~ “Don't judge each day by the harvest you reap but by the seeds that you plant.” ~

~ Robert Louis Stevenson ~

# PREDICTIVE VEGETATION TYPE MAPPING USING CARTOGRAPHIC DEPTH-TO-WATER, SLOPE, ASPECT, AND ELEVATION

by

Douglas Hiltz

BSc. Forestry, University of New Brunswick, 2009

A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

Masters of Science in Forestry

In the Graduate Academic Unit of
Forestry and Environmental Management

Supervisor: Paul Arp, PhD, Forestry and Environmental Management

Examining Board: Paul Arp, PhD, Forestry and Environmental Management

Marek Krasowski, PhD, Forestry and Environmental Management

Katherine Frego, PhD, Biology

This thesis is accepted by the
Dean of Graduate Studies

THE UNIVERSITY OF NEW BRUNSWICK

February 2014

© Douglas Hiltz, 2014

# ABSTRACT

This thesis describes a method for modelling vegetation type according to species-specific soil moisture preferences from hydric to xeric across the landscape at one meter resolution. This method assesses the occurrence and abundance of all vegetation at the species and genus levels and for vegetation index (VI) classes as these range from xeric (1) to hydric (8). Subsequently, it relates these classes to the depth-to-water index (DTW) and the terrain wetness index (TWI). This is done for two areas: the Willmore Wilderness Park within the Rocky Mountain and Foothills natural regions of Alberta, and the EMEND ("Ecosystem Management Emulating Natural Disturbance") area within the Dry Mixedwood subregion of the Boreal Forest natural region of Alberta. The field work proceeded by noting the occurrence and abundance of vegetation in 1x1 $m^2$ plots, and also in 5x5 $m^2$ plots (Willmore only). The mapping work proceeded by deriving the local flow channel, DTW and TWI patterns from the currently available 1 m LiDAR-derived bare–earth digital elevation model (DEM) for both areas. For the purpose of sensitivity analysis, the flow-channels and DTW were derived with initiation points of 4, 1, and 0.25 ha of minimum flow accumulation. For optimization purposes, the DEM-derived values for TWI, slope, and aspect at 1 m resolution were zonally averaged across quadratic cells spanning 5, 10, 20, 40, 80, and 160 m along each side. VI based on plot occurrence and abundance by species and genus was best correlated with the DTW patterns [i.e., $VI = a + b \log_{10} (DTW)$], with a and b as calibrated regression coefficients) that were associated with the 1 ha flow initiation flow channel network. These VI determinations could also be related to TWI, but the correlation was highly dependent on TWI averaging, with best

results obtained with the 40x40 m averaged TWI values across each of the two areas. Slope and aspect influenced the plot-based VI determinations, but only weakly, likely due to sparse sampling across very steep slopes. Regression results for VI versus DTW (1 ha flow initiation) produced generally good correspondences between the plot-determined VI values and the resulting regression-modeled VI map. Results for plot-determined VI conformance by occurrence alone proved better than by abundance. Plot VI values that strongly deviated from their mapped values were identified, and examined in terms of their species composition and local disturbance pattern as revealed through high-resolution surface imagery. This analysis suggested that vegetation species interactions and local disturbance may have influenced the vegetation composition of outliers, with opportunistic species dominating and reflecting drier or wetter conditions than may be the case under non-disturbed vegetation cover. During this work, the algorithm for the DTW derivation was improved by tracking the least-cost path to each landscape cell from its nearest DTW = 0 location (presumed surface water location according to the 4, 1 or 0.25 ha flow channel network) by elevational rise only. Doing so improved the DTW and VI especially across the wetland portions of the Willmore Wilderness Park and EMEND areas. Through plot-based indexing of vegetation type by soil wetness (VI), and correlating the same to LiDAR cartographically derived depth-to-water index DTW, it is possible to model and map the moisture-based VI variations across the Willmore Wilderness Park and the EMEND area at 1-metre resolution. Results have shown a 40-50% capture of the individual plot-by-plot VI variations under regression analyses and up to 97% capture of vegetation-moisture relationships under classified regression analyses.

# DEDICATION

To Dayne and the rest of my family and friends, without whom I would not have made it through the past few years.

And

For Dave and Linda, who always believed in me, even when I didn't.

# ACKNOWLEDGMENTS

This work was financially supported through research grants and in-field assistance received from Alberta Environment and Sustainable Resource Development and by Alberta Tourism, Parks and Recreation. The majority of vegetation data used in this study was provided through a joint research project of Alberta Tourism, Parks and Recreation, Alberta Innovates, and the Alberta Biodiversity Monitoring Institute.

Special thanks go to: Joshua Noseworthy, David Campbell, Sheena Briggs, Karen Anderson, Marge Meijer, Joyce Gould, Brian Gauthier, and Kyle Chisholm for field assistance and data collection; to Jae Ogilvie, Mark Castonguay and Kim Wen for assistance with geo-processing and DTW mapping; and to Marie-France Jutras for editing and formatting support.

I would also like to acknowledge the contributions of the members of my advisory committee, without whose patience and stead-fastness this work would never have been completed.

TABLE OF CONTENTS

Page

ABSTRACT ..... ii

DEDICATION ..... iv

ACKNOWLEDGMENTS ..... v

LIST OF TABLES ..... viii

LIST OF FIGURES ..... ix

INTRODUCTION ..... 1

REVIEW OF LITERATURE AND PREVIOUS RESEARCH ..... 4

STUDY AREAS ..... 12

WILLMORE WILDERNESS PARK ..... 12

EMEND RESEARCH AREA ..... 14

METHODS ..... 18

VEGETATION MOISTURE INDEXING ..... 18

GIS MODELLING ..... 23

DATA COMPILATION AND ANALYSIS ..... 33

RESULTS AND ANALYSES ..... 35

VEGETATION MOISTURE INDEXING ..... 35

SPECIES AND GENUS LEVEL VI-DTW AND VI-TWI RELATIONSHIPS ..... 36

PLOT-BASED VI-DTW AND VI-TWI RELATIONSHIPS ..... 55

VEGETATION INDEX MAPPING EXAMPLES ..... 73

MULTIPLE-REGRESSION ANALYSIS ..... 82

DISCUSSION ..... 90

REGRESSION ANALYSES ..... 90

IDENTIFIED NON-CONFORMANCES ..... 98

POTENTIAL APPLICATIONS OF WORK ..... 99

SUGGESTIONS FOR FUTURE WORK ..... 101

CONCLUSIONS.....103

APPENDIX A - SPECIES-SPECIFIC XERIC TO HYDRIC VEGETATION MOISTURE INDEX FOR FLORA RECORDED IN BOTH THE EMEND RESEARCH AREA AND THE WILLMORE WILDERNESS PARK, ARRANGED ALPHABETICALLY BY SPECIES SCIENTIFIC NAME .....111

APPENDIX B - VEGETATION INVENTORY FIELD DATA THE FROM THE WILLMORE WILDERNESS PARK STUDY AREA SPANNING 2009-2010 FIELD SEASONS .....126

APPENDIX C - VEGETATION INVENTORY FIELD DATA THE FROM THE EMEND RESEARCH SITE STUDY AREA SPANNING 2008-2012 FIELD SEASONS .....178

APPENDIX D - ABMI DATA COLLECTION PROTOCOLS USED FOR SURVEYS OF THE WILLMORE WILDERNESS PARK BY ALBERTA PARKS, TOURISM, AND RECREATION.....202

APPENDIX E - PLOT SPECIFIC EXAMPLES OF NON-CONFORMANCE WITH POSSIBLE REASON FOR NON-CONFORMANCE FOR FUTURE VERIFICATION AND STUDY.....211

# LIST OF TABLES

Table Page

1. Coordinates of EMEND vegetation survey sites (eastern-most points). ..... 19
2. Coordinates of Willmore vegetation survey sites (centre points). ..... 20
3. Summary table of key values from all Species-level VI-DTW and VI-TWI regression analyses. ..... 53
4. Summary table of key values from all Genus-level VI-DTW and VI-TWI regression analyses. ..... 54
5. Summary table of key values from all species-presence averaged plot VI regression analyses. ..... 71
6. Summary table of key values from all species-abundance averaged plot VI regression analyses. ..... 72

# LIST OF FIGURES

Figure Page


1. Examples of landscapes/forest covers within the Willmore Wilderness Park. Photo source: Doug Hiltz 2010 ..... 14

2. Examples of landscapes/forest covers from the EMEND Research Area. Photo source: EMEND 2008 ..... 16

3. Location of Willmore Wilderness Park and EMEND area research sites in the province of Alberta, Canada. ..... 17

4. Overview and principles of the GIS-based flow-channel and cartographic depth-to-water index modelling and mapping (White *et al.* 2012). ..... 25

5. Graphical representations of canopy heights, DEM elevations, and 1ha DTW values (old and new DTW algoritms) along a 1200m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line. ..... 27

6. Graphical representations of canopy heights, DEM elevations, and 4ha DTW values (old and new DTW algorithms) along a 1200m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line. ..... 28

7. Graphical representations of canopy heights, DEM elevations, and 1ha DTW values (old and new DTW algorithms) along a 3500m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line. ..... 29

8. Graphical representations of canopy heights, DEM elevations, and 4ha DTW values (old and new DTW algorithms) along a 3500m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line. ..... 30

9. Graphical representation of the impacts of slope and aspect corrections on vegetation moisture indices (VI)..... 32

10. Scatterplot of assigned VI values for each recorded vegetation species vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which each species was encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values. ..... 41

11. Scatterplot of assigned VI values for each recorded vegetation species, grouped in whole integer classes, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which species of that VI value were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values..... 42

12. Scatterplot of mean VI value for all species within each genus vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which species of each genus were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values. ..... 43

13. Scatterplot of mean VI values for each genus, classed by common VI value, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which species of each genus were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values..... 44

14. Scatterplot of mean VI values for each genus, grouped in half integer classes, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which genera in each class were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values. ..... 45

15. Scatterplot of averaged VI values for each genus, grouped in whole integer classes, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which genera in each class were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values..... 46

16. Scatterplot of assigned VI values for each recorded vegetation species vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which the species was encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values..... 47

17. Scatterplot of assigned VI values for each recorded vegetation species, classed by common VI value vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which species of each VI value were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values. ..... 48

18. Scatterplot of mean VI values for all species within each genus vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which these species were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values..... 49

19. Scatterplot of mean VI values for each genus, classed by common VI value, vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which species of each genera were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values..... 50

20. Scatterplot of mean VI values for each genus, grouped in half integer classes, vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which species of each VI value were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values. ..... 51

21. Scatterplot of mean VI values for each genus, classed by common VI value, vs. mean plot-generated TWI (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) value for all plots (1x1 m and 5x5 m) at which species of each genera were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values..... 52

22. Scatterplot of plot-determined VI values by species presence vs. plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 59

23. Scatterplot of plot-determined VI values by species presence, grouped in half integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values..... 60

24. Scatterplot of plot-determined VI values by species presence, grouped in whole integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 61

25. Scatterplot of plot-determined VI values by species abundance vs. plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 62

26. Scatterplot of plot-determined VI values by species abundance, grouped in half integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 63

27. Scatterplot of plot-determined VI values by species abundance, grouped in whole integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 64

28. Scatterplot of plot-determined VI values by species presence vs. plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 65

29. Scatterplot of plot-determined VI values by species presence, grouped in half integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 66

30. Scatterplot of plot-determined VI values by species presence, grouped in whole integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 67

31. Scatterplot of plot-determined VI values by species abundance vs. plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 68

32. Scatterplot of plot-determined VI values by species abundance, grouped in half integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 69

33. Scatterplot of plot-determined VI values by species abundance, grouped in whole integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values. ..... 70

34. Example vegetation index map for site S5 within the Willmore Wilderness Park based on an algorithm derived from the regression of individual species VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale. ..... 74

35. Example vegetation index map for site S5 within the Willmore Wilderness Park, based on an algorithm derived from the regression of species abundance-calculated plot-based VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale. ..... 75

36. Example vegetation index map for site S5 within the Willmore Wilderness Park, based on an algorithm derived from the regression of species VI values grouped by whole-integer classes and mean 40x40 m focal-averaged terrain wetness index (TWI) for each class. Circles indicate plot locations, coded by VI colour scale. ..... 76

37. Example vegetation index map for transects T24 and T25 within the EMEND Research Area, based on an algorithm derived from the regression of individual species VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale. ..... 77

38. Example vegetation index map for transects T24 and T25 within the EMEND Research Area, based on an algorithm derived from the regression of species abundance-calculated plot-based VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale. ..... 78

39. Example vegetation index map for transects T24 and T25 within the EMEND Research Area, based on an algorithm derived from the regression of species VI values grouped by whole-integer classes and mean 40x40 m focal-averaged terrain wetness index (TWI) for each class. Circles indicate plot locations, coded by VI colour scale. ..... 79

40. Example vegetation index maps for sites E9 (top), S16 (centre), and S4 (bottom) within the Willmore Wilderness Park, based on an algorithm derived from the regression of individual species VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale. ..... 80

41. Example vegetation index map for transects OT8 & T11 (top), OT2 (centre), and T18, T19, & T20 (bottom) within the EMEND Research Area, based on an algorithm derived from the regression of species abundance-calculated plot-based VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water values for each class. Circles indicate plot locations, coded by VI colour scale. ..... 81

42. Colour-coded representation of the correspondence of plot-determined VI values to Slope and Aspect. ..... 84

43. Comparison of regressions of 40mx40m focal averaged TWI values with species presence-calculated VI (top) and species abundance-calculated VI (bottom) values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values..... 85

44. Comparison of regressions of 4 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species presence-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values..... 86

45. Comparison of regressions of 4 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species abundance-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values. ..... 87

46. Comparison of regressions of 1 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species presence-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values..... 88

47. Comparison of regressions of 1 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species abundance-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values. ..... 89

# INTRODUCTION

The ability to accurately predict and map sites where different vegetation species/types are likely to be found, or may have the potential to establish, has widespread natural resource management implications. This project explored the relationships between cartographic depth-to-water and other site factors, and site vegetation type. The primary research questions that this project sought to answer were: can site vegetation be definitively linked to depth-to-water, and could this relationship be used to define ecological functions through depth-to-water mapping.

This project focused transforming the DEM-derived DTW map into a high-resolution vegetation moisture index (VI) for two study areas in the province of Alberta:

(i) the Willmore Wilderness Park near the town of Grande Cache, within the Rocky Mountain and Foothills Natural Regions of Alberta, and

(ii) the EMEND ("Ecosystem Management Emulating Natural Disturbance") forest area near Peace River, representing the Dry Mixedwood subregion of the Boreal Forest natural region of Alberta.

The process began with indexing of vegetation by species-specific soil-moisture requirements. The species VI values were averaged for each survey plot. The relationship between both species and plot VI values and the topographically derived depth-to-water

were established. Those relationships were then used as algorithms to model and map predicted VI values across the two study areas, with DTW as the main VI predictor, with and without local slope and aspect corrections. In principle, such maps would be derived from Light Detection and Ranging (LiDAR)-derived bare-ground digital elevation models (DEM) and the DEM-derived cartographic depth-to-water (DTW) index map (Murphy *et al.* 2011). DTW is an indication of the gradual changes in soil moisture regime from very poorly drained areas in wetlands, along shorelines and stream channels (DTW<10 cm), to excessively well drained areas along ridge tops (DTW> 40 m). Depths of zero metres are centered along all open flow channels and water bodies.

Ideally, the maps so generated would provide a high-resolution benchmark of vegetation type distributions across landscapes from depressions to ridge tops and along flow channels. This ability would facilitate location of habitats with unique faunal and floral elements, assist in eco-site classification, and assess invasive species movement through and into environmentally protected or disturbed areas. These maps could be utilized in efforts to conserve and protect sensitive ecological habitats from physical and biological intrusions, when possible. They could also be used to provide ready visualizations of likely encroachment pathways taken by invasive species and delineating the vulnerability areas of specific habitats for plants and animals to anticipated physical or biological disturbances. The maps could serve as planning aides when applied with specific vegetation and habitat characterization and protection interests.

This thesis begins with an overview of results from previous research and related literature in this area with regards to development of different vegetation indices and soil moisture prediction methods and how they have been used together. A brief description of the main study areas, the Willmore Wilderness Park and EMEND Research Area located in Alberta, provides context for the types of landscapes involved in this study.

The methods used in this study were broken down into three main sections. The first section describes the process for indexing vegetation species by soil moisture preference and range. The second outlines the GIS modelling process. This includes the determination of the mathematical relationship between VI and DTW, and accounting for influences of slope, aspect, and elevation. The third describes the compilation of all data and the approaches used in analysing these data.

The Results include simple regression analyses of species-based and genus-based relationships with averaged DTW values, and further analyses such as multiple-regression analyses pertaining to the plot-based VI-DTW relationship as well as impacts of other site characteristics. These analyses will illustrate the strengths and weaknesses of these relationships and also how they conform to, and are influenced by, such factors as survey plot size, wetland classification, and different levels of focal statistics carried out on site characteristics. The Discussion examines the relevance and applications of this work with regard to natural resource management and vegetation science. Attention is paid to the works potential for application in the fields of biological conservation and protection. There are also suggestions for future work to expand and build upon the scope of the current work.

# REVIEW OF LITERATURE AND PREVIOUS RESEARCH

The research described in this thesis relates to earlier research, using coarse-gridded and fine-gridded DEMs for the derivation of VI, DTW, and topographic wetness index (TWI). There has also been research conducted with the goal of linking soil moisture prediction to not only vegetation species/types but also to species richness and biodiversity. While past research has relied more heavily on TWI using many different inputs such as nutrient availability, acidity, salinity, temperature, and light availability, this project attempts to relate DTW specifically to a VI primarily using the predictive potential of soil moisture.

Some past attempts to develop a simple but effective modelling method for predicting vegetation species/type across landscapes identified the need to map vegetation patterns over large areas for resource conservation planning, prediction of the response to ecological "dimensions" (functions), and the prediction of the effects of environmental change on vegetation distributions. Austin et al. (1980) expressed the need for a model that linked vegetation responses to environmental gradients. That study identified three main types of environmental gradient:

(i) Indirect gradients – factors that affect vegetation responses but not in a direct physiological way, such as elevation, slope, and aspect.

(ii) Direct gradients – factors that affect vegetation responses in a physiological way but that are not direct resources for plant growth, such as pH and temperature.

(iii) Resource gradients – factors that are essential resources for plant growth, such as water and nutrients.

Most methods used to model vegetation patterns at the time these studies were conducted were found to focus on only one of these gradient types and usually for a limited number of factors within the type (Austin *et al.* 1980). Austin *et al.* (1980) suggested that incorporating indirect, direct, and resource gradients may overcome some shortfalls. The lack of directly observed data was identified as a major obstacle to progress in this field, as was lack of accurate data concerning the environmental gradients (Austin *et al.* 1980).

Franklin *et al.* (1995) also evaluated modelling vegetation pattern responses to environmental gradients. Franklin *et al.* (1995) noted that, with great advancements in GIS and remote-sensing technologies over the previous two decades, vegetation modelling had made progress as well. Still a model had not been produced that could adequately model over large, diverse landscapes (Franklin *et al.* 1995). They also concluded that future advances in vegetation modelling must come from use of continuous raster-based geographic data as opposed to categorised polygon geographic data. Past vegetation modelling attempts were found to avoid using continuous gradient data as it often lead to modelling error and areas of non-conformance. Franklin *et al.* (1995) advocated the use of continuous data and analysis of errors/non-conformance in order to develop hypotheses about spatial processes and relationships not yet accounted for in the modelling process.

Venterink *et al.* (1997) evaluated six different models commonly in use at the time. They found that the models varied greatly in the complexity and number of field measurements and input data required to run them. There was also great divergence in the purposes behind the development of each model as well as the scale and landscape for which they were intended (Venterink *et al.* 1997). Overall, they concluded that these wide divergences made it very difficult to say that one modelling strategy was more appropriate than another. Most of the evaluated models worked well at some scale and location but worked poorly, or not at all, at others. Venterink *et al.* (1997) identified what they considered a "major need" in the future of vegetation modelling development: the need to embrace more and better expert knowledge in the causal relationships between vegetation and environment, as well as more and better quality empirical data to be used as inputs.

Tappeiner *et al.* (1998) focused on the effects of indirect environmental gradients on conglomerated vegetation types but also took into account land-use and anthropogenic influences. They concluded that, though their overall prediction accuracy for all vegetation types combined was on the order of 78%, the results for individual vegetation types or "units" were highly variable. Of the 21 identified vegetation units used, 2 were accurately predicted 0% of the time, 6 were accurately predicted 100% of the time, while the remainder were accurately predicted anywhere from 20-80% of the time (Tappeiner *et al.* 1998). Much of the highly variable results were attributed to the fact that this was an alpine site in the Alps where snow distribution patterns are unpredictable. Another reason stated for the variability was lack of precise information on grazing patterns in the area and on land-use history.

Murphy *et al.* (2011) undertook DTW versus TWI comparisons regarding the mapping and modelling of soil, drainage, and vegetation type. They found, for example, mapped vegetation type followed the DEM-derived DTW index considerably more closely than the DEM-derived TWI index (Murphy *et al*. 2011). In general, DEM-derived maps for TWI and soil moisture in general tend to be strongly affected by (i) DEM grid-point resolution, and (ii) methods used for grid-point interpolations and slope derivation. The DTW-derivation process was, in contrast, not strongly affected by the cell-to-cell variations in slope (Murphy *et al*. 2011). They conclude that DTW predicts the position of the water table better than TWI, especially in low -lying areas and along the flow channels. In turn, the apparently higher correlation between VI and DTW compared to VI and TWI would seem to indicate that the DTW approach may be a better way to map soil moisture variations across the landscape.

Kopecký & Čížková (2010) conducted research into soil moisture modelling and its implications in vegetation ecology. Their research involved correlating TWI values and vegetation data from 521 geo-referenced plots, sampled across a range of forest communities in the Czech Republic. The study utilised and evaluated TWI values produced using several different flow-routing algorithms and their correlation to Ellenberg indicator values (Ellenberg 1992) for soil moisture as indicated by surveyed vegetation. The results were widely variable with regard to the relationship between TWI values produced by various methods and soil moisture as it relates to vegetation species. Findings indicated that some TWI producing algorithms worked markedly better than others. In fact, some algorithms produced a correlation twice as strong as others. In

general Kopecký & Čížková (2010) found that, though the relative performance of some TWI algorithms over others was consistent, TWI as a whole was not. Kopecký & Čížková (2010) went on to state that, while they believed TWI to be a "highly useful" tool in vegetation ecology, there is much room for improvement. They cite specifically TWI's inability to account for slope and aspect effects on soil moisture. These findings may indicate that the use of another approach, such as DTW, as a soil moisture predictor for vegetation ecology, may prove to be more appropriate.

Research similar to that presented in this thesis includes attempts to tie not only individual vegetation species but also species richness and biodiversity measures to moisture values (e.g. Sass *et al.* 2012). The moisture values used by Sass *et al.* (2012) were derived using a coarse filtered approach based on remotely sensed data [specifically, Synthetic Aperture Radar (SAR) images]. These images were used to classify the land cover by moisture into three categories: unsaturated, saturated, and inundated. Vegetation inventories were then used to determine plant biodiversity at survey plots across the study site in Sundance Provincial Park in Alberta. The vegetation survey protocols used in Sass *et al.* (2012) were the same ones used for the surveys of the Willmore Wilderness Park included in this thesis. Using the vegetation inventories and radar-derived moisture classification, determinations were made regarding the relationship between biodiversity and moisture class. Results showed a linear relationship between plant biodiversity and wetness with $R^2$ values ranging from 0.0 to 0.8 depending on how diversity is defined. Overall, the diversity (total number of all vascular species present) showed an $R^2$ of 0.70. This would seem to illustrate the potential of such methods to viably relate soil moisture to vegetation species and biodiversity.

There have recently been other attempts at developing soil moisture maps and vegetation indices more directly derived from remotely sensed data including spectral image analyses. Halounová (2008) used RADAR thematic mapping to determine and track changes in vegetation index values for reclaimed mine areas in the Czech Republic. Nine different methods of vegetation indexing were used in this study. However, these VI methods looked at only very broad species grouping/forest cover types. This kind of broad classification could limit usefulness in a targeted study of vegetation at the species level. Yilmaz (2008) also utilised Landsat RADAR thematic mapping to explore relationship between vegetation and the detected foliar water content in different vegetation species. His objective was to determine the water content of the forest canopy by determining species composition and canopy density. However, the methodology employed could be used to simply determine species composition remotely. Goward (1992) also employed remote sensing methodologies to determine ground temperature and vegetation index to estimate surface moisture. Both Yilmaz (2008) and Goward (1992) sought to determine moisture contents through remotely-sensed vegetation types. The downfall of all of these remote-sensing-based approaches to vegetation typing in indexing is a lack of specificity. At this time, remotely-sensed data, though a more direct determination of vegetation information than predictive mapping based on environmental variables does not have the ability to inform at a species level and is restricted to broad species and vegetation cover types.

The work in this thesis focuses mainly on determining vegetation type by moisture regime and other closely related site factors, and therefore does not inform about species-

specific preferences regarding nutrient availability, acidity, salinity, temperature, and light availability as some others have (Schmidtlein 2005; Humbert, *et al*. 2007). Many past studies in this field have relied on Ellenberg indicator values, which are used widely in Europe to describe relationships between site soil conditions (moisture, acidity, nutrient availability, and salinity) and the species of vegetation present at those sites, (Ellenberg 1992; Käfer 2004). Though Ellenberg indicator values are used widely in applied plant ecology, forestry, and agriculture, they were developed for, and are confined in application to, central Europe (Diekmann 2003). The research in this thesis therefore used different methods of moisture indexing and weighted averaging due to the lack of calibrated Ellenberg indicator values for North America.

Another consideration in exploring past research is the intended and potential applications of this study. Halounova (2008) proposed such work as a means to track vegetation changes in mine sites and disturbed areas as they are reclaimed and re-vegetated. The research in this thesis could be similarly applied both to predict how natural re-vegetation and reclamation may occur on a site and to aid in selecting species for planting in active reclamation efforts. Other major potential applications for this research lie in the area of biological conservation and protection. For example, Anderson *et al.* (2006) shows the validity of vegetation modelling based on environmental gradients to predict vulnerability to invasive species, in that case purple loosestrife (*Lythrum salicaria*). They showed that, by identifying and mapping environmental conditions favourable to purple loosestrife in Kansas, that they could consistently predict and potentially mitigate the spread of the species. The study also stated that by employing similar methods to other newly detected invasive species they may be able to halt

invasion before it gets out of control and while more complex studies are being undertaken. The research in this thesis could be used in a similar fashion to identify migration pathways and areas sensitive to invasive species with specific moisture requirements. In contrast, Sass (2012) suggests application of predictive vegetation-moisture relationship modelling to conserve and protect sensitive plant habitats, rare species, and overall biodiversity. Sass showed that wet areas have inherently greater biodiversity. This knowledge can then be used to map such areas and mitigate negative impacts on them. Such mapping could also suggest boundaries for other ecologically sensitive areas and habitats and aid mitigation of human disturbance in these areas as well.

In spite of some limitations of, and divergences from, past research, the methods to be used in this study represent an advance in vegetation modelling and mapping at high-resolution. This advancement comes about in three main ways. The first major advancement comes from the more widely available and higher quality LiDAR scan coverage. In some cases the overall results will inform more consistently about the soil moisture-vegetation species relationship than past studies by providing finer classifications for vegetation types and soil moisture. While the strength of this relationship in this study is comparable to past studies, those studies used methods that depended on complex data inputs and analyses which make them of limited practical use.

# STUDY AREAS

This study utilises data collected at two main study areas located in the province of Alberta, Canada. These study areas are the Willmore Wilderness Park in west-central Alberta and the EMEND area in northwestern Alberta. The following is a brief description of each study area and its key attributes.

## WILLMORE WILDERNESS PARK

The Willmore Wilderness Park (Figures 1 & 3) is approximately 4,600 km² in size and is located to the south, east, and west of the town of Grande Cache, Alberta, Canada (approximate Latitude 54° N, Longitude 119° W) (Government of Alberta 2002). Elevation ranges from 300 to over 1500 m. Soils vary between the brunisol and grey luvisol groups (CanSIS 2012). Climate is continental, with average daily maximum and minimum temperatures of 18° C and 1° C for summer and -6° C and -21° C for winter and mean annual precipitation is 288 mm of rainfall and 17 cm of snowfall (for the town of Grande Cache, with more extremes recorded at higher and lower elevation areas within the Park) (Environment Canada 2012). The area falls mainly within the Rocky Mountain and Foothills Natural Regions of Alberta. Natural subregions represented in the park include the Alpine, Subalpine, Montane, Upper Foothills, and Lower Foothills (Rowe 1972).The Park is part of the Western Cordilleran system, situated amidst the Main and Front Ranges of the Rocky Mountains (Fisher 2011). The Front ranges of the Rocky Mountains are a transition between the lower elevation foothills and the Main ranges, which contain higher peaks and form the Continental Divide. The front ranges also tend

to be drier as they experience a rain shadow effect caused be the taller and more westerly peaks of the main ranges.

Alpine areas in Alberta are above the treeline and are characterized by meadows of herbaceous plants and woody shrubs (Rowe 1972). Subalpine slopes are forested primarily by spruces (*Picea* spp. Mill.) and subalpine fir (*Abies bifolia* A. Murray) (Rowe 1972). Shrubs such as willows (*Salix* spp. L.), bearberry (*Arctostaphylus uva-ursi* (L.) Spreng) and grouseberry (*Vaccinium scoparium* Leiberg ex Coville) are predominant on the subalpine slopes. Lower elevations include a higher component of broadleaf tree species such as trembling aspen (*Populus tremuloides* Michx.) and white birch (*Betula papyrifera* Marshall) (Beckingham 1996). There is also a wide diversity of ground vegetation which will be discussed in later sections.

The Willmore is a formally designated park that is protected from development, resource extraction, and motorised transportation use (Province of Alberta 2002). Public access to the park is restricted to foot travel or horseback. Topography in the park is quite rugged and variable, ranging from high peaks to steep-sloped ridges to deep valley bottoms (Fisher 2011). The Willmore is the site of several research projects and is a research node within Alberta's park system. The Park is home to numerous rare, sensitive, threatened, and/or uncommon flora and fauna [e.g. whitebark pine (*Pinus albicaulis* Engelm.) and wolverine (*Gulo gulo* Linnaeus, 1758)] (Fisher 2011). The Willmore Wilderness Park is an excellent example of a protected, undeveloped, and intact ecosystem of west-central Alberta.

Figure 1. Examples of landscapes/forest covers within the Willmore Wilderness Park. Photo source: Doug Hiltz 2010

## EMEND RESEARCH AREA

The EMEND research study site (Figures 2 & 3) is located on the Daishowa-Marubeni International (DMI) P2 forest management area north of Hines Creek, Alberta, Canada (approximate Latitude 57° N, Longitude 119° W). The site is approximately 7000 ha in

size, which includes 1000 ha focused treatment area divided into 100 10 ha experimental compartments. Elevation ranges from 677 to 880 m (EMEND 2008). The relatively uniform, fine textured soils fall under the dark grey chemozemics and dark grey luvisol soil groups (Kishchuk 2004, CanSIS 2012). Climate is continental, with average daily maximum and minimum temperatures of 21° C and 8° C for summer and -10° C and -21° C for winter. Mean annual precipitation is 320 mm and is distributed mostly as rainfall during the summer (Environment Canada 2012). It should be noted that this area experienced drier than usual conditions for several years prior to the data collection for this thesis (Environment Canada 2012). The area falls within the Dry Mixedwood subregion of the Boreal Forest natural region of Alberta (Rowe 1972), approximately 90 km northwest of Peace River.

The EMEND site is typical of the Boreal Mixedwood Plains (Rowe 1972) of Northern Alberta. The forest overstory is composed primarily of poplars (*Populus* spp. L.), spruces (*Picea* spp. Mill.), and lodgepole pine (*Pinus contorta* Douglas) (Rowe 1972). The understory is composed mostly of low bush cranberry (*Viburnum edule* (Michx.) Raf.), prickly rose (*Rosa acicularis* Lindl.), alders (*Alnus* spp. Mill.) and buffaloberry (*Shepherdia canadensis* (L.) Nutt.), as well as a wide diversity of ground vegetation typical of the boreal plains (Beckingham 1996). Species composition of the ground vegetation will be discussed in later sections.

The research site is a large-scale variable retention harvest experiment designed to test effects of different levels and types of residual forest structure on ecosystem integrity, function, and regeneration stand-level (EMEND 2008). It was designed to be a long-term project, initiated in 1998, and intended to run for one standard stand rotation for this area

(approximately 80-100 years). EMEND is a key research area within Northern Alberta and is one of the largest dedicated forest research sites in North America (EMEND 2008). The project is centred at the University of Alberta, but it is a collaborative effort between numerous research agencies, educational institutions, provincial and federal governments, and the forest companies operating in northwest Alberta.

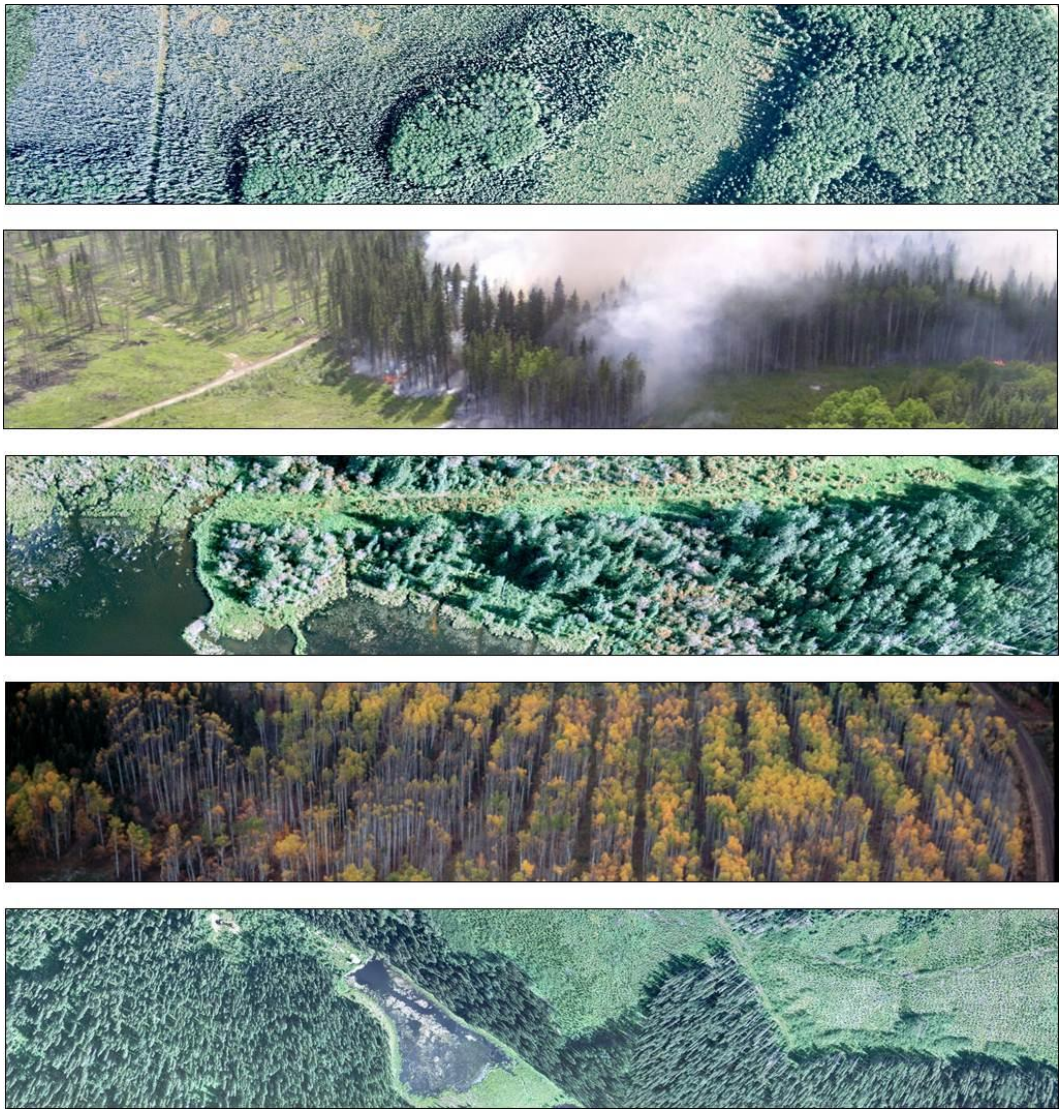


Figure 2. Examples of landscapes/forest covers from the EMEND Research Area. Photo source: EMEND 2008

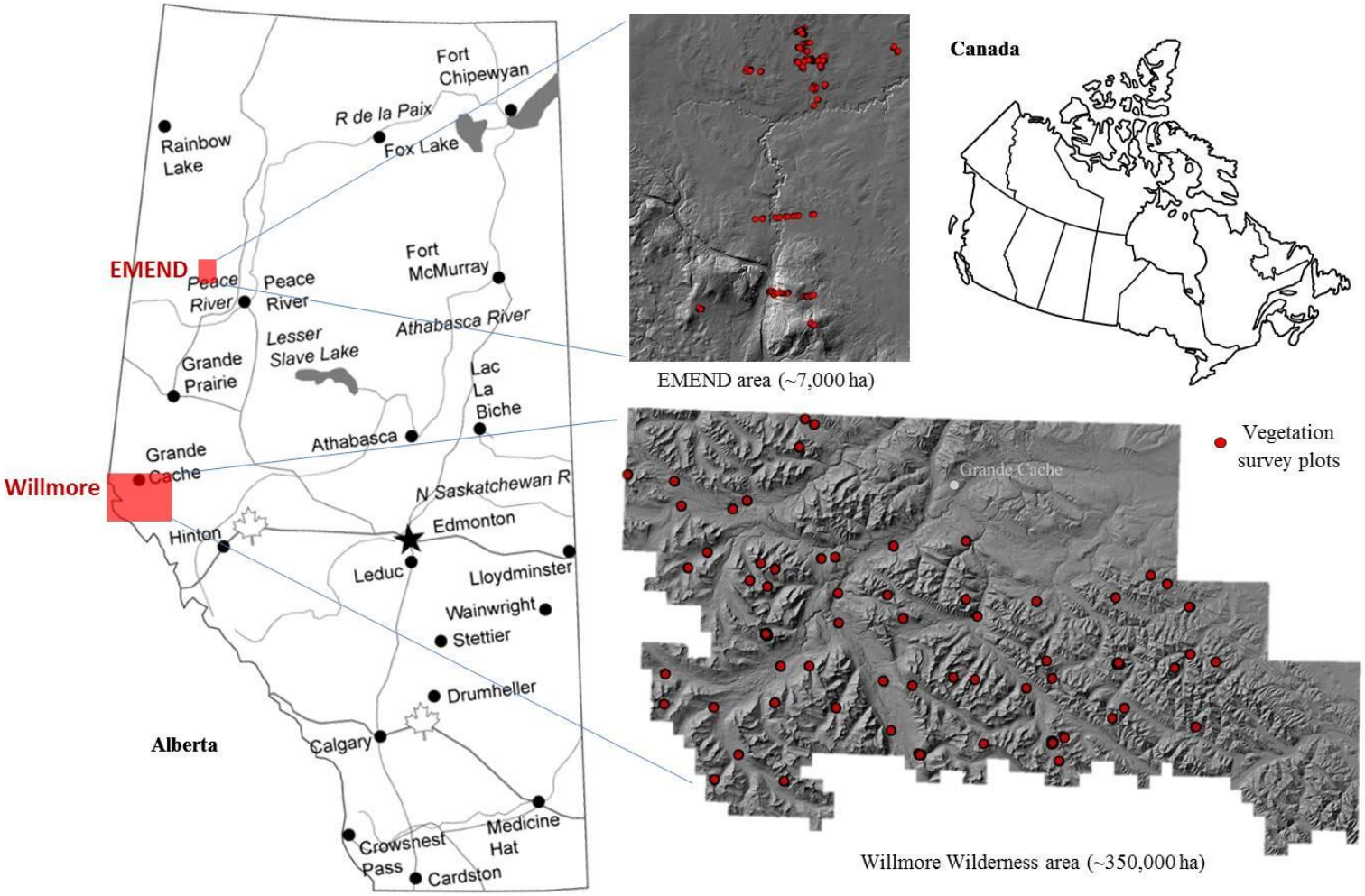



Figure 3. Location of Willmore Wilderness Park and EMEND area research sites in the province of Alberta, Canada.

# METHODS

## VEGETATION MOISTURE INDEXING

To derive and calibrate VI equations, vegetation was sampled in 1 $m^2$ plots and larger 25 $m^2$ survey plots across the Willmore Wilderness Park (51 transects, 297 plots) and 1x1 m plots along transect lines within the EMEND area (31 transects, 277 plots) (Tables 1 & 2). Transects in the Willmore were mostly square, corresponding to the 100x100 m (1 ha) square vegetation survey areas described in the collection protocols for the Willmore with survey plots located at the corners of these areas (Appendix D). Exceptions were those plots on transects four through twelve, which were larger and irregular in shape with the plots falling at breeding bird survey points as prescribed in the full ABMI protocols developed for the Willmore (Appendix D). The survey areas within the Willmore Wilderness Park were accessed through helicopter travel, while the plots within the EMEND area were accessed through ground travel. The majority of data from within the Willmore were collected by Alberta Tourism, Parks, and Recreation during the 2009-2012 field seasons as part of a collaborative research effort of Alberta Tourism, Parks, and Recreation; Alberta Innovates; and the Alberta Biodiversity Monitoring Institute's (ABMI) (Appendix B). These data were collected using a version of ABMI's core field data collection protocols modified for use in the Wilmore Wilderness Park (Appendix D). Alberta Parks, Tourism, and Recreation provided the main vegetation database which was supplemented with data collected by the author of this thesis in the Willmore in 2010 (Appendix B). Data were also collected at EMEND by the author and other University of

New Brunswick Forest Watershed Research Centre (UNBFWRC) staff during the 2008-2012 field seasons (Appendix C). Attributes of data, regardless of source, were consistent with the modified ABMI protocols, except that mosses were identified to the genus or species level, where possible, and not simply as “moss”. All plots were GPS referenced to within ± 4 m.

Table 1. Coordinates of EMEND vegetation survey sites (eastern-most points).

| Transect/Survey Area | Number of survey plots | Year Surveyed | Latitude | Longitude |
|---|---|---|---|---|
| 1 | 11 | 2008 | 56$^{0}$45′15.68″ | -118$^{0}$20′42.2″ |
| 2 | 26 | 2008 | 56$^{0}$45′18.5″ | -118$^{0}$21′40.9″ |
| 3 | 10 | 2008 | 56$^{0}$44′55.39″ | -118$^{0}$24′59.93″ |
| 4 | 11 | 2008 | 56$^{0}$50′1.92″ | -118$^{0}$23′18.86″ |
| 5 | 9 | 2008 | 56$^{0}$49′59.12″ | -118$^{0}$22′54.14″ |
| 6 | 8 | 2008 | 56$^{0}$50′28.91″ | -118$^{0}$17′37.49″ |
| 7 | 7 | 2010 | 56$^{0}$44′38.18″ | -118$^{0}$20′41.31″ |
| 8 | 7 | 2010 | 56$^{0}$50′7.26″ | -118$^{0}$20′36.91″ |
| 9 | 3 | 2012 | 56$^{0}$49′17.38″ | -118$^{0}$20′50.38″ |
| 10 | 3 | 2012 | 56$^{0}$49′24.27″ | -118$^{0}$20′40.4″ |
| 11 | 3 | 2012 | 56$^{0}$49′42.53″ | -118$^{0}$20′26.7″ |
| 12 | 3 | 2012 | 56$^{0}$49′44.32″ | -118$^{0}$20′24.89″ |
| 13 | 4 | 2012 | 56$^{0}$49′40.56″ | -118$^{0}$20′45.94″ |
| 14 | 6 | 2012 | 56$^{0}$49′43.09″ | -118$^{0}$20′51.69″ |
| 15 | 6 | 2012 | 56$^{0}$50′20.26″ | -118$^{0}$20′26.31″ |
| 16 | 20 | 2012 | 56$^{0}$50′14.46″ | -118$^{0}$20′27.62″ |
| 17 | 12 | 2012 | 56$^{0}$50′10.14″ | -118$^{0}$20′34.35″ |
| 18 | 11 | 2012 | 56$^{0}$50′11.41″ | -118$^{0}$21′24.14″ |
| 19 | 10 | 2012 | 56$^{0}$50′16.83″ | -118$^{0}$21′10.7″ |
| 20 | 10 | 2012 | 56$^{0}$50′3.03″ | -118$^{0}$21′16.69″ |
| 21 | 10 | 2012 | 56$^{0}$50′28.38″ | -118$^{0}$21′16.9″ |
| 22 | 10 | 2012 | 56$^{0}$50′28.39″ | -118$^{0}$21′22.78″ |
| 23 | 12 | 2012 | 56$^{0}$50′37.14″ | -118$^{0}$21′2.43″ |
| 24 | 10 | 2012 | 56$^{0}$50′56.03″ | -118$^{0}$21′16.24″ |
| 25 | 10 | 2012 | 56$^{0}$50′52.51″ | -118$^{0}$21′25.94″ |
| 26 | 10 | 2012 | 56$^{0}$50′47.33″ | -118$^{0}$21′14.41″ |
| 27 | 10 | 2012 | 56$^{0}$50′16.03″ | -118$^{0}$20′57.44″ |
| 28 | 10 | 2012 | 56$^{0}$50′13.15″ | -118$^{0}$20′54.43″ |
| 29 | 10 | 2012 | 56$^{0}$50′14.18″ | -118$^{0}$21′1.02″ |
| 30 | 7 | 2012 | 56$^{0}$46′58.89″ | -118$^{0}$20′45.76″ |
| 31 | 7 | 2012 | 56$^{0}$46′58.22″ | -118$^{0}$20′45.67″ |

Table 2. Coordinates of Willmore vegetation survey sites (centre points).

| Transect/Survey Area | Year Surveyed | Number of survey plots | Latitude | Longitude |
|---|---|---|---|---|
| 1 | 2010 | 8 | 53$^{0}$36′37.42″ | -118$^{0}$30′0.94″ |
| 2 | 2010 | 8 | 53$^{0}$32′37.69″ | -118$^{0}$37′58.85″ |
| 3 | 2010 | 4 | 53$^{0}$59′1.79″ | -119$^{0}$29′39.23″ |
| 4 | 2010 | 15 | 53$^{0}$38′40.38″ | -119$^{0}$36′11.02″ |
| 5 | 2010 | 7 | 53$^{0}$32′7.51″ | -119$^{0}$34′27.07″ |
| 6 | 2010 | 14 | 53$^{0}$27′35.69″ | -119$^{0}$10′46.86″ |
| 7 | 2010 | 7 | 53$^{0}$31′51.17″ | -119$^{0}$24′30.77″ |
| 8 | 2010 | 13 | 53$^{0}$29′8.81″ | -118$^{0}$49′23.85″ |
| 9 | 2010 | 13 | 53$^{0}$36′56.28″ | -118$^{0}$39′8.65″ |
| 10 | 2010 | 10 | 53$^{0}$30′58.98″ | -118$^{0}$26′25.19″ |
| 11 | 2010 | 5 | 53$^{0}$42′29.85″ | -118$^{0}$27′52.36″ |
| 12 | 2010 | 9 | 53$^{0}$33′45.37″ | -119$^{0}$16′36.99″ |
| 13 | 2010 | 8 | 53$^{0}$35′40.85″ | -119$^{0}$33′43.68″ |
| 14 | 2010 | 4 | 53$^{0}$45′26.24″ | -118$^{0}$34′15.63″ |
| 15 | 2010 | 4 | 53$^{0}$35′46.91″ | -119$^{0}$29′6.17″ |
| 16 | 2010 | 4 | 53$^{0}$37′16.17″ | -118$^{0}$23′26.48″ |
| 17 | 2010 | 4 | 53$^{0}$31′36.87″ | -119$^{0}$52′14.92″ |
| 18 | 2010 | 4 | 53$^{0}$45′0.02″ | -119$^{0}$35′8.69″ |
| 19 | 2010 | 4 | 53$^{0}$34′14.7″ | -119$^{0}$12′21.59″ |
| 20 | 2010 | 4 | 53$^{0}$37′57.3″ | -118$^{0}$27′33.72″ |
| 21 | 2010 | 4 | 53$^{0}$44′40.1″ | -118$^{0}$31′32.2″ |
| 22 | 2010 | 4 | 53$^{0}$29′51.37″ | -119$^{0}$15′31.9″ |
| 23 | 2010 | 4 | 53$^{0}$59′31.27″ | -119$^{0}$31′10.91″ |
| 24 | 2009 | 4 | 53$^{0}$43′18.09″ | -119$^{0}$36′17.42″ |
| 25 | 2010 | 4 | 53$^{0}$27′2.95″ | -119$^{0}$39′57.09″ |
| 26 | 2009 | 4 | 53$^{0}$35′7.75″ | -119$^{0}$5′44.3″ |
| 27 | 2009 | 4 | 53$^{0}$43′50.54″ | -119$^{0}$39′8.59″ |
| 28 | 2009 | 4 | 53$^{0}$34′17.92″ | -118$^{0}$53′55.52″ |
| 29 | 2009 | 4 | 53$^{0}$27′22.71″ | -118$^{0}$48′18.08″ |
| 30 | 2009 | 4 | 53$^{0}$56′47.84″ | -119$^{0}$31′57.56″ |
| 31 | 2009 | 4 | 53$^{0}$42′52.89″ | -119$^{0}$16′49.63″ |
| 32 | 2009 | 4 | 53$^{0}$36′57.87″ | -118$^{0}$50′47.02″ |
| 33 | 2009 | 4 | 53$^{0}$53′32.34″ | -119$^{0}$59′40.65″ |
| 34 | 2009 | 4 | 53$^{0}$29′39.39″ | -118$^{0}$47′35.15″ |
| 35 | 2009 | 4 | 53$^{0}$24′32.52″ | -119$^{0}$43′41.38″ |
| 36 | 2009 | 4 | 53$^{0}$34′59.39″ | -119$^{0}$2′17.59″ |
| 37 | 2009 | 4 | 53$^{0}$35′19.6″ | -118$^{0}$49′47.42″ |
| 38 | 2009 | 4 | 53$^{0}$40′42.25″ | -119$^{0}$14′7.48″ |
| 39 | 2009 | 4 | 53$^{0}$42′40.06″ | -119$^{0}$4′7.13″ |
| 40 | 2009 | 4 | 53$^{0}$24′39.37″ | -119$^{0}$32′30.7″ |
| 41 | 2009 | 4 | 53$^{0}$43′14.87″ | -118$^{0}$39′52.34″ |
| 42 | 2009 | 4 | 53$^{0}$44′47.4″ | -119$^{0}$49′16.74″ |
| 43 | 2009 | 4 | 53$^{0}$45′29.59″ | -119$^{0}$37′33.24″ |
| 44 | 2009 | 4 | 53$^{0}$46′10.18″ | -119$^{0}$27′43.25″ |
| 45 | 2009 | 2 | 53$^{0}$47′35.24″ | -119$^{0}$16′5.69″ |
| 46 | 2009 | 4 | 53$^{0}$28′50.47″ | -119$^{0}$0′31.99″ |
| 47 | 2009 | 4 | 53$^{0}$31′30.13″ | -119$^{0}$44′15.33″ |
| 48 | 2009 | 4 | 53$^{0}$53′3.52″ | -119$^{0}$52′1.36″ |
| 49 | 2009 | 4 | 53$^{0}$50′37.85″ | -119$^{0}$42′24.28″ |
| 50 | 2009 | 4 | 53$^{0}$46′20.6″ | -119$^{0}$25′27.32″ |
| 51 | 2009 | 4 | 53$^{0}$42′52.78″ | -119$^{0}$24′51.79″ |

Vegetation was sampled in each survey plot (either 1x1 m or 5x5 m) by listing all plant species. 1x1 m plots were those collected by the author and UNB staff specifically for use in this thesis to match the 1x1 m resolution of the underlying DEM and DTW maps. 5x5 m plots were surveyed by Alberta Parks, Tourism, and Recreation in the Willmore Wilderness Park and were the smallest scale full detail vegetation plots available from those data. In most cases the two-dimensional (2D) and three-dimensional (3D) percent ground covers of each species were also recorded. 2D ground cover is assessed based solely on what the observer can see directly from above a survey plot and records the approximate percentage of the two-dimensional shape of the plot that each species covers. 3D ground cover takes into account the various layers of vegetation on a plot and records the approximate percentage of the plot that a species would cover if all species above it were stripped away. As a result, the 3D method for assessing ground cover very often totals more than 100% whereas 2D cover can only ever reach 100%. The 3D ground cover percentages were later used to determine each species' abundance at any given plot, relative to other species present. When unknown species were encountered while inventorying in the field, voucher specimens were collected for later identification.

Vegetation field guides and literature for Alberta (list) were used to assign each species a soil moisture preference and distribution range from xeric to hydric, with a corresponding Moisture Index: 8-hydric, 7-sub-hydric, 6-hygric, 5-sub-hygric, 4-sub-mesic, 3-mesic, 2-sub-xeric, 1-xeric, and 0-very xeric are linearly related to $\log_{10}$ DTW. Grouping species by their soil moisture requirements requires both general literature reviews for the individual species as well as knowledge of their habitats in various geographical areas (Dufrêne 1997). (Although it was not used in this thesis, a classification of 9-aquatic,

which would cover all aquatic plants, could be added to the wet end of the moisture scale.) The resulting species' moisture index values for each plot were weighted and averaged by their relative abundance, or absence/presence (2008 EMEND data only). Finally, regression analyses were applied to VI, DTW and other plot attributes extracted from Geographic Information System (GIS) data in three main categories; vegetation characteristics, moisture regime information, and physical site characteristics.

## GIS MODELLING

The processes and methods used for GIS modelling portions of this thesis are as described in Chapter 4 of *Reclamation and Restoration of Boreal Ecosystems* (Hiltz *et al.* 2012). The DTW interpolation and associated wet-areas delineation process from digital elevation model data is illustrated in Figure 4, using several GIS algorithms to perform the tasks. The process starts with acquiring a LiDAR-derived DEM for the study area, and using the FILL function of ArcGIS to generate a digital surface free of depressions (Tarboton 1991; Tarboton *et al*. 1997). The filled DEM is then used to comprehensively determine flow direction, slope gradient, and flow accumulation across the study area with the $D_8$ and $D_\infty$ flow algorithms (O'Callaghan 1984; Hornberger 1995). Doing so results in: (i) the slope gradient grid, (ii) the DTW=0 defining flow-channel grid based on, e.g., 4 ha flow-initiation threshold values to signal perennial surface flow (Murphy *et al*. 2009), (iii) a least-elevation (least-cost) grid between any grid cell and nearest open-water cells with DTW=0.

The resulting DTW grid was formally obtained from;

$$\text{DTW [m]} = \left[\sum \frac{dz_i}{dx_i} a\right] x_c \qquad [1]$$

Where dz/dx is the slope of a cell, i represents a cell along the path, a is 1 when the path crosses the cell parallel to the cell boundaries and $2^{0.5}$ when it crosses diagonally, with $x_c$ as cell size, in m.

By definition, there is a direct dependence between the DTW and the DEM derived flow-channel network and the adopted flow-initiation threshold. For forested areas, dry-weather initiation for perennial flow depends on (i) catchment slope, increasing from 1 to 4 ha or more as slope decreases from 100 % towards zero, and (ii) geological substrate, depending on flow allocation to surface and subsurface drainage channels (Jaeger *et al*. 2007). Decreasing this threshold from 4 ha also increases the area mapped to be wet, thereby simulating the change in soil moisture status from generally dry (e.g., end of summer) to wet (e.g., after the snowmelt season and prolonged precipitation events). Hydrographic DEM corrections (Figure 4) are needed when the DEM data do not conform with the exact locations of open-water surfaces, shorelines and streams, and when surface structures such as roads and bridges as well as DEM artifacts obscure flow continuity along streams (Garbrecht *et al*. 2001; Murphy *et al*. 2007). For comparison, the widely used TWI was also mapped for the two study areas and for each plot location in particular, using the same DEM and flow direction, slope gradient and flow accumulation algorithms.

TWI is given obtained by;

$$\text{TWI} = \ln[\text{flow-accumulated area} / \tan(\pi\ \text{slope_angle}/180)] \qquad [2]$$

The quality of the wet-area delineation process was checked by first overlaying the DTW map on the aerial photograph mosaic and the bare-ground DEM for the study areas, and then profiling the LiDAR-generated data layers across the study areas by scanning along straight lines and displaying the resulting cross-sections involving the first and last pulse

returns corresponding to canopy height and bare-ground elevation respectively, and the corresponding DTW line below the bare-ground elevation, as illustrated in Figure 4. Doing so revealed a correspondence between the locations of mapped and actual flow-channels and wet areas including wetlands.

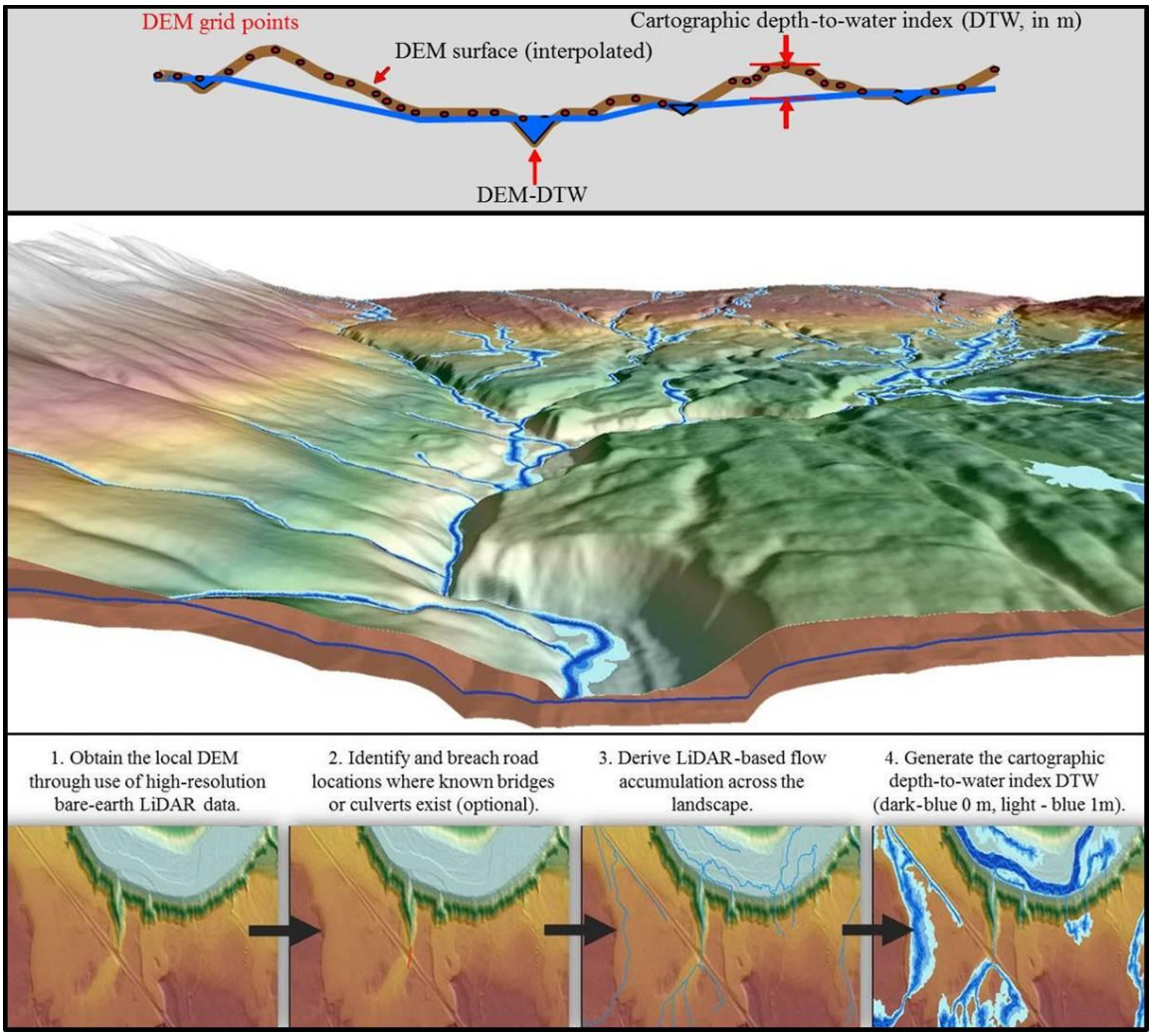



Figure 4. Overview and principles of the GIS-based flow-channel and cartographic depth-to-water index modelling and mapping (White *et al.* 2012).

In addition to the DTW modelling as described above, this research incorporates data layers produced by a newly created cartographic depth-to-water (DTW) index algorithm. This algorithm was provided for evaluation in the hope that it could better predict subtle changes in soil moisture regime, ranging from saturated soils near wetlands through to excessively well–drained soils near ridge tops, than previous versions of DTW maps. This new DTW algorithm utilizes a correction that better captures how water actually moves along different slopes across the landscape (P. A. Arp, personal communication, 2013). Figures 5 and 6 graphically illustrate the differences in DTW output for the old and new algorithms along a 1200 metre scan line delineated through a wetland complex in the northern part of the EMEND research area. These figures demonstrate how much better DTW values are captured for certain wetland types using either a 1ha or a 4ha flow initiation. Figures 7 and 8 similarly illustrate the differences in the new and old DTW algoritms along a 3500 metre scan line delineated through a hilly area in the southern part of the EMEND research area that crosses through many forestry operations site of varying ages. These figures do not show a significant difference in DTW values when using a 1ha flow initiation but when using a 4ha flow initiation the resulting DTW values are higher. This shows some potential in being able to reduce possible false-positives for wet areas.

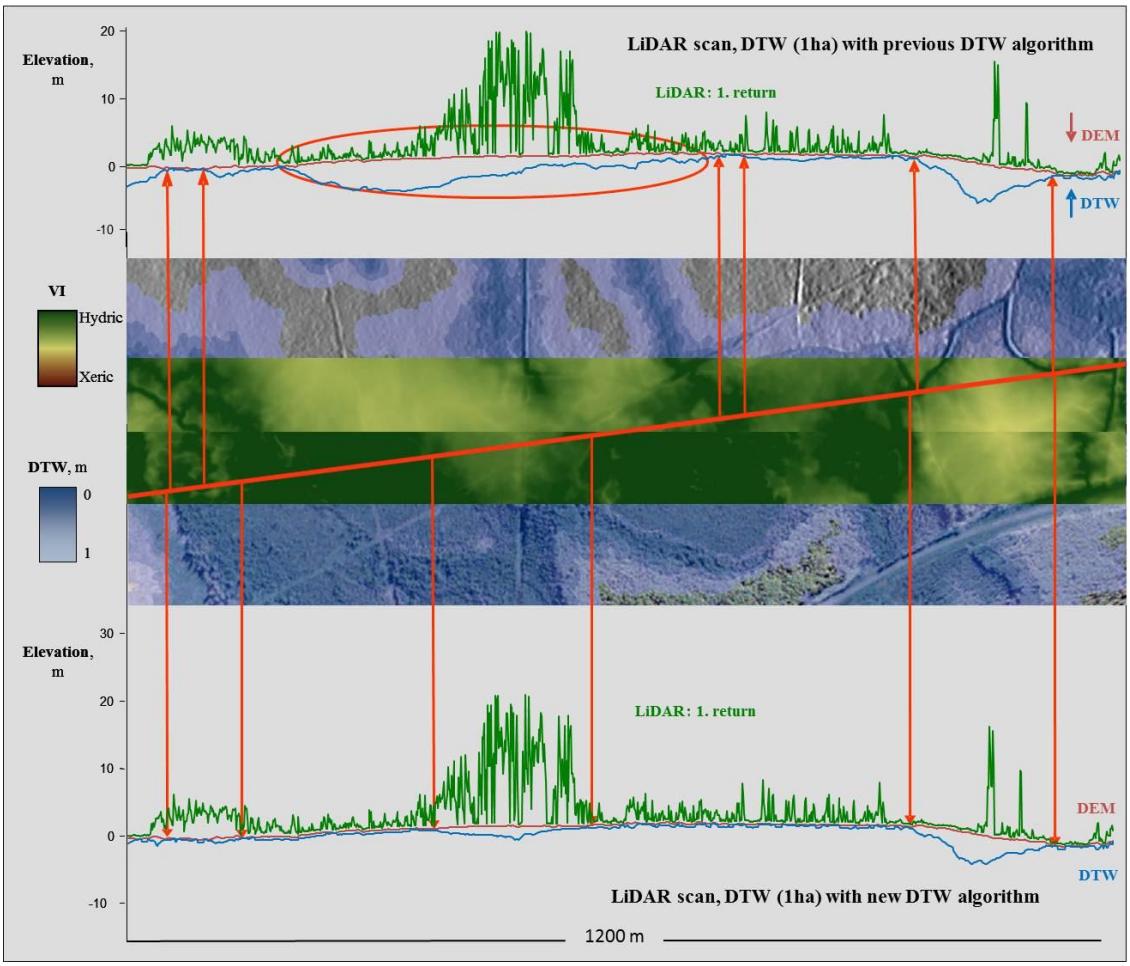



Figure 5. Graphical representations of canopy heights, DEM elevations, and 1ha DTW values (old and new DTW algoritms) along a 1200m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line.

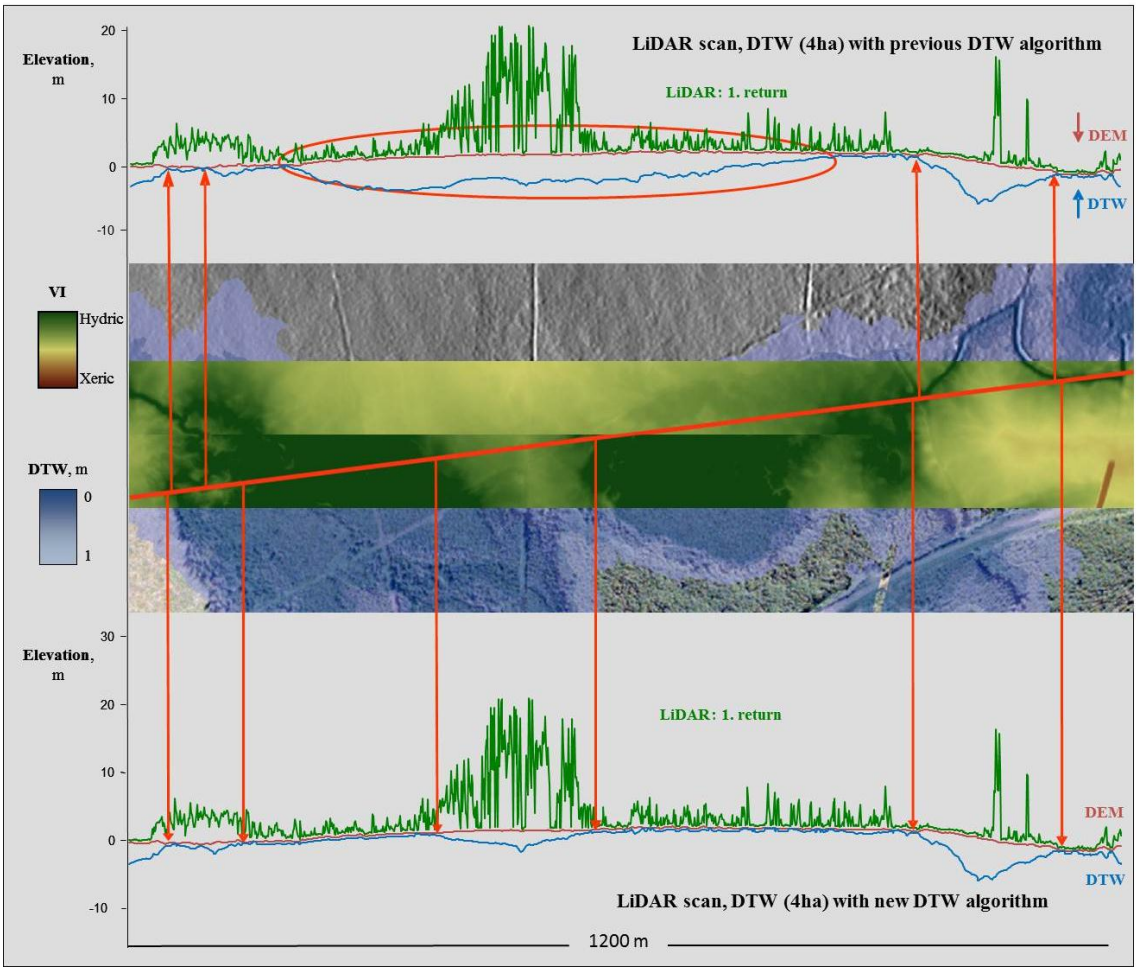



Figure 6. Graphical representations of canopy heights, DEM elevations, and 4ha DTW values (old and new DTW algorithms) along a 1200m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line.

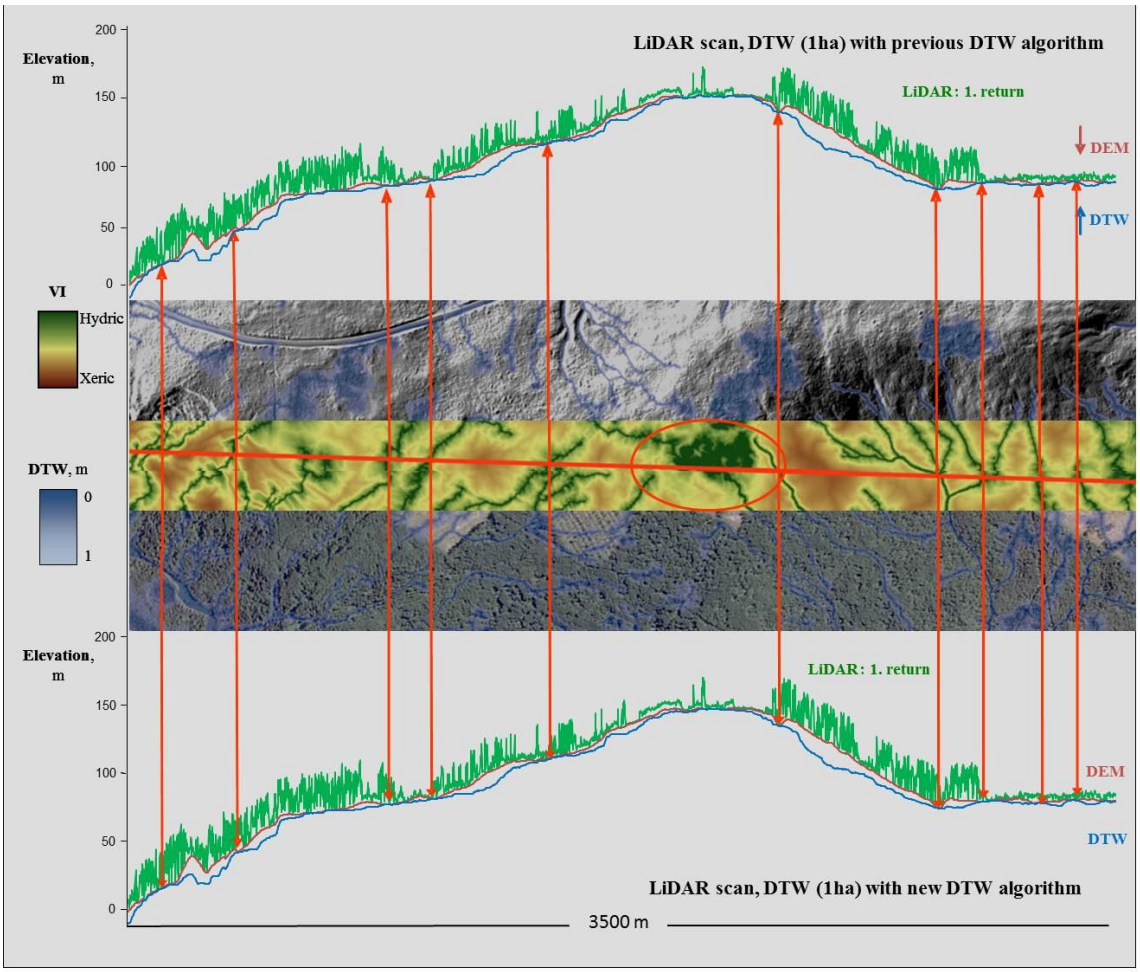



Figure 7. Graphical representations of canopy heights, DEM elevations, and 1ha DTW values (old and new DTW algorithms) along a 3500m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line.

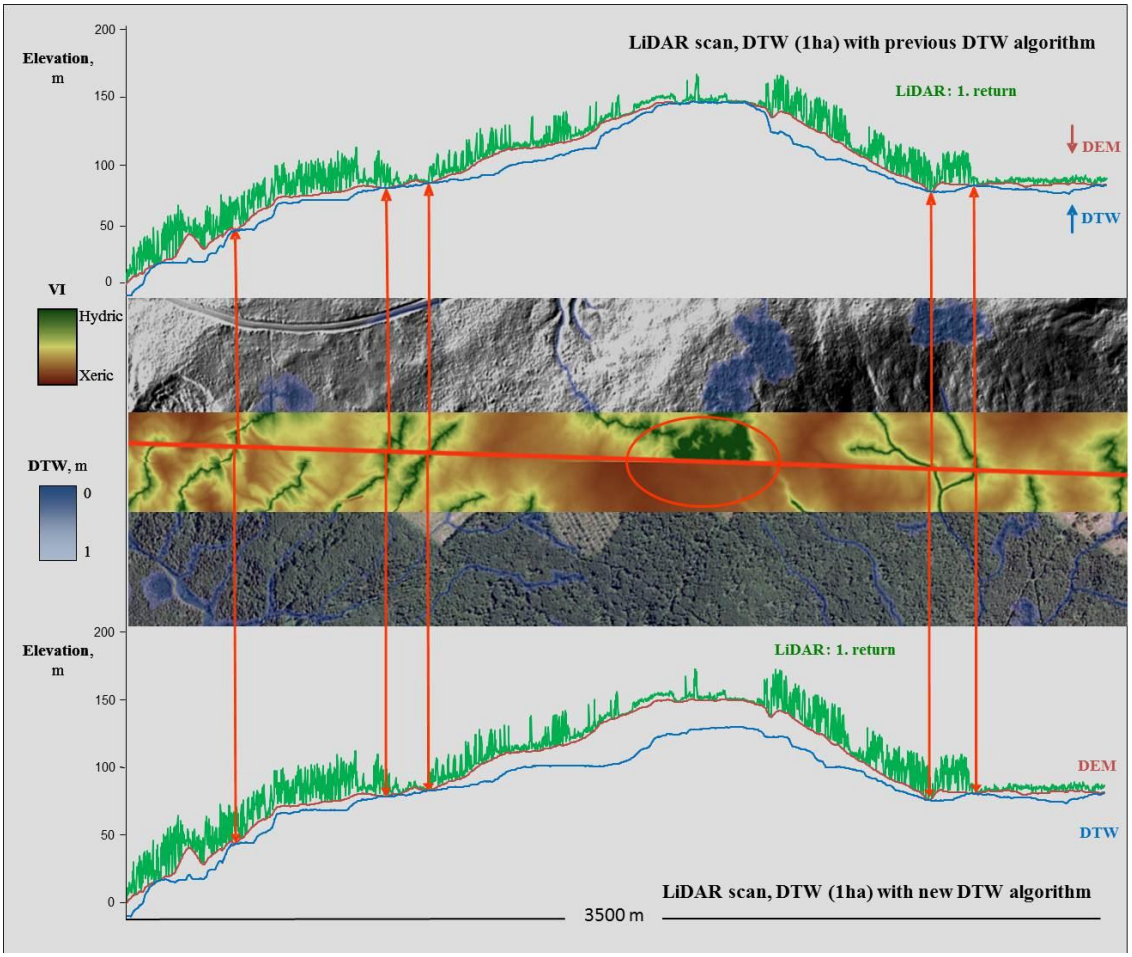



Figure 8. Graphical representations of canopy heights, DEM elevations, and 4ha DTW values (old and new DTW algorithms) along a 3500m long scan line in the northern part of the EMEND research area. The upper half of the centre panel shows the bare earth DEM and the VI based on DTW values for the old DTW algorithm and the corresponding data along the scan line. The lower half of the centre panel shows the ortho-photo imagery and the VI based on DTW values for the new DTW algorithm and the corresponding data along the scan line.

Previous DEM-based analyses (Murphy *et al*. 2011) had revealed closer relationships between DTW ,and with $\log_{10}$DTW in particular, and soil type, drainage type, vegetation type, a variety of soil properties, than with TWI. Therefore, $\log_{10}$DTW was selected to be the more appropriate moisture predictor for this study as well. However, both $\log_{10}$DTW-VI and TWI-VI relationships were evaluated and contrasted in this thesis.

Hence the equations used for mapping VI were :

$$VI = (a_{VI} + b_{VI} \log_{10}DTW) \quad [3a]$$

$$VI = (a_{VI} + b_{VI} TWI) \quad [3b]$$

where $a_{VI}$ and $b_{VI}$ are calibration coefficients.

For analysis purposes, slope and aspect rasters were created using DEM rasters that had undergone cell-centered neighbourhood smoothing at distances of 5 m, 10 m, 20 m, 40 m, 80 m, and 160 m. This was done in order to perform sensitivity analyses to determine the optimal resolution for correcting for slope and aspect and because the elevational precision of LiDAR-generated DEMs generally varied by ±15 cm from cell to cell. The previously derived formulation for VI could then potentially be adjusted to account for local variations in slope and aspect, if necessary, following a process similar to:

$$\text{if } VI \leq 4: \quad VI_{adj} = VI + 0.5\, VI\, [1-\exp(-a_{slope} slope)] \sin(\pi\, (aspect-a_{aspect})/180) \quad [4a]$$

$$\text{if } VI > 4: \quad VI_{adj} = VI + 0.5\, (8-VI)\, [1-\exp(-a_{slope} slope)] \sin(\pi\, (aspect-a_{spect})/180)] \quad [4b]$$

with slope = tan (slope_angle), slope_angle and aspect in degrees (northern aspect: 0º), and with aslope and aaspect as additional calibration coefficients.

The principles of the predicted slope and aspect contributions to VI implied by Equations 4a & 4b are illustrated in Figure 9 for three VI values: 1, 4, and 7. Accordingly, greatest slope and aspect contribution would be applied to mesic VI levels, and these contributions would diminish towards extreme xeric and hydric conditions.

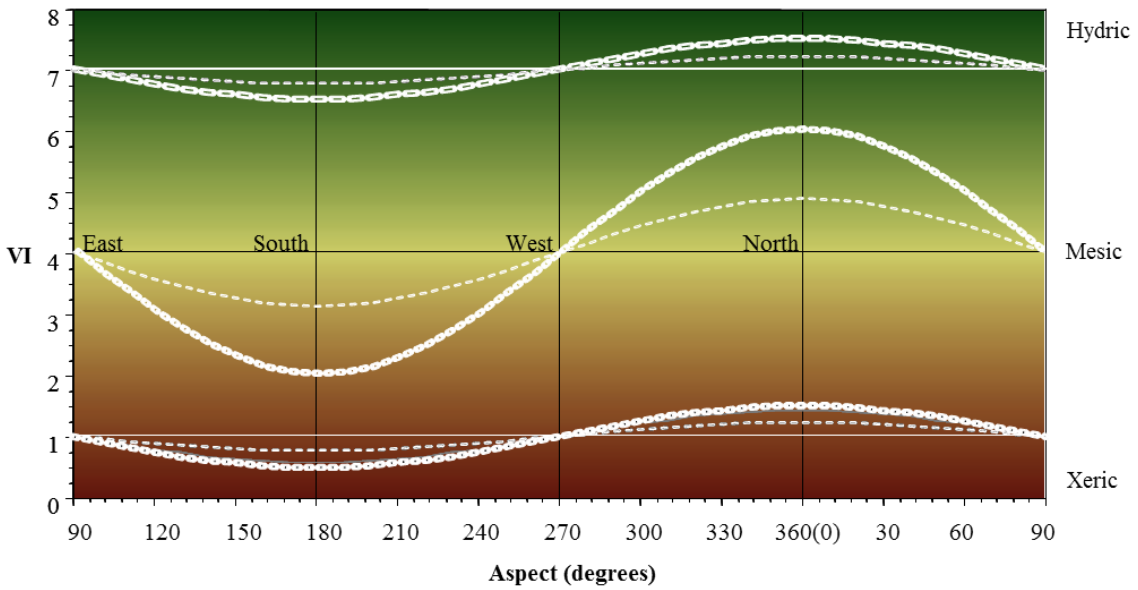



Figure 9. Graphical representation of the impacts of slope and aspect corrections on vegetation moisture indices (VI).

The plot-generated VI values could then be used to calibrate the coefficients in Equation 3 based on the corresponding map-derived $\log_{10}$DTW, slope and aspect values. The model so calibrated could subsequently be used to map VI across the two study areas,

with the LiDAR-derived $\log_{10}$DTW, slope, and aspect values for each grid cell as VI predictor variables.

## DATA COMPILATION AND ANALYSIS

All vegetation data were combined with various GIS data extracted for the survey plots in order to form a complete picture of site conditions and form a means for comprehensive analyses. The GIS data extracted for the survey plots included: DTW, TWI, percent slope, aspect, and elevation values. The DTW values included were based on three different DTW maps utilizing 4 ha, 1 ha, and 0.25 ha flow initiation values in order to evaluate the most appropriate map with regard to vegetation-moisture relationships. The DTW values were also categorized into classes at several different levels of precision to provide sensitivity analyses as to the breadth of the DTW classes. The TWI, slope, and aspect of the plots underwent focal statistic calculations at levels of 5x5 m, 10x10 m, 20x20 m, 40x40 m, 80x80 m, and160x160 m to provide sensitivity analyses with regard to which level best captures vegetation responses to these gradients. The percent ground cover composed by each species, as well as the size of the survey plot, was included in the analysis database to provide insight as to how relative species abundances may affect VI determination. In addition to the VI (indicating moisture preferences), and ranges assigned to them, each species was also grouped taxonomically by genus, family, and order. Species were grouped physiognomically by: vascular plants, non-vascular plants, herbaceous plants, ferns and fern allies, herbs combined with ferns and allies, graminoids

(grass-like plants), shrubs, and trees as in Sass *et al.* (2012). Coarse categorizations by species' light preferences/tolerances were also included. All of these characterizations were done in order to added insight into species' responses, or lack thereof, to other environmental gradients during multiple regression analyses. Finally, all vegetation and GIS data as well as various aerial and satellite imagery were utilized to identify any plots within wetland types (e.g. bogs vs. fens) and those in disturbed areas (roadways, burned areas, harvesting areas, talus slopes). These special plot considerations were identified so that their potential impact on VI-moisture relationships could be evaluated during analysis

.

# RESULTS AND ANALYSES

## VEGETATION MOISTURE INDEXING

In total, 549 vascular and non-vascular species were encountered within the survey plots across the two study areas: 539 species in the Willmore Wilderness Park, 129 in the EMEND Research Area, with 119 species common to both study areas. Each species was assigned a moisture index value for its absolute moisture preference (from 0-very xeric to 8-hydric), and index values for its upper and lower moisture range limits. All species, their literature-interpreted soil moisture preferences and ranges are listed in Appendix A. For this study, no species were rated as 0-very xeric. This was expected because the study areas did not include very dry grasslands to desert type vegetation. There were also relatively few species rated with a preference of 8-hydric, which would be those that thrive only on saturated (DTW = 0-10 cm) soils.

While many species are common to both areas, there were many more species listed for the Willmore Wilderness Park than for the EMEND area. This was likely due to:

(i) the difference in size of the overall survey areas (approximately 350,000 ha for the former and approximately 7,000 ha for the latter).

(ii) differences in location, and diversity of topography, climate types and forest types (boreal to alpine versus boreal only).

(iii) differences in disturbance regimes (managed forest vs protected park).

## SPECIES AND GENUS LEVEL VI-DTW AND VI-TWI RELATIONSHIPS

The species vegetation index classes 0-8 were fairly well represented across the soil moisture range for both study areas. However, there were fewer plots centered on very wet sites, on dry to very dry sites, on barren or near barren sites, or on slopes > 25º. Species VI assignments were used to explore direct species-moisture relationships, conglomerated to explore genus-moisture relationships, and were also averaged and used to calculate VI values for each survey plot. All of these VI values (dependent variable) underwent simple linear regression analyses with both $\log_{10}$DTW and TWI as moisture predictors (independent variables). This was done in order to determine which combination of vegetation and moisture parameters defined the clearest relationship. In addition, the $\log_{10}$DTW values were produced using three different flow initiation (FI) levels and the TWI values were averaged over six different focal area sizes (5x5 m, 10x10 m, 20x20 m, 40x40 m, 80x80 m, and 160x160 m). These different ways of processing the moisture parameters were intended to provide more information on the sensitivity of vegetation-moisture relationship. Key values including linear slopes, y-intercepts, and $R^2$ values pertaining to the linear relationships found in all species and genus level regression analyses can be found summarized in Tables 3 and 4.

Most individual species had a wide range of DTW values (Figure 10). This range is due in part to the fact that no species is so moisture specific that it can establish in only a single moisture class (Appendix A). The occasionally wide spread of moisture preference ranges for each species led to generally very low $R^2$ values of between 0.16 and 0.18 for

regression analyses with all three types of DTW values (Figure 10, Table 3). The same analyses yielded virtually non-existent relationships when using focal averaged TWI values (Figure 16, Table 3).

All species were grouped by VI values in whole integer classes. The moisture values for all plots containing species from each VI class were then averaged, to clarify the relationship between the assigned vegetation index and predicted soil moisture. As can be seen in Figure 11, this grouping of species into their VI classes shows a strong, clear linear relationship between VI at the species level and $\log_{10}$DTW. $R^2$ values for these regressions ranged from 0.92 and 0.93. The 4 ha FI DTW showed the highest $R^2$ at 0.93 with the 1 ha and 0.25 ha FI DTW both showing $R^2$ values of 0.92 (Table 3). Though the 4 ha FI DTW showed a slightly higher $R^2$, the 1 ha FI DTW shows a slightly more even spread of VI across the averaged moisture values (Figure 11).

