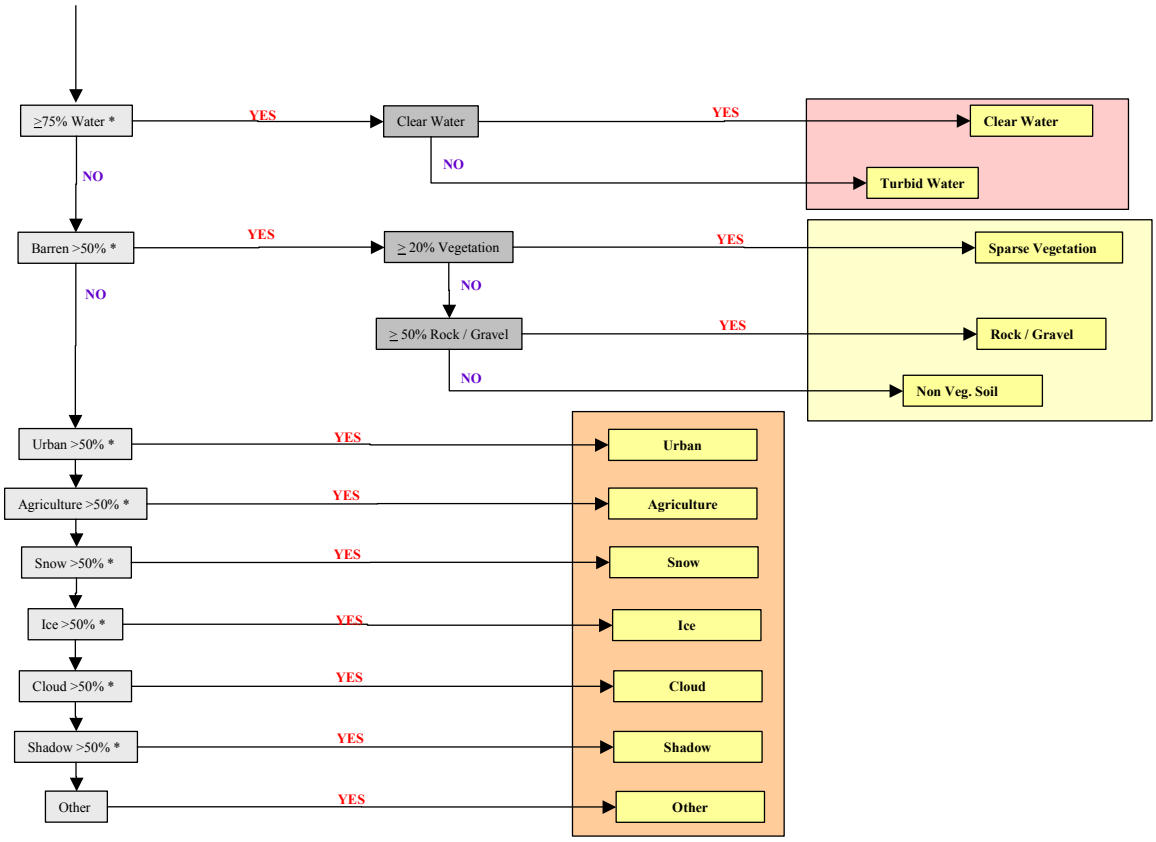
Appendix A Beauval Project Decision Tree

Beauval Earthcover Classification (Decision Tree)

(* Indicates % Total Land Cover, otherwise % of Major Category)




Trees 6 – 24 % *
YES
Needleleaf ≥ 75% and Height > 1 meter
YES
Woodland Needleleaf
Woodland Needleleaf / Lichen
Woodland Needleleaf / Moss
Woodland Needleleaf / Other
NO
NO
Shrubs 25 - 100% *
YES
Highest %Shrub is≥ 1.6 tall OR highest % is Tall Shrub
YES
Tall Shrub
≥ 60% canopy cover
Closed Tall Shrub
NO
Open TS / Lichen 20%
Open TS / Moss 20%
Open TS / Other
NO
NO
Highest %Shrub is≥ 0.25 <1.6 tall OR highest % is Low Shrub
YES
Low Shrub
≥ 60% canopy cover
Closed Low Shrub
NO
Open LS / Lichen 20%
Open LS / Moss 20%
Open LS / Other
NO
Highest % Shrub is < 0.25 M tall or highest % is dwarf shrub
Dwarf Shrub
≥ 20% Lichen *
Dwarf Shrub / Lichen 20%
NO
Dwarf Shrub / Other
≥30% Herbaceous * AND ≤ 25% Water *
YES
≥50% Byroid
YES
≥50% Lichen
YES
Lichen
NO
NO
Moss
NO
≥ 5% and ≤ 25% Water *
YES
Wet Graminoid
YES
≥ 50% Graminoid (Sedge, Grass, Tussock)
YES
Wet Graminoid
NO
Wet Forb
NO
Mesic / Dry / Herbaceous
≥ 50% Graminoid (Sedge, Grass Tussock)
YES
Mesic / Dry / Gramin.
NO
Mesic / Dry / Forb
≥ 30% Aquatic Vegetation *
YES
≥ 30% Aquatic Bed
YES
Aquatic Bed
NO
Emergent Vegetation
NO


≥75% Water *
YES
Clear Water
YES
Clear Water
NO
Turbid Water
NO
Barren >50% *
YES
≥ 20% Vegetation
YES
Sparse Vegetation
NO
NO
≥ 50% Rock / Gravel
YES
Rock / Gravel
NO
Non Veg. Soil
Urban >50% *
YES
Urban
Agriculture >50% *
YES
Agriculture
Snow >50% *
YES
Snow
Ice >50% *
YES
Ice
Cloud >50% *
YES
Cloud
Shadow >50% *
YES
Shadow
Other
YES
Other