Regressions on these VI groupings using focal averaged TWI values show a clear relationship between VI classes and TWI at certain focal averages (Figure 17). The $R^2$ values for this series of regressions ranged from 0.3 to 0.82 (Figure 17, Table 3). The highest $R^2$ of 0.82 was obtained when using the 40x40 m averaged TWI values (Figure 17, Table 3). Generally, for all species level groupings, DTW as the moisture predictor shows much stronger relationships with VI than does TWI.

In order to explore the strength and sensitivity of VI-moisture relationships at different taxonomic levels, the same types of analyses were conducted on the vegetation data but by first grouping all recorded species into their respective genera. Genus-based VI values were classified in groups in order to get a wider range of moisture values for averaging. Since the average VI within a given genus was not always a whole number, as they were at the species level, there was the opportunity to perform different levels of VI classification. The mean VI values for the different genera were classified in three ways. The first group classification was by common mean VI value. That is, genera having the same non-rounded VI value were grouped together. Second, the averaged VI values were grouped by the nearest half-integer. That is, genera having average VI values of 1-1.5, 1.5-2, 2-2.5, etc. Finally, the genera were grouped by whole-integer VI classes as done at the species level. Using just the mean VI for each genus, $R^2$ ranged from 0.16 to 0.23 for the different DTW values (Figure 12, Table 4) and 0.02 to 0.06 for TWI analyses (Figure 18, Table 4). In the case of ungrouped Genus VI values, both 4 ha FI DTW and 1 ha FI DTW values showed very similar results, both having $R^2$ values of 0.23 and very similar data spreads (Figure 12, Table 4). As was the case in species level analyses, ungrouped VI values showed very weak relationships to TWI values with the highest $R^2$ of 0.06 being obtained with the 5x5 m focal averaged TWI (Figure 18, Table 4). Grouping genera by common mean VI values improved $R^2$ values for DTW regressions, raising the range to 0.34 to 0.38 (Figure 13, Table 4). Once again the 4 ha FI DTW and the 1 ha FI DTW had the same $R^2$ of 0.38 value and similar data spreads (Figure 13). This same VI classification scheme resulted in lower $R^2$ values for TWI regressions, showing essentially no relationship between VI values, so grouped, and TWI (Figure 19, Table 4).

Grouping genera into half-integer VI classes significantly improved $R^2$ values for DTW regressions, raising the range to 0.73 to 0.80 (Figure 14, Table 4). Unlike the previous regressions, the 4 ha FI DTW and the 1 ha FI DTW had lower $R^2$ values when compared to the 0.79 $R^2$ for wetter, 0.25 ha FI DTW (Figure 14). This VI classification scheme resulted in raised $R^2$ values of 0.10 to 0.27 for TWI regressions, showing relatively weak but clear relationships between the grouped VI values and TWI (Figure 20, Table 4). The highest $R^2$ of 0.27 was obtained when using the 10x10 m focal averaged TWI values (Figure 20, Table 4). Grouping genera into whole-integer VI classes decreased $R^2$ values for DTW regressions slightly, lowering the range to 0.70 to 0.79 (Figure 15, Table 4). As was the case in regressions performed on half-integer VI classes, the 4 ha FI DTW and the 1 ha FI DTW had lower $R^2$ values when compared to the 0.79 $R^2$ for the 0.25 ha FI DTW (Figure 15, Table 4). This VI classification scheme resulted in significantly higher $R^2$ values of 0.39 to 0.54 for TWI regressions, showing relatively clear relationships between the grouped VI values and TWI (Figure 21, Table 4). The highest $R^2$ of 0.54 was obtained when using either the 10x10 m or the 40x40 m focal averaged TWI values (Figure 21, Table 4). At the genus level as at the species level, DTW as the moisture predictor shows much stronger relationships with VI than does TWI.

Overall, regressions of genus-based VI produced poorer results than similar species-based results for both DTW and TWI as moisture predictors (Tables 3 and 4). Similarly, DTW consistently produced higher $R^2$ values with VI than did TWI (Tables 3 and 4). For the most part the 4 ha FI DTW and 1 ha FI DTW showed similar results, both

outperforming the 0.25 ha FI DTW. Overall, the strongest and clearest relationship between vegetation and soil moisture from these regressions, with an $R^2$ of 0.93, was that using Species VI values grouped into VI classes and the 4 ha flow initiation derived DTW values (Table 3). The same VI regression type using 40x40m focal averaged TWI produced an $R^2$ of 0.82.

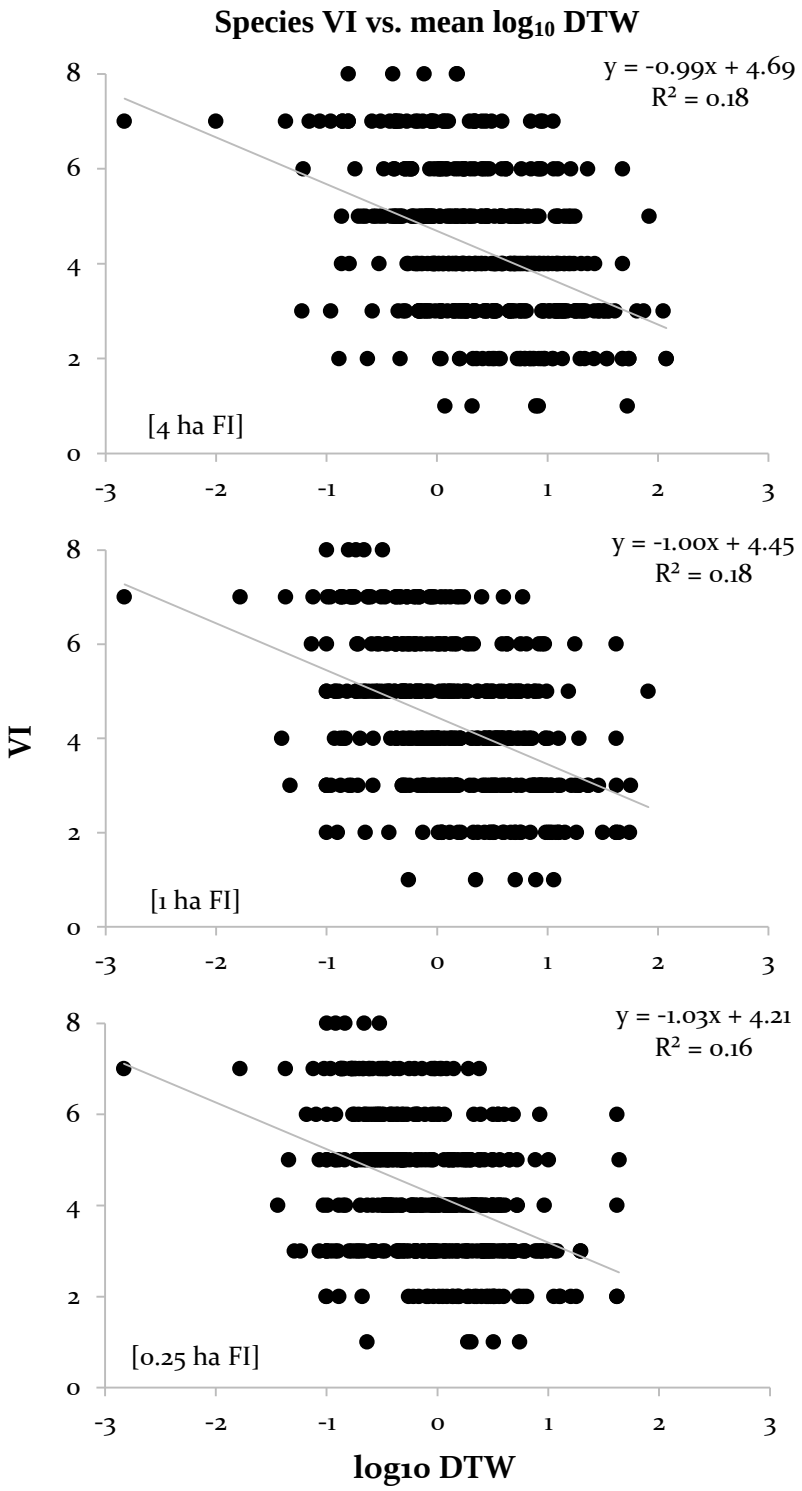



Figure 10. Scatterplot of assigned VI values for each recorded vegetation species vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which each species was encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

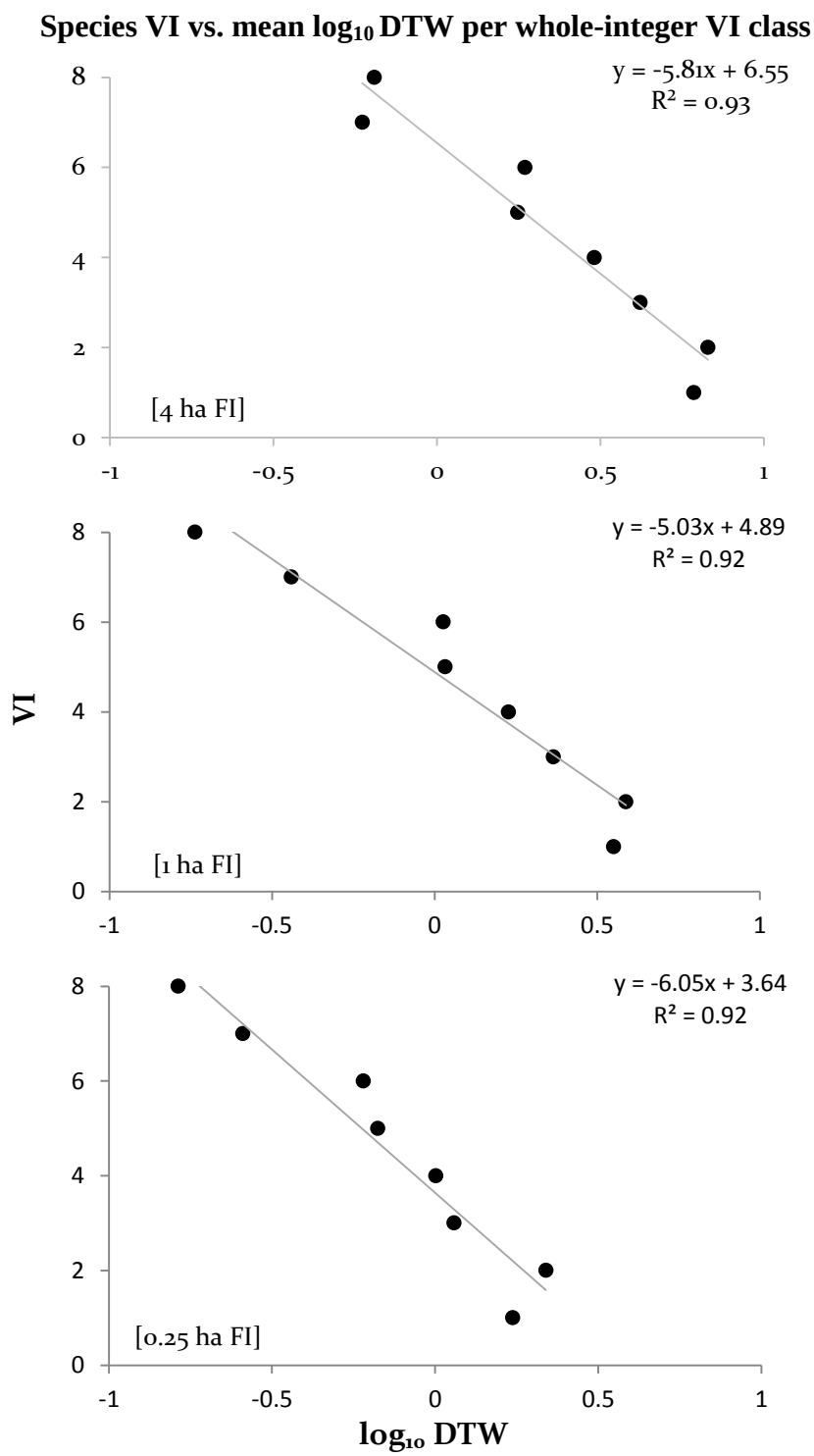



Figure 11. Scatterplot of assigned VI values for each recorded vegetation species, grouped in whole integer classes, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which species of that VI value were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

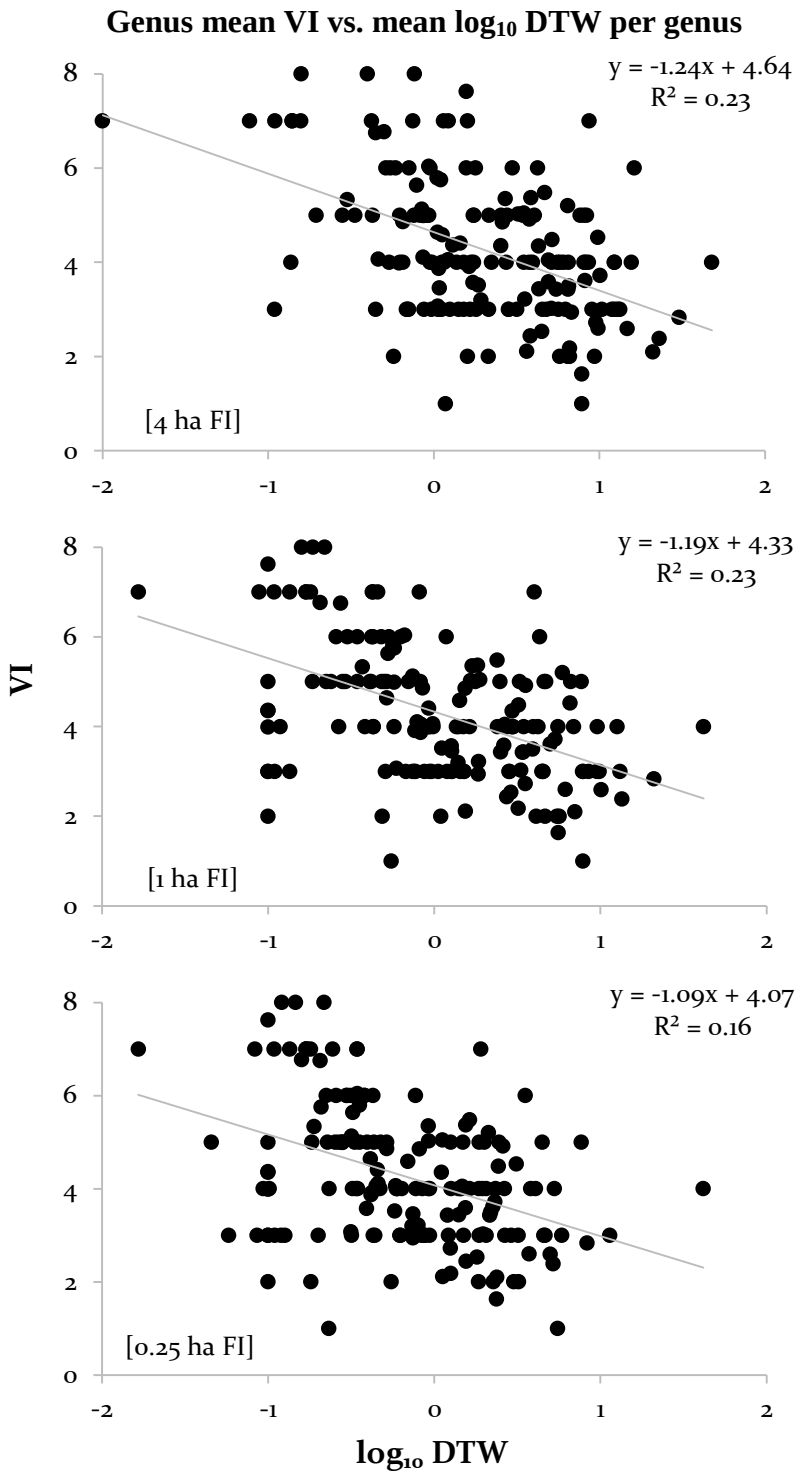



Figure 12. Scatterplot of mean VI value for all species within each genus vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which species of each genus were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

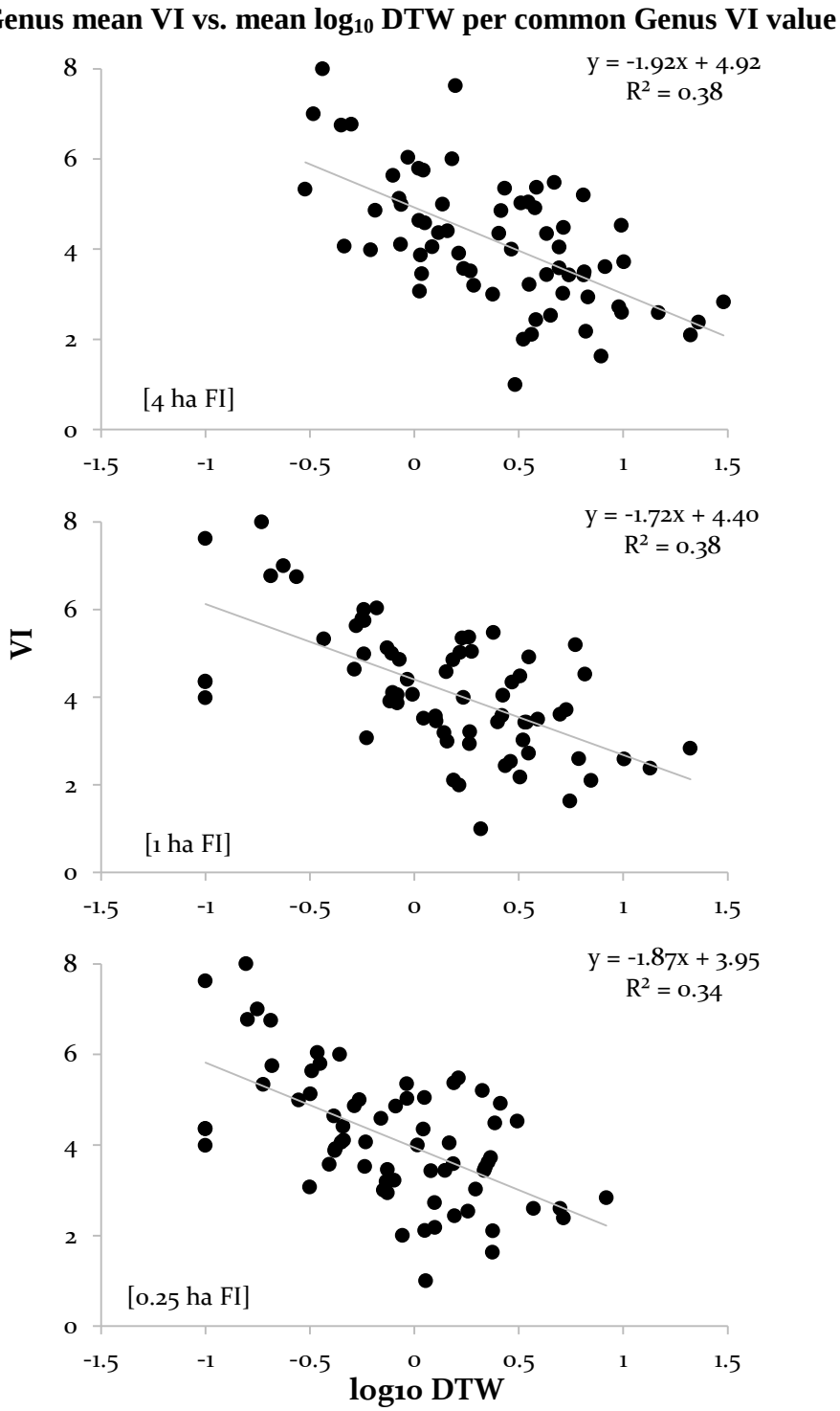



Figure 13. Scatterplot of mean VI values for each genus, classed by common VI value, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which species of each genus were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

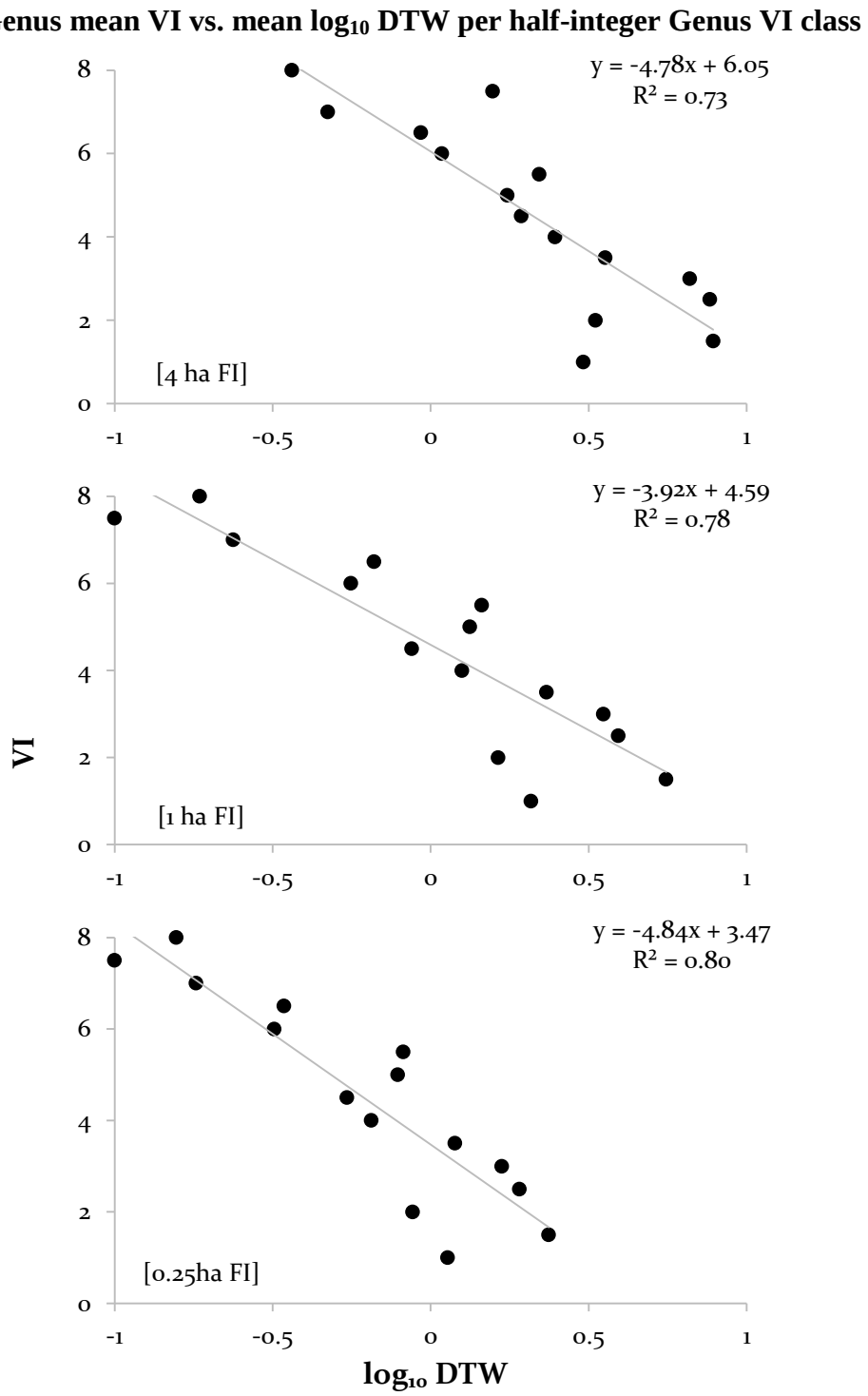



Figure 14. Scatterplot of mean VI values for each genus, grouped in half integer classes, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which genera in each class were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

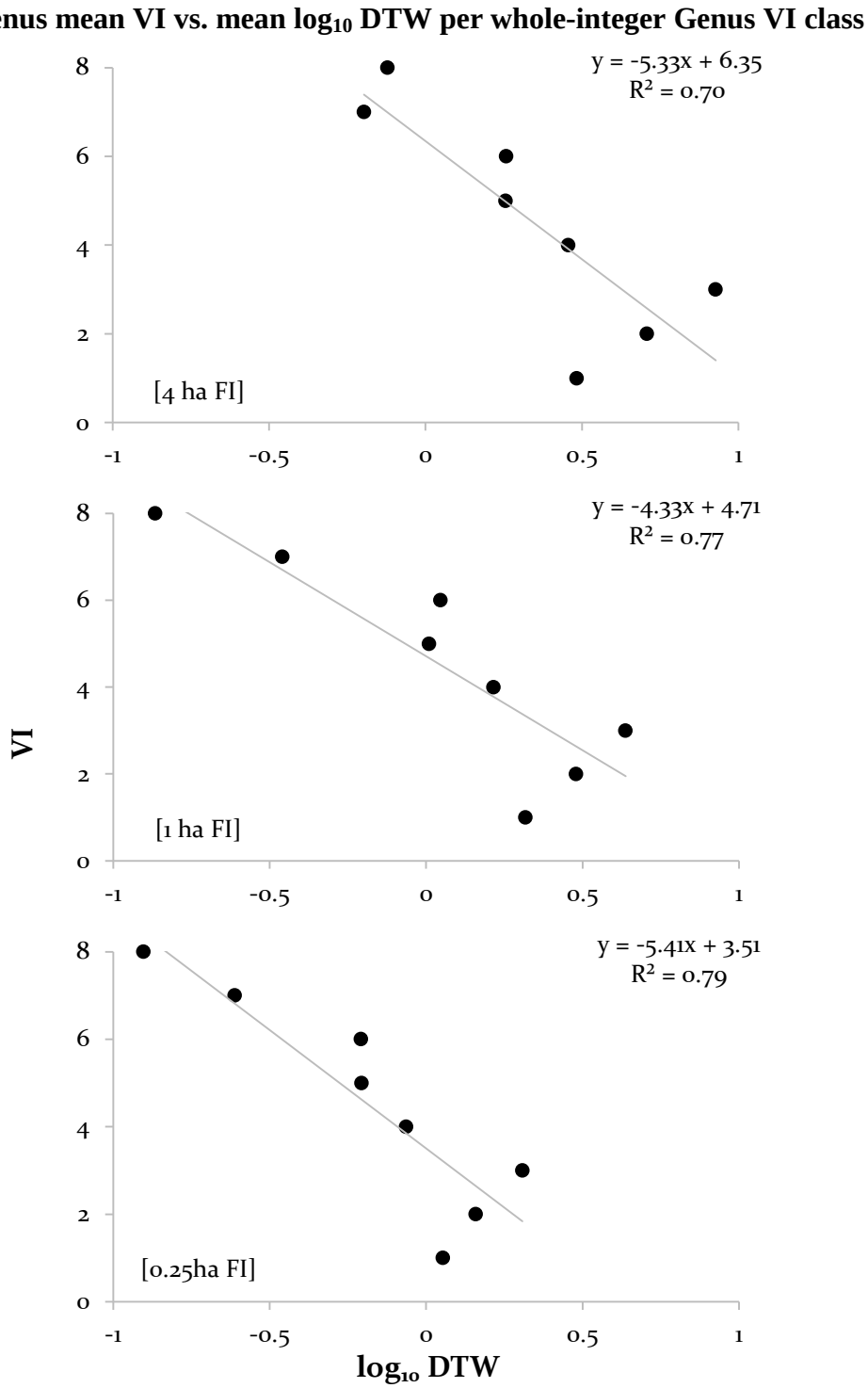



Figure 15. Scatterplot of averaged VI values for each genus, grouped in whole integer classes, vs. mean plot-generated DTW (4, 1, and 0.25 ha flow initiations) value for all plots (1x1 m and 5x5 m) at which genera in each class were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

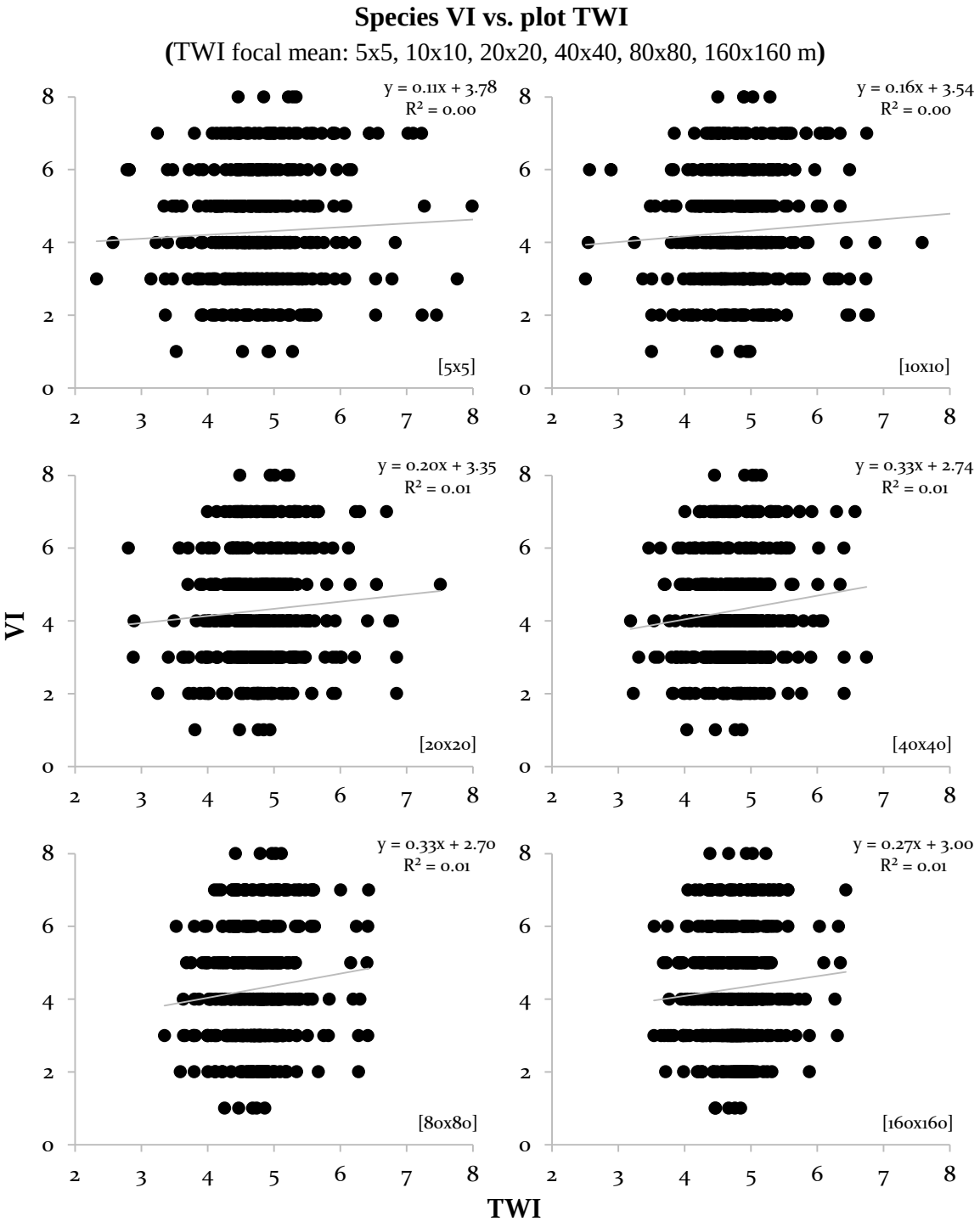



Figure 16. Scatterplot of assigned VI values for each recorded vegetation species vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which the species was encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

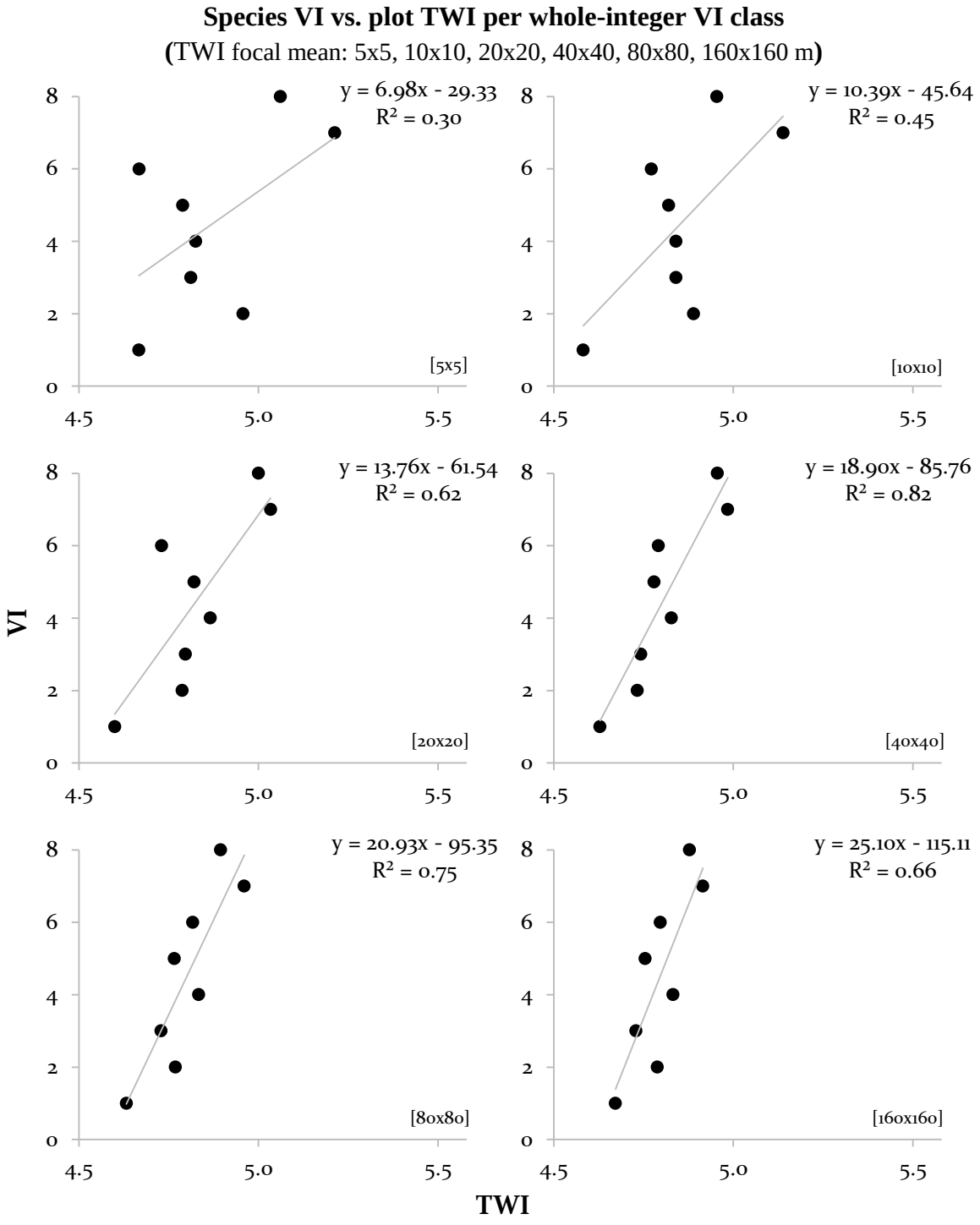



Figure 17. Scatterplot of assigned VI values for each recorded vegetation species, classed by common VI value vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which species of each VI value were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

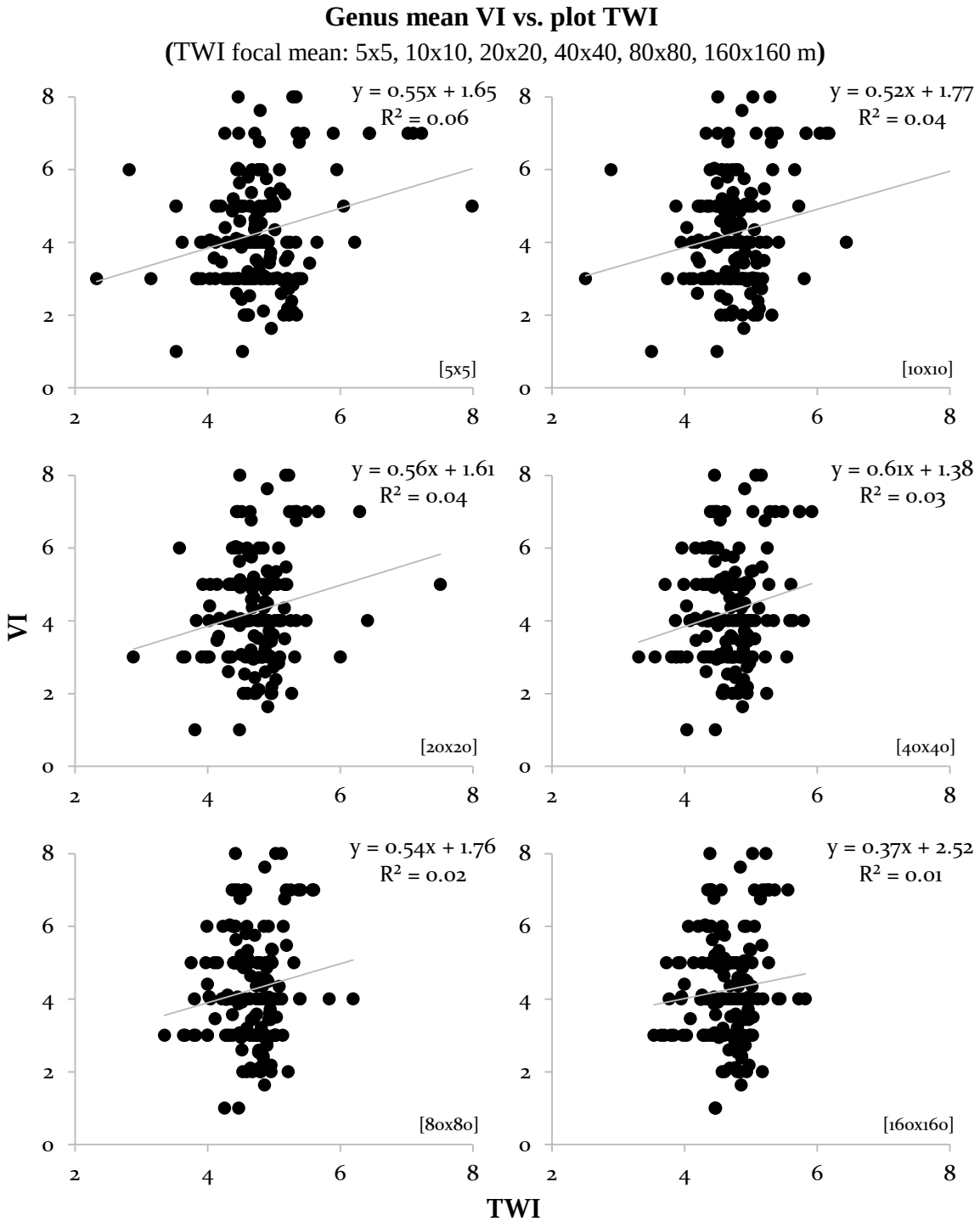



Figure 18. Scatterplot of mean VI values for all species within each genus vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which these species were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

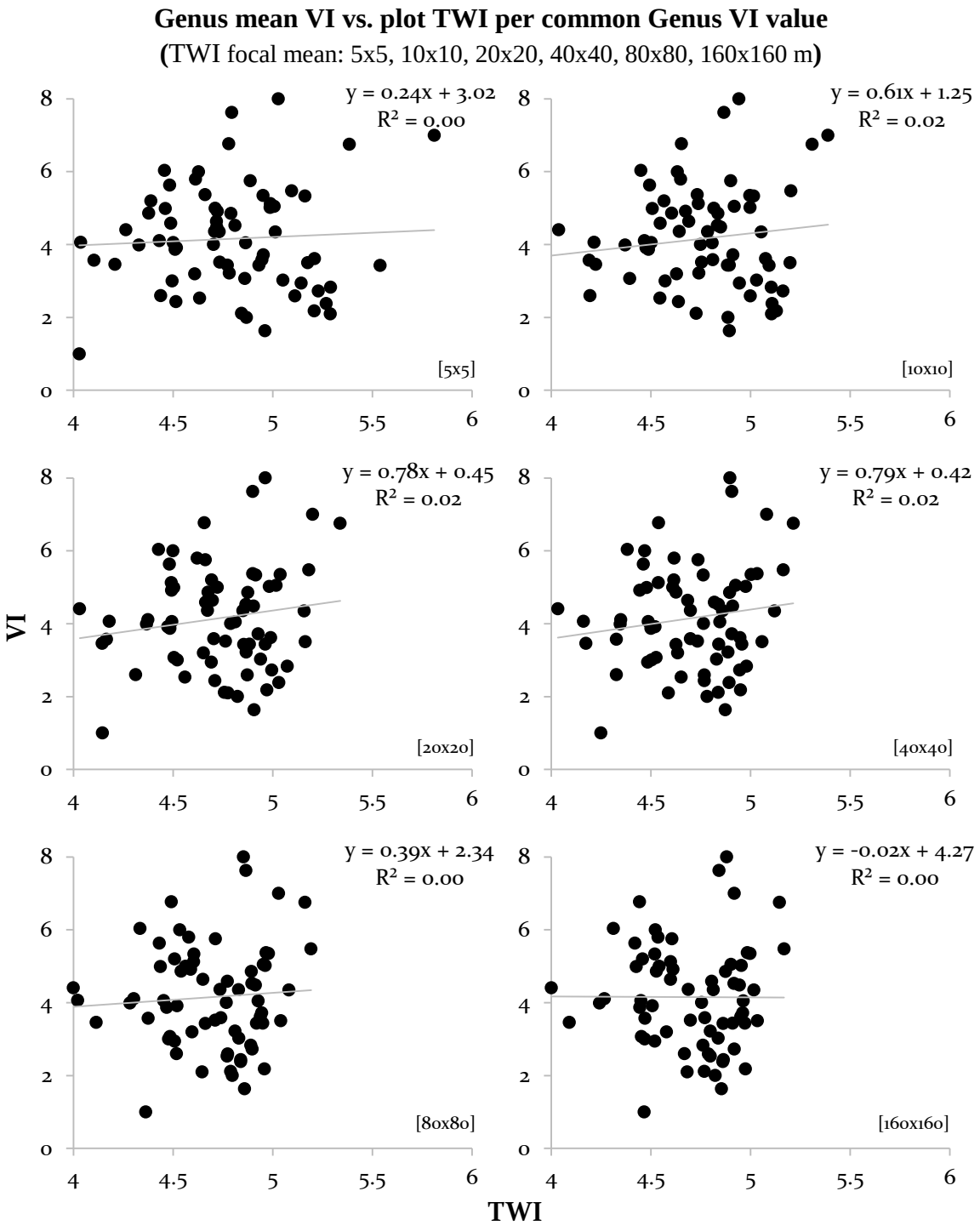



Figure 19. Scatterplot of mean VI values for each genus, classed by common VI value, vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which species of each genera were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

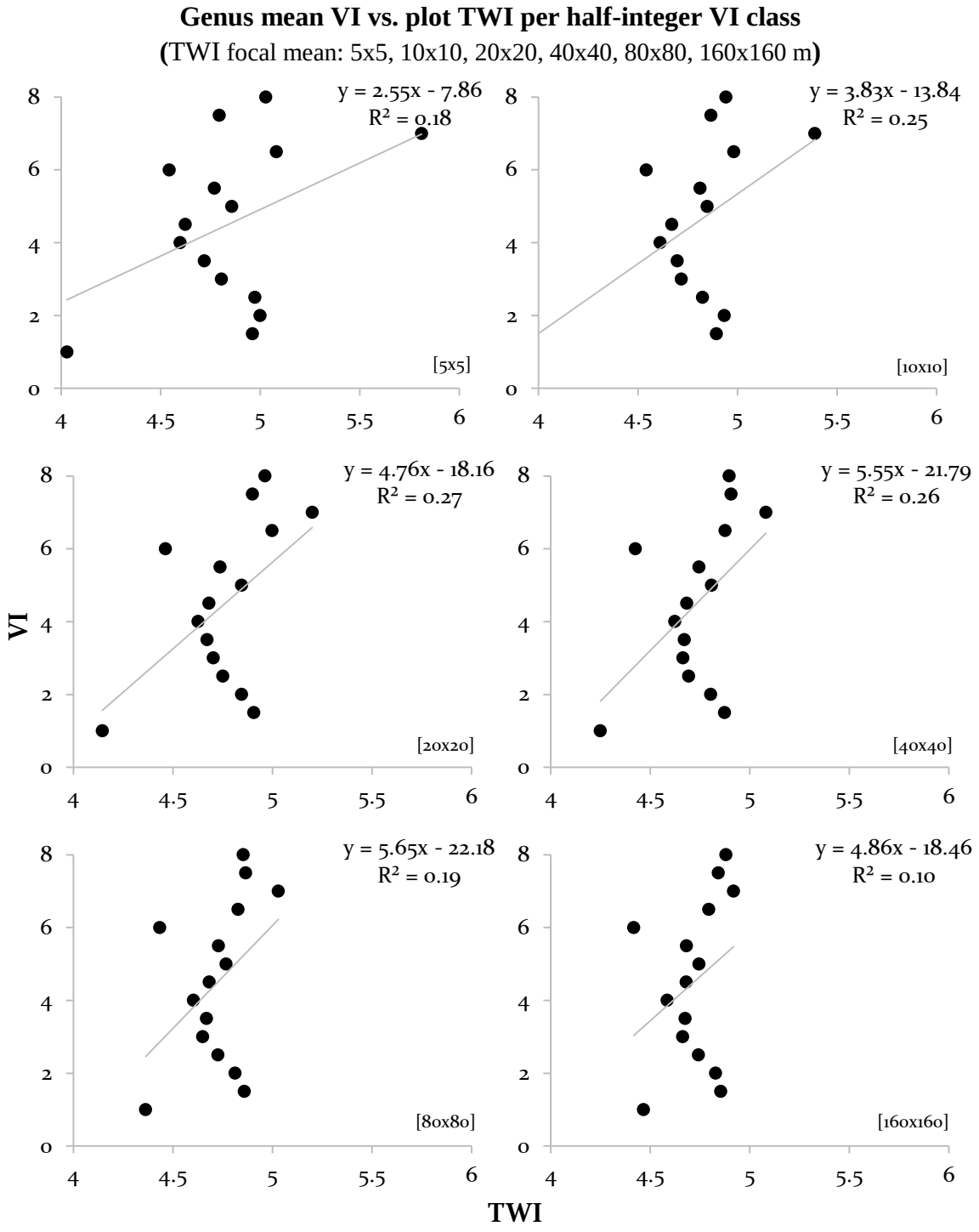



Figure 20. Scatterplot of mean VI values for each genus, grouped in half integer classes, vs. mean plot-generated TWI value (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots (1x1 m and 5x5 m) at which species of each VI value were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

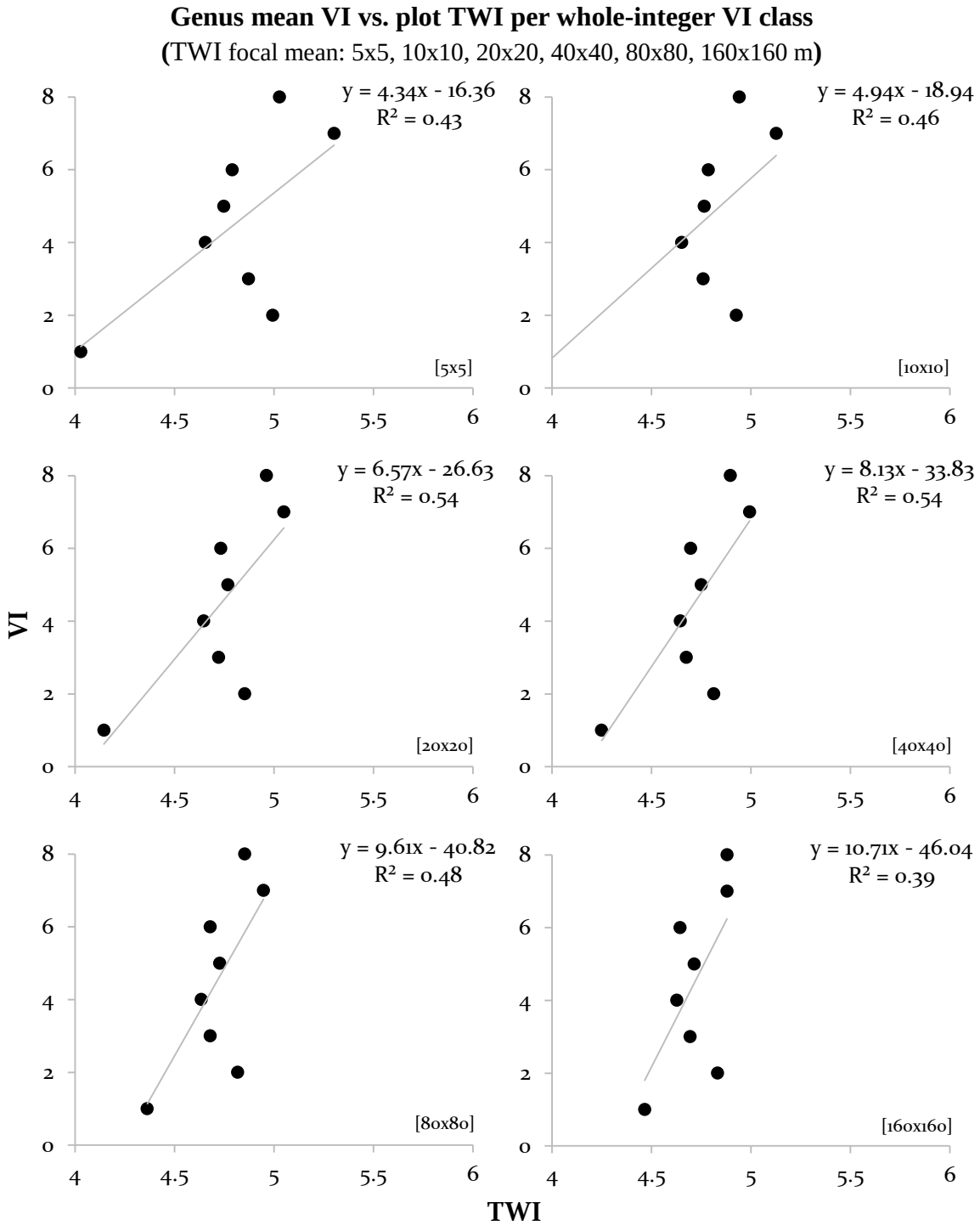



Figure 21. Scatterplot of mean VI values for each genus, classed by common VI value, vs. mean plot-generated TWI (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) value for all plots (1x1 m and 5x5 m) at which species of each genera were encountered within the EMEND and Willmore study areas, showing trendlines with equations and $R^2$ values.

Table 3. Summary table of key values from all Species-level VI-DTW and VI-TWI regression analyses.

| VI | Moisture Predictor | $_a$VI (slope) | $_b$VI (y-intercept) | $R^2$ |
|---|---|---|---|---|
| Individual Species VI | DTW (4ha flow initiation) | -0.99 | 4.69 | 0.18 |
| | DTW (1ha flow initiation) | -1.00 | 4.45 | 0.18 |
| | DTW (0.25ha flow initiation) | -1.03 | 4.21 | 0.16 |
| | TWI (5x5 focal average) | 0.11 | 3.78 | 0.00 |
| | TWI (10x10 focal average) | 0.16 | 3.54 | 0.00 |
| | TWI (20x20 focal average) | 0.20 | 3.35 | 0.01 |
| | TWI (40x40 focal average) | 0.33 | 2.74 | 0.01 |
| | TWI (80x80 focal average) | 0.33 | 2.70 | 0.01 |
| | TWI (160x160 focal average) | 0.27 | 3.00 | 0.01 |
| Species VI Grouped by Whole Integer Classes | DTW (4ha flow initiation) | -5.81 | 6.55 | 0.93 |
| | DTW (1ha flow initiation) | -5.03 | 4.89 | 0.92 |
| | DTW (0.25ha flow initiation) | -6.05 | 3.64 | 0.92 |
| | TWI (5x5 focal average) | 6.98 | -29.33 | 0.30 |
| | TWI (10x10 focal average) | 10.39 | -45.64 | 0.45 |
| | TWI (20x20 focal average) | 13.76 | -61.54 | 0.62 |
| | TWI (40x40 focal average) | 18.90 | -85.76 | 0.82 |
| | TWI (80x80 focal average) | 20.93 | -95.35 | 0.75 |
| | TWI (160x160 focal average) | 25.10 | -115.11 | 0.66 |

Table 4. Summary table of key values from all Genus-level VI-DTW and VI-TWI regression analyses.

| VI | Moisture Predictor | $_a$VI (slope) | $_b$VI (y-intercept) | $R^2$ |
|---|---|---|---|---|
| Genus Mean VI | DTW (4ha flow initiation) | -1.24 | 4.64 | 0.23 |
| | DTW (1ha flow initiation) | -1.19 | 4.33 | 0.23 |
| | DTW (0.25ha flow initiation) | -1.09 | 4.07 | 0.16 |
| | TWI (5x5 focal average) | 0.55 | 1.65 | 0.06 |
| | TWI (10x10 focal average) | 0.52 | 1.77 | 0.04 |
| | TWI (20x20 focal average) | 0.56 | 1.61 | 0.04 |
| | TWI (40x40 focal average) | 0.61 | 1.38 | 0.03 |
| | TWI (80x80 focal average) | 0.54 | 1.76 | 0.02 |
| | TWI (160x160 focal average) | 0.37 | 2.52 | 0.01 |
| Genus Mean VI Grouped by Common Mean | DTW (4ha flow initiation) | -1.92 | 4.92 | 0.38 |
| | DTW (1ha flow initiation) | -1.72 | 4.40 | 0.38 |
| | DTW (0.25ha flow initiation) | -1.87 | 3.95 | 0.34 |
| | TWI (5x5 focal average) | 0.24 | 3.02 | 0.00 |
| | TWI (10x10 focal average) | 0.61 | 1.25 | 0.02 |
| | TWI (20x20 focal average) | 0.78 | 0.45 | 0.02 |
| | TWI (40x40 focal average) | 0.79 | 0.42 | 0.02 |
| | TWI (80x80 focal average) | 0.39 | 2.34 | 0.00 |
| | TWI (160x160 focal average) | -0.02 | 4.27 | 0.00 |
| Genus Meann VI Grouped by Half Integer Classes | DTW (4ha flow initiation) | -4.78 | 6.05 | 0.73 |
| | DTW (1ha flow initiation) | -3.92 | 4.59 | 0.78 |
| | DTW (0.25ha flow initiation) | -4.84 | 3.47 | 0.80 |
| | TWI (5x5 focal average) | 2.55 | -7.86 | 0.18 |
| | TWI (10x10 focal average) | 3.83 | -13.84 | 0.25 |
| | TWI (20x20 focal average) | 4.76 | -18.16 | 0.27 |
| | TWI (40x40 focal average) | 5.55 | -21.79 | 0.26 |
| | TWI (80x80 focal average) | 5.65 | -22.18 | 0.19 |
| | TWI (160x160 focal average) | 4.86 | -18.46 | 0.10 |
| Genus Meann VI Grouped by Whole Integer Classes | DTW (4ha flow initiation) | -5.33 | 6.35 | 0.70 |
| | DTW (1ha flow initiation) | -4.33 | 4.71 | 0.77 |
| | DTW (0.25ha flow initiation) | -5.41 | 3.51 | 0.79 |
| | TWI (5x5 focal average) | 4.34 | -16.36 | 0.43 |
| | TWI (10x10 focal average) | 4.94 | -18.94 | 0.46 |
| | TWI (20x20 focal average) | 6.57 | -26.63 | 0.54 |
| | TWI (40x40 focal average) | 8.13 | -33.83 | 0.54 |
| | TWI (80x80 focal average) | 9.61 | -40.82 | 0.48 |
| | TWI (160x160 focal average) | 10.71 | -46.04 | 0.39 |

## PLOT-BASED VI-DTW AND VI-TWI RELATIONSHIPS

In order to begin to take account of vegetation communities and species associations and their impact on the VI-moisture relationships the same types of regression analyses were used only not with individual species and genus VI values, but calculated average VI values for entire survey plots. These plot-based VI values were calculated in two different ways, the first was a direct average of the VI values for all species present in a given plot. The second was a weighted average of the VI values that took into account the relative abundances of each species within a given plot. Analyses involving abundances do not include the plots surveyed at EMEND in 2008 as no abundance/ground cover data were collected. Abundance weighting was done in order to determine if the relative abundances of species within a survey plot better defined the likelihood of a given species establishing on that plot. Both plot-based averages also were placed in classified groups in order to get wider ranges of moisture values for averaging. Since the average VI of all species within a given plot was again not always a whole number, there was the opportunity to perform different levels of VI classification. The mean VI values for the survey plots were classified in two ways. In the first group, averaged VI values were grouped by the nearest half-integer. That is, plots having average VI values of 1-1.5, 1.5-2, 2-2.5, etc. Finally, the plots were grouped by whole-integer VI. Both presence and abundance averaged plot VI values were then compared to the corresponding DTW and TWI values.

Using species-presence only to calculate the mean VI for each plot, $R^2$ ranged of 0.22 to 0.29 for the different DTW values (Figure 22, Table 5). Using species-abundance to calculate the mean VI for each plot, $R^2$ ranges from 0.22 to 0.27 for the different DTW values (Figure 25, Table 6). Though there is little apparent difference in $R^2$ values between presence-calculated and abundance-calculated, presence-only VI regressions do have a closer and more even spread of data points (Figures 22 and 25). The highest $R^2$ (0.29) for unclassified VI regressions was produced by the regression of presence-calculated VI values with 4 ha FI DTW values. Grouping plot VI values into half-integer classes significantly improved $R^2$ values for both presence-calculated VI and abundance-calculated VI regressions. This grouping raised the range to 0.92 to 0.94 for presence-calculated VI and 0.94 to 0.96 for abundance-calculated values (Figures 23 and 26, Tables 5 and 6). Under this VI classification scheme, the highest $R^2$, 0.96, was obtained by a regression of abundance-calculated VI values with 1 ha FI DTW values.

Grouping plots into whole-integer VI classes caused slight decrease in $R^2$ values for presence-calculated VI regressions, lowering the range to 0.90 to 0.93 (Figure 24, Table 5). Opposite to what was the case in regressions performed on half-integer VI classes, the 4 ha FI DTW and the 1 ha FI DTW in this case have lower $R^2$ values in this case when compared to the 0.93 $R^2$ for the 0.25 ha FI DTW (Figure 24, Table 5). $R^2$ values for abundance-calculated VI values increased under the whole integer grouping. The range for abundance-calculated VI regressions in this case was 0.92 to 0.98 (Figure 27, Table 6). Under this VI classification scheme, the highest $R^2$, 0.98, was obtained by a

regression of abundance-calculated VI values with 4 ha FI DTW values. This was the strongest and clearest vegetation-moisture relationship defined by simple regression analyses.

Figures 28 through 33 as well as Tables 5 and 6 show the results of all TWI regressions conducted on both the presence-calculated and abundance-calculated plot VI values. The results of these regressions were universally very weak. Though some $R^2$ values for these analyses are greater than 0.70 and even reach 0.88, the graphs of these higher $R^2$ regressions actually show a negative relationship where a positive one should exist. Therefore, these apparently high $R^2$ vales are misleading. For TWI analyses on the plot VI values, the highest $R^2$ on regression showing the expected positive relationship is 0.25 (Figure 30, Table 5). This $R^2$ was obtained by the regression of the species presence-calculated plot VI vales and the 40x40 m focal averaged TWI.

Overall, regressions of presence-calculated VI analyses produced poorer results than similar species-based results for both DTW and TWI as moisture predictors (Tables 5 and 6). As previously stated, DTW consistently produced far higher $R^2$ values with VI when compared to TWI, which showed virtually non-existent relationships with plot VI in all cases (Tables 5 and 6). For the most part the 4 ha FI DTW and 1 ha FI DTW show similar results, with 4 ha FI DTW showing higher $R^2$ values in most cases and with both outperforming the 0.25 ha FI derived DTW. Overall, the strongest and clearest relationship between plot VI and soil moisture from these regressions is defined by using

species abundance-calculated VI values for survey plots, grouped into whole VI classes and the 4 ha flow initiation derived DTW values (Table 6).

**Species-presence: plot-determined VI vs. plot-generated $\log_{10}$ DTW**

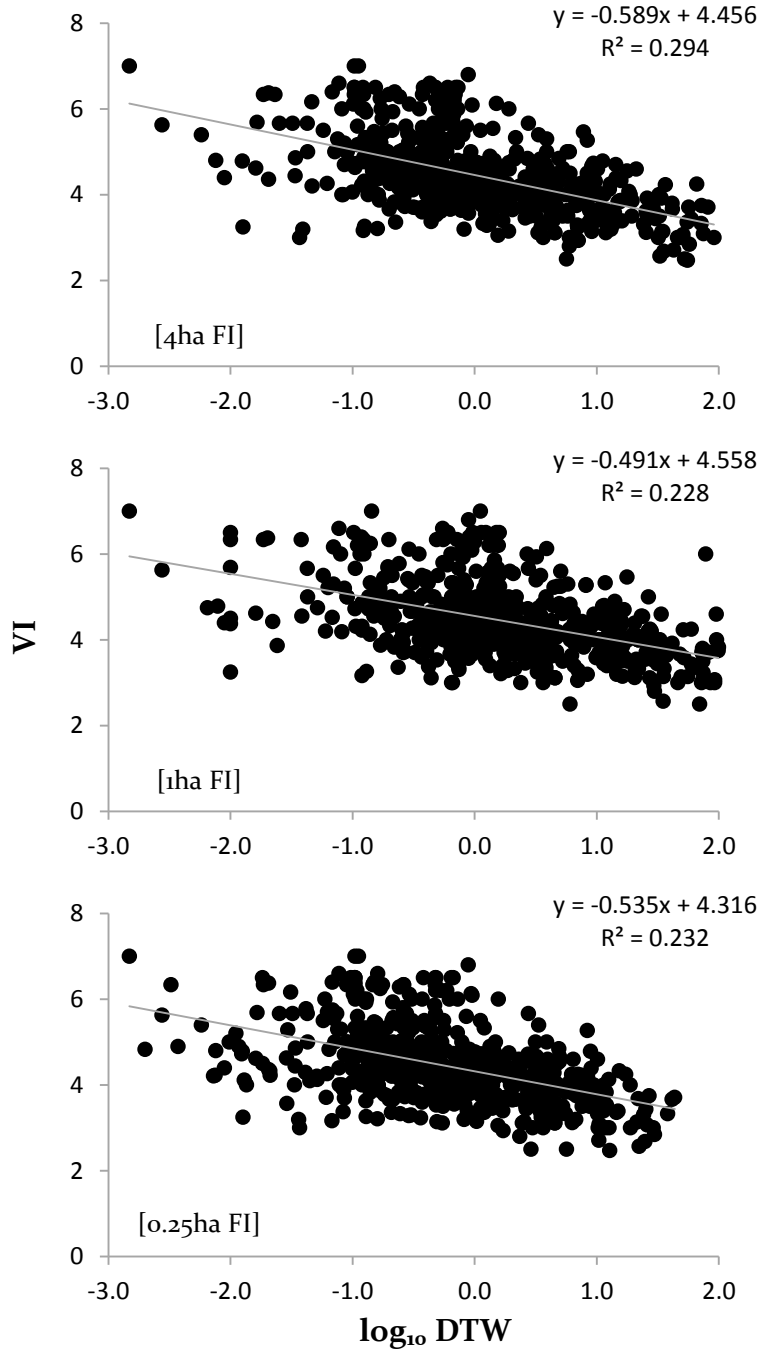



Figure 22. Scatterplot of plot-determined VI values by species presence vs. plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

**Species-presence: plot-determined VI vs. mean plot-generated $\log_{10}$ DTW per VI half-integer class**

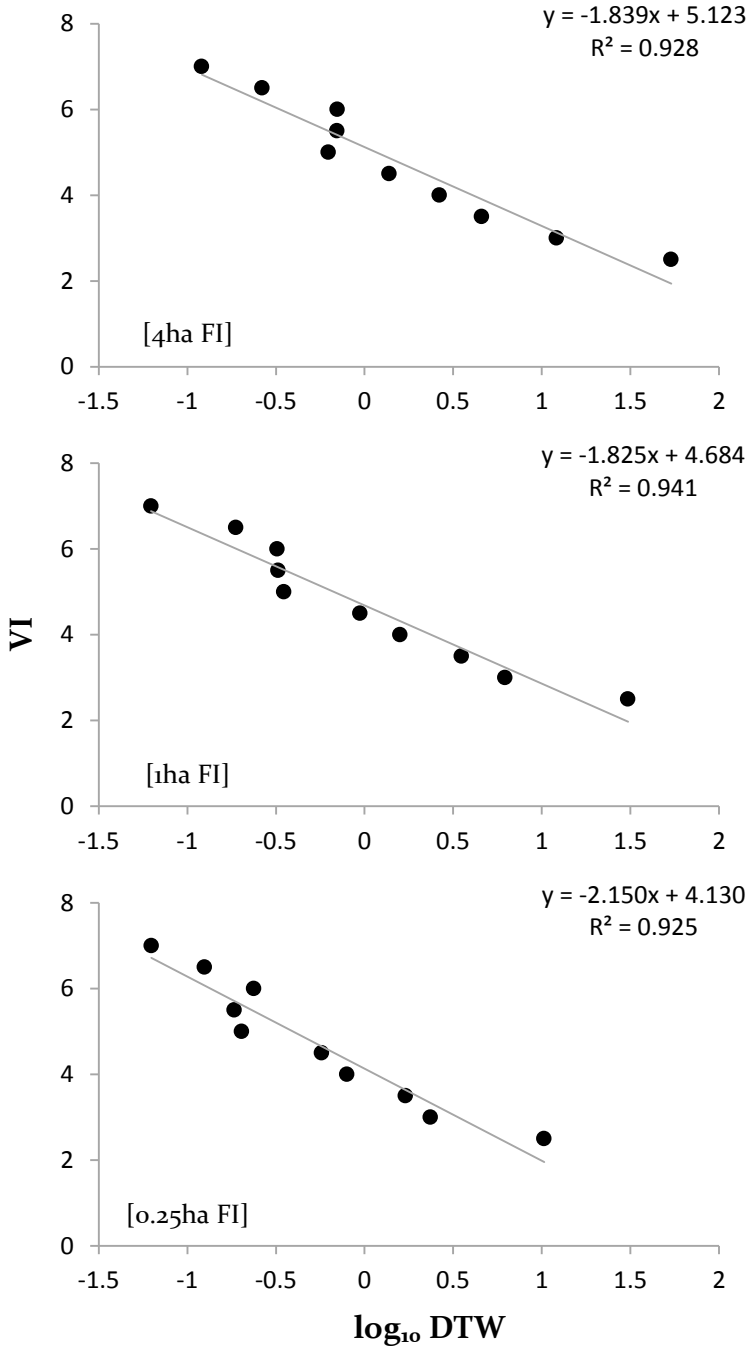



Figure 23. Scatterplot of plot-determined VI values by species presence, grouped in half integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

Species-presence: plot-determined VI class vs. mean plot-generated $\log_{10}$ DTW per VI whole-integer class

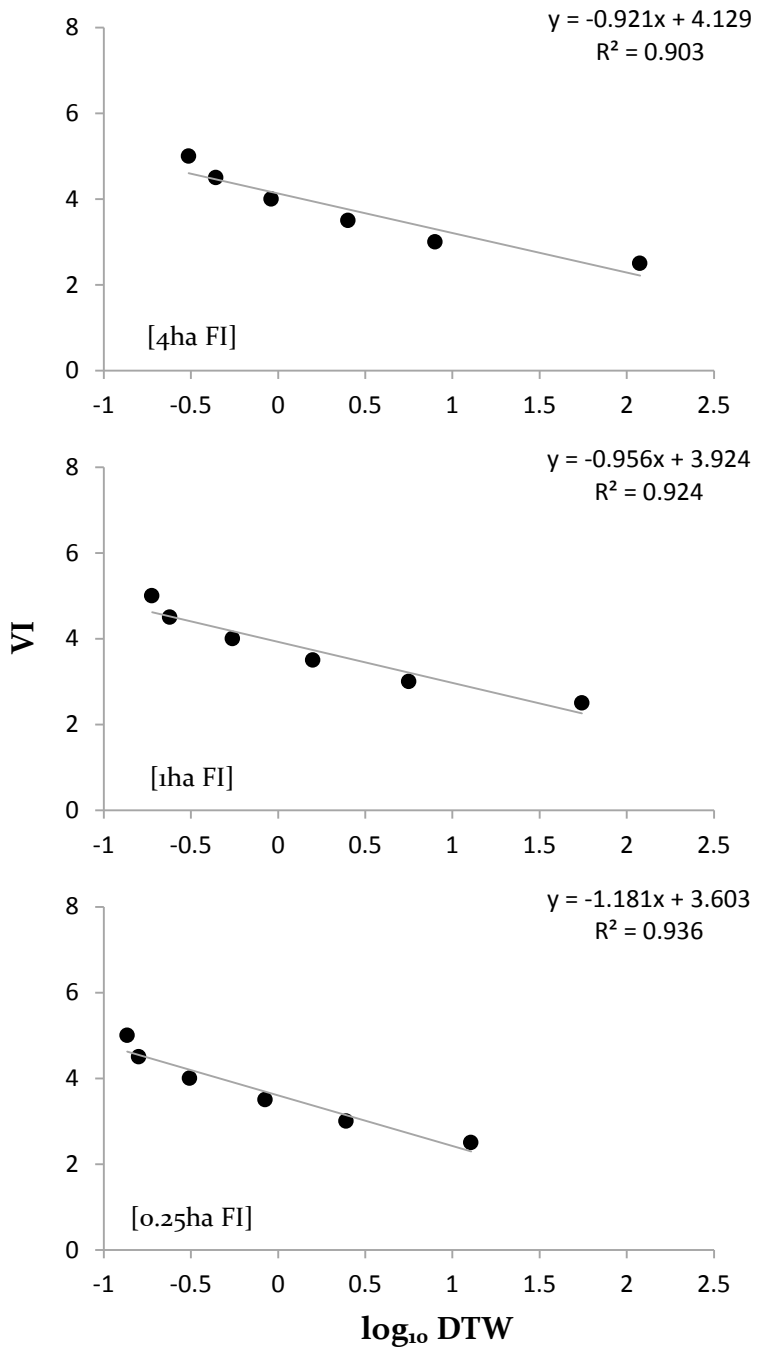



Figure 24. Scatterplot of plot-determined VI values by species presence, grouped in whole integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

**Species-abundance: plot-determined VI vs. mean plot-generated $\log_{10}$ DTW**

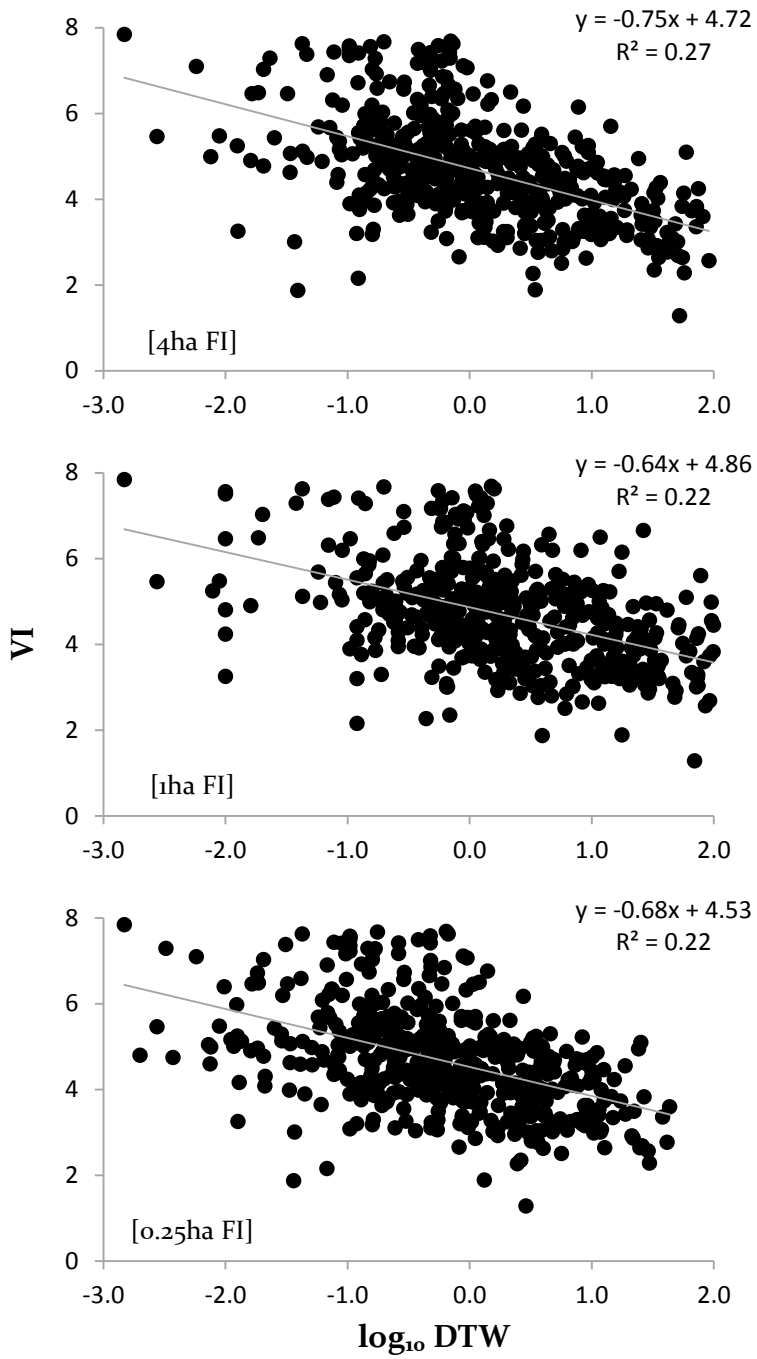



Figure 25. Scatterplot of plot-determined VI values by species abundance vs. plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

**Species-abundance: plot-determined VI vs. mean plot-generated $\log_{10}$ DTW per VI half-integer class**

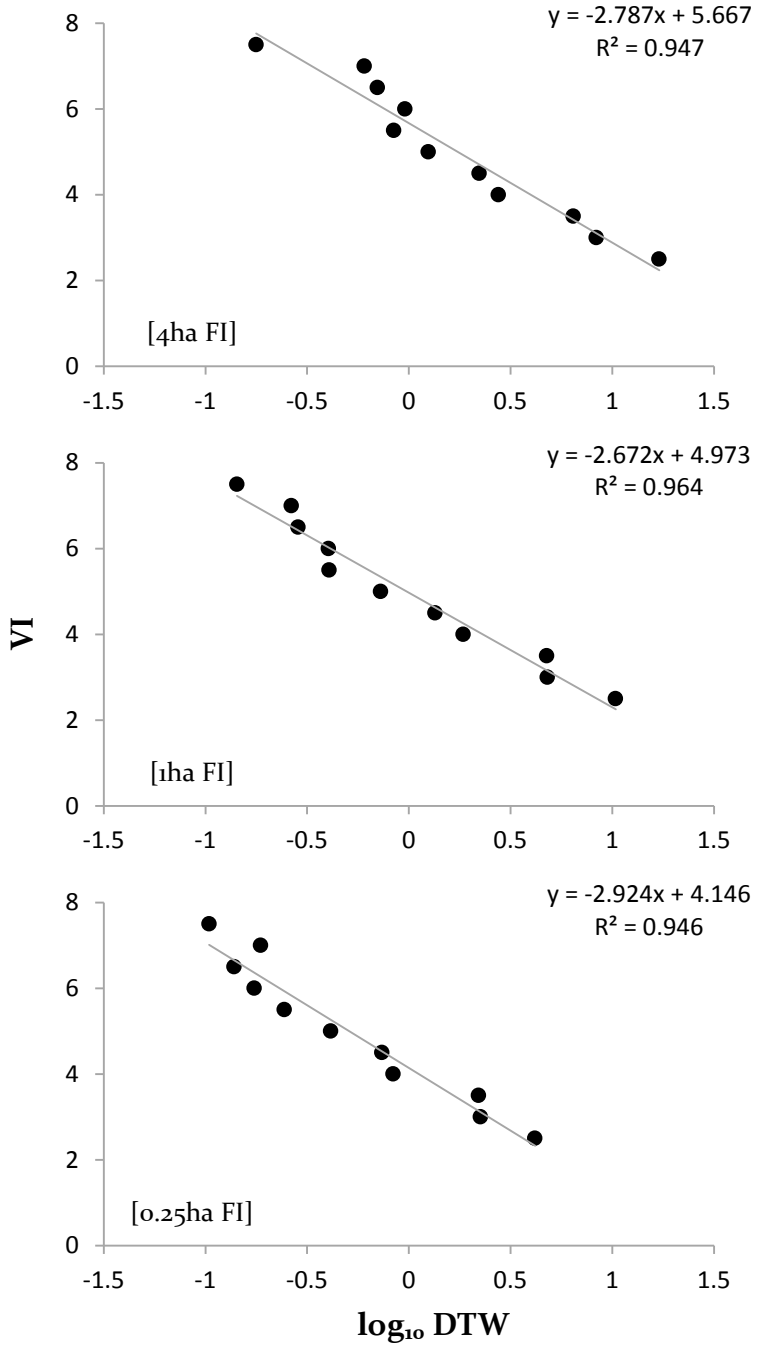



Figure 26. Scatterplot of plot-determined VI values by species abundance, grouped in half integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

**Species-abundance: plot-determined VI vs. mean plot-generated $\log_{10}$ DTW per VI whole-integer class**

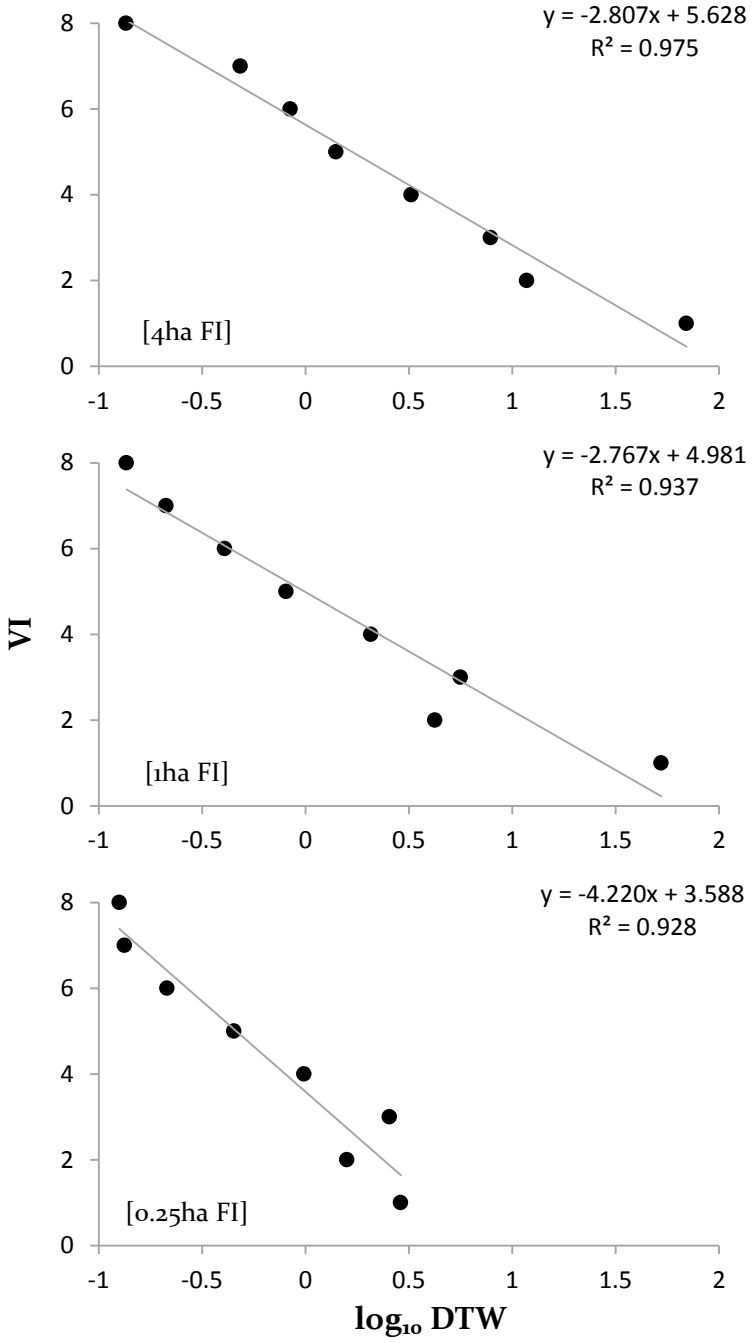



Figure 27. Scatterplot of plot-determined VI values by species abundance, grouped in whole integer classes vs. mean plot-generated DTW values (4, 1, and 0.25 ha flow initiations) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

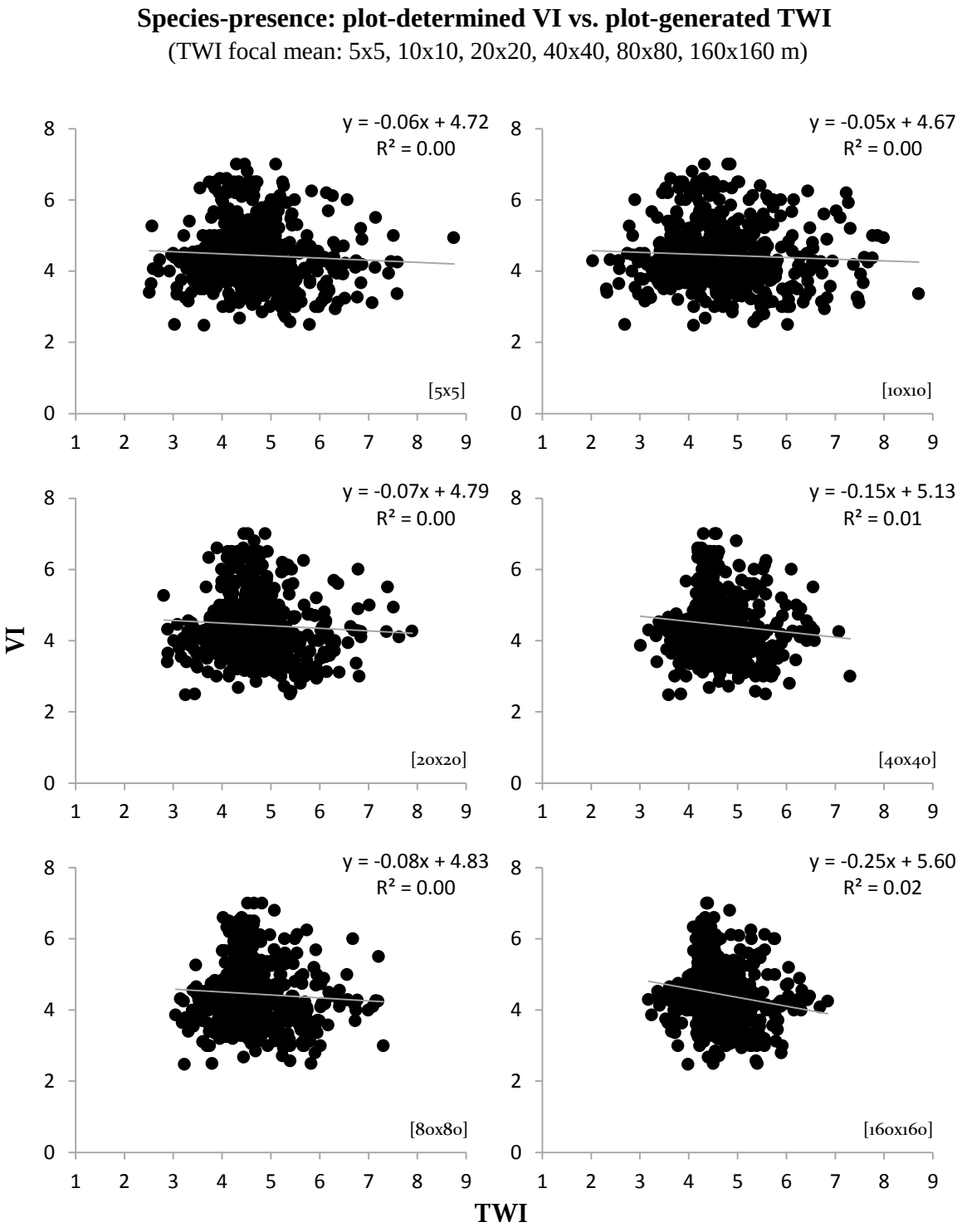



Figure 28. Scatterplot of plot-determined VI values by species presence vs. plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

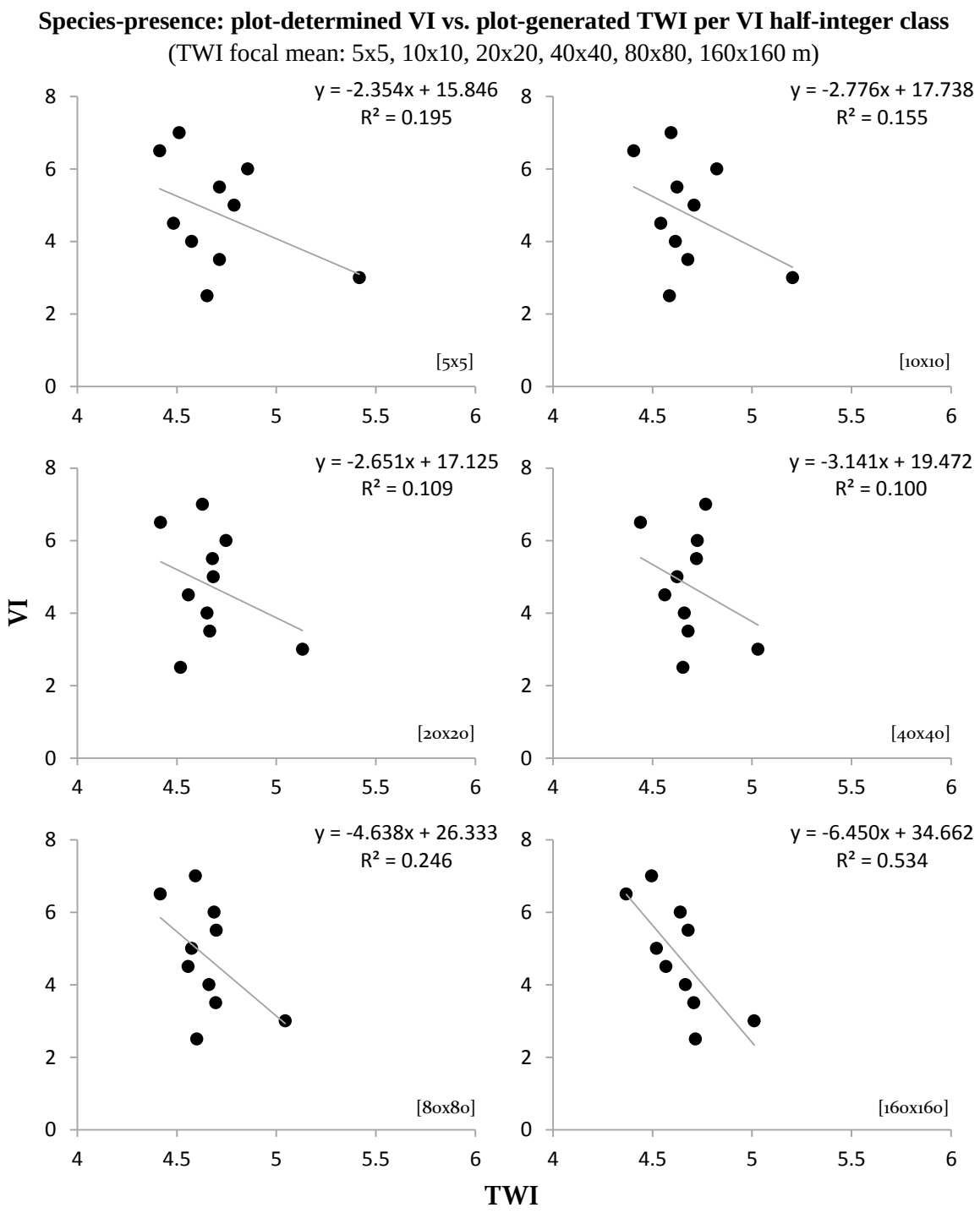



Figure 29. Scatterplot of plot-determined VI values by species presence, grouped in half integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

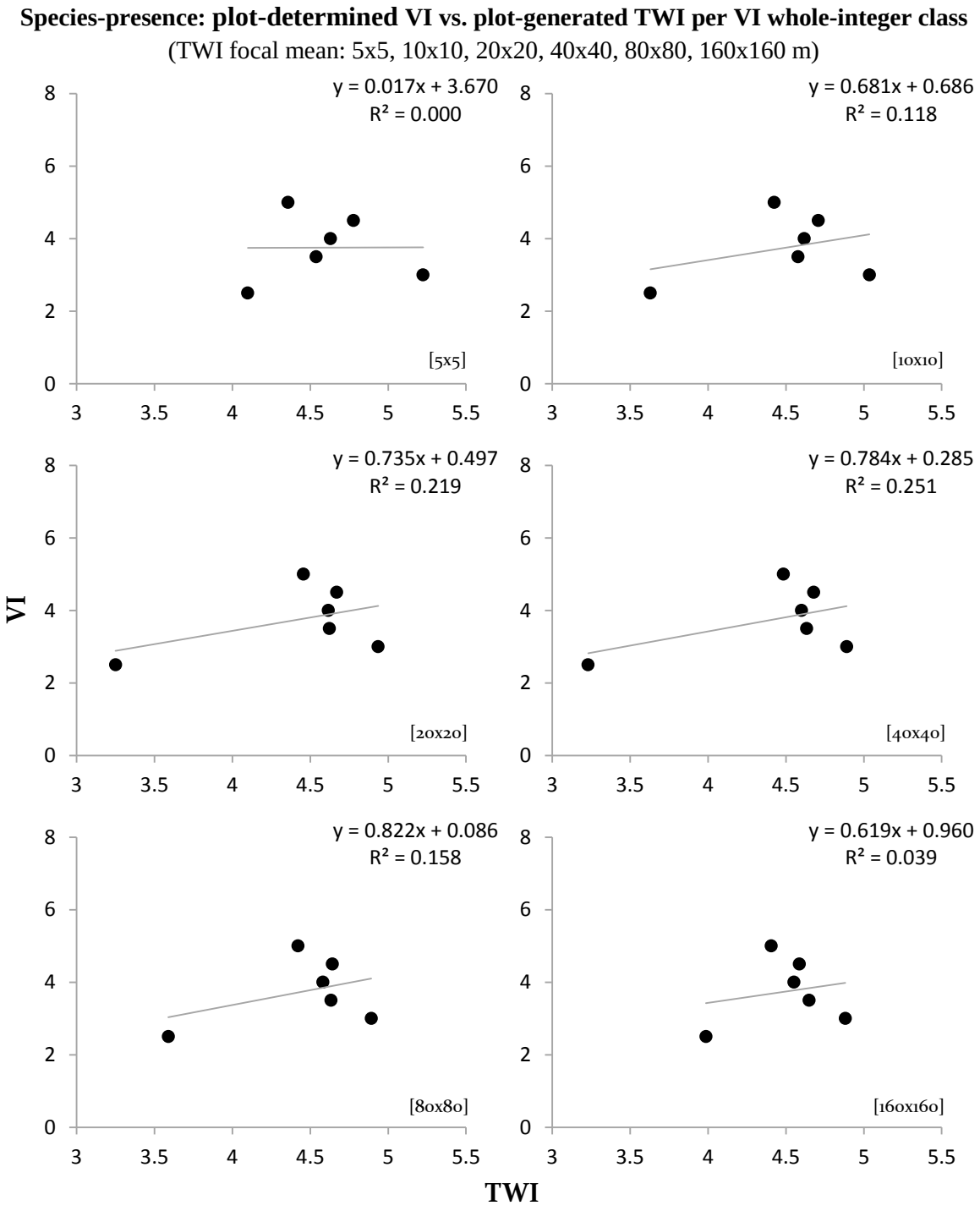



Figure 30. Scatterplot of plot-determined VI values by species presence, grouped in whole integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

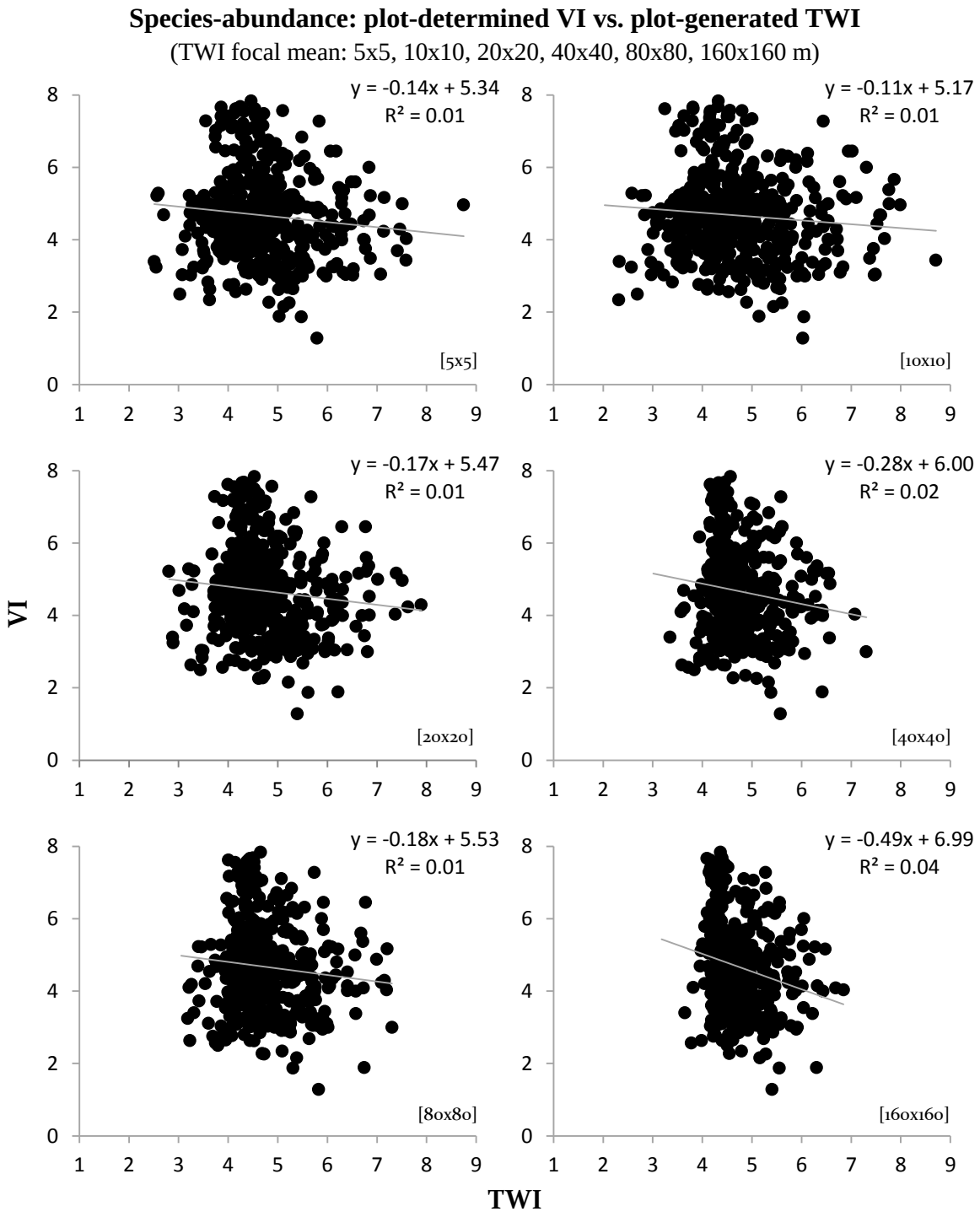



Figure 31. Scatterplot of plot-determined VI values by species abundance vs. plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for plots within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

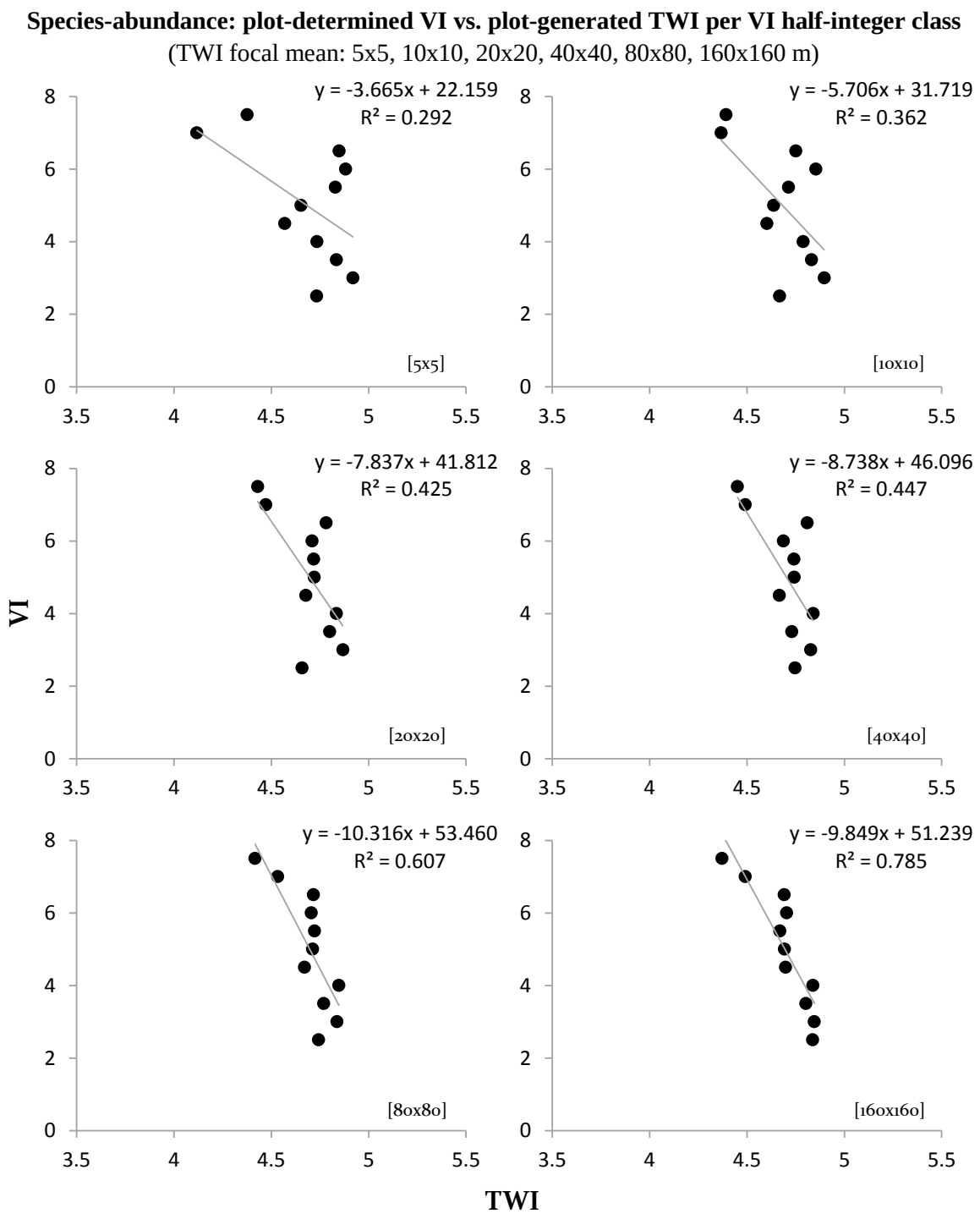



Figure 32. Scatterplot of plot-determined VI values by species abundance, grouped in half integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

**Species-abundance: plot-determined VI vs. plot-generated TWI per VI whole-integer class**

(TWI focal mean: 5x5, 10x10, 20x20, 40x40, 80x80, 160x160 m)

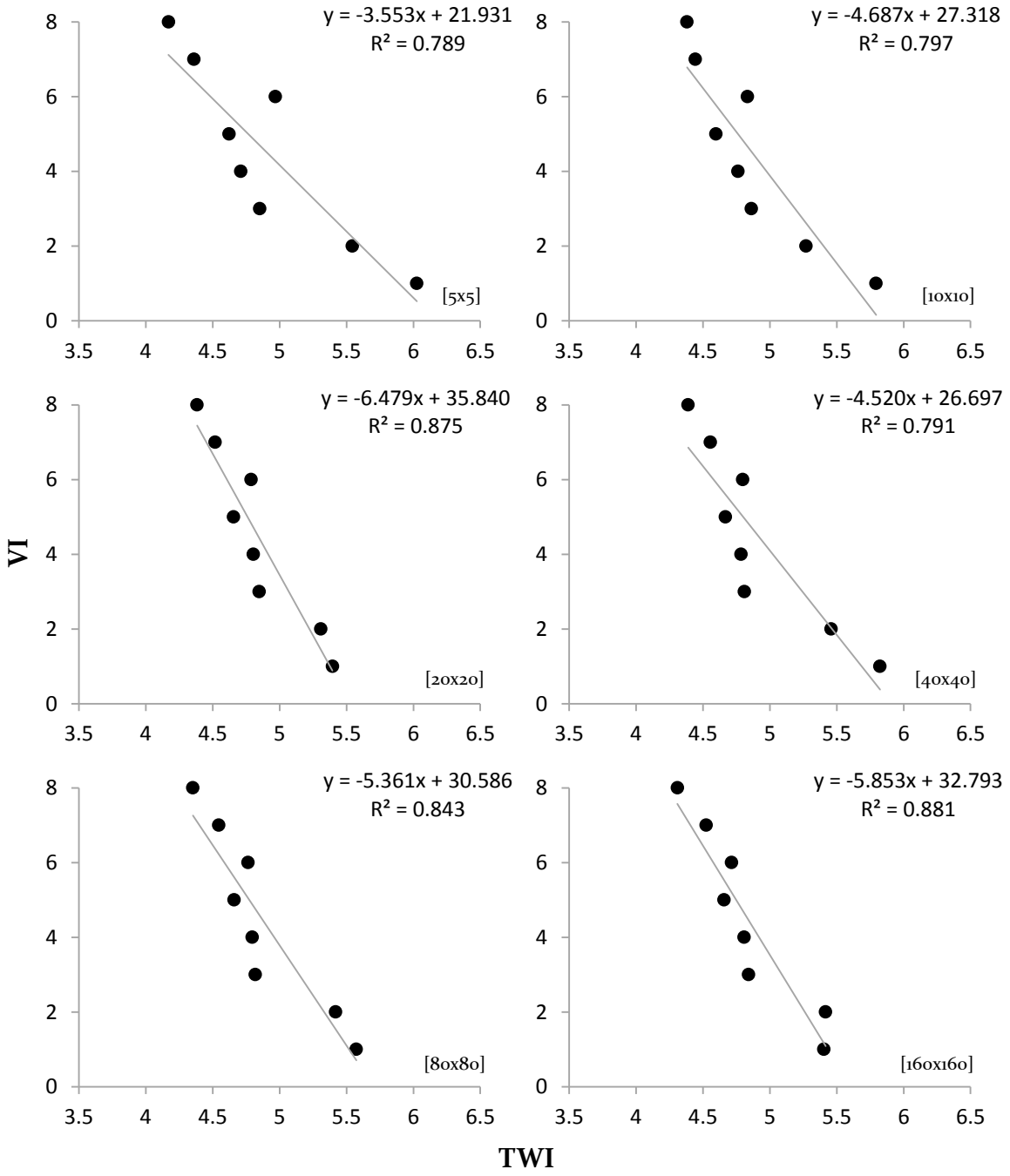



Figure 33. Scatterplot of plot-determined VI values by species abundance, grouped in whole integer classes vs. mean plot-generated TWI values (5x5, 10x10, 20x20, 40x40, 80x80, and 160x160 m focal averages) for all plots in each class within the EMEND and Willmore study areas, showing trend lines with equations and $R^2$ values.

.

Table 5. Summary table of key values from all species-presence averaged plot VI regression analyses.

| VI | Moisture Predictor | $_a$VI (slope) | $_b$VI (y-intercept) | $R^2$ |
|---|---|---|---|---|
| Species Presence Calculated Plot VI | DTW (4ha flow initiation) | -0.59 | 4.46 | 0.29 |
| | DTW (1ha flow initiation) | -0.49 | 4.56 | 0.23 |
| | DTW (0.25ha flow initiation) | -0.54 | 4.32 | 0.23 |
| | TWI (5x5 focal average) | -0.06 | 4.72 | 0.00 |
| | TWI (10x10 focal average) | -0.05 | 4.67 | 0.00 |
| | TWI (20x20 focal average) | -0.07 | 4.79 | 0.00 |
| | TWI (40x40 focal average) | -0.15 | 5.13 | 0.01 |
| | TWI (80x80 focal average) | -0.08 | 4.83 | 0.00 |
| | TWI (160x160 focal average) | -0.25 | 5.60 | 0.02 |
| Species Presence Calculated Plot VI Grouped by Half Integer Classes | DTW (4ha flow initiation) | -1.84 | 5.12 | 0.92 |
| | DTW (1ha flow initiation) | -1.83 | 4.68 | 0.94 |
| | DTW (0.25ha flow initiation) | -2.15 | 4.13 | 0.93 |
| | TWI (5x5 focal average) | -2.35 | 15.85 | 0.20 |
| | TWI (10x10 focal average) | -2.78 | 17.74 | 0.16 |
| | TWI (20x20 focal average) | -2.65 | 17.13 | 0.11 |
| | TWI (40x40 focal average) | -3.14 | 19.47 | 0.10 |
| | TWI (80x80 focal average) | -4.64 | 26.33 | 0.25 |
| | TWI (160x160 focal average) | -6.45 | 34.66 | 0.53 |
| Species Presence Calculated Plot VI Grouped by Whole Integer Classes | DTW (4ha flow initiation) | -0.92 | 4.13 | 0.90 |
| | DTW (1ha flow initiation) | -0.96 | 3.92 | 0.92 |
| | DTW (0.25ha flow initiation) | -1.18 | 3.60 | 0.94 |
| | TWI (5x5 focal average) | 0.02 | 3.67 | 0.00 |
| | TWI (10x10 focal average) | 0.68 | 0.69 | 0.19 |
| | TWI (20x20 focal average) | 0.74 | 0.50 | 0.22 |
| | TWI (40x40 focal average) | 0.78 | 0.29 | 0.25 |
| | TWI (80x80 focal average) | 0.82 | 0.09 | 0.16 |
| | TWI (160x160 focal average) | 0.62 | 0.96 | 0.04 |

Table 6. Summary table of key values from all species-abundance averaged plot VI regression analyses.

| VI | Moisture Predictor | $_a$VI (slope) | $_b$VI (y-intercept) | $R^2$ |
|---|---|---|---|---|
| Species Abundance Calculated Plot VI | DTW (4ha flow initiation) | -0.75 | 4.72 | 0.27 |
| | DTW (1ha flow initiation) | -0.64 | 4.86 | 0.22 |
| | DTW (0.25ha flow initiation) | -0.68 | 0.53 | 0.22 |
| | TWI (5x5 focal average) | -0.14 | 5.34 | 0.01 |
| | TWI (10x10 focal average) | -0.11 | 5.17 | 0.01 |
| | TWI (20x20 focal average) | -0.17 | 5.47 | 0.01 |
| | TWI (40x40 focal average) | -0.28 | 6.00 | 0.02 |
| | TWI (80x80 focal average) | -0.18 | 5.53 | 0.01 |
| | TWI (160x160 focal average) | -0.49 | 6.99 | 0.04 |
| Species Abundance Calculated Plot VI Grouped by Half Integer Classes | DTW (4ha flow initiation) | -2.79 | 5.67 | 0.95 |
| | DTW (1ha flow initiation) | -2.67 | 4.97 | 0.96 |
| | DTW (0.25ha flow initiation) | -2.92 | 4.15 | 0.95 |
| | TWI (5x5 focal average) | -3.67 | 22.16 | 0.29 |
| | TWI (10x10 focal average) | -5.71 | 31.72 | 0.36 |
| | TWI (20x20 focal average) | -7.84 | 41.81 | 0.43 |
| | TWI (40x40 focal average) | -8.74 | 46.10 | 0.45 |
| | TWI (80x80 focal average) | -10.32 | 53.46 | 0.61 |
| | TWI (160x160 focal average) | -9.85 | 51.24 | 0.79 |
| Species Abundance Calculated Plot VI Grouped by Whole Integer Classes | DTW (4ha flow initiation) | -2.81 | 5.63 | 0.98 |
| | DTW (1ha flow initiation) | -2.77 | 4.98 | 0.94 |
| | DTW (0.25ha flow initiation) | -4.22 | 3.59 | 0.93 |
| | TWI (5x5 focal average) | -3.55 | 21.93 | 0.79 |
| | TWI (10x10 focal average) | -4.69 | 27.32 | 0.80 |
| | TWI (20x20 focal average) | -6.48 | 35.84 | 0.88 |
| | TWI (40x40 focal average) | -4.52 | 26.70 | 0.79 |
| | TWI (80x80 focal average) | -5.36 | 30.59 | 0.84 |
| | TWI (160x160 focal average) | -5.85 | 32.79 | 0.88 |

## VEGETATION INDEX MAPPING EXAMPLES

After all statistical analyses were complete; several of the regression equations with the highest $R^2$ values were selected to be used as algorithms to produce example vegetation index maps for the study areas. The equations chosen were those for: (i) regression of species VI grouped by whole integer class vs. mean $\log_{10}$ 4 ha flow initiation DTW for each class (Figure 11), (ii) regression of species VI grouped by whole integer class vs. mean 40x40 focal averaged TWI values for each class (Figure 17), and (iii) regression of species abundance calculated plot VI values grouped by whole integer class vs. mean $\log_{10}$ 4 ha flow initiation DTW for each class (Figure 27). These regressions produced $R^2$ values of 0.93, 0.82, and 0.98 respectively (Tables 3 and 6). The example maps show the predicted vegetation moisture gradient across the landscape from xeric (dark brown) to hydric (dark green). Figures 34-36 show VI maps produced using these three different algorithms for site S5 in the Willmore Wilderness Park and Figures 37-39 show maps for transects T24 and T25 in the EMEND research area. These maps also show points representing the vegetation survey plot locations in each of these areas. Plot location points were categorized and colour-coded to reflect each plot's calculated vegetation index. The colour-coding was intended to provide a visual indication of general conformance between the calculated VI values for the plots and the projected VI values on the predictive map. Further to the close-up examples in Figures 34-39, Figures 40 and 41 show a short series of other example maps for other sites in both the Willmore Wilderness Park and the EMEND Area. These figures were produced using whichever algorithm showed the best general conformance for each study area.

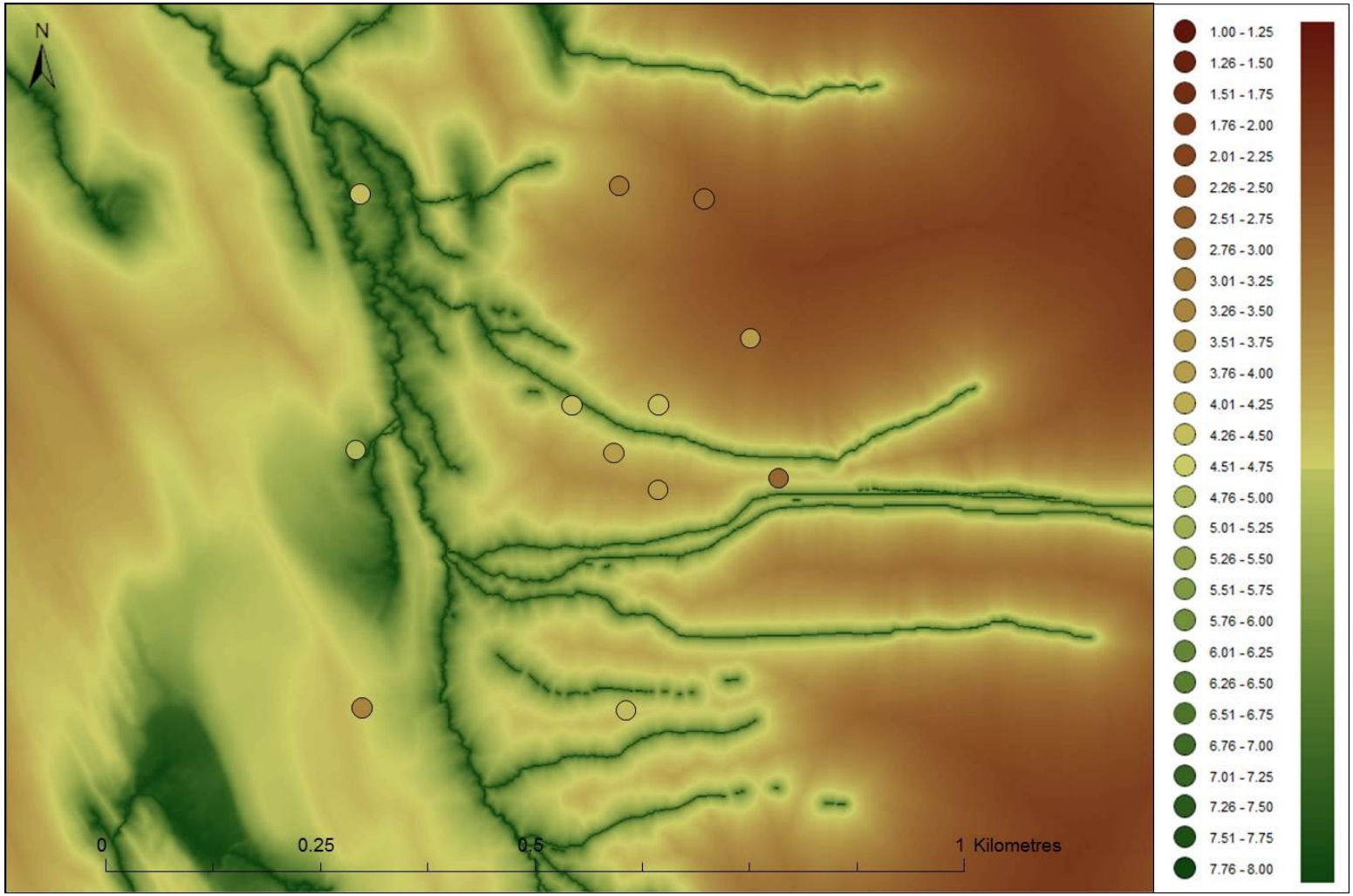



Figure 34. Example vegetation index map for site S5 within the Willmore Wilderness Park based on an algorithm derived from the regression of individual species VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale.

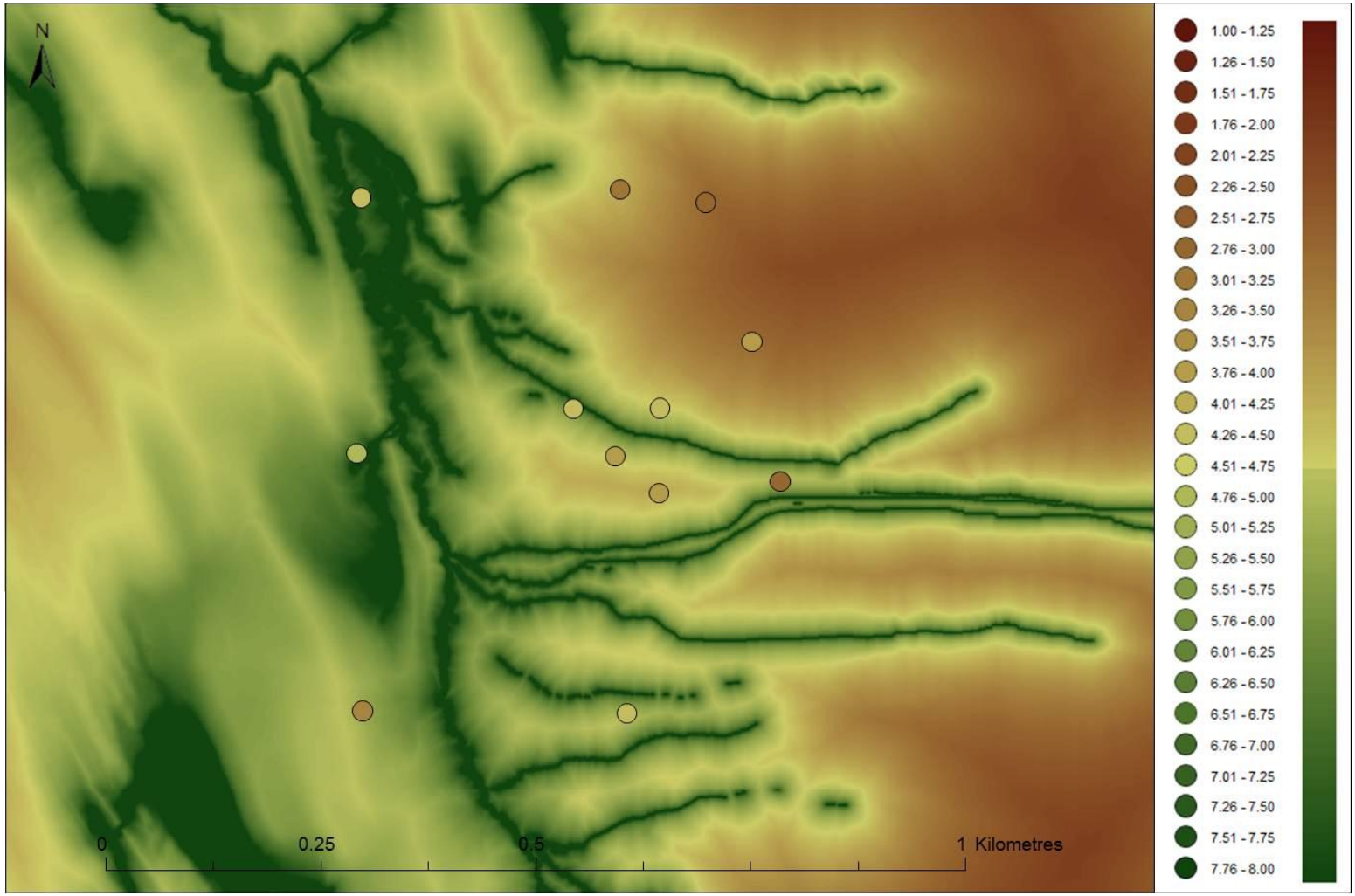



Figure 35. Example vegetation index map for site S5 within the Willmore Wilderness Park, based on an algorithm derived from the regression of species abundance-calculated plot-based VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale.

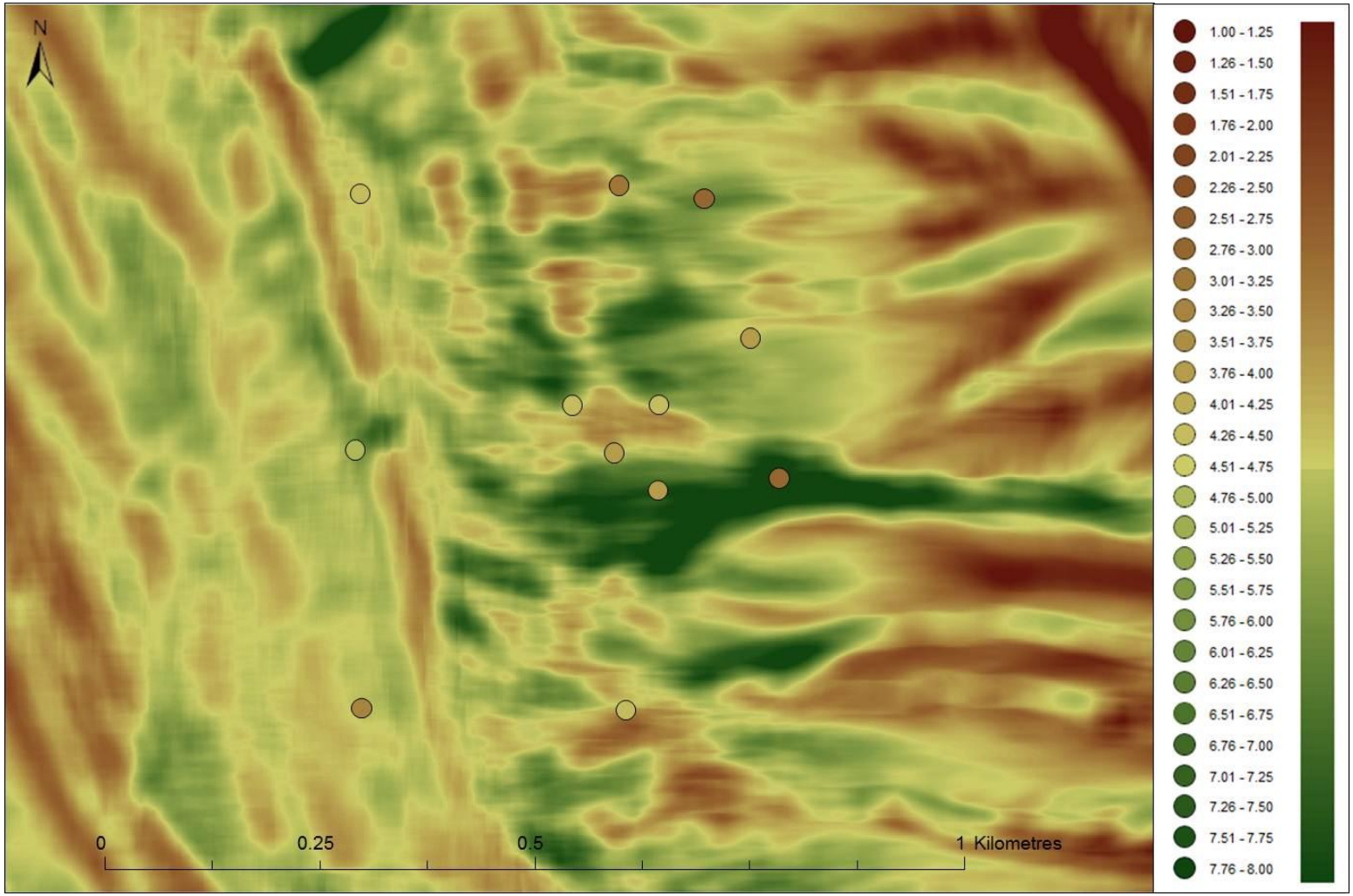



Figure 36. Example vegetation index map for site S5 within the Willmore Wilderness Park, based on an algorithm derived from the regression of species VI values grouped by whole-integer classes and mean 40x40 m focal-averaged terrain wetness index (TWI) for each class. Circles indicate plot locations, coded by VI colour scale.

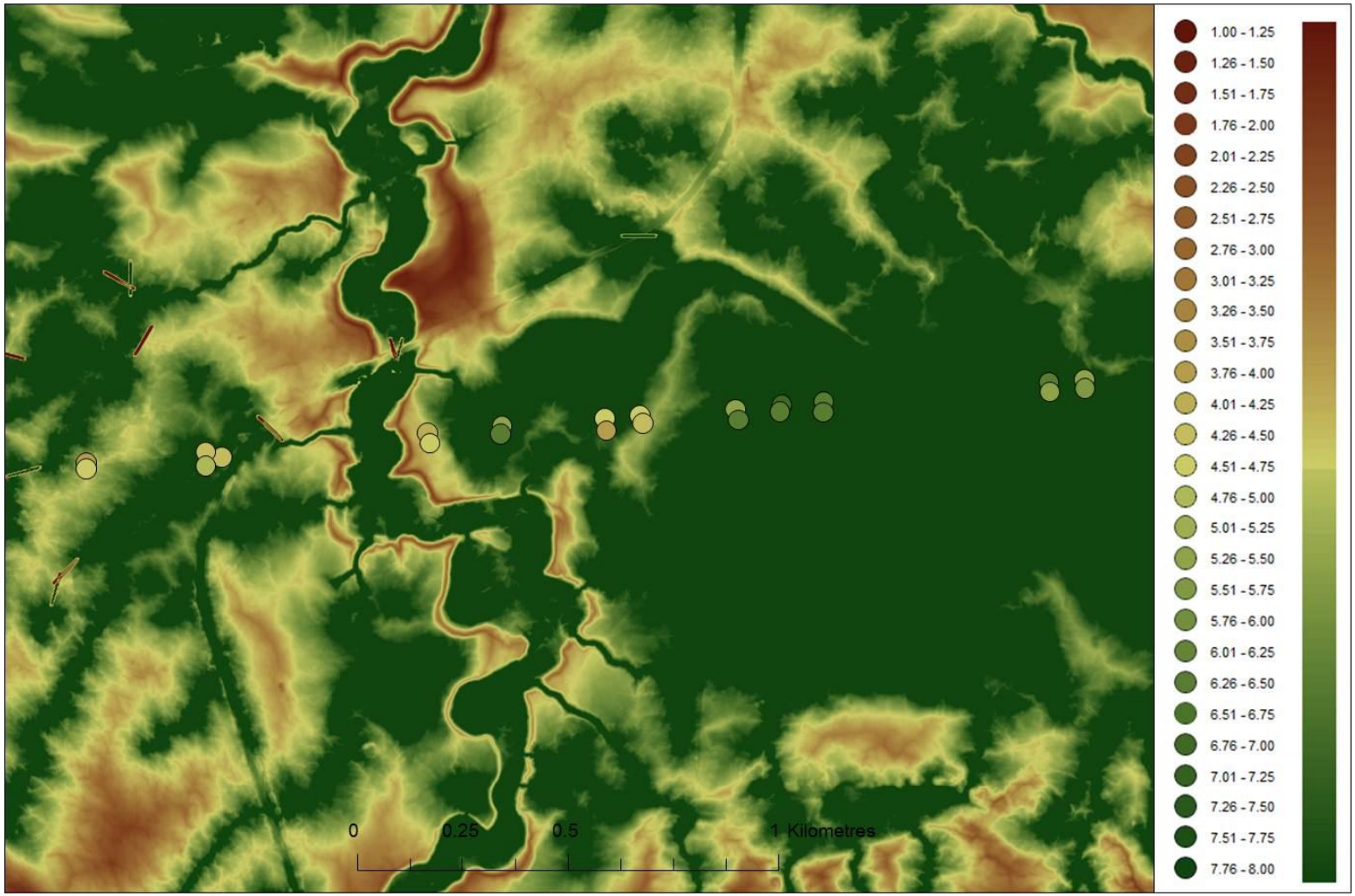



Figure 37. Example vegetation index map for transects T24 and T25 within the EMEND Research Area, based on an algorithm derived from the regression of individual species VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale.

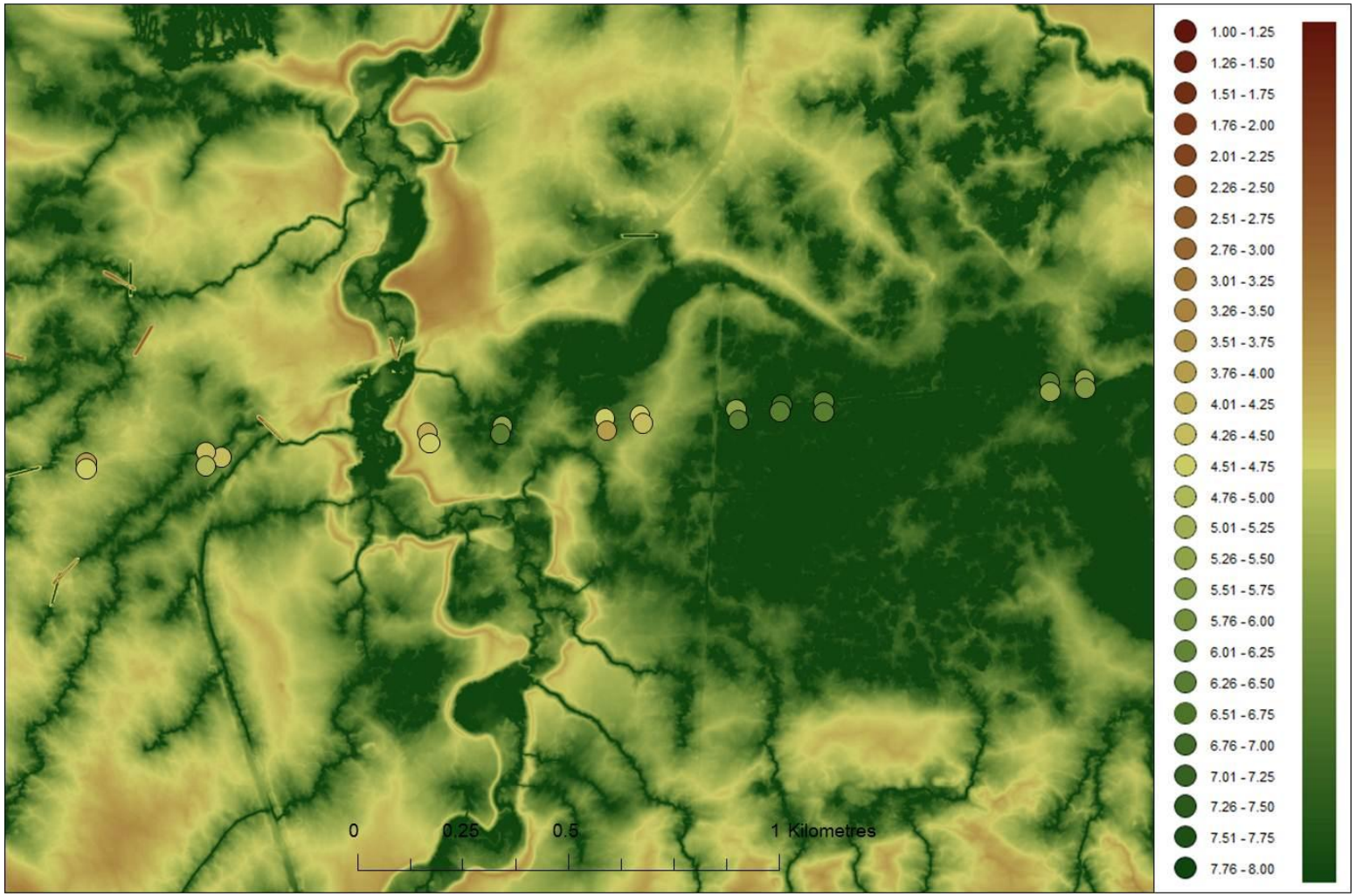



Figure 38. Example vegetation index map for transects T24 and T25 within the EMEND Research Area, based on an algorithm derived from the regression of species abundance-calculated plot-based VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale.

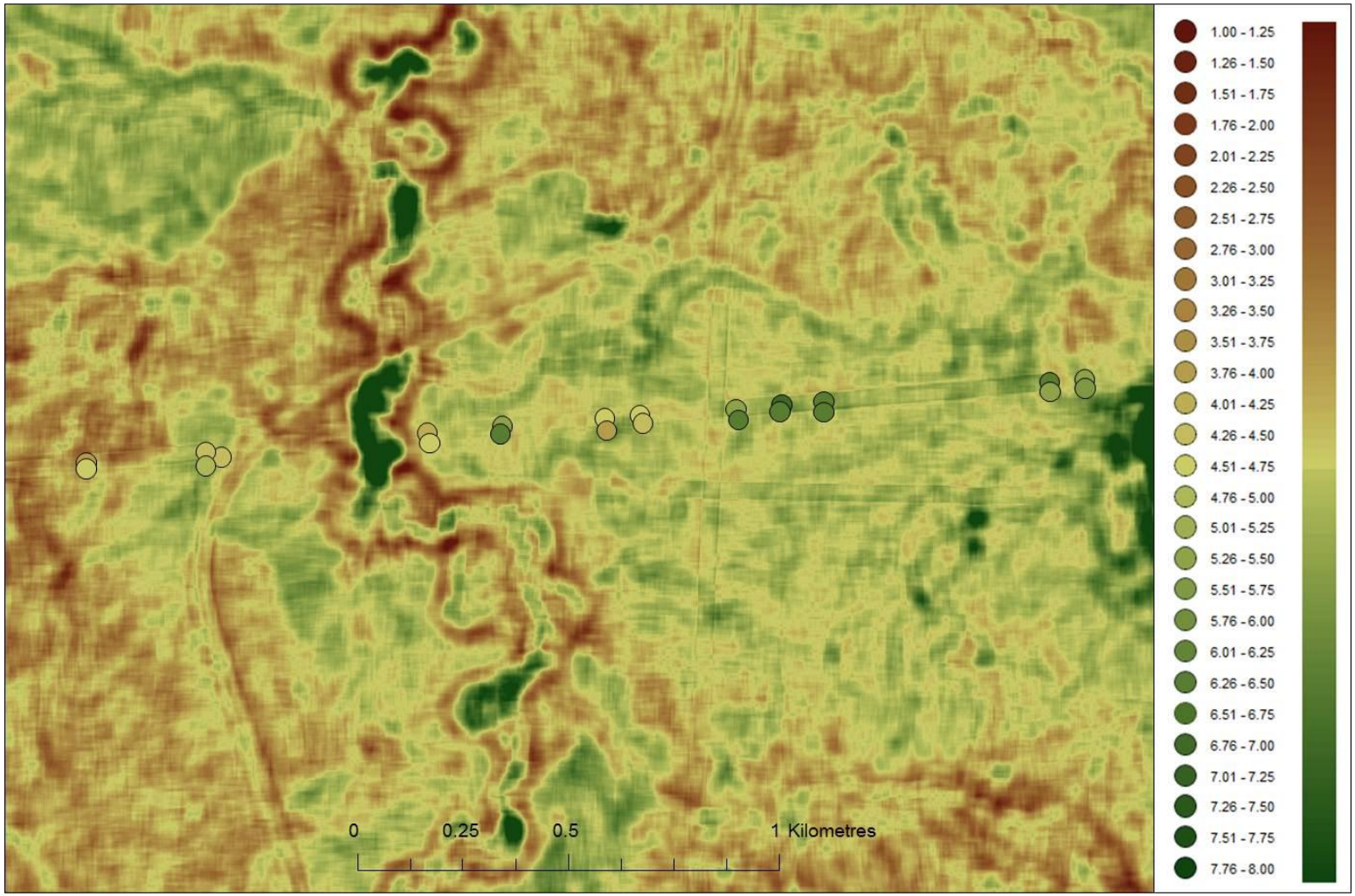



Figure 39. Example vegetation index map for transects T24 and T25 within the EMEND Research Area, based on an algorithm derived from the regression of species VI values grouped by whole-integer classes and mean 40x40 m focal-averaged terrain wetness index (TWI) for each class. Circles indicate plot locations, coded by VI colour scale.

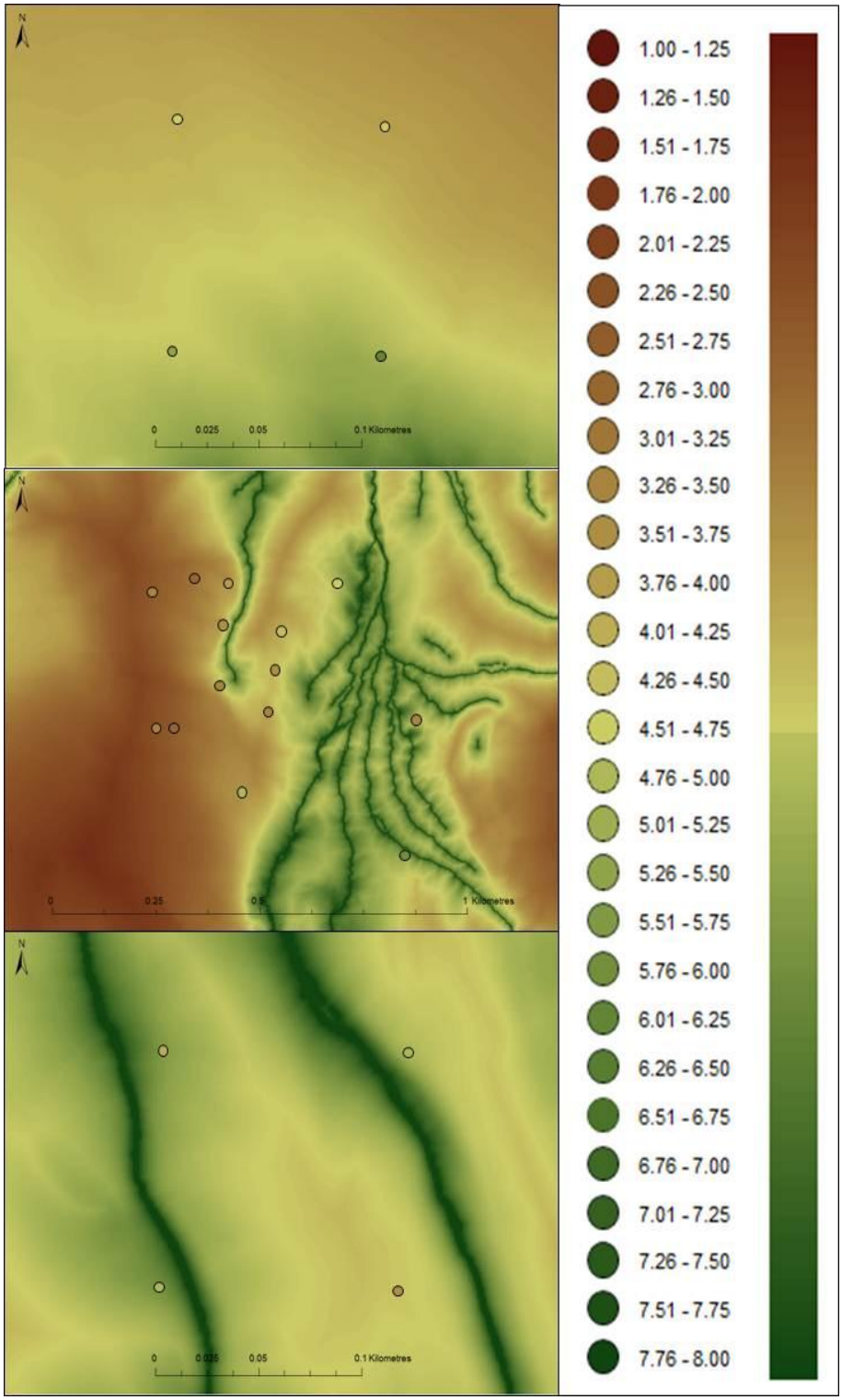



Figure 40. Example vegetation index maps for sites E9 (top), S16 (centre), and S4 (bottom) within the Willmore Wilderness Park, based on an algorithm derived from the regression of individual species VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water (DTW) for each class. Circles indicate plot locations, coded by VI colour scale.

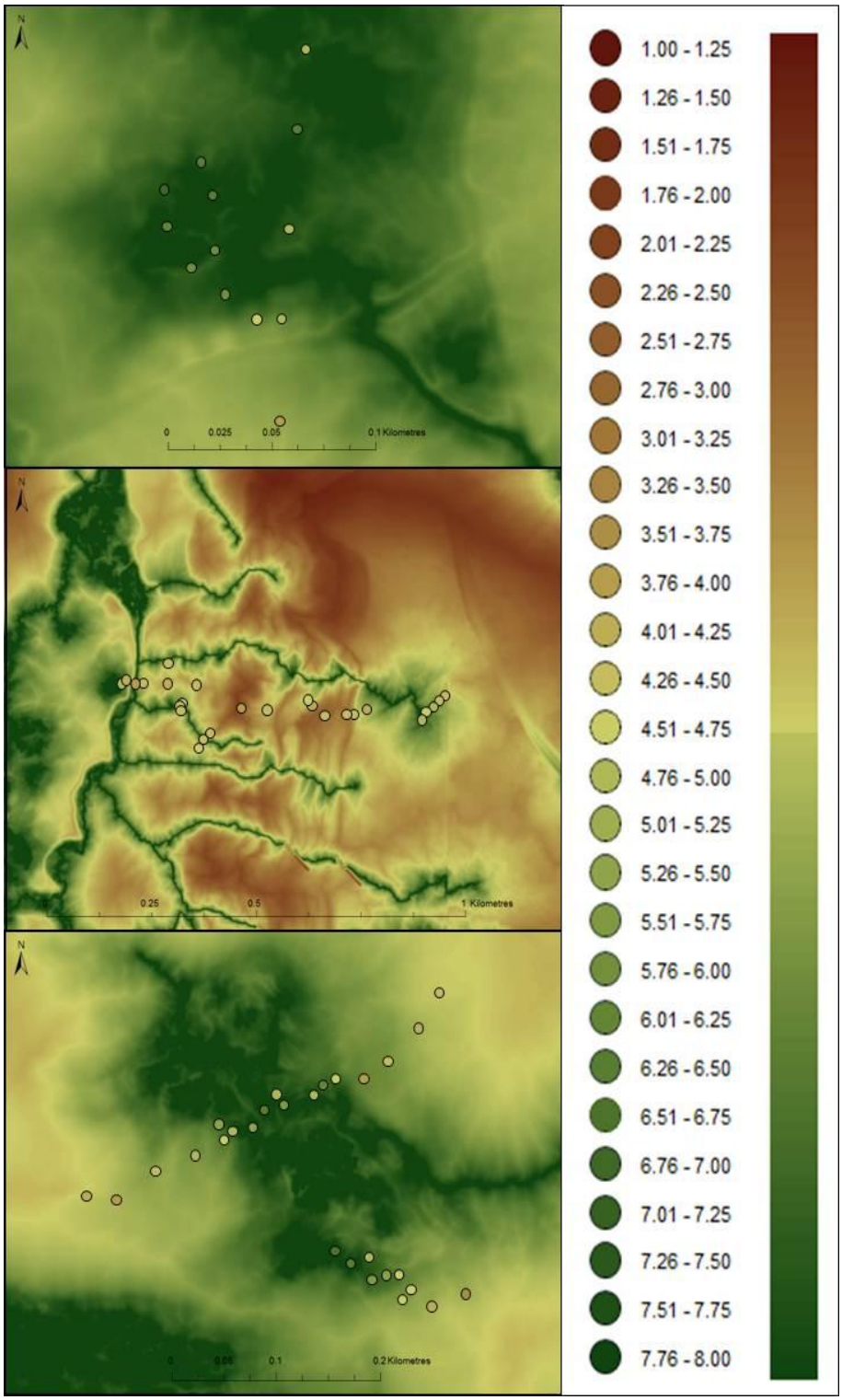



Figure 41. Example vegetation index map for transects OT8 & T11 (top), OT2 (centre), and T18, T19, & T20 (bottom) within the EMEND Research Area, based on an algorithm derived from the regression of species abundance-calculated plot-based VI values grouped by whole-integer classes and mean 4 ha flow initiation $\log_{10}$ depth-to-water values for each class. Circles indicate plot locations, coded by VI colour scale.

## MULTIPLE-REGRESSION ANALYSIS

All field-collected data and GIS derived data for each survey plot underwent comprehensive multiple-regression analyses to explore the strength of unclassified plot-based VI relationships with soil moisture as well as with other factors, e.g. slope, aspect, elevation, disturbance, and survey plot size. The regressions also considered plot VI values based on different methods of weighting and calculating. In the process, the algorithm for the DTW derivation was improved by tracking the least-cost path to each landscape cell from its nearest DTW = 0 location (presumed surface water location according to the 4, 1, or 0.25 ha flow channel network) by elevational rise only. Doing so improved the DTW and VI especially across the wetland portions of the Willmore and EMEND areas. Subsequently, this new DTW dataset was incorporated into further analyses, in addition to those from the previously used algorithm, to provide a newer, more realistic interpretation of how water flows across very flat areas and through raised sphagnum bogs. These new DTW data were incorporated to evaluate how they affected the strength or weakness of previously determined VI-moisture relationships.

Although slope, aspect, elevation, and other considerations affected soil moisture, any iterations of the multiple-regression analysis seemed to indicate that they did not impact the VI-soil moisture relationship in a significant way for the current dataset. The correlation of slope and aspect to VI is represented visually in Figure 42. As a result of this determination, it became evident that the strongest unclassified plot-based VI-moisture relationships come from simple regressions of VI values and soil moisture. The

remaining uncertainty was which combination of VI calculation, soil moisture predictor, and flow initiation/focal averaging threshold showed the clearest relationship. Regression of TWI values produced very weak $R^2$ values with both species presence-calculated and species abundance-calculated VI values (Figure 43). TWI values used were for the 40x40 m focal average, which had performed best when compared to other averages in VI regressions. All further regressions included various DTW datasets and all showed stronger relation to VI values (Figures 44-47). VI calculated by species presence alone consistently showed higher $R^2$ values VI calculated by species abundance (Figures 44 & 45, Figures 46 & 47). Presence-calculated VI regressions also show a narrower and more even spread of the data points (Figures 44 & 46). Of the various DTW data used in regression with ungrouped presence-calculated VI values, the DTW produced using a 1 ha flow initiation threshold showed higher $R^2$ values than the commonly used 4 ha FI DTW (Figures 44 & 46, Figures 45 & 47). Finally, when evaluating the DTW values based on the new DTW mapping algorithm and how they relate to VI values, these new values consistently produced higher $R^2$ values in regression (Figures 44 & 46). After all these comparisons, the clearest and strongest ungrouped VI-moisture relationship was defined by the regression of species presence-calculated VI and DTW produced with a 1 ha flow initiation threshold and the newly developed DTW mapping algorithm. This regression showed an $R^2$ of 0.416, which, though still relatively low, best captures the variation in the VI-moisture relationship.

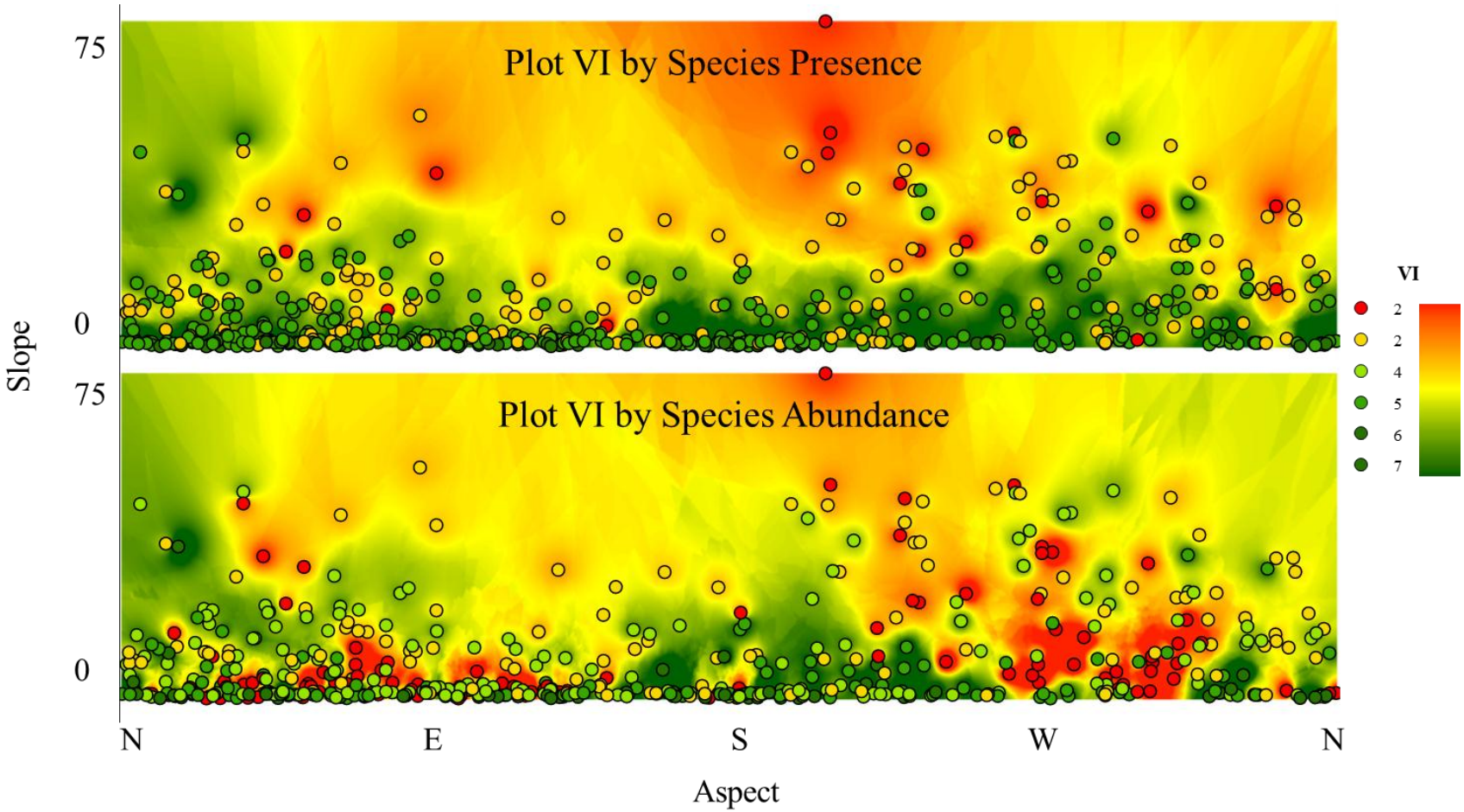



Figure 42. Colour-coded representation of the correspondence of plot-determined VI values to Slope and Aspect.

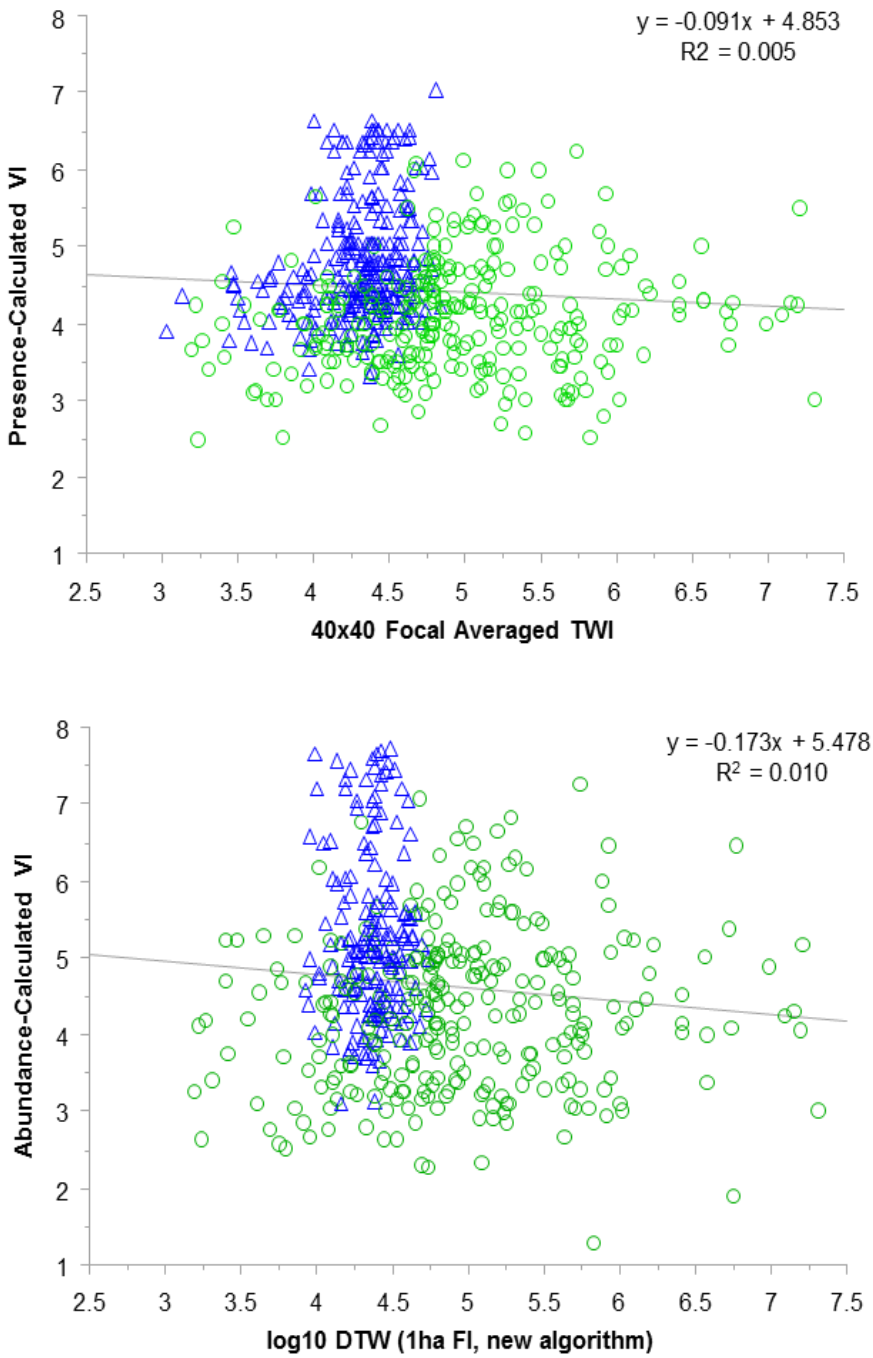



Figure 43. Comparison of regressions of 40mx40m focal averaged TWI values with species presence-calculated VI (top) and species abundance-calculated VI (bottom) values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values.

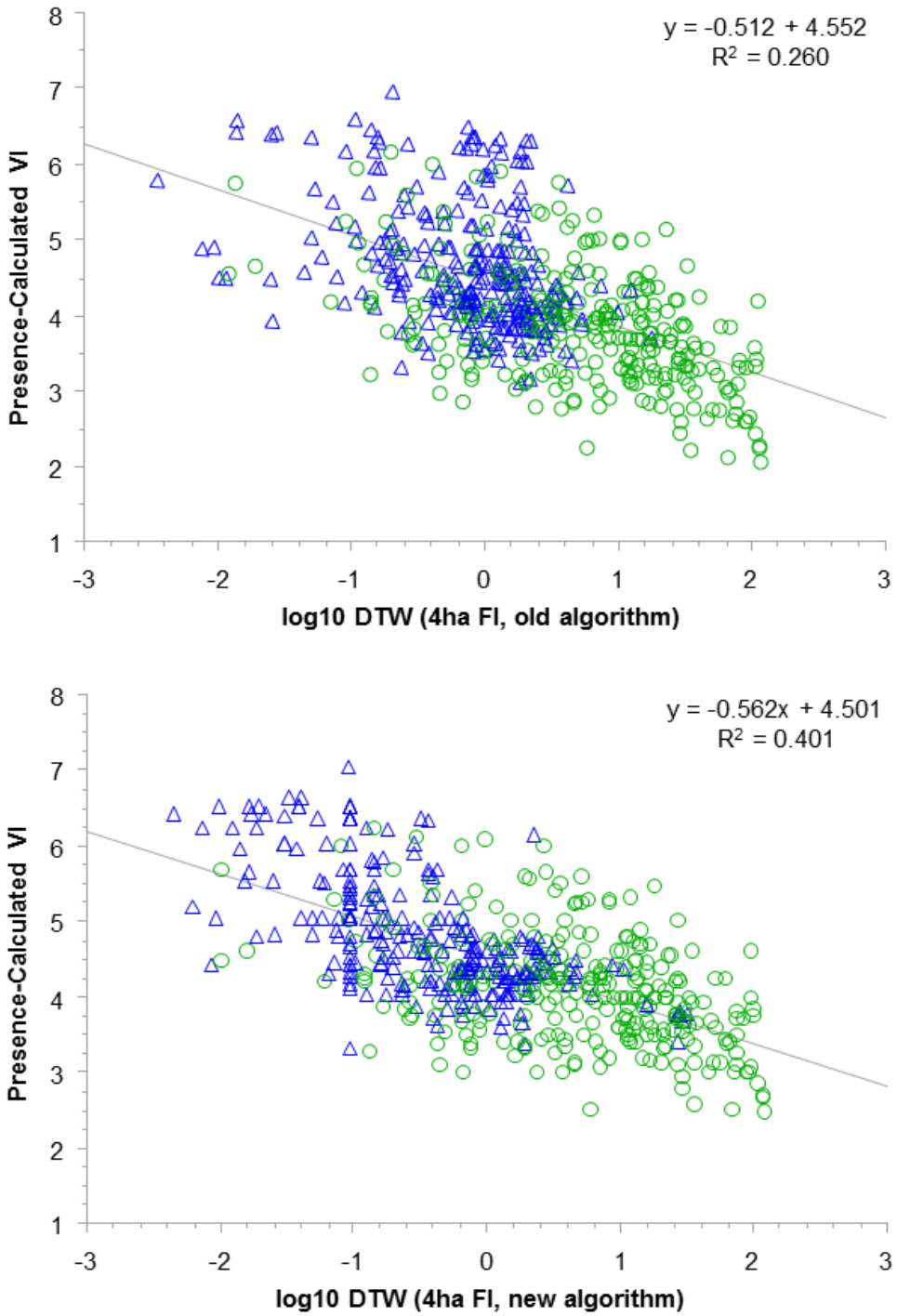



Figure 44. Comparison of regressions of 4 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species presence-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values.

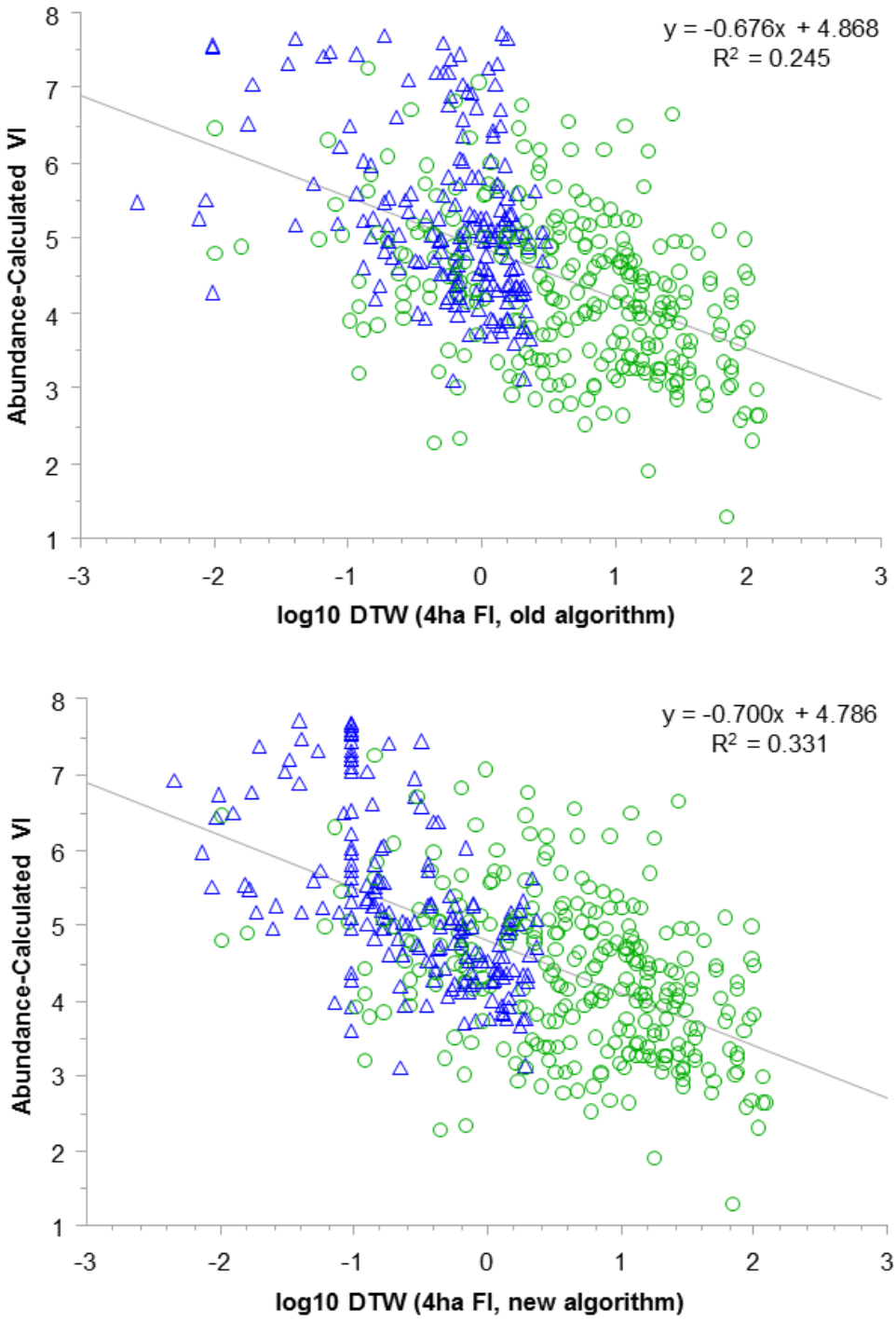
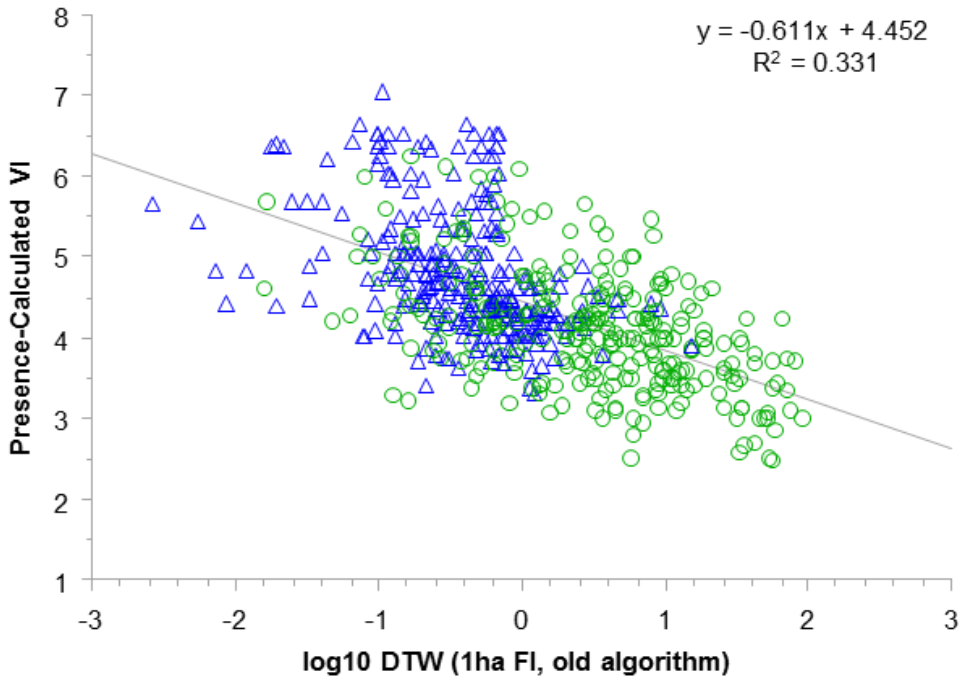



Figure 45. Comparison of regressions of 4 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species abundance-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values.



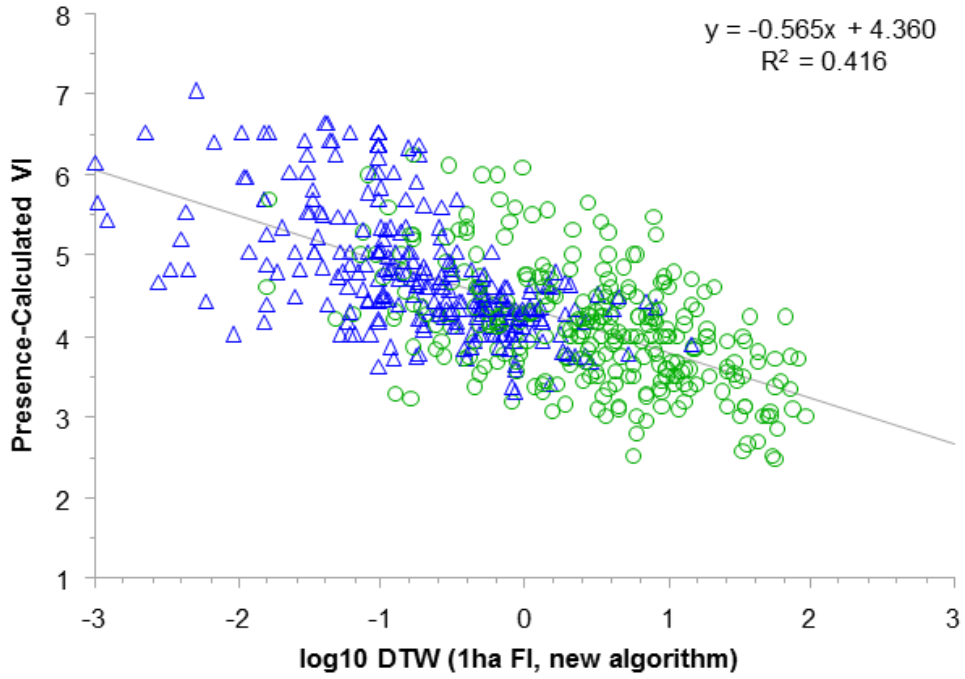




Figure 46. Comparison of regressions of 1 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species presence-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values.

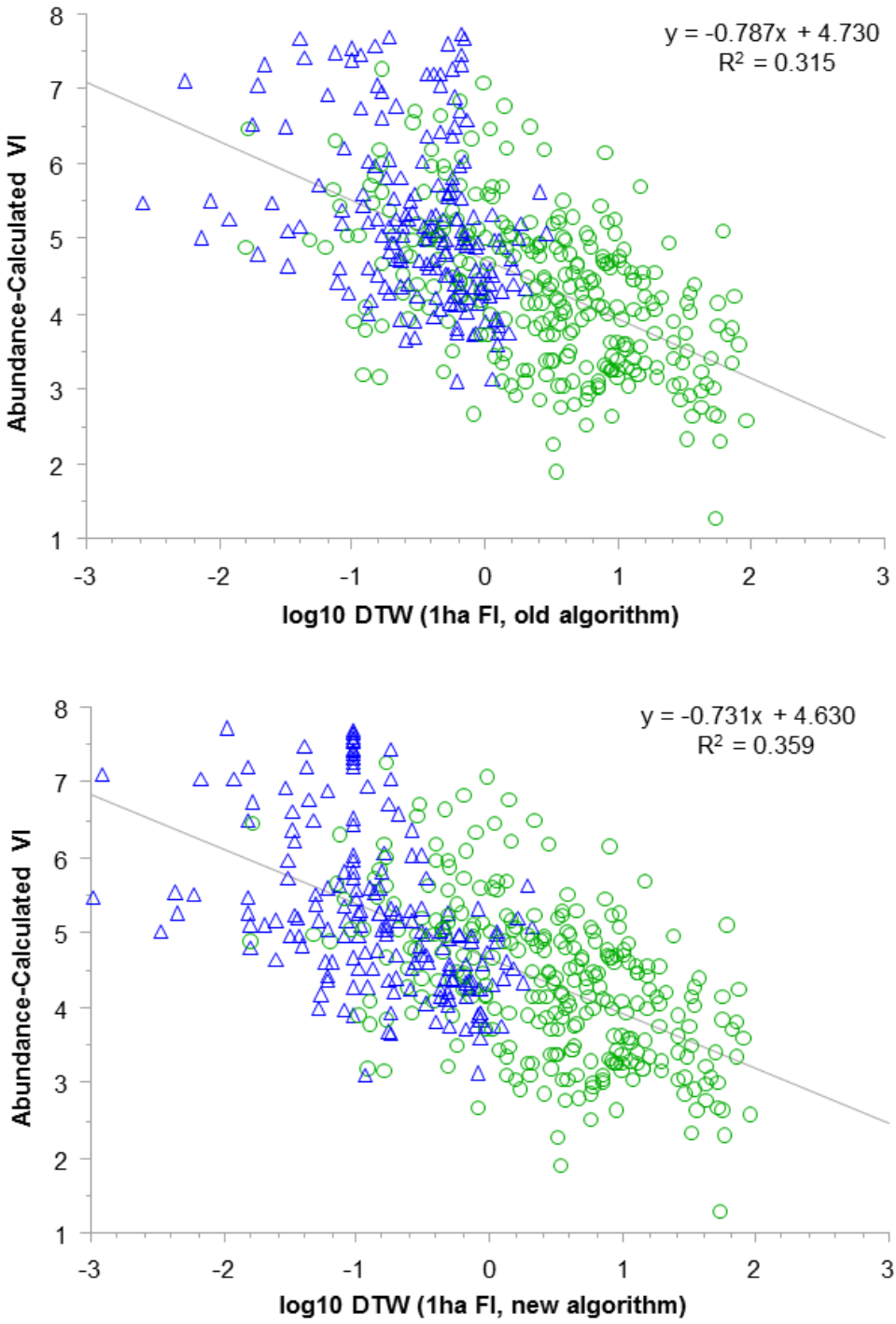



Figure 47. Comparison of regressions of 1 ha flow initiation DTW values based on the previously used DTW algorithm (top) and the newly developed DTW algorithm (bottom) with species abundance-calculated VI values for the Willmore Wilderness Park (green circles) and the EMEND Research Area (blue triangles), located in Alberta, Canada, showing regression equations and $R^2$ values.

# DISCUSSION

## REGRESSION ANALYSES

Regressions were carried out on many combinations of variables in order to determine the combination of criteria that would best capture the relationship between the vegetation growing at a given site and the hydrological and geographical characteristics of that site. One key area assessed included different moisture predictors and sensitivities to different averaging and different models/algorithms for producing those predictors. Another explored the magnitude of the effect of slope, aspect, and elevational position of the vegetation survey plots on moisture regime and its relation to present vegetation. A thirdassessed the method used to calculate VI values using individual species assigned moisture preferences and ranges as well as the species presence and relative abundance at a given site. The culmination of these analyses was to translate the mathematical relationships described in the regression formulae into a model that would produce an accurate and operationally useful VI landscape map. Though such maps show great promise and level of accuracy, no model can totally capture the variability of very complex natural systems. No model can be expected to perfectly conform to determined VI-moisture trends.

Two main moisture mapping techniques were assessed in this study, those being the terrain wetness index (TWI) and depth-to-water (DTW) mapping. In every case in this project DTW shows much higher regression $R^2$ values than does TWI. This had been previously indicated by Murphy *et al.,* (2011) in trying to relate TWI and DTW to

vegetation types. The results seem to show lower $R^2$ when attempting to relate the TWI to individual species or calculated plot VI values. TWI values seem too widely variable to capture the relation between vegetation and moisture.

Since results generally showed DTW values had a much higher correspondence to both individual species and calculated plot VI values than TWI, the next question became which means of determining DTW values produced the strongest regressions. DTW mapping can be produced with any flow initiation threshold, which is the number of hectares needed to drain into a particular point for the potential of flowing water to be present. For most applications, DTW mapping using a 4 ha flow initiation threshold is considered to be the most generally usable. Setting a higher flow initiation threshold has the effect of making the landscape appear drier while a lower threshold makes water appear closer to the surface (White *et al*. 2012). While 4 ha FI DTW values showed a very high correspondence to VI values, DTW values produced from a 1 ha threshold outperformed 4 ha DTW values in many cases and quite often showed a more even spread of data points along the VI gradient. However, this does not necessarily mean that 1 ha DTW maps better predict the position of the ground water table. In addition, even accurate estimates of the depth to water table may not precisely predict vegetation because plants are affected by moisture above the surface from various sources. In any case, both the 4 ha and 1 ha FI thresholds produce values suitable for VI mapping and with further study and calibration, a universally viable FI threshold can be identified for more accurate VI mapping.

Availabiility of water for plants is also related to drainage speeds, flow patterns, which are in turn influenced by geophysical attributes such as soil texture, slope, aspect, and elevation (Murphy *et al*. 2007, Austin 1980, Austin 1987)). Because soil survey data are largely incomplete and often out of date for the province of Alberta, this project focused on accounting for slope, aspect, and elevation. These values are more easily obtained through high-resolution GIS data and are continuous across the study areas. Surface water tends to drain and run-off areas of high slope than flat areas; the former would favour slightly drier species. Evaporation rates change diurnally, exacerbated by slope. For example, evaporation of soil moisture would be far lower. As the Earth rotates, the Sun's angle and intensity change from morning to afternoon. Within the morning hours when both light intensity and temperature are generally lower than in the afternoon sun. In the northern hemisphere, slopes with southern aspects would have much greater solar interception than north-facing slopes that never intercept direct sunlight. Elevation can affect moisture availability in two main ways. Very high elevations often retain water as ice and snow for longer periods of time than low-lying areas. The same thinner atmospheric conditions that cause lower temperatures and more solid, inaccessible water also allow for more intense solar radiation levels. Both of these phenomena mean less water available for plant uptake at high elevations and a subsequently shorter growing season.

Regardless of these trends, multiple regression analyses showed little significant effect from these geophysical attributes. Some results did show a stronger effect of slope on VI-moisture relationships than for aspect or elevation. This stronger effect of slope over

aspect may be due to the more immediate nature of the influence of slope on drainage and water flow. Aspect, on the other hand, has a slower more cumulative effect on evaporation and drying rates that is easily negated by weather and climate. This general lack of influence can also be attributed to insufficient data on these types of areas to fully capture the influence of these factors. Further field data collection, targeting sites at the extreme values of slope, aspect, and elevation, may further define these quantities' influence on the VI-moisture relationship.

Results vary depending on weighting and averaging of species VI values in plot VI calculation. Since relative abundance data were available for the majority of survey plots across both study areas, plot VI values were calculated both utilizing species abundance data (based on % of 3D ground cover) and utilizing species presence. . Under the abundance-weighted averaging, a species with a high relative abundance within a survey plot has a proportionally higher influence on the calculated VI value for that plot. Using species presence data, all species have equal influence, regardless of how much of the plot they occupied. Intuitively, abundance weighting would seem to provide a more accurate assessment of a plot's suitability to sustain a given species. If a species is abundant in a plot, it suggests that that plot and its moisture regime are very well suited to that species. This, however, may not always be the case. In the regression analyses, VI calculated by presence consistently showed higher correspondence to DTW values than did abundance-calculated VI. This trend could be explained by a number of factors. First, the sample size was larger for presence data: species ground cover/abundances were not part of the surveys conducted at EMEND in 2008 field season. Second, many biotic and

abiotic factors affect species presence and percent cover, e.g. [here you should think about the logical order in which you will address them] range of ecological tolerance, plant growth form, life history strategy (including dispersal mechanisms), and Percent cover does not account for the number of individuals of a given species within a plot. This shortfall is mitigated partially by using what is referred to as three-dimensional percent ground cover in which ground cover for each species is recorded as if no other species were present. Smaller plants closer to the ground are still accounted for even if they are not easily seen through larger plants between eye level and the ground. This mitigation technique for still does not fully account for the fact a single large shrub may appear to have the same abundance as hundreds of individuals of a much smaller species.

This leads to another consideration to the validity of any relative abundance data: plant species dynamics and interactions, including competition. There are a number of processes that can cause one species to thrive on a site that may not be optimal. Plants differ in life strategies and genetically programmed patterns of resource allocation). Some plants have evolved to be prolific seed producers with the strategy that even if their seeds are small and vulnerable that greater quantity will mean greater chances of dispersal to favourable germination conditions. This strategy of producing many, low energy cost offspring is generally referred to as r-selection. Other species produce very few but very robust seeds that can wait for favourable growth conditions. This strategy of producing very few, high energy cost offspring is generally referred to as K-selection. Both of these life strategies allow for some level of opportunism in where species can germinate and establish themselves.

When dealing with plant propagation and growth, one must also accept random chance as a factor. A seed from any given species may happen to land on a site that is not within the parameters of that species preferences yet it may germinate and even flourish. Plants are after all, biological entities genetically driven to grow and reproduce regardless of adverse circumstances.

Though all plant species have ranges of ecological tolerance with regard to essential resources (e.g. moisture) and conditions (e.g. temperature regimes), some are narrower ranges than others. Scientific opinion and published literature can vary greatly as to what the exact requirements/preferences are for any given species, and many are based on induction, i.e. generalization from observation, rather than tests of hypothesis. Descriptions of species' "typical" habitats (which are often interpreted to be "preferred" or optimal) with regard to moisture are most often qualitative, written descriptions that are difficult to directly compare or rank. While some plants tend to grow only on sites with very specific moisture regimes, others can thrive on a much wider spectrum of moisture classes. The difficulty in predicting where these more generalist species will be found can be partially mitigated by taking into account the range of moisture regimes in which they has been documented (Appendix A). In any case, the assignment and classification of quantitative, numerical moisture index values from qualitative habitat descriptions is a difficult and imprecise process. Regardless of how many texts are consulted there will always be some disagreement. Overall, these factors introduce a certain amount of error in the VI indexing and mapping process. This error and

uncertainty could be mitigated if an effort were undertaken to develop a comprehensive, quantitative database of limits of tolerance for North American plants, similar to the Ellenburg indicator system used in Central Europe.

Some species' life strategies are associated with different stages of ecological succession and competition with other species for resources including water. For example, some considered to be early successional tend to be well-dispersed, short-lived, fast-growing, tolerant of temperature and light extremes but not competitive stress. These species tend to establish and grow on any disturbed site before poorly dispersed, often slower growing but more competitive late-successional species can establish themselves. These differences in tolerance for different stressors, species interactions and the temporal nature of succession dynamics can cause species to appear where growth conditions are tolerable, not necessarily ideal.

Another consideration in evaluating relative abundances of vegetation species is how they interact with other plants and even animals. Some plant species (e.g. *Picea engelmannii*, *Solidago spp*, *grasses.*) exhibit a process known as allelopathy, in which they can secrete various chemicals and hormones that inhibit germination and growth of species that may compete for resources (Barbier 2008, Coder 1999, Larso and Schwarz 1980). This exclusion of other species could potentially skew relative abundance and presence, depending on the plot size, data. Some plants display commensal or mutual relationships with other plants, mycorrhizal fungi, insects, and animals. The presence or absence of those with obligate mutalists could also affect species abundance data.

Ultimately species presence alone, though more simplistic, may have proven more appropriate for calculating plot VI values.

VI mapping produced in this study appear to have a high level of conformance to field-observed vegetation data (Figures 34-41), though some areas seem to have a higher conformance with algorithms derived from different regression relationships. For example, mapping for the Willmore Wilderness Park produced better results using the relationship between species VI classes and DTW (Figure 34, 35, & 40). However, maps of the EMEND area appear to conform better when produced with the relationship between plot-averaged VI and DTW (Figures 37, 38, & 41). The future challenge coming from these positive mapping results based on different algorithms would be to find a single algorithm that can be applied not only across both of this project's study areas but across broader landscapes as well. This could be achieved by further targeted data collection and analysis for areas not well represented in the current dataset and by further refinements to both DTW and VI mapping algorithms. As was illustrated in Figures 43-47, new DTW mapping recently made available has already led to a greater capture of variability.

Presence and abundance of different species found where they are not expected can also be caused by human intervention in an area. Means for this include unnatural propagule dispersal patterns, resulting in introduction (intentional or unintentional) of garden plants and other invasive species. Once moved around or into a given area these species may prove able to out-compete the normal species for these areas for resources. At best this

would require a re-classification and calibration of any VI model and at worst makes modelling impossible.

As with all attempts to model natural systems, no effort will ever achieve 100% conformance with what is observed in the field. This uncertainty can be caused by many things in such complex systems: unpredictable abiotic factors such as climate and weather patterns, biological interactions (including competition, herbivory, mutualism, etc.), genetics and species adaptation, and anthropogenic influences.

## IDENTIFIED NON-CONFORMANCES

In analysing VI-DTW trends over the two study areas, several survey plots had calculated VI values that differed significantly from what would be expected if only examining DTW values for those plots. Instances of non-conformance could be attributed to many things including vegetation competition, species dynamics, disturbance regime, inaccuracy in derivation and averaging of the VI values, and problems with the underlying DTW maps. Ofcourse, when dealing with plant propagation and growth, one must also accept random chance as a factor. A seed from any given species may happen to land on a site that is not within the parameters of that species preferences yet it may germinate and even flourish. Plants are after all, biological entities genetically driven to grow and reproduce regardless of adverse circumstances. Though these complex interactions may make 100% conformance very unlikely, the a description some of these non-conformance plots including photos and images, relevant vegetation and geospatial

data collected at and projected for the plots, as well as possible explanations for the non-conformances can be found in Appendix E.

## POTENTIAL APPLICATIONS OF WORK

The ability to accurately predict sites where different vegetation types are likely to be found, or may have the potential to establish, has widespread natural resource management implications. If GIS data could be used to predict vegetation types, potential habitat/risk maps can be produced for different applications across the landscape. These maps would provide valuable a priori knowledge that can be used to streamline landscape management and planning before entering the field, saving time and resources. One immediate impact of the work in this thesis is that, for the first time, DTW technology is providing links to understanding ecological function and structure. With further time and research these links may be expanded for applications in silviculture, site indexing, tree growth and yield, biodiversity, and forest stand structure.

There are also potential applications in environmental science and conservation. The approach might be employed in combination with other soil-moisture and climate change models to assess and predictively map vegetation change with changing climate and moisture gradients (Woodward 1987, Neilson 1995). In essentially undisturbed areas, the outlined approach could allow for: ready visualizations of likely encroachment pathways taken by invasive species, locating and delineating potential endangered flora habitat elements, and locating possible faunal habitat elements. This approach could also aid in

delineating potentially vulnerable areas for specific flora and fauna to anticipated disturbances. Many rare and invasive species have very specific soil moisture requirements. Invasive species programs could then be focused in areas where patterns show highest risk of spread (Lieffers 1993). At the same time, areas can be weighted based on their potential to support rare species before being allocated for development in land use plans. This would provide one more means of stratifying sampling efforts for rare or elusive species which is often a difficulty in plant ecology (McDonald 2004). Other potential operational and land-management applications would include assignment or confirmation of eco-site classifications and wetland delineations, the selection of site-suited plant species for reclaiming disturbed locations, planning trails and access routes that are designed to minimize disturbance to floral and faunal habitat elements. These maps may also provide additional means of identifying areas that may provide moisture concerns for forestry operations.

In restoration and reclamation, it is helpful to be able to predict the influence of local topography on both pre-disturbance and post-disturbance variations soil moisture regime and the related vegetation patterns. While high-resolution DEMs may not be available for mapping pre-disturbance conditions, it is possible to approximate the pre-existing patterns based on coarser resolution DEMs where available. To assess disturbed areas, the resulting maps could be utilized to predict the pathways of invasive vegetation based on the species-specific dispersal methods and moisture requirements according to do-nothing scenarios taking into account influence of the surrounding, undisturbed areas (Harper *et al*. 2005). Examples include making line-specific restoration plans from

established lineal inventories and deriving indices regarding re-vegetation, browse & forage, trafficability, and line-of-sight (Nash 2010). The VI mapping approach based on DTW mapping could also potentially be used to predict and assess the magnitude of disturbance impact on local vegetation (Latifovica *et al*. 2005; Sitters *et al*. 2011). For heavily disturbed areas, the described methods have the potential to be used for mapping locations that may aid or detract from achieving desired re-vegetation goals based on modelled evidence of excessive soil wetness or dryness.

VI maps based on soil moisture regimes may become an important filter in mapping the distribution of plant and animal species and communities by way of multispectral and hyperspectral image analyses (Ghiyamat 2010). They could also have the potential to be used to as one indicator of species richness across the landscape.

## SUGGESTIONS FOR FUTURE WORK

Future avenues for improvement of the DTW-based VI mapping approach should address refining its predictive value in dealing with (i) landform based differences in soil drainage (e.g., sandy alluvial plans would generally be drier than morainal and colluvial surface deposits), (ii) topographic differences pertaining to discharge versus recharge areas: the former would be somewhat drier than the latter, depending on local curvatures, and (iii) further consideration of slope, aspect, elevation, and climate conditions. In order to address any of these concerns, it is recommended that further field data be collected in areas targeted as falling within the extremes of such values, so that the model can be

calibrated for them. Examples of these areas to be targeted for further sampling would include areas of steep slope, North and South facing slopes, and areas of high elevation. Another area of expansion would be additional plot-based vegetation indexing in direct reference to Ellenberg indicators and factors such as local changes in precipitation, soil nutrient availability, acidity, salinity, and light availability, thereby determining how these factors also affect plot-specific species occurrences and vegetation type in relation to local topography and other factors in North America specifically.

# CONCLUSIONS

The work presented in this thesis comprises the first attempt to expand DTW mapping beyond operational considerations by linking it to ecosystem condition and processes. By doing such, this work has contributed to the Alberta Government's adoption of DTW-based wet-areas-mapping as a formal database and to further invest in research which relates soil moisture with ecosystem processes. Through plot-based indexing of vegetation type by soil wetness (VI), and correlating the same to LiDAR cartographically derived depth-to-water index (DTW), it is possible to model and map the VI variations across the Willmore Wilderness Park and the EMEND area at 1-metre resolution. Results have shown a 40-50% capture of the individual plot-by-plot VI variations using regression analyses, and up to 97% capture of vegetation-moisture relationships using classified regression analyses. This constitutes an improvement over some previous moisture-based VI indexing techniques either associated with image-based spectral analyses, or other topographically derived wetness indices, notably TWI (Murphy 2011). However, more refinements to the modeling process and a broader database should lead to greater correlation in future work. If so, the maps produced for the two study areas in particular could be useful for developing detailed response and mitigation measures to actual or anticipated disturbance scenarios. This may include conservation and protection of the Willmore Wilderness Park from physical and biological intrusions, by delineating possible migration paths for invasive flora. The maps could provide insight into identification of potential habitat for species of concern. They could also be used to predict soil-mitigated vegetation responses to the various forest-management actions within the EMEND area within the context of the local soil moisture variations. The

research presented in this thesis provides examples of how the VI mapping results could be applied to other locations with specific vegetation and habitat protection, and restoration interests and needs (Latifovica *et al.* 2005; Sitters *et al.* 2011). For essentially undisturbed scenarios, the approach would allow for ready visualizations of likely encroachment pathways taken by invasive species, and delineating the vulnerable areas of specific habitats for plants and animals to anticipated physical or biological disturbances. For severely disturbed areas, the approach lends itself to identifying locations that may contribute to, or detract from, achieving desired re-vegetation goals due to excessive soil wetness or dryness at high-resolution.

The maps may also serve as useful tools for addressing many important research and management concerns. These concerns include vegetation and soil water interactions in general (Naeth et al. 2011), as well as interactions along roads (active or abandoned), trails, seismic lines, pipe lines, power lines, dikes and other linear and non-linear structures in particular (Nash 2010, Crisfield *et al.* 2012).

Ultimately, the end product of the research in this thesis would have the simplicity of colours on a map. These colours would be a visual, cartographic representation of predicted vegetation gradients. This information could be used by forest managers in both long-term strategic planning as well as day-to-day operations across a wide array of forest values. As with any modeled data, however, the result would be intended as a broad filter decision-aiding tool and not as an absolute representation of reality.

# REFERENCES


Austin, M.P. (1980). Searching for a model for use in vegetation analysis. Plant Ecology, 42, 11-21.

Austin, M.P. (1987). Models for the analysis of species response to environmental gradients. Plant Ecology, 69(1), 35-45.

Anderson, R.P.A., Peterson, T., & Egbert, S.L. (2006). Vegetation-index models predict areas vulnerable to purple loosestrife (*Lythrum salicaria*) invasion in Kansas. The Southwestern Naturalist, 51, 471-480.

Barbier, S., Gosselin, F., & Balandier, P. (2008). Influence of tree species on understory vegetation diversity and mechanisms involved—a critical review for temperate and boreal forests. Forest Ecology and Management, 254(1), 1-15.

Beckingham, J.D. & Archibald, J.H.. (1996). Field guide to ecosites of Northern Alberta. Alberta: Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Centre.

CanSIS (2012). CanSIS - Canadian Soil Information System. Agriculture and Agri-Food Canada. < http://sis.agr.gc.ca/cansis/index.html>.

Chávez, V., & Macdonald, S. E. (2010). The influence of canopy patch mosaics on understory plant community composition in boreal mixedwood forest. Forest Ecology and Management, 259(6), 1067-1075.

Coder, Kimberly Dean. Potential allelopathy in different tree species. University of Georgia, Cooperative Extension Service, Forest Resources, 1999.

Crisfield, V. E., Macdonald, S. E., & Gould, A. J. (2012). Effects of Recreational Traffic on Alpine Plant Communities in the Northern Canadian Rockies. Arctic, Antarctic, and Alpine Research, 44(3), 277-287.

Diekmann, M. (2003). Species indicator values as an important tool in applied plant ecology–a review. Basic and Applied Ecology, 4(6), 493-506.

Dufrêne, M., & Legendre, P. (1997). Species assemblages and indicator species: the need for a flexible asymmetrical approach. Ecological monographs, 67(3), 345-366.

Ellenberg, H. 1992. Zeigerwerte der Gefäßpflanzen (ohne Rubus). In: Ellenberg, H., Weber, H.E., Düll, R., Wirth,V., Werner, W. & Paulißen, D., Zeigerwerte von Pflanzen in Mitteleuropa, 2nd. ed. Verlag Erich Goltze, Göttingen, DE.

EMEND. (2008). Ecosystem Management Emulating Natural Disturbance Project. <http://www.emend.rr.ualberta.ca/>.

Environment Canada. (2012). National Climate Data and Information Archive. <http://climate.weatheroffice.gc.ca/Welcome_e.html>.

Farrar, J.L. (1995). Trees in Canada. Markham, Ontario: Fitzhenry & Whiteside Limited/Canadian Forest Service. 1-502.

Fisher, J.T., Wheatley, M.T., & Gould, J. (2011), Rocky Mountain biodiversity: ecological communities and rare and elusive species in heterogeneous landscapes, Interim Report from the Willmore Biodiversity Research Project, 1-37

Franklin, J. (1995). Predictive vegetation mapping: geographical modeling of biospatial patterns in relation to environmental gradients. Progress in Physical Geography, 19, 474–499.

Garbrecht, J., Ogden, F.L., DeBarry, P.A., & Maidment, D.R. (2001). GIS and distributed watershed models I: data coverages and sources. Journal Hydrological Engineering, 6, 506-514.

Gerling, H.S., Willoughby, M.G., Schoepf, A., Tannas, K.E., & Tannas, C.A. (1996). A guide to using native plants on disturbed lands. Edmonton, AB: Alberta Agriculture, Food and Rural Development and Alberta Environmental Protection. 174-233.

Ghiyamat, A. & Shafri, H.Z.M. (2010). A review on hyperspectral remote sensing for homogeneous and heterogeneous forest biodiversity assessment', International Journal of Remote Sensing, 31, 1837-1856.

Government of Alberta. (2002). Willmore Wilderness Park Act. Alberta Queen's Printer. 1-4

Goward, S.N., Xue, Y. & Czajkowski, K.P. (2002). Evaluating land surface moisture conditions from the remotely sensed temperature/vegetation index measurements: An exploration with the simplified simple biosphere model. Remote Sensing of Environment 79, 225-242.

Halounová, L. (2008). Reclamation areas and their development studied by vegetation indices. International Journal Digital Earth, 1, 155-164.

Harper, K. A., Macdonald, S. E., Burton, P. J., Chen, J., Brosofske, K. D., Saunders, S. C., Brosofske, K. D., & Esseen, P. A. (2005). Edge influence on forest structure and composition in fragmented landscapes. Conservation Biology, 19(3), 768-782.

Hiltz, D., Gould, J., White, B., Ogilvie, J., & Arp, P. (2012). Reclamation and restoration of boreal ecosystems: attaining sustainable development. Restoration and Reclamation of Boreal Ecosystems: Attaining Sustainable Development, 56.

Hoefnagels, M.H. (2005). Biodiversity of Fungi: Inventory and Monitoring Methods. BioScience, 55(3), 282-283.

Hornberger, G.M. & Boyer, E.W. (1995). Recent advances in watershed modelling. Reviews of Geophysics. 33, 949-957.

Humbert, L., Gagnon, D., Kneeshaw, D., & Messier, C. (2007). A shade tolerance index for common understory species of northeastern North America. Ecological Indicators, 7, 195–207.

Jaeger, K.L., Montgomery, D.R., & Bolton, S.M. (2007). Channel and perennial flow initiation in headwater streams: management implications of variability in source-area size. Environmental Management, 40, 775-786.

Käfer, J. & Witte, J. P. M. (2004). Cover-weighted averaging of indicator values in vegetation analyses. Journal of Vegetation Science, 15(5), 647-652.

Kershaw, L.J., MacKinnon A. & Pojar, J. (1998). Plants of the rocky mountains. Edmonton, AB: Lone Pine Publishing. 1-384

Kishchuk, B., Hannam, K., Jerabkova, L., Swallow, M., Quideau, S. & Prescott, C. (2010). Influence of cover type and variable retention harvesting on soils in the EMEND Experiment. SFM Network Research Note Series No. 70.

Kopecký, M. & Čížková, Š. (2010). Using topographic wetness index in vegetation ecology: does the algorithm matter? Applied Vegetation Science, 13, 450–459.

Larson, M. M., and E. L. Schwarz. "Allelopathic inhibition of black locust, red clover, and black alder by six common herbaceous species." Forest science 26.3 (1980): 511-520.

Latifovica, R., Fytas, K., Chen, J. & Paraszczak, J. (2005). Assessing land cover change resulting from large surface mining development. International J. Applied Earth Observation Geoinformation, 7, 29–48.

Lieffers, V. J., Macdonald, S. E., & Hogg, E. H. (1993). Ecology of and control strategies for Calamagrostis canadensis in boreal forest sites. Canadian Journal of Forest Research, 23(10), 2070-2077.

Moss, E.H. & Packer, J.G. (1983). Flora of Alberta, 2nd edn. Toronto, ON: University of Toronto Press. Toronto. pp. 1-687

McDonald, L.L. (2004). Sampling rare populations. In Thompson, W.D. ed. Sampling rare or elusive species. Island Press, London. 11-42.

Murphy, P.N.C., Ogilvie, J., Connor, K. & Arp, P.A. (2007). Mapping wetlands: a comparison of two different approaches for New Brunswick, Canada. Wetlands, 27, 846-854.

Murphy, P.N.C., Ogilvie, J. & Arp. P.A. (2009). Topographic modelling of soil moisture conditions: a comparison and verification of two models. European Journal of Soil Science, 60, 94-109.

Murphy, P.N.C., Ogilvie, J., Meng, F.-R., White, B., Bhatti, J.S., Arp, P.A. (2011). Modelling and mapping topographic variations in forest soils at high-resolution: a case study. Ecological Modelling. Article in Press, Corrected Proof; doi:10.1016/ j.ecolmodel.2011.01.003.

Naeth M.A., Chanasyk, D.S. & Burgers T.D. (2011). Vegetation and soil water interactions on a tailings sand storage facility in the Athabasca oil sands region of Alberta, Canada. Physics and Chemistry of the Earth, 36, 19–30.

Nash, J.C. (2010). Lineal inventory of the little smoky caribou. Foothills Landscape Management Forum (FLMF) <http://foothillsresearchinstitute.ca/Content_Files/Files/ FLMF/FLMF_2010_10_report_LinealInventory_Final.pdf>.

Neilson, R.P. (1995). A model for predicting continental-scale vegetation distribution and water balance, Ecological Applications, Vol. 5, No. 2, 362-385

Pierson, T.C. (1982) Classification and Hydrological Characteristic of Scree Slope Deposits in the Northern Craigieburn Range, New Zealand. Journal of Hydrology (NZ), 21(1).

Pojar, J. and A. MacKinnon. (1994). Plants of the Pacific Northwest coast–Washington, Oregon, British Columbia and Alaska. Lone Pine Publishing, Edmonton, Canada. 526 p.

Rowe, J.S. (1972). Forest Regions of Canada. Canadian Forestry Service Publication no. 1300, Publishing Division, Canada

Rowe, J.S. (1956). Uses of Undergrowth Plant Species in Forestry. Ecology, 37, 461-473.

Sass, G., Wheatley, M., Aldred, D., Gould, J. & Creed, I. (2012). Defining protected area boundaries based on vascular-plant species richness using hydrological information derived from archived satellite imagery. Biological Conservation 147:143-152

Schmidtlein, S. (2005). Imaging spectroscopy as a tool for mapping Ellenberg indicator values. Journal of Applied Ecology, 42, 966–974.

Sims, H.P. & D. Mueller-Dombois. (1968). Effect of grass competition and depth to water-table on height growth of coniferous tree seedlings. Ecology 49: 597 603.

Sitters, J., Holmgren, M., Stoorvogel, J.J. & López, B.C. (2011). Rainfall-tuned management facilitates dry forest recovery. Restoration Ecology, 1- DOI: 10.1111/j.1526-100X.2010.00761.x.

Tappeiner, U., Tasser, E. & Tappeiner, G. (1998). Modelling vegetation patterns using natural and anthropogenic influence factors: preliminary experience with a GIS based model applied to an alpine area. Ecological Modelling, 113, 225-237.

Tarboton, D.G., Bras, R.L., Rodriguez-Itube, I. (1991). On the extraction of channel networks from digital elevation data. Hydrological Processes. 1991, 81–100.

Tarboton, D.G. (1997). A new method for the determination of flow directions and upslope areas in grid digital elevation models. Water Resources Research, 33, 309–319.

University of British Columbia (2010). E-flora BC: Electronic Atlas of the Plants of British Columbia. <http://www.geog.ubc.ca/biodiversity/eflora/>.

Venterink, H.O. & Wassen, M.J. (1997). A comparison of six models predicting vegetation response to hydrological habitat change. Ecological Modelling, 101, 347–361.

White B., Ogilvie J., Campbell D.M.H., Hiltz D., Gauthier B., Chisholm H.K., Wen H.K., Murphy P.N.C., and Arp P.A. 2012. Using the Cartographic Depth-to-Water Index to Locate Small Streams and Associated Wet Areas across Landscapes. Canadian Water Resources Journal

Woodward, F. I., & Williams, B. G. (1987). Climate and plant distribution at global and local scales. Plant Ecology, 69(1), 189-197.

Yilmaz, M.T., Hunt, Jr., E.R., Goins, L. D., Ustin, S.L., Vanderbilt, V.C. & Jackson, T.J. (2008). Vegetation water content during SMEX04 from ground data and LANDSAT 5 thematic mapper imagery. Remote Sensing of Environment, 112, 350–362.

# APPENDIX A - SPECIES-SPECIFIC XERIC TO HYDRIC VEGETATION MOISTURE INDEX FOR FLORA RECORDED IN BOTH THE EMEND RESEARCH AREA AND THE WILLMORE WILDERNESS PARK, ARRANGED ALPHABETICALLY BY SPECIES SCIENTIFIC NAME

| Scientific Name | Common Name | ABMI Code | Pref VI | Min VI | Max VI | Ref. | Willmore | EMEND |
|---|---|---|---|---|---|---|---|---|
| *Abies balsamea* | balsam fir | ABIEBAL | 4 | 3 | 7 | b,d,f | • | |
| *Abies bifolia* | subalpine fir | ABIEBIF | 4 | 3 | 6 | b,d,f | • | |
| *Achillea millefolium* | common yarrow | ACHIMIL | 2 | 1 | 4 | a | • | • |
| *Aconitum delphinifolium* | monkshood | ACONDEL | 3 | 0 | 8 | e | • | |
| *Actaea rubra* | baneberry | ACTARUB | 4 | 1 | 8 | b | • | • |
| *Adoxa moschatellina* | moschatel | ADOXMOS | 5 | 3 | 7 | g | • | • |
| *Agoseris glauca* | yellow false dandelion | AGOSGLA | 3 | 1 | 4 | g | • | • |
| *Agoseris sp* | false dandelions | AGOSSPP | 3 | 1 | 6 | g | • | |
| *Agrostis variabilis* | alpine redtop | AGROVIO | 3 | 1 | 5 | g | • | • |
| *Alnus crispa* | green alder | ALNUCRI | 3 | 1 | 7 | a,f | • | • |
| *Alnus tenuifolia* | river alder | ALNUTEN | 3 | 1 | 7 | d,f,g | • | • |
| *Amelanchier alnifolia* | saskatoon | AMALALN | 3 | 2 | 5 | a,g | • | • |
| *Amerorchis rotundifolia* | round-leaved orchid | AMERROT | 6 | 2 | 8 | g | • | |
| *Anaphalis margaritacea* | pearly everlasting | ANAPMAR | 4 | 0 | 7 | g | • | |
| *Androsace septentrionalis* | northern fairy candelabra | ANDRSEP | 3 | 0 | 5 | g | • | |
| *Anemone lithophila* | Drummond's anemone | ANEMLIT | 3 | 2 | 5 | g | • | |
| *Anemone multifida* | cut-leaved anemone | ANEMMUL | 3 | 0 | 8 | b | • | |
| *Anemone occidentalis* | western anemone | ANEMOCC | 5 | 0 | 7 | f,g | • | |
| *Anemone parviflora* | small wood anemone | ANEMPAR | 4 | 0 | 8 | g | • | |
| *Anemone richardsonii* | yellow anemone | ANEMRIC | 5 | 2 | 7 | f,g | • | |
| *Antennaria alpina* | alpine everlasting | ANTELAN | 3 | 0 | 7 | g | • | |
| *Antennaria lanata* | woolly everlasting | ANTEMON | 5 | 0 | 8 | f,g | • | |
| *Antennaria monocephala* | one-headed everlasting | ANTENEG | 3 | 0 | 7 | g | • | |
| *Antennaria neglecta* | broad-leaved everlasting | ANTEPAR | 3 | 0 | 6 | g | • | |
| *Antennaria parvifolia* | small-leaved everlasting | ANTEPUL | 3 | 2 | 7 | f,g | • | |
| *Antennaria pulcherrima* | showy everlasting | ANTERAC | 3 | 0 | 7 | g | • | |
| *Antennaria racemosa* | racemose everlasting | ANTESPP | 5 | 0 | 7 | f,g | • | |
| *Antennaria sp* | everlastings | ANTEALP | 3 | 0 | 7 | c | • | |
| *Antennaria umbrinella* | brown-bracted mountain everlasting | ANTEUMB | 2 | 0 | 7 | b,g | • | |
| *Anthoxanthum monticola ssp. alpinum* | alpine sweetgrass | HIERALP | 3 | 0 | 7 | g | • | |
| *Apocynum androsaemifolium* | spreading dogbane | APOCAND | 3 | 0 | 7 | a | • | • |
| *Aquilegia flavescens* | yellow columbine | AQUIFOR | 4 | 4 | 6 | f,g | • | |
| *Aquilegia formosa* | Sitka columbine | AQUISPP | 4 | 2 | 7 | g | • | |
| *Aquilegia sp* | columbines | AQUIFLA | 4 | 0 | 7 | b,c,f | • | |
| *Arabis drummondii* | Drummond's rock cress | ARABDRU | 3 | 0 | 6 | c,g | • | |
| *Arabis glabra* | tower mustard | ARABGLA | 4 | 3 | 6 | c | • | |
| *Arabis lemmonii* | Lemmon's rock cress | ARABLEM | 2 | 1 | 3 | c,g | • | |
| *Arabis lyallii* | Lyall's rock cress | ARABLYA | 2 | 1 | 4 | c,g | • | |
| *Arabis sp* | cresses | ARABSPP | 3 | 1 | 6 | c,g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Aralia nudicaulis* | wild sarsaparilla | ARALNUD | 3 | 0 | 6 | a,f | • | • |
| *Arctostaphylos rubra* | alpine bearberry | ARCTRUB | 2 | 0 | 6 | a,f | • | |
| *Arctostaphylos uva-ursi* | common bearberry | ARCTUVA | 2 | 0 | 6 | a,f | • | |
| *Arnica alpina* | alpine arnica | ARNIALP | 4 | 1 | 5 | c,e | • | |
| *Arnica angustifolia* | narrowleaf arnica | ARNIANG | 4 | 1 | 5 | c,e | • | |
| *Arnica chamissonis* | leafy arnica | ARNICHA | 5 | 3 | 7 | g | • | |
| *Arnica cordifolia* | heart-leaved arnica | ARNICOR | 3 | 1 | 5 | c,e | • | • |
| *Arnica diversifolia* | lawless arnica | ARNIDIV | 4 | 2 | 5 | c,g | • | |
| *Arnica gracilis* | graceful arnica | ARNIGRA | 2 | 1 | 4 | g | • | |
| *Arnica latifolia* | broad-leaved arnica | ARNILAT | 4 | 0 | 8 | g | • | |
| *Arnica longifolia* | long-leaved arnica | ARNILON | 6 | 6 | 6 | g | • | |
| *Arnica mollis* | cordilleran arnica | ARNIMOL | 4 | 0 | 8 | g | • | |
| *Arnica parryi* | nodding arnica | ARNIPAR | 4 | 0 | 7 | g | • | |
| *Arnica rydbergii* | narrow-leaved arnica | ARNIRYD | 3 | 0 | 5 | g | • | |
| *Arnica sp* | arnicas | ARNISPP | 4 | 0 | 8 | c,g | • | |
| *Artemisia frigida* | pasture sagewort | ARTELON | 3 | 3 | 5 | c,f,g | • | |
| *Artemisia longifolia* | long-leaved sagewort | ARTEMIC | 2 | 0 | 6 | g | • | |
| *Artemisia michauxiana* | Michaux's sagewort | ARTENOR | 2 | 1 | 6 | e | • | |
| *Artemisia norvegica* | mountain sagewort | ARTEFRI | 2 | 0 | 7 | b,g | • | |
| *Aster alpinus* | alpine aster | ASTEALP | 2 | 1 | 4 | c,g | • | |
| *Aster sp* | asters | ASTESPP | 3 | 1 | 6 | c,g | • | |
| *Astragalus aboriginum* | Indian milk vetch | ASTRABO | 2 | 1 | 4 | g | • | |
| *Astragalus alpinus* | alpine milk vetch | ASTRALP | 3 | 4 | 7 | c,f,g | • | |
| *Astragalus americanus* | American milk vetch | ASTRAME | 3 | 3 | 7 | b,c,g | • | • |
| *Astragalus pectinatus* | narrow-leaved milk vetch | ASTRPEC | 2 | 1 | 4 | c | • | • |
| *Astragalus sp* | milk vetches | ASTRSPP | 3 | 1 | 6 | c,g | • | |
| *Astragalus tenellus* | loose-flowered milk vetch | ASTRTEN | 3 | 0 | 6 | g | • | |
| *Astragalus vexilliflexus* | few-flowered milk vetch | ASTRVEX | 3 | 1 | 4 | c,e | • | |
| *Athyrium filix-femina* | lady fern | ATHYFIL | 4 | 4 | 7 | c,g | • | • |
| *Bazzania trilobata* | bazzania | BAZZTRI | 7 | 5 | 8 | f | • | |
| *Betula glandulosa* | bog birch | BETUGLA | 8 | 2 | 8 | a | • | • |
| *Betula papyrifera* | white birch | BETUPAP | 5 | 2 | 8 | b,g | | • |
| *Betula pumila* | dwarf birch | BETUPUM | 6 | 2 | 8 | b,g | | • |
| *Botrychium ascendens* | ascending grape fern | BOTRASC | 7 | 4 | 8 | f,g | | • |
| *Botrychium lunaria* | moonwort | BOTRLUN | 4 | 0 | 6 | g | | • |
| *Botrychium virginianum* | Virginia grape fern | BOTRVIR | 5 | 2 | 8 | g | | • |
| *Bromus ciliatus* | fringed brome | BROMCIL | 4 | 1 | 8 | g | • | |
| *Bromus inermis* | awnless brome | BROMINE | 3 | 0 | 8 | a | • | |
| *Bromus inermis ssp. pumpellianus* | Pumpelly's brome | BROMPUM | 3 | 0 | 8 | g | • | |
| *Bromus sp* | bromus grass | BROMSPP | 3 | 1 | 5 | g | • | |
| *Calamagrostis canadensis* | bluejoint | CALACAN | 6 | 1 | 7 | a | • | • |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Calamagrostis sp* | reed grasses | CALASPP | 4 | 1 | 7 | g | • | • |
| *Caltha leptosepala* | mountain marsh-marigold | CALTLEP | 7 | 4 | 7 | b | • | |
| *Calypso bulbosa* | Venus'-slipper | CALYBUL | 4 | 3 | 6 | c,f,g | • | • |
| *Campanula lasiocarpa* | Alaska harebell | CAMPLAS | 3 | 0 | 8 | g | • | |
| *Campanula rotundifolia* | harebell | CAMPROT | 2 | 0 | 7 | b,c,g | • | |
| *Campanula uniflora* | alpine harebell | CAMPUNI | 2 | 1 | 5 | e,g | • | |
| *Canadanthusmodestus* | large northern aster | ASTEMOD | 6 | 0 | | g | • | |
| *Cardamine pensylvanica* | bittercress | CARDPEN | 5 | 1 | 8 | c,g | • | • |
| *Cardamine umbellata* | umbel bittercress | CARDUMB | 6 | 3 | 8 | g | • | • |
| *Carex adusta* | browned sedge | CAREADU | 0 | 0 | 2 | g | • | • |
| *Carex albo-nigra* | black-and-white sedge | CAREALB | 3 | 0 | 8 | g | • | |
| *Carex aquatilus* | water sedge | CAREAQU | 7 | 6 | 8 | c | • | |
| *Carex bebbii* | Bebb's sedge | CAREBEB | 5 | 0 | 8 | g | • | |
| *Carex brunnescens* | brownish sedge | CAREBRU | 5 | 6 | 8 | c,f | • | |
| *Carex canescens* | short sedge | CARECAN | 7 | 6 | 8 | c | • | |
| *Carex capillaris* | hair-like sedge | CARECAP | 5 | 0 | 8 | g | • | |
| *Carex concinna* | beautiful sedge | CARECON | 4 | 0 | 7 | g | • | |
| *Carex disperma* | two-seeded sedge | CAREDIS | 5 | 1 | 8 | c | • | • |
| *Carex flava* | yellow sedge | CAREFLA | 7 | 3 | 8 | g | • | • |
| *Carex glacialis* | glacier sedge | CAREGLA | 5 | 5 | 8 | f,g | • | • |
| *Carex gynocrates* | northern bog sedge | CAREGYN | 6 | 0 | 8 | g | • | |
| *Carex incurviformis* | seaside sedge | CAREINC | 3 | 0 | 5 | g | • | |
| *Carex interior* | inland sedge | CAREINT | 7 | 0 | 8 | g | • | |
| *Carex lacustris* | lakeshore sedge | CARELAC | 5 | 1 | 8 | g | • | |
| *Carex lasiocarpa* | hairy-fruited sedge | CARELAN | 7 | 5 | 8 | g | • | |
| *Carex leptalea* | bristle-stalked sedge | CARELEP | 7 | 5 | 8 | c,g | • | |
| *Carex limosa* | mud sedge | CARELIM | 7 | 3 | 8 | g | • | |
| *Carex livida* | livid sedge | CARELIV | 7 | 5 | 8 | c,g | • | |
| *Carex macloviana* | thick-spike sedge | CAREMAC | 5 | 0 | 8 | g | • | |
| *Carex microglochin* | short-awned sedge | CAREMIC | 6 | 2 | 7 | g | • | |
| *Carex nardina* | fragrant sedge | CARENAR | 2 | 0 | 7 | g | • | |
| *Carex nigricans* | black alpine sedge | CARENIG | 5 | 0 | 8 | g | • | |
| *Carex norvegica* | Norway sedge | CARENOR | 5 | 0 | 8 | g | • | |
| *Carex pachystachya* | chammiso sedge | CAREPAC | 4 | 0 | 8 | g | • | |
| *Carex parryana* | Parry's sedge | CAREPAR | 6 | 3 | 7 | g | • | |
| *Carex pauciflora* | few-flowered sedge | CAREPAU | 7 | 2 | 8 | g | • | |
| *Carex paupercula* | boreal bog sedge | CAREPAP | 7 | 5 | 8 | c,g | • | |
| *Carex pensylvanica* | sun-loving sedge | CAREPEN | 3 | 0 | 5 | c,g | • | |
| *Carex petricosa* | stone sedge | CAREPER | 2 | 0 | 4 | c,g | • | |
| *Carex phaeocephala* | head-like sedge | CAREPHA | 2 | 0 | 8 | g | • | |
| *Carex prairea* | prairie sedge | CAREPRA | 7 | 6 | 7 | g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Carex pyrenaica* | spiked sedge | CAREPYR | 5 | 3 | 7 | c,g | • | |
| *Carex raymondii* | Raymond's sedge | CARERAY | 4 | 1 | 7 | g | • | |
| *Carex rupestris* | rock sedge | CARERUP | 1 | 0 | 3 | c,g | • | |
| *Carex saxatilis* | rocky-ground sedge | CARESAX | 7 | 5 | 8 | c,g | • | |
| *Carex scirpoidea* | rush-like sedge | CARESCI | 5 | 0 | 8 | c | • | |
| *Carex sp* | sedges | CARESPP | 5 | 0 | 5 | c,g | • | |
| *Carex spectabilis* | showy sedge | CARESPE | 4 | 0 | 8 | g | • | |
| *Carex sprengelii* | Sprengel's sedge | CARESPR | 5 | 3 | 8 | c,g | • | |
| *Carex tenera* | broad-fruited sedge | CARETEN | 3 | 1 | 5 | c,g | • | |
| *Carex umbellata* | umbellate sedge | CAREUMB | 2 | 0 | 4 | c | • | |
| *Carex utriculata* | small bottle sedge | CAREUTR | 7 | 0 | 8 | g | • | |
| *Carex vaginata* | sheathed sedge | CAREVAG | 6 | 3 | 8 | g | • | |
| *Cassiope mertensiana* | western mountain-heather | CASSMER | 4 | 3 | 5 | b,e,g | • | |
| *Cassiope tetragona* | white mountain-heather | CASSTET | 4 | 3 | 5 | b,e,g | • | |
| *Castilleja lutescens* | stiff yellow paintbrush | CASTLUT | 3 | 0 | 7 | g | • | |
| *Castilleja miniata* | common red paintbrush | CASTMIN | 4 | 0 | 8 | g | • | |
| *Castilleja occidentalis* | lance-leaved paintbrush | CASTOCC | 5 | 0 | 7 | b,g | • | |
| *Castilleja parviflora* | small-flowered Indian paintbrush | CASTPAR | 4 | 0 | 7 | g | • | |
| *Castilleja rhexiifolia* | alpine red paintbrush | CASTRHE | 4 | 0 | 7 | g | • | |
| *Cerastium arvense* | field mouse-ear chickweed | CERAARV | 3 | 0 | 8 | g | • | |
| *Cerastium beeringianum* | alpine mouse-ear chickweed | CERABEE | 2 | 1 | 3 | g | • | |
| *Cerastium brachypodum* | shortstalk chickweed | CERABRA | 5 | 4 | 6 | g | • | |
| *Cerastium sp* | chickweeds | CERASPP | 3 | 1 | 8 | g | • | |
| *Chimaphila umbellata* | prince's-pine | CHRYTET | 5 | 4 | 8 | g | • | |
| *Chrysosplenium tetrandrum* | green saxifrage | CHIMUMB | 5 | 1 | 6 | c,f,g | • | |
| *Circaea alpina* | small enchanter's nightshade | CIRCALP | 5 | 4 | 7 | a | • | • |
| *Cirsium arvense* | creeping thistle | CIRSARV | 4 | 1 | 8 | c,g | • | • |
| *Cirsium undulatum* | wavy-leaved thistle | CIRSUND | 3 | 0 | 7 | g | • | • |
| *Cladina mitis* | Green Reindeer Lichen | CLADMIT | 2 | 1 | 7 | f | • | • |
| *Cladina rangifera* | Reindeer Lichen | CLADRAN | 1 | 1 | 6 | a | • | • |
| *Claytonia lanceolata* | western spring beauty | CLAYLAN | 4 | 0 | 8 | g | • | |
| *Clematis occidentalis* | purple clematis | CLEMOCC | 3 | 1 | 4 | c,g | • | |
| *Climacium dendroides* | tree moss | CLIMDEN | 7 | 5 | 8 | a | • | • |
| *Comandra umbellata* | bastard toadflax | COMAUMB | 3 | 2 | 5 | c,g | • | |
| *Corallorhiza maculata* | spotted coralroot | CORAMAC | 3 | 0 | 7 | a,g | • | • |
| *Corallorhiza trifida* | pale coralroot | CORATRI | 4 | 1 | 7 | g | • | • |
| *Cornus canadensis* | bunchberry | CORNCAN | 4 | 2 | 7 | a | • | • |
| *Cornus stolinifera* | red-osier dogwood | CORNSTO | 5 | 0 | 8 | a,g | • | • |
| *Corydalis sempervirens* | pink corydalis | CORYSEM | 1 | 0 | 4 | g | • | |
| *Cypripedium passerinum* | sparrow’s-egg lady’s-slipper | CYPRPAS | 5 | 3 | 8 | g | • | |
| *Cystopteris fragilis* | fragile fern | CYSTFRA | 3 | 0 | 8 | g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Danthonia intermedia* | Vasey oat grass | DANTINT | 4 | 0 | 8 | g | • | |
| *Delphinium bicolor* | low larkspur | DELPBIC | 2 | 1 | 4 | b,g | • | |
| *Delphinium glaucum* | tall larkspur | DELPGLA | 4 | 1 | 8 | b | • | • |
| *Delphinium sp* | larkspurs | DELPSPP | 3 | 1 | 8 | b,g | • | • |
| *Deschampsia caespitosa* | tufted hair grass | DESCCAE | 4 | 3 | 5 | c,g | • | |
| *Dicranum scoparium* | broom moss | DICRSCO | 3 | 2 | 6 | g | • | • |
| *Dicranum sp* | dicranum mosses | DICRSPP | 3 | 2 | 7 | f,g | | • |
| *Diphasiastrum alpinum* | alpine club-moss | DIPHALP | 3 | 0 | 7 | g | • | |
| *Diphasiastrum complanatum* | ground-cedar | DIPHCOM | 3 | 0 | 7 | g | • | |
| *Disporum trachycarpum* | fairybells | DISPTRA | 4 | 0 | 8 | g | • | |
| *Dodecatheon sp* | shooting stars | DODESPP | 6 | 5 | 7 | g | • | |
| *Draba borealis* | northern whitlow-grass | DRABBOR | 3 | 2 | 4 | g | • | |
| *Draba cana* | whitlow-grass | DRABCAN | 2 | 0 | 7 | g | • | |
| *Draba crassifolia* | thick-leaved whitlow-grass | DRABCRA | 3 | 1 | 5 | g | • | |
| *Draba incerta* | whitlow-grass | DRABINC | 2 | 0 | 4 | g | • | |
| *Draba lonchocarpa* | whitlow-grass | DRABLON | 2 | 0 | 4 | g | • | |
| *Draba nivalis* | annual whitlow-grass | DRABNIV | 3 | 1 | 5 | e | • | |
| *Draba sp* | whitlow-grasses | DRABSPP | 2 | 0 | 7 | c,g | • | |
| *Dryas integrifolia* | northern white mountain avens | DRYAINT | 3 | 2 | 4 | e | • | |
| *Dryas octopetala* | white mountain avens | DRYAOCT | 3 | 2 | 8 | g | • | |
| *Dryopteris assimilis* | broad spinulose shield fern | DRYOASS | 4 | 0 | 7 | f,g | • | |
| *Dryopteris carthusiana* | narrow spinulose shield fern | DRYOCAR | 5 | 3 | 8 | g | • | |
| *Eleocharis quinqueflora* | few-flowered spike-rush | ELEOQUI | 7 | 5 | 7 | b,g | • | |
| *Elymus canadensis* | Canada wild rye | ELYMCAN | 2 | 1 | 3 | g | • | |
| *Elymus lanceolatus* | Northern wheat grass | AGROSPP | 3 | 1 | 5 | g | • | |
| *Elymus lanceolatus* | northern wheat grass | ELYMLAN | 1 | 0 | 4 | g | • | |
| *Elymus sp* | agropyron grasses | AGRODAS | 3 | 0 | 5 | a | • | |
| *Elymus trachycaulus* | slender wheat grass | ELYMTRA | 2 | 1 | 8 | e,g | • | |
| *Elymus violaceus* | broad-glumed wheat grass | AGROVAR | 3 | 1 | 5 | g | • | |
| *Empetrum nigrum* | crowberry | EMPENIG | 5 | 0 | 8 | c,f,g | • | |
| *Epilobium anagallidifolium* | alpine willowherb | EPILANA | 4 | 0 | 4 | b,c | • | |
| *Epilobium angustifolium* | common fireweed | EPILANG | 3 | 2 | 7 | b | • | • |
| *Epilobium ciliatum* | northern willowherb | EPILCIL | 5 | 4 | 7 | g | • | • |
| *Epilobium hornemannii* | Hornemann's willowherb | EPILHOR | 6 | 5 | 8 | g | • | • |
| *Epilobium lactiflorum* | willowherb | EPILLAC | 4 | 0 | 8 | g | • | • |
| *Epilobium latifolium* | broad-leaved fireweed | EPILLAT | 4 | 0 | 8 | g | • | |
| *Epilobium leptocarpum* | willowherb | EPILLEP | 4 | 0 | 8 | g | • | |
| *Epilobium palustre* | marsh willowherb | EPILPAL | 7 | 2 | 7 | g | • | |
| *Epilobium saximontanum* | Rocky Mountain willowherb | EPILSAX | 5 | 4 | 8 | a,g | • | |
| *Epilobium sp* | willowherbs | EPILSPP | 4 | 0 | 8 | g | • | |
| *Equisetum arvense* | common horsetail | EQUIARV | 6 | 2 | 7 | a,f | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Equisetum hyemale* | common scouring-rush | EQUIHYE | 2 | 1 | 8 | g | • | |
| *Equisetum palustre* | marsh horsetail | EQUIPAL | 7 | 4 | 8 | a,g | • | |
| *Equisetum pratense* | meadow horsetail | EQUIPRA | 5 | 2 | 8 | a,g | | • |
| *Equisetum scirpoides* | dwarf scouring-rush | EQUISCI | 5 | 1 | 8 | e,g | • | • |
| *Equisetum sp* | horsetails | EQUISPP | 5 | 1 | 8 | a,g | • | • |
| *Equisetum sylvaticum* | woodland horsetail | EQUISYL | 4 | 2 | 8 | g | • | • |
| *Equisetum variegatum* | variegated horsetail | EQUIVAR | 6 | 5 | 8 | e,g | • | |
| *Erigeron compositus* | compound-leaved fleabane | ERIGCOM | 2 | 0 | 5 | g | • | |
| *Erigeron grandiflorus* | large-flowered fleabane | ERIGGRA | 3 | 1 | 8 | g | • | |
| *Erigeron humilis* | purple fleabane | ERIGHUM | 4 | 0 | 4 | e | • | |
| *Erigeron peregrinus* | wandering daisy | ERIGPER | 2 | 1 | 7 | g | • | |
| *Erigeron sp* | fleabanes | ERIGSPP | 3 | 0 | 5 | g | • | |
| *Erigeron trifidus* | trifid-leaved fleabane | ERIGTRI | 3 | 2 | 8 | c,g | • | |
| *Eriophorum angustifolium* | common cotton grass | ERIOANG | 7 | 1 | 8 | g | • | |
| *Eriophorum brachyantherum* | close-sheathed cotton grass | ERIOBRA | 7 | 6 | 8 | g | • | |
| *Eriophorum polystachion* | tall cotton grass | ERIOPOL | 7 | 3 | 7 | g | • | |
| *Eriophorum scheuchzeri* | one-spike cotton grass | ERIOSCH | 7 | 4 | 8 | g | • | |
| *Eriophorum sp* | cotton grasses | ERIOSPP | 7 | 1 | 8 | g | • | |
| *Eriophorum viridi-carinatum* | thin-leaved cotton grass | ERIOVIR | 7 | 3 | 7 | a,b | • | |
| *Eurybia conspicua* | showy aster | ASTECON | 4 | 1 | 5 | g,f | • | |
| *Eurybia sibirica* | arctic aster | ASTESIB | 2 | 1 | 4 | c,g | • | |
| *Festuca altaica* | northern rough fescue | FESTALT | 2 | 0 | 5 | f,g | • | |
| *Festuca baffinensis* | arctic fescue | FESTBAF | 2 | 0 | 7 | c,g | • | |
| *Festuca brachyphylla* | alpine fescue | FESTBRA | 2 | 0 | 2 | g | • | |
| *Festuca minutiflora* | tiny-flowered fescue | FESTMIN | 1 | 0 | 7 | c,g | • | |
| *Festuca occidentalis* | western fescue | FESTOCC | 2 | 0 | 4 | c,g | • | |
| *Festuca ovina* | sheep fescue | FESTOVI | 3 | 2 | 6 | c,e | • | |
| *Festuca rubra* | red fescue | FESTRUB | 4 | 3 | 7 | g | • | |
| *Festuca saximontana* | Rocky Mountain fescue | FESTSAX | 3 | 0 | 5 | a,g | • | |
| *Festuca sp* | fescues | FESTSPP | 2 | 0 | 8 | b,c | • | |
| *Fragaria vesca* | woodland strawberry | FRAGVES | 3 | 1 | 5 | g | • | • |
| *Fragaria virginiana* | wild strawberry | FRAGVIR | 3 | 1 | 8 | b,c | • | |
| *Galium boreale* | northern bedstraw | GALIBOR | 3 | 0 | 6 | g | • | • |
| *Galium labradoricum* | Labrador bedstraw | GALILAB | 6 | 6 | 8 | b,c | • | |
| *Galium trifidum* | small bedstraw | GALITRI | 7 | 6 | 8 | a,g | • | • |
| *Galium triflorum* | sweet-scented bedstraw | GALITRF | 5 | 0 | 7 | c,g | • | • |
| *Gentiana glauca* | alpine gentian | GENTGLA | 4 | 0 | 6 | g | • | |
| *Gentiana prostrata* | moss gentian | GENTPRO | 3 | 0 | 8 | a,g | • | |
| *Gentianella amarella* | felwort | GENTAMA | 5 | 3 | 8 | g | • | |
| *Geocaulon lividum* | northern bastard toadflax | GEOCLIV | 5 | 0 | 8 | c,g | • | • |
| *Geranium richardsonii* | Richardson's geranium | GERARIC | 5 | 3 | 7 | g | | • |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Geum aleppicum* | yellow avens | GEUMALE | 5 | 2 | 8 | a,c | • | |
| *Geum macrophyllum* | large-leaved yellow avens | GEUMMAC | 7 | 4 | 8 | g | • | • |
| *Geum rivale* | purple avens | GEUMRIV | 6 | 1 | 7 | a,g | • | |
| *Geum sp* | avenses | GEUMSPP | 6 | 1 | 8 | g | • | |
| *Goodyera repens* | lesser rattlesnake plantain | GOODREP | 4 | 1 | 8 | f,g | • | • |
| *Gymnocarpium dryopteris* | oak fern | GYMNDRY | 5 | 0 | 8 | a,g | • | • |
| *Hedysarum alpinum* | alpine hedysarum | HEDYALP | 2 | 0 | 5 | b | • | |
| *Hedysarum boreale* | northern hedysarum | HEDYBOR | 4 | 2 | 7 | g | • | |
| *Hedysarum sulphurescens* | yellow hedysarum | HEDYSUL | 3 | 0 | 8 | b | • | |
| *Heracleum lanatum* | cow parsnip | HERALAN | 4 | 1 | 7 | c | • | • |
| *Hieracium triste* | slender hawkweed | HIERTRI | 3 | 0 | 5 | b,g | • | |
| *Hieracium umbellatum* | narrow-leaved hawkweed | HIERUMB | 1 | 1 | 8 | g | • | • |
| *Hierochloe odorata* | sweetgrass | HIERODO | 4 | 0 | 7 | g | • | |
| *Huperzia haleakalae* | Pacific clubmoss | HUPEHAL | 5 | 0 | 7 | a,c | • | |
| *Hylocomium splendens* | step moss | HYLOSPL | 5 | 4 | 5 | a | • | • |
| *Impatiens capensis* | spotted touch-me-not | IMPACAP | 5 | 5 | 8 | c,g | • | • |
| *Juncus albescens* | white rush | JUNCALB | 7 | 5 | 8 | g | • | • |
| *Juncus alpinoarticulatus* | alpine rush | JUNCALP | 4 | 3 | 8 | g | • | • |
| *Juncus balticus* | wire rush | JUNCBAL | 6 | 2 | 8 | g | • | |
| *Juncus castaneus* | chestnut rush | JUNCCAS | 6 | 4 | 7 | g | • | |
| *Juncus drummondii* | Drummond's rush | JUNCDRU | 5 | 3 | 8 | g | • | |
| *Juncus mertensianus* | slender-stemmed rush | JUNCMER | 6 | 0 | 8 | g | • | |
| *Juncus sp* | rush sp | JUNCSPP | 7 | 0 | 8 | g | • | |
| *Juncus stygius* | marsh rush | JUNCSTY | 8 | 8 | 8 | c | • | |
| *Juncus tracyi* | mud rush | JUNCTRA | 7 | 6 | 8 | a,g | • | |
| *Juniperus communis* | ground juniper | JUNICOM | 2 | 0 | 7 | g | • | |
| *Juniperus horizontalis* | creeping juniper | JUNIHOR | 3 | 1 | 8 | c,g | • | |
| *Kalmia microphylla* | mountain laurel | KALMMIC | 8 | 7 | 8 | a,g | • | |
| *Kalmia polifolia* | northern laurel | KALMPOL | 6 | 5 | 8 | g | • | |
| *Kobresia myosuroides* | bog-sedge | KOBRMYO | 3 | 0 | 8 | b,d,g | • | |
| *Larix laricina* | tamarack | LARILAR | 6 | 1 | 7 | a,g | | • |
| *Lathyrus ochroleucus* | cream-colored vetchling | LATHOCH | 3 | 1 | 8 | a | • | • |
| *Ledum groenlandicum* | common Labrador tea | LEDUGRO | 7 | 3 | 8 | g | • | • |
| *Leptarrhena pyrolifolia* | leather-leaved saxifrage | LEPTPYO | 6 | 1 | 7 | g | • | |
| *Leymus innovatus* | hairy wild rye | LEYMINN | 4 | 0 | 6 | a,g | • | |
| *Linnaea borealis* | twinflower | LINNBOR | 4 | 2 | 8 | g | • | • |
| *Listera cordata* | heart-leaved twayblade | LISTCOR | 4 | 0 | 8 | g | • | |
| *Loiseleuria procumbens* | alpine azalea | LOISPRO | 3 | 0 | 5 | a,c,f | • | |
| *Lonicera caerulea* | fly honeysuckle | LONICAE | 6 | 5 | 6 | a,g | • | • |
| *Lonicera dioica* | twining honeysuckle | LONIDIO | 4 | 2 | 8 | g | • | • |
| *Lonicera involucrata* | bracted honeysuckle | LONIINV | 5 | 0 | 8 | g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Luetkea pectinata* | partridgefoot | LUETPEC | 6 | 0 | 7 | f,g | • | |
| *Lupinus nootkatensis* | Nootka lupine | LUPINOO | 5 | 4 | 8 | c,g | • | |
| *Luzula arcuata* | alpine wood-rush | LUZUARC | 2 | 1 | 7 | c,g | • | |
| *Luzula multiflora* | field wood-rush | LUZUMUL | 3 | 1 | 8 | g | • | |
| *Luzula parviflora* | small-flowered wood-rush | LUZUPAR | 4 | 0 | 7 | g | • | |
| *Luzula piperi* | mountain wood-rush | LUZUPIP | 4 | 0 | 7 | g | • | |
| *Luzula sp* | wood-rush sp | LUZUSPP | 3 | 0 | 6 | c,g | • | |
| *Luzula spicata* | spiked wood-rush | LUZUSPI | 3 | 0 | 8 | a,g | • | |
| *Lycopodium annotinum* | stiff club-moss | LYCOANN | 4 | 0 | 7 | a,g | • | • |
| *Lycopodium complanatum* | ground cedar | LYCOCOM | 2 | 0 | 8 | b,c | • | • |
| *Maianthemum canadense* | wild lily-of-the-valley | MAIACAN | 3 | 1 | 8 | a | • | • |
| *Maianthemum stellatum* | star-flowered Solomon's-seal | SMILSTE | 4 | 1 | 8 | g | • | • |
| *Mentha arvensis* | wild mint | MENTARV | 7 | 3 | 8 | g | • | • |
| *Menyanthes trifoliata* | buck-bean | MENYTRI | 7 | 5 | 7 | g | • | |
| *Menziesia ferruginea* | false azalea | MENZFER | 4 | 1 | 5 | a,g | • | |
| *Mertensia paniculata* | tall lungwort | MERTPAN | 4 | 4 | 4 | g | • | • |
| *Minuartia biflora* | dwarf alpine sandwort | MINUBIF | 3 | 2 | 4 | g | • | |
| *Minuartia elegans* | purple alpine sandwort | MINUELE | 2 | 1 | 7 | g | • | |
| *Minuartia obtusiloba* | Arctic sandwort | MINUOBT | 2 | 0 | 6 | g | • | |
| *Minuartia rubella* | red-seeded sandwort | MINURUB | 2 | 0 | 3 | g | • | |
| *Mirabilis hirsuta* | hairy four o'clock | MIRAHIR | 1 | 0 | 8 | g | • | |
| *Mitella breweri* | Brewer's bishop's-cap | MITEBRE | 4 | 0 | 8 | a,g | • | |
| *Mitella nuda* | naked bishop's-cap | MITENUD | 5 | 0 | 8 | g | • | • |
| *Mitella pentandra* | bishop's-cap | MITEPEN | 5 | 1 | 7 | a,g | • | |
| *Moehringia laterifolia* | blunt-leaved sandwort | MOEHLAT | 4 | 1 | 8 | a,g | • | |
| *Moneses uniflora* | one-flowered wintergreen | MONEUNI | 5 | 0 | 6 | c,g | • | • |
| *Monotropa hypopitys* | pinesap | MONOHYP | 3 | 0 | 7 | g | • | • |
| *Muhlenbergia asperifolia* | scratch grass | MUHLASP | 3 | 1 | 8 | g | • | |
| *Myosotis asiatica* | mountain forget-me-not | MYOSASI | 3 | 0 | 7 | g | • | |
| *Nephroma arctium* | nephroma lichen | NEPHARC | 4 | 3 | 6 | g | • | |
| *Orthilia secunda* | one-sided wintergreen | ORTHSEC | 3 | 2 | 7 | c,g | • | • |
| *Orthocarpus luteus* | owl-clover | ORTHLUT | 3 | 0 | 5 | e,f | • | • |
| *Oryzopsis asperifolia* | white-grained mountain rice grass | ORYZASP | 4 | 0 | 7 | g | • | |
| *Osmorhiza depauperata* | spreading sweet cicely | OSMODEP | 4 | 2 | 8 | b,g | • | |
| *Oxycoccus microcarpus* | small bog cranberry | OXYCMIC | 8 | 5 | 8 | c,g | • | • |
| *Oxyria digyna* | mountain sorrel | OXYRDIG | 4 | 0 | 5 | g | • | |
| *Oxytropis cusickii* | alpine locoweed | OXYTCUS | 3 | 0 | 5 | c,g | • | |
| *Oxytropis deflexa* | reflexed locoweed | OXYTDEF | 3 | 2 | 5 | g | • | |
| *Oxytropis podocarpa* | inflated oxytrope | OXYTPOD | 2 | 0 | 4 | g | • | |
| *Oxytropis splendens* | showy locoweed | OXYTSPL | 3 | 2 | 8 | c,g | • | |
| *Packera paupercula* | balsam groundsel | SENEPAU | 7 | 4 | 8 | a,g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Packera streptanthifolia* | northern ragwort | SENESTR | 3 | 0 | 5 | g | • | |
| *Parnassia fimbriata* | fringed grass-of-parnassus | PARNFIM | 5 | 0 | 6 | g | • | |
| *Parnassia kotzebuei* | small grass-of-parnassus | PARNKOT | 5 | 2 | 8 | a,g | • | |
| *Parnassia palustris* | northern grass-of-parnassus | PARNPAL | 7 | 2 | 7 | g | • | • |
| *Parnassia parviflora* | small northern grass-of-parnassus | PARNPAR | 6 | 5 | 8 | g | • | • |
| *Parnassia sp* | grass-of-parnassus sp | PARNSPP | 6 | 0 | 8 | g | • | |
| *Pedicularis arctica* | arctic lousewort | PEDIARC | 4 | 2 | 5 | g | • | |
| *Pedicularis bracteosa* | western lousewort | PEDIBRA | 4 | 3 | 7 | c,g | • | |
| *Pedicularis capitata* | large-flowered lousewort | PEDICAP | 4 | 1 | 7 | g | • | |
| *Pedicularis flammea* | flame-colored lousewort | PEDIFLA | 4 | 3 | 8 | g | • | |
| *Pedicularis groenlandica* | elephant's-head | PEDIGRO | 6 | 1 | 6 | g | • | |
| *Pedicularis labradorica* | Labrador lousewort | PEDILAB | 4 | 1 | 4 | c,g | • | |
| *Pedicularis lanata* | woolly lousewort | PEDILAN | 3 | 1 | 5 | g | • | |
| *Pedicularis sp* | lousewort sp | PEDISPP | 4 | 1 | 5 | c,g | • | |
| *Penstemon procerus* | slender blue beardtongue | PENSPRO | 3 | 1 | 7 | g | • | |
| *Petasites frigidus* | arctic sweet coltsfoot | PETAFRI | 6 | 3 | 7 | g | • | |
| *Petasites frigidus var x vitifolius* | vine-leaved coltsfoot | PETAVIT | 5 | 2 | 8 | g | • | |
| *Petasites frigidus var. Frigidus* | sweet coltsfoot | PETANIV | 6 | 3 | 8 | a | • | |
| *Petasites frigidus var. palmatus* | palmate-leaved coltsfoot | PETAPAL | 4 | 1 | 8 | a,g | • | |
| *Petasites frigidus var. sagittatus* | arrow-leaved coltsfoot | PETASAG | 8 | 5 | 8 | g | • | |
| *Phleum commutatum* | mountain timothy | PHLECOM | 4 | 0 | 8 | c,g | • | |
| *Phleum pratense* | timothy | PHLEPRA | 4 | 0 | 8 | c,g | • | |
| *Phyllodoce empetriformis* | red heather | PHYLEMP | 4 | 0 | 7 | g | • | |
| *Phyllodoce glanduliflora* | yellow heather | PHYLGLA | 3 | 0 | 8 | g | • | |
| *Phyllodoce sp* | heathers | PHYLSPP | 3 | 0 | 8 | g | • | |
| *Phyllodoce x intermedia* | pink heather | PHYLINT | 3 | 0 | 8 | b,g | • | |
| *Picea engelmannii* | Engelmann spruce | PICEENG | 4 | 0 | 8 | b,g | • | |
| *Picea glauca* | white spruce | PICEGLA | 4 | 0 | 8 | b,d | • | • |
| *Picea mariana* | black spruce | PICEMAR | 6 | 1 | 8 | g | • | • |
| *Pinguicula vulgaris* | common butterwort | PINGVUL | 7 | 5 | 7 | b | • | |
| *Pinus contorta* | lodgepole pine | PINUCON | 3 | 1 | 8 | g | • | • |
| *Platanthera aquilonis* | northern green bog orchid | PLATAQU | 6 | 1 | 7 | g | | • |
| *Platanthera dilatata* | tall white bog orchid | PLATDIL | 6 | 3 | 7 | g | • | |
| *Platanthera huronensis* | green bog orchid | PLATHYE | 6 | 4 | 8 | c,g | • | |
| *Platanthera hyperborea* | northern green bog orchid | PLATHYP | 8 | 3 | 8 | g | • | |
| *Platanthera obtusata* | blunt-leaved bog orchid | HABEOBT | 6 | 5 | 8 | a,g | • | |
| *Platanthera orbiculata* | round-leaved bog orchid | HABEORB | 5 | 0 | 8 | a | • | |
| *Platanthera sp* | bog orchids | PLATSPP | 6 | 1 | 8 | g | • | |
| *Platanthera stricta* | slender bog orchid | PLATSTR | 6 | 1 | 7 | a,g | • | |
| *Pleurozium schreberi* | Schreber's moss | PLEUSCH | 5 | 4 | 6 | g | • | • |
| *Poa abbreviata* | dwarf bluegrass | POAABBR | 4 | 3 | 6 | g | • | • |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Poa alpina* | alpine bluegrass | POAALPI | 5 | 4 | 7 | g | • | |
| *Poa arctica* | Arctic bluegrass | POAARCT | 4 | 3 | 5 | g | • | |
| *Poa epilis* | skyline bluegrass | POAEPIL | 3 | 1 | 5 | g | • | |
| *Poa glauca* | timberline bluegrass | POAGLAU | 3 | 1 | 5 | g | • | |
| *Poa palustris* | fowl bluegrass | POAPALU | 5 | 0 | 8 | a | • | |
| *Poa pattersonii* | Patterson's bluegrass | POAPATT | 4 | 3 | 6 | g | • | |
| *Poa pratensis* | Kentucky bluegrass | POAPRAT | 3 | 1 | 6 | c,g | • | |
| *Poa sp* | poa grasses | POASPP | 4 | 0 | 7 | c,g | • | |
| *Poa wheeleri* | Wheeler's bluegrass | POAWHEE | 3 | 0 | 6 | g | • | |
| *Polemonium acutiflorum* | tall Jacob's-ladder | POLEACU | 4 | 1 | 8 | g | • | |
| *Polemonium caeruleum* | Jacob's-ladder | POLECAE | 7 | 4 | 8 | b,g | • | • |
| *Polemonium sp* | Jacob's-ladders | POLESPP | 4 | 1 | 8 | c,g | • | • |
| *Polemonium viscosum* | skunkweed | POLEVIS | 2 | 2 | 2 | g | • | • |
| *Polygonum sp* | knotweed sp | POLY SPP. | 4 | 0 | 8 | g | • | • |
| *Polygonum viviparum* | alpine bistort | POLYVIV | 5 | 0 | 8 | b,g | • | |
| *Polypogon monspeliensis* | annual beard grass | POLYMON | 4 | 0 | 8 | g | • | |
| *Polytrichum commune* | common haircap moss | POLYCOM | 5 | 3 | 7 | g | • | • |
| *Populus balsamifera* | balsam poplar | POPUBAL | 5 | 4 | 7 | b | • | • |
| *Populus tremuloides* | trembling aspen | POPUTRE | 4 | 0 | 8 | b,g | • | • |
| *Potentilla diversifolia* | mountain cinquefoil | POTEDIV | 4 | 1 | 5 | b,c | • | |
| *Potentilla fruticosa* | shrubby cinquefoil | POTEFRU | 4 | 0 | 8 | g | • | |
| *Potentilla gracilis* | graceful cinquefoil | POTEGRA | 4 | 1 | 7 | g | • | |
| *Potentilla hookeriana* | Hooker's cinquefoil | POTEHOO | 3 | 1 | 5 | g | • | |
| *Potentilla hyparctica* | northern cinquefoil | POTEHYP | 3 | 0 | 8 | g | • | |
| *Potentilla multifida* | branched cinquefoil | POTEMUL | 2 | 0 | 4 | c | • | |
| *Potentilla nivea* | snow cinquefoil | POTENIV | 4 | 1 | 4 | e,g | • | |
| *Potentilla palustris* | marsh cinquefoil | POTEPAL | 7 | 2 | 9 | g | • | |
| *Potentilla pensylvanica* | prairie cinquefoil | POTEPEN | 2 | 0 | 4 | c,g | • | |
| *Potentilla sp* | cinquefoil | POTESPP | 3 | 0 | 8 | g | • | |
| *Potentilla uniflora* | one-flowered cinquefoil | POTEUNI | 2 | 0 | 6 | g | • | |
| *Potentilla villosa* | hairy cinquefoil | POTEVIL | 2 | 0 | 8 | g | • | |
| *Ptilium crista-castrensis* | plume moss | PTILCRI | 6 | 4 | 7 | g | • | • |
| *Pyrola asarifolia* | common pink wintergreen | PYROASA | 4 | 0 | 8 | b,c | • | • |
| *Pyrola chlorantha* | greenish-flowered wintergreen | PYROCHL | 4 | 0 | 8 | g | • | |
| *Pyrola elliptica* | white wintergreen | PYROELL | 5 | 3 | 6 | g | • | |
| *Pyrola grandiflora* | Arctic wintergreen | PYROGRA | 3 | 1 | 7 | c,g | • | |
| *Pyrola minor* | lesser wintergreen | PYROMIN | 4 | 1 | 8 | g | • | |
| *Pyrola sp* | wintergreens | PYROSPP | 4 | 0 | 8 | g | • | |
| *Ranunculus acris* | tall buttercup | RANUACR | 5 | 2 | 7 | g | • | |
| *Ranunculus eschscholtzii* | mountain buttercup | RANUESC | 4 | 0 | 8 | g | • | |
| *Ranunculus lapponicus* | Lapland buttercup | RANULAP | 5 | 4 | 8 | a,g | • | • |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Ranunculus macounii* | Macoun's buttercup | RANUMAC | 7 | 4 | 8 | b,g | • | • |
| *Ranunculus occidentalis* | western buttercup | RANUOCC | 5 | 3 | 6 | g | • | |
| *Rhinanthus borealis* | yellow rattle | RHINBOR | 3 | 0 | 7 | g | • | |
| *Rhododendron albiflorum* | white-flowered rhododendron | RHODALB | 4 | 0 | 8 | g | • | |
| *Ribes glandulosum* | skunk currant | RIBEGLA | 6 | 0 | 7 | a,g | • | |
| *Ribes hudsonianum* | northern black currant | RIBEHUD | 7 | 4 | 8 | g | • | |
| *Ribes lacustre* | bristly black currant | RIBELAC | 7 | 0 | 8 | a,c | • | • |
| *Ribes laxiflorum* | mountain currant | RIBELAX | 5 | 1 | 8 | g | • | |
| *Ribes oxyacanthoides* | northern gooseberry | RIBEOXY | 5 | 3 | 7 | b,g | • | • |
| *Ribes sp* | currants | RIBESPP | 6 | 0 | 8 | g | • | |
| *Ribes triste* | wild red currant | RIBETRI | 5 | 1 | 8 | a | • | • |
| *Rosa acicularis* | prickly rose | ROSAACI | 3 | 1 | 5 | a | • | |
| *Rosa sp* | roses | ROSASPP | 3 | 1 | 6 | c,g | • | |
| *Rubus acaulis* | dwarf raspberry | RUBUACA | 6 | 5 | 8 | b,g | • | |
| *Rubus arcticus* | arctic blackberry | RUBUARC | 6 | 5 | 8 | b,g | • | • |
| *Rubus chamaemorus* | cloudberry | RUBUCHA | 7 | 1 | 8 | a | • | • |
| *Rubus idaeus* | wild red raspberry | RUBUIDA | 5 | 3 | 6 | a,g | • | • |
| *Rubus pedatus* | dwarf bramble | RUBUPED | 5 | 0 | 8 | b,g | • | |
| *Rubus pubescens* | dewberry | RUBUPUB | 5 | 4 | 8 | a,g | • | • |
| *Rumex acetosa* | green sorrel | RUMEACE | 5 | 3 | 7 | c,g | • | |
| *Rumex occidentalis* | western dock | RUMEOCC | 6 | 1 | 8 | g | • | |
| *Rumex sp* | docks | RUMESPP | 5 | 0 | 8 | c,g | • | |
| *Salix arbusculoides* | shrubby willow | SALIARB | 6 | 3 | 8 | g | • | |
| *Salix arctica* | Arctic willow | SALIARC | 4 | 0 | 8 | a,c | • | |
| *Salix athabascensis* | Athabasca willow | SALIATH | 6 | 2 | 8 | g | • | |
| *Salix barrattiana* | Barratt's willow | SALIBAA | 5 | 0 | 8 | a,c | • | |
| *Salix bebbiana* | beaked willow | SALIBEB | 4 | 0 | 8 | g | • | |
| *Salix boothii* | Booth's willow | SALIBOO | 7 | 6 | 8 | g | • | |
| *Salix brachycarpa* | short-capsuled willow | SALIBRA | 5 | 1 | 8 | g | • | |
| *Salix candida* | hoary willow | SALICAN | 7 | 2 | 8 | g | • | |
| *Salix commutata* | changeable willow | SALICOM | 5 | 1 | 8 | g | • | |
| *Salix drummondiana* | Drummond's willow | SALIDRU | 6 | 1 | 8 | g | • | |
| *Salix farriae* | Farr's willow | SALIFAR | 5 | 2 | 8 | g | • | |
| *Salix glauca* | smooth willow | SALIGLA | 5 | 4 | 8 | a,c | • | |
| *Salix melanopsis* | dusky willow | SALIMEL | 5 | 2 | 8 | g | • | |
| *Salix myrtillifolia* | myrtle-leaved willow | SALIMYR | 6 | 1 | 8 | g | • | |
| *Salix nivalis* | snow willow | SALINIV | 4 | 0 | 8 | a,c,g | • | |
| *Salix pedicellaris* | bog willow | SALIPED | 7 | 4 | 8 | g | • | |
| *Salix planifolia* | flat-leaved willow | SALIPLA | 6 | 1 | 8 | g | • | |
| *Salix pseudomonticola* | false mountain willow | SALIPSE | 6 | 2 | 8 | g | • | |
| *Salix reticulata* | snow willow | SALIRET | 3 | 1 | 6 | c,g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Salix scouleriana* | Scouler's willow | SALISCO | 4 | 0 | 8 | g | • | |
| *Salix sp* | willows | SALISPP | 6 | 0 | 8 | a | • | |
| *Salix stolonifera* | creeping willow | SALISTO | 4 | 0 | 8 | g | • | |
| *Salix vestita* | rock willow | SALIVES | 3 | 0 | 8 | a,c | • | |
| *Sanionia uncinata* | sanionia moss | SANIUNC | 6 | 1 | 7 | a | • | |
| *Saussurea nuda* | Dwarf Saw-wort | SAUSNUD | 2 | 0 | 3 | c,g | • | |
| *Saxifraga adscendens* | wedge-leaved saxifrage | SAXIADS | 3 | 1 | 5 | g | • | |
| *Saxifraga aizoides* | yellow mountain saxifrage | SAXIAIZ | 4 | 1 | 5 | f,g | • | |
| *Saxifraga bronchialis* | spotted saxifrage | SAXIBRO | 2 | 0 | 4 | c | • | |
| *Saxifraga caespitosa* | tufted saxifrage | SAXICAE | 3 | 1 | 5 | g | • | |
| *Saxifraga cernua* | nodding saxifrage | SAXICER | 2 | 1 | 5 | g | • | |
| *Saxifraga ferruginea* | saxifrage | SAXIFER | 2 | 0 | 7 | g | • | |
| *Saxifraga flagellaris* | spiderplant | SAXIFLA | 3 | 0 | 6 | g | • | |
| *Saxifraga hyperborea* | brook saxifrage | SAXIHYP | 4 | 0 | 7 | f,g | • | |
| *Saxifraga lyallii* | red-stemmed saxifrage | SAXILYA | 6 | 4 | 8 | g | • | |
| *Saxifraga nelsoniana* | Nelson's saxifrage | SAXINEL | 4 | 0 | 6 | f,g | • | |
| *Saxifraga nivalis* | alpine saxifrage | SAXINIV | 4 | 0 | 6 | f,g | • | |
| *Saxifraga occidentalis* | rhomboid-leaved saxifrage | SAXIOCC | 4 | 0 | 6 | f,g | • | |
| *Saxifraga oppositifolia* | purple saxifrage | SAXIOPP | 2 | 0 | 5 | g | • | |
| *Saxifraga tricuspidata* | three-toothed saxifrage | SAXITRI | 2 | 0 | 8 | g | • | |
| *Sedum divergens* | spreading stonecrop | SEDUDIV | 2 | 0 | 6 | g | • | |
| *Sedum lanceolatum* | lance-leaved stonecrop | SEDULAN | 3 | 1 | 5 | g | • | |
| *Selaginella densa* | prairie selaginella | SELADEN | 2 | 0 | 6 | g | • | |
| *Selaginella scopulorum* | cliff selaginella | SELASCO | 2 | 2 | 3 | g | • | |
| *Selaginella selaginoides* | spiny-edged little club-moss | SELASEL | 5 | 2 | 8 | g | • | |
| *Senecio sp* | ragworts | SENESPP | 4 | 0 | 8 | g | • | • |
| *Senecio triangularis* | brook ragwort | SENETRI | 5 | 0 | 8 | g | • | |
| *Sheperdia canadensis* | Canada buffaloberry | SHEPCAN | 2 | 0 | 8 | a,g | • | • |
| *Sibbaldia procumbens* | sibbaldia | SIBBPRO | 4 | 0 | 8 | g | • | |
| *Silene acaulis* | moss campion | SILEACA | 2 | 1 | 3 | g | • | |
| *Silene drummondii* | Drummond's cockle | SILEDRU | 4 | 1 | 5 | g | • | |
| *Smilacina trifolia* | three-leaved Solomon's-seal | SMILTRI | 7 | 3 | 8 | b,g | • | • |
| *Solidago canadensis* | Canada goldenrod | SOLICAN | 3 | 1 | 6 | b,g | • | • |
| *Solidago multiradiata* | alpine goldenrod | SOLIMUL | 3 | 0 | 8 | g | • | |
| *Solidago sp* | goldenrods | SOLISPP | 4 | 1 | 7 | c,g | • | |
| *Sorbus scopulina* | western mountain-ash | SORBSCO | 5 | 3 | 6 | g | • | |
| *Sorbus sitchensis* | Sitka mountain-ash | SORBSIT | 5 | 3 | 7 | g | • | |
| *Sphagnum fuscum* | sphagnum | SPHAFUS | 8 | 6 | 8 | a | • | • |
| *Spiraea betulifolia* | white meadowsweet | SPIRBET | 3 | 1 | 5 | g | • | • |
| *Spiranthes romanzoffiana* | hooded ladies'-tresses | SPIRROM | 6 | 0 | 8 | g | • | |
| *Stellaria calycantha* | northern stitchwort | STELCAL | 5 | 1 | 8 | g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Stellaria crassifolia* | fleshy stitchwort | STELCRA | 4 | 2 | 6 | g | • | |
| *Stellaria longifolia* | long-leaved chickweed | STELLON | 5 | 0 | 8 | a,g | • | |
| *Stellaria longipes* | long-stalked chickweed | STELLOG | 4 | 1 | 7 | g | • | |
| *Streptopus amplexifolius* | clasping-leaved twisted-stalk | STREAMP | 3 | 5 | 7 | g | • | |
| *Symphoricarpos albus* | snowberry | SYMPALB | 3 | 2 | 4 | g | • | |
| *Symphoricarpos occidentalis* | buckbrush | SYMPOCC | 4 | 0 | 6 | g | • | |
| *Symphyotrichum ciliolatum* | Lindley's aster | ASTECIL | 3 | 1 | 4 | a | • | |
| *Symphyotrichum laeve* | smooth aster | ASTELAE | 2 | 1 | 4 | c,g | • | |
| *Symphyotrichum lanceolatum* | panicled aster | ASTELAN | 2 | 1 | 4 | c,g | • | |
| *Taraxacum ceratophorum* | northern dandelion | TARACER | 3 | 0 | 8 | g | • | |
| *Taraxacum officinale* | common dandelion | TARAOFF | 4 | 0 | 8 | g | • | • |
| *Thalictrum occidentale* | western meadow rue | THALOCC | 4 | 0 | 8 | g | • | |
| *Thalictrum sp* | meadow rues | THALSPP | 4 | 1 | 7 | c,g | • | |
| *Thalictrum sparsiflorum* | flat-fruited meadow rue | THALSPA | 5 | 2 | 7 | c,g | • | • |
| *Thalictrum venulosum* | veiny meadow rue | THALVEN | 4 | 1 | 7 | g | • | |
| *Tiarella trifoliata* | laceflower | TIARTRI | 5 | 4 | 6 | g | • | |
| *Tiarella unifoliata* | sugarscoop | TIARUNI | 4 | 0 | 8 | g | • | |
| *Tofieldia glutinosa* | sticky false asphodel | TOFIGLU | 7 | 0 | 8 | c,g | • | |
| *Tofieldia pusilla* | dwarf false asphodel | TOFIPUS | 5 | 2 | 8 | g | • | |
| *Trichophorum alpinum* | Hudson Bay bulrush | SCIRHUD | 7 | 4 | 8 | g | • | |
| *Trichophorum cespitosum* | tufted bulrush | SCIRCES | 7 | 0 | 8 | g | • | |
| *Trientalis europaea* | Arctic starflower | TRIEEUR | 7 | 5 | 8 | c,g | • | |
| *Trifolium pratense* | red clover | TRIFPRA | 4 | 1 | 8 | c,g | • | |
| *Trifolium repens* | white clover | TRIFREP | 4 | 0 | 8 | c,g | • | |
| *Triglochin maritima* | seaside arrow-grass | TRIGMAR | 7 | 1 | 8 | g | • | |
| *Triglochin palustris* | slender arrow-grass | TRIGPAL | 7 | 3 | 8 | g | • | |
| *Trisetum montanum* | mountain trisetum | TRISMON | 3 | 0 | 8 | g | • | |
| *Trisetum sp* | trisetums | TRISSPP | 4 | 0 | 8 | g | • | |
| *Trisetum spicatum* | spike trisetum | TRISSPI | 3 | 0 | 8 | g | • | |
| *Trollius albiflorus* | globeflower | TROLALB | 5 | 0 | 8 | g | • | |
| *Urtica doica* | common nettle | URTIDOI | 5 | 3 | 7 | c,g | • | • |
| *Utricularia intermedia* | flat-leaved bladderwort | UTRIINT | 7 | 6 | 8 | g | • | • |
| *Vaccinium caespitosum* | dwarf bilberry | VACCCAE | 2 | 0 | 8 | a,g | • | |
| *Vaccinium membranaceum* | tall bilberry | VACCMEM | 4 | 0 | 8 | g | • | |
| *Vaccinium myrtilloides* | common blueberry | VACCMYR | 3 | 0 | 8 | a,g | • | • |
| *Vaccinium ovalifolium* | oval-leaved blueberry | VACCOVA | 4 | 0 | 8 | g | • | • |
| *Vaccinium scoparium* | grouseberry | VACCSCO | 3 | 0 | 8 | c,g | • | |
| *Vaccinium sp* | bilberries & blueberries | VACCSPP | 3 | 0 | 8 | c,g | • | |
| *Vaccinium vitis-idaea* | bog cranberry | VACCVIT | 4 | 0 | 8 | a,g | • | • |
| *Vahlodea atropurpurea* | mountain hair grass | VAHLATR | 4 | 0 | 8 | g | • | |
| *Vahlodea sp* | hair grasses | VAHLSPP | 4 | 0 | 8 | g | • | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Valeriana dioica* | northern valerian | VALEDIO | 5 | 3 | 8 | g | • | |
| *Valeriana sitchensis* | mountain valerian | VALESIT | 4 | 0 | 8 | g | • | |
| *Veratrum eschscholtzii* | green false hellebore | VERAESC | 5 | 0 | 8 | g | • | |
| *Veronica alpina* | alpine speedwell | VEROALP | 5 | 3 | 6 | c,e | • | |
| *Veronica americana* | American brooklime | VEROAME | 7 | 6 | 8 | e,g | • | |
| *Veronica scutellata* | marsh speedwell | VEROSCU | 7 | 4 | 8 | g | • | |
| *Veronica wormskjoldii* | American alpine speedwell | VEROWOR | 5 | 3 | 6 | c,e | • | |
| *Viburnum edule* | low-bush cranberry | VIBUEDU | 5 | 0 | 8 | a,g | • | • |
| *Viburnum opulus* | high-bush cranberry | VIBUOPU | 5 | 4 | 7 | a,c | • | • |
| *Vicia americana* | wild vetch | VICIAME | 3 | 0 | 8 | a,g | • | • |
| *Viola canadensis* | western Canada violet | VIOLCAN | 4 | 0 | 7 | b,f,g | • | • |
| *Viola glabella* | yellow wood violet | VIOLGLA | 4 | 0 | 7 | f,g | • | |
| *Viola orbiculata* | evergreen violet | VIOLORB | 4 | 0 | 8 | g | • | |
| *Viola palustris* | marsh violet | VIOLPAL | 6 | 4 | 8 | g | • | |
| *Viola renifolia* | kidney-leaved violet | VIOLREN | 4 | 0 | 7 | a,f | • | • |
| *Viola sp* | violets | VIOL SPP. | 5 | 0 | 7 | c,f,g | • | |
| *Vulpia octoflora* | six-weeks fescue | VULPOCT | 3 | 0 | 5 | g | • | |
| *Zigadenus elegans* | white camas | ZIGAELE | 4 | 2 | 6 | c,g | • | • |

**Index Meanings**

0 Very xeric
1 Xeric
2 Sub-xeric
3 Sub-mesic
4 Mesic
5 Sub-hygric
6 Hygric
7 Sub-hydric
8 Hydric

**Sources**

a Gerling et al. (1996)
b Rowe (1956)
c Moss & Packer (1983)
d Farrar (1995)
e Kershaw et al. (1998)
f Beckingham & Archibald (1996)
g UBC E-flora BC (2009)

# APPENDIX B - VEGETATION INVENTORY FIELD DATA THE FROM THE WILLMORE WILDERNESS PARK STUDY AREA SPANNING 2009-2010 FIELD SEASONS

| Willmore Wilderness Park | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 (APTR) | | | | | | | | | | | |
| **Site** | **Date** | **Surveyor** | **Plot** | **Species** | **%** | **Site** | **Date** | **Surveyor** | **Plot** | **Species** | **%** |
| S26 | July 10-09 | JG | NW | PICEGLA | 12 | S24 | July 22-09 | JG | NE | JUNCDRU | P |
| S26 | July 10-09 | JG | NW | POPUTRE | P | S24 | July 22-09 | JG | NE | CARENIG | 20 |
| S26 | July 10-09 | JG | NW | SHEPCAN | 20 | S24 | July 22-09 | JG | NE | SENETRI | 5 |
| S26 | July 10-09 | JG | NW | ROSAACI | 10 | S24 | July 22-09 | JG | NE | CASSMER | 40 |
| S26 | July 10-09 | JG | NW | ASTECON | 3 | S24 | July 22-09 | JG | NE | ANTELAN | 1 |
| S26 | July 10-09 | JG | NW | EPILANG | 1 | S24 | July 22-09 | JG | NE | PHYLEMP | 10 |
| S26 | July 10-09 | JG | NW | LEYMINN | 25 | S24 | July 22-09 | JG | NE | ABIEBIF | 10 |
| S26 | July 10-09 | JG | NW | FRAGVIR | P | S24 | July 22-09 | JG | NE | VACCCAE | P |
| S26 | July 10-09 | JG | NW | LINNBOR | 10 | S24 | July 22-09 | JG | NE | ERIGPER | P |
| S26 | July 10-09 | JG | NW | SYMPOCC | P | S24 | July 22-09 | JG | NE | CALTLEP | 3 |
| S26 | July 10-09 | JG | SW | PICEGLA | 36 | S24 | July 22-09 | JG | NE | CARESPE | P |
| S26 | July 10-09 | JG | SW | POPUBAL | 3 | S24 | July 22-09 | JG | NE | POTEDIV | P |
| S26 | July 10-09 | JG | SW | ROSAACI | P | S24 | July 22-09 | JG | NW | SENETRI | P |
| S26 | July 10-09 | JG | SW | LEYMINN | 20 | S24 | July 22-09 | JG | NW | CARESPE | 30 |
| S26 | July 10-09 | JG | SW | GALIBOR | P | S24 | July 22-09 | JG | NW | CARENIG | 20 |
| S26 | July 10-09 | JG | SW | RIBEOXY | P | S24 | July 22-09 | JG | NW | CASSMER | 5 |
| S26 | July 10-09 | JG | SW | ORTHSEC | P | S24 | July 22-09 | JG | NW | KALMMIC | P |
| S26 | July 10-09 | JG | SW | EPILANG | P | S24 | July 22-09 | JG | NW | PHYLGLA | 5 |
| S26 | July 10-09 | JG | SW | LATHOCH | P | S24 | July 22-09 | JG | NW | HIERUMB | P |
| S26 | July 10-09 | JG | SW | VIOLREN | P | S24 | July 22-09 | JG | NW | LUETPEC | P |
| S26 | July 10-09 | JG | SW | ASTECON | 5 | S24 | July 22-09 | JG | NW | SIBBPRO | P |
| S26 | July 10-09 | JG | SW | ASTECIL | 5 | S24 | July 22-09 | JG | NW | ERIGPER | P |
| H3 | July 11-09 | JG | NW | PICEENG | 5 | S24 | July 22-09 | JG | NW | GENTGLA | P |
| H3 | July 11-09 | JG | NW | ABIEBIF | P | S24 | July 22-09 | JG | NW | VEROALP | P |
| H3 | July 11-09 | JG | NW | DRYAOCT | 30 | S24 | July 22-09 | JG | NW | PICEENG | P |
| H3 | July 11-09 | JG | NW | POLYVIV | P | S24 | July 22-09 | JG | NW | JUNCDRU | P |
| H3 | July 11-09 | JG | NW | SALIARC | P | S24 | July 22-09 | JG | SW | CASTMIN | 40 |
| H3 | July 11-09 | JG | NW | SILEACA | P | S24 | July 22-09 | JG | SW | ABIEBIF | 5 |
| H3 | July 11-09 | JG | NW | PEDICAP | 3 | S24 | July 22-09 | JG | SW | DIPHALP | P |
| H3 | July 11-09 | JG | NW | SIBBPRO | P | S24 | July 22-09 | JG | SW | VACCVIT | P |
| H3 | July 11-09 | JG | NW | ARTENOR | 3 | S24 | July 22-09 | JG | SW | LOISPRO | P |
| H3 | July 11-09 | JG | NW | PHYLEMP | P | S24 | July 22-09 | JG | SW | GENTGLA | P |
| H3 | July 11-09 | JG | NW | SALIRET | 5 | S24 | July 22-09 | JG | SW | PHYLGLA | P |
| H3 | July 11-09 | JG | NW | CAREALB | P | S24 | July 22-09 | JG | SW | SALIARC | P |
| H3 | July 11-09 | JG | NW | FESTBRA | 1 | S24 | July 22-09 | JG | SW | ARTENOR | P |
| H3 | July 11-09 | JG | NW | ANTEMON | P | S24 | July 22-09 | JG | SW | EMPENIG | 1 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H3 | July 11-09 | JG | NW | SELASEL | P | S24 | July 22-09 | JG | SW | CARESPE | P |
| H3 | July 11-09 | JG | NW | POAALPI | P | S24 | July 22-09 | JG | SE | CASSMER | 50 |
| H3 | July 11-09 | JG | NW | DRABLON | P | S24 | July 22-09 | JG | SE | CARENIG | P |
| H3 | July 11-09 | JG | NE | PICEENG | 5 | S24 | July 22-09 | JG | SE | GENTGLA | P |
| H3 | July 11-09 | JG | NE | DRYAOCT | 40 | S24 | July 22-09 | JG | SE | LUETPEC | P |
| H3 | July 11-09 | JG | NE | CARESCI | 7 | S24 | July 22-09 | JG | SE | CARESPE | P |
| H3 | July 11-09 | JG | NE | SILEACA | P | S24 | July 22-09 | JG | SE | DIPHALP | 1 |
| H3 | July 11-09 | JG | NE | PEDICAP | P | S24 | July 22-09 | JG | SE | PHYLGLA | 1 |
| H3 | July 11-09 | JG | NE | ARTENOR | P | S24 | July 22-09 | JG | SE | HIERUMB | P |
| H3 | July 11-09 | JG | NE | ACONDEL | P | W8 | July 23-09 | | NW | PICEENG | 5 |
| H3 | July 11-09 | JG | NE | POLYVIV | P | W8 | July 23-09 | | NW | SALIBAR | 10 |
| H3 | July 11-09 | JG | NE | SALIARC | 1 | W8 | July 23-09 | | NW | LEDUGRO | 20 |
| H3 | July 11-09 | JG | NE | CASSTET | P | W8 | July 23-09 | | NW | HEDYALP | P |
| H3 | July 11-09 | JG | NE | CASTOCC | P | W8 | July 23-09 | | NW | PETAPAL | P |
| H3 | July 11-09 | JG | NE | ANEMPAR | P | W8 | July 23-09 | | NW | CARELEP | P |
| H3 | July 11-09 | JG | NE | SALIRET | 1 | W8 | July 23-09 | | NW | CARECAP | P |
| H3 | July 11-09 | JG | NE | DRABLON | P | W8 | July 23-09 | | NW | ARCTUVA | P |
| H3 | July 11-09 | JG | NE | MINUBIF | P | W8 | July 23-09 | | NW | CYPRPAS | P |
| H3 | July 11-09 | JG | NE | SOLIMUL | P | W8 | July 23-09 | | NW | TOFIPUS | P |
| H3 | July 11-09 | JG | SE | DRYAOCT | 50 | W8 | July 23-09 | | NW | CARESAX | 5 |
| H3 | July 11-09 | JG | SE | POLYVIV | P | W8 | July 23-09 | | NW | JUNIHOR | P |
| H3 | July 11-09 | JG | SE | HEDYALP | 15 | W8 | July 23-09 | | NW | SALIPLA | 1 |
| H3 | July 11-09 | JG | SE | PEDILAN | P | W8 | July 23-09 | | NW | SALIMYR | 5 |
| H3 | July 11-09 | JG | SE | PEDICAP | P | W8 | July 23-09 | | NW | GEOCLIV | 5 |
| H3 | July 11-09 | JG | SE | ARCTRUB | P | W8 | July 23-09 | | NW | ROSAACI | P |
| H3 | July 11-09 | JG | SE | SILEACA | P | W8 | July 23-09 | | NW | ASTECIL | P |
| H3 | July 11-09 | JG | SE | SALIARC | P | W8 | July 23-09 | | NW | ARCTRUB | 1 |
| H3 | July 11-09 | JG | SE | CARESCI | 3 | W8 | July 23-09 | | NW | ORYZASP | P |
| H3 | July 11-09 | JG | SE | PICEENG | P | W8 | July 23-09 | | NW | EQUIARV | P |
| H3 | July 11-09 | JG | SW | ABIEBIF | 20 | W8 | July 23-09 | | NW | EQUISCI | P |
| H3 | July 11-09 | JG | SW | PICEENG | 3 | W8 | July 23-09 | | NW | HEDYSUL | P |
| H3 | July 11-09 | JG | SW | ARTENOR | 5 | W8 | July 23-09 | | NE | PICEGLA | 21 |
| H3 | July 11-09 | JG | SW | ANTELAN | 15 | W8 | July 23-09 | | NE | POTEFRU | 1 |
| H3 | July 11-09 | JG | SW | ERIGPER | 5 | W8 | July 23-09 | | NE | JUNIHOR | P |
| H3 | July 11-09 | JG | SW | SALIARC | P | W8 | July 23-09 | | NE | LEDUGRO | 1 |
| H3 | July 11-09 | JG | SW | SIBBPRO | P | W8 | July 23-09 | | NE | ARCTUVA | 2 |
| H3 | July 11-09 | JG | SW | POLYVIV | P | W8 | July 23-09 | | NE | GEOCLIV | P |
| H3 | July 11-09 | JG | SW | PEDIMAC | P | W8 | July 23-09 | | NE | CARECON | P |
| H3 | July 11-09 | JG | SW | PEDIMAC | P | W8 | July 23-09 | | NE | ORYZASP | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S18 | July 12-09 | JG | NW | ABIEBIF | 10 | W8 | July 23-09 | | NE | ERIGPER | P |
| S18 | July 12-09 | JG | NW | TROLALB | 1 | W8 | July 23-09 | | NE | SHEPCAN | P |
| S18 | July 12-09 | JG | NW | CALTLEP | 1 | W8 | July 23-09 | | NE | JUNICOM | 1 |
| S18 | July 12-09 | JG | NW | PHYLEMP | P | W8 | July 23-09 | | NE | SALIGLA | 5 |
| S18 | July 12-09 | JG | NW | DIPHALP | 10 | W8 | July 23-09 | | NE | ROSAACI | 1 |
| S18 | July 12-09 | JG | NW | ANEMOCC | 1 | W8 | July 23-09 | | NE | PYROASA | P |
| S18 | July 12-09 | JG | NW | LUZUPIP | P | W8 | July 23-09 | | NE | ARCTRUB | 1 |
| S18 | July 12-09 | JG | NW | RANUOCC | 1 | W8 | July 23-09 | | NE | LINNBOR | 2 |
| S18 | July 12-09 | JG | NW | SALIGLA | 5 | W8 | July 23-09 | | NE | ORTHSEC | P |
| S18 | July 12-09 | JG | NW | MITEBRE | 1 | W8 | July 23-09 | | NE | PYROELL | P |
| S18 | July 12-09 | JG | NW | ARTENOR | 1 | W8 | July 23-09 | | SE | PICEGLA | 3 |
| S18 | July 12-09 | JG | NW | ANTELAN | P | W8 | July 23-09 | | SE | SALIBAR | 5 |
| S18 | July 12-09 | JG | SW | ABIEBIF | 35 | W8 | July 23-09 | | SE | JUNIHOR | 5 |
| S18 | July 12-09 | JG | SW | CARELEP | P | W8 | July 23-09 | | SE | SALIPLA | 1 |
| S18 | July 12-09 | JG | SW | ANEMOCC | P | W8 | July 23-09 | | SE | SALIGLA | 3 |
| S18 | July 12-09 | JG | SW | VIOLORB | P | W8 | July 23-09 | | SE | GALIBOR | P |
| S18 | July 12-09 | JG | SW | VIOLREN | P | W8 | July 23-09 | | SE | ZIGAELE | P |
| S18 | July 12-09 | JG | SW | RANUOCC | P | W8 | July 23-09 | | SE | HEDYSUL | P |
| S18 | July 12-09 | JG | SW | VALEDIO | 5 | W8 | July 23-09 | | SE | LINNBOR | P |
| S18 | July 12-09 | JG | SW | ANTELAN | P | W8 | July 23-09 | | SE | ANTEPUL | P |
| S18 | July 12-09 | JG | SW | VACCMEM | 5 | W8 | July 23-09 | | SE | TOFIGLU | P |
| S18 | July 12-09 | JG | SW | PHYLEMP | 1 | W8 | July 23-09 | | SE | ELYMTRA | 10 |
| S18 | July 12-09 | JG | SW | TROLALB | 5 | W8 | July 23-09 | | SE | ASTECIL | P |
| S18 | July 12-09 | JG | SW | ANEMOCC | P | W8 | July 23-09 | | SE | ARCTRUB | 1 |
| S18 | July 12-09 | JG | SW | DIPHALP | 5 | W8 | July 23-09 | | SE | POTEFRU | 7 |
| S18 | July 12-09 | JG | SE | ABIEBIF | 25 | W8 | July 23-09 | | SE | SALIMYR | 40 |
| S18 | July 12-09 | JG | SE | VERAESC | P | W8 | July 23-09 | | SE | SALIMYR | 40 |
| S18 | July 12-09 | JG | SE | ERIGPER | 5 | W8 | July 23-09 | | SE | LEDUGRO | 1 |
| S18 | July 12-09 | JG | SE | VALEDIO | 5 | W8 | July 23-09 | | SE | ROSAACI | P |
| S18 | July 12-09 | JG | SE | ANTELAN | 5 | W8 | July 23-09 | | SE | CARECON | P |
| S18 | July 12-09 | JG | SE | TROLALB | 5 | W8 | July 23-09 | | SE | CYPRPAS | P |
| S18 | July 12-09 | JG | SE | PEDIMAC | 5 | W8 | July 23-09 | | SE | CAMPROT | P |
| S18 | July 12-09 | JG | SE | PEDIMAC | 5 | W8 | July 23-09 | | SE | CARECAP | 5 |
| S18 | July 12-09 | JG | SE | CLAYLAN | P | W8 | July 23-09 | | SE | PYROASA | P |
| S18 | July 12-09 | JG | SE | EQUISCI | P | W8 | July 23-09 | | SE | ORYZASP | 5 |
| S18 | July 12-09 | JG | SE | ARTENOR | P | W8 | July 23-09 | | SE | AMERROT | P |
| S18 | July 12-09 | JG | SE | ARNIMOL | P | W8 | July 23-09 | | SE | EQUIARV | P |
| S18 | July 12-09 | JG | SE | ARNIDIV | P | W8 | July 23-09 | | SW | PICEGLA | 18 |
| S18 | July 12-09 | JG | SE | VIOLORB | P | W8 | July 23-09 | | SW | SALIGLA | 3 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S18 | July 12-09 | JG | SE | VIOLREN | P | W8 | July 23-09 | | SW | SALIBAR | 25 |
| S18 | July 12-09 | JG | NE | SALIBOO | 30 | W8 | July 23-09 | | SW | LEDUGRO | 10 |
| S18 | July 12-09 | JG | NE | TROLALB | P | W8 | July 23-09 | | SW | ROSAACI | 2 |
| S18 | July 12-09 | JG | NE | PEDIBRA | 1 | W8 | July 23-09 | | SW | CYPRPAS | P |
| S18 | July 12-09 | JG | NE | ERIGPER | P | W8 | July 23-09 | | SW | ARCTRUB | 1 |
| S18 | July 12-09 | JG | NE | HERALAN | 20 | W8 | July 23-09 | | SW | ARCTUVA | 1 |
| S18 | July 12-09 | JG | NE | PARN SPP. | 1 | W8 | July 23-09 | | SW | ANTEPAR | P |
| S18 | July 12-09 | JG | NE | RANUOCC | 1 | W8 | July 23-09 | | SW | TOFIGLU | P |
| S18 | July 12-09 | JG | NE | VERAESC | P | W8 | July 23-09 | | SW | CARELIV | P |
| S18 | July 12-09 | JG | NE | ACHIMIL | P | W8 | July 23-09 | | SW | JUNIHOR | 25 |
| S18 | July 12-09 | JG | NE | FRAGVIR | 1 | W8 | July 23-09 | | SW | BETUGLA | 1 |
| S18 | July 12-09 | JG | NE | ANEMLIT | P | W8 | July 23-09 | | SW | POTEFRU | 10 |
| S18 | July 12-09 | JG | NE | SALIBAA | 20 | W8 | July 23-09 | | SW | SALIPLA | 1 |
| S18 | July 12-09 | JG | NE | POTENOR | P | W8 | July 23-09 | | SW | CARECON | 10 |
| S18 | July 12-09 | JG | NE | POTENOR | P | W8 | July 23-09 | | SW | JUNCBAL | 2 |
| S18 | July 12-09 | JG | NE | PHLECOM | P | W8 | July 23-09 | | SW | ASTECIL | P |
| S18 | July 12-09 | JG | NE | EPILANG | P | W8 | July 23-09 | | SW | CARECAP | 2 |
| H2 | July 15-09 | JG | SE | SALIARC | 5 | W8 | July 23-09 | | SW | ANTEPUL | 1 |
| H2 | July 15-09 | JG | SE | ANTENEG | P | W8 | July 23-09 | | SW | ZIGAELE | P |
| H2 | July 15-09 | JG | SE | POAALPI | P | S12 | July 23-09 | | NW | PICEENG | 30 |
| H2 | July 15-09 | JG | SE | PEDIBRA | P | S12 | July 23-09 | | NW | ABIEBIF | 55 |
| H2 | July 15-09 | JG | SE | SEDULAN | P | S12 | July 23-09 | | NW | SALIGLA | 10 |
| H2 | July 15-09 | JG | SE | CASTOCC | P | S12 | July 23-09 | | NW | SIBBPRO | P |
| H2 | July 15-09 | JG | SE | OXYRDIG | 1 | S12 | July 23-09 | | NW | DRYAOCT | 5 |
| H2 | July 15-09 | JG | SE | PARNFIM | 1 | S12 | July 23-09 | | NW | ARTENOR | 5 |
| H2 | July 15-09 | JG | SE | RANUESC | P | S12 | July 23-09 | | NW | ACONDEL | P |
| H2 | July 15-09 | JG | SE | ANTEALP | 1 | S12 | July 23-09 | | NW | SALIRET | 1 |
| H2 | July 15-09 | JG | SE | ARTENOR | P | S12 | July 23-09 | | NW | POAALPI | P |
| H2 | July 15-09 | JG | SE | TRISSPI | P | S12 | July 23-09 | | NW | POTEDIV | P |
| H2 | July 15-09 | JG | SE | LUZUSPI | 1 | S12 | July 23-09 | | NW | ARCTALP | P |
| H2 | July 15-09 | JG | SE | LUZUSPI | 1 | S12 | July 23-09 | | NW | ANTEALP | P |
| H2 | July 15-09 | JG | SE | SAXIOCC | P | S12 | July 23-09 | | NW | EPILANG | P |
| H2 | July 15-09 | JG | SE | SILEACA | P | S12 | July 23-09 | | NW | POLYVIV | P |
| H2 | July 15-09 | JG | NE | ABIEBIF | P | S12 | July 23-09 | | NE | PICEENG | 3 |
| H2 | July 15-09 | JG | NE | ARTELON | 35 | S12 | July 23-09 | | NE | SALIARC | 20 |
| H2 | July 15-09 | JG | NE | ARTELON | 35 | S12 | July 23-09 | | NE | POLYVIV | P |
| H2 | July 15-09 | JG | NE | ERIGPER | P | S12 | July 23-09 | | NE | ERIGPER | P |
| H2 | July 15-09 | JG | NE | ANEMOCC | P | S12 | July 23-09 | | NE | ARTENOR | 5 |
| H2 | July 15-09 | JG | NE | SALIARC | 10 | S12 | July 23-09 | | NE | ABIEBIF | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H2 | July 15-09 | JG | NE | TRISSPI | 1 | S12 | July 23-09 | | NE | POAALPI | P |
| H2 | July 15-09 | JG | NE | VAHLATR | P | S12 | July 23-09 | | NE | POLYVIV | P |
| H2 | July 15-09 | JG | NE | PHLECOM | P | S12 | July 23-09 | | NE | SEDULAN | P |
| H2 | July 15-09 | JG | NE | CASTOCC | P | S12 | July 23-09 | | NE | POTEDIV | P |
| H2 | July 15-09 | JG | NE | PEDIBRA | 5 | S12 | July 23-09 | | NE | SOLIMUL | P |
| H2 | July 15-09 | JG | NE | ARTENOR | 5 | S12 | July 23-09 | | NE | DRYAOCT | 50 |
| H2 | July 15-09 | JG | NE | POAALPI | 1 | S12 | July 23-09 | | NE | MINUBIF | P |
| H2 | July 15-09 | JG | NE | DIPHALP | 1 | S12 | July 23-09 | | NE | JUNICOM | P |
| H2 | July 15-09 | JG | NE | CAREPAR | P | S12 | July 23-09 | | NE | ACONDEL | P |
| H2 | July 15-09 | JG | NE | SIBBPRO | 5 | S12 | July 23-09 | | NE | THALVEN | P |
| H2 | July 15-09 | JG | NE | MYOSALP | P | S12 | July 23-09 | | NE | FESTBRA | P |
| H2 | July 15-09 | JG | NE | CLAYLAN | P | S12 | July 23-09 | | NE | TRISSPI | P |
| H2 | July 15-09 | JG | NE | SALIRET | 5 | S12 | July 23-09 | | SE | DRYAOCT | 30 |
| H2 | July 15-09 | JG | NE | DRAB SPP. | P | S12 | July 23-09 | | SE | SALIRET | 30 |
| H2 | July 15-09 | JG | NE | DRAB SPP. | P | S12 | July 23-09 | | SE | ARTENOR | 5 |
| H2 | July 15-09 | JG | NE | TROLALB | 5 | S12 | July 23-09 | | SE | SALIARC | 1 |
| H2 | July 15-09 | JG | NE | ERIGHUM | P | S12 | July 23-09 | | SE | PICEENG | P |
| H2 | July 15-09 | JG | NE | EQUIVAR | P | S12 | July 23-09 | | SE | FESTBRA | P |
| H2 | July 15-09 | JG | NE | ARAB SPP. | P | S12 | July 23-09 | | SE | POAALPI | P |
| H2 | July 15-09 | JG | NE | POAALPI | P | S12 | July 23-09 | | SE | POLYVIV | P |
| H2 | July 15-09 | JG | NE | PHYLGLA | P | S12 | July 23-09 | | SE | CASTMIN | P |
| H2 | July 15-09 | JG | NW | PHYLGLA | 5 | S12 | July 23-09 | | SE | FESTSAX | P |
| H2 | July 15-09 | JG | NW | CASSMER | 15 | S12 | July 23-09 | | SE | ANTEMON | P |
| H2 | July 15-09 | JG | NW | ARNILAT | 5 | S12 | July 23-09 | | SE | ACONDEL | P |
| H2 | July 15-09 | JG | NW | ERIGPER | P | S12 | July 23-09 | | SE | DELPGLA | P |
| H2 | July 15-09 | JG | NW | ANTELAN | P | S12 | July 23-09 | | SE | FESTSEN | P |
| H2 | July 15-09 | JG | NW | ARTENOR | P | S12 | July 23-09 | | SE | POTEDIV | P |
| H2 | July 15-09 | JG | NW | POAALPI | P | S12 | July 23-09 | | SE | CAREALB | P |
| H2 | July 15-09 | JG | NW | ARNILAT | P | S12 | July 23-09 | | SE | EQUISCI | P |
| H2 | July 15-09 | JG | NW | ANEMOCC | P | S12 | July 23-09 | | SW | ABIEBIF | 50 |
| H2 | July 15-09 | JG | NW | PEDIBRA | P | S12 | July 23-09 | | SW | ORTHSEC | 1 |
| H2 | July 15-09 | JG | NW | CLAYLAN | P | S12 | July 23-09 | | SW | EPILANG | P |
| H2 | July 15-09 | JG | SW | ARTENOR | P | S12 | July 23-09 | | SW | ARTENOR | P |
| H2 | July 15-09 | JG | SW | SALIGLA | 1 | S12 | July 23-09 | | SW | VALESIT | P |
| H2 | July 15-09 | JG | SW | CALTLEP | P | E5 | July 24-09 | | SE | ABIEBIF | 25 |
| H2 | July 15-09 | JG | SW | OXYRDIG | P | E5 | July 24-09 | | SE | PHYLEMP | P |
| H2 | July 15-09 | JG | SW | PARNFIM | P | E5 | July 24-09 | | SE | CALTLEP | P |
| H2 | July 15-09 | JG | SW | PYROGRA | P | E5 | July 24-09 | | SE | MITEPEN | P |
| H2 | July 15-09 | JG | SW | RANUOCC | P | E5 | July 24-09 | | SE | PARAFIM | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H2 | July 15-09 | JG | SW | ERIGHUM | P | E5 | July 24-09 | | SE | PARAFIM | P |
| H2 | July 15-09 | JG | SW | LUZUSPI | P | E5 | July 24-09 | | SE | VERAESC | P |
| H2 | July 15-09 | JG | SW | LUZUSPI | P | E5 | July 24-09 | | SE | LUZUPAR | P |
| H2 | July 15-09 | JG | SW | JUNCDRU | 3 | E5 | July 24-09 | | SE | SAXILYA | P |
| H2 | July 15-09 | JG | SW | PETANIV | 3 | E5 | July 24-09 | | SE | PICEENG | 20 |
| H2 | July 15-09 | JG | SW | ANTEALP | P | E5 | July 24-09 | | SE | SALIARC | P |
| H2 | July 15-09 | JG | SW | SEDUDIV | P | E5 | July 24-09 | | SE | HERALAN | P |
| H2 | July 15-09 | JG | SW | POAALPI | 3 | E5 | July 24-09 | | SE | SENETRI | 1 |
| H2 | July 15-09 | JG | SW | SIBBPRO | P | E5 | July 24-09 | | SW | ABIEBIF | 91 |
| S25 | July 15-09 | DV | SE | SHEPCAN | 15 | E5 | July 24-09 | | SW | VACCMEM | 10 |
| S25 | July 15-09 | DV | SE | MENZFER | 5 | E5 | July 24-09 | | SW | PHYLGLA | P |
| S25 | July 15-09 | DV | SE | LEDUGRO | 5 | E5 | July 24-09 | | SW | RUBUPED | P |
| S25 | July 15-09 | DV | SE | SALI SPP. | 2 | E5 | July 24-09 | | NW | CASSMER | 70 |
| S25 | July 15-09 | DV | SE | PINUCON | 5 | E5 | July 24-09 | | NW | LUZUPAR | P |
| S25 | July 15-09 | DV | SE | CORNCAN | 15 | E5 | July 24-09 | | NW | LUETPEC | 5 |
| S25 | July 15-09 | DV | SE | ARNICOR | 10 | E5 | July 24-09 | | NW | VACCMEM | P |
| S25 | July 15-09 | DV | SE | RIBEOXY | P | E5 | July 24-09 | | NW | ANTELAN | P |
| S25 | July 15-09 | DV | SE | EPILANG | P | E5 | July 24-09 | | NW | CARESPE | P |
| S25 | July 15-09 | DV | SE | ORTHSEC | 2 | E5 | July 24-09 | | NE | CASSMER | 80 |
| S25 | July 15-09 | DV | SE | LINNBOR | P | E5 | July 24-09 | | NE | VERAESC | P |
| S25 | July 15-09 | DV | SE | EMPENIG | 3 | E5 | July 24-09 | | NE | VALESIT | P |
| S25 | July 15-09 | DV | SE | VACCCAE | 10 | E5 | July 24-09 | | NE | VACCMEM | 5 |
| S25 | July 15-09 | DV | SW | LEDUGRO | 10 | E5 | July 24-09 | | NE | CARESPE | 1 |
| S25 | July 15-09 | DV | SW | MENZFER | 20 | E5 | July 24-09 | | NE | ARNIMOL | P |
| S25 | July 15-09 | DV | SW | RHAMALN | 1 | E5 | July 24-09 | | NE | LUETPEC | 5 |
| S25 | July 15-09 | DV | SW | EMPENIG | 15 | E5 | July 24-09 | | NE | GENTGLA | P |
| S25 | July 15-09 | DV | SW | SALIX SPP. | 2 | E5 | July 24-09 | | NE | ANTELAN | P |
| S25 | July 15-09 | DV | SW | SALIX SPP. | 2 | E5 | July 24-09 | | NE | LUZUPAR | P |
| S25 | July 15-09 | DV | SW | CORNCAN | 10 | W3 | July 24-09 | DVU | SE | SALIGLA | 40 |
| S25 | July 15-09 | DV | SW | VACCCAE | 5 | W3 | July 24-09 | DVU | SE | SALIFAR | 30 |
| S25 | July 15-09 | DV | SW | PINUCON | 5 | W3 | July 24-09 | DVU | SE | BROMCIL | 10 |
| S25 | July 15-09 | DV | SW | LISTCOR | P | W3 | July 24-09 | DVU | SE | CAREUTR | 10 |
| S25 | July 15-09 | DV | NW | MENZFER | 20 | W3 | July 24-09 | DVU | SE | CAREDIS | 2 |
| S25 | July 15-09 | DV | NW | LEDUGRO | 10 | W3 | July 24-09 | DVU | SE | SALIBAA | 1 |
| S25 | July 15-09 | DV | NW | CORNCAN | 15 | W3 | July 24-09 | DVU | SE | MERTPAN | P |
| S25 | July 15-09 | DV | NW | VACCVIT | P | W3 | July 24-09 | DVU | SE | SALIMUL | P |
| S25 | July 15-09 | DV | NW | RHAMALN | P | W3 | July 24-09 | DVU | SE | SALIMUL | P |
| S25 | July 15-09 | DV | NW | SORBSCO | P | W3 | July 24-09 | DVU | SE | LONIINV | 1 |
| S25 | July 15-09 | DV | NW | VACCCAE | 5 | W3 | July 24-09 | DVU | SE | CAREAQU | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S25 | July 15-09 | DV | NW | PINUCON | 10 | W3 | July 24-09 | DVU | SE | GEUMRIV | 2 |
| S25 | July 15-09 | DV | NW | ABIEBIF | 5 | W3 | July 24-09 | DVU | SE | VALEDIO | P |
| S25 | July 15-09 | DV | NE | RIBEOXY | 3 | W3 | July 24-09 | DVU | SE | EPILANG | 1 |
| S25 | July 15-09 | DV | NE | PICEGLA | P | W3 | July 24-09 | DVU | SE | SENETRI | P |
| S25 | July 15-09 | DV | NE | EPILANG | 2 | W3 | July 24-09 | DVU | SE | BETUGLA | 1 |
| S25 | July 15-09 | DV | NE | SENECAN | 20 | W3 | July 24-09 | DVU | SE | ERIGPER | P |
| S25 | July 15-09 | DV | NE | SENECAN | 20 | W3 | July 24-09 | DVU | SE | ACHIMIL | P |
| S25 | July 15-09 | DV | NE | RHAMALN | 10 | W3 | July 24-09 | DVU | SE | POAPRAT | P |
| S25 | July 15-09 | DV | NE | FRAGVIR | 3 | W3 | July 24-09 | DVU | SE | POAPRAT | P |
| S25 | July 15-09 | DV | NE | CORNCAN | 10 | W3 | July 24-09 | DVU | SE | EPILSAX | P |
| S25 | July 15-09 | DV | NE | LEDUGRO | 2 | W3 | July 24-09 | DVU | SE | THALVEN | 5 |
| S25 | July 15-09 | DV | NE | ABIEBIF | 3 | W3 | July 24-09 | DVU | NE | BETUGLA | 7 |
| S25 | July 15-09 | DV | NE | PINUCON | 10 | W3 | July 24-09 | DVU | NE | SALIGLA | 1 |
| S25 | July 15-09 | DV | NE | ARALNUD | 10 | W3 | July 24-09 | DVU | NE | CAREPRA | 10 |
| S25 | July 15-09 | DV | NE | ARNICOR | 25 | W3 | July 24-09 | DVU | NE | CAREAQU | 20 |
| S25 | July 15-09 | DV | NE | LINNBOR | 1 | W3 | July 24-09 | DVU | NE | CAREUTR | 10 |
| S25 | July 15-09 | DV | NE | MITEPEN | P | W3 | July 24-09 | DVU | SW | BETUGLA | P |
| S25 | July 15-09 | DV | NE | OSMODEP | 1 | W3 | July 24-09 | DVU | SW | SALIFAR | 3 |
| S25 | July 15-09 | DV | NE | SOLI SPP. | P | W3 | July 24-09 | DVU | SW | SALIBAR | 7 |
| W9 | July 16-09 | DVU | NE | BETUGLA | 10 | W3 | July 24-09 | DVU | SW | CAREAQU | 50 |
| W9 | July 16-09 | DVU | NE | SALIBAR | 25 | W3 | July 24-09 | DVU | SW | GALILAB | P |
| W9 | July 16-09 | DVU | NE | SALIBAA | 5 | W3 | July 24-09 | DVU | SW | SALIPLA | 2 |
| W9 | July 16-09 | DVU | NE | RUBUARC | 2 | W3 | July 24-09 | DVU | SW | SALIDRU | 1 |
| W9 | July 16-09 | DVU | NE | CAREUTR | 2 | W3 | July 24-09 | DVU | SW | CAREUTR | 30 |
| W9 | July 16-09 | DVU | NE | CAREBEL | P | W3 | July 24-09 | DVU | SW | SALIGLA | 2 |
| W9 | July 16-09 | DVU | NE | DESCCAE | P | W3 | July 24-09 | DVU | NW | CAREUTR | 2 |
| W9 | July 16-09 | DVU | NE | EQUIARV | P | W3 | July 24-09 | DVU | NW | CAREAQU | 1 |
| W9 | July 16-09 | DVU | NE | CAREAQU | 3 | W3 | July 24-09 | DVU | NW | SALIBAR | 10 |
| W9 | July 16-09 | DVU | NE | PYROASA | P | W3 | July 24-09 | DVU | NW | SALIBAA | 25 |
| W9 | July 16-09 | DVU | NW | PICEGLA | 5 | W3 | July 24-09 | DVU | NW | LONIINV | 1 |
| W9 | July 16-09 | DVU | NW | PINUCON | 4 | W3 | July 24-09 | DVU | NW | BETUGLA | 10 |
| W9 | July 16-09 | DVU | NW | ABIEBAL | 1 | W3 | July 24-09 | DVU | NW | SALIGLA | 3 |
| W9 | July 16-09 | DVU | NW | ARNICOR | 5 | W3 | July 24-09 | DVU | NW | PICEENG | 27 |
| W9 | July 16-09 | DVU | NW | PELTIGERA | 1 | W3 | July 24-09 | DVU | NW | MERTPAN | 3 |
| W9 | July 16-09 | DVU | NW | PELTIGERA | 1 | W3 | July 24-09 | DVU | NW | CAREDIS | 2 |
| W9 | July 16-09 | DVU | NW | VACCMEM | 3 | W3 | July 24-09 | DVU | NW | GEUMMAC | P |
| W9 | July 16-09 | DVU | NW | LYCOANN | P | W3 | July 24-09 | DVU | NW | POAPRAT | 2 |
| W9 | July 16-09 | DVU | NW | CLADONIA | 2 | W3 | July 24-09 | DVU | NW | POAPRAT | 2 |
| W9 | July 16-09 | DVU | NW | CLADONIA | 2 | W3 | July 24-09 | DVU | NW | EQUIARV | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W9 | July 16-09 | DVU | NW | ANTERAC | P | W3 | July 24-09 | DVU | NW | DELPGLA | P |
| W9 | July 16-09 | DVU | NW | EPILANG | P | W3 | July 24-09 | DVU | NW | FRAGVIR | P |
| W9 | July 16-09 | DVU | NW | ORTHSEC | 1 | W3 | July 24-09 | DVU | NW | VIOLGLA | P |
| W9 | July 16-09 | DVU | NW | VACCCAE | P | W3 | July 24-09 | DVU | NW | RUBUARC | P |
| W9 | July 16-09 | DVU | NW | LUPINOO | 1 | W3 | July 24-09 | DVU | NW | VALEDIO | P |
| W9 | July 16-09 | DVU | NW | PYROASA | P | W3 | July 24-09 | DVU | NW | EPILANG | P |
| W9 | July 16-09 | DVU | SW | PINUCON | 3 | W3 | July 24-09 | DVU | NW | SMILSTE | P |
| W9 | July 16-09 | DVU | SW | ABIELAS | 3 | W3 | July 24-09 | DVU | NW | SOLIMUL | P |
| W9 | July 16-09 | DVU | SW | SALIBAR | 1 | W3 | July 24-09 | DVU | NW | ACHIMIL | P |
| W9 | July 16-09 | DVU | SW | LEDUMGRO | 3 | W3 | July 24-09 | DVU | NW | ERIGPER | 1 |
| W9 | July 16-09 | DVU | SW | LEDUMGRO | 3 | W3 | July 24-09 | DVU | NW | PETASAG | P |
| W9 | July 16-09 | DVU | SW | SHEPCAN | 2 | W3 | July 24-09 | DVU | NW | MITENUD | P |
| W9 | July 16-09 | DVU | SW | RHODALB | 1 | W3 | July 24-09 | DVU | NW | GALIBOR | P |
| W9 | July 16-09 | DVU | SW | VACCMEM | 40 | E10 | July 25-09 | | NW | DRYAOCT | 25 |
| W9 | July 16-09 | DVU | SW | VACCVIT | 10 | E10 | July 25-09 | | NW | CASSTET | 5 |
| W9 | July 16-09 | DVU | SW | CORNCAN | 1 | E10 | July 25-09 | | NW | ARTENOR | 20 |
| W9 | July 16-09 | DVU | SW | LYCOANN | 1 | E10 | July 25-09 | | NW | SALIARC | 25 |
| W9 | July 16-09 | DVU | SW | SALIARC | 1 | E10 | July 25-09 | | NW | ACHIMIL | P |
| W9 | July 16-09 | DVU | SW | LUPINOO | P | E10 | July 25-09 | | NW | ERIGHUM | P |
| W9 | July 16-09 | DVU | SW | ARNICOR | P | E10 | July 25-09 | | NW | SIBBPRO | P |
| W9 | July 16-09 | DVU | SW | ARNILAT | 2 | E10 | July 25-09 | | NW | RANUOCC | P |
| W9 | July 16-09 | DVU | SW | EPILANG | P | E10 | July 25-09 | | NW | ACONDEL | P |
| W9 | July 16-09 | DVU | SW | POANERV | 1 | E10 | July 25-09 | | NW | CASTMIN | P |
| W9 | July 16-09 | DVU | SW | POANERV | 1 | E10 | July 25-09 | | NW | SALIRET | P |
| W9 | July 16-09 | DVU | SW | PELTIGERA | P | E10 | July 25-09 | | NW | LUZUARC | P |
| W9 | July 16-09 | DVU | SW | PELTIGERA | P | E10 | July 25-09 | | NW | ANEMPAR | P |
| W9 | July 16-09 | DVU | SW | PELTIGERA | P | E10 | July 25-09 | | NW | ARNIANG | P |
| W9 | July 16-09 | DVU | SE | SALIBAR | 60 | E10 | July 25-09 | | NW | EQUISCI | P |
| W9 | July 16-09 | DVU | SE | SALIGLA | 5 | E10 | July 25-09 | | NW | POLYVIV | P |
| W9 | July 16-09 | DVU | SE | PICEENG | 5 | E10 | July 25-09 | | NW | DESCCAE | P |
| W9 | July 16-09 | DVU | SE | LONIINV | P | E10 | July 25-09 | | NW | ERIGPER | P |
| W9 | July 16-09 | DVU | SE | EQUIARV | 40 | E10 | July 25-09 | | NW | VEROALP | P |
| W9 | July 16-09 | DVU | SE | EPILANG | 1 | E10 | July 25-09 | | NW | CARERAY | P |
| W9 | July 16-09 | DVU | SE | DESCCAE | 1 | E10 | July 25-09 | | NE | SILEACA | 1 |
| W9 | July 16-09 | DVU | SE | LUZUPAR | P | E10 | July 25-09 | | NE | CYSTFRA | P |
| W9 | July 16-09 | DVU | SE | RUBUARC | 1 | E10 | July 25-09 | | NE | STELLON | P |
| W9 | July 16-09 | DVU | SE | THAL SPP. | 5 | E10 | July 25-09 | | NE | SAXIOPP | P |
| W9 | July 16-09 | DVU | SE | MITENUD | P | E10 | July 25-09 | | NE | POAALPI | P |
| W9 | July 16-09 | DVU | SE | MERTPAN | 5 | E10 | July 25-09 | | SW | DESCCAE | 7 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W9 | July 16-09 | DVU | SE | LEDUGRO | 1 | E10 | July 25-09 | | SW | SAXILYA | P |
| W9 | July 16-09 | DVU | SE | FRAGVIR | 1 | E10 | July 25-09 | | SW | CERABEE | P |
| W9 | July 16-09 | DVU | SE | ERIOBRA | P | E10 | July 25-09 | | SW | POAALPI | P |
| W9 | July 16-09 | DVU | SE | ERIOBRA | P | S2 | July 27-09 | | SW | SALIARC | 5 |
| W9 | July 16-09 | DVU | SE | ACHIMIL | P | S2 | July 27-09 | | SW | TROLALB | 25 |
| W9 | July 16-09 | DVU | SE | PYROASA | P | S2 | July 27-09 | | SW | ANEMOCC | 5 |
| S19 | July 16-09 | JG, KA | NW | SALIARC | 30 | S2 | July 27-09 | | SW | RANUNIV | P |
| S19 | July 16-09 | JG, KA | NW | SAXITRI | P | S2 | July 27-09 | | SW | ERIGPER | 10 |
| S19 | July 16-09 | JG, KA | NW | DRYAINT | 5 | S2 | July 27-09 | | SW | PEDIBRA | 1 |
| S19 | July 16-09 | JG, KA | NW | FESTBRA | P | S2 | July 27-09 | | SW | ARTENOR | 30 |
| S19 | July 16-09 | JG, KA | NW | CERABEE | P | S2 | July 27-09 | | SW | MITEPEN | P |
| S19 | July 16-09 | JG, KA | NW | LUZUARC | P | S2 | July 27-09 | | SW | ARNILAT | 1 |
| S19 | July 16-09 | JG, KA | NW | OXYTPOD | P | S2 | July 27-09 | | SW | VERAESC | P |
| S19 | July 16-09 | JG, KA | NW | POTEUNI | 1 | S2 | July 27-09 | | SW | VEROALP | P |
| S19 | July 16-09 | JG, KA | NW | EQUISCI | P | S2 | July 27-09 | | SW | VALESIT | P |
| S19 | July 16-09 | JG, KA | NW | SILEACA | P | S2 | July 27-09 | | SW | PARNFIM | P |
| S19 | July 16-09 | JG, KA | NW | SAXIOPP | P | S2 | July 27-09 | | SW | CASTOCC | P |
| S19 | July 16-09 | JG, KA | NW | PEDICAP | P | S2 | July 27-09 | | SW | ANEMPAR | P |
| S19 | July 16-09 | JG, KA | NW | SAXITRI | P | S2 | July 27-09 | | SW | SALICOM | 1 |
| S19 | July 16-09 | JG, KA | NW | DELPBIC | P | S2 | July 27-09 | | SW | JUNCDRU | P |
| S19 | July 16-09 | JG, KA | NE | SALIARC | 30 | S2 | July 27-09 | | SW | CLAYLAN | P |
| S19 | July 16-09 | JG, KA | NE | CASSTET | 10 | S2 | July 27-09 | | SW | EPILANA | P |
| S19 | July 16-09 | JG, KA | NE | PEDICAP | P | S2 | July 27-09 | | SW | POAARCT | P |
| S19 | July 16-09 | JG, KA | NE | STELLON | P | S2 | July 27-09 | | SW | POTEDIV | P |
| S19 | July 16-09 | JG, KA | NE | FESTBRA | P | S2 | July 27-09 | | SW | SENETRI | P |
| S19 | July 16-09 | JG, KA | NE | ARTENOR | P | S2 | July 27-09 | | SW | POLYVIV | P |
| S19 | July 16-09 | JG, KA | NE | SAXITRI | P | S2 | July 27-09 | | SW | CALTLEP | P |
| S19 | July 16-09 | JG, KA | NE | CAMPLAS | P | S2 | July 27-09 | | SW | PARNFIM | P |
| S19 | July 16-09 | JG, KA | NE | ANEMPAR | P | S2 | July 27-09 | | SW | PYROGRA | P |
| S19 | July 16-09 | JG, KA | NE | SILEACA | P | S2 | July 27-09 | | SW | THALOCC | P |
| S19 | July 16-09 | JG, KA | NE | ACONDEL | P | S2 | July 27-09 | | SW | EPILLEP | P |
| S19 | July 16-09 | JG, KA | NE | DELPGLA | P | S2 | July 27-09 | | SW | PETAFRI | P |
| S19 | July 16-09 | JG, KA | NE | SALIRET | P | S2 | July 27-09 | | NW | RANUOCC | 10 |
| S19 | July 16-09 | JG, KA | NE | EQUISCI | P | S2 | July 27-09 | | NW | ARTENOR | 40 |
| S19 | July 16-09 | JG, KA | SE | SALIARC | 10 | S2 | July 27-09 | | NW | ARNILAT | 10 |
| S19 | July 16-09 | JG, KA | SE | SENETRI | P | S2 | July 27-09 | | NW | PARNFIM | P |
| S19 | July 16-09 | JG, KA | SE | FESTBRA | P | S2 | July 27-09 | | NW | TROLALB | 20 |
| S19 | July 16-09 | JG, KA | SE | ACONDEL | P | S2 | July 27-09 | | NW | EPILANG | P |
| S19 | July 16-09 | JG, KA | SE | SALIRET | 10 | S2 | July 27-09 | | NW | ANEMOCC | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S19 | July 16-09 | JG, KA | SE | POLYVIV | P | S2 | July 27-09 | | NW | MITEPEN | P |
| S19 | July 16-09 | JG, KA | SE | DRYAOCT | P | S2 | July 27-09 | | NW | ERIGPER | 10 |
| S19 | July 16-09 | JG, KA | SE | PEDICAP | P | S2 | July 27-09 | | NW | EQUIARV | P |
| S19 | July 16-09 | JG, KA | SE | POLYVIV | P | S2 | July 27-09 | | NW | JUNCDRU | P |
| S19 | July 16-09 | JG, KA | SE | PEDILAN | P | S2 | July 27-09 | | NW | LUZUPAR | P |
| S19 | July 16-09 | JG, KA | SE | CARESPR | P | S2 | July 27-09 | | NW | VEROALP | P |
| S19 | July 16-09 | JG, KA | SE | HIERALP | P | S2 | July 27-09 | | NW | CLAYLAN | P |
| S19 | July 16-09 | JG, KA | SE | FESTBRA | P | S2 | July 27-09 | | NE | PHYLEMP | 20 |
| S19 | July 16-09 | JG, KA | SE | POAALPI | P | S2 | July 27-09 | | NE | ANEMOCC | 5 |
| S19 | July 16-09 | JG, KA | SW | PEDICAP | P | S2 | July 27-09 | | NE | ANTELAN | 30 |
| S19 | July 16-09 | JG, KA | SW | SALI SPP. | 30 | S2 | July 27-09 | | NE | ARNILAT | 5 |
| S19 | July 16-09 | JG, KA | SW | DRYAINT | P | S2 | July 27-09 | | NE | POAALPI | P |
| S19 | July 16-09 | JG, KA | SW | SAXITRI | P | S2 | July 27-09 | | NE | ERIGHUM | P |
| S19 | July 16-09 | JG, KA | SW | POLYVIV | P | S2 | July 27-09 | | NE | EPILLEP | P |
| S19 | July 16-09 | JG, KA | SW | PEDILAN | P | S2 | July 27-09 | | NE | LUZUPAR | 5 |
| S19 | July 16-09 | JG, KA | SW | POAALPI | 1 | S2 | July 27-09 | | NE | DIPHALP | 30 |
| S19 | July 16-09 | JG, KA | SW | FESTBRA | P | S2 | July 27-09 | | NE | CASSMER | P |
| S19 | July 16-09 | JG, KA | SW | SAXICAE | P | S2 | July 27-09 | | NE | VALESIT | P |
| S19 | July 16-09 | JG, KA | SW | ACONDEL | P | S2 | July 27-09 | | NE | VIOLORB | P |
| S19 | July 16-09 | JG, KA | SW | EQUISCI | P | S2 | July 27-09 | | SE | ARTENOR | 30 |
| S19 | July 16-09 | JG, KA | SW | DELPBIC | P | S2 | July 27-09 | | SE | ARNILAT | 10 |
| S19 | July 16-09 | JG, KA | SW | POTEUNI | P | S2 | July 27-09 | | SE | ANTELAN | 10 |
| S19 | July 16-09 | JG, KA | SW | STELLON | P | S2 | July 27-09 | | SE | DIPHALP | 5 |
| S19 | July 16-09 | JG, KA | SW | CERABEE | P | S2 | July 27-09 | | SE | POAALPI | P |
| S19 | July 16-09 | JG, KA | SW | SALIRET | P | S2 | July 27-09 | | SE | ANEMOCC | 5 |
| W5 | July 17-09 | | NW | SALISPP | 80 | S2 | July 27-09 | | SE | VIOLORB | P |
| W5 | July 17-09 | | NW | BETUGLA | 10 | S2 | July 27-09 | | SE | LUZUPAR | P |
| W5 | July 17-09 | | NW | ELEO SPP. | 10 | S2 | July 27-09 | | SE | VACCCAE | 10 |
| W5 | July 17-09 | | NW | SOLI SPP. | P | S2 | July 27-09 | | SE | PHYLGLA | 5 |
| W5 | July 17-09 | | NW | CAREAQU | 20 | S2 | July 27-09 | | SE | VERAESC | P |
| W5 | July 17-09 | | NW | SCIRCES | 40 | S2 | July 27-09 | | SE | VEROALP | P |
| W5 | July 17-09 | | NW | MITENUD | 1 | S2 | July 27-09 | | SE | CLAYLAN | P |
| W5 | July 17-09 | | NW | GALILAB | P | S2 | July 27-09 | | SE | CARESPE | P |
| W5 | July 17-09 | | NW | PINUCON | 1 | S2 | July 27-09 | | SE | CARENIG | P |
| W5 | July 17-09 | | NW | PLATDIL | P | S2 | July 27-09 | | SE | VACCCAE | P |
| W5 | July 17-09 | | NW | PLATAQU | P | S2 | July 27-09 | | SE | PEDIBRA | P |
| W5 | July 17-09 | | NW | RUBUARC | P | S2 | July 27-09 | | SE | POAARCT | P |
| W5 | July 17-09 | | NW | TOFIGLU | P | S2 | July 27-09 | | SE | TRISSPI | P |
| W5 | July 17-09 | | NW | DESCCAE | 2 | S8 | July 27-09 | DHA | NE | SALICOM | 45 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W5 | July 17-09 | | NW | SENETRI | P | S8 | July 27-09 | DHA | NE | RIBELAC | 10 |
| W5 | July 17-09 | | NE | PICEENG | 5 | S8 | July 27-09 | DHA | NE | LONIINV | 5 |
| W5 | July 17-09 | | NE | MENZFER | 40 | S8 | July 27-09 | DHA | NE | RUBUPED | 10 |
| W5 | July 17-09 | | NE | LEDUGRO | 5 | S8 | July 27-09 | DHA | NE | PICEMAR | 10 |
| W5 | July 17-09 | | NE | EMPENIG | 1 | S8 | July 27-09 | DHA | NE | ABIEBIF | 5 |
| W5 | July 17-09 | | NE | ORTHSEC | P | S8 | July 27-09 | DHA | NE | EQUIARV | 5 |
| W5 | July 17-09 | | NE | PYROASA | P | S8 | July 27-09 | DHA | NE | CORNCAN | P |
| W5 | July 17-09 | | NE | ABIEBAL | P | S8 | July 27-09 | DHA | NE | VALESIT | 5 |
| W5 | July 17-09 | | NE | PINUCON | P | S8 | July 27-09 | DHA | NE | PETASAG | P |
| W5 | July 17-09 | | NE | SALIBAR | P | S8 | July 27-09 | DHA | NE | EQUISYL | P |
| W5 | July 17-09 | | NE | CORNCAN | 5 | S8 | July 27-09 | DHA | NE | LEPTPYO | P |
| W5 | July 17-09 | | NE | VACCMEM | 25 | S8 | July 27-09 | DHA | NE | PLATSTR | P |
| W5 | July 17-09 | | NE | LINNBOR | 1 | S8 | July 27-09 | DHA | NE | SALIMEL | 10 |
| W5 | July 17-09 | | NE | LYCOANN | P | S8 | July 27-09 | DHA | NE | EPILANG | P |
| W5 | July 17-09 | | NE | ABIE SPP. | P | S8 | July 27-09 | DHA | NE | STREAMP | P |
| W5 | July 17-09 | | NE | ABIE SPP. | P | S8 | July 27-09 | DHA | NE | ORTHSEC | P |
| W5 | July 17-09 | | NE | SHEPCAN | 5 | S8 | July 27-09 | DHA | NE | MENZFER | 5 |
| W5 | July 17-09 | | NE | PELT SPP. | P | S8 | July 27-09 | DHA | SE | ABIEBIF | 10 |
| W5 | July 17-09 | | NE | PELT SPP. | P | S8 | July 27-09 | DHA | SE | EQUIARV | 10 |
| W5 | July 17-09 | | SE | BETU SPP. | 20 | S8 | July 27-09 | DHA | SE | VALESIT | 10 |
| W5 | July 17-09 | | SE | BETU SPP. | 20 | S8 | July 27-09 | DHA | SE | EQUISYL | P |
| W5 | July 17-09 | | SE | TOFIGLU | 1 | S8 | July 27-09 | DHA | SE | LEPTPYO | 15 |
| W5 | July 17-09 | | SE | SCIRCES | 40 | S8 | July 27-09 | DHA | SE | PLATSTR | P |
| W5 | July 17-09 | | SE | MENYTRI | P | S8 | July 27-09 | DHA | SE | EPILANG | 15 |
| W5 | July 17-09 | | SE | TRIGMAR | P | S8 | July 27-09 | DHA | SE | SALISPP | 15 |
| W5 | July 17-09 | | SE | PLATHYP | P | S8 | July 27-09 | DHA | SE | SENETRI | P |
| W5 | July 17-09 | | SE | PINUCON | 2 | S8 | July 27-09 | DHA | SE | ARNIMOL | 5 |
| W5 | July 17-09 | | SE | PINGVUL | P | S8 | July 27-09 | DHA | SE | TRIEEUR | 5 |
| W5 | July 17-09 | | SE | CAREAQU | 2 | S8 | July 27-09 | DHA | SE | CASTSPP | P |
| W5 | July 17-09 | | SE | PICE SPP. | P | S8 | July 27-09 | DHA | SE | CASTSPP | P |
| W5 | July 17-09 | | SE | PICE SPP. | P | S8 | July 27-09 | DHA | SE | JUNCMER | P |
| W5 | July 17-09 | | SW | BETUGLA | 10 | S8 | July 27-09 | DHA | SE | RUBUARC | 5 |
| W5 | July 17-09 | | SW | LEDUGRO | 3 | S8 | July 27-09 | DHA | SW | RIBELAC | 5 |
| W5 | July 17-09 | | SW | PLATDIL | 2 | S8 | July 27-09 | DHA | SW | LONIINV | P |
| W5 | July 17-09 | | SW | PICEGLA | 1 | S8 | July 27-09 | DHA | SW | RUBUPED | 15 |
| W5 | July 17-09 | | SW | SCIRCES | 5 | S8 | July 27-09 | DHA | SW | PICEMAR | 20 |
| W5 | July 17-09 | | SW | PLATAQU | 1 | S8 | July 27-09 | DHA | SW | ABIEBIF | 15 |
| W5 | July 17-09 | | SW | RUBUARC | P | S8 | July 27-09 | DHA | SW | EQUIARV | P |
| W5 | July 17-09 | | SW | VIOLNEP | P | S8 | July 27-09 | DHA | SW | CORNCAN | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W5 | July 17-09 | | SW | VIOLNEP | P | S8 | July 27-09 | DHA | SW | VALESIT | P |
| W5 | July 17-09 | | SW | MITENUD | P | S8 | July 27-09 | DHA | SW | STREAMP | 5 |
| W5 | July 17-09 | | SW | ANEMRIC | P | S8 | July 27-09 | DHA | SW | MENZFER | 35 |
| W5 | July 17-09 | | SW | CARESPP | 50 | S8 | July 27-09 | DHA | SW | TIARTRI | P |
| W5 | July 17-09 | | SW | CARESPP | 50 | S8 | July 27-09 | DHA | SW | RUBUARC | 20 |
| W5 | July 17-09 | | SW | TOFIGLU | P | S8 | July 27-09 | DHA | SW | GYMNDRY | 25 |
| W5 | July 17-09 | | SW | LONIINV | 1 | S8 | July 27-09 | DHA | SW | VACCMEM | 5 |
| W5 | July 17-09 | | SW | KALMMIC | P | S8 | July 27-09 | DHA | SW | DRYOASS | 5 |
| W5 | July 17-09 | | SW | SALIGLA | P | S8 | July 27-09 | DHA | NW | RUBUPED | 30 |
| W5 | July 17-09 | | SW | GALILAB | P | S8 | July 27-09 | DHA | NW | PICEMAR | P |
| E1 | July 17-09 | JG | SE | CALTLEP | P | S8 | July 27-09 | DHA | NW | ABIEBIF | 20 |
| E1 | July 17-09 | JG | SE | SALIARC | 5 | S8 | July 27-09 | DHA | NW | TRIEEUR | P |
| E1 | July 17-09 | JG | SE | DESCCAE | 1 | S8 | July 27-09 | DHA | NW | VACCMEM | 10 |
| E1 | July 17-09 | JG | SE | EQUIVAR | 1 | S4 | July 28-09 | | NW | SALIARC | 3 |
| E1 | July 17-09 | JG | SE | SAXILYA | P | S4 | July 28-09 | | NW | SALIRET | P |
| E1 | July 17-09 | JG | SE | POTENIV | P | S4 | July 28-09 | | NW | ABIEBIF | 2 |
| E1 | July 17-09 | JG | SE | CARESAX | 15 | S4 | July 28-09 | | NW | PICEENG | 3 |
| E1 | July 17-09 | JG | SE | ERIOSCH | 5 | S4 | July 28-09 | | NW | CASTMIN | 40 |
| E1 | July 17-09 | JG | SE | ERIOSCH | 5 | S4 | July 28-09 | | NW | DRYAOCT | 10 |
| E1 | July 17-09 | JG | SE | TARACER | P | S4 | July 28-09 | | NW | POAALPI | P |
| E1 | July 17-09 | JG | SE | SALIBAA | P | S4 | July 28-09 | | NW | CAREATR | P |
| E1 | July 17-09 | JG | SE | SALIBOO | P | S4 | July 28-09 | | NW | POLYVIV | P |
| E1 | July 17-09 | JG | SE | POLYVIV | P | S4 | July 28-09 | | NW | ARNIANG | P |
| E1 | July 17-09 | JG | SE | EQUIARV | P | S4 | July 28-09 | | NW | EMPENIG | P |
| E1 | July 17-09 | JG | SE | PEDILAN | P | S4 | July 28-09 | | NW | KOBRMYO | P |
| E1 | July 17-09 | JG | NE | EQUIVAR | 7 | S4 | July 28-09 | | NW | SALIBAA | P |
| E1 | July 17-09 | JG | NE | DESCCAE | P | S4 | July 28-09 | | SW | CALTLEP | 5 |
| E1 | July 17-09 | JG | NE | POLYVIV | P | S4 | July 28-09 | | SW | OXYRDIG | P |
| E1 | July 17-09 | JG | NE | SALIARC | 1 | S4 | July 28-09 | | SW | JUNCDRU | 1 |
| E1 | July 17-09 | JG | NE | CARESAX | 5 | S4 | July 28-09 | | SW | SENETRI | P |
| E1 | July 17-09 | JG | NW | PARNFIM | P | S4 | July 28-09 | | SW | PETAFRI | 1 |
| E1 | July 17-09 | JG | NW | SALIARC | 10 | S4 | July 28-09 | | SW | LUZUPAR | 1 |
| E1 | July 17-09 | JG | NW | POLYVIV | 1 | S4 | July 28-09 | | SW | ARNILAT | P |
| E1 | July 17-09 | JG | NW | EQUIVAR | P | S4 | July 28-09 | | SW | CARENIG | 1 |
| E1 | July 17-09 | JG | NW | SILEACA | P | S4 | July 28-09 | | SE | PHYLGLA | 2 |
| E1 | July 17-09 | JG | NW | CARESCI | 2 | S4 | July 28-09 | | SE | PHYLEMP | 1 |
| E1 | July 17-09 | JG | NW | ARTENOR | P | S4 | July 28-09 | | SE | POLYVIV | 10 |
| E1 | July 17-09 | JG | NW | ANEMLIT | P | S4 | July 28-09 | | SE | ABIEBIF | 3 |
| E1 | July 17-09 | JG | NW | ERIGHUM | P | S4 | July 28-09 | | SE | PICEENG | 2 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E1 | July 17-09 | JG | NW | PETANIV | P | S4 | July 28-09 | | SE | ANTELAN | 20 |
| E1 | July 17-09 | JG | NW | ARNILAT | P | S4 | July 28-09 | | SE | CASSMER | 5 |
| EI | July 17-09 | JG | SW | POLYVIV | P | S4 | July 28-09 | | SE | SIBBPRO | P |
| EI | July 17-09 | JG | SW | SALIARC | 10 | S4 | July 28-09 | | SE | DIPHALP | 1 |
| EI | July 17-09 | JG | SW | PEDILAA | P | S4 | July 28-09 | | SE | TRISSPI | P |
| EI | July 17-09 | JG | SW | CARESCI | P | S4 | July 28-09 | | SE | ARTENOR | P |
| EI | July 17-09 | JG | SW | SILEACA | P | S4 | July 28-09 | | SE | DRYAOCT | 1 |
| EI | July 17-09 | JG | SW | ARTENOR | P | S4 | July 28-09 | | SE | SALIRET | 1 |
| W2 | July 18-09 | | SE | SALIBAR | 5 | S4 | July 28-09 | | SE | SALIARC | 20 |
| W2 | July 18-09 | | SE | SENETRI | 3 | S4 | July 28-09 | | SE | JUNCDRU | P |
| W2 | July 18-09 | | SE | EPILSAX | P | S4 | July 28-09 | | SE | ERIGPER | 10 |
| W2 | July 18-09 | | SE | VIOLPAL | P | S4 | July 28-09 | | SE | CAREALB | P |
| W2 | July 18-09 | | SE | PLATDIL | 1 | S4 | July 28-09 | | SE | PETAFRI | P |
| W2 | July 18-09 | | SE | CAREAQU | 50 | S4 | July 28-09 | | NE | CARENIG | P |
| W2 | July 18-09 | | SE | PHLECOM | P | S3 | July 28-09 | | SE | BETUPUM | P |
| W2 | July 18-09 | | SE | EQUIARV | 1 | S3 | July 28-09 | | SE | LEDUGRO | 40 |
| W2 | July 18-09 | | SE | ERIGPER | P | S3 | July 28-09 | | SE | ABIEBIF | 15 |
| W2 | July 18-09 | | NE | SALIBAR | 90 | S3 | July 28-09 | | SE | RHODALB | 5 |
| W2 | July 18-09 | | NE | VALESIT | 1 | S3 | July 28-09 | | SE | ROSAACI | 2 |
| W2 | July 18-09 | | NE | EPILANG | 1 | S3 | July 28-09 | | SE | CORNCAN | 1 |
| W2 | July 18-09 | | NE | RANUOCC | 1 | S3 | July 28-09 | | SE | VACCMYR | 5 |
| W2 | July 18-09 | | NE | SENETRI | 2 | S3 | July 28-09 | | SE | EMPENIG | 2 |
| W2 | July 18-09 | | NE | RUBUARC | 2 | S3 | July 28-09 | | SE | ORTHSEC | P |
| W2 | July 18-09 | | NE | PLATDIL | P | S3 | July 28-09 | | SW | VACCMEM | 5 |
| W2 | July 18-09 | | NE | CAREATR | P | S3 | July 28-09 | | SW | ABIEBIF | 30 |
| W2 | July 18-09 | | NE | TROLALB | 10 | S3 | July 28-09 | | SW | JUNISPP | 10 |
| W2 | July 18-09 | | NE | CASTMIN | P | S3 | July 28-09 | | SW | JUNISPP | 10 |
| W2 | July 18-09 | | NE | THALVEN | 5 | S3 | July 28-09 | | SW | SHEPCAN | 20 |
| W2 | July 18-09 | | NE | ERIGPER | 5 | S3 | July 28-09 | | SW | ROSASPP | 5 |
| W2 | July 18-09 | | NE | CAREAQU | 20 | S3 | July 28-09 | | SW | ROSASPP | 5 |
| W2 | July 18-09 | | NE | DELPGLA | P | S3 | July 28-09 | | SW | VACCMYR | 1 |
| W2 | July 18-09 | | NE | EPILANA | P | S3 | July 28-09 | | SW | EMPENIG | 1 |
| W2 | July 18-09 | | NE | DESCCAE | P | S3 | July 28-09 | | SW | CORNCAN | 3 |
| W2 | July 18-09 | | NW | SALISPP | 3 | S3 | July 28-09 | | NW | ABIEBIF | 1 |
| W2 | July 18-09 | | NW | HIERHIR | 2 | S3 | July 28-09 | | NW | BETUPUM | 30 |
| W2 | July 18-09 | | NW | CASTRHE | 7 | S3 | July 28-09 | | NW | POTESPP | 5 |
| W2 | July 18-09 | | NW | RANUOCC | 5 | S3 | July 28-09 | | NW | POTESPP | 5 |
| W2 | July 18-09 | | NW | CAREAQU | 3 | S3 | July 28-09 | | NW | LEDUGRO | 15 |
| W2 | July 18-09 | | NW | RUMEACE | P | S3 | July 28-09 | | NW | JUNISPP | 1 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W2 | July 18-09 | | NW | THALVEN | P | S3 | July 28-09 | | NW | JUNISPP | 1 |
| W2 | July 18-09 | | NW | VEROALP | P | S3 | July 28-09 | | NW | ROSASPP | 1 |
| W2 | July 18-09 | | NW | EPILANG | P | S3 | July 28-09 | | NW | ROSASPP | 1 |
| W2 | July 18-09 | | NW | VALESIT | P | S3 | July 28-09 | | NW | SPIRROM | P |
| W2 | July 18-09 | | NW | DESCCAE | 50 | S3 | July 28-09 | | NW | ARCTRUB | 1 |
| W2 | July 18-09 | | NW | EPILSAX | 3 | S3 | July 28-09 | | NW | CORNCAN | 1 |
| W2 | July 18-09 | | NW | SENETRI | 1 | S3 | July 28-09 | | NW | VACCVIT | 1 |
| W2 | July 18-09 | | NW | CAREATR | P | S3 | July 28-09 | | NW | EQUIARV | 2 |
| W2 | July 18-09 | | NW | TROLALB | 1 | S3 | July 28-09 | | NW | PETAFRI | 1 |
| W2 | July 18-09 | | NW | EPILANA | P | S3 | July 28-09 | | NW | PYROASA | 1 |
| W2 | July 18-09 | | NW | PHLECOM | 2 | S3 | July 28-09 | | NW | CARESCI | 10 |
| W2 | July 18-09 | | NW | PLATDIL | P | S3 | July 28-09 | | NW | LINNBOR | 1 |
| W2 | July 18-09 | | NW | ERIGPER | P | S3 | July 28-09 | | NW | PINGVUL | P |
| W2 | July 18-09 | | SW | SALIGLA | 80 | S3 | July 28-09 | | NE | LEDUGRO | 55 |
| W2 | July 18-09 | | SW | SALIBAR | 15 | S3 | July 28-09 | | NE | BETUPUM | 15 |
| W2 | July 18-09 | | SW | VALESIT | 5 | S3 | July 28-09 | | NE | SALIMYR | 1 |
| W2 | July 18-09 | | SW | THALVEN | 5 | S3 | July 28-09 | | NE | PICEMAR | 5 |
| W2 | July 18-09 | | SW | CARDOLI | P | S3 | July 28-09 | | NE | ROSAACI | 1 |
| W2 | July 18-09 | | SW | CALACAN | P | S3 | July 28-09 | | NE | EQUIARV | 10 |
| W2 | July 18-09 | | SW | DELPGLA | 1 | S3 | July 28-09 | | NE | VACCVIT | 1 |
| W2 | July 18-09 | | SW | HERALAN | 3 | S3 | July 28-09 | | NE | EMPENIG | 10 |
| W2 | July 18-09 | | SW | VIOLPAL | P | S3 | July 28-09 | | NE | ARCTRUB | 2 |
| W2 | July 18-09 | | SW | SENETRI | 5 | S3 | July 28-09 | | NE | JUNCBAL | 1 |
| W2 | July 18-09 | | SW | TROLALB | 5 | S3 | July 28-09 | | NE | PARNPAL | P |
| W2 | July 18-09 | | SW | RANUOCC | P | S3 | July 28-09 | | NE | ZIGAELE | P |
| W2 | July 18-09 | | SW | EPILANA | P | H8 | July 29-09 | | SW | DRYAOCT | 3 |
| W2 | July 18-09 | | SW | ERIGPER | 2 | H8 | July 29-09 | | SW | KOBRMYO | P |
| W2 | July 18-09 | | SW | EQUIARV | P | H8 | July 29-09 | | SW | SALIARC | 1 |
| H6 | July 18-09 | JG | NW | VACCCAE | 5 | H8 | July 29-09 | | SW | FESTALT | P |
| H6 | July 18-09 | JG | NW | ARTENOR | 50 | H8 | July 29-09 | | SW | SILEACA | P |
| H6 | July 18-09 | JG | NW | SALIARC | 5 | H8 | July 29-09 | | SW | ANTEMON | P |
| H6 | July 18-09 | JG | NW | ANTELAN | P | H8 | July 29-09 | | SW | ARTENOR | P |
| H6 | July 18-09 | JG | NW | GENTGLA | P | H8 | July 29-09 | | SW | ANEMPAR | P |
| H6 | July 18-09 | JG | NW | PHYLEMP | 5 | H8 | July 29-09 | | SW | SELADEN | 1 |
| H6 | July 18-09 | JG | NW | POLYVIV | P | H8 | July 29-09 | | SW | ERIGHUM | P |
| H6 | July 18-09 | JG | NW | RUMEOCC | P | H8 | July 29-09 | | SW | CASTOCC | P |
| H6 | July 18-09 | JG | NW | CARESPE | 5 | H8 | July 29-09 | | SW | DRABNIV | P |
| H6 | July 18-09 | JG | NW | VEROALP | P | H8 | July 29-09 | | SW | SAXICAE | P |
| H6 | July 18-09 | JG | NW | ERIGPER | P | H8 | July 29-09 | | SW | CAREATR | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H6 | July 18-09 | JG | NW | LUZUPIP | P | H8 | July 29-09 | | SW | ERIGPER | P |
| H6 | July 18-09 | JG | NW | LUZUPAR | P | H8 | July 29-09 | | SW | SALINUD | P |
| H6 | July 18-09 | JG | NW | LUZUSPI | P | H8 | July 29-09 | | SW | SALINUD | P |
| H6 | July 18-09 | JG | NW | LUZUSPI | P | H8 | July 29-09 | | NW | DRYAOCT | 60 |
| H6 | July 18-09 | JG | NW | POLYVIV | P | H8 | July 29-09 | | NW | PICEENG | P |
| H6 | July 18-09 | JG | NW | HIERUMB | P | H8 | July 29-09 | | NW | SILEACA | P |
| H6 | July 18-09 | JG | NW | FESTBRA | P | H8 | July 29-09 | | NW | ABIEBIF | P |
| H6 | July 18-09 | JG | NW | DIPHALP | P | H8 | July 29-09 | | NW | FESTALT | 10 |
| H6 | July 18-09 | JG | NW | ACONDEL | P | H8 | July 29-09 | | NW | SALIRET | 10 |
| H6 | July 18-09 | JG | SW | ERIGPER | 15 | H8 | July 29-09 | | NW | POLYVIV | P |
| H6 | July 18-09 | JG | SW | RANUOCC | P | H8 | July 29-09 | | NW | ARTENOR | P |
| H6 | July 18-09 | JG | SW | ARTENOR | 15 | H8 | July 29-09 | | NW | EQUISCI | P |
| H6 | July 18-09 | JG | SW | VEROALP | P | H8 | July 29-09 | | NW | SALIARC | P |
| H6 | July 18-09 | JG | SW | CLAYLAN | P | H8 | July 29-09 | | NW | PEDICAP | P |
| H6 | July 18-09 | JG | SW | ANTELAN | P | H8 | July 29-09 | | NE | CARENIG | 80 |
| H6 | July 18-09 | JG | SW | VACCCAE | 3 | H8 | July 29-09 | | NE | ANTELAN | 5 |
| H6 | July 18-09 | JG | SW | JUNCDRU | P | H8 | July 29-09 | | NE | PEDIBRA | P |
| H6 | July 18-09 | JG | SW | SENETRI | P | H8 | July 29-09 | | NE | VEROALP | P |
| H6 | July 18-09 | JG | SW | ACONDEL | P | H8 | July 29-09 | | NE | ERIGPER | 5 |
| H6 | July 18-09 | JG | SW | SALIARC | P | H8 | July 29-09 | | NE | CLAYLAN | P |
| H6 | July 18-09 | JG | SW | HIERUMB | P | H8 | July 29-09 | | NE | POLYVIV | P |
| H6 | July 18-09 | JG | SW | CARENIG | 20 | H8 | July 29-09 | | NE | POAALPI | P |
| H6 | July 18-09 | JG | SW | CALTLEP | P | H8 | July 29-09 | | NE | JUNCDRU | P |
| H6 | July 18-09 | JG | SW | VALESIT | P | H8 | July 29-09 | | NE | LUZUPAR | P |
| H6 | July 18-09 | JG | SW | CARESPE | P | H8 | July 29-09 | | NE | SENETRI | P |
| H6 | July 18-09 | JG | SW | SALIARC | 10 | H8 | July 29-09 | | NE | ARNILAT | P |
| H6 | July 18-09 | JG | SW | RANUOCC | P | H8 | July 29-09 | | NE | SALIARC | 5 |
| H6 | July 18-09 | JG | SE | TROLALB | 30 | H8 | July 29-09 | | NE | POAARCT | P |
| H6 | July 18-09 | JG | SE | ARTENOR | P | H8 | July 29-09 | | SE | SALIARC | 5 |
| H6 | July 18-09 | JG | SE | SENETRI | P | H8 | July 29-09 | | SE | CASTMIN | P |
| H6 | July 18-09 | JG | SE | CLAYLAN | P | H8 | July 29-09 | | SE | ARTENOR | 5 |
| H6 | July 18-09 | JG | SE | ERIGPER | 20 | H8 | July 29-09 | | SE | SALIRET | 20 |
| H6 | July 18-09 | JG | SE | JUNCDRU | P | H8 | July 29-09 | | SE | DRYAOCT | 5 |
| H6 | July 18-09 | JG | SE | POTEDIV | P | H8 | July 29-09 | | SE | PEDIBRA | P |
| H6 | July 18-09 | JG | SE | PETAFRI | P | H8 | July 29-09 | | SE | POLYVIV | P |
| H6 | July 18-09 | JG | SE | PEDIBRA | P | H8 | July 29-09 | | SE | ANTELAN | 40 |
| H6 | July 18-09 | JG | SE | CALTLEP | P | H8 | July 29-09 | | SE | ABIEBIF | 1 |
| H6 | July 18-09 | JG | SE | CARESPE | 3 | H8 | July 29-09 | | SE | PICEENG | 5 |
| H6 | July 18-09 | JG | SE | DESCCAE | P | H8 | July 29-09 | | SE | FESTALT | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H6 | July 18-09 | JG | SE | PHLECOM | 1 | H8 | July 29-09 | | SE | MYOSALP | P |
| H6 | July 18-09 | JG | SE | CASTMIN | P | H8 | July 29-09 | | SE | PARNFIM | P |
| H6 | July 18-09 | JG | SE | RANUOCC | 20 | H8 | July 29-09 | | SE | SILEACA | P |
| H6 | July 18-09 | JG | SE | CARENIG | P | H8 | July 29-09 | | SE | SEDULAN | P |
| H6 | July 18-09 | JG | SE | OXYRDIG | P | H8 | July 29-09 | | SE | SELADEN | P |
| H6 | July 18-09 | JG | SE | PARNFIM | P | H8 | July 29-09 | | SE | PEDILAN | P |
| H6 | July 18-09 | JG | SE | VALESIT | 5 | E9 | July 29-09 | | NE | SALIGLA | 55 |
| H6 | July 18-09 | JG | NE | ARTENOR | 30 | E9 | July 29-09 | | NE | BETUGLA | 35 |
| H6 | July 18-09 | JG | NE | RUMEACE | P | E9 | July 29-09 | | NE | SALIFAR | 25 |
| H6 | July 18-09 | JG | NE | GENTGLA | P | E9 | July 29-09 | | NE | DELPGLA | 5 |
| H6 | July 18-09 | JG | NE | SALIARC | 15 | E9 | July 29-09 | | NE | RANUACR | 10 |
| H6 | July 18-09 | JG | NE | LUZUPIP | P | E9 | July 29-09 | | NE | SENETRI | 2 |
| H6 | July 18-09 | JG | NE | LUZUPAR | P | E9 | July 29-09 | | NE | PEDIBRA | 1 |
| H6 | July 18-09 | JG | NE | ACONDEL | P | E9 | July 29-09 | | NE | EQUIPRA | 1 |
| H6 | July 18-09 | JG | NE | VACCCAE | P | E9 | July 29-09 | | NE | FRAGVIR | 1 |
| H6 | July 18-09 | JG | NE | SIBBPRO | P | E9 | July 29-09 | | NE | ACONDEL | P |
| H6 | July 18-09 | JG | NE | EPILANG | P | E9 | July 29-09 | | SE | SALIGLA | 25 |
| H6 | July 18-09 | JG | NE | CARESPE | 5 | E9 | July 29-09 | | SE | SALIFAR | 1 |
| H6 | July 18-09 | JG | NE | POLYVIV | P | E9 | July 29-09 | | SE | SALIPSE | 1 |
| H6 | July 18-09 | JG | NE | CAREBRU | P | E9 | July 29-09 | | SE | BETUGLA | 1 |
| H6 | July 18-09 | JG | NE | CARENIG | 5 | E9 | July 29-09 | | SE | CAREAQU | 50 |
| H6 | July 18-09 | JG | NE | FESTBRA | P | E9 | July 29-09 | | SE | RUBUARC | 2 |
| H6 | July 18-09 | JG | NE | MULHL SPP. | P | E9 | July 29-09 | | SE | POAPALU | 1 |
| H6 | July 18-09 | JG | NE | MUHL SPP. | P | E9 | July 29-09 | | SE | ERIOANG | 1 |
| H6 | July 18-09 | JG | NE | SENEPAU | P | E9 | July 29-09 | | SW | SALIGLA | 70 |
| H6 | July 18-09 | JG | NE | KOBRMYO | P | E9 | July 29-09 | | SW | BETUGLA | 10 |
| E8 | July 20/21-09 | | NW | PICEGLA | 30 | E9 | July 29-09 | | SW | POLEACU | 1 |
| E8 | July 20/21-09 | | NW | SALIGLA | 10 | E9 | July 29-09 | | SW | CAREAQU | 10 |
| E8 | July 20/21-09 | | NW | EPILANG | P | E9 | July 29-09 | | SW | GEUM SPP. | 2 |
| E8 | July 20/21-09 | | NW | ACHIMIL | P | E9 | July 29-09 | | SW | GEUM SPP. | 2 |
| E8 | July 20/21-09 | | NW | DELPGLA | P | E9 | July 29-09 | | SW | SOLIMUL | 1 |
| E8 | July 20/21-09 | | NW | MERTPAN | P | E9 | July 29-09 | | SW | VALEDIO | 1 |
| E8 | July 20/21-09 | | NW | RUBUARC | P | E9 | July 29-09 | | SW | POAGLAU | P |
| E8 | July 20/21-09 | | NW | ARNICOR | P | E9 | July 29-09 | | SW | RUBUARC | 2 |
| E8 | July 20/21- | | NW | FRAGVIR | P | E9 | July 29-09 | | NW | BETUGLA | 20 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 09 | | | | | | | | | | |
| E8 | July 20/21-09 | | NW | SALIFAR | 30 | E9 | July 29-09 | | NW | SALIGLA | 55 |
| E8 | July 20/21-09 | | NW | LEYMINN | 6 | E9 | July 29-09 | | NW | SALIFAR | 10 |
| E8 | July 20/21-09 | | NW | PYROASA | P | E9 | July 29-09 | | NW | RANUACR | 10 |
| E8 | July 20/21-09 | | NE | SALIGLA | 10 | E9 | July 29-09 | | NW | DELPGLA | 5 |
| E8 | July 20/21-09 | | NE | EPILANG | 1 | E9 | July 29-09 | | NW | THALOCC | 5 |
| E8 | July 20/21-09 | | NE | ASTECIL | P | E9 | July 29-09 | | NW | ACONDEL | 1 |
| E8 | July 20/21-09 | | NE | PETAPAL | P | E9 | July 29-09 | | NW | VALEDIO | 1 |
| E8 | July 20/21-09 | | NE | MERTPAN | P | E9 | July 29-09 | | NW | PEDIGRO | P |
| E8 | July 20/21-09 | | NE | ARNICOR | P | E9 | July 29-09 | | NW | POAPALU | P |
| E8 | July 20/21-09 | | NE | SALIFAR | 40 | E9 | July 29-09 | | NW | POLYVIV | P |
| E8 | July 20/21-09 | | NE | LEYMINN | 5 | E9 | July 29-09 | | NW | SENETRI | 65 |
| E8 | July 20/21-09 | | NE | SHEPCAN | 20 | E9 | July 29-09 | | NW | ACHIMIL | P |
| E8 | July 20/21-09 | | NE | PICEGLA | 1 | E9 | July 29-09 | | NW | MITENUD | P |
| E8 | July 20/21-09 | | SW | PICEGLA | 15 | E9 | July 29-09 | | NW | PEDIBRA | 2 |
| E8 | July 20/21-09 | | SW | ABIEBIF | 20 | S16 | Aug-05-09 | JG,MW, JF | NW | CASSTET | 10 |
| E8 | July 20/21-09 | | SW | CORNCAN | 5 | S16 | Aug-05-09 | JG,MW, JF | NW | PHYLGLA | P |
| E8 | July 20/21-09 | | SW | VACCCAE | 30 | S16 | Aug-05-09 | JG,MW, JF | NW | ABIEBIF | 50 |
| E8 | July 20/21-09 | | SW | LEYMINN | 2 | S16 | Aug-05-09 | JG,MW, JF | NW | GENTGLA | P |
| E8 | July 20/21-09 | | SW | LEDUGRO | 1 | S16 | Aug-05-09 | JG,MW, JF | NW | DIPHALP | P |
| E8 | July 20/21-09 | | SW | EPILANG | P | S16 | Aug-05-09 | JG,MW, JF | NW | HIERALP | P |
| E8 | July 20/21-09 | | SW | EQUISCI | P | S16 | Aug-05-09 | JG,MW, JF | NW | POAALPI | P |
| E8 | July 20/21-09 | | SW | SALIFAR | 1 | S16 | Aug-05-09 | JG,MW, JF | NW | GENTGLA | P |
| E8 | July 20/21-09 | | SW | SALIGLA | 1 | S16 | Aug-05-09 | JG,MW, JF | NW | ARTENOR | P |
| E8 | July 20/21-09 | | SW | ACHIMIL | 3 | S16 | Aug-05-09 | JG,MW, JF | SW | CASSMER | 50 |
| E8 | July 20/21-09 | | SE | PICEGLA | 25 | S16 | Aug-05-09 | JG,MW, JF | SW | ANTELAN | 10 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E8 | July 20/21-09 | | SE | SALIGLA | 40 | S16 | Aug-05-09 | JG,MW, JF | SW | LUZUPAR | P |
| E8 | July 20/21-09 | | SE | ACHIMIL | P | S16 | Aug-05-09 | JG,MW, JF | SW | CARESPE | 10 |
| E8 | July 20/21-09 | | SE | DELPGLA | 3 | S16 | Aug-05-09 | JG,MW, JF | SW | ABIEBIF | P |
| E8 | July 20/21-09 | | SE | LEYMINN | 40 | S16 | Aug-05-09 | JG,MW, JF | SW | SILEACA | P |
| E8 | July 20/21-09 | | SE | HEDYSUL | 5 | S16 | Aug-05-09 | JG,MW, JF | SW | HIERUMB | P |
| E8 | July 20/21-09 | | SE | EPILANG | P | S16 | Aug-05-09 | JG,MW, JF | SW | LUZUPAR | P |
| E8 | July 20/21-09 | | SE | MERTPAN | P | S16 | Aug-05-09 | JG,MW, JF | SW | RANUESC | P |
| E8 | July 20/21-09 | | SE | FRAGVIR | P | S16 | Aug-05-09 | JG,MW, JF | SW | SIBBPRO | P |
| E8 | July 20/21-09 | | SE | ABIEBIF | 1 | S16 | Aug-05-09 | JG,MW, JF | SW | PHYLGLA | P |
| E8 | July 20/21-09 | | SE | SHEPCAN | P | S16 | Aug-05-09 | JG,MW, JF | SW | SAXIFER | P |
| E8 | July 20/21-09 | | SE | BETUPUM | P | S16 | Aug-05-09 | JG,MW, JF | SW | KOBRMYO | P |
| H5 | July 20-09 | | NW | POAARCT | 80 | S16 | Aug-05-09 | JG,MW, JF | SW | GENTGLA | P |
| H5 | July 20-09 | | NW | DESCCAE | 5 | S16 | Aug-05-09 | JG,MW, JF | SW | SAXIFER | P |
| H5 | July 20-09 | | NW | SALIARC | 2 | S16 | Aug-05-09 | JG,MW, JF | SE | CASSMER | 30 |
| H5 | July 20-09 | | NW | POTEDIV | 2 | S16 | Aug-05-09 | JG,MW, JF | SE | HIERUMB | P |
| H5 | July 20-09 | | NW | CERABEE | 1 | S16 | Aug-05-09 | JG,MW, JF | SE | ANTELAN | P |
| H5 | July 20-09 | | NW | ACHIMIL | 1 | S16 | Aug-05-09 | JG,MW, JF | SE | SIBBPRO | P |
| H5 | July 20-09 | | NW | CAREATR | 5 | S16 | Aug-05-09 | JG,MW, JF | SE | JUNCDRU | P |
| H5 | July 20-09 | | NW | PEDICAP | P | S16 | Aug-05-09 | JG,MW, JF | SE | PHYLGLA | P |
| H5 | July 20-09 | | NW | GENTPRO | P | S16 | Aug-05-09 | JG,MW, JF | SE | PHYLEMP | P |
| H5 | July 20-09 | | NW | GENTGLA | P | S16 | Aug-05-09 | JG,MW, JF | SE | KOBRMYO | 20 |
| H5 | July 20-09 | | NW | CAREPHA | 5 | S16 | Aug-05-09 | JG,MW, JF | SE | LUZUPAR | P |
| H5 | July 20-09 | | NW | VEROALP | P | S16 | Aug-05-09 | JG,MW, JF | SE | CARESPE | 5 |
| H5 | July 20-09 | | NW | RANUESC | P | S16 | Aug-05-09 | JG,MW, JF | SE | SALIARC | P |
| H5 | July 20-09 | | NW | ERIGHUM | P | S16 | Aug-05-09 | JG,MW, JF | SE | SIBBPRO | P |
| H5 | July 20-09 | | NW | POLYVIV | P | S16 | Aug-05-09 | JG,MW, JF | NE | CASSMER | 60 |
| H5 | July 20-09 | | NW | TRISMON | P | S16 | Aug-05-09 | JG,MW, JF | NE | ABIEBIF | 20 |
| H5 | July 20-09 | | NW | STELLON | P | S16 | Aug-05-09 | JG,MW, JF | NE | LUETPEC | P |
| H5 | July 20-09 | | NW | ANEMPAR | P | S16 | Aug-05-09 | JG,MW, JF | NE | POAALPI | P |
| H5 | July 20-09 | | NW | LUZUPIP | P | S16 | Aug-05-09 | JG,MW, JF | NE | PICEENG | 5 |
| H5 | July 20-09 | | NE | KOBRMYO | 3 | S16 | Aug-05-09 | JG,MW, JF | NE | PHYLEMP | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H5 | July 20-09 | | NE | OXYTPOD | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | VERAESC | 20 |
| H5 | July 20-09 | | NE | PEDICAP | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | VALESIT | 20 |
| H5 | July 20-09 | | NE | DRABCAN | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | SENETRI | 5 |
| H5 | July 20-09 | | NE | SALIARC | 1 | S1 | Aug-06-09 | JG, MW, JF,SS | NW | POAALPI | P |
| H5 | July 20-09 | | NE | SAXITRI | 1 | S1 | Aug-06-09 | JG, MW, JF,SS | NW | CALTLEP | P |
| H5 | July 20-09 | | NE | DRABBOR | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | SENETRI | 25 |
| H5 | July 20-09 | | NE | POAARCT | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | ANEMOCC | 5 |
| H5 | July 20-09 | | NE | POTEHYP | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | PHYLINT | P |
| H5 | July 20-09 | | NE | DRYAOCT | 40 | S1 | Aug-06-09 | JG, MW, JF,SS | NW | LUETPEC | P |
| H5 | July 20-09 | | NE | POLYVIV | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | CASTSPE | 10 |
| H5 | July 20-09 | | NE | POTEDIV | 1 | S1 | Aug-06-09 | JG, MW, JF,SS | NW | VEROALP | P |
| H5 | July 20-09 | | NE | SOLIMUL | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | RANUOCC | P |
| H5 | July 20-09 | | NE | POTEVIL | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | SALIGLA | P |
| H5 | July 20-09 | | NE | ANTELAN | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | CASTMIN | P |
| H5 | July 20-09 | | NE | SILEACA | 1 | S1 | Aug-06-09 | JG, MW, JF,SS | NW | HIERTRI | P |
| H5 | July 20-09 | | NE | GENTPRO | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | ERIGPER | P |
| H5 | July 20-09 | | NE | TRISSPI | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | LUZUPAR | P |
| H5 | July 20-09 | | SE | SALIRET | 50 | S1 | Aug-06-09 | JG, MW, JF,SS | NW | PHLECOM | P |
| H5 | July 20-09 | | SE | POLYVIV | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | JUNCDRU | 1 |
| H5 | July 20-09 | | SE | POTEHYP | P | S1 | Aug-06-09 | JG, MW, JF,SS | NW | CAREUMB | P |
| H5 | July 20-09 | | SE | SALIARC | 5 | S1 | Aug-06-09 | JG, MW, JF,SS | NE | SENETRI | 1 |
| H5 | July 20-09 | | SE | SAXIADS | P | S1 | Aug-06-09 | JG, MW, JF,SS | NE | VALESIT | 10 |
| H5 | July 20-09 | | SE | PEDICAP | P | S1 | Aug-06-09 | JG, MW, JF,SS | NE | ANEMOCC | 20 |
| H5 | July 20-09 | | SE | DRYAOCT | P | S1 | Aug-06-09 | JG, MW, JF,SS | NE | LUETPEC | 5 |
| H5 | July 20-09 | | SE | CASSTET | 1 | S1 | Aug-06-09 | JG, MW, JF,SS | NE | CARESPE | 5 |
| H5 | July 20-09 | | SE | DRABCRA | P | S1 | Aug-06-09 | JG, MW, JF,SS | NE | EPILANG | P |
| H5 | July 20-09 | | SE | SILEACA | 1 | S1 | Aug-06-09 | JG, MW, JF,SS | NE | PHYLEMP | 10 |
| H5 | July 20-09 | | SE | ANEMPAR | P | S1 | Aug-06-09 | JG, MW, JF,SS | NE | ARNILAT | P |
| H5 | July 20-09 | | SE | POTEDIV | P | S1 | Aug-06-09 | JG, MW, JF,SS | NE | CASSMER | 40 |
| H5 | July 20-09 | | SW | SALIRET | 3 | S1 | Aug-06-09 | JG, MW, JF,SS | NE | POAALPI | P |
| H5 | July 20-09 | | SW | SALIBAA | 2 | S1 | Aug 06-09 | | SE | LUETPEC | 1 |
| H5 | July 20-09 | | SW | ERIOSCH | 1 | S1 | Aug 06-09 | | SE | PARNFIM | P |
| H5 | July 20-09 | | SW | ERIOSCH | 1 | S1 | Aug 06-09 | | SE | CARESPE | 3 |
| H5 | July 20-09 | | SW | DESCCAE | 1 | S1 | Aug 06-09 | | SE | CASSMER | 1 |
| H5 | July 20-09 | | SW | EQUIARV | 2 | S1 | Aug 06-09 | | SE | ATHYFIL | P |
| H5 | July | | SW | EQUIVAR | 1 | S1 | Aug 06- | | SE | LUETPEC | 1 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20-09 | | | | | | 09 | | | | |
| H5 | July 20-09 | | SW | POLYVIV | P | S1 | Aug 06-09 | | SE | PARNFIM | P |
| S13 | July 21-09 | | S13 | SALIDRU | 1 | S1 | Aug 06-09 | | SE | CARESPE | 3 |
| S13 | July 21-09 | | S13 | SALIBAR | 40 | S1 | Aug 06-09 | | SE | CASSMER | 1 |
| S13 | July 21-09 | | S13 | BETUGLA | 5 | S1 | Aug 06-09 | | SE | ATHYFIL | P |
| S13 | July 21-09 | | NW | POLYVIV | P | S21 | Aug 07-09 | | NW | PICEENG | 10 |
| S13 | July 21-09 | | NW | ANEMPAR | P | S21 | Aug 07-09 | | NW | SALIBAA | P |
| S13 | July 21-09 | | NW | PETAVIT | P | S21 | Aug 07-09 | | NW | SALIGLA | 5 |
| S13 | July 21-09 | | NW | PARNFIM | P | S21 | Aug 07-09 | | NW | SALIMYR | 20 |
| S13 | July 21-09 | | NW | ACHIMIL | P | S21 | Aug 07-09 | | NW | MERTPAN | P |
| S13 | July 21-09 | | NW | SALIBAA | 20 | S21 | Aug 07-09 | | NW | VACCSCO | 20 |
| S13 | July 21-09 | | NW | SALIGLA | 40 | S21 | Aug 07-09 | | NW | LEYMINN | 20 |
| S13 | July 21-09 | | NW | FESTALT | 5 | S21 | Aug 07-09 | | NW | BETUGLA | P |
| S13 | July 21-09 | | NW | SENETRI | P | S21 | Aug 07-09 | | NW | LEDUGRO | P |
| S13 | July 21-09 | | NW | HEDYALP | P | S21 | Aug 07-09 | | NW | SENETRI | P |
| S13 | July 21-09 | | NW | SILEACA | P | S21 | Aug 07-09 | | NW | DELPGLA | P |
| S13 | July 21-09 | | NW | ARNIDIV | P | S21 | Aug 07-09 | | NW | PEDIBRA | P |
| S13 | July 21-09 | | NE | SALIBAR | P | S21 | Aug 07-09 | | NW | ACHIMIL | P |
| S13 | July 21-09 | | NE | FESTALT | P | S21 | Aug 07-09 | | NW | GALIBOR | P |
| S13 | July 21-09 | | NE | TROLALB | P | S21 | Aug 07-09 | | NW | FRAGVIR | P |
| S13 | July 21-09 | | NE | SENEPAU | P | S21 | Aug 07-09 | | NW | ACONDEL | P |
| S13 | July 21-09 | | NE | ERIGHUM | P | S21 | Aug 07-09 | | NW | HERALAN | P |
| S13 | July 21-09 | | NE | SOLIMUL | P | S21 | Aug 07-09 | | NW | SOLISPP | P |
| S13 | July 21-09 | | NE | OXYTDEF | P | S21 | Aug 07-09 | | NW | SOLISPP | P |
| S13 | July 21-09 | | NE | BETUGLA | P | S21 | Aug 07-09 | | NW | ANEMLIT | P |
| S13 | July 21-09 | | NE | CASTOCC | P | S21 | Aug 07-09 | | NW | POLYVIV | P |
| S13 | July 21-09 | | NE | HEDYALP | P | S21 | Aug 07-09 | | NW | ERIGPER | P |
| S13 | July 21-09 | | NE | STELLON | P | S21 | Aug 07-09 | | NW | ARNICOR | P |
| S13 | July 21-09 | | NE | ACHIMIL | P | S21 | Aug 07-09 | | NW | EPILANG | P |
| S13 | July 21-09 | | NE | ARTENOR | P | S21 | Aug 07-09 | | NW | EMPENIG | P |
| S13 | July 21-09 | | NE | SALIGLA | P | S21 | Aug 07-09 | | NW | LYCOANN | P |
| S13 | July 21-09 | | NE | ANEMPAR | P | S21 | Aug 07-09 | | NE | PICEENG | 60 |
| S13 | July 21-09 | | NE | POTEDIV | P | S21 | Aug 07-09 | | NE | SALIGLA | 1 |
| S13 | July 21-09 | | NE | ARABSPP | P | S21 | Aug 07-09 | | NE | LEYMINN | 5 |
| S13 | July 21-09 | | NE | ARABSPP | P | S21 | Aug 07-09 | | NE | PETAPAL | P |
| S13 | July 21-09 | | SE | SALIBAA | 20 | S21 | Aug 07-09 | | NE | THALOCC | P |
| S13 | July 21-09 | | SE | BETUGLA | 80 | S21 | Aug 07-09 | | NE | FRAGVIR | P |
| S13 | July 21-09 | | SE | TROLALB | P | S21 | Aug 07-09 | | NE | ACHIMIL | P |
| S13 | July 21-09 | | SE | SALIGLA | 5 | S21 | Aug 07-09 | | NE | PICEMAR | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S13 | July 21-09 | | SE | ACHIMIL | P | S21 | Aug 07-09 | | NE | EPILANG | P |
| S13 | July 21-09 | | SE | MYOSALP | P | S21 | Aug 07-09 | | NE | GALIBOR | P |
| S13 | July 21-09 | | SE | LUZUPAR | P | S21 | Aug 07-09 | | NE | MERTPAN | P |
| S13 | July 21-09 | | SE | POASPP | 3 | S21 | Aug 07-09 | | NE | ARNICOR | 5 |
| S13 | July 21-09 | | SE | POASPP | 3 | S21 | Aug 07-09 | | NE | PEDIBRA | P |
| S13 | July 21-09 | | SE | STELLON | P | S21 | Aug 07-09 | | NE | ZIGAELE | P |
| S13 | July 21-09 | | SE | STELCAL | P | S21 | Aug 07-09 | | NE | ACONDEL | P |
| S13 | July 21-09 | | SE | ERIGPER | P | S21 | Aug 07-09 | | SE | SALIBAA | 5 |
| S13 | July 21-09 | | SE | POTEDIV | P | S21 | Aug 07-09 | | SE | BETUGLA | 20 |
| S13 | July 21-09 | | SE | ACONDEL | P | S21 | Aug 07-09 | | SE | PICEENG | 10 |
| S13 | July 21-09 | | SE | POLEACU | P | S21 | Aug 07-09 | | SE | DELPGLA | P |
| S13 | July 21-09 | | SE | ARTENOR | P | S21 | Aug 07-09 | | SE | RUBUPUB | P |
| S13 | July 21-09 | | SE | DRABBOR | P | S21 | Aug 07-09 | | SE | LEYMINN | 20 |
| S13 | July 21-09 | | SW | SALIBAA | 80 | S21 | Aug 07-09 | | SE | SENETRI | P |
| S13 | July 21-09 | | SW | DRABBOR | P | S21 | Aug 07-09 | | SE | PEDIBRA | P |
| S13 | July 21-09 | | SW | THALVEN | 1 | S21 | Aug 07-09 | | SE | ACONDEL | P |
| S13 | July 21-09 | | SW | ARNICOR | P | S21 | Aug 07-09 | | SE | MERTPAN | P |
| S13 | July 21-09 | | SW | MYOSALP | P | S21 | Aug 07-09 | | SE | ACHIMIL | 1 |
| S13 | July 21-09 | | SW | DELPGLA | 1 | S21 | Aug 07-09 | | SE | MITENUD | P |
| S13 | July 21-09 | | SW | PENSPRO | P | S21 | Aug 07-09 | | SE | PETAPAL | P |
| S13 | July 21-09 | | SW | POTEDIV | P | S21 | Aug 07-09 | | SE | VACCCAE | 5 |
| S13 | July 21-09 | | SW | SALIGLA | 10 | S21 | Aug 07-09 | | SE | SALIBAR | P |
| S13 | July 21-09 | | SW | GEUMMAC | P | S21 | Aug 07-09 | | SE | POTEGRA | P |
| S13 | July 21-09 | | SW | EPILANG | P | S21 | Aug 07-09 | | SE | SALIGLA | 1 |
| S13 | July 21-09 | | SW | POLEACU | 2 | S21 | Aug 07-09 | | SE | SALIBRA | P |
| S13 | July 21-09 | | SW | TROLALB | 3 | S21 | Aug 07-09 | | SE | TRISSPI | P |
| S13 | July 21-09 | | SW | FESTALT | 10 | S21 | Aug 07-09 | | SW | SALIBAA | 20 |
| S13 | July 21-09 | | SW | PETAVIT | 1 | S21 | Aug 07-09 | | SW | BETUGLA | 5 |
| S13 | July 21-09 | | SW | STELLON | P | S21 | Aug 07-09 | | SW | SALISPP | 20 |
| S13 | July 21-09 | | SW | ACONDEL | 1 | S21 | Aug 07-09 | | SW | SALIGLA | 10 |
| S13 | July 21-09 | | SW | ACHIMIL | P | S21 | Aug 07-09 | | SW | EQUIARV | 40 |
| S23 | July 22-09 | | S23 | VALESIT | 2 | S21 | Aug 07-09 | | SW | CAREAQU | 10 |
| S23 | July 22-09 | | S23 | EQUIARV | 5 | S21 | Aug 07-09 | | SW | VALEDIO | P |
| S23 | July 22-09 | | S23 | LEPTPOL | 1 | S21 | Aug 07-09 | | SW | PICEENG | P |
| S23 | July 22-09 | | S23 | JUNEDRUM | P | S21 | Aug 07-09 | | SW | MERTPAN | P |
| S23 | July 22-09 | | S23 | VACCMEM | P | S21 | Aug 07-09 | | SW | RUBUPUB | P |
| S23 | July 22-09 | | S23 | PETAFRI | 2 | S21 | Aug 07-09 | | SW | SENETRI | P |
| S23 | July 22-09 | | S23 | CALTLEP | 1 | | | | | | |
| S23 | July 22-09 | | S23 | MITEPEN | P | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| S23 | July 22-09 | | S23 | PHYLEMP | P |
| S23 | July 22-09 | | S23 | ABIEBIF | P |
| S23 | July 22-09 | | S23 | SALIBAR | 5 |
| S23 | July 22-09 | | S23 | PICEENG | 5 |
| S23 | July 22-09 | | S23 | ABIE SPP. | 10 |
| S23 | July 22-09 | | S23 | ABIE SPP. | 10 |
| S23 | July 22-09 | | S23 | VACCMEM | 10 |
| S23 | July 22-09 | | S23 | LYCOANN | 1 |
| S23 | July 22-09 | | S23 | RUBUPED | 5 |
| S23 | July 22-09 | | S23 | ARNILAT | P |
| S23 | July 22-09 | | S23 | PICEENG | 25 |
| S23 | July 22-09 | | S23 | ABIE SPP. | 8 |
| S23 | July 22-09 | | S23 | TIARUNI | 2 |
| S23 | July 22-09 | | S23 | ARNILAT | 5 |
| S23 | July 22-09 | | S23 | GYMNDRY | 10 |
| S23 | July 22-09 | | S23 | VACCMEM | 5 |
| S23 | July 22-09 | | S23 | LYCOANN | 1 |
| S23 | July 22-09 | | S23 | RUBUPED | 5 |
| S23 | July 22-09 | | S23 | OSMODEP | 1 |
| S23 | July 22-09 | | S23 | ARNICOR | 1 |
| S23 | July 22-09 | | S23 | LONIINV | 3 |
| S23 | July 22-09 | | S23 | PICEENG | 1 |
| S23 | July 22-09 | | S23 | ABIE SPP. | 3 |
| S23 | July 22-09 | | S23 | ABIE SPP. | 3 |
| S23 | July 22-09 | | S23 | VACCMEM | 7 |
| S23 | July 22-09 | | S23 | RUBUPED | P |
| S23 | July 22-09 | | S23 | LISTCOR | P |
| S23 | July 22-09 | | S23 | CALACAN | P |
| S23 | July 22-09 | | S23 | ARNILAT | P |
| S23 | July 22-09 | | S23 | RHODALB | P |

| 2010 (APTR) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Survey Plot** | **Date** | **Surveyor** | **Plot** | **Species Code** | **% Cover** | **Survey Plot** | **Date** | **Surveyor** | **Plot** | **Species Code** | **% Cover** |
| H10 | July-10-10 | SB, KA, JG, DH | NW | DRYAINT | 30 | E6 | July-28-10 | LA, SB | NW | PINUCON | 10 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | HEDYBOR | 15 | E6 | July-28-10 | LA, SB | NW | ABIEBIF | 25 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | CARESCI | 1 | E6 | July-28-10 | LA, SB | NW | RHODALB | 15 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | CARERUP | P | E6 | July-28-10 | LA, SB | NW | VACCMYR | 60 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | POLYVIV | P | E6 | July-28-10 | LA, SB | NW | CORNCAN | 5 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | CAMPUNI | P | E6 | July-28-10 | LA, SB | NW | ORTHSEC | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | SILEACA | P | E6 | July-28-10 | LA, SB | NW | PHYLEMP | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H10 | July-10-10 | SB, KA, JG, DH | NW | CASSTET | P | E6 | July-28-10 | LA, SB | NW | VACCCAE | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | PEDILAN | P | E6 | July-28-10 | LA, SB | NW | RUBUPED | 3 |
| H10 | July-10-10 | SB, KA, JG, DH | NW | PYROGRA | P | E6 | July-28-10 | LA, SB | NW | LYCOANN | 5 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | SALIBAA | 10 | E6 | July-28-10 | LA, SB | NW | ARNICOR | P |
| H10 | July-10-10 | SB, KA, JG, DH | NE | CASSTET | 10 | E6 | July-28-10 | LA, SB | SW | PINUCON | 20 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | DRYAINT | 50 | E6 | July-28-10 | LA, SB | SW | ABIEBIF | 3 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | HEDYALP | 5 | E6 | July-28-10 | LA, SB | SW | CORNCAN | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | FESTALT | 3 | E6 | July-28-10 | LA, SB | SW | VACCMYR | 10 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | POLYVIV | P | E6 | July-28-10 | LA, SB | SW | LEYMINN | 4 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | PEDICAP | P | E6 | July-28-10 | LA, SB | SW | VACCVIT | 5 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | PYROGRA | P | E6 | July-28-10 | LA, SB | SW | ARNICOR | P |
| H10 | July-10-10 | SB, KA, JG, DH | NE | SALIARC | 1 | E6 | July-28-10 | LA, SB | SW | VACCCAE | 3 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | CARESUP | P | E6 | July-28-10 | LA, SB | SE | PINUCON | 30 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | SILEACA | P | E6 | July-28-10 | LA, SB | SE | VACCMYR | 20 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | SOLIMUL | P | E6 | July-28-10 | LA, SB | SE | CORNCAN | 5 |
| H10 | July-10-10 | SB, KA, JG, DH | NE | ARNIANG | P | E6 | July-28-10 | LA, SB | SE | LINNBOR | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | DRYAINT | 25 | E6 | July-28-10 | LA, SB | SE | EPILANG | P |
| H10 | July-10-10 | SB, KA, JG, DH | SE | HEDYALP | P | E6 | July-28-10 | LA, SB | SE | ARNICOR | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | HEDYBOR | 2 | E6 | July-28-10 | LA, SB | SE | MERTPAN | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | SILEACA | 1 | E6 | July-28-10 | LA, SB | SE | VACCVIT | P |
| H10 | July-10-10 | SB, KA, JG, DH | SE | ARNIANG | P | E6 | July-28-10 | LA, SB | SE | LYCOANN | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | POLYVIV | P | E6 | July-28-10 | LA, SB | SE | LEYMINN | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | PEDILAN | P | E6 | July-28-10 | LA, SB | NE | VACCMYR | 25 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | PEDICAP | P | E6 | July-28-10 | LA, SB | NE | VACCVIT | P |
| H10 | July-10-10 | SB, KA, JG, DH | SE | SALIRET | P | E6 | July-28-10 | LA, SB | NE | CALACAN | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | PYROGRA | P | E6 | July-28-10 | LA, SB | NE | EPILANG | P |
| H10 | July-10-10 | SB, KA, JG, DH | SE | ZIGAELE | P | E6 | July-28-10 | LA, SB | NE | FRAGVIR | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | SOLIMUL | P | E6 | July-28-10 | LA, SB | NE | DELPGLA | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | CASSTET | 3 | E6 | July-28-10 | LA, SB | NE | LEYMINN | 8 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | ANEMPAR | P | E6 | July-28-10 | LA, SB | NE | ARNIDIV | 3 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | ASTRABO | P | E6 | July-28-10 | LA, SB | NE | CORNCAN | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | OXYTPOD | P | E6 | July-28-10 | LA, SB | NE | RUBUPED | 5 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | FESTALT | 3 | E6 | July-28-10 | LA, SB | NE | LEDUGRO | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | CARESCI | P | E6 | July-28-10 | LA, SB | NE | ARNICOR | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | ERIGHUM | P | E6 | July-28-10 | LA, SB | NE | MERTPAN | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SE | CARERUP | 2 | E6 | July-28-10 | LA, SB | NE | LINNBOR | 3 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | SALIARC | 2 | E6 | July-28-10 | LA, SB | NE | ACHIMIL | P |
| H10 | July-10-10 | SB, KA, JG, DH | SW | HEDYBOR | 5 | E6 | July-28-10 | LA, SB | NE | OSMODEP | P |
| H10 | July-10-10 | SB, KA, JG, DH | SW | POTEUNI | P | E6 | July-28-10 | LA, SB | NE | ORTHSEC | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H10 | July-10-10 | SB, KA, JG, DH | SW | DRYAINT | 20 | E2 | July-29-10 | LA, EC, DH | NE | PINUCON | 25 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | SAXIOPP | P | E2 | July-29-10 | LA, EC, DH | NE | PICEMAR | 30 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | PEDILAN | P | E2 | July-29-10 | LA, EC, DH | NE | ABIEBIF | P |
| H10 | July-10-10 | SB, KA, JG, DH | SW | SILEACA | P | E2 | July-29-10 | LA, EC, DH | NE | CORNCAN | 3 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | SALIRET | P | E2 | July-29-10 | LA, EC, DH | NE | ROSAACI | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | POLYVIV | P | E2 | July-29-10 | LA, EC, DH | NE | ARNICOR | P |
| H10 | July-10-10 | SB, KA, JG, DH | SW | PEDICAP | P | E2 | July-29-10 | LA, EC, DH | NE | VACCCAE | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | ERIGTRI | P | E2 | July-29-10 | LA, EC, DH | NE | LEYMINN | P |
| H10 | July-10-10 | SB, KA, JG, DH | SW | ASTRABO | P | E2 | July-29-10 | LA, EC, DH | NE | VACCVIT | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | OXYTPOD | P | E2 | July-29-10 | LA, EC, DH | NE | LINNBOR | 2 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | CAMPUNI | P | E2 | July-29-10 | LA, EC, DH | NE | LONIINV | 1 |
| H10 | July-10-10 | SB, KA, JG, DH | SW | CARESCI | P | E2 | July-29-10 | LA, EC, DH | NE | EMPENIG | P |
| H10 | July-10-10 | SB, KA, JG, DH | SW | CARERUP | P | E2 | July-29-10 | LA, EC, DH | SW | PICEMAR | 10 |
| W10 | July-10-10 | SB, JG | SW | PICEGLA | 20 | E2 | July-29-10 | LA, EC, DH | SW | LEDUGRO | 3 |
| W10 | July-10-10 | SB, JG | SW | LEDUGRO | 15 | E2 | July-29-10 | LA, EC, DH | SW | LINNBOR | P |
| W10 | July-10-10 | SB, JG | SW | ABIEBIF | 20 | E2 | July-29-10 | LA, EC, DH | SW | BETUGLA | 10 |
| W10 | July-10-10 | SB, JG | SW | CORNCAN | P | E2 | July-29-10 | LA, EC, DH | SW | SALIGLA | 2 |
| W10 | July-10-10 | SB, JG | SW | ROSAACI | P | E2 | July-29-10 | LA, EC, DH | SW | EQUISYL | P |
| W10 | July-10-10 | SB, JG | SW | PETAPAL | P | E2 | July-29-10 | LA, EC, DH | SW | RUBUARC | 1 |
| W10 | July-10-10 | SB, JG | SW | VACCVIT | P | E2 | July-29-10 | LA, EC, DH | SW | POTEFRU | 5 |
| W10 | July-10-10 | SB, JG | SW | ARNICOR | P | E2 | July-29-10 | LA, EC, DH | SW | SALIMYR | 5 |
| W10 | July-10-10 | SB, JG | SW | LINNBOR | P | E2 | July-29-10 | LA, EC, DH | SW | PARNPAL | P |
| W10 | July-10-10 | SB, JG | SW | GALIBOR | P | E2 | July-29-10 | LA, EC, DH | SW | MITENUD | P |
| W10 | July-10-10 | SB, JG | SW | EQUISCI | P | E2 | July-29-10 | LA, EC, DH | SW | ARCTRUB | 5 |
| W10 | July-10-10 | SB, JG | SW | LEYMINN | P | E2 | July-29-10 | LA, EC, DH | SW | CAREUTR | 5 |
| W10 | July-10-10 | SB, JG | SW | CAREPEN | 1 | E2 | July-29-10 | LA, EC, DH | SW | AGROTRA | 2 |
| W10 | July-10-10 | SB, JG | SW | SALIMER | 2 | E2 | July-29-10 | LA, EC, DH | SW | CAREAQU | 10 |
| W10 | July-10-10 | SB, JG | SW | CARECON | 1 | E2 | July-29-10 | LA, EC, DH | SW | EQUISCI | P |
| H10 | July-12-10 | JG, SB, KA, DH | NW | DRYAINT | 30 | E2 | July-29-10 | LA, EC, DH | SW | JUNCBAL | 1 |
| H10 | July-12-10 | JG, SB, KA, DH | NW | HEDYBOR | 15 | E2 | July-29-10 | LA, EC, DH | SW | CARETEN | 5 |
| H10 | July-12-10 | JG, SB, KA, DH | NW | CARESCI | 1 | E2 | July-29-10 | LA, EC, DH | SW | CARECAP | 5 |
| H10 | July-12-10 | JG, SB, KA, DH | NW | POLYVIV | P | E2 | July-29-10 | LA, EC, DH | SW | CAREDIS | 5 |
| H10 | July-12-10 | JG, SB, KA, DH | NW | SILEACA | P | E2 | July-29-10 | LA, EC, DH | NW | PINUCON | 25 |
| H10 | July-12-10 | JG, SB, KA, DH | NW | CASSTET | P | E2 | July-29-10 | LA, EC, DH | NW | PICEMAR | 7 |
| H10 | July-12-10 | JG, SB, KA, DH | NW | PEDILAN | P | E2 | July-29-10 | LA, EC, DH | NW | CORNCAN | 1 |
| H10 | July-12-10 | JG, SB, KA, DH | NW | PYROGRA | P | E2 | July-29-10 | LA, EC, DH | NW | LEDUGRO | 30 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | SALIBAA | 10 | E2 | July-29-10 | LA, EC, DH | NW | VACCCAE | 1 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | CASSTET | 10 | E2 | July-29-10 | LA, EC, DH | NW | VACCVIT | 3 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | DRYAINT | 50 | E2 | July-29-10 | LA, EC, DH | NW | VACCMYR | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H10 | July-12-10 | JG, SB, KA, DH | NE | HEDYALP | 5 | E2 | July-29-10 | LA, EC, DH | SE | PICEMAR | 10 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | FESTALT | 3 | E2 | July-29-10 | LA, EC, DH | SE | LEDUGRO | 3 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | POLYVIV | P | E2 | July-29-10 | LA, EC, DH | SE | POTEFRU | 2 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | PEDICAP | P | E2 | July-29-10 | LA, EC, DH | SE | SALIGLA | 3 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | PYROGRA | P | E2 | July-29-10 | LA, EC, DH | SE | SALIMYR | 3 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | SALIARC | 1 | E2 | July-29-10 | LA, EC, DH | SE | BETUGLA | 3 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | CARERUP | P | E2 | July-29-10 | LA, EC, DH | SE | ROSAACI | 1 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | SILEACA | P | E2 | July-29-10 | LA, EC, DH | SE | EQUISYL | 2 |
| H10 | July-12-10 | JG, SB, KA, DH | NE | SOLIMUL | P | E2 | July-29-10 | LA, EC, DH | SE | MITENUD | P |
| H10 | July-12-10 | JG, SB, KA, DH | NE | ARNIANG | P | E2 | July-29-10 | LA, EC, DH | SE | VACCVIT | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | DRYAINT | 25 | E2 | July-29-10 | LA, EC, DH | SE | VACCMYR | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | HEDYALP | P | E2 | July-29-10 | LA, EC, DH | SE | CAREAQU | 30 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | HEDYBOR | 2 | E2 | July-29-10 | LA, EC, DH | SE | CAREUTR | 5 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | SILEACA | 1 | E2 | July-29-10 | LA, EC, DH | SE | CARE SPP. | 10 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | POLYVIV | P | S11 | July-29-10 | KA, SB | NW | ERIGSPP | 2 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | PEDILAN | P | S11 | July-29-10 | KA, SB | NW | HEDYBOR | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | PEDICAP | P | S11 | July-29-10 | KA, SB | NW | PICEENG | 1 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | SALIRET | P | S11 | July-29-10 | KA, SB | NW | SALI SPP. | 2 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | BETUGLA | P | S11 | July-29-10 | KA, SB | NW | SOLIMUL | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | SOLIMUL | P | S11 | July-29-10 | KA, SB | NW | ACHIMIL | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | CASSTET | 3 | S11 | July-29-10 | KA, SB | NW | TARAOFF | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | ANEMPAR | P | S11 | July-29-10 | KA, SB | NW | CARE SPP. | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | ASTRABO | P | S11 | July-29-10 | KA, SB | NW | ANEMPAR | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | OXYTPOD | P | S11 | July-29-10 | KA, SB | NW | SALIVES | 2 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | FESTALT | 3 | S11 | July-29-10 | KA, SB | NW | SHEPCAN | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | CARESCI | P | S11 | July-29-10 | KA, SB | NW | HEDYALP | 2 |
| H10 | July-12-10 | JG, SB, KA, DH | SE | ERIGHUM | P | S11 | July-29-10 | KA, SB | NW | AQUIFLA | P |
| H10 | July-12-10 | JG, SB, KA, DH | SE | CARERUP | 2 | S11 | July-29-10 | KA, SB | NW | SALI SPP. | 5 |
| S20 | July-14-10 | SB, KA | NE | SALIBAR | 5 | S11 | July-29-10 | KA, SB | NW | PARNFIM | P |
| S20 | July-14-10 | SB, KA | NE | ACHIMIL | P | S11 | July-29-10 | KA, SB | NW | LEYMINN | P |
| S20 | July-14-10 | SB, KA | NE | LEYMINN | 35 | S11 | July-29-10 | KA, SB | NW | ARCTUVA | P |
| S20 | July-14-10 | SB, KA | NE | RUBUARC | P | S11 | July-29-10 | KA, SB | NW | ERIGRED | 1 |
| S20 | July-14-10 | SB, KA | NE | VACCCAE | 30 | S11 | July-29-10 | KA, SB | NW | DRYAINT | P |
| S20 | July-14-10 | SB, KA | NE | CORNCAN | 1 | S11 | July-29-10 | KA, SB | NE | PLATOBT | P |
| S20 | July-14-10 | SB, KA | NE | PICEENG | 2 | S11 | July-29-10 | KA, SB | NE | PICEENG | 15 |
| S20 | July-14-10 | SB, KA | NE | FRAGVIR | P | S11 | July-29-10 | KA, SB | NE | ABIEBIF | 3 |
| S20 | July-14-10 | SB, KA | NE | ASTRAME | 3 | S11 | July-29-10 | KA, SB | NE | SALI SPP. | 2 |
| S20 | July-14-10 | SB, KA | NE | MERTPAN | 3 | S11 | July-29-10 | KA, SB | NE | ARCTRUB | 1 |
| S20 | July-14-10 | SB, KA | NE | EQUIARV | P | S11 | July-29-10 | KA, SB | NE | EQUIPRA | 2 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S20 | July-14-10 | SB, KA | NE | EPILANG | P | S11 | July-29-10 | KA, SB | NE | POLYVIV | P |
| S20 | July-14-10 | SB, KA | NE | BETUGLA | 6 | S11 | July-29-10 | KA, SB | NE | ERIGSPP | P |
| S20 | July-14-10 | SB, KA | NE | PINUCON | 35 | S11 | July-29-10 | KA, SB | NE | EQUISCI | P |
| S20 | July-14-10 | SB, KA | NE | VACCVIT | P | S11 | July-29-10 | KA, SB | NE | ORTHSEC | P |
| S20 | July-14-10 | SB, KA | NE | ERIGPER | P | S11 | July-29-10 | KA, SB | NE | PARNFIM | 1 |
| S20 | July-14-10 | SB, KA | SE | HERALAN | P | S11 | July-29-10 | KA, SB | NE | PETAFRI | 2 |
| S20 | July-14-10 | SB, KA | SE | ERIGPER | 1 | S11 | July-29-10 | KA, SB | NE | PYROASA | P |
| S20 | July-14-10 | SB, KA | SE | PETAFRI | P | S11 | July-29-10 | KA, SB | NE | ANEMPAR | 1 |
| S20 | July-14-10 | SB, KA | SE | EQUIARV | P | S11 | July-29-10 | KA, SB | NE | SALIVES | P |
| S20 | July-14-10 | SB, KA | SE | LEYMINN | 3 | S11 | July-29-10 | KA, SB | NE | SALI SPP. | 20 |
| S20 | July-14-10 | SB, KA | SE | VACCCAE | 30 | S11 | July-29-10 | KA, SB | NE | CARE SPP. | P |
| S20 | July-14-10 | SB, KA | SE | ABIEBIF | 1 | S11 | July-29-10 | KA, SB | SW | CORNCAN | 5 |
| S20 | July-14-10 | SB, KA | SE | ARNIMOL | P | S11 | July-29-10 | KA, SB | SW | ABIEBIF | 25 |
| S20 | July-14-10 | SB, KA | SE | BETUGLA | 35 | S11 | July-29-10 | KA, SB | SW | PICEENG | 10 |
| S20 | July-14-10 | SB, KA | SE | EPILANG | 2 | S11 | July-29-10 | KA, SB | SW | LYCOANN | P |
| S20 | July-14-10 | SB, KA | SE | MERTPAN | 3 | S11 | July-29-10 | KA, SB | SW | EMPENIG | 1 |
| S20 | July-14-10 | SB, KA | SE | PICEENG | 2 | S11 | July-29-10 | KA, SB | SW | AGROTRA | P |
| S20 | July-14-10 | SB, KA | SE | CORNCAN | 1 | S11 | July-29-10 | KA, SB | SW | EQUIPRA | 1 |
| S20 | July-14-10 | SB, KA | SE | DIPHCOM | P | S11 | July-29-10 | KA, SB | SW | VACCMEM | 10 |
| S20 | July-14-10 | SB, KA | SE | PYROASA | P | S11 | July-29-10 | KA, SB | SW | VACCVIT | P |
| S20 | July-14-10 | SB, KA | SE | ARNICOR | P | S11 | July-29-10 | KA, SB | SW | ORTHSEC | P |
| S20 | July-14-10 | SB, KA | SE | ARTENOR | P | S11 | July-29-10 | KA, SB | SW | ARNISPP | P |
| S20 | July-14-10 | SB, KA | SW | ERIGPER | P | S11 | July-29-10 | KA, SB | SW | SALIVES | 2 |
| S20 | July-14-10 | SB, KA | SW | SALIBAR | 10 | S11 | July-29-10 | KA, SB | SW | BETUGLA | P |
| S20 | July-14-10 | SB, KA | SW | ABIEBIF | 15 | S11 | July-29-10 | KA, SB | SW | LEDUGRO | P |
| S20 | July-14-10 | SB, KA | SW | EPILANG | 1 | S11 | July-29-10 | KA, SB | SE | EQUIPRA | 3 |
| S20 | July-14-10 | SB, KA | SW | LYCOANN | P | S11 | July-29-10 | KA, SB | SE | HEDYALP | P |
| S20 | July-14-10 | SB, KA | SW | BETUGLA | 13 | S11 | July-29-10 | KA, SB | SE | ORTHSEC | 1 |
| S20 | July-14-10 | SB, KA | SW | EQUIARV | P | S11 | July-29-10 | KA, SB | SE | PYROASA | 1 |
| S20 | July-14-10 | SB, KA | SW | MERTPAN | P | S11 | July-29-10 | KA, SB | SE | PICEENG | 5 |
| S20 | July-14-10 | SB, KA | SW | ARNIMOL | P | S11 | July-29-10 | KA, SB | SE | ABIEBIF | 4 |
| S20 | July-14-10 | SB, KA | SW | RUBUARC | P | S11 | July-29-10 | KA, SB | SE | SALIVES | 2 |
| S20 | July-14-10 | SB, KA | SW | THALOCC | P | S11 | July-29-10 | KA, SB | SE | PLATOBT | P |
| S20 | July-14-10 | SB, KA | SW | LISTCOR | P | S11 | July-29-10 | KA, SB | SE | ARNICOR | 1 |
| S20 | July-14-10 | SB, KA | SW | ACHIMIL | P | S11 | July-29-10 | KA, SB | SE | ARCTRUB | 2 |
| S20 | July-14-10 | SB, KA | SW | ARNICOR | 1 | S11 | July-29-10 | KA, SB | SE | SHEPCAN | P |
| S20 | July-14-10 | SB, KA | SW | PEDIBRA | 1 | S11 | July-29-10 | KA, SB | SE | MONEUNI | P |
| S20 | July-14-10 | SB, KA | SW | PICEENG | 3 | S11 | July-29-10 | KA, SB | SE | AGROTRA | P |
| S20 | July-14-10 | SB, KA | SW | PYROASA | P | S11 | July-29-10 | KA, SB | SE | SALI SPP. | 2 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S20 | July-14-10 | SB, KA | SW | VACCCAE | 10 | S11 | July-29-10 | KA, SB | SE | EMPENIG | P |
| S20 | July-14-10 | SB, KA | SW | LINNBOR | 15 | S11 | July-29-10 | KA, SB | SE | POLYVIV | P |
| S20 | July-14-10 | SB, KA | SW | SENETRI | 1 | S11 | July-29-10 | KA, SB | SE | LINNBOR | P |
| S20 | July-14-10 | SB, KA | SW | CAREDIS | P | E7 | July-30-10 | KA, LA | NW | EPILANG | 45 |
| S20 | July-14-10 | SB, KA | SW | ANEMPAR | P | E7 | July-30-10 | KA, LA | NW | VACCMEM | 10 |
| S20 | July-14-10 | SB, KA | NW | VACCVIT | 4 | E7 | July-30-10 | KA, LA | NW | ARNISPP | 2 |
| S20 | July-14-10 | SB, KA | NW | BETUGLA | 20 | E7 | July-30-10 | KA, LA | NW | RIBESPP | 1 |
| S20 | July-14-10 | SB, KA | NW | ARNICOR | 1 | E7 | July-30-10 | KA, LA | NW | LUZU SPP. | P |
| S20 | July-14-10 | SB, KA | NW | VACCCAE | 7 | E7 | July-30-10 | KA, LA | NW | ORTHSEC | P |
| S20 | July-14-10 | SB, KA | NW | ABIEBIF | 5 | E7 | July-30-10 | KA, LA | NW | RUBUPED | 1 |
| S20 | July-14-10 | SB, KA | NW | PYROASA | P | E7 | July-30-10 | KA, LA | NW | RHODALB | 1 |
| S20 | July-14-10 | SB, KA | NW | PEDILAB | P | E7 | July-30-10 | KA, LA | NW | ERIGPER | P |
| S20 | July-14-10 | SB, KA | NW | PICEENG | 45 | E7 | July-30-10 | KA, LA | SW | RHODALB | 20 |
| S20 | July-14-10 | SB, KA | NW | PINUCON | 1 | E7 | July-30-10 | KA, LA | SW | EPILANG | 10 |
| S20 | July-14-10 | SB, KA | NW | LEYMINN | 2 | E7 | July-30-10 | KA, LA | SW | VACCMEM | 1 |
| S20 | July-14-10 | SB, KA | NW | EPILANG | P | E7 | July-30-10 | KA, LA | SW | RUBUPED | 1 |
| S20 | July-14-10 | SB, KA | NW | CORNCAN | P | E7 | July-30-10 | KA, LA | SW | EQUISYL | P |
| S20 | July-14-10 | SB, KA | NW | SALIBAR | 1 | E7 | July-30-10 | KA, LA | SW | VALESIT | P |
| S20 | July-14-10 | SB, KA | NW | PHYLEMP | P | E7 | July-30-10 | KA, LA | NE | LUETPEC | 2 |
| S20 | July-14-10 | SB, KA | NW | CASSMER | P | E7 | July-30-10 | KA, LA | NE | SORBSCO | 2 |
| S20 | July-14-10 | SB, KA | NW | ERIGPER | P | E7 | July-30-10 | KA, LA | NE | PHYLGLA | 1 |
| H4 | July-14-10 | JG, DH | NW | FESTALT | 10 | E7 | July-30-10 | KA, LA | NE | VACCMYR | 2 |
| H4 | July-14-10 | JG, DH | NW | EPILANG | P | E7 | July-30-10 | KA, LA | NE | EPILANG | P |
| H4 | July-14-10 | JG, DH | NW | BETUGLA | 5 | E7 | July-30-10 | KA, LA | SE | EPILANG | 3 |
| H4 | July-14-10 | JG, DH | NW | ARTENOR | P | E7 | July-30-10 | KA, LA | SE | VACCMEM | 5 |
| H4 | July-14-10 | JG, DH | NW | ACONDEL | P | E7 | July-30-10 | KA, LA | SE | RHODALB | 15 |
| H4 | July-14-10 | JG, DH | NW | SALIRET | P | E7 | July-30-10 | KA, LA | SE | EPILPAL | P |
| H4 | July-14-10 | JG, DH | NW | SOLIMUL | P | W4 | July-30-10 | DH, EC, SB | NE | EPILANG | 14 |
| H4 | July-14-10 | JG, DH | NW | KOBRMYO | 10 | W4 | July-30-10 | DH, EC, SB | NE | SALI SPP. | P |
| H4 | July-14-10 | JG, DH | NW | SAXIBRO | P | W4 | July-30-10 | DH, EC, SB | NE | PINUCON | P |
| H4 | July-14-10 | JG, DH | NW | PICEENG | P | W4 | July-30-10 | DH, EC, SB | NE | CARE SPP. | P |
| H4 | July-14-10 | JG, DH | NW | DRYAOCT | 40 | W4 | July-30-10 | DH, EC, SB | NE | VACCMYR | P |
| H4 | July-14-10 | JG, DH | NW | POTEDIV | P | W4 | July-30-10 | DH, EC, SB | NE | LEDUGRO | P |
| H4 | July-14-10 | JG, DH | NW | FESTBRA | P | W4 | July-30-10 | DH, EC, SB | SE | EPILANG | 10 |
| H4 | July-14-10 | JG, DH | NW | POLYVIV | P | W4 | July-30-10 | DH, EC, SB | SE | VACCMYR | P |
| H4 | July-14-10 | JG, DH | NW | HEDYALP | 7 | W4 | July-30-10 | DH, EC, SB | SE | LEDUGRO | P |
| H4 | July-14-10 | JG, DH | NW | GENTPRO | P | W4 | July-30-10 | DH, EC, SB | SE | CORNCAN | P |
| H4 | July-14-10 | JG, DH | NW | SALIGLA | 1 | W4 | July-30-10 | DH, EC, SB | SW | PINUCON | P |
| H4 | July-14-10 | JG, DH | NW | RUMEACE | P | W4 | July-30-10 | DH, EC, SB | SW | VACCMYR | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H4 | July-14-10 | JG, DH | NW | PICEENG | P | W4 | July-30-10 | DH, EC, SB | SW | CORNCAN | P |
| H4 | July-14-10 | JG, DH | NW | ARCTUVA | P | W4 | July-30-10 | DH, EC, SB | SW | EPILANG | P |
| H4 | July-14-10 | JG, DH | NE | FESTALP | 5 | W4 | July-30-10 | DH, EC, SB | NW | EPILANG | 20 |
| H4 | July-14-10 | JG, DH | SE | SALIBAA | 45 | W4 | July-30-10 | DH, EC, SB | NW | PINUCON | P |
| H4 | July-14-10 | JG, DH | SE | EPILANG | P | W4 | July-30-10 | DH, EC, SB | NW | RIBES SPP. | 2 |
| H4 | July-14-10 | JG, DH | SE | ARAB SPP. | P | W4 | July-30-10 | DH, EC, SB | NW | CORYSEM | P |
| H4 | July-14-10 | JG, DH | SE | PHLECOM | P | W4 | July-30-10 | DH, EC, SB | NW | CARE SPP. | P |
| H4 | July-14-10 | JG, DH | SE | DELPBIC | P | W4 | July-30-10 | DH, EC, SB | NW | CARE SPP. | P |
| H4 | July-14-10 | JG, DH | SE | POTEDIV | P | S6 | Aug-02-10 | KA, SB | NE | PICEENG | 3 |
| H4 | July-14-10 | JG, DH | SE | MERTPAN | P | S6 | Aug-02-10 | KA, SB | NE | SALIRET | 20 |
| H4 | July-14-10 | JG, DH | SE | LUZU SPP. | P | S6 | Aug-02-10 | KA, SB | NE | ACONDEL | P |
| H4 | July-14-10 | JG, DH | SE | SALIARC | P | S6 | Aug-02-10 | KA, SB | NE | FESTBAF | P |
| H4 | July-14-10 | JG, DH | SE | SIBBPRO | P | S6 | Aug-02-10 | KA, SB | NE | KOBRMYO | P |
| H4 | July-14-10 | JG, DH | SE | JUNCDRU | P | S6 | Aug-02-10 | KA, SB | NE | SOLIMUL | P |
| H4 | July-14-10 | JG, DH | SW | DRYAINT | 55 | S6 | Aug-02-10 | KA, SB | NE | LUZUPAR | 1 |
| H4 | July-14-10 | JG, DH | SW | POLYVIV | P | S6 | Aug-02-10 | KA, SB | NE | VEROALP | P |
| H4 | July-14-10 | JG, DH | SW | FESTALP | 1 | S6 | Aug-02-10 | KA, SB | NE | ARTENOR | 20 |
| H4 | July-14-10 | JG, DH | SW | PEDIFLA | P | S6 | Aug-02-10 | KA, SB | NE | DRABAUR | P |
| H4 | July-14-10 | JG, DH | SW | OXYTPOD | P | S6 | Aug-02-10 | KA, SB | NE | SALIGLA | 10 |
| H4 | July-14-10 | JG, DH | SW | POTEDIV | P | S6 | Aug-02-10 | KA, SB | NE | POAALPI | P |
| H4 | July-14-10 | JG, DH | SW | SALIBAA | 1 | S6 | Aug-02-10 | KA, SB | NE | PHLECOM | P |
| H4 | July-14-10 | JG, DH | SW | ARCTRUB | P | S6 | Aug-02-10 | KA, SB | NE | DRYAOCT | 7 |
| S30 | July-15-10 | DH, KA | NW | CORNCAN | P | S6 | Aug-02-10 | KA, SB | NE | FESTALT | 1 |
| S30 | July-15-10 | DH, KA | NW | LEDUGRO | 5 | S6 | Aug-02-10 | KA, SB | NE | POLYVIV | P |
| S30 | July-15-10 | DH, KA | NW | LYCOANN | P | S6 | Aug-02-10 | KA, SB | NE | GENTGLA | P |
| S30 | July-15-10 | DH, KA | NW | VACCVIT | P | S6 | Aug-02-10 | KA, SB | NE | ANTEALP | 15 |
| S30 | July-15-10 | DH, KA | NW | BETUGLA | 20 | S6 | Aug-02-10 | KA, SB | NE | EQUISCI | P |
| S30 | July-15-10 | DH, KA | NW | EPILANG | P | S6 | Aug-02-10 | KA, SB | NE | HIERGRA | P |
| S30 | July-15-10 | DH, KA | NW | SALIGLA | 10 | S6 | Aug-02-10 | KA, SB | NE | MYOSALP | P |
| S30 | July-15-10 | DH, KA | NW | PINUCON | 15 | S6 | Aug-02-10 | KA, SB | NE | SALIBAA | 3 |
| S30 | July-15-10 | DH, KA | NW | VACCCAE | P | S6 | Aug-02-10 | KA, SB | NE | POTEDIV | P |
| S30 | July-15-10 | DH, KA | NW | ORTHSEC | P | S6 | Aug-02-10 | KA, SB | NE | RUMEACE | P |
| S30 | July-15-10 | DH, KA | NW | LEYMINN | P | S6 | Aug-02-10 | KA, SB | SE | ANTEALP | 15 |
| S30 | July-15-10 | DH, KA | NW | ARNIDIV | P | S6 | Aug-02-10 | KA, SB | SE | POLYVIV | P |
| S30 | July-15-10 | DH, KA | NW | ARNICOR | 1 | S6 | Aug-02-10 | KA, SB | SE | EQUISCI | P |
| S30 | July-15-10 | DH, KA | SW | ARNICOR | 10 | S6 | Aug-02-10 | KA, SB | SE | POTENIV | P |
| S30 | July-15-10 | DH, KA | SW | CORNCAN | 10 | S6 | Aug-02-10 | KA, SB | SE | ACHIMIL | P |
| S30 | July-15-10 | DH, KA | SW | BETUGLA | P | S6 | Aug-02-10 | KA, SB | SE | SOLIMUL | P |
| S30 | July-15-10 | DH, KA | SW | LEDUGRO | 20 | S6 | Aug-02-10 | KA, SB | SE | ANEMPAR | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S30 | July-15-10 | DH, KA | SW | EPILANG | P | S6 | Aug-02-10 | KA, SB | SE | LUZUPAR | P |
| S30 | July-15-10 | DH, KA | SW | PYROASA | P | S6 | Aug-02-10 | KA, SB | SE | ACONDEL | P |
| S30 | July-15-10 | DH, KA | SW | ORTHSEC | P | S6 | Aug-02-10 | KA, SB | SE | CASTMIN | P |
| S30 | July-15-10 | DH, KA | SW | VACCCAE | 1 | S6 | Aug-02-10 | KA, SB | SE | CERABEE | P |
| S30 | July-15-10 | DH, KA | SW | LEYMINN | 5 | S6 | Aug-02-10 | KA, SB | SE | PENSPRO | P |
| S30 | July-15-10 | DH, KA | SW | PINUCON | 10 | S6 | Aug-02-10 | KA, SB | SE | SENETRI | P |
| S30 | July-15-10 | DH, KA | SW | SALIGLA | P | S6 | Aug-02-10 | KA, SB | SE | ARNILAT | P |
| S30 | July-15-10 | DH, KA | SE | ARNICOR | 20 | S6 | Aug-02-10 | KA, SB | SE | SALIARC | 10 |
| S30 | July-15-10 | DH, KA | SE | LEDUGRO | P | S6 | Aug-02-10 | KA, SB | SE | POAALPI | P |
| S30 | July-15-10 | DH, KA | SE | LYCOANN | P | S6 | Aug-02-10 | KA, SB | SE | MYOSALP | P |
| S30 | July-15-10 | DH, KA | SE | CORNCAN | 25 | S6 | Aug-02-10 | KA, SB | SE | GENTPRP | P |
| S30 | July-15-10 | DH, KA | SE | LINNBOR | P | S6 | Aug-02-10 | KA, SB | SE | ANTE SPP. | P |
| S30 | July-15-10 | DH, KA | SE | EPILANG | 2 | S6 | Aug-02-10 | KA, SB | SE | FESTALT | 25 |
| S30 | July-15-10 | DH, KA | SE | SALIGLA | 1 | S6 | Aug-02-10 | KA, SB | SE | EQUIVAR | P |
| S30 | July-15-10 | DH, KA | SE | EQUIPRA | P | S6 | Aug-02-10 | KA, SB | SE | PHLECOM | P |
| S30 | July-15-10 | DH, KA | SE | LEYMINN | 2 | S6 | Aug-02-10 | KA, SB | SE | ERIGPER | 2 |
| S30 | July-15-10 | DH, KA | SE | VACCCAE | P | S6 | Aug-02-10 | KA, SB | SE | POTEDIV | P |
| S30 | July-15-10 | DH, KA | SE | ABIEBIF | 2 | S6 | Aug-02-10 | KA, SB | SE | DRYAOCT | 3 |
| S30 | July-15-10 | DH, KA | SE | MERTPAN | P | S6 | Aug-02-10 | KA, SB | SE | KOBRMYO | P |
| S30 | July-15-10 | DH, KA | SE | PICEENG | 3 | S6 | Aug-02-10 | KA, SB | SE | FESTBAF | P |
| S30 | July-15-10 | DH, KA | SE | PINUCON | 5 | S6 | Aug-02-10 | KA, SB | SE | ARTENOR | 5 |
| S30 | July-15-10 | DH, KA | SE | BETUGLA | P | S6 | Aug-02-10 | KA, SB | SE | ANEMRIC | P |
| S30 | July-15-10 | DH, KA | SE | ACHIMIL | P | S6 | Aug-02-10 | KA, SB | SE | VEROALP | P |
| S30 | July-15-10 | DH, KA | SE | PYROCHL | P | S6 | Aug-02-10 | KA, SB | SE | SALIBAA | 2 |
| S30 | July-15-10 | DH, KA | SE | HERALAN | P | S6 | Aug-02-10 | KA, SB | SE | CAREDIS | P |
| S30 | July-15-10 | DH, KA | NE | CORNCAN | 30 | S6 | Aug-02-10 | KA, SB | SE | SENEPAU | P |
| S30 | July-15-10 | DH, KA | NE | SHEPCAN | 4 | S6 | Aug-02-10 | KA, SB | SW | EQUIVAR | P |
| S30 | July-15-10 | DH, KA | NE | LEYMINN | 2 | S6 | Aug-02-10 | KA, SB | SW | ACONDEL | 1 |
| S30 | July-15-10 | DH, KA | NE | MERTPAN | P | S6 | Aug-02-10 | KA, SB | SW | ACHIMIL | P |
| S30 | July-15-10 | DH, KA | NE | ABIEBIF | 2 | S6 | Aug-02-10 | KA, SB | SW | EPILANG | P |
| S30 | July-15-10 | DH, KA | NE | FRAGVIR | P | S6 | Aug-02-10 | KA, SB | SW | POLEACU | 1 |
| S30 | July-15-10 | DH, KA | NE | LYCOANN | 10 | S6 | Aug-02-10 | KA, SB | SW | VALEDIO | 1 |
| S30 | July-15-10 | DH, KA | NE | BETUGLA | 1 | S6 | Aug-02-10 | KA, SB | SW | POTEDIV | P |
| S30 | July-15-10 | DH, KA | NE | LEDUGRO | 1 | S6 | Aug-02-10 | KA, SB | SW | ERIGPER | P |
| S30 | July-15-10 | DH, KA | NE | EMPENIG | 2 | S6 | Aug-02-10 | KA, SB | SW | DRABAUR | P |
| S30 | July-15-10 | DH, KA | NE | ARNICOR | 5 | S6 | Aug-02-10 | KA, SB | SW | POAALPI | P |
| S30 | July-15-10 | DH, KA | NE | SALIGLA | P | S6 | Aug-02-10 | KA, SB | SW | GEUMMAC | P |
| S30 | July-15-10 | DH, KA | NE | RUBUARC | P | S6 | Aug-02-10 | KA, SB | SW | SALIRET | 2 |
| S30 | July-15-10 | DH, KA | NE | PINUCON | 20 | S6 | Aug-02-10 | KA, SB | SW | POLYVIV | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S30 | July-15-10 | DH, KA | NE | EPILANG | P | S6 | Aug-02-10 | KA, SB | SW | ELYMTRA | P |
| S30 | July-15-10 | DH, KA | NE | PETAFRI | P | S6 | Aug-02-10 | KA, SB | SW | SALIBAA | 50 |
| S30 | July-15-10 | DH, KA | NE | EQUIPRA | P | S6 | Aug-02-10 | KA, SB | SW | ASTEALP | P |
| S30 | July-15-10 | DH, KA | NE | VACCCAE | P | S6 | Aug-02-10 | KA, SB | SW | DELPGLA | P |
| S30 | July-15-10 | DH, KA | NE | PICEENG | 1 | S6 | Aug-02-10 | KA, SB | SW | ABIEBIF | P |
| H7 | July-16-10 | KA, JG | NW | LUZUPIP | 2 | S6 | Aug-02-10 | KA, SB | SW | GENTPRP | P |
| H7 | July-16-10 | KA, JG | NW | CALTLEP | 5 | S6 | Aug-02-10 | KA, SB | SW | ANEMPAR | 3 |
| H7 | July-16-10 | KA, JG | NW | VERAVIR | P | S6 | Aug-02-10 | KA, SB | SW | SOLIMUL | P |
| H7 | July-16-10 | KA, JG | NW | LUETPEC | 60 | S6 | Aug-02-10 | KA, SB | SW | ARTENOR | 2 |
| H7 | July-16-10 | KA, JG | NW | POAALPI | 1 | S6 | Aug-02-10 | KA, SB | SW | SENETRI | P |
| H7 | July-16-10 | KA, JG | NW | CASSMER | 30 | S6 | Aug-02-10 | KA, SB | SW | ASTRALP | P |
| H7 | July-16-10 | KA, JG | NW | CAREGYN | P | S6 | Aug-02-10 | KA, SB | SW | EQUISCI | P |
| H7 | July-16-10 | KA, JG | NW | ANTELIN | P | S6 | Aug-02-10 | KA, SB | SW | AGOSAUR | P |
| H7 | July-16-10 | KA, JG | NW | HIERGRA | 3 | S6 | Aug-02-10 | KA, SB | SW | DRABLON | P |
| H7 | July-16-10 | KA, JG | NE | LUETPEC | 30 | S6 | Aug-02-10 | KA, SB | SW | TARACER | P |
| H7 | July-16-10 | KA, JG | NE | POAALPI | 2 | S6 | Aug-02-10 | KA, SB | SW | POTEUNI | P |
| H7 | July-16-10 | KA, JG | NE | CASSMER | 3 | S6 | Aug-02-10 | KA, SB | SW | VEROALP | P |
| H7 | July-16-10 | KA, JG | NE | LUZUARC | P | S6 | Aug-02-10 | KA, SB | SW | CERABEE | P |
| H7 | July-16-10 | KA, JG | NE | CALTLEP | P | S6 | Aug-02-10 | KA, SB | SW | SIBBPRO | P |
| H7 | July-16-10 | KA, JG | NE | GENTGLA | P | S6 | Aug-02-10 | KA, SB | SW | SALIGLA | 15 |
| H7 | July-16-10 | KA, JG | NE | JUNCDRU | 3 | S6 | Aug-02-10 | KA, SB | SW | ANEMRIC | P |
| H7 | July-16-10 | KA, JG | NE | HIERGRA | P | S6 | Aug-02-10 | KA, SB | SW | ANEM SPP. | P |
| H7 | July-16-10 | KA, JG | NE | CLAYLAN | P | S6 | Aug-02-10 | KA, SB | SW | FESTALT | 2 |
| H7 | July-16-10 | KA, JG | NE | PHYLGLA | P | S6 | Aug-02-10 | KA, SB | NW | CARE SPP. | P |
| H7 | July-16-10 | KA, JG | NE | EPILANA | P | S6 | Aug-02-10 | KA, SB | NW | DRABLON | P |
| H7 | July-16-10 | KA, JG | NE | LUZUPIP | P | S6 | Aug-02-10 | KA, SB | NW | CASTMIN | 1 |
| H7 | July-16-10 | KA, JG | SE | SENETRI | P | S6 | Aug-02-10 | KA, SB | NW | POLEACU | P |
| H7 | July-16-10 | KA, JG | SE | CALTLEP | 1 | S6 | Aug-02-10 | KA, SB | NW | FESTALT | 15 |
| H7 | July-16-10 | KA, JG | SE | LUETPEC | 70 | S6 | Aug-02-10 | KA, SB | NW | VEROALP | P |
| H7 | July-16-10 | KA, JG | SE | ANTELIN | P | S6 | Aug-02-10 | KA, SB | NW | KOBRMYO | 15 |
| H7 | July-16-10 | KA, JG | SE | EPILANA | P | S6 | Aug-02-10 | KA, SB | NW | ACONDEL | P |
| H7 | July-16-10 | KA, JG | SE | POAALPI | 1 | S6 | Aug-02-10 | KA, SB | NW | BETUGLA | P |
| H7 | July-16-10 | KA, JG | SE | HIERGRA | P | S6 | Aug-02-10 | KA, SB | NW | TARACER | P |
| H7 | July-16-10 | KA, JG | SE | LUZUARC | 1 | S6 | Aug-02-10 | KA, SB | NW | ACHIMIL | P |
| H7 | July-16-10 | KA, JG | SE | GENTGLA | P | S6 | Aug-02-10 | KA, SB | NW | EQUISCI | P |
| H7 | July-16-10 | KA, JG | SE | JUNCDRU | P | S6 | Aug-02-10 | KA, SB | NW | CARE SPP. | P |
| H7 | July-16-10 | KA, JG | SE | CARENIG | 1 | S6 | Aug-02-10 | KA, SB | NW | ANEMRIC | P |
| H7 | July-16-10 | KA, JG | SE | CASSMER | P | S6 | Aug-02-10 | KA, SB | NW | ARTENOR | 5 |
| W10 | July-17-10 | SB, JG | NE | PICEGLA | P | S6 | Aug-02-10 | KA, SB | NW | POTEDIV | 1 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W10 | July-17-10 | SB, JG | NE | ABIEBIF | 25 | S6 | Aug-02-10 | KA, SB | NW | ANTEALP | 20 |
| W10 | July-17-10 | SB, JG | NE | LEDUGRO | 10 | S6 | Aug-02-10 | KA, SB | NW | LUZUSPI | 5 |
| W10 | July-17-10 | SB, JG | NE | LINNBOR | 1 | S6 | Aug-02-10 | KA, SB | NW | SALIRET | 20 |
| W10 | July-17-10 | SB, JG | NE | CORNCAN | 1 | S6 | Aug-02-10 | KA, SB | NW | SIBBPRO | P |
| W10 | July-17-10 | SB, JG | NE | LEYMINN | 1 | S6 | Aug-02-10 | KA, SB | NW | POLYVIV | P |
| W10 | July-17-10 | SB, JG | NE | LYCOANN | P | S6 | Aug-02-10 | KA, SB | NW | ERIGPER | P |
| W10 | July-17-10 | SB, JG | NE | VACCMEM | P | S6 | Aug-02-10 | KA, SB | NW | FESTBAF | P |
| W10 | July-17-10 | SB, JG | NE | ABIEBIF | 20 | S6 | Aug-02-10 | KA, SB | NW | SENETRI | P |
| W10 | July-17-10 | SB, JG | NW | ABIEBIF | 20 | S6 | Aug-02-10 | KA, SB | NW | DRYAOCT | P |
| W10 | July-17-10 | SB, JG | NW | LEDUGRO | 35 | S27 | Aug-03-10 | KA, SB | NE | PETAPAL | 5 |
| W10 | July-17-10 | SB, JG | NW | ABIEBIE | 5 | S27 | Aug-03-10 | KA, SB | NE | EQUIPRA | 7 |
| S9 | July-17-10 | DH, JG | NW | DRYAOCT | 15 | S27 | Aug-03-10 | KA, SB | NE | LEDUGRO | 2 |
| S9 | July-17-10 | DH, JG | NW | SAXIBRO | P | S27 | Aug-03-10 | KA, SB | NE | ABIEBIF | 4 |
| S9 | July-17-10 | DH, JG | NW | SALIARC | 15 | S27 | Aug-03-10 | KA, SB | NE | PICEGLA | 7 |
| S9 | July-17-10 | DH, JG | NW | PICEENG | P | S27 | Aug-03-10 | KA, SB | NE | FRAGVES | 1 |
| S9 | July-17-10 | DH, JG | NW | SALIRET | P | S27 | Aug-03-10 | KA, SB | NE | FRAGVIR | 1 |
| S9 | July-17-10 | DH, JG | NW | POAALPI | P | S27 | Aug-03-10 | KA, SB | NE | HERALAN | 2 |
| S9 | July-17-10 | DH, JG | NW | STELLON | P | S27 | Aug-03-10 | KA, SB | NE | SALI SPP. | 35 |
| S9 | July-17-10 | DH, JG | NW | SILEACA | P | S27 | Aug-03-10 | KA, SB | NE | BETUGLA | P |
| S9 | July-17-10 | DH, JG | NW | CASSTET | P | S27 | Aug-03-10 | KA, SB | NE | ERIGPER | P |
| S9 | July-17-10 | DH, JG | NW | CASTOCC | P | S27 | Aug-03-10 | KA, SB | NE | MITENUD | P |
| S9 | July-17-10 | DH, JG | NW | ANTEMON | P | S27 | Aug-03-10 | KA, SB | NE | CORNCAN | 2 |
| S9 | July-17-10 | DH, JG | NW | ASTEALP | 1 | S27 | Aug-03-10 | KA, SB | NE | ROSAACI | 2 |
| S9 | July-17-10 | DH, JG | NW | FESTBRA | P | S27 | Aug-03-10 | KA, SB | NE | DELPGLA | 1 |
| S9 | July-17-10 | DH, JG | NW | EPILLAT | P | S27 | Aug-03-10 | KA, SB | NE | VACCVIT | P |
| S9 | July-17-10 | DH, JG | NW | ABIEBIF | 1 | S27 | Aug-03-10 | KA, SB | NE | EMPENIG | P |
| S9 | July-17-10 | DH, JG | NW | ARTENOR | P | S27 | Aug-03-10 | KA, SB | NE | LINNBOR | 1 |
| S9 | July-17-10 | DH, JG | NW | CARESPE | P | S27 | Aug-03-10 | KA, SB | NE | PEDIBRA | 1 |
| S9 | July-17-10 | DH, JG | NW | POTEHYP | P | S27 | Aug-03-10 | KA, SB | NE | MERTPAN | 3 |
| S9 | July-17-10 | DH, JG | NW | LUZUARC | P | S27 | Aug-03-10 | KA, SB | NE | RIBETRI | 1 |
| S9 | July-17-10 | DH, JG | NW | TRISSPI | P | S27 | Aug-03-10 | KA, SB | NE | CAREDIS | P |
| S9 | July-17-10 | DH, JG | NW | POLYVIV | P | S27 | Aug-03-10 | KA, SB | NE | LEYMINN | P |
| S9 | July-17-10 | DH, JG | NW | POTEUNI | P | S27 | Aug-03-10 | KA, SB | NE | LONIINV | P |
| S9 | July-17-10 | DH, JG | SW | DRYAOCT | 10 | S27 | Aug-03-10 | KA, SB | NE | VIOLREN | P |
| S9 | July-17-10 | DH, JG | SW | CASSTET | 5 | S27 | Aug-03-10 | KA, SB | NE | ACHIMIL | P |
| S9 | July-17-10 | DH, JG | SW | VACCVIT | P | S27 | Aug-03-10 | KA, SB | NE | MENZFER | P |
| S9 | July-17-10 | DH, JG | SW | SALIARC | 5 | S27 | Aug-03-10 | KA, SB | NW | PINUCON | 15 |
| S9 | July-17-10 | DH, JG | SW | ABIEBIF | P | S27 | Aug-03-10 | KA, SB | NW | ABIEBIF | 10 |
| S9 | July-17-10 | DH, JG | SW | PICEENG | P | S27 | Aug-03-10 | KA, SB | NW | LONIINV | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S9 | July-17-10 | DH, JG | SW | HIERALP | 1 | S27 | Aug-03-10 | KA, SB | NW | PEDIBRA | 3 |
| S9 | July-17-10 | DH, JG | SW | FESTBRA | P | S27 | Aug-03-10 | KA, SB | NW | LINNBOR | 7 |
| S9 | July-17-10 | DH, JG | SW | SILEACA | P | S27 | Aug-03-10 | KA, SB | NW | CORNCAN | 7 |
| S9 | July-17-10 | DH, JG | SW | LUZUARC | P | S27 | Aug-03-10 | KA, SB | NW | LEDUGRO | 4 |
| S9 | July-17-10 | DH, JG | SW | SAXIBRO | P | S27 | Aug-03-10 | KA, SB | NW | FRAGVIR | P |
| S9 | July-17-10 | DH, JG | SW | POTEUNI | P | S27 | Aug-03-10 | KA, SB | NW | PETAPAL | P |
| S9 | July-17-10 | DH, JG | SW | ARTENOR | P | S27 | Aug-03-10 | KA, SB | NW | EQUIPRA | 5 |
| S9 | July-17-10 | DH, JG | SW | CARENAR | P | S27 | Aug-03-10 | KA, SB | NW | SALIGLA | 45 |
| S9 | July-17-10 | DH, JG | SW | CAREALB | P | S27 | Aug-03-10 | KA, SB | NW | BETUGLA | 1 |
| S9 | July-17-10 | DH, JG | SW | SALIRET | P | S27 | Aug-03-10 | KA, SB | NW | RIBEHUD | 1 |
| S9 | July-17-10 | DH, JG | SW | EMPENIG | 30 | S27 | Aug-03-10 | KA, SB | NW | LEYMINN | 2 |
| S9 | July-17-10 | DH, JG | NE | DRYAOCT | 5 | S27 | Aug-03-10 | KA, SB | NW | ROSAACI | P |
| S9 | July-17-10 | DH, JG | NE | ABIEBIF | 5 | S27 | Aug-03-10 | KA, SB | NW | MERTPAN | 3 |
| S9 | July-17-10 | DH, JG | NE | VACCVIT | 3 | S27 | Aug-03-10 | KA, SB | NW | VACCVIT | P |
| S9 | July-17-10 | DH, JG | NE | EMPENIG | 30 | S27 | Aug-03-10 | KA, SB | NW | MITENUD | P |
| S9 | July-17-10 | DH, JG | NE | ARTENOR | P | S27 | Aug-03-10 | KA, SB | NW | ORTHSEC | P |
| S9 | July-17-10 | DH, JG | NE | CASSTET | P | S27 | Aug-03-10 | KA, SB | NW | SHEPCAN | 2 |
| S9 | July-17-10 | DH, JG | NE | SALIARC | P | S27 | Aug-03-10 | KA, SB | NW | EPILANG | 1 |
| S9 | July-17-10 | DH, JG | NE | HIERALP | P | S27 | Aug-03-10 | KA, SB | NW | CAREDIS | P |
| S9 | July-17-10 | DH, JG | NE | CARENAR | P | S27 | Aug-03-10 | KA, SB | NW | VIOLREN | P |
| S9 | July-17-10 | DH, JG | NE | SILEACA | P | S27 | Aug-03-10 | KA, SB | NW | DELPGLA | P |
| S9 | July-17-10 | DH, JG | NE | ASTEALP | P | S27 | Aug-03-10 | KA, SB | NW | ERIGPER | P |
| S9 | July-17-10 | DH, JG | NE | SALIRET | P | S27 | Aug-03-10 | KA, SB | SE | ABIEBIF | 3 |
| S9 | July-17-10 | DH, JG | NE | CAMPLAS | P | S27 | Aug-03-10 | KA, SB | SE | SALIGLA | 15 |
| S9 | July-17-10 | DH, JG | SE | DRYAOCT | P | S27 | Aug-03-10 | KA, SB | SE | ALNUINC | 75 |
| S9 | July-17-10 | DH, JG | SE | FESTBRA | 1 | S27 | Aug-03-10 | KA, SB | SE | DELPGLA | 3 |
| S9 | July-17-10 | DH, JG | SE | SIBBPRO | P | S27 | Aug-03-10 | KA, SB | SE | CALACAN | 10 |
| S9 | July-17-10 | DH, JG | SE | LUZUARC | P | S27 | Aug-03-10 | KA, SB | SE | EQUIPRA | 10 |
| S9 | July-17-10 | DH, JG | SE | SILEACA | P | S27 | Aug-03-10 | KA, SB | SE | RUBUIDA | 2 |
| S9 | July-17-10 | DH, JG | SE | POAALPI | P | S27 | Aug-03-10 | KA, SB | SE | MERTPAN | 2 |
| S9 | July-17-10 | DH, JG | SE | OXYRDIG | P | S27 | Aug-03-10 | KA, SB | SE | ROSAACI | 1 |
| S9 | July-17-10 | DH, JG | SE | TRISSPI | P | S27 | Aug-03-10 | KA, SB | SE | PETAFRI | 2 |
| S9 | July-17-10 | DH, JG | SE | SAXIHYP | P | S27 | Aug-03-10 | KA, SB | SE | RIBETRI | 1 |
| W10 | July-17-10 | JG, SB | SE | LEYMINN | P | S27 | Aug-03-10 | KA, SB | SE | VIOLREN | P |
| W10 | July-17-10 | JG, SB | SE | LINNBOR | P | S27 | Aug-03-10 | KA, SB | SE | LINNBOR | P |
| W10 | July-17-10 | JG, SB | SE | PICEGLA | 5 | S27 | Aug-03-10 | KA, SB | SE | MITENUD | P |
| W10 | July-17-10 | JG, SB | SE | CORNCAN | P | S27 | Aug-03-10 | KA, SB | SE | EQUISYL | 5 |
| W10 | July-17-10 | JG, SB | SE | JUNICOM | P | S27 | Aug-03-10 | KA, SB | SE | RUBUPUB | P |
| W10 | July-17-10 | JG, SB | SE | ROSAACI | P | S27 | Aug-03-10 | KA, SB | SE | CARE SPP. | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W10 | July-17-10 | JG, SB | SE | VACCVIT | P | S27 | Aug-03-10 | KA, SB | SE | RIBEHUD | P |
| W10 | July-17-10 | JG, SB | SE | SALI SPP. | P | S27 | Aug-03-10 | KA, SB | SW | ABIEBIF | 5 |
| W10 | July-17-10 | JG, SB | SE | ABIEBIF | 30 | S27 | Aug-03-10 | KA, SB | SW | PINUCON | 15 |
| W6 | July-19-10 | JG, SB | SW | HERALAN | P | S27 | Aug-03-10 | KA, SB | SW | LONIINV | 15 |
| W6 | July-19-10 | JG, SB | SW | FRAGVIR | 5 | S27 | Aug-03-10 | KA, SB | SW | DELPGLA | 1 |
| W6 | July-19-10 | JG, SB | SW | ARNICOR | P | S27 | Aug-03-10 | KA, SB | SW | RIBELAC | 3 |
| W6 | July-19-10 | JG, SB | SW | CARECAN | P | S27 | Aug-03-10 | KA, SB | SW | LEYMINN | 10 |
| W6 | July-19-10 | JG, SB | SW | PETAPAL | P | S27 | Aug-03-10 | KA, SB | SW | LATHOCH | 1 |
| W6 | July-19-10 | JG, SB | SW | CASTOCC | P | S27 | Aug-03-10 | KA, SB | SW | SALIGLA | 15 |
| W6 | July-19-10 | JG, SB | SW | RUBUARC | P | S27 | Aug-03-10 | KA, SB | SW | EQUIPRA | 7 |
| W6 | July-19-10 | JG, SB | SW | LUZUPIP | P | S27 | Aug-03-10 | KA, SB | SW | CORNCAN | 15 |
| W6 | July-19-10 | JG, SB | SW | MERTPAN | 2 | S27 | Aug-03-10 | KA, SB | SW | MERTPAN | 7 |
| W6 | July-19-10 | JG, SB | SW | ACHIMIL | P | S27 | Aug-03-10 | KA, SB | SW | HERALAN | 7 |
| W6 | July-19-10 | JG, SB | SW | EQUIARV | P | S27 | Aug-03-10 | KA, SB | SW | ROSAACI | 3 |
| W6 | July-19-10 | JG, SB | SW | LINNBOR | P | S27 | Aug-03-10 | KA, SB | SW | VACCVIT | 1 |
| W6 | July-19-10 | JG, SB | SW | HEDYSUL | 1 | S27 | Aug-03-10 | KA, SB | SW | VIOLREN | P |
| W6 | July-19-10 | JG, SB | SW | LONIDIO | P | S27 | Aug-03-10 | KA, SB | SW | PETAPAL | 1 |
| W6 | July-19-10 | JG, SB | SE | SAXIMYR | 60 | S27 | Aug-03-10 | KA, SB | SW | MITENUD | P |
| W6 | July-19-10 | JG, SB | SE | EPILANG | P | S27 | Aug-03-10 | KA, SB | SW | LINNBOR | P |
| W6 | July-19-10 | JG, SB | SE | MERTPAN | 5 | S27 | Aug-03-10 | KA, SB | SW | EPILANG | P |
| W6 | July-19-10 | JG, SB | SE | ACHIMIL | P | S27 | Aug-03-10 | KA, SB | SW | FRAGVES | P |
| W6 | July-19-10 | JG, SB | SE | MITENUD | P | S27 | Aug-03-10 | KA, SB | SW | FRAGVIR | P |
| W6 | July-19-10 | JG, SB | SE | BROMPUM | P | S27 | Aug-03-10 | KA, SB | SW | ALNUINC | 1 |
| W6 | July-19-10 | JG, SB | SE | LUZUPIP | P | S27 | Aug-03-10 | KA, SB | SW | OSMODEP | P |
| W6 | July-19-10 | JG, SB | SE | BETUGLA | 5 | S27 | Aug-03-10 | KA, SB | SW | LEDUGRO | P |
| W6 | July-19-10 | JG, SB | SE | RIBELAX | P | S27 | Aug-03-10 | KA, SB | SW | BETUGLA | P |
| W6 | July-19-10 | JG, SB | SE | FRAGVIR | 5 | S27 | Aug-03-10 | KA, SB | SW | RIBETRI | P |
| W6 | July-19-10 | JG, SB | SE | CORNCAN | 1 | S27 | Aug-03-10 | KA, SB | SW | ORTHSEC | P |
| W6 | July-19-10 | JG, SB | SE | ROSAACI | P | S27 | Aug-03-10 | KA, SB | SW | ARNICOR | P |
| W6 | July-19-10 | JG, SB | SE | PICEGLA | 15 | S27 | Aug-03-10 | KA, SB | SW | RUBUIDA | P |
| W6 | July-19-10 | JG, SB | SE | ARNICOR | P | S27 | Aug-03-10 | KA, SB | SW | PICEGLA | 3 |
| W6 | July-19-10 | JG, SB | SE | HERALAN | P | S17 | Aug-04-10 | SB, KA | NE | PINUCON | 2 |
| W6 | July-19-10 | JG, SB | SE | LINNBOR | P | S17 | Aug-04-10 | SB, KA | NE | PICEGLA | 4 |
| W6 | July-19-10 | JG, SB | SE | SALIGLA | 5 | S17 | Aug-04-10 | SB, KA | NE | POTEFRU | 10 |
| W6 | July-19-10 | JG, SB | NE | SALIMYR | 40 | S17 | Aug-04-10 | SB, KA | NE | LEDUGRO | 25 |
| W6 | July-19-10 | JG, SB | NE | SALIGLA | 30 | S17 | Aug-04-10 | SB, KA | NE | CORNCAN | 10 |
| W6 | July-19-10 | JG, SB | NE | MERTPAN | 5 | S17 | Aug-04-10 | SB, KA | NE | LINNBOR | 10 |
| W6 | July-19-10 | JG, SB | NE | PEDIPRA | P | S17 | Aug-04-10 | SB, KA | NE | PARNFIM | 5 |
| W6 | July-19-10 | JG, SB | NE | EPILANG | P | S17 | Aug-04-10 | SB, KA | NE | BETUGLA | 7 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W6 | July-19-10 | JG, SB | NE | DELPGLA | 1 | S17 | Aug-04-10 | SB, KA | NE | ALNUVIR | 5 |
| W6 | July-19-10 | JG, SB | NE | PETA SPP. | P | S17 | Aug-04-10 | SB, KA | NE | AQUIFLA | 2 |
| W6 | July-19-10 | JG, SB | NE | RIBEOXY | P | S17 | Aug-04-10 | SB, KA | NE | GALIBOR | 1 |
| W6 | July-19-10 | JG, SB | NE | FRAGVIR | 7 | S17 | Aug-04-10 | SB, KA | NE | LEYMINN | 1 |
| W6 | July-19-10 | JG, SB | NE | RIBELAX | P | S17 | Aug-04-10 | SB, KA | NE | ROSAACI | 1 |
| W6 | July-19-10 | JG, SB | NE | VIOLORB | P | S17 | Aug-04-10 | SB, KA | NE | ANEMPAR | 1 |
| W6 | July-19-10 | JG, SB | NE | LINNBOR | P | S17 | Aug-04-10 | SB, KA | NE | PEDIBRA | P |
| W6 | July-19-10 | JG, SB | NE | RANU SPP. | P | S17 | Aug-04-10 | SB, KA | NE | PETAPAL | P |
| W6 | July-19-10 | JG, SB | NE | MITENUD | P | S17 | Aug-04-10 | SB, KA | NE | VACCMYR | P |
| W6 | July-19-10 | JG, SB | NE | RUBUPED | P | S17 | Aug-04-10 | SB, KA | NE | JUNICOM | 2 |
| W6 | July-19-10 | JG, SB | NE | BETUGLA | 1 | S17 | Aug-04-10 | SB, KA | NE | SHEPCAN | 1 |
| W6 | July-19-10 | JG, SB | NE | VEROALP | P | S17 | Aug-04-10 | SB, KA | NE | ORTHSEC | P |
| W6 | July-19-10 | JG, SB | NE | LEDUGRO | P | S17 | Aug-04-10 | SB, KA | NE | VACCVIT | 1 |
| W6 | July-19-10 | JG, SB | NE | LONIINV | 1 | S17 | Aug-04-10 | SB, KA | NE | EPIL SPP. | P |
| W6 | July-19-10 | JG, SB | NW | PICEENG | P | S17 | Aug-04-10 | SB, KA | NE | SALI SPP. | 5 |
| W6 | July-19-10 | JG, SB | NW | BETUGLA | 5 | S17 | Aug-04-10 | SB, KA | NE | RUBUPUB | P |
| W6 | July-19-10 | JG, SB | NW | HERALAN | P | S17 | Aug-04-10 | SB, KA | NE | VACCCAE | 2 |
| W6 | July-19-10 | JG, SB | NW | EPILANG | P | S17 | Aug-04-10 | SB, KA | NE | EQUIPRA | 1 |
| W6 | July-19-10 | JG, SB | NW | LEDUGRO | P | S17 | Aug-04-10 | SB, KA | NE | LONIINV | 2 |
| W6 | July-19-10 | JG, SB | NW | PEDIBRA | P | S17 | Aug-04-10 | SB, KA | NE | PYROASA | P |
| W6 | July-19-10 | JG, SB | NW | SALIGLA | 30 | S17 | Aug-04-10 | SB, KA | NE | ZIGAELE | P |
| W6 | July-19-10 | JG, SB | NW | EQUIARV | 1 | S17 | Aug-04-10 | SB, KA | NW | LEDUGRO | 45 |
| W6 | July-19-10 | JG, SB | NW | SALIMYR | 30 | S17 | Aug-04-10 | SB, KA | NW | PICEGLA | 4 |
| W6 | July-19-10 | JG, SB | NW | FRAGVIR | 5 | S17 | Aug-04-10 | SB, KA | NW | PINUCON | P |
| W6 | July-19-10 | JG, SB | NW | MERTPAN | 5 | S17 | Aug-04-10 | SB, KA | NW | EQUIPRA | 15 |
| W6 | July-19-10 | JG, SB | NW | DELPGLA | P | S17 | Aug-04-10 | SB, KA | NW | LINNBOR | 6 |
| W6 | July-19-10 | JG, SB | NW | ARNICOR | P | S17 | Aug-04-10 | SB, KA | NW | VACCVIT | 10 |
| W6 | July-19-10 | JG, SB | NW | CORNCAN | P | S17 | Aug-04-10 | SB, KA | NW | CORNCAN | 10 |
| W6 | July-19-10 | JG, SB | NW | MITENUD | P | S17 | Aug-04-10 | SB, KA | NW | PARNFIM | 4 |
| W6 | July-19-10 | JG, SB | NW | LONIINV | P | S17 | Aug-04-10 | SB, KA | NW | SALI SPP. | 5 |
| W6 | July-19-10 | JG, SB | NW | ACHIMIL | P | S17 | Aug-04-10 | SB, KA | NW | CAREX SPP. | 10 |
| W6 | July-19-10 | JG, SB | NW | PETAPAL | P | S17 | Aug-04-10 | SB, KA | NW | ALNUVIR | 3 |
| W6 | July-19-10 | JG, SB | NW | LUZUPIP | P | S17 | Aug-04-10 | SB, KA | NW | GALIBOR | 1 |
| W6 | July-19-10 | JG, SB | NW | HEDYSUL | P | S17 | Aug-04-10 | SB, KA | NW | ROSAACI | 1 |
| W6 | July-19-10 | JG, SB | NW | ERIGPER | P | S17 | Aug-04-10 | SB, KA | NW | PEDIBRA | P |
| W6 | July-19-10 | JG, SB | NW | EQUISCI | P | S17 | Aug-04-10 | SB, KA | NW | EPIL SPP. | P |
| W6 | July-19-10 | JG, SB | NW | RIBELAX | P | S17 | Aug-04-10 | SB, KA | NW | JUNICOM | P |
| S10 | July-20-10 | KA, JG, DH | SE | SALIDRU | 20 | S17 | Aug-04-10 | SB, KA | NW | GLYCERIA | P |
| S10 | July-20-10 | KA, JG, DH | SE | PICEENG | 10 | S17 | Aug-04-10 | SB, KA | NW | VACCCAE | 1 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S10 | July-20-10 | KA, JG, DH | SE | DESCCAE | P | S17 | Aug-04-10 | SB, KA | NW | VACCMYR | P |
| S10 | July-20-10 | KA, JG, DH | SE | EQUISYL | P | S17 | Aug-04-10 | SB, KA | NW | BETUGLA | P |
| S10 | July-20-10 | KA, JG, DH | SE | CASSTET | P | S17 | Aug-04-10 | SB, KA | SW | ABIEBIF | P |
| S10 | July-20-10 | KA, JG, DH | SE | ORTHSEC | P | S17 | Aug-04-10 | SB, KA | SW | PICEGLA | 5 |
| S10 | July-20-10 | KA, JG, DH | SE | CASTMIN | P | S17 | Aug-04-10 | SB, KA | SW | CORNCAN | 35 |
| S10 | July-20-10 | KA, JG, DH | SE | CARELEP | P | S17 | Aug-04-10 | SB, KA | SW | PETAPAL | 5 |
| S10 | July-20-10 | KA, JG, DH | SE | VACCVIT | P | S17 | Aug-04-10 | SB, KA | SW | ARNICOR | 1 |
| S10 | July-20-10 | KA, JG, DH | SE | JUNCCAS | P | S17 | Aug-04-10 | SB, KA | SW | RIBELAC | 6 |
| S10 | July-20-10 | KA, JG, DH | SE | ABIEBIF | P | S17 | Aug-04-10 | SB, KA | SW | LYCOANN | 5 |
| S10 | July-20-10 | KA, JG, DH | SE | SALIBAR | 10 | S17 | Aug-04-10 | SB, KA | SW | EQUISCI | P |
| S10 | July-20-10 | KA, JG, DH | SE | EQUIARV | 25 | S17 | Aug-04-10 | SB, KA | SW | EPILANG | P |
| S10 | July-20-10 | KA, JG, DH | SE | PETAFRI | P | S17 | Aug-04-10 | SB, KA | SW | VACCMEM | 1 |
| S10 | July-20-10 | KA, JG, DH | SE | POLYVIV | P | S17 | Aug-04-10 | SB, KA | SW | ORTHSEC | P |
| S10 | July-20-10 | KA, JG, DH | SE | EMPENIG | P | S17 | Aug-04-10 | SB, KA | SW | MENZFER | 1 |
| S10 | July-20-10 | KA, JG, DH | SE | SENETRI | P | S17 | Aug-04-10 | SB, KA | SW | SHEPCAN | 1 |
| S10 | July-20-10 | KA, JG, DH | SE | VEROALP | P | S17 | Aug-04-10 | SB, KA | SW | ALNUVIR | 1 |
| S10 | July-20-10 | KA, JG, DH | SE | SAXINEL | P | S17 | Aug-04-10 | SB, KA | SW | ARNIDIV | P |
| S10 | July-20-10 | KA, JG, DH | SE | POAALPI | P | S17 | Aug-04-10 | SB, KA | SW | MITENUD | P |
| S10 | July-20-10 | KA, JG, DH | SE | CARELET | P | S17 | Aug-04-10 | SB, KA | SW | STREAMP | P |
| S10 | July-20-10 | KA, JG, DH | SE | CERABEE | P | S17 | Aug-04-10 | SB, KA | SW | PARNFIM | P |
| S10 | July-20-10 | KA, JG, DH | SE | LUZUPAR | P | S17 | Aug-04-10 | SB, KA | SW | CALACAN | P |
| S10 | July-20-10 | KA, JG, DH | SE | CAREPET | P | S17 | Aug-04-10 | SB, KA | SW | LISTCOR | P |
| S10 | July-20-10 | KA, JG, DH | NE | POLYVIV | P | S17 | Aug-04-10 | SB, KA | SE | BETUGLA | 50 |
| S10 | July-20-10 | KA, JG, DH | NE | EMPENIG | 5 | S17 | Aug-04-10 | SB, KA | SE | LEDUGRO | 20 |
| S10 | July-20-10 | KA, JG, DH | NE | PETAFRI | P | S17 | Aug-04-10 | SB, KA | SE | PARNFIM | 1 |
| S10 | July-20-10 | KA, JG, DH | NE | VACCCAE | P | S17 | Aug-04-10 | SB, KA | SE | LEYMINN | P |
| S10 | July-20-10 | KA, JG, DH | NE | ABIEBIF | P | S17 | Aug-04-10 | SB, KA | SE | PINUCON | 4 |
| S10 | July-20-10 | KA, JG, DH | NE | KALMMIC | P | S17 | Aug-04-10 | SB, KA | SE | PICEGLA | 1 |
| S10 | July-20-10 | KA, JG, DH | NE | CAREDIS | P | S17 | Aug-04-10 | SB, KA | SE | CORNCAN | 7 |
| S10 | July-20-10 | KA, JG, DH | NE | SALIFAR | 20 | S17 | Aug-04-10 | SB, KA | SE | GALIBOR | P |
| S10 | July-20-10 | KA, JG, DH | NE | SALIDRU | 5 | S17 | Aug-04-10 | SB, KA | SE | LINNBOR | 4 |
| S10 | July-20-10 | KA, JG, DH | NE | ANTEMON | P | S17 | Aug-04-10 | SB, KA | SE | ROSAACI | 1 |
| S10 | July-20-10 | KA, JG, DH | NE | PHYLGLA | P | S17 | Aug-04-10 | SB, KA | SE | COMAUMB | P |
| S10 | July-20-10 | KA, JG, DH | NE | ARTENOR | P | S17 | Aug-04-10 | SB, KA | SE | VACCVIT | 1 |
| S10 | July-20-10 | KA, JG, DH | NE | CORNCAN | P | S17 | Aug-04-10 | SB, KA | SE | EQUIPRA | P |
| S10 | July-20-10 | KA, JG, DH | NE | ORTHSEC | P | S17 | Aug-04-10 | SB, KA | SE | CASTMIN | P |
| S10 | July-20-10 | KA, JG, DH | NE | VACCVIT | 3 | S17 | Aug-04-10 | SB, KA | SE | PETAPAL | P |
| S10 | July-20-10 | KA, JG, DH | NE | EQUIARV | 1 | S17 | Aug-04-10 | SB, KA | SE | AQUIFLA | P |
| S10 | July-20-10 | KA, JG, DH | NE | CASSTET | P | S17 | Aug-04-10 | SB, KA | SE | EPIL SPP. | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S10 | July-20-10 | KA, JG, DH | NE | SALIBAR | 5 | S17 | Aug-04-10 | SB, KA | SE | PLATHYP | P |
| S10 | July-20-10 | KA, JG, DH | NE | PICEENG | 5 | S17 | Aug-04-10 | SB, KA | SE | CARE SPP. | P |
| S10 | July-20-10 | KA, JG, DH | NE | CARE SPP. | P | S17 | Aug-04-10 | SB, KA | SE | VACCMEM | P |
| S10 | July-20-10 | KA, JG, DH | NE | SALIMEL | P | S17 | Aug-04-10 | SB, KA | SE | ANEMPAR | P |
| S10 | July-20-10 | KA, JG, DH | NW | EMPENIG | 10 | S17 | Aug-04-10 | SB, KA | SE | PEDIBRA | P |
| S10 | July-20-10 | KA, JG, DH | NW | EQUIARV | P | S17 | Aug-04-10 | SB, KA | SE | CAMPROT | P |
| S10 | July-20-10 | KA, JG, DH | NW | PICEENG | 5 | S17 | Aug-04-10 | SB, KA | SE | ARCTRUB | P |
| S10 | July-20-10 | KA, JG, DH | NW | ERIO SPP. | P | S17 | Aug-04-10 | SB, KA | SE | SALI SPP. | P |
| S10 | July-20-10 | KA, JG, DH | NW | SALIMEL | 10 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ACONDEL | 1 |
| S10 | July-20-10 | KA, JG, DH | NW | VACCVIT | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ARNIANG | 2 |
| S10 | July-20-10 | KA, JG, DH | NW | LEDULAN | 2 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | POTEDIV | P |
| S10 | July-20-10 | KA, JG, DH | NW | CAREAQU | 35 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | FESTALT | 15 |
| S10 | July-20-10 | KA, JG, DH | NW | SALIFAR | 10 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | HEDYALP | 15 |
| S10 | July-20-10 | KA, JG, DH | NW | POLYVIV | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | POLYVIV | 1 |
| S10 | July-20-10 | KA, JG, DH | SW | EQUIARV | 3 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | SAXITRI | 5 |
| S10 | July-20-10 | KA, JG, DH | SW | KALMMIC | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | TRISSPI | P |
| S10 | July-20-10 | KA, JG, DH | SW | VACCCAE | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ARTENOR | P |
| S10 | July-20-10 | KA, JG, DH | SW | VACCVIT | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | DRYAOCT | 10 |
| S10 | July-20-10 | KA, JG, DH | SW | EMPENIG | 5 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ANTE SPP. | 1 |
| S10 | July-20-10 | KA, JG, DH | SW | CASTMIN | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | SEDULAN | P |
| S10 | July-20-10 | KA, JG, DH | SW | ORTHSEC | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | POAALPI | P |
| S10 | July-20-10 | KA, JG, DH | SW | EPILANG | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | DRYAINT | 1 |
| S10 | July-20-10 | KA, JG, DH | SW | ABIEBIF | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ASTEALP | P |
| S10 | July-20-10 | KA, JG, DH | SW | PICEENG | 20 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ASTRSTR | 1 |
| S10 | July-20-10 | KA, JG, DH | SW | LEDUGRO | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | CARERUP | 1 |
| S10 | July-20-10 | KA, JG, DH | SW | PETAFRI | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | EPILANG | P |
| S10 | July-20-10 | KA, JG, DH | SW | RUBUARC | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | POTEUNI | P |
| S10 | July-20-10 | KA, JG, DH | SW | ERIO SPP. | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | GENTPRO | P |
| S10 | July-20-10 | KA, JG, DH | SW | STELCRA | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | GENTPRP | P |
| S10 | July-20-10 | KA, JG, DH | SW | CALACAN | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ZIGAELE | P |
| S10 | July-20-10 | KA, JG, DH | SW | POLYVIV | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | MYOSALP | P |
| S10 | July-20-10 | KA, JG, DH | SW | SALIFAR | 15 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | SOLIMUL | P |
| S10 | July-20-10 | KA, JG, DH | SW | SALIDRU | 10 | H1 | Aug-09-10 | KA, JF, JG, MW | NW | ERIGSPP | 1 |
| S10 | July-20-10 | KA, JG, DH | SW | SENEPAU | P | H1 | Aug-09-10 | KA, JF, JG, MW | NW | FESTBAF | P |
| S10 | July-20-10 | KA, JG, DH | SW | GOODREP | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | POTEUNI | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S10 | July-20-10 | KA, JG, DH | SW | SALIMEL | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | NE | CARERUP | P |
| S10 | July-20-10 | KA, JG, DH | SW | CARELEP | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | SAXITRI | 1 |
| S10 | July-20-10 | KA, JG, DH | SW | PARNPAL | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | DRYAOCT | P |
| S10 | July-20-10 | KA, JG, DH | SW | ARNICHA | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | ARTENOR | P |
| S10 | July-20-10 | KA, JG, DH | SW | PHYLGLA | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | POAGLAU | P |
| S10 | July-20-10 | KA, JG, DH | SW | ERIG SPP. | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | SAXIBRO | P |
| S10 | July-20-10 | KA, JG, DH | SW | CAREAQU | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | POLYVIV | P |
| S5 | July-21-10 | SB, MM, JG | SE | SALIGLA | 15 | H1 | Aug-09-10 | KA, JF, JG, MW | NE | CAMPLAS | P |
| S5 | July-21-10 | SB, MM, JG | SE | DRABBOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | FESTALT | P |
| S14 | July-23-10 | KA, JG, MM | NE | JUNICOM | 2 | H1 | Aug-09-10 | KA, JF, JG, MW | NE | SALIRET | P |
| S14 | July-23-10 | KA, JG, MM | NE | ARNICOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | FESTBAF | P |
| S14 | July-23-10 | KA, JG, MM | NE | LINNBOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | ASTEALP | P |
| S14 | July-23-10 | KA, JG, MM | NE | VACCCAE | 5 | H1 | Aug-09-10 | KA, JF, JG, MW | NE | CAREMAR | P |
| S14 | July-23-10 | KA, JG, MM | NE | EPILANG | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | OXYTPOD | P |
| S14 | July-23-10 | KA, JG, MM | NE | FESTALT | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | DRYAINT | 10 |
| S14 | July-23-10 | KA, JG, MM | NE | VACCMEM | 10 | H1 | Aug-09-10 | KA, JF, JG, MW | NE | ASTRSTR | P |
| S14 | July-23-10 | KA, JG, MM | NE | CORNCAN | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | NE | ERIGCOM | P |
| S14 | July-23-10 | KA, JG, MM | NE | ABIEBIF | 35 | H1 | Aug-09-10 | KA, JF, JG, MW | NE | STELLON | P |
| S14 | July-23-10 | KA, JG, MM | NE | ARTENOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | SELASCO | 1 |
| S14 | July-23-10 | KA, JG, MM | NE | LEYMINN | P | H1 | Aug-09-10 | KA, JF, JG, MW | NE | ANEMLIT | P |
| S14 | July-23-10 | KA, JG, MM | NW | ARNICOR | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | ACONDEL | P |
| S14 | July-23-10 | KA, JG, MM | NW | LINNBOR | 3 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | POLYVIV | P |
| S14 | July-23-10 | KA, JG, MM | NW | PINUCON | 15 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | FESTALT | 7 |
| S14 | July-23-10 | KA, JG, MM | NW | JUNICOM | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | SAXITRI | 7 |
| S14 | July-23-10 | KA, JG, MM | NW | LEYMINN | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | HEDYALP | 10 |
| S14 | July-23-10 | KA, JG, MM | NW | VACCVIT | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | SALIRET | P |
| S14 | July-23-10 | KA, JG, MM | NW | FESTALT | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | POTEDIV | 1 |
| S14 | July-23-10 | KA, JG, MM | NW | EPILANG | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | DRYAOCT | 35 |
| S14 | July-23-10 | KA, JG, MM | SW | PICEENG | 5 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | CAREALB | P |
| S14 | July-23-10 | KA, JG, MM | SW | ABIEBIF | 50 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | ARTENOR | 3 |
| S14 | July-23-10 | KA, JG, MM | SW | PEDIBRA | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | GENTPRP | P |
| S14 | July-23-10 | KA, JG, MM | SW | ORTHSEC | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | POAALPI | 1 |
| S14 | July-23-10 | KA, JG, MM | SW | ARTENOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | SOLIMUL | 1 |
| S14 | July-23-10 | KA, JG, MM | SW | ARNICOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | MYOSALP | P |
| S14 | July-23-10 | KA, JG, MM | SW | VACCMEM | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | POTEUNI | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S14 | July-23-10 | KA, JG, MM | SW | POLYVIV | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | MERTPAN | P |
| S14 | July-23-10 | KA, JG, MM | SW | SALI SPP. | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | PICEENG | P |
| S14 | July-23-10 | KA, JG, MM | SW | LINNBOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | SEDULAN | P |
| S14 | July-23-10 | KA, JG, MM | SW | EPILANG | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | SAXIOCC | P |
| S14 | July-23-10 | KA, JG, MM | SW | VACCCAE | 3 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | ARNIANG | P |
| S14 | July-23-10 | KA, JG, MM | SW | CORNCAN | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | CARERUP | P |
| S14 | July-23-10 | KA, JG, MM | SW | FESTALT | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | CAMPLAS | P |
| S14 | July-23-10 | KA, JG, MM | SW | ANAPMAR | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | ZIGAELE | P |
| S14 | July-23-10 | KA, JG, MM | SW | ERIG SPP. | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | DRYAINT | 1 |
| S14 | July-23-10 | KA, JG, MM | SE | VACCCAE | 4 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | PEDICAP | P |
| S14 | July-23-10 | KA, JG, MM | SE | FESTALT | P | H1 | Aug-09-10 | KA, JF, JG, MW | SW | PEDILAN | P |
| S14 | July-23-10 | KA, JG, MM | SE | CORNCAN | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | KOBRMYO | 1 |
| S14 | July-23-10 | KA, JG, MM | SE | VACCMEM | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SW | GENTPRO | P |
| S14 | July-23-10 | KA, JG, MM | SE | BETUGLA | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | POLYVIV | 1 |
| S14 | July-23-10 | KA, JG, MM | SE | EMPENIG | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | HEDYALP | 5 |
| S14 | July-23-10 | KA, JG, MM | SE | LINNBOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | MYOSALP | P |
| S14 | July-23-10 | KA, JG, MM | SE | EPILANG | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | DRYAOCT | 5 |
| S14 | July-23-10 | KA, JG, MM | SE | ABIEBIF | 25 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | ARNIANG | P |
| S14 | July-23-10 | KA, JG, MM | SE | VACCVIT | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | ASTEALP | P |
| S14 | July-23-10 | KA, JG, MM | SE | PICEENG | 25 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | FESTBAF | P |
| S14 | July-23-10 | KA, JG, MM | SE | PHYLEMP | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | SAXITRI | 10 |
| S14 | July-23-10 | KA, JG, MM | SE | ARTENOR | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | GENTPRP | P |
| S7 | July-26-10 | | NE | PICEGLA | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | ARCTRUB | P |
| S7 | July-26-10 | | NE | PICEENG | 5 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | OXYTPOD | P |
| S7 | July-26-10 | | NE | PINUCON | 2 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | SILEACA | P |
| S7 | July-26-10 | | NE | JUNICOM | 2 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | SAXIBRO | 3 |
| S7 | July-26-10 | | NE | CORNCAN | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | KOBRMYO | P |
| S7 | July-26-10 | | NE | VACCMEM | 2 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | DRYAINT | 20 |
| S7 | July-26-10 | | NE | LEYMINN | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | FESTALT | P |
| S7 | July-26-10 | | NE | ABIEBIF | 3 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | POAALPI | P |
| S7 | July-26-10 | | SE | PICEENG | 4 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | POAGLAU | P |
| S7 | July-26-10 | | SE | ABIEBIF | 5 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | TRISSPI | P |
| S7 | July-26-10 | | SE | LINNBOR | 2 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | CAMPLAS | P |
| S7 | July-26-10 | | SE | VACCMEM | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | PEDIARC | P |
| S7 | July-26-10 | | SE | VACCVIT | 1 | H1 | Aug-09-10 | KA, JF, JG, MW | SE | SELASCO | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S7 | July-26-10 | | SE | FESTALT | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | POTEUNI | P |
| S7 | July-26-10 | | SE | LEYMINN | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | CAREALB | P |
| S7 | July-26-10 | | SW | LEYMINN | P | H1 | Aug-09-10 | KA, JF, JG, MW | SE | PEDILAN | P |
| S7 | July-26-10 | | SW | CORNCAN | P | W7 | Aug-10-10 | SB, JG, MW, JF | NE | BETUGLA | 20 |
| S7 | July-26-10 | | SW | ORTHSEC | P | W7 | Aug-10-10 | SB, JG, MW, JF | NE | RUBUARC | 10 |
| S7 | July-26-10 | | SW | JUNIHOR | P | W7 | Aug-10-10 | SB, JG, MW, JF | NE | MITENUD | 5 |
| S7 | July-26-10 | | SW | LINNBOR | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | NE | EQUIVAR | P |
| S7 | July-26-10 | | SW | MERTPAN | P | W7 | Aug-10-10 | SB, JG, MW, JF | NE | OXYCMIC | 2 |
| S7 | July-26-10 | | SW | ARNICOR | P | W7 | Aug-10-10 | SB, JG, MW, JF | NE | VIOL SPP. | 1 |
| S7 | July-26-10 | | SW | HEDYBOR | P | W7 | Aug-10-10 | SB, JG, MW, JF | NE | ERIGPER | 1 |
| S7 | July-26-10 | | NW | PINUCON | 5 | W7 | Aug-10-10 | SB, JG, MW, JF | NE | CALACAN | P |
| S7 | July-26-10 | | NW | PICE SPP. | 3 | W7 | Aug-10-10 | SB, JG, MW, JF | NE | PLATDIL | P |
| S7 | July-26-10 | | NW | ABIEBIF | P | W7 | Aug-10-10 | SB, JG, MW, JF | NE | LONIINV | 2 |
| S7 | July-26-10 | | NW | SHEPCAN | 2 | W7 | Aug-10-10 | SB, JG, MW, JF | NE | CAREAQU | 25 |
| S7 | July-26-10 | | NW | JUNICOM | 10 | W7 | Aug-10-10 | SB, JG, MW, JF | NE | SCIRCES | 3 |
| S7 | July-26-10 | | NW | CORNCAN | 2 | W7 | Aug-10-10 | SB, JG, MW, JF | NE | CAREUTR | 3 |
| S7 | July-26-10 | | NW | VACCVIT | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | SW | BETUGLA | 15 |
| S7 | July-26-10 | | NW | LEYMINN | 3 | W7 | Aug-10-10 | SB, JG, MW, JF | SW | PYROASA | 1 |
| S7 | July-26-10 | | NW | LINNBOR | P | W7 | Aug-10-10 | SB, JG, MW, JF | SW | LINNBOR | P |
| S7 | July-26-10 | | NW | ROSAACI | P | W7 | Aug-10-10 | SB, JG, MW, JF | SW | RUBUARC | 1 |
| S7 | July-26-10 | | NW | MERTPAN | P | W7 | Aug-10-10 | SB, JG, MW, JF | SW | ERIOVIR | 30 |
| S7 | July-26-10 | | NW | FESTALT | P | W7 | Aug-10-10 | SB, JG, MW, JF | SW | CAREAQU | 10 |
| S7 | July-26-10 | | NW | ARNICOR | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | SW | MITENUD | P |
| S7 | July-26-10 | | NW | CAMPROT | P | W7 | Aug-10-10 | SB, JG, MW, JF | SW | SPIRROM | P |
| S7 | July-26-10 | | NW | VACCCAE | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | SW | SALIX SPP. | 1 |
| H9 | July-27-10 | KA, LA | NW | ANTEALP | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | SW | CAREUTR | 3 |
| H9 | July-27-10 | KA, LA | NW | DIPHALP | 3 | W7 | Aug-10-10 | SB, JG, MW, JF | SW | CARELEP | 3 |
| H9 | July-27-10 | KA, LA | NW | CASSMER | 75 | W7 | Aug-10-10 | SB, JG, MW, JF | SE | EMPENIG | 35 |
| H9 | July-27-10 | KA, LA | NW | ARTENOR | P | W7 | Aug-10-10 | SB, JG, MW, JF | SE | ABIEBIF | 28 |
| H9 | July-27-10 | KA, LA | NW | HIERGRA | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | SE | CORNCAN | 5 |
| H9 | July-27-10 | KA, LA | NW | GENTGLA | P | W7 | Aug-10-10 | SB, JG, MW, JF | SE | VACCCAE | 3 |
| H9 | July-27-10 | KA, LA | NW | PHYLEMP | P | W7 | Aug-10-10 | SB, JG, MW, JF | SE | LEDUGRO | 5 |
| H9 | July-27-10 | KA, LA | NW | LUETPEC | P | W7 | Aug-10-10 | SB, JG, MW, JF | SE | PICEENG | 1 |
| H9 | July-27-10 | KA, LA | NW | CARE SPP. | P | W7 | Aug-10-10 | SB, JG, MW, JF | SE | PINUCON | 3 |
| H9 | July-27-10 | KA, LA | NW | LUZUPAR | P | W7 | Aug-10-10 | SB, JG, MW, JF | SE | ARNIDIV | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H9 | July-27-10 | KA, LA | NW | PHYLGLA | P | W7 | Aug-10-10 | SB, JG, MW, JF | SE | RUBUPED | P |
| H9 | July-27-10 | KA, LA | SW | ABIEBIF | 85 | W7 | Aug-10-10 | SB, JG, MW, JF | SE | VACCMEM | 1 |
| H9 | July-27-10 | KA, LA | SW | RUBUPED | 10 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | BETUGLA | 30 |
| H9 | July-27-10 | KA, LA | SW | PHYLGLA | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | ELYMTRA | 1 |
| H9 | July-27-10 | KA, LA | SW | CASSMER | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | PINUCON | 3 |
| H9 | July-27-10 | KA, LA | SW | VACCMEM | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | MITENUD | P |
| H9 | July-27-10 | KA, LA | NE | CASSMER | 95 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | OXYCMIC | P |
| H9 | July-27-10 | KA, LA | NE | LUETPEC | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | LINNBOR | 3 |
| H9 | July-27-10 | KA, LA | NE | HIERGRA | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | GALIBOR | P |
| H9 | July-27-10 | KA, LA | NE | PHYLGLA | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | CALACAN | P |
| H9 | July-27-10 | KA, LA | NE | DIPHALP | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | LONIINV | P |
| H9 | July-27-10 | KA, LA | NE | LUZUPAR | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | CAREAQU | 20 |
| H9 | July-27-10 | KA, LA | NE | PHYLEMP | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | VIOL SPP. | 20 |
| H9 | July-27-10 | KA, LA | NE | CARE SPP. | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | ANEMPAR | 1 |
| H9 | July-27-10 | KA, LA | NE | GENTGLA | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | ERIGPER | 3 |
| H9 | July-27-10 | KA, LA | SE | CASSTET | 20 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | RUBUARC | 3 |
| H9 | July-27-10 | KA, LA | SE | POLYVIV | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | LEDUGRO | 2 |
| H9 | July-27-10 | KA, LA | SE | ARTENOR | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | CORNCAN | P |
| H9 | July-27-10 | KA, LA | SE | SALIARC | 1 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | EMPENIG | 5 |
| H9 | July-27-10 | KA, LA | SE | EMPENIG | 25 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | CAREUTR | 5 |
| H9 | July-27-10 | KA, LA | SE | CASSMER | 2 | W7 | Aug-10-10 | SB, JG, MW, JF | NW | SCIRCES | 2 |
| H9 | July-27-10 | KA, LA | SE | GENTGLA | P | W7 | Aug-10-10 | SB, JG, MW, JF | NW | CARELIM | P |
| H9 | July-27-10 | KA, LA | SE | VACCVIT | P | S15 | Aug-11-10 | KA, JG | NW | ARNICOR | P |
| H9 | July-27-10 | KA, LA | SE | PHYLGLA | 2 | S15 | Aug-11-10 | KA, JG | NW | ORTHSEC | 2 |
| H9 | July-27-10 | KA, LA | SE | CARESPE | 1 | S15 | Aug-11-10 | KA, JG | NW | EQUISCI | 4 |
| H9 | July-27-10 | KA, LA | SE | RARE SPP. | P | S15 | Aug-11-10 | KA, JG | NW | LINNBOR | 2 |
| H9 | July-27-10 | KA, LA | SE | ABIEBIF | P | S15 | Aug-11-10 | KA, JG | NW | LEYMINN | 1 |
| H9 | July-27-10 | KA, LA | SE | DIPHALP | P | S15 | Aug-11-10 | KA, JG | NW | PICEENG | 15 |
| H9 | July-27-10 | KA, LA | SE | HIERALP | P | S15 | Aug-11-10 | KA, JG | NW | ABIEBIF | 3 |
| W1 | July-27-10 | SB, EC | NE | EQUIPRA | 12 | S15 | Aug-11-10 | KA, JG | NW | MERTPAN | P |
| W1 | July-27-10 | SB, EC | NE | SENETRI | P | S15 | Aug-11-10 | KA, JG | NE | LYCOANN | 7 |
| W1 | July-27-10 | SB, EC | NE | ACHIMIL | P | S15 | Aug-11-10 | KA, JG | NE | ABIEBIF | 5 |
| W1 | July-27-10 | SB, EC | NE | FRAGVIR | P | S15 | Aug-11-10 | KA, JG | NE | PICEENG | 25 |
| W1 | July-27-10 | SB, EC | NE | LONIINV | 2 | S15 | Aug-11-10 | KA, JG | NE | LEYMINN | 2 |
| W1 | July-27-10 | SB, EC | NE | TROLALB | P | S15 | Aug-11-10 | KA, JG | NE | EQUISCI | 3 |
| W1 | July-27-10 | SB, EC | NE | VACCCAE | 3 | S15 | Aug-11-10 | KA, JG | NE | SALIGLA | 15 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W1 | July-27-10 | SB, EC | NE | PETAPAL | 1 | S15 | Aug-11-10 | KA, JG | NE | ORTHSEC | P |
| W1 | July-27-10 | SB, EC | NE | PYROASA | P | S15 | Aug-11-10 | KA, JG | NE | SALIVES | 2 |
| W1 | July-27-10 | SB, EC | NE | ARNICOR | P | S15 | Aug-11-10 | KA, JG | NE | LINNBOR | 2 |
| W1 | July-27-10 | SB, EC | NE | RUBUARC | 1 | S15 | Aug-11-10 | KA, JG | NE | MERTPAN | P |
| W1 | July-27-10 | SB, EC | NE | TRIEEUR | P | S15 | Aug-11-10 | KA, JG | NE | SHEPCAN | 1 |
| W1 | July-27-10 | SB, EC | NE | SALI SPP. | 50 | S15 | Aug-11-10 | KA, JG | NE | DELPGLA | P |
| W1 | July-27-10 | SB, EC | NE | PICEGLA | 8 | S15 | Aug-11-10 | KA, JG | NE | POLYVIV | P |
| W1 | July-27-10 | SB, EC | NE | PINUCON | 2 | S15 | Aug-11-10 | KA, JG | SW | PICEENG | 5 |
| W1 | July-27-10 | SB, EC | NE | VIOLADU | P | S15 | Aug-11-10 | KA, JG | SW | ABIEBIF | 3 |
| W1 | July-27-10 | SB, EC | NE | ARTENOR | P | S15 | Aug-11-10 | KA, JG | SW | LEYMINN | P |
| W1 | July-27-10 | SB, EC | NE | ERIG SPP. | P | S15 | Aug-11-10 | KA, JG | SW | ORTHSEC | P |
| W1 | July-27-10 | SB, EC | NE | POTEDIV | P | S15 | Aug-11-10 | KA, JG | SW | LINNBOR | 2 |
| W1 | July-27-10 | SB, EC | NE | EPILPAL | P | S15 | Aug-11-10 | KA, JG | SW | EQUISCI | 1 |
| W1 | July-27-10 | SB, EC | NE | THALOCC | P | S15 | Aug-11-10 | KA, JG | SW | LEDUGRO | P |
| W1 | July-27-10 | SB, EC | NE | ARNIMOL | P | S15 | Aug-11-10 | KA, JG | SW | VACCVIT | P |
| W1 | July-27-10 | SB, EC | NE | ACONDEL | P | S15 | Aug-11-10 | KA, JG | SE | PICEENG | 7 |
| W1 | July-27-10 | SB, EC | NE | BETUGLA | 2 | S15 | Aug-11-10 | KA, JG | SE | LINNBOR | 1 |
| W1 | July-27-10 | SB, EC | NE | PARNFIM | P | S15 | Aug-11-10 | KA, JG | SE | LEYMINN | P |
| W1 | July-27-10 | SB, EC | NE | ORTHSEC | P | S15 | Aug-11-10 | KA, JG | SE | ORTHSEC | P |
| W1 | July-27-10 | SB, EC | NE | DESCCAE | P | S15 | Aug-11-10 | KA, JG | SE | ABIEBIF | 3 |
| W1 | July-27-10 | SB, EC | SE | CORNCAN | P | S15 | Aug-11-10 | KA, JG | SE | VACCVIT | P |
| W1 | July-27-10 | SB, EC | SE | EQUIPRA | 5 | S22 | Aug-11-10 | SB, JF, MW | NE | VACCMEM | 25 |
| W1 | July-27-10 | SB, EC | SE | PETAPAL | P | S22 | Aug-11-10 | SB, JF, MW | NE | CORNCAN | 10 |
| W1 | July-27-10 | SB, EC | SE | LONIINV | 2 | S22 | Aug-11-10 | SB, JF, MW | NE | LINNBOR | 8 |
| W1 | July-27-10 | SB, EC | SE | BETUGLA | 1 | S22 | Aug-11-10 | SB, JF, MW | NE | BETUGLA | 1 |
| W1 | July-27-10 | SB, EC | SE | RUBUARC | P | S22 | Aug-11-10 | SB, JF, MW | NE | ABIEBIF | 5 |
| W1 | July-27-10 | SB, EC | SE | LEYMINN | P | S22 | Aug-11-10 | SB, JF, MW | NE | VACCVIT | 2 |
| W1 | July-27-10 | SB, EC | SE | VACCCAE | 10 | S22 | Aug-11-10 | SB, JF, MW | NE | RHODALB | 2 |
| W1 | July-27-10 | SB, EC | SE | ORTHSEC | P | S22 | Aug-11-10 | SB, JF, MW | NE | ORTHSEC | P |
| W1 | July-27-10 | SB, EC | SE | ARNIANG | P | S22 | Aug-11-10 | SB, JF, MW | NE | PICEGLA | 1 |
| W1 | July-27-10 | SB, EC | SE | VIOLADU | P | S22 | Aug-11-10 | SB, JF, MW | NE | LYCOANN | 4 |
| W1 | July-27-10 | SB, EC | SE | ACHIMIL | P | S22 | Aug-11-10 | SB, JF, MW | NE | PINUCON | 2 |
| W1 | July-27-10 | SB, EC | SE | ERIG SPP. | P | S22 | Aug-11-10 | SB, JF, MW | NE | FESTALT | P |
| W1 | July-27-10 | SB, EC | SE | SALI SPP. | 15 | S22 | Aug-11-10 | SB, JF, MW | NE | RUBUPED | P |
| W1 | July-27-10 | SB, EC | SE | EPILANG | P | S22 | Aug-11-10 | SB, JF, MW | SE | ABIEBIF | 1 |
| W1 | July-27-10 | SB, EC | SE | TRIEEUR | P | S22 | Aug-11-10 | SB, JF, MW | SE | PINUCON | 1 |
| W1 | July-27-10 | SB, EC | SE | EQUIARV | 2 | S22 | Aug-11-10 | SB, JF, MW | SE | PICEGLA | 1 |
| W1 | July-27-10 | SB, EC | SE | ARTENOR | P | S22 | Aug-11-10 | SB, JF, MW | SE | VACCMEM | 2 |
| W1 | July-27-10 | SB, EC | SE | ABIEBIF | P | S22 | Aug-11-10 | SB, JF, MW | SE | VACCVIT | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W1 | July-27-10 | SB, EC | SE | PICEENG | 4 | S22 | Aug-11-10 | SB, JF, MW | SE | EMPENIG | 25 |
| W1 | July-27-10 | SB, EC | SE | ARNICOR | P | S22 | Aug-11-10 | SB, JF, MW | SE | CORNCAN | 1 |
| W1 | July-27-10 | SB, EC | SW | LONIINV | 11 | S22 | Aug-11-10 | SB, JF, MW | SE | LINNBOR | 1 |
| W1 | July-27-10 | SB, EC | SW | SENETRI | P | S22 | Aug-11-10 | SB, JF, MW | SE | JUNICOM | 10 |
| W1 | July-27-10 | SB, EC | SW | THALOCC | P | S22 | Aug-11-10 | SB, JF, MW | SE | ARNICOR | P |
| W1 | July-27-10 | SB, EC | SW | ACONDEL | P | S22 | Aug-11-10 | SB, JF, MW | SE | EPILANG | P |
| W1 | July-27-10 | SB, EC | SW | PICEENG | 5 | S22 | Aug-11-10 | SB, JF, MW | SE | LEYMINN | P |
| W1 | July-27-10 | SB, EC | SW | FRAGVIR | P | S22 | Aug-11-10 | SB, JF, MW | SW | VACCMEM | 30 |
| W1 | July-27-10 | SB, EC | SW | ABIEBIF | 28 | S22 | Aug-11-10 | SB, JF, MW | SW | CORNCAN | 4 |
| W1 | July-27-10 | SB, EC | SW | ACHIMIL | P | S22 | Aug-11-10 | SB, JF, MW | SW | RUBUPED | 12 |
| W1 | July-27-10 | SB, EC | SW | GALIBOR | P | S22 | Aug-11-10 | SB, JF, MW | SW | LINNBOR | 2 |
| W1 | July-27-10 | SB, EC | SW | RUBUPED | P | S22 | Aug-11-10 | SB, JF, MW | SW | VACCVIT | 2 |
| W1 | July-27-10 | SB, EC | SW | MITEPEN | P | S22 | Aug-11-10 | SB, JF, MW | SW | BETUGLA | 2 |
| W1 | July-27-10 | SB, EC | SW | RUBUARC | P | S22 | Aug-11-10 | SB, JF, MW | SW | ABIEBIF | 3 |
| W1 | July-27-10 | SB, EC | SW | ARNICOR | P | S22 | Aug-11-10 | SB, JF, MW | SW | EMPENIG | 5 |
| W1 | July-27-10 | SB, EC | SW | RIBEOXY | P | S22 | Aug-11-10 | SB, JF, MW | SW | ORTHSEC | P |
| W1 | July-27-10 | SB, EC | SW | STREAMP | P | S22 | Aug-11-10 | SB, JF, MW | SW | PINUCON | 5 |
| W1 | July-27-10 | SB, EC | SW | VACCCAE | P | S22 | Aug-11-10 | SB, JF, MW | SW | PICEGLA | 1 |
| W1 | July-27-10 | SB, EC | SW | LEYMINN | P | S22 | Aug-11-10 | SB, JF, MW | NW | VACCMEM | 30 |
| W1 | July-27-10 | SB, EC | SW | EQUIPRA | P | S22 | Aug-11-10 | SB, JF, MW | NW | RUBUPED | 5 |
| W1 | July-27-10 | SB, EC | SW | DELPGLA | P | S22 | Aug-11-10 | SB, JF, MW | NW | VACCVIT | 3 |
| W1 | July-27-10 | SB, EC | SW | BETUGLA | P | S22 | Aug-11-10 | SB, JF, MW | NW | CORNCAN | 2 |
| W1 | July-27-10 | SB, EC | NW | LISTCOR | P | S22 | Aug-11-10 | SB, JF, MW | NW | PINUCON | 1 |
| W1 | July-27-10 | SB, EC | NW | RUBUARC | 2 | S22 | Aug-11-10 | SB, JF, MW | NW | LYCOANN | 2 |
| W1 | July-27-10 | SB, EC | NW | RUBUPED | P | S22 | Aug-11-10 | SB, JF, MW | NW | EMPENIG | 10 |
| W1 | July-27-10 | SB, EC | NW | VACCCAE | 7 | S22 | Aug-11-10 | SB, JF, MW | NW | BETUGLA | P |
| W1 | July-27-10 | SB, EC | NW | MONEUNI | P | S22 | Aug-11-10 | SB, JF, MW | NW | RHODALB | P |
| W1 | July-27-10 | SB, EC | NW | THALOCC | 1 | S22 | Aug-11-10 | SB, JF, MW | NW | ORTHSEC | P |
| W1 | July-27-10 | SB, EC | NW | ORTHSEC | P | S5 | Aug-20-10 | | NW | PICEENG | 6 |
| W1 | July-27-10 | SB, EC | NW | POA SPP. | 1 | S5 | Aug-20-10 | | NW | BETUGLA | 3 |
| W1 | July-27-10 | SB, EC | NW | ARNICOR | P | S5 | Aug-20-10 | | NW | ARTENOR | P |
| W1 | July-27-10 | SB, EC | NW | LONIINV | 3 | S5 | Aug-20-10 | | NW | TOFIGLU | P |
| W1 | July-27-10 | SB, EC | NW | EPILANG | P | S5 | Aug-20-10 | | NW | PARNPAL | P |
| W1 | July-27-10 | SB, EC | NW | ABIEBIF | 20 | S5 | Aug-20-10 | | NW | PEDIBRA | P |
| W1 | July-27-10 | SB, EC | NW | FRAGVIR | P | S5 | Aug-20-10 | | NW | ANEMPAR | P |
| W1 | July-27-10 | SB, EC | NW | DELPGLA | P | S5 | Aug-20-10 | | NW | CARECON | P |
| W1 | July-27-10 | SB, EC | NW | ACHIMIL | P | S5 | Aug-20-10 | | NW | SALIFAR | P |
| W1 | July-27-10 | SB, EC | NW | ASTE SPP. | P | S5 | Aug-20-10 | | NW | EQUISCI | P |
| W1 | July-27-10 | SB, EC | NW | PICEENG | 5 | S5 | Aug-20-10 | | NW | POLYVIV | P |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W1 | July-27-10 | SB, EC | NW | ACONDEL | P | S5 | Aug-20-10 | | NW | DRYAOCT | P |
| E3 | July-28-10 | KA, EC, DH | NW | CORNCAN | 2 | S5 | Aug-20-10 | | NW | ARCTRUB | P |
| E3 | July-28-10 | KA, EC, DH | NW | LEDUGRO | 15 | S5 | Aug-20-10 | | NW | CARESCI | 7 |
| E3 | July-28-10 | KA, EC, DH | NW | VACCVIT | 2 | S5 | Aug-20-10 | | NW | LINNBOR | P |
| E3 | July-28-10 | KA, EC, DH | NW | PICEENG | P | S5 | Aug-20-10 | | NW | ERIGPER | P |
| E3 | July-28-10 | KA, EC, DH | NW | LYCOANN | 1 | S5 | Aug-20-10 | | NW | AQUI SPP. | P |
| E3 | July-28-10 | KA, EC, DH | NW | LINNBOR | 1 | S5 | Aug-20-10 | | NW | PYROASA | P |
| E3 | July-28-10 | KA, EC, DH | NW | VACCCAE | 5 | S5 | Aug-20-10 | | NW | SALIVES | 3 |
| E3 | July-28-10 | KA, EC, DH | NW | FESTALT | P | S5 | Aug-20-10 | | NW | SALIGLA | 5 |
| E3 | July-28-10 | KA, EC, DH | NW | LEYMINN | 2 | S5 | Aug-20-10 | | NW | SALIDRU | 1 |
| E3 | July-28-10 | KA, EC, DH | NW | PINUCON | 15 | S5 | Aug-20-10 | | NW | JUNICOM | P |
| E3 | July-28-10 | KA, EC, DH | NW | PEDILAB | P | S5 | Aug-20-10 | | NE | PICEENG | 15 |
| E3 | July-28-10 | KA, EC, DH | SE | LEDUGRO | 35 | S5 | Aug-20-10 | | NE | ABIEBIF | 30 |
| E3 | July-28-10 | KA, EC, DH | SE | CORNCAN | 7 | S5 | Aug-20-10 | | NE | SALIGLA | 7 |
| E3 | July-28-10 | KA, EC, DH | SE | VACCVIT | 2 | S5 | Aug-20-10 | | NE | DRYAOCT | P |
| E3 | July-28-10 | KA, EC, DH | SE | VACCCAE | 7 | S5 | Aug-20-10 | | NE | PETAPAL | P |
| E3 | July-28-10 | KA, EC, DH | SE | EPILANG | P | S5 | Aug-20-10 | | NE | PEDIBRA | P |
| E3 | July-28-10 | KA, EC, DH | SE | ROSAACI | 1 | S5 | Aug-20-10 | | NE | CARESCI | 7 |
| E3 | July-28-10 | KA, EC, DH | SE | LYCOANN | P | S5 | Aug-20-10 | | NE | ERIGPER | P |
| E3 | July-28-10 | KA, EC, DH | SE | DIPHCOM | P | S5 | Aug-20-10 | | NE | LINNBOR | P |
| E3 | July-28-10 | KA, EC, DH | SE | FESTALT | P | S5 | Aug-20-10 | | NE | ANEMPAR | P |
| E3 | July-28-10 | KA, EC, DH | SE | LEYMINN | 3 | S5 | Aug-20-10 | | NE | ARTENOR | P |
| E3 | July-28-10 | KA, EC, DH | SE | LINNBOR | 1 | S5 | Aug-20-10 | | NE | SALIVES | 10 |
| E3 | July-28-10 | KA, EC, DH | SE | PINUCON | 7 | S5 | Aug-20-10 | | NE | JUNICOM | P |
| E3 | July-28-10 | KA, EC, DH | SE | PICEENG | P | S5 | Aug-20-10 | | NE | ZIGAELE | P |
| E3 | July-28-10 | KA, EC, DH | SE | PEDILAB | P | S5 | Aug-20-10 | | NE | PYROASA | P |
| E3 | July-28-10 | KA, EC, DH | SW | LEDUGRO | 30 | S5 | Aug-20-10 | | NE | BETUGLA | P |
| E3 | July-28-10 | KA, EC, DH | SW | EMPENIG | 2 | S5 | Aug-20-10 | | NE | ARNIMOL | P |
| E3 | July-28-10 | KA, EC, DH | SW | VACCCAE | 20 | S5 | Aug-20-10 | | NE | CASTOCC | P |
| E3 | July-28-10 | KA, EC, DH | SW | VACCVIT | 1 | S5 | Aug-20-10 | | NE | SALIFAR | 1 |
| E3 | July-28-10 | KA, EC, DH | SW | LINNBOR | P | S5 | Aug-20-10 | | NE | POAALPI | P |
| E3 | July-28-10 | KA, EC, DH | SW | LYCOANN | 3 | S5 | Aug-20-10 | | NE | CARENOR | P |
| E3 | July-28-10 | KA, EC, DH | SW | CORNCAN | 7 | | | | | | |
| E3 | July-28-10 | KA, EC, DH | SW | PETAPAL | 1 | | | | | | |
| E3 | July-28-10 | KA, EC, DH | SW | FESTALT | 3 | | | | | | |
| E3 | July-28-10 | KA, EC, DH | SW | LEYMINN | 7 | | | | | | |
| E3 | July-28-10 | KA, EC, DH | SW | EPILANG | P | | | | | | |
| E3 | July-28-10 | KA, EC, DH | SW | PINUCON | 7 | | | | | | |
| E3 | July-28-10 | KA, EC, DH | SW | PICEENG | 1 | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| E3 | July-28-10 | KA, EC, DH | NE | PETAPAL | 1 |
| E3 | July-28-10 | KA, EC, DH | NE | BETUGLA | 10 |
| E3 | July-28-10 | KA, EC, DH | NE | LEDUGRO | 7 |
| E3 | July-28-10 | KA, EC, DH | NE | CORNCAN | 10 |
| E3 | July-28-10 | KA, EC, DH | NE | VACCVIT | 2 |
| E3 | July-28-10 | KA, EC, DH | NE | VACCCAE | 7 |
| E3 | July-28-10 | KA, EC, DH | NE | LINNBOR | P |
| E3 | July-28-10 | KA, EC, DH | NE | FESTALT | P |
| E3 | July-28-10 | KA, EC, DH | NE | LEYMINN | 1 |
| E3 | July-28-10 | KA, EC, DH | NE | LYCOANN | P |
| E3 | July-28-10 | KA, EC, DH | NE | EMPENIG | 2 |
| E3 | July-28-10 | KA, EC, DH | NE | PINUCON | 7 |
| E3 | July-28-10 | KA, EC, DH | NE | PICEENG | 1 |

**2010 (UNB)**

| **Plot** | **Date** | **Surveyor** | **Plot** | **Species Code** | **% Cover** | S5 | July-21-10 | DH | P1 | *Calamagrostis canadesis* | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S16 | Aug-05-09 | DH | P1 | *Abies lasiocarpa* | 30 | S5 | July-21-10 | DH | P1 | *Carex sp.* | 65 |
| S16 | Aug-05-09 | DH | P1 | *Festuca rubra* | 5 | S5 | July-21-10 | DH | P1 | *Dicranum sp.* | 1 |
| S16 | Aug-05-09 | DH | P1 | *Lichen* | 25 | S5 | July-21-10 | DH | P1 | *Rubus pedatus* | 1 |
| S16 | Aug-05-09 | DH | P2 | *Carex sp.* | 60 | S5 | July-21-10 | DH | P1 | *Salix glauca* | 95 |
| S16 | Aug-05-09 | DH | P3 | *Abies lasiocarpa* | 10 | S5 | July-21-10 | DH | P2 | *Artemesia norvegica* | 5 |
| S16 | Aug-05-09 | DH | P3 | *Carex sp.* | 5 | S5 | July-21-10 | DH | P2 | *Calamagrostis canadesis* | 5 |
| S16 | Aug-05-09 | DH | P3 | *Cassiope mertensiana* | 30 | S5 | July-21-10 | DH | P2 | *Carex sp.* | 50 |
| S16 | Aug-05-09 | DH | P3 | *Dryas octopetala* | 20 | S5 | July-21-10 | DH | P2 | *Equiseteum hymale* | 1 |
| S16 | Aug-05-09 | DH | P3 | *Festuca altaica* | 10 | S5 | July-21-10 | DH | P2 | *Polygonum viviparum* | 1 |
| S16 | Aug-05-09 | DH | P3 | *Festuca occidentalis* | 10 | S5 | July-21-10 | DH | P2 | *Rubus arcticus* | 5 |
| S16 | Aug-05-09 | DH | P4 | *Carex sp.* | 10 | S5 | July-21-10 | DH | P2 | *Salix glauca* | 65 |
| S16 | Aug-05-09 | DH | P4 | *Cassiope mertensiana* | 40 | S5 | July-21-10 | DH | P3 | *Aquilegia flavescens* | 1 |
| S16 | Aug-05-09 | DH | P4 | *Dryas octopetala* | 30 | S5 | July-21-10 | DH | P3 | *Artemesia norvegica* | 1 |
| S16 | Aug-05-09 | DH | P4 | *Festuca altaica* | 5 | S5 | July-21-10 | DH | P3 | *Dicranum sp.* | 15 |
| S16 | Aug-05-09 | DH | P4 | *Festuca occidentalis* | 10 | S5 | July-21-10 | DH | P3 | *Dryas octopetala* | 10 |
| S16 | Aug-05-09 | DH | P5 | *Anemone multifida* | 50 | S5 | July-21-10 | DH | P3 | *Lichen* | 50 |
| S16 | Aug-05-09 | DH | P5 | *Cassiope mertensiana* | 20 | S5 | July-21-10 | DH | P3 | *Linnaea borealis* | 5 |
| S16 | Aug-05-09 | DH | P6 | *Antennaria alpina* | 5 | S5 | July-21-10 | DH | P3 | *Picea engelmannii* | 15 |
| S16 | Aug-05-09 | DH | P6 | *Cassiope mertensiana* | 35 | S5 | July-21-10 | DH | P3 | *Sheperdia canadensis* | 5 |
| S16 | Aug-05-09 | DH | P6 | *Festuca altaica* | 20 | S5 | July-21-10 | DH | P3 | *Zigadenus elegans* | 5 |
| S16 | Aug-05-09 | DH | P6 | *Salix vestita* | 30 | S5 | July-21-10 | DH | P4 | *Dryas integrifolia* | 20 |
| S16 | Aug-05-09 | DH | P6 | *Phyllodoce glanduliflora* | 10 | S5 | July-21-10 | DH | P4 | *Salix vestita* | 20 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S16 | Aug-05-09 | DH | P7 | *Abies lasiocarpa* | 80 | S5 | July-21-10 | DH | P5 | *Arctostaphylos rubra* | 30 |
| S16 | Aug-05-09 | DH | P7 | *Dicranum sp.* | 10 | S5 | July-21-10 | DH | P5 | *Betula glandulosa* | 10 |
| S16 | Aug-05-09 | DH | P7 | *Dryas octopetala* | 10 | S5 | July-21-10 | DH | P5 | *Carex sp.* | 1 |
| S16 | Aug-05-09 | DH | P7 | *Epilobium angustifolium* | 10 | S5 | July-21-10 | DH | P5 | *Dasiphora floribunda* | 2 |
| S16 | Aug-05-09 | DH | P7 | *Lycopodium annotinum* | 10 | S5 | July-21-10 | DH | P5 | *Dryas integrifolia* | 1 |
| S16 | Aug-05-09 | DH | P7 | *Rubus pedatus* | 5 | S5 | July-21-10 | DH | P5 | *Dryas octopetala* | 1 |
| S16 | Aug-05-09 | DH | P8 | *Caltha leptosepala* | 5 | S5 | July-21-10 | DH | P5 | *Hedysarum boreale* | 1 |
| S16 | Aug-05-09 | DH | P8 | *Carex sp.* | 1 | S5 | July-21-10 | DH | P5 | *Juniperus communis* | 10 |
| S16 | Aug-05-09 | DH | P8 | *Cassiope mertensiana* | 5 | S5 | July-21-10 | DH | P5 | *Salix vestita* | 30 |
| S16 | Aug-05-09 | DH | P8 | *Poa palustris* | 1 | S5 | July-21-10 | DH | P5 | *Zigadenus elegans* | 5 |
| S16 | Aug-05-09 | DH | P8 | *Potentilla diversifolia* | 5 | S5 | July-21-10 | DH | P6 | *Dryas octopetala* | 10 |
| S16 | Aug-05-09 | DH | P8 | *Salix vestita* | 15 | S5 | July-21-10 | DH | P6 | *Salix vestita* | 30 |
| S16 | Aug-05-09 | DH | P8 | *Castilleja occidentalis* | 1 | S5 | July-21-10 | DH | P7 | *Linnaea borealis* | 1 |
| S16 | Aug-05-09 | DH | P9 | *Delphinium bicolour* | 5 | S5 | July-21-10 | DH | P7 | *Picea engelmannii* | 20 |
| S16 | Aug-05-09 | DH | P9 | *Dicranum sp.* | 5 | S5 | July-21-10 | DH | P7 | *Pleurozium schreberi* | 1 |
| S16 | Aug-05-09 | DH | P9 | *Dryas octopetala* | 20 | S5 | July-21-10 | DH | P7 | *Salix vestita* | 70 |
| S16 | Aug-05-09 | DH | P9 | *Festuca altaica* | 5 | S5 | July-21-10 | DH | P7 | *Vaccinium vitis-idaea* | 1 |
| S16 | Aug-05-09 | DH | P9 | *Moehringia lateriflora* | 10 | S5 | July-21-10 | DH | P8 | *Aquilegia flavescens* | 1 |
| S16 | Aug-05-09 | DH | P9 | *Myostis asiatica* | 5 | S5 | July-21-10 | DH | P8 | *Betula glandulosa* | 30 |
| S16 | Aug-05-09 | DH | P9 | *Petasites palmatus* | 5 | S5 | July-21-10 | DH | P8 | *Carex sp.* | 1 |
| S16 | Aug-05-09 | DH | P9 | *Polygonum viviparum* | 20 | S5 | July-21-10 | DH | P8 | *Dryas octopetala* | 10 |
| S16 | Aug-05-09 | DH | P9 | *Salix glauca* | 20 | S5 | July-21-10 | DH | P8 | *Lichen* | 1 |
| S16 | Aug-05-09 | DH | P9 | *Salix vestita* | 15 | S5 | July-21-10 | DH | P8 | *Picea engelmannii* | 5 |
| S16 | Aug-05-09 | DH | P9 | *Abies lasiocarpa* | 20 | S5 | July-21-10 | DH | P8 | *Rubus arcticus* | 1 |
| S16 | Aug-05-09 | DH | P10 | *Caltha leptosepala* | 20 | S5 | July-21-10 | DH | P8 | *Salix vestita* | 50 |
| S16 | Aug-05-09 | DH | P10 | *Carex sp.* | 10 | S5 | July-21-10 | DH | P8 | *Zigadenus elegans* | 1 |
| S16 | Aug-05-09 | DH | P10 | *Cassiope mertensiana* | 25 | S5 | July-21-10 | DH | P9 | *Antennaria alpina* | 1 |
| S16 | Aug-05-09 | DH | P10 | *Castilleja occidentalis* | 2 | S5 | July-21-10 | DH | P9 | *Artemesia norvegica* | 30 |
| S16 | Aug-05-09 | DH | P10 | *Juncus sp.* | 5 | S5 | July-21-10 | DH | P9 | *Festuca rubra* | 2 |
| S16 | Aug-05-09 | DH | P10 | *Petasites sagittatus* | 5 | S5 | July-21-10 | DH | P9 | *Salix glauca* | 40 |
| S3 | July 28-09 | DH | P1 | *Arctostaphylos rubra* | 15 | S5 | July-21-10 | DH | P9 | *Vaccinium scoparium* | 30 |
| S3 | July 28-09 | DH | P1 | *Betula glandulosa* | 70 | S14 | July-23-10 | DH | P1 | *Abies lasiocarpa* | 5 |
| S3 | July 28-09 | DH | P1 | *Dasiphora floribunda* | 2 | S14 | July-23-10 | DH | P1 | *Carex sp.* | 1 |
| S3 | July 28-09 | DH | P1 | *Festuca rubra* | 10 | S14 | July-23-10 | DH | P1 | *Equiseteum scirpoides* | 5 |
| S3 | July 28-09 | DH | P1 | *Tofieldia glutinosa* | 20 | S14 | July-23-10 | DH | P1 | *Pleurozium schreberi* | 95 |
| S3 | July 28-09 | DH | P2 | *Abies lasiocarpa* | 20 | S14 | July-23-10 | DH | P1 | *Pyrola secunda* | 1 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S3 | July 28-09 | DH | P2 | *Carex sp.* | 3 | S14 | July-23-10 | DH | P2 | *Aquilegia flavescens* | 1 |
| S3 | July 28-09 | DH | P2 | *Cornus canadensis* | 15 | S14 | July-23-10 | DH | P2 | *Arinca cordifolia* | 1 |
| S3 | July 28-09 | DH | P2 | *Pleurozium Schreberi* | 50 | S14 | July-23-10 | DH | P2 | *Artemesia norvegica* | 50 |
| S3 | July 28-09 | DH | P2 | *Ptilium crista-castrensis* | 15 | S14 | July-23-10 | DH | P2 | *Erigeron peregrinus* | 40 |
| S3 | July 28-09 | DH | P2 | *Vaccinium vitis-idaea* | 10 | S14 | July-23-10 | DH | P2 | *Festuca rubra* | 15 |
| S3 | July 28-09 | DH | P3 | *Cornus canadensis* | 10 | S14 | July-23-10 | DH | P2 | *Veronica wormskjoldii* | 1 |
| S3 | July 28-09 | DH | P3 | *Empetrum nigrum* | 40 | S14 | July-23-10 | DH | P3 | *Artemesia norvegica* | 5 |
| S3 | July 28-09 | DH | P3 | *Equiseteum arvense* | 5 | S14 | July-23-10 | DH | P3 | *Carex sp.* | 1 |
| S3 | July 28-09 | DH | P3 | *Pleurozium Schreberi* | 10 | S14 | July-23-10 | DH | P3 | *Dicranum sp.* | 5 |
| S3 | July 28-09 | DH | P3 | *Ptilium crista-castrensis* | 40 | S14 | July-23-10 | DH | P3 | *Equiseteum scirpoides* | 1 |
| S3 | July 28-09 | DH | P3 | *Salix glauca* | 10 | S14 | July-23-10 | DH | P3 | *Festuca altaica* | 10 |
| S3 | July 28-09 | DH | P4 | *No veg - dry sandy talus slope* | | S14 | July-23-10 | DH | P3 | *Salix glauca* | 70 |
| S3 | July 28-09 | DH | P5 | *Arctostaphylos rubra* | 10 | S14 | July-23-10 | DH | P3 | *Veronica wormskjoldii* | 10 |
| S3 | July 28-09 | DH | P5 | *Carex sp.* | 20 | S14 | July-23-10 | DH | P4 | *Abies lasiocarpa* | 5 |
| S3 | July 28-09 | DH | P5 | *Empetrum nigrum* | 25 | S14 | July-23-10 | DH | P4 | *Artemesia norvegica* | 1 |
| S3 | July 28-09 | DH | P5 | *Equiseteum arvense* | 1 | S14 | July-23-10 | DH | P4 | *Cornus canadensis* | 10 |
| S3 | July 28-09 | DH | P5 | *Festuca rubra* | 10 | S14 | July-23-10 | DH | P4 | *Dicranum sp.* | 5 |
| S3 | July 28-09 | DH | P5 | *Juncus sp.* | 25 | S14 | July-23-10 | DH | P4 | *Epilobium angustifolium* | 1 |
| S3 | July 28-09 | DH | P5 | *Ledum groenlandicum* | 10 | S14 | July-23-10 | DH | P4 | *Festuca rubra* | 1 |
| S3 | July 28-09 | DH | P5 | *Platanthera hyperborea* | 1 | S14 | July-23-10 | DH | P4 | *Juniperus communis* | 15 |
| S3 | July 28-09 | DH | P5 | *Vaccinium oxycoccos* | 5 | S14 | July-23-10 | DH | P4 | *Picea engelmannii* | 100 |
| S3 | July 28-09 | DH | P5 | *Vaccinium vitis-idaea* | 5 | S14 | July-23-10 | DH | P4 | *Pleurozium schreberi* | 20 |
| S3 | July 28-09 | DH | P6 | *Betula glandulosa* | 5 | S14 | July-23-10 | DH | P4 | *Vaccinium scoparium* | 5 |
| S3 | July 28-09 | DH | P6 | *Festuca occidentalis* | 20 | S14 | July-23-10 | DH | P4 | *Vaccinium vitis-idaea* | 1 |
| S3 | July 28-09 | DH | P6 | *Hedysarum alpinum* | 20 | S14 | July-23-10 | DH | P5 | *Achillea millefolium* | 10 |
| S3 | July 28-09 | DH | P6 | *Juniperus communis* | 1 | S14 | July-23-10 | DH | P5 | *Arctostaphylos uvi-ursi* | 10 |
| S3 | July 28-09 | DH | P6 | *Picea engelmanii* | 2 | S14 | July-23-10 | DH | P5 | *Artemesia norvegica* | 30 |
| S3 | July 28-09 | DH | P6 | *Pyrola asarifolia* | 1 | S14 | July-23-10 | DH | P5 | *Dicranum sp.* | 1 |
| S3 | July 28-09 | DH | P6 | *Salix glauca* | 10 | S14 | July-23-10 | DH | P5 | *Epilobium angustifolium* | 5 |
| S3 | July 28-09 | DH | P6 | *Sheperdia canadensis* | 10 | S14 | July-23-10 | DH | P5 | *Festuca rubra* | 1 |
| S3 | July 28-09 | DH | P6 | *Vaccinium vitis-idaea* | 10 | S14 | July-23-10 | DH | P5 | *Fragaria vesca* | 10 |
| S3 | July 28-09 | DH | P6 | *Zigadenus elegans* | 1 | S14 | July-23-10 | DH | P5 | *Poa palustris* | 1 |
| S3 | July 28-09 | DH | P7 | *Empetrum nigrum* | 30 | S14 | July-23-10 | DH | P5 | *Vaccinium scoparium* | 40 |
| S3 | July 28-09 | DH | P7 | *Epilobium angustifolium* | 1 | S14 | July-23-10 | DH | P6 | *Arinca cordifolia* | 2 |
| S3 | July 28-09 | DH | P7 | *Ledum groenlandicum* | 3 | S14 | July-23-10 | DH | P6 | *Cornus canadensis* | 1 |
| S3 | July | DH | P7 | *Menziesia* | 5 | S14 | July-23- | DH | P6 | *Dicranum sp.* | 50 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28-09 | | | *ferruginea* | | | 10 | | | | |
| S3 | July 28-09 | DH | P7 | *Pleurozium schreberi* | 20 | S14 | July-23-10 | DH | P6 | *Epilobium angustifolium* | 1 |
| S3 | July 28-09 | DH | P7 | *Vaccinium vitis-idaea* | 10 | S14 | July-23-10 | DH | P6 | *Festuca rubra* | 5 |
| S3 | July 28-09 | DH | P8 | *Festuca occidentalis* | 20 | S14 | July-23-10 | DH | P6 | *Fragaria vesca* | 1 |
| S3 | July 28-09 | DH | P8 | *Juniperus communis* | 50 | S14 | July-23-10 | DH | P6 | *Hedysarum alpinum* | 3 |
| S3 | July 28-09 | DH | P8 | *Pleurozium schreberi* | 10 | S14 | July-23-10 | DH | P6 | *Vaccinium scoparium* | 5 |
| S3 | July 28-09 | DH | P8 | *Rosa acicularis* | 5 | S14 | July-23-10 | DH | P7 | *Achillea millefolium* | 1 |
| S3 | July 28-09 | DH | P8 | *Vaccinium vitis-idaea* | 15 | S14 | July-23-10 | DH | P7 | *Arctostaphylos uvi-ursi* | 5 |
| S3 | July 28-09 | DH | P9 | *Calamagrostis canadesis* | 1 | S14 | July-23-10 | DH | P7 | *Festuca rubra* | 20 |
| S3 | July 28-09 | DH | P9 | *Carex sp.* | 15 | S14 | July-23-10 | DH | P7 | *Hedysarum alpinum* | 1 |
| S3 | July 28-09 | DH | P9 | *Castilleja occidentalis* | 1 | S14 | July-23-10 | DH | P7 | *Picea engelmannii* | 20 |
| S3 | July 28-09 | DH | P9 | *Hedysarum alpinum* | 30 | S14 | July-23-10 | DH | P7 | *Rosa acicularis* | 5 |
| S3 | July 28-09 | DH | P9 | *Juniperus communis* | 1 | S14 | July-23-10 | DH | P7 | *Sheperdia canadensis* | 35 |
| S3 | July 28-09 | DH | P9 | *Ledum groenlandicum* | 5 | S14 | July-23-10 | DH | P8 | *Abies lasiocarpa* | 1 |
| S3 | July 28-09 | DH | P9 | *Salix glauca* | 5 | S14 | July-23-10 | DH | P8 | *Artemesia norvegica* | 1 |
| S3 | July 28-09 | DH | P9 | *Sheperdia canadensis* | 20 | S14 | July-23-10 | DH | P8 | *Betula glandulosa* | 10 |
| S3 | July 28-09 | DH | P9 | *Zigadenus elegans* | 2 | S14 | July-23-10 | DH | P8 | *Cladina sp.* | 5 |
| S3 | July 28-09 | DH | P10 | *Arctostaphylos rubra* | 5 | S14 | July-23-10 | DH | P8 | *Cornus canadensis* | 1 |
| S3 | July 28-09 | DH | P10 | *Betula glandulosa* | 25 | S14 | July-23-10 | DH | P8 | *Dicranum sp.* | 10 |
| S3 | July 28-09 | DH | P10 | *Empetrum nigrum* | 1 | S14 | July-23-10 | DH | P8 | *Epilobium angustifolium* | 1 |
| S3 | July 28-09 | DH | P10 | *Equiseteum arvense* | 1 | S14 | July-23-10 | DH | P8 | *Festuca altaica* | 1 |
| S3 | July 28-09 | DH | P10 | *Festuca occidentalis* | 50 | S14 | July-23-10 | DH | P8 | *Linnaea borealis* | 1 |
| S3 | July 28-09 | DH | P10 | *Ledum groenlandicum* | 20 | S14 | July-23-10 | DH | P8 | *Pleurozium schreberi* | 60 |
| S3 | July 28-09 | DH | P10 | *Petasites palmatus* | 5 | S14 | July-23-10 | DH | P8 | *Vaccinium scoparium* | 20 |
| S3 | July 28-09 | DH | P10 | *Sphagnum sp.* | 15 | S14 | July-23-10 | DH | P8 | *Vaccinium vitis-idaea* | 1 |
| S3 | July 28-09 | DH | P10 | *Vaccinium oxycoccos* | 5 | S14 | July-23-10 | DH | P9 | *Arinca cordifolia* | 5 |
| S3 | July 28-09 | DH | P10 | *Zigadenus elegans* | 1 | S14 | July-23-10 | DH | P9 | *Festuca altaica* | 70 |
| H10 | July-12-10 | DH | P1 | *Canpanula uniflora* | 5 | S14 | July-23-10 | DH | P9 | *Hedysarum boreale* | 1 |
| H10 | July-12-10 | DH | P1 | *Carex scirpoidea* | 5 | S14 | July-23-10 | DH | P9 | *Hierochloe odorata* | 5 |
| H10 | July-12-10 | DH | P1 | *Dryas integrifolia* | 50 | S14 | July-23-10 | DH | P9 | *Petasites palmatus* | 20 |
| H10 | July-12-10 | DH | P1 | *Pedicularis lanata* | 2 | S7 | July-26-10 | DH | P1 | *Cladina sp.* | 10 |
| H10 | July-12-10 | DH | P1 | *Polygonum viviparum* | 5 | S7 | July-26-10 | DH | P1 | *Cornus canadensis* | 5 |
| H10 | July-12-10 | DH | P1 | *Potentilla nivea* | 1 | S7 | July-26-10 | DH | P1 | *Dicranum sp.* | 15 |
| H10 | July-12-10 | DH | P1 | *Salix nivalis* | 5 | S7 | July-26-10 | DH | P1 | *Festuca altaica* | 1 |
| H10 | July-12-10 | DH | P1 | *Salix vestita* | 2 | S7 | July-26-10 | DH | P1 | *Linnaea borealis* | 2 |
| H10 | July-12-10 | DH | P1 | *Silene acaulis* | 1 | S7 | July-26-10 | DH | P1 | *Pleurozium schreberi* | 50 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H10 | July-12-10 | DH | P2 | *Canpanula uniflora* | 1 | S7 | July-26-10 | DH | P1 | *Vaccinium vitis-idaea* | 15 |
| H10 | July-12-10 | DH | P2 | *Carex scirpoidea* | 5 | S7 | July-26-10 | DH | P2 | *Abies lasiocarpa* | 1 |
| H10 | July-12-10 | DH | P2 | *Cassiope tetragona* | 10 | S7 | July-26-10 | DH | P2 | *Dicranum sp.* | 45 |
| H10 | July-12-10 | DH | P2 | *Dryas integrifolia* | 60 | S7 | July-26-10 | DH | P2 | *Picea engelmannii* | 90 |
| H10 | July-12-10 | DH | P2 | *Hedysarum alpinum* | 5 | S7 | July-26-10 | DH | P2 | *Pleurozium schreberi* | 5 |
| H10 | July-12-10 | DH | P2 | *Hedysarum boreale* | 5 | S7 | July-26-10 | DH | P3 | *Aconitum delphinifolium* | 1 |
| H10 | July-12-10 | DH | P2 | *Pedicularis lanata* | 1 | S7 | July-26-10 | DH | P3 | *Aquilegia flavescens* | 1 |
| H10 | July-12-10 | DH | P2 | *Polygonum viviparum* | 3 | S7 | July-26-10 | DH | P3 | *Delphinium bicolour* | 10 |
| H10 | July-12-10 | DH | P2 | *Salix vestita* | 2 | S7 | July-26-10 | DH | P3 | *Festuca altaica* | 50 |
| H10 | July-12-10 | DH | P2 | *Silene acaulis* | 1 | S7 | July-26-10 | DH | P3 | *Hedysarum alpinum* | 1 |
| H10 | July-12-10 | DH | P3 | *Astragalus vexilliflexus* | 5 | S7 | July-26-10 | DH | P3 | *Vaccinium cespitosum* | 1 |
| H10 | July-12-10 | DH | P3 | *Canpanula uniflora* | 1 | S7 | July-26-10 | DH | P4 | *Dicranum sp.* | 40 |
| H10 | July-12-10 | DH | P3 | *Carex scirpoidea* | 3 | S7 | July-26-10 | DH | P4 | *Hylocomium splendens* | 30 |
| H10 | July-12-10 | DH | P3 | *Dryas integrifolia* | 40 | S7 | July-26-10 | DH | P4 | *Moneses uniflora* | 2 |
| H10 | July-12-10 | DH | P3 | *Hedysarum boreale* | 10 | S7 | July-26-10 | DH | P4 | *Pleurozium schreberi* | 30 |
| H10 | July-12-10 | DH | P3 | *Oxytropis podocarpa* | 1 | S7 | July-26-10 | DH | P4 | *Polytrichum sp.* | 1 |
| H10 | July-12-10 | DH | P3 | *Pedicularis arctica* | 1 | S7 | July-26-10 | DH | P5 | *Dicranum sp.* | 10 |
| H10 | July-12-10 | DH | P3 | *Pedicularis capitata* | 1 | S7 | July-26-10 | DH | P5 | *Festuca altaica** | 1 |
| H10 | July-12-10 | DH | P3 | *Pedicularis lanata* | 1 | S7 | July-26-10 | DH | P5 | *Juniperus communis* | 10 |
| H10 | July-12-10 | DH | P3 | *Polygonum viviparum* | 3 | S7 | July-26-10 | DH | P5 | *Linnaea borealis* | 1 |
| H10 | July-12-10 | DH | P3 | *Pyrola grandiflora* | 1 | S7 | July-26-10 | DH | P5 | *Picea engelmannii* | 100 |
| H10 | July-12-10 | DH | P3 | *Salix nivalis* | 5 | S7 | July-26-10 | DH | P5 | *Rosa acicularis* | 1 |
| H10 | July-12-10 | DH | P3 | *Saxifraga oppositifolia* | 1 | S7 | July-26-10 | DH | P5 | *Vaccinium vitis-idaea* | 1 |
| H10 | July-12-10 | DH | P3 | *Silene acaulis* | 2 | S7 | July-26-10 | DH | P6 | *Abies lasiocarpa* | 30 |
| H10 | July-12-10 | DH | P4 | *Carex scirpoidea* | 5 | S7 | July-26-10 | DH | P6 | *Hylocomium splendens* | 30 |
| H10 | July-12-10 | DH | P4 | *Dryas integrifolia* | 30 | S7 | July-26-10 | DH | P6 | *Linnaea borealis* | 2 |
| H10 | July-12-10 | DH | P4 | *Hedysarum boreale* | 10 | S7 | July-26-10 | DH | P6 | *Pleurozium schreberi* | 20 |
| H10 | July-12-10 | DH | P4 | *Lichen* | 10 | S7 | July-26-10 | DH | P6 | *Vaccinium vitis-idaea* | 3 |
| H10 | July-12-10 | DH | P4 | *Pedicularis lanata* | 1 | E3 | July-28-10 | DH | P1 | *Cornus canadensis* | 10 |
| H10 | July-12-10 | DH | P4 | *Polygonum viviparum* | 5 | E3 | July-28-10 | DH | P1 | *Elymuscanadensis* | 1 |
| H10 | July-12-10 | DH | P4 | *Salix nivalis* | 10 | E3 | July-28-10 | DH | P1 | *Empetrum nigrum* | 20 |
| H10 | July-12-10 | DH | P4 | *Saxifraga oppositifolia* | 5 | E3 | July-28-10 | DH | P1 | *Ledum groenlandicum* | 45 |
| H10 | July-12-10 | DH | P4 | *Silene acaulis* | 1 | E3 | July-28-10 | DH | P1 | *Pleurozium schreberi* | 80 |
| H4 | July-14-10 | DH | P1 | *Aconitum delphinifolium* | 1 | E3 | July-28-10 | DH | P1 | *Vaccinium cespitosum* | 1 |
| H4 | July-14-10 | DH | P1 | *Artemesia norvegica* | 5 | E3 | July-28-10 | DH | P1 | *Vaccinium vitis-idaea* | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H4 | July-14-10 | DH | P1 | *Betula glandulosa* | 3 | E3 | July-28-10 | DH | P2 | *Cornus canadensis* | 1 |
| H4 | July-14-10 | DH | P1 | *Carex sp.* | 50 | E3 | July-28-10 | DH | P2 | *Empetrum nigrum* | 30 |
| H4 | July-14-10 | DH | P1 | *Hedysarum alpinum* | 2 | E3 | July-28-10 | DH | P2 | *Festuca occidentalis* | 1 |
| H4 | July-14-10 | DH | P1 | *Polygonum viviparum* | 5 | E3 | July-28-10 | DH | P2 | *Ledum groenlandicum* | 60 |
| H4 | July-14-10 | DH | P1 | *Potentilla diversifolia* | 3 | E3 | July-28-10 | DH | P2 | *Linnaea borealis* | 10 |
| H4 | July-14-10 | DH | P1 | *Stellaria longifolia* | 1 | E3 | July-28-10 | DH | P2 | *Lycopodium annotinum* | 1 |
| H4 | July-14-10 | DH | P1 | *Vaccinium cespitosum* | 2 | E3 | July-28-10 | DH | P2 | *Petasites palmatus* | 1 |
| H4 | July-14-10 | DH | P2 | *Antennaria umbrinella* | 1 | E3 | July-28-10 | DH | P2 | *Pleurozium schreberi* | 60 |
| H4 | July-14-10 | DH | P2 | *Betula glandulosa* | 20 | E3 | July-28-10 | DH | P2 | *Vaccinium cespitosum* | 2 |
| H4 | July-14-10 | DH | P2 | *Epilobium angustifolium* | 5 | E3 | July-28-10 | DH | P2 | *Vaccinium vitis-idaea* | 5 |
| H4 | July-14-10 | DH | P2 | *Hedysarum alpinum* | 10 | E3 | July-28-10 | DH | P3 | *Abies lasiocarpa* | 5 |
| H4 | July-14-10 | DH | P2 | *Pleurozium Schreberi* | 40 | E3 | July-28-10 | DH | P3 | *Cornus canadensis* | 10 |
| H4 | July-14-10 | DH | P2 | *Polygonum viviparum* | 10 | E3 | July-28-10 | DH | P3 | *Empetrum nigrum* | 20 |
| H4 | July-14-10 | DH | P3 | *Arinca cordifolia* | 1 | E3 | July-28-10 | DH | P3 | *Festuca occidentalis* | 2 |
| H4 | July-14-10 | DH | P3 | *Artemesia norvegica* | 3 | E3 | July-28-10 | DH | P3 | *Pinus contorta* | 100 |
| H4 | July-14-10 | DH | P3 | *Betula glandulosa* | 40 | E3 | July-28-10 | DH | P3 | *Pleurozium schreberi* | 35 |
| H4 | July-14-10 | DH | P3 | *Delphinium bicolour* | 5 | E3 | July-28-10 | DH | P3 | *Vaccinium cespitosum* | 1 |
| H4 | July-14-10 | DH | P3 | *Erigeron peregrinus* | 2 | E3 | July-28-10 | DH | P3 | *Vaccinium vitis-idaea* | 5 |
| H4 | July-14-10 | DH | P3 | *Festuca altaica* | 20 | E3 | July-28-10 | DH | P4 | *Betula glandulosa* | 10 |
| H4 | July-14-10 | DH | P3 | *Salix arctica* | 5 | E3 | July-28-10 | DH | P4 | *Ledum groenlandicum* | 30 |
| H4 | July-14-10 | DH | P3 | *Salix barrattiana* | 25 | E3 | July-28-10 | DH | P4 | *Petasites palmatus* | 1 |
| H4 | July-14-10 | DH | P4 | *Abies lasiocarpa* | 10 | E3 | July-28-10 | DH | P4 | *Pinus contorta* | 50 |
| H4 | July-14-10 | DH | P4 | *Dryas integrifolia* | 50 | E3 | July-28-10 | DH | P4 | *Pleurozium schreberi* | 30 |
| H4 | July-14-10 | DH | P4 | *Festuca altaica* | 1 | E3 | July-28-10 | DH | P4 | *Polytrichum sp.* | 1 |
| H4 | July-14-10 | DH | P4 | *Lichen* | 20 | E3 | July-28-10 | DH | P4 | *Vaccinium cespitosum* | 10 |
| H4 | July-14-10 | DH | P4 | *Pleurozium schreberi* | 1 | E3 | July-28-10 | DH | P4 | *Vaccinium vitis-idaea* | 1 |
| S30 | July-15-10 | DH | P1 | *Arinca cordifolia* | 3 | E3 | July-28-10 | DH | P5 | *Achillea millefolium* | 1 |
| S30 | July-15-10 | DH | P1 | *Betula glandulosa* | 1 | E3 | July-28-10 | DH | P5 | *Aconitum delphinifolium* | 10 |
| S30 | July-15-10 | DH | P1 | *Cornus canadensis* | 20 | E3 | July-28-10 | DH | P5 | *Aquilegia flavescens* | 1 |
| S30 | July-15-10 | DH | P1 | *Epilobium angustifolium* | 1 | E3 | July-28-10 | DH | P5 | *Carex sp.* | 1 |
| S30 | July-15-10 | DH | P1 | *Lycopodium annotinum* | 1 | E3 | July-28-10 | DH | P5 | *Festuca occidentalis* | 90 |
| S30 | July-15-10 | DH | P1 | *Pinus contorta* | 1 | E3 | July-28-10 | DH | P5 | *Hedysarum alpinum* | 1 |
| S30 | July-15-10 | DH | P1 | *Pleurozium Schreberi* | 80 | E2 | July-29-10 | DH | P1 | *Cornus canadensis* | 5 |
| S30 | July-15-10 | DH | P1 | *Rubus arcticus* | 1 | E2 | July-29-10 | DH | P1 | *Picea mariana* | 30 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S30 | July-15-10 | DH | P2 | *Arinca cordifolia* | 1 | E2 | July-29-10 | DH | P1 | *Pinus contorta* | 20 |
| S30 | July-15-10 | DH | P2 | *Betula glandulosa* | 3 | E2 | July-29-10 | DH | P1 | *Pleurozium schreberi* | 90 |
| S30 | July-15-10 | DH | P2 | *Cornus canadensis* | 5 | E2 | July-29-10 | DH | P1 | *Rosa acicularis* | 1 |
| S30 | July-15-10 | DH | P2 | *Epilobium angustifolium* | 1 | E2 | July-29-10 | DH | P1 | *Vaccinium vitis-idaea* | 10 |
| S30 | July-15-10 | DH | P2 | *Ledum groenlandicum* | 25 | E2 | July-29-10 | DH | P2 | *Ledum groenlandicum* | 20 |
| S30 | July-15-10 | DH | P2 | *Linnaea borealis* | 5 | E2 | July-29-10 | DH | P2 | *Lycopodium annotinum* | 5 |
| S30 | July-15-10 | DH | P2 | *Lycopodium annotinum* | 10 | E2 | July-29-10 | DH | P2 | *Pleurozium schreberi* | 10 |
| S30 | July-15-10 | DH | P2 | *Pleurozium Schreberi* | 70 | E2 | July-29-10 | DH | P2 | *Rosa acicularis* | 3 |
| S30 | July-15-10 | DH | P2 | *Salix glauca* | 5 | E2 | July-29-10 | DH | P2 | *Vaccinium vitis-idaea* | 2 |
| S30 | July-15-10 | DH | P2 | *Vaccinium myrtilloides* | 2 | E2 | July-29-10 | DH | P3 | *Arctostaphylos rubra* | 5 |
| S30 | July-15-10 | DH | P3 | *Arinca cordifolia* | 3 | E2 | July-29-10 | DH | P3 | *Betula glandulosa* | 5 |
| S30 | July-15-10 | DH | P3 | *Carex sp.* | 15 | E2 | July-29-10 | DH | P3 | *Carex aquatilus* | 30 |
| S30 | July-15-10 | DH | P3 | *Cornus canadensis* | 5 | E2 | July-29-10 | DH | P3 | *Dasiphora floribunda* | 1 |
| S30 | July-15-10 | DH | P3 | *Dicranum sp.* | 5 | E2 | July-29-10 | DH | P3 | *Dicranum sp.* | 1 |
| S30 | July-15-10 | DH | P3 | *Epilobium angustifolium* | 5 | E2 | July-29-10 | DH | P3 | *Empetrum nigrum* | 10 |
| S30 | July-15-10 | DH | P3 | *Juncus sp.* | 1 | E2 | July-29-10 | DH | P3 | *Ledum groenlandicum* | 1 |
| S30 | July-15-10 | DH | P3 | *Ledum groenlandicum* | 5 | E2 | July-29-10 | DH | P3 | *Pleurozium schreberi* | 60 |
| S30 | July-15-10 | DH | P3 | *Lycopodium annotinum* | 10 | E2 | July-29-10 | DH | P3 | *Salix sp.* | 10 |
| S30 | July-15-10 | DH | P3 | *Moneses uniflora* | 1 | E2 | July-29-10 | DH | P4 | *Betula glandulosa* | 10 |
| S30 | July-15-10 | DH | P3 | *Pleurozium Schreberi* | 70 | E2 | July-29-10 | DH | P4 | *Carex aquatilus* | 50 |
| S30 | July-15-10 | DH | P4 | *Arinca cordifolia* | 5 | E2 | July-29-10 | DH | P4 | *Dasiphora floribunda* | 1 |
| S30 | July-15-10 | DH | P4 | *Betula glandulosa* | 15 | E2 | July-29-10 | DH | P4 | *Equiseteum sylvaticum* | 1 |
| S30 | July-15-10 | DH | P4 | *Cornus canadensis* | 3 | E2 | July-29-10 | DH | P4 | *Ledum groenlandicum* | 30 |
| S30 | July-15-10 | DH | P4 | *Carex sp.* | 20 | E2 | July-29-10 | DH | P4 | *Picea mariana* | 50 |
| S30 | July-15-10 | DH | P4 | *Dicranum sp.* | 10 | E2 | July-29-10 | DH | P4 | *Rosa acicularis* | 3 |
| S30 | July-15-10 | DH | P4 | *Ledum groenlandicum* | 1 | E2 | July-29-10 | DH | P4 | *Salix glauca* | 1 |
| S30 | July-15-10 | DH | P4 | *Lycopodium annotinum* | 1 | E2 | July-29-10 | DH | P4 | *Salix sp.* | 2 |
| S30 | July-15-10 | DH | P4 | *Pleurozium Schreberi* | 50 | E2 | July-29-10 | DH | P4 | *Vaccinium vitis-idaea* | 15 |
| S30 | July-15-10 | DH | P4 | *Polytrichum sp.* | 5 | E2 | July-29-10 | DH | P5 | *Carex aquatilus* | 60 |
| S30 | July-15-10 | DH | P4 | *Ptilium crista-castrensis* | 5 | E2 | July-29-10 | DH | P5 | *Dasiphora floribunda* | 40 |
| S30 | July-15-10 | DH | P4 | *Vaccinium cespitosum* | 2 | E2 | July-29-10 | DH | P5 | *Pyrola asarifolia* | 5 |
| S30 | July-15-10 | DH | P4 | *Vaccinium vitis-idaea* | 2 | E2 | July-29-10 | DH | P5 | *Salix glauca* | 1 |
| S9 | July-17-10 | DH | P1 | *Cassiope tetragona* | 10 | W4 | July-30-10 | DH | P1 | *Epilobium angustifolium* | 3 |
| S9 | July-17-10 | DH | P1 | *Dicranum sp.* | 2 | W4 | July-30-10 | DH | P1 | *Pinus contorta* | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S9 | July-17-10 | DH | P1 | *Dryas octopetala* | 10 | W4 | July-30-10 | DH | P2 | *Epilobium angustifolium* | 15 |
| S9 | July-17-10 | DH | P1 | *Empetrum nigrum* | 1 | W4 | July-30-10 | DH | P2 | *Polytrichum sp.* | 10 |
| S9 | July-17-10 | DH | P1 | *Rubus arcticus* | 1 | W4 | July-30-10 | DH | P3 | *Epilobium angustifolium* | 10 |
| S9 | July-17-10 | DH | P1 | *Salix nivalis* | 10 | W4 | July-30-10 | DH | P3 | *Pinus contorta* | 2 |
| S9 | July-17-10 | DH | P1 | *Saxifraga bronchialis* | 5 | W4 | July-30-10 | DH | P3 | *Polytrichum sp.* | 15 |
| S9 | July-17-10 | DH | P2 | *Cassiope tetragona* | 15 | W4 | July-30-10 | DH | P3 | *Ribes glandulosum* | 5 |
| S9 | July-17-10 | DH | P2 | *Dryas octopetala* | 20 | W4 | July-30-10 | DH | P4 | *Epilobium angustifolium* | 10 |
| S9 | July-17-10 | DH | P2 | *Rubus arcticus* | 2 | W4 | July-30-10 | DH | P4 | *Pinus contorta* | 2 |
| S9 | July-17-10 | DH | P2 | *Salix nivalis* | 5 | W4 | July-30-10 | DH | P4 | *Polytrichum sp.* | 15 |
| S9 | July-17-10 | DH | P2 | *Vaccinium vitis-idaea* | 3 | W4 | July-30-10 | DH | P4 | *Ribes glandulosum* | 5 |
| S9 | July-17-10 | DH | P3 | *Dryas octopetala* | 1 | | | | | | |
| S9 | July-17-10 | DH | P3 | *Festuca brachyphylla* | 1 | | | | | | |
| S9 | July-17-10 | DH | P4 | *Abies lasiocarpa* | 60 | | | | | | |
| S9 | July-17-10 | DH | P4 | *Artemesia norvegica* | 10 | | | | | | |
| S9 | July-17-10 | DH | P4 | *Dryas octopetala* | 10 | | | | | | |
| S9 | July-17-10 | DH | P4 | *Empetrum nigrum* | 10 | | | | | | |
| S9 | July-17-10 | DH | P4 | *Vaccinium vitis-idaea* | 1 | | | | | | |
| S10 | July-20-10 | DH | P1 | *Cornus canadensis* | 1 | | | | | | |
| S10 | July-20-10 | DH | P1 | *Pleurozium schreberi* | 80 | | | | | | |
| S10 | July-20-10 | DH | P1 | *Ptilium crista-castrensis* | 10 | | | | | | |
| S10 | July-20-10 | DH | P1 | *Polytrichum commune* | 15 | | | | | | |
| S10 | July-20-10 | DH | P2 | *Abies lasiocarpa* | 1 | | | | | | |
| S10 | July-20-10 | DH | P2 | *Cornus canadensis* | 1 | | | | | | |
| S10 | July-20-10 | DH | P2 | *Linnaea borealis* | 5 | | | | | | |
| S10 | July-20-10 | DH | P2 | *Lycopodium annotinum* | 15 | | | | | | |
| S10 | July-20-10 | DH | P2 | *Pleurozium schreberi* | 70 | | | | | | |
| S10 | July-20-10 | DH | P2 | *Rubus pedatus* | 15 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Abies lasiocarpa* | 3 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Cornus canadensis* | 1 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Dicranum sp.* | 5 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Cassiope tetragona* | 5 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Equiseteum arvense* | 2 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Linnaea borealis* | 15 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Pleurozium schreberi* | 50 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Salix glauca* | 10 | | | | | | |
| S10 | July-20-10 | DH | P3 | *Sphagnum sp.* | 10 | | | | | | |
| S10 | July-20-10 | DH | P4 | *Carex sp.* | 60 | | | | | | |
| S10 | July- | DH | P4 | *Equiseteum* | 1 | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | 20-10 | | | *arvense* | |
| S10 | July-20-10 | DH | P4 | *Petasites palmatus* | 1 |
| S10 | July-20-10 | DH | P4 | *Picea engelmannii* | 2 |
| S10 | July-20-10 | DH | P4 | *Pleurozium schreberi* | 10 |
| S10 | July-20-10 | DH | P4 | *Salix glauca* | 30 |
| S10 | July-20-10 | DH | P4 | *Sphagnum sp.* | 70 |
| S10 | July-20-10 | DH | P4 | *Vaccinium vitis-idaea* | 1 |
| S10 | July-20-10 | DH | P5 | *Abies lasiocarpa* | 2 |
| S10 | July-20-10 | DH | P5 | *Carex sp.* | 1 |
| S10 | July-20-10 | DH | P5 | *Dicranum sp.* | 10 |
| S10 | July-20-10 | DH | P5 | *Equiseteum sylvaticum* | 20 |
| S10 | July-20-10 | DH | P5 | *Kalmia polifolia* | 1 |
| S10 | July-20-10 | DH | P5 | *Ledum groenlandicum* | 5 |
| S10 | July-20-10 | DH | P5 | *Picea engelmannii* | 1 |
| S10 | July-20-10 | DH | P5 | *Pleurozium schreberi* | 20 |
| S10 | July-20-10 | DH | P5 | *Salix glauca* | 10 |
| S10 | July-20-10 | DH | P5 | *Sphagnum sp.* | 60 |
| S10 | July-20-10 | DH | P5 | *Vaccinium vitis-idaea* | 10 |
| S10 | July-20-10 | DH | P6 | *Dicranum sp.* | 10 |
| S10 | July-20-10 | DH | P6 | *Equiseteum arvense* | 20 |
| S10 | July-20-10 | DH | P6 | *Ledum groenlandicum* | 1 |
| S10 | July-20-10 | DH | P6 | *Petasites palmatus* | 5 |
| S10 | July-20-10 | DH | P6 | *Pleurozium schreberi* | 30 |
| S10 | July-20-10 | DH | P6 | *Rubus pedatus* | 2 |
| S10 | July-20-10 | DH | P6 | *Salix glauca* | 1 |
| S10 | July-20-10 | DH | P6 | *Sphagnum sp.* | 40 |
| S10 | July-20-10 | DH | P6 | *Vaccinium vitis-idaea* | 15 |
| S10 | July-20-10 | DH | P6 | *Veronica wormskjoldii* | 5 |
| S10 | July-20-10 | DH | P6 | *Empetrum nigrum* | 1 |

# APPENDIX C - VEGETATION INVENTORY FIELD DATA THE FROM THE EMEND RESEARCH SITE STUDY AREA SPANNING 2008-2012 FIELD SEASONS

| EMEND area | | | | | | |
|---|---|---|---|---|---|---|
| 2008 | | | 2012 | | | |
| **Plot** | **Species Common Name** | **Species Scientific Name** | **Plot** | **Species Common Name** | **Species Scientific Name** | **%** |
| **OT1P1** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T10P10** | tree moss | *Climacium dendroides* | 5 |
| **OT1P1** | Low bush-cranberry | *Viburnum edule* | **T10P10** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P1** | Twinflower | *Linnaea borealis* | **T10P10** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT1P1** | One-sided wintergreen | *Pyrola secunda* | **T10P10** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT1P1** | Prickly Rose | *Rosa acicularis* | **T10P10** | currants | *Ribes sp* | 5 |
| **OT1P1** | Dewberry | *Rubus pubescens* | **T10P10** | prickly rose | *Rosa acicularis* | 30 |
| **OT1P1** | Woodland horsetail | *Equisetum sylvaticum* | **T10P10** | dewberry | *Rubus pubescens* | 10 |
| **OT1P1** | Rattlesnake plantain | *Goodyera repens* | **T10P10** | low-bush cranberry | *Viburnum edule* | 10 |
| **OT1P1** | Wild vetch | *Vicia americana* | **T10P11** | tree moss | *Climacium dendroides* | 5 |
| **OT1P1** | Green alder | *Alnus crispa* | **T10P11** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P1** | Sarsaparilla | *Aralis nudicaulis* | **T10P11** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P1** | Spreading dogbane | *Apocynum androsaemifolium* | **T10P11** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT1P1** | Sweet-scented bedstraw | *Galium boreale* | **T10P11** | common horsetail | *Equisetum arvense* | 1 |
| **OT1P1** | bunchberry | *Cornus canadensis* | **T10P11** | common horsetail | *Equisetum arvense* | 25 |
| **OT1P1** | Tree moss | *Climacium dendroides* | **T10P11** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT1P1** | Step moss | *Hylocomium splendens* | **T10P11** | step moss | *Hylocomium splendens* | 1 |
| **OT1P2** | bunchberry | *Cornus canadensis* | **T10P11** | step moss | *Hylocomium splendens* | 15 |
| **OT1P2** | Green alder | *Alnus crispa* | **T10P11** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT1P2** | Prickly Rose | *Rosa acicularis* | **T10P11** | twinflower | *Linnaea borealis* | 1 |
| **OT1P2** | Low bush-cranberry | *Viburnum edule* | **T10P11** | tall lungwort | *Mertensia paniculata* | 20 |
| **OT1P2** | Sarsaparilla | *Aralis nudicaulis* | **T10P11** | tall lungwort | *Mertensia paniculata* | 1 |
| **OT1P2** | Twinflower | *Linnaea borealis* | **T10P11** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT1P2** | Balsam poplar | *Populus balsamea* | **T10P11** | Schreber's moss | *Pleurozium schreberi* | 1 |
| **OT1P2** | White baneberry | *Actaea rubra* | **T10P11** | currants | *Ribes sp* | 10 |
| **OT1P2** | Red-osier dogwood | *Cornus stolinifera* | **T10P11** | prickly rose | *Rosa acicularis* | 5 |
| **OT1P2** | Kidney-leaved violet | *Viola renifolia* | **T10P13** | Reindeer Lichen | *Cladina rangifera* | 1 |
| **OT1P2** | Raspberry | *Rubus ideaus* | **T10P13** | step moss | *Hylocomium splendens* | 10 |
| **OT1P2** | Woodland horsetail | *Equisetum sylvaticum* | **T10P13** | common Labrador tea | *Ledum groenlandicum* | 50 |
| **OT1P2** | Common mitrewort | *Mitella nuda* | **T10P13** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT1P2** | Tall larkspur | *Delphinium glaucum* | **T10P13** | sphagnum | *Sphagnum fuscum* | 30 |
| **OT1P2** | Tall lungwort | *Mertensia paniculata* | **T10P13** | bog cranberry | *Vaccinium vitis-idaea* | 60 |
| **OT1P2** | Showy aster | *Aster conspicuus* | **T10P14** | Reindeer Lichen | *Cladina rangifera* | 10 |
| **OT1P2** | Northern gooseberry | *Ribes oxyacanthiodes* | **T10P14** | step moss | *Hylocomium splendens* | 30 |
| **OT1P2** | Cow parsnip | *Heracleum lanatum* | **T10P14** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT1P2** | Dicranum | *Dicranum sp.* | **T10P14** | Schreber's moss | *Pleurozium schreberi* | 30 |
| **OT1P3** | Showy aster | *Aster conspicuus* | **T10P14** | sphagnum | *Sphagnum fuscum* | 10 |
| **OT1P3** | Bluejoint | *Calamagrostis candensis* | **T10P14** | bog cranberry | *Vaccinium vitis-idaea* | 50 |
| **OT1P3** | Green alder | *Alnus crispa* | **T10P15** | tree moss | *Climacium dendroides* | 5 |
| **OT1P3** | Cow parsnip | *Heracleum lanatum* | **T10P15** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P3** | Prickly rose | *Rosa acicularis* | **T10P15** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT1P3** | Low bush-cranberry | *Viburnum edule* | **T10P15** | Northern bedstraw | *Galium boreale* | 5 |
| **OT1P3** | Northern gooseberry | *Ribes oxyacanthiodes* | **T10P15** | twinflower | *Linnaea borealis* | 5 |
| **OT1P3** | Bunchberry | *Cornus canadensis* | **T10P15** | naked bishop's-cap | *Mitella nuda* | 10 |
| **OT1P3** | Kidney-leaved violet | *Viola renifolia* | **T10P15** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT1P3** | Sweet-scented bedstraw | *Galium boreale* | **T10P15** | prickly rose | *Rosa acicularis* | 10 |
| **OT1P3** | White baneberry | *Actaea rubra* | **T10P15** | dewberry | *Rubus pubescens* | 5 |
| **OT1P3** | Fireweed | *Epilobium angustifolium* | **T10P16** | blue columbine | *Aquilegia brevistyla* | 5 |
| **OT1P3** | Wild vetch | *Vicia americana* | **T10P16** | bog birch | *Betula glandulosa* | 15 |
| **OT1P3** | Raspberry | *Rubus ideaus* | **T10P16** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT1P3** | Spreading dogbane | *Apocynum androsaemifolium* | **T10P16** | step moss | *Hylocomium splendens* | 80 |
| **OT1P3** | Sarsaparilla | *Aralia nudicaulis* | **T10P16** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT1P4** | Stinging nettle | *Urtica dioca* | **T10P16** | naked bishop's-cap | *Mitella nuda* | 10 |
| **OT1P4** | Woodland horsetail | *Equisetum sylvaticum* | **T10P16** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT1P4** | Small enchanters nightshade | *Circaea alpina* | **T10P16** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT1P4** | Cow parsnip | *Heracleum lanatum* | **T10P16** | plume moss | *Ptilium crista-castrensis* | 5 |
| **OT1P4** | Prickly rose | *Rosa acicularis* | **T10P16** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT1P4** | Bluejoint | *Calamagrostis canadensis* | **T10P16** | prickly rose | *Rosa acicularis* | 10 |
| **OT1P4** | Red-osier dogwood | *Cornus stolinifera* | **T10P16** | sphagnum | *Sphagnum fuscum* | 80 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT1P4** | Raspberry | *Rubus ideaus* | **T10P16** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT1P4** | Northern gooseberry | *Ribes oxyacanthiodes* | **T10P18** | common Labrador tea | *Ledum groenlandicum* | 5 |
| **OT1P4** | Jewelweed | *Impatiens capensis* | **T10P18** | common haircap moss | *Polytrichum commune* | 20 |
| **OT1P4** | Common mitrewort | *Mitella nuda* | **T10P18** | willows | *Salix sp* | 1 |
| **OT1P4** | False lily-of-the-valley | *Mainthemum canadense* | **T10P18** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT1P5** | Tall Larkspur | *Delphinium glaucum* | **T10P18** | bog cranberry | *Vaccinium vitis-idaea* | 20 |
| **OT1P5** | Cow Parsnip | *Heracleum lanatum* | **T10P19** | Reindeer Lichen | *Cladina rangifera* | 20 |
| **OT1P5** | Prickly rose | *Rosa acicularis* | **T10P19** | step moss | *Hylocomium splendens* | 20 |
| **OT1P5** | Woodland horsetail | *Equisetum sylvaticum* | **T10P19** | common Labrador tea | *Ledum groenlandicum* | 25 |
| **OT1P5** | Bluejoint | *Calamagrostis canadensis* | **T10P19** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT1P5** | Jewelweed | *Impatiens capensis* | **T10P19** | bog cranberry | *Vaccinium vitis-idaea* | 40 |
| **OT1P5** | Common mitrewort | *Mitella nuda* | **T10P20** | Reindeer Lichen | *Cladina rangifera* | 30 |
| **OT1P5** | Sweet scented bedstraw | *Galium triflorum* | **T10P20** | common horsetail | *Equisetum arvense* | 1 |
| **OT1P5** | Northern gooseberry | *Ribes oxyacanthiodes* | **T10P20** | common Labrador tea | *Ledum groenlandicum* | 50 |
| **OT1P5** | Dewberry | *Rubus pubescens* | **T10P20** | Schreber's moss | *Pleurozium schreberi* | 25 |
| **OT1P5** | Stinging nettle | *Urtica dioca* | **T10P20** | sphagnum | *Sphagnum fuscum* | 40 |
| **OT1P5** | Red-osier dogwood | *Cornus stolinifera* | **T10P20** | bog cranberry | *Vaccinium vitis-idaea* | 30 |
| **OT1P5** | Low bush-cranberry | *Viburnum edule* | **T10P3** | common Labrador tea | *Ledum groenlandicum* | 80 |
| **OT1P5** | Sarsaparilla | *Aralia nudicaulis* | **T10P3** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT1P5** | Raspberry | *Rubus ideaus* | **T10P3** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT1P5** | Yellow avens | *Geum macrophyllum* | **T10P4** | Reindeer Lichen | *Cladina rangifera* | 40 |
| **OT1P5** | Tall lungwort | *Mertensia paniculata* | **T10P4** | common Labrador tea | *Ledum groenlandicum* | 70 |
| **OT1P6** | Tall Larkspur | *Delphinium glaucum* | **T10P4** | sphagnum | *Sphagnum fuscum* | 60 |
| **OT1P6** | Cow Parsnip | *Heracleum lanatum* | **T10P4** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT1P6** | Prickly rose | *Rosa acicularis* | **T10P5** | Reindeer Lichen | *Cladina rangifera* | 1 |
| **OT1P6** | Woodland horsetail | *Equisetum sylvaticum* | **T10P5** | Reindeer Lichen | *Cladina rangifera* | 5 |
| **OT1P6** | Bluejoint | *Calamagrostis canadensis* | **T10P5** | step moss | *Hylocomium splendens* | 15 |
| **OT1P6** | Jewelweed | *Impatiens capensis* | **T10P5** | common Labrador tea | *Ledum groenlandicum* | 90 |
| **OT1P6** | Common mitrewort | *Mitella nuda* | **T10P5** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT1P6** | Sweet scented bedstraw | *Galium triflorum* | **T10P5** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT1P6** | Northern gooseberry | *Ribes oxyacanthiodes* | **T10P5** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT1P6** | Dewberry | *Rubus pubescens* | **T10P5** | sphagnum | *Sphagnum fuscum* | 60 |
| **OT1P6** | Stinging nettle | *Urtica dioca* | **T10P5** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT1P6** | Red-osier dogwood | *Cornus stolinifera* | **T10P5** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT1P6** | Low bush-cranberry | *Viburnum edule* | **T10P7** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P6** | Baneberry | *Actaea rubra* | **T10P7** | step moss | *Hylocomium splendens* | 40 |
| **OT1P6** | Bristly Black Currant | *Ribes lacustre* | **T10P7** | common Labrador tea | *Ledum groenlandicum* | 20 |
| **OT1P6** | Wild red currant | *Ribes triste* | **T10P7** | twinflower | *Linnaea borealis* | 15 |
| **OT1P6** | False lily-of-the-valley | *Mainthemum canadense* | **T10P7** | stiff club-moss | *Lycopodium annotinum* | 20 |
| **OT1P6** | Canada violet | *Viola canadensis* | **T10P7** | Schreber's moss | *Pleurozium schreberi* | 25 |
| **OT1P6** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T10P7** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT1P6** | lindley's aster | *Aster ciliolatus* | **T10P7** | dwarf raspberry | *Rubus acaulis* | 1 |
| **OT1P7** | Tall Larkspur | *Delphinium glaucum* | **T10P7** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT1P7** | River alder | *Alnus tenuifolia* | **T10P8** | common yarrow | *Achillea millefolium* | 1 |
| **OT1P7** | Prickly rose | *Rosa acicularis* | **T10P8** | tree moss | *Climacium dendroides* | 5 |
| **OT1P7** | Woodland horsetail | *Equisetum sylvaticum* | **T10P8** | bunchberry | *Cornus canadensis* | 5 |
| **OT1P7** | Bluejoint | *Calamagrostis canadensis* | **T10P8** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT1P7** | Jewelweed | *Impatiens capensis* | **T10P8** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT1P7** | White birch | *Betula papyrifera* | **T10P8** | step moss | *Hylocomium splendens* | 5 |
| **OT1P7** | Sweet scented bedstraw | *Galium triflorum* | **T10P8** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT1P7** | Fireweed | *Epilobium angustifolium* | **T10P8** | twinflower | *Linnaea borealis* | 5 |
| **OT1P7** | Dewberry | *Rubus pubescens* | **T10P8** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT1P7** | Kidney-leaved violet | *Viola renifolia* | **T10P8** | prickly rose | *Rosa acicularis* | 10 |
| **OT1P7** | Red-osier dogwood | *Cornus stolinifera* | **T10P8** | low-bush cranberry | *Viburnum edule* | 25 |
| **OT1P7** | Low bush-cranberry | *Viburnum edule* | **T10P9** | tree moss | *Climacium dendroides* | 5 |
| **OT1P7** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T10P9** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P7** | Bristly Black Currant | *Ribes lacustre* | **T10P9** | fairybells | *Disporum trachycarpum* | 1 |
| **OT1P7** | Wild red currant | *Ribes triste* | **T10P9** | Northern bedstraw | *Galium boreale* | 1 |
| **OT1P8** | Tall Larkspur | *Delphinium glaucum* | **T10P9** | step moss | *Hylocomium splendens* | 20 |
| **OT1P8** | Prickly rose | *Rosa acicularis* | **T10P9** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT1P8** | Bluejoint | *Calamagrostis canadensis* | **T10P9** | twinflower | *Linnaea borealis* | 1 |
| **OT1P8** | Fireweed | *Epilobium angustifolium* | **T10P9** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT1P8** | Low bush-cranberry | *Viburnum edule* | **T10P9** | prickly rose | *Rosa acicularis* | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT1P8** | Red/white baneberry | *Actaea rubra* | **T10P9** | dewberry | *Rubus pubescens* | 15 |
| **OT1P8** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T11P1** | Reindeer Lichen | *Cladina rangifera* | 40 |
| **OT1P8** | Woodland horsetail | *Equisetum sylvaticum* | **T11P1** | common Labrador tea | *Ledum groenlandicum* | 90 |
| **OT1P8** | Bunchberry | *Cornus canadensis* | **T11P1** | Schreber's moss | *Pleurozium schreberi* | 50 |
| **OT1P8** | Cow parsnip | *Heracleum lanatum* | **T11P1** | sphagnum | *Sphagnum fuscum* | 5 |
| **OT1P8** | Creamy peavine | *Lathyrus ochroleucus* | **T11P1** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT1P9** | Prickly rose | *Rosa acicularis* | **T11P11** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P9** | Low bush-cranberry | *Viburnum edule* | **T11P11** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT1P9** | Bunchberry | *Cornus canadensis* | **T11P11** | common horsetail | *Equisetum arvense* | 40 |
| **OT1P9** | Creamy peavine | *Lathyrus ochroleucus* | **T11P11** | plume moss | *Ptilium crista-castrensis* | 15 |
| **OT1P9** | Twinflower | *Linnaea borealis* | **T11P11** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT1P9** | Green wintergreen | *Pyrola virens* | **T11P11** | prickly rose | *Rosa acicularis* | 10 |
| **OT1P9** | Spotted coralroot | *Corallorhiza maculata* | **T11P11** | dewberry | *Rubus pubescens* | 5 |
| **OT1P9** | Tall Larkspur | *Delphinium glaucum* | **T11P12** | tree moss | *Climacium dendroides* | 10 |
| **OT1P9** | Fireweed | *Epilobium angustifolium* | **T11P12** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P9** | Dewberry | *Rubus pubescens* | **T11P12** | tall larkspur | *Delphinium glaucum* | 15 |
| **OT1P9** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T11P12** | common horsetail | *Equisetum arvense* | 5 |
| **OT1P9** | Bristly Black Currant | *Ribes lacustre* | **T11P12** | cream-colored vetchling | *Lathyrus ochroleucus* | 15 |
| **OT1P9** | Wild red currant | *Ribes triste* | **T11P12** | twinflower | *Linnaea borealis* | 5 |
| **OT1P9** | Baneberry | *Actaea rubra* | **T11P12** | plume moss | *Ptilium crista-castrensis* | 15 |
| **OT1P9** | Schrebers moss | *Pleurozium schreberi* | **T11P12** | dewberry | *Rubus pubescens* | 5 |
| **OT1P9** | Showy aster | *Aster conspicuus* | **T11P12** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT1P10** | Prickly rose | *Rosa acicularis* | **T11P2** | common Labrador tea | *Ledum groenlandicum* | 80 |
| **OT1P10** | Low bush-cranberry | *Viburnum edule* | **T11P2** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT1P10** | Bunchberry | *Cornus canadensis* | **T11P2** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT1P10** | Creamy peavine | *Lathyrus ochroleucus* | **T11P3** | common yarrow | *Achillea millefolium* | 5 |
| **OT1P10** | Twinflower | *Linnaea borealis* | **T11P3** | bog birch | *Betula glandulosa* | 10 |
| **OT1P10** | Tall Larkspur | *Delphinium glaucum* | **T11P3** | tree moss | *Climacium dendroides* | 5 |
| **OT1P10** | Fireweed | *Epilobium angustifolium* | **T11P3** | bunchberry | *Cornus canadensis* | 5 |
| **OT1P10** | Dewberry | *Rubus pubescens* | **T11P3** | common fireweed | *Epilobium angustifolium* | 10 |
| **OT1P10** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T11P3** | common horsetail | *Equisetum arvense* | 1 |
| **OT1P10** | Bristly Black Currant | *Ribes lacustre* | **T11P3** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT1P10** | Kidney-leaved violet | *Viola renifolia* | **T11P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT1P10** | Woodland strawberry | *Fragaria vesca* | **T11P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT1P10** | Woodland horsetail | *Equisetum sylvaticum* | **T11P3** | common Labrador tea | *Ledum groenlandicum* | 20 |
| **OT1P10** | Step moss | *Hylocomium splendens* | **T11P3** | twinflower | *Linnaea borealis* | 1 |
| **OT1P10** | Common pink wintergreen | *Pyrola asarifolia* | **T11P3** | Schreber's moss | *Pleurozium schreberi* | 30 |
| **OT1P10** | Round-leaved orchid | *Habenaria orbiculata* | **T11P3** | plume moss | *Ptilium crista-castrensis* | 50 |
| **OT1P10** | Common mitrewort | *Mitella nuda* | **T11P3** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT1P11** | Tall Larkspur | *Delphinium glaucum* | **T11P3** | willows | *Salix sp* | 10 |
| **OT1P11** | River alder | *Alnus tenuifolia* | **T11P3** | willows | *Salix sp* | 5 |
| **OT1P11** | Prickly rose | *Rosa acicularis* | **T11P3** | sphagnum | *Sphagnum fuscum* | 60 |
| **OT1P11** | Woodland horsetail | *Equisetum sylvaticum* | **T11P3** | sphagnum | *Sphagnum fuscum* | 10 |
| **OT1P11** | White birch | *Betula papyrifera* | **T11P3** | common dandelion | *Taraxacum officinale* | 1 |
| **OT1P11** | Sweet scented bedstraw | *Galium triflorum* | **T11P3** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT1P11** | Dewberry | *Rubus pubescens* | **T11P3** | common blueberry | *Vaccinium myrtilloides* | 1 |
| **OT1P11** | Kidney-leaved violet | *Viola renifolia* | **T11P6** | common yarrow | *Achillea millefolium* | 5 |
| **OT1P11** | Red-osier dogwood | *Cornus stolinifera* | **T11P6** | tree moss | *Climacium dendroides* | 5 |
| **OT1P11** | Low bush-cranberry | *Viburnum edule* | **T11P6** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P11** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T11P6** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT1P11** | Bristly Black Currant | *Ribes lacustre* | **T11P6** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT1P11** | Willow | *Salix sp.* | **T11P6** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT1P11** | Bunchberry | *Cornus canadensis* | **T11P6** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT1P11** | Common mitrewort | *Mitella nuda* | **T11P6** | common horsetail | *Equisetum arvense* | 5 |
| **OT1P11** | Baneberry | *Actaea rubra* | **T11P6** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT1P11** | White spruce | *Picea glauca* | **T11P6** | Northern bedstraw | *Galium boreale* | 1 |
| **OT1P11** | Twinflower | *Linnaea borealis* | **T11P6** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT1P11** | Wild vetch | *Vicia americana* | **T11P6** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT1P11** | Yellow avens | *Geum macrophyllum* | **T11P6** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT1P12** | Prickly rose | *Rosa acicularis* | **T11P6** | currants | *Ribes sp* | 15 |
| **OT1P12** | Woodland horsetail | *Equisetum sylvaticum* | **T11P6** | currants | *Ribes sp* | 5 |
| **OT1P12** | Wild vetch | *Vicia americana* | **T11P6** | Northern gooseberry | *Ribes oxyacanthoides* | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT1P12** | Creamy peavine | *Lathyrus ochroleucus* | **T11P6** | currants | *Ribes sp* | 1 |
| **OT1P12** | Low bush-cranberry | *Viburnum edule* | **T11P6** | prickly rose | *Rosa acicularis* | 5 |
| **OT1P12** | Bunchberry | *Cornus canadensis* | **T11P6** | prickly rose | *Rosa acicularis* | 5 |
| **OT1P12** | Twinflower | *Linnaea borealis* | **T11P6** | prickly rose | *Rosa acicularis* | 10 |
| **OT1P12** | Tall Larkspur | *Delphinium glaucum* | **T11P6** | prickly rose | *Rosa acicularis* | 1 |
| **OT1P12** | Fireweed | *Epilobium angustifolium* | **T11P6** | prickly rose | *Rosa acicularis* | 1 |
| **OT1P12** | Bristly Black Currant | *Ribes lacustre* | **T11P6** | dewberry | *Rubus pubescens* | 1 |
| **OT1P12** | Kidney-leaved violet | *Viola renifolia* | **T12P1** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P12** | Woodland strawberry | *Fragaria vesca* | **T12P1** | step moss | *Hylocomium splendens* | 50 |
| **OT1P12** | White spruce | *Picea glauca* | **T12P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT1P12** | Showy aster | *Aster conspicuus* | **T12P1** | twinflower | *Linnaea borealis* | 5 |
| **OT1P12** | Yarrow | *Achillea millefolium* | **T12P1** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT1P12** | Canada Buffaloberry | *Shepherdia canadensis* | **T12P1** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT1P12** | Agropyron Grass | *Agropyron sp* | **T12P1** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT1P12** | Bromus Grass | *Bromus sp* | **T12P1** | dwarf raspberry | *Rubus acaulis* | 5 |
| **OT1P12** | Common dandelion | *Taraxacum officinale* | **T12P1** | Canada buffaloberry | *Sheperdia canadensis* | 10 |
| **OT1P12** | Unknown species | *See IMG_1159* | **T12P1** | common blueberry | *Vaccinium myrtilloides* | 1 |
| **OT1P13** | Prickly rose | *Rosa acicularis* | **T12P1** | low-bush cranberry | *Viburnum edule* | 5 |
| **OT1P13** | Woodland horsetail | *Equisetum sylvaticum* | **T12P10** | Reindeer Lichen | *Cladina rangifera* | 20 |
| **OT1P13** | Wild vetch | *Vicia americana* | **T12P10** | Northern rough fescue | *Festuca altaica** | 20 |
| **OT1P13** | Low bush-cranberry | *Viburnum edule* | **T12P10** | common Labrador tea | *Ledum groenlandicum* | 20 |
| **OT1P13** | Bunchberry | *Cornus canadensis* | **T12P10** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT1P13** | Tall Larkspur | *Delphinium glaucum* | **T12P10** | cloudberry | *Rubus chamaemorus* | 10 |
| **OT1P13** | Fireweed | *Epilobium angustifolium* | **T12P10** | three-leaved Solomon's-seal | *Smilacina trifolia* | 10 |
| **OT1P13** | Bristly Black Currant | *Ribes lacustre* | **T12P10** | sphagnum | *Sphagnum fuscum* | 80 |
| **OT1P13** | Woodland strawberry | *Fragaria vesca* | **T12P10** | bog cranberry | *Vaccinium vitis-idaea* | 25 |
| **OT1P13** | Showy aster | *Aster conspicuus* | **T12P11** | tree moss | *Climacium dendroides* | 1 |
| **OT1P13** | Yarrow | *Achillea millefolium* | **T12P11** | bunchberry | *Cornus canadensis* | 10 |
| **OT1P13** | Canada Buffaloberry | *Shepherdia canadensis* | **T12P11** | tall larkspur | *Delphinium glaucum* | 5 |
| **OT1P13** | Bluejoint | *Calamagrostis canadensis* | **T12P11** | step moss | *Hylocomium splendens* | 60 |
| **OT1P13** | Baneberry | *Actaea rubra* | **T12P11** | twinflower | *Linnaea borealis* | 10 |
| **OT1P13** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T12P11** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT1P13** | Cow parsnip | *Heracleum lanatum* | **T12P11** | prickly rose | *Rosa acicularis* | 15 |
| **OT1P13** | Canada goldenrod | *Solidago canadensis* | **T12P2** | bunchberry | *Cornus canadensis* | 1 |
| **OT1P13** | White birch | *Betula papyrifera* | **T12P2** | step moss | *Hylocomium splendens* | 75 |
| **OT1P13** | Canada violet | *Viola canadensis* | **T12P2** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT1P13** | Willow | *Salix sp* | **T12P2** | prickly rose | *Rosa acicularis* | 1 |
| **OT2P1** | Prickly rose | *Rosa acicularis* | **T12P3** | two-seeded sedge | *Carex disperma* | 1 |
| **OT2P1** | Low bush-cranberry | *Viburnum edule* | **T12P3** | step moss | *Hylocomium splendens* | 70 |
| **OT2P1** | Tall Larkspur | *Delphinium glaucum* | **T12P4** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT2P1** | Bristly Black Currant | *Ribes lacustre* | **T12P4** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT2P1** | White birch | *Betula papyrifera* | **T12P4** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P1** | Wild red currant | *Ribes triste* | **T12P5** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT2P1** | Heartleaf arnica | *Arnica cordifolia* | **T12P5** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT2P1** | Dicranum | *Dicranum sp.* | **T12P5** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P2** | Prickly rose | *Rosa acicularis* | **T12P6** | bunchberry | *Cornus canadensis* | 5 |
| **OT2P2** | Low bush-cranberry | *Viburnum edule* | **T12P6** | tall larkspur | *Delphinium glaucum* | 10 |
| **OT2P2** | Red/white baneberry | *Actaea rubra* | **T12P6** | fairybells | *Disporum trachycarpum* | 10 |
| **OT2P2** | Woodland horsetail | *Equisetum sylvaticum* | **T12P6** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT2P2** | Bunchberry | *Cornus canadensis* | **T12P6** | prickly rose | *Rosa acicularis* | 30 |
| **OT2P2** | Dewberry | *Rubus pubescens* | **T12P6** | dewberry | *Rubus pubescens* | 10 |
| **OT2P2** | Bristly Black Currant | *Ribes lacustre* | **T12P7** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P2** | Showy aster | *Aster conspicuus* | **T12P7** | step moss | *Hylocomium splendens* | 40 |
| **OT2P2** | Common mitrewort | *Mitella nuda* | **T12P7** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT2P2** | Tall lungwort | *Mertensia paniculata* | **T12P7** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT2P2** | Canada violet | *Viola canadensis* | **T12P7** | common pink wintergreen | *Pyrola asarifolia* | 40 |
| **OT2P2** | Sweet-scented bedstraw | *Galium boreale* | **T12P7** | dewberry | *Rubus pubescens* | 1 |
| **OT2P2** | Fringed aster | *Aster ciliolatus* | **T12P8** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P3** | Tall Larkspur | *Delphinium glaucum* | **T12P8** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT2P3** | River alder | *Alnus tenuifolia* | **T12P8** | common horsetail | *Equisetum arvense* | 1 |
| **OT2P3** | Woodland horsetail | *Equisetum sylvaticum* | **T12P8** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT2P3** | Bluejoint | *Calamagrostis canadensis* | **T12P8** | step moss | *Hylocomium splendens* | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P3** | Jewelweed | *Impatiens capensis* | **T12P8** | twinflower | *Linnaea borealis* | 1 |
| **OT2P3** | Dewberry | *Rubus pubescens* | **T12P8** | naked bishop's-cap | *Mitella nuda* | 10 |
| **OT2P3** | Low bush-cranberry | *Viburnum edule* | **T12P8** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT2P3** | Bristly Black Currant | *Ribes lacustre* | **T12P8** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT2P3** | Wild red currant | *Ribes triste* | **T12P8** | currants | *Ribes sp* | 1 |
| **OT2P3** | Common mitrewort | *Mitella nuda* | **T12P9** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P3** | Schrebers moss | *Pleurozium schreberi* | **T12P9** | step moss | *Hylocomium splendens* | 40 |
| **OT2P3** | Cow parsnip | *Heracleum lanatum* | **T12P9** | twinflower | *Linnaea borealis* | 1 |
| **OT2P3** | Tall lungwort | *Mertensia paniculata* | **T12P9** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT2P3** | Canada violet | *Viola canadensis* | **T13P1** | common Labrador tea | *Ledum groenlandicum* | 50 |
| **OT2P3** | Small enchanters nightshade | *Circaea alpina* | **T13P1** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT2P3** | Plume moss | *Ptilium crista-castrensis* | **T13P1** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT2P3** | Shield fern | *Dryopteris carthusiana* | **T13P10** | bog birch | *Betula glandulosa* | 25 |
| **OT2P4** | Tall Larkspur | *Delphinium glaucum* | **T13P10** | Northern rough fescue | *Festuca altaica** | 40 |
| **OT2P4** | Woodland horsetail | *Equisetum sylvaticum* | **T13P10** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT2P4** | Bluejoint | *Calamagrostis canadensis* | **T13P10** | cloudberry | *Rubus chamaemorus* | 15 |
| **OT2P4** | Jewelweed | *Impatiens capensis* | **T13P10** | three-leaved Solomon's-seal | *Smilacina trifolia* | 10 |
| **OT2P4** | Dewberry | *Rubus pubescens* | **T13P10** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT2P4** | Low bush-cranberry | *Viburnum edule* | **T13P2** | blue columbine | *Aquilegia brevistyla* | 5 |
| **OT2P4** | Bristly Black Currant | *Ribes lacustre* | **T13P2** | bluejoint | *Calamagrostis canadensis* | 20 |
| **OT2P4** | Common mitrewort | *Mitella nuda* | **T13P2** | common horsetail | *Equisetum arvense* | 1 |
| **OT2P4** | Cow parsnip | *Heracleum lanatum* | **T13P2** | step moss | *Hylocomium splendens* | 30 |
| **OT2P4** | Tall lungwort | *Mertensia paniculata* | **T13P2** | nephroma lichen | *Nephroma arctium* | 5 |
| **OT2P4** | Canada violet | *Viola canadensis* | **T13P2** | sphagnum | *Sphagnum fuscum* | 50 |
| **OT2P4** | Shield fern | *Dryopteris carthusiana* | **T13P3** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P4** | Prickly rose | *Rosa acicularis* | **T13P3** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT2P4** | Red/white baneberry | *Actaea rubra* | **T13P3** | step moss | *Hylocomium splendens* | 95 |
| **OT2P4** | Bunchberry | *Cornus canadensis* | **T13P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT2P4** | Sweet-scented bedstraw | *Galium boreale* | **T13P3** | twinflower | *Linnaea borealis* | 5 |
| **OT2P4** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T13P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT2P4** | Yellow avens | *Geum macrophyllum* | **T13P3** | currants | *Ribes sp* | 5 |
| **OT2P4** | Oak fern | *Gymnocarpium dryopteris* | **T13P3** | prickly rose | *Rosa acicularis* | 5 |
| **OT2P5** | Woodland horsetail | *Equisetum sylvaticum* | **T13P3** | Canada buffaloberry | *Sheperdia canadensis* | 5 |
| **OT2P5** | Dewberry | *Rubus pubescens* | **T13P4** | bunchberry | *Cornus canadensis* | 5 |
| **OT2P5** | Common mitrewort | *Mitella nuda* | **T13P4** | step moss | *Hylocomium splendens* | 90 |
| **OT2P5** | Canada violet | *Viola canadensis* | **T13P4** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT2P5** | Bunchberry | *Cornus canadensis* | **T13P4** | dwarf raspberry | *Rubus acaulis* | 1 |
| **OT2P5** | Sweet-scented bedstraw | *Galium boreale* | **T13P4** | low-bush cranberry | *Viburnum edule* | 10 |
| **OT2P5** | Sphagnum moss | *Sphagnum sp* | **T13P5** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P5** | Twinflower | *Linnaea borealis* | **T13P5** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT2P5** | White spruce | *Picea glauca* | **T13P5** | Northern bedstraw | *Galium boreale* | 1 |
| **OT2P5** | Small enchanters nightshade | *Circaea alpina* | **T13P5** | step moss | *Hylocomium splendens* | 90 |
| **OT2P5** | Plume moss | *Ptilium crista-castrensis* | **T13P5** | twinflower | *Linnaea borealis* | 5 |
| **OT2P5** | Rattle-snake plantain | *Goodyera repens* | **T13P5** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT2P5** | Stiff clubmoss | *Lycopodium annotinum* | **T13P5** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT2P5** | Bluejoint | *Calamagrostis canadensis* | **T13P5** | prickly rose | *Rosa acicularis* | 30 |
| **OT2P5** | Shield fern | *Dryopteris carthusiana* | **T13P5** | common blueberry | *Vaccinium myrtilloides* | 25 |
| **OT2P6** | Tall Larkspur | *Delphinium glaucum* | **T13P6** | tree moss | *Climacium dendroides* | 5 |
| **OT2P6** | Dewberry | *Rubus pubescens* | **T13P6** | bunchberry | *Cornus canadensis* | 10 |
| **OT2P6** | Low bush-cranberry | *Viburnum edule* | **T13P6** | tall larkspur | *Delphinium glaucum* | 15 |
| **OT2P6** | Bristly Black Currant | *Ribes lacustre* | **T13P6** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT2P6** | Common mitrewort | *Mitella nuda* | **T13P6** | step moss | *Hylocomium splendens* | 20 |
| **OT2P6** | Tall lungwort | *Mertensia paniculata* | **T13P6** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT2P6** | Prickly rose | *Rosa acicularis* | **T13P6** | twinflower | *Linnaea borealis* | 5 |
| **OT2P6** | Red/white baneberry | *Actaea rubra* | **T13P6** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT2P6** | Bunchberry | *Cornus canadensis* | **T13P6** | currants | *Ribes sp* | 10 |
| **OT2P6** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T13P6** | prickly rose | *Rosa acicularis* | 50 |
| **OT2P6** | Twinflower | *Linnaea borealis* | **T13P6** | dewberry | *Rubus pubescens* | 20 |
| **OT2P6** | Wild red currant | *Ribes triste* | **T13P6** | common blueberry | *Vaccinium myrtilloides* | 5 |
| **OT2P6** | Raspberry | *Rubus ideaus* | **T13P7** | bunchberry | *Cornus canadensis* | 30 |
| **OT2P6** | Green alder | *Alnus crispa* | **T13P7** | step moss | *Hylocomium splendens* | 80 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P6** | Kidney-leaved violet | *Viola renifolia* | **T13P7** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT2P6** | Schrebers moss | *Pleurozium schreberi* | **T13P7** | twinflower | *Linnaea borealis* | 5 |
| **OT2P6** | Showy aster | *Aster conspicuus* | **T13P7** | prickly rose | *Rosa acicularis* | 10 |
| **OT2P6** | Northern bedstraw | *Galium boreale* | **T13P7** | dewberry | *Rubus pubescens* | 40 |
| **OT2P6** | Canada hawkweed | *Hieracium umbellatum* | **T13P8** | fairybells | *Disporum trachycarpum* | 1 |
| **OT2P7** | Tall Larkspur | *Delphinium glaucum* | **T13P8** | twinflower | *Linnaea borealis* | 10 |
| **OT2P7** | River alder | *Alnus tenuifolia* | **T13P8** | currants | *Ribes sp* | 10 |
| **OT2P7** | Prickly rose | *Rosa acicularis* | **T13P8** | prickly rose | *Rosa acicularis* | 20 |
| **OT2P7** | Woodland horsetail | *Equisetum sylvaticum* | **T13P8** | dewberry | *Rubus pubescens* | 5 |
| **OT2P7** | Dewberry | *Rubus pubescens* | **T13P8** | common blueberry | *Vaccinium myrtilloides* | 10 |
| **OT2P7** | Red-osier dogwood | *Cornus stolinifera* | **T13P9** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P7** | Low bush-cranberry | *Viburnum edule* | **T13P9** | step moss | *Hylocomium splendens* | 85 |
| **OT2P7** | Sweet scented bedstraw | *Galium triflorum* | **T13P9** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT2P7** | Bristly Black Currant | *Ribes lacustre* | **T13P9** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT2P7** | Bunchberry | *Cornus canadensis* | **T13P9** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT2P7** | Common mitrewort | *Mitella nuda* | **T14P1** | Reindeer Lichen | *Cladina rangifera* | 10 |
| **OT2P7** | Baneberry | *Actaea rubra* | **T14P1** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT2P7** | Twinflower | *Linnaea borealis* | **T14P1** | Schreber's moss | *Pleurozium schreberi* | 70 |
| **OT2P7** | Tall lungwort | *Mertensia paniculata* | **T14P1** | sphagnum | *Sphagnum fuscum* | 30 |
| **OT2P7** | Showy aster | *Aster conspicuus* | **T14P1** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT2P7** | Balsam poplar | *Populus balsamifera* | **T14P10** | step moss | *Hylocomium splendens* | 20 |
| **OT2P7** | Green wintergreen | *Pyrola virens* | **T14P10** | common Labrador tea | *Ledum groenlandicum* | 50 |
| **OT2P7** | Woodland strawberry | *Fragaria vesca* | **T14P10** | Schreber's moss | *Pleurozium schreberi* | 30 |
| **OT2P7** | Canada violet | *Viola canadensis* | **T14P10** | sphagnum | *Sphagnum fuscum* | 5 |
| **OT2P7** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T14P10** | bog cranberry | *Vaccinium vitis-idaea* | 40 |
| **OT2P8** | White spruce | *Picea glauca* | **T14P2** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT2P8** | Tall Larkspur | *Delphinium glaucum* | **T14P2** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT2P8** | Prickly rose | *Rosa acicularis* | **T14P2** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT2P8** | Red-osier dogwood | *Cornus stolinifera* | **T14P3** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P8** | Dewberry | *Rubus pubescens* | **T14P3** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT2P8** | Sweet scented bedstraw | *Galium triflorum* | **T14P3** | Schreber's moss | *Pleurozium schreberi* | 70 |
| **OT2P8** | Bristly Black Currant | *Ribes lacustre* | **T14P3** | common haircap moss | *Polytrichum commune* | 1 |
| **OT2P8** | Bunchberry | *Cornus canadensis* | **T14P3** | plume moss | *Ptilium crista-castrensis* | 30 |
| **OT2P8** | Baneberry | *Actaea rubra* | **T14P4** | Reindeer Lichen | *Cladina rangifera* | 1 |
| **OT2P8** | Twinflower | *Linnaea borealis* | **T14P4** | common Labrador tea | *Ledum groenlandicum* | 25 |
| **OT2P8** | Tall lungwort | *Mertensia paniculata* | **T14P4** | common Labrador tea | *Ledum groenlandicum* | 20 |
| **OT2P8** | Showy aster | *Aster conspicuus* | **T14P4** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT2P8** | Green wintergreen | *Pyrola virens* | **T14P4** | common haircap moss | *Polytrichum commune* | 60 |
| **OT2P8** | Woodland strawberry | *Fragaria vesca* | **T14P4** | cloudberry | *Rubus chamaemorus* | 5 |
| **OT2P8** | Canada violet | *Viola canadensis* | **T14P4** | sphagnum | *Sphagnum fuscum* | 10 |
| **OT2P8** | Bluejoint | *Calamagrostis canadensis* | **T14P4** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT2P8** | Creamy peavine | *Lathyrus ochroleucus* | **T14P4** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT2P8** | Green alder | *Alnus crispa* | **T14P6** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P8** | Balsam poplar | *Populus balsamifera* | **T14P6** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT2P8** | Twining honeysuckle | *Lonicera dioica* | **T14P6** | fairybells | *Disporum trachycarpum* | 5 |
| **OT2P8** | Common horsetail | *Equisetum pratense* | **T14P6** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT2P9** | Prickly rose | *Rosa acicularis* | **T14P6** | Northern bedstraw | *Galium boreale* | 1 |
| **OT2P9** | Red-osier dogwood | *Cornus stolinifera* | **T14P6** | step moss | *Hylocomium splendens* | 20 |
| **OT2P9** | Dewberry | *Rubus pubescens* | **T14P6** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT2P9** | Sweet scented bedstraw | *Galium triflorum* | **T14P6** | tall lungwort | *Mertensia paniculata* | 1 |
| **OT2P9** | Bristly Black Currant | *Ribes lacustre* | **T14P6** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT2P9** | Bunchberry | *Cornus canadensis* | **T14P6** | prickly rose | *Rosa acicularis* | 40 |
| **OT2P9** | Tall lungwort | *Mertensia paniculata* | **T14P7** | common yarrow | *Achillea millefolium* | 1 |
| **OT2P9** | Showy aster | *Aster conspicuus* | **T14P7** | bunchberry | *Cornus canadensis* | 5 |
| **OT2P9** | Woodland strawberry | *Fragaria vesca* | **T14P7** | fairybells | *Disporum trachycarpum* | 1 |
| **OT2P9** | Canada violet | *Viola canadensis* | **T14P7** | step moss | *Hylocomium splendens* | 10 |
| **OT2P9** | Creamy peavine | *Lathyrus ochroleucus* | **T14P7** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT2P9** | Green alder | *Alnus crispa* | **T14P7** | twinflower | *Linnaea borealis* | 10 |
| **OT2P9** | Twining honeysuckle | *Lonicera dioica* | **T14P7** | tall lungwort | *Mertensia paniculata* | 15 |
| **OT2P9** | Northern bedstraw | *Galium boreale* | **T14P7** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT2P9** | Raspberry | *Rubus ideaus* | **T14P7** | prickly rose | *Rosa acicularis* | 40 |
| **OT2P9** | Bluejoint | *Calamagrostis canadensis* | **T14P7** | dewberry | *Rubus pubescens* | 15 |
| **OT2P9** | Low bush-cranberry | *Viburnum edule* | **T14P8** | bunchberry | *Cornus canadensis* | 10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P9** | Common mitrewort | *Mitella nuda* | **T14P8** | common horsetail | *Equisetum arvense* | 5 |
| **OT2P9** | Kidney-leaved violet | *Viola renifolia* | **T14P8** | blunt-leaved bog orchid | *Habenaria obtusata* | 1 |
| **OT2P10** | Sarsaparilla | *Aralia nudicaulis* | **T14P8** | step moss | *Hylocomium splendens* | 60 |
| **OT2P10** | Tall Larkspur | *Delphinium glaucum* | **T14P8** | twinflower | *Linnaea borealis* | 5 |
| **OT2P10** | Green alder | *Alnus crispa* | **T14P8** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT2P10** | Prickly rose | *Rosa acicularis* | **T14P8** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT2P10** | Woodland horsetail | *Equisetum sylvaticum* | **T14P9** | step moss | *Hylocomium splendens* | 10 |
| **OT2P10** | Low bush-cranberry | *Viburnum edule* | **T14P9** | common Labrador tea | *Ledum groenlandicum* | 1 |
| **OT2P10** | Sweet scented bedstraw | *Galium triflorum* | **T14P9** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT2P10** | Bristly Black Currant | *Ribes lacustre* | **T14P9** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT2P10** | Bunchberry | *Cornus canadensis* | **T14P9** | common haircap moss | *Polytrichum commune* | 1 |
| **OT2P10** | Common mitrewort | *Mitella nuda* | **T14P9** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT2P10** | Showy aster | *Aster conspicuus* | **T14P9** | three-leaved Solomon's-seal | *Smilacina trifolia* | 5 |
| **OT2P10** | Green wintergreen | *Pyrola virens* | **T14P9** | sphagnum | *Sphagnum fuscum* | 40 |
| **OT2P10** | Woodland strawberry | *Fragaria vesca* | **T14P9** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT2P10** | Canada violet | *Viola canadensis* | **T15P1** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P10** | Baneberry | *Actaea rubra* | **T15P1** | step moss | *Hylocomium splendens* | 50 |
| **OT2P11** | Tall Larkspur | *Delphinium glaucum* | **T15P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT2P11** | Prickly rose | *Rosa acicularis* | **T15P1** | common Labrador tea | *Ledum groenlandicum* | 1 |
| **OT2P11** | Red-osier dogwood | *Cornus stolinifera* | **T15P1** | Schreber's moss | *Pleurozium schreberi* | 30 |
| **OT2P11** | Dewberry | *Rubus pubescens* | **T15P1** | plume moss | *Ptilium crista-castrensis* | 30 |
| **OT2P11** | Sweet scented bedstraw | *Galium triflorum* | **T15P1** | prickly rose | *Rosa acicularis* | 5 |
| **OT2P11** | Bristly Black Currant | *Ribes lacustre* | **T15P1** | low-bush cranberry | *Viburnum edule* | 5 |
| **OT2P11** | Baneberry | *Actaea rubra* | **T15P10** | Reindeer Lichen | *Cladina rangifera* | 5 |
| **OT2P11** | Showy aster | *Aster conspicuus* | **T15P10** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P11** | Woodland strawberry | *Fragaria vesca* | **T15P10** | step moss | *Hylocomium splendens* | 60 |
| **OT2P11** | Canada violet | *Viola canadensis* | **T15P10** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT2P11** | Bluejoint | *Calamagrostis canadensis* | **T15P10** | common haircap moss | *Polytrichum commune* | 5 |
| **OT2P11** | Green alder | *Alnus crispa* | **T15P10** | plume moss | *Ptilium crista-castrensis* | 5 |
| **OT2P11** | Common horsetail | *Equisetum pratense* | **T15P10** | currants | *Ribes sp* | 10 |
| **OT2P11** | River alder | *Alnus tenuifolia* | **T15P10** | prickly rose | *Rosa acicularis* | 1 |
| **OT2P11** | Sarsaparilla | *Aralia nudicaulis* | **T15P2** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P11** | Low bush-cranberry | *Viburnum edule* | **T15P2** | step moss | *Hylocomium splendens* | 30 |
| **OT2P11** | Common mitrewort | *Mitella nuda* | **T15P2** | twinflower | *Linnaea borealis* | 1 |
| **OT2P11** | Tall lungwort | *Mertensia paniculata* | **T15P2** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT2P11** | Fireweed | *Epilobium angustifolium* | **T15P2** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT2P12** | Labrador tea | *Ledum groenlandicum* | **T15P2** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P12** | Bunchberry | *Cornus canadensis* | **T15P2** | dicranum mosses | *Dicranum sp* | 1 |
| **OT2P12** | Reindeer lichen | *Cladina rangiferina* | **T15P3** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P12** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T15P3** | step moss | *Hylocomium splendens* | 10 |
| **OT2P12** | Bog cranberry | *Vaccinium vitis-idaea* | **T15P3** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT2P12** | Haircap moss | *Polytrichum sp* | **T15P3** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P12** | Sphagnum moss | *Sphagnum sp* | **T15P4** | common Labrador tea | *Ledum groenlandicum* | 70 |
| **OT2P12** | Broom moss | *Dicranum sp* | **T15P4** | cloudberry | *Rubus chamaemorus* | 5 |
| **OT2P12** | Cloudberry | *Rubus chamaemorus* | **T15P4** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT2P12** | Common horsetail | *Equisetum pratense* | **T15P4** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P12** | Twinflower | *Linnaeus borealis* | **T15P5** | Reindeer Lichen | *Cladina rangifera* | 1 |
| **OT2P12** | Willow | *Salix sp* | **T15P5** | common Labrador tea | *Ledum groenlandicum* | 20 |
| **OT2P12** | Velvet-leaf blueberry | *Vaccinium myrtilloides* | **T15P5** | cloudberry | *Rubus chamaemorus* | 1 |
| **OT2P13** | Prickly rose | *Rosa acicularis* | **T15P5** | Hudson Bay bulrush | *Scirpus hudsonianus* | 1 |
| **OT2P13** | Common horsetail | *Equisetum pratense* | **T15P5** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT2P13** | Fireweed | *Epilobium angustifolium* | **T15P5** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT2P13** | Labrador tea | *Ledum groenlandicum* | **T15P6** | step moss | *Hylocomium splendens* | 60 |
| **OT2P13** | Bunchberry | *Cornus canadensis* | **T15P6** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT2P13** | Reindeer lichen | *Cladina rangiferina* | **T15P6** | plume moss | *Ptilium crista-castrensis* | 25 |
| **OT2P13** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T15P7** | bunchberry | *Cornus canadensis* | 15 |
| **OT2P13** | Bog cranberry | *Vaccinium vitis-idaea* | **T15P7** | step moss | *Hylocomium splendens* | 40 |
| **OT2P13** | Twinflower | *Linnaeus borealis* | **T15P7** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT2P13** | Wild lily of the valley | *Maianthemum canadense* | **T15P7** | plume moss | *Ptilium crista-castrensis* | 15 |
| **OT2P13** | Bromus Grass | *Bromus sp* | **T15P7** | prickly rose | *Rosa acicularis* | 5 |
| **OT2P13** | Schrebers moss | *Pleurozium schreberi* | **T15P7** | common blueberry | *Vaccinium myrtilloides* | 1 |
| **OT2P13** | Step moss | *Hylocomium splendens* | **T15P8** | bunchberry | *Cornus canadensis* | 15 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P14** | White birch | *Betula papyrifera* | **T15P8** | step moss | *Hylocomium splendens* | 40 |
| **OT2P14** | Canada Buffaloberry | *Shepherdia canadensis* | **T15P8** | twinflower | *Linnaea borealis* | 1 |
| **OT2P14** | Prickly rose | *Rosa acicularis* | **T15P8** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT2P14** | Bunchberry | *Cornus canadensis* | **T15P8** | plume moss | *Ptilium crista-castrensis* | 15 |
| **OT2P14** | Woodland horsetail | *Equisetum sylvaticum* | **T15P9** | bunchberry | *Cornus canadensis* | 15 |
| **OT2P14** | Twinflower | *Linnaea borealis* | **T15P9** | step moss | *Hylocomium splendens* | 60 |
| **OT2P14** | Fireweed | *Epilobium angustifolium* | **T15P9** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT2P14** | Yarrow | *Achillea millefolium* | **T15P9** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT2P14** | Tamarack | *Larix laricina* | **T15P9** | currants | *Ribes sp* | 1 |
| **OT2P14** | Tall lungwort | *Mertensia paniculata* | **T15P9** | prickly rose | *Rosa acicularis* | 25 |
| **OT2P14** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T16P1** | common Labrador tea | *Ledum groenlandicum* | ## |
| **OT2P14** | Bog cranberry | *Vaccinium vitis-idaea* | **T16P1** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT2P14** | Schrebers moss | *Pleurozium schreberi* | **T16P1** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P14** | Common mitrewort | *Mitella nuda* | **T16P2** | Reindeer Lichen | *Cladina rangifera* | 50 |
| **OT2P14** | Woodland strawberry | *Fragaria vesca* | **T16P2** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT2P14** | Wild red currant | *Ribes triste* | **T16P2** | sphagnum | *Sphagnum fuscum* | 40 |
| **OT2P14** | Stiff clubmoss | *Lycopodium annotinum* | **T16P2** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT2P14** | Green wintergreen | *Pyrola virens* | **T16P3** | common horsetail | *Equisetum arvense* | 5 |
| **OT2P14** | Grass of parnassus | *Parnassia palustris* | **T16P3** | step moss | *Hylocomium splendens* | 100 |
| **OT2P14** | Blunt-leaved orchid | *Habenaria obtusata* | **T16P3** | common Labrador tea | *Ledum groenlandicum* | 10 |
| **OT2P14** | American milkvetch | *Astragalus americanus* | **T16P3** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P14** | One-sided wintergreen | *Pyrola secunda* | **T16P3** | common blueberry | *Vaccinium myrtilloides* | 5 |
| **OT2P14** | Wild vetch | *Vicia americana* | **T16P4** | bunchberry | *Cornus canadensis* | 1 |
| **OT2P15** | Prickly rose | *Rosa acicularis* | **T16P4** | step moss | *Hylocomium splendens* | 70 |
| **OT2P15** | Bunchberry | *Cornus canadensis* | **T16P4** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT2P15** | Tall lungwort | *Mertensia paniculata* | **T16P4** | Schreber's moss | *Pleurozium schreberi* | 30 |
| **OT2P15** | Showy aster | *Aster conspicuus* | **T16P4** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P15** | Creamy peavine | *Lathyrus ochroleucus* | **T16P4** | common blueberry | *Vaccinium myrtilloides* | 1 |
| **OT2P15** | Northern bedstraw | *Galium boreale* | **T16P5** | bunchberry | *Cornus canadensis* | 15 |
| **OT2P15** | Low bush-cranberry | *Viburnum edule* | **T16P5** | tall larkspur | *Delphinium glaucum* | 10 |
| **OT2P15** | Canada Buffaloberry | *Shepherdia canadensis* | **T16P5** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT2P15** | Woodland horsetail | *Equisetum sylvaticum* | **T16P5** | step moss | *Hylocomium splendens* | 1 |
| **OT2P15** | Twinflower | *Linnaea borealis* | **T16P5** | cream-colored vetchling | *Lathyrus ochroleucus* | 15 |
| **OT2P15** | Fireweed | *Epilobium angustifolium* | **T16P5** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT2P15** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T16P5** | plume moss | *Ptilium crista-castrensis* | 50 |
| **OT2P15** | Schrebers moss | *Pleurozium schreberi* | **T16P5** | common pink wintergreen | *Pyrola asarifolia* | 25 |
| **OT2P15** | Grass of parnassus | *Parnassia palustris* | **T16P5** | currants | *Ribes sp* | 5 |
| **OT2P15** | Labrador tea | *Ledum groenlandicum* | **T16P5** | prickly rose | *Rosa acicularis* | 20 |
| **OT2P15** | Step moss | *Hylocomium splendens* | **T16P5** | common blueberry | *Vaccinium myrtilloides* | 5 |
| **OT2P15** | Low bush-cranberry | *Viburnum edule* | **T16P6** | bunchberry | *Cornus canadensis* | 20 |
| **OT2P15** | Dwarf birch | *Betula pumila* | **T16P6** | tall larkspur | *Delphinium glaucum* | 5 |
| **OT2P16** | Sweet scented bedstraw | *Galium triflorum* | **T16P6** | step moss | *Hylocomium splendens* | 1 |
| **OT2P16** | Northern bedstraw | *Galium boreale* | **T16P6** | twinflower | *Linnaea borealis* | 1 |
| **OT2P16** | Prickly rose | *Rosa acicularis* | **T16P6** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT2P16** | Bunchberry | *Cornus canadensis* | **T16P6** | currants | *Ribes sp* | 1 |
| **OT2P16** | Tall lungwort | *Mertensia paniculata* | **T16P6** | prickly rose | *Rosa acicularis* | 15 |
| **OT2P16** | Woodland horsetail | *Equisetum sylvaticum* | **T16P7** | bunchberry | *Cornus canadensis* | 10 |
| **OT2P16** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T16P7** | common fireweed | *Epilobium angustifolium* | 15 |
| **OT2P16** | Canada Buffaloberry | *Shepherdia canadensis* | **T16P7** | step moss | *Hylocomium splendens* | 1 |
| **OT2P16** | Twinflower | *Linnaea borealis* | **T16P7** | twinflower | *Linnaea borealis* | 40 |
| **OT2P16** | Fireweed | *Epilobium angustifolium* | **T16P7** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT2P16** | Schrebers moss | *Pleurozium schreberi* | **T16P7** | currants | *Ribes sp* | 35 |
| **OT2P16** | Common mitrewort | *Mitella nuda* | **T16P7** | prickly rose | *Rosa acicularis* | 20 |
| **OT2P16** | Woodland strawberry | *Fragaria vesca* | **T16P8** | bunchberry | *Cornus canadensis* | 10 |
| **OT2P16** | Common horsetail | *Equisetum pratense* | **T16P8** | tall larkspur | *Delphinium glaucum* | 5 |
| **OT2P16** | Tall Larkspur | *Delphinium glaucum* | **T16P8** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT2P16** | Red-osier dogwood | *Cornus stolinifera* | **T16P8** | twinflower | *Linnaea borealis* | 5 |
| **OT2P16** | Dewberry | *Rubus pubescens* | **T16P8** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT2P16** | Low bush-cranberry | *Viburnum edule* | **T16P8** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT2P16** | Lindsay's aster | *Aster ciliatus* | **T16P8** | currants | *Ribes sp* | 20 |
| **OT2P16** | Sarsaparilla | *Aralia nudicaulis* | **T16P8** | prickly rose | *Rosa acicularis* | 10 |
| **OT2P16** | Bristly Black Currant | *Ribes lacustre* | **T16P9** | bunchberry | *Cornus canadensis* | 5 |
| **OT2P16** | River alder | *Alnus tennuifolia* | **T16P9** | step moss | *Hylocomium splendens* | 100 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P16** | Twining honeysuckle | *Lonicera dioica* | **T16P9** | step moss | *Hylocomium splendens* | 60 |
| **OT2P16** | Rattlesnake plantain | *Goodyera repens* | **T16P9** | twinflower | *Linnaea borealis* | 10 |
| **OT2P16** | Creamy peavine | *Lathyrus ochroleucus* | **T16P9** | prickly rose | *Rosa acicularis* | 15 |
| **OT2P16** | Sickle moss | *Drepanocladus uncinatus* | **T16P9** | Canada buffaloberry | *Sheperdia canadensis* | 5 |
| **OT2P16** | Trembling aspen | *Populus tremuloides* | **T17P1** | Reindeer Lichen | *Cladina rangifera* | 100 |
| **OT2P16** | One flowered wintergreen | *Moneses uniflora* | **T17P1** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT2P16** | Northern gooseberry | *Ribes oxyacanthoides* | **T17P1** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT2P16** | False lily-of-the-valley | *Maianthemum canadense* | **T17P10** | common yarrow | *Achillea millefolium* | 5 |
| **OT2P16** | Green wintergreen | *Pyrola virens* | **T17P10** | common fireweed | *Epilobium angustifolium* | 10 |
| **OT2P16** | Blunt leaved orcid | *Habenaria orbiculata* | **T17P10** | common horsetail | *Equisetum arvense* | 20 |
| **OT2P17** | Sweet scented bedstraw | *Galium triflorum* | **T17P10** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT2P17** | Prickly rose | *Rosa acicularis* | **T17P10** | prickly rose | *Rosa acicularis* | 10 |
| **OT2P17** | Bunchberry | *Cornus canadensis* | **T17P11** | common fireweed | *Epilobium angustifolium* | 15 |
| **OT2P17** | Tall lungwort | *Mertensia paniculata* | **T17P11** | common horsetail | *Equisetum arvense* | 1 |
| **OT2P17** | Woodland horsetail | *Equisetum sylvaticum* | **T17P11** | step moss | *Hylocomium splendens* | 30 |
| **OT2P17** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T17P11** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT2P17** | Canada Buffaloberry | *Shepherdia canadensis* | **T17P11** | common haircap moss | *Polytrichum commune* | 1 |
| **OT2P17** | Twinflower | *Linnaea borealis* | **T17P11** | prickly rose | *Rosa acicularis* | 20 |
| **OT2P17** | Fireweed | *Epilobium angustifolium* | **T17P11** | dewberry | *Rubus pubescens* | 5 |
| **OT2P17** | Common mitrewort | *Mitella nuda* | **T17P11** | Arctic starflower | *Trientalis europaea* | 5 |
| **OT2P17** | Woodland strawberry | *Fragaria vesca* | **T17P12** | common yarrow | *Achillea millefolium* | 5 |
| **OT2P17** | Dewberry | *Rubus pubescens* | **T17P12** | common fireweed | *Epilobium angustifolium* | 30 |
| **OT2P17** | Low bush-cranberry | *Viburnum edule* | **T17P12** | common horsetail | *Equisetum arvense* | 1 |
| **OT2P17** | Kidney-leaved violet | *Viola renifolia* | **T17P12** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT2P17** | Showy aster | *Aster conspicuus* | **T17P12** | twinflower | *Linnaea borealis* | 10 |
| **OT2P17** | Plume moss | *Ptilium crista-castrensis* | **T17P12** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT2P17** | Creamy peavine | *Lathyrus ochroleucus* | **T17P12** | plume moss | *Ptilium crista-castrensis* | 5 |
| **OT2P17** | Northern bedstraw | *Galium boreale* | **T17P12** | currants | *Ribes sp* | 15 |
| **OT2P17** | Green alder | *Alnus crispa* | **T17P12** | dewberry | *Rubus pubescens* | 20 |
| **OT2P17** | Labrador tea | *Ledum groenlandicum* | **T17P12** | common dandelion | *Taraxacum officinale* | 1 |
| **OT2P17** | White birch | *Betula papyrifera* | **T17P12** | Arctic starflower | *Trientalis europaea* | 5 |
| **OT2P17** | Yarrow | *Achillea millefolium* | **T17P2** | bog birch | *Betula glandulosa* | 10 |
| **OT2P17** | Sphagnum moss | *Sphagnum sp* | **T17P2** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT2P17** | Schrebers moss | *Pleurozium schreberi* | **T17P2** | willows | *Salix sp* | 20 |
| **OT2P17** | Jacob's ladder | *Polemonium caeruleum* | **T17P2** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT2P18** | Sweet scented bedstraw | *Galium triflorum* | **T17P2** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT2P18** | Prickly rose | *Rosa acicularis* | **T17P3** | bog birch | *Betula glandulosa* | 10 |
| **OT2P18** | Bunchberry | *Cornus canadensis* | **T17P3** | common Labrador tea | *Ledum groenlandicum* | 5 |
| **OT2P18** | Tall lungwort | *Mertensia paniculata* | **T17P3** | marsh cinquefoil | *Potentilla palustris* | 1 |
| **OT2P18** | Woodland horsetail | *Equisetum sylvaticum* | **T17P3** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT2P18** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T17P3** | willows | *Salix sp* | 5 |
| **OT2P18** | Twinflower | *Linnaea borealis* | **T17P3** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT2P18** | Fireweed | *Epilobium angustifolium* | **T17P4** | blue columbine | *Aquilegia brevistyla* | 1 |
| **OT2P18** | Common mitrewort | *Mitella nuda* | **T17P4** | tree moss | *Climacium dendroides* | 1 |
| **OT2P18** | Dewberry | *Rubus pubescens* | **T17P5** | common yarrow | *Achillea millefolium* | 1 |
| **OT2P18** | Low bush-cranberry | *Viburnum edule* | **T17P5** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT2P18** | Showy aster | *Aster conspicuus* | **T17P5** | common horsetail | *Equisetum arvense* | 1 |
| **OT2P18** | Creamy peavine | *Lathyrus ochroleucus* | **T17P5** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT2P18** | Tall Larkspur | *Delphinium glaucum* | **T17P5** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT2P18** | Red-osier dogwood | *Cornus stolinifera* | **T17P5** | currants | *Ribes sp* | 35 |
| **OT2P18** | Rattlesnake plantain | *Goodyera repens* | **T17P5** | wild red raspberry | *Rubus idaeus* | 10 |
| **OT2P18** | Sickle moss | *Drepanocladus uncinatus* | **T17P6** | common fireweed | *Epilobium angustifolium* | 15 |
| **OT2P18** | Lindsay's aster | *Aster ciliatus* | **T17P6** | common horsetail | *Equisetum arvense* | 25 |
| **OT2P18** | Sarsaparilla | *Aralia nudicaulis* | **T17P6** | currants | *Ribes sp* | 5 |
| **OT2P18** | Bristly Black Currant | *Ribes lacustre* | **T17P7** | common fireweed | *Epilobium angustifolium* | 10 |
| **OT2P18** | River alder | *Alnus tennuifolia* | **T17P7** | common horsetail | *Equisetum arvense* | 15 |
| **OT2P18** | Twining honeysuckle | *Lonicera dioica* | **T17P7** | palmate-leaved coltsfoot | *Petasites palmatus* | 1 |
| **OT2P19** | Sweet scented bedstraw | *Galium triflorum* | **T17P7** | Northern gooseberry | *Ribes oxyacanthoides* | 15 |
| **OT2P19** | Prickly rose | *Rosa acicularis* | **T17P7** | dewberry | *Rubus pubescens* | 5 |
| **OT2P19** | Bunchberry | *Cornus canadensis* | **T17P7** | Arctic starflower | *Trientalis europaea* | 1 |
| **OT2P19** | Tall lungwort | *Mertensia paniculata* | **T17P8** | bunchberry | *Cornus canadensis* | 10 |
| **OT2P19** | Woodland horsetail | *Equisetum sylvaticum* | **T17P8** | tall larkspur | *Delphinium glaucum* | 5 |
| **OT2P19** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T17P8** | common horsetail | *Equisetum arvense* | 30 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P19** | Twinflower | *Linnaea borealis* | **T17P8** | twinflower | *Linnaea borealis* | 10 |
| **OT2P19** | Fireweed | *Epilobium angustifolium* | **T17P8** | palmate-leaved coltsfoot | *Petasites palmatus* | 1 |
| **OT2P19** | Common mitrewort | *Mitella nuda* | **T17P8** | Northern gooseberry | *Ribes oxyacanthoides* | 10 |
| **OT2P19** | Common horsetail | *Equisetum pratense* | **T17P8** | dwarf raspberry | *Rubus acaulis* | 5 |
| **OT2P19** | Tall Larkspur | *Delphinium glaucum* | **T17P9** | bunchberry | *Cornus canadensis* | 5 |
| **OT2P19** | Dewberry | *Rubus pubescens* | **T17P9** | tall larkspur | *Delphinium glaucum* | 10 |
| **OT2P19** | Low bush-cranberry | *Viburnum edule* | **T17P9** | common horsetail | *Equisetum arvense* | 30 |
| **OT2P19** | Lindsay's aster | *Aster ciliatus* | **T17P9** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT2P19** | Plume moss | *Ptilium crista-castrensis* | **T17P9** | naked bishop's-cap | *Mitella nuda* | 20 |
| **OT2P19** | River alder | *Alnus tennuifolia* | **T17P9** | prickly rose | *Rosa acicularis* | 60 |
| **OT2P19** | Twining honeysuckle | *Lonicera dioica* | **T17P9** | dewberry | *Rubus pubescens* | 30 |
| **OT2P19** | Labrador tea | *Ledum groenlandicum* | **T17P9** | Arctic starflower | *Trientalis europaea* | 1 |
| **OT2P19** | Willow | *Salix sp* | **T18P1** | bunchberry | *Cornus canadensis* | 30 |
| **OT2P19** | Canada violet | *Viola canadensis* | **T18P1** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT2P19** | Saskatoon berry | *Amalanchier alnifolia* | **T18P1** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT2P20** | Sweet scented bedstraw | *Galium triflorum* | **T18P1** | step moss | *Hylocomium splendens* | 20 |
| **OT2P20** | Prickly rose | *Rosa acicularis* | **T18P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 15 |
| **OT2P20** | Bunchberry | *Cornus canadensis* | **T18P1** | twinflower | *Linnaea borealis* | 5 |
| **OT2P20** | Tall lungwort | *Mertensia paniculata* | **T18P1** | naked bishop's-cap | *Mitella nuda* | 10 |
| **OT2P20** | Woodland horsetail | *Equisetum sylvaticum* | **T18P1** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT2P20** | Twinflower | *Linnaea borealis* | **T18P1** | prickly rose | *Rosa acicularis* | 25 |
| **OT2P20** | Fireweed | *Epilobium angustifolium* | **T18P1** | dewberry | *Rubus pubescens* | 20 |
| **OT2P20** | Common mitrewort | *Mitella nuda* | **T18P1** | low-bush cranberry | *Viburnum edule* | 30 |
| **OT2P20** | Tall Larkspur | *Delphinium glaucum* | **T18P10** | common horsetail | *Equisetum arvense* | 10 |
| **OT2P20** | Dewberry | *Rubus pubescens* | **T18P10** | Northern bedstraw | *Galium boreale* | 5 |
| **OT2P20** | Low bush-cranberry | *Viburnum edule* | **T18P10** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT2P20** | River alder | *Alnus tennuifolia* | **T18P10** | palmate-leaved coltsfoot | *Petasites palmatus* | 1 |
| **OT2P20** | Twining honeysuckle | *Lonicera dioica* | **T18P10** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT2P20** | Canada violet | *Viola canadensis* | **T18P10** | common pink wintergreen | *Pyrola asarifolia* | 20 |
| **OT2P20** | Showy aster | *Aster conspicuus* | **T18P10** | dewberry | *Rubus pubescens* | 20 |
| **OT2P20** | Creamy peavine | *Lathyrus ochroleucus* | **T18P10** | dwarf raspberry | *Rubus acaulis* | 10 |
| **OT2P20** | Schrebers moss | *Pleurozium schreberi* | **T18P10** | Arctic starflower | *Trientalis europaea* | 1 |
| **OT2P20** | Kidney-leaved violet | *Viola renifolia* | **T18P2** | bunchberry | *Cornus canadensis* | 10 |
| **OT2P20** | Rattlesnake plantain | *Goodyera repens* | **T18P2** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT2P20** | Bristly Black Currant | *Ribes lacustre* | **T18P2** | fairybells | *Disporum trachycarpum* | 10 |
| **OT2P20** | Fly honeysuckle | *Lonicera caerulea* | **T18P2** | step moss | *Hylocomium splendens* | 15 |
| **OT2P21** | Sweet scented bedstraw | *Galium triflorum* | **T18P2** | twining honeysuckle | *Lonicera dioica* | 40 |
| **OT2P21** | Northern bedstraw | *Galium boreale* | **T18P2** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT2P21** | Prickly rose | *Rosa acicularis* | **T18P2** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT2P21** | Bunchberry | *Cornus canadensis* | **T18P2** | prickly rose | *Rosa acicularis* | 30 |
| **OT2P21** | Tall lungwort | *Mertensia paniculata* | **T18P2** | dewberry | *Rubus pubescens* | 20 |
| **OT2P21** | Woodland horsetail | *Equisetum sylvaticum* | **T18P2** | low-bush cranberry | *Viburnum edule* | 20 |
| **OT2P21** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T18P3** | bunchberry | *Cornus canadensis* | 10 |
| **OT2P21** | Fireweed | *Epilobium angustifolium* | **T18P3** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT2P21** | Schrebers moss | *Pleurozium schreberi* | **T18P3** | fairybells | *Disporum trachycarpum* | 5 |
| **OT2P21** | Common mitrewort | *Mitella nuda* | **T18P3** | step moss | *Hylocomium splendens* | 40 |
| **OT2P21** | Woodland strawberry | *Fragaria vesca* | **T18P3** | twinflower | *Linnaea borealis* | 20 |
| **OT2P21** | Common horsetail | *Equisetum pratense* | **T18P3** | common pink wintergreen | *Pyrola asarifolia* | 10 |
| **OT2P21** | Tall Larkspur | *Delphinium glaucum* | **T18P3** | prickly rose | *Rosa acicularis* | 40 |
| **OT2P21** | Dewberry | *Rubus pubescens* | **T18P3** | three-leaved Solomon's-seal | *Smilacina trifolia* | 5 |
| **OT2P21** | Low bush-cranberry | *Viburnum edule* | **T18P3** | common blueberry | *Vaccinium myrtilloides* | 10 |
| **OT2P21** | Lindsay's aster | *Aster ciliatus* | **T18P3** | low-bush cranberry | *Viburnum edule* | 5 |
| **OT2P21** | River alder | *Alnus tennuifolia* | **T18P4** | bunchberry | *Cornus canadensis* | 40 |
| **OT2P21** | Creamy peavine | *Lathyrus ochroleucus* | **T18P4** | tall larkspur | *Delphinium glaucum* | 5 |
| **OT2P21** | American milkvetch | *Astragalus americanus* | **T18P4** | fairybells | *Disporum trachycarpum* | 5 |
| **OT2P21** | Twining honeysuckle | *Lonicera dioica* | **T18P4** | prickly rose | *Rosa acicularis* | 60 |
| **OT2P21** | Kidney-leaved violet | *Viola renifolia* | **T18P4** | low-bush cranberry | *Viburnum edule* | 80 |
| **OT2P21** | Fly honeysuckle | *Lonicera caerulea* | **T18P5** | bastard toadflax | *Comandra umbellata* | 30 |
| **OT2P21** | Plume moss | *Ptilium crista-castrensis* | **T18P5** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT2P21** | Baneberry | *Actaea rubra* | **T18P5** | common horsetail | *Equisetum arvense* | 1 |
| **OT2P22** | Northern bedstraw | *Galium boreale* | **T18P5** | step moss | *Hylocomium splendens* | 30 |
| **OT2P22** | Prickly rose | *Rosa acicularis* | **T18P5** | twinflower | *Linnaea borealis* | 50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P22** | Bunchberry | *Cornus canadensis* | **T18P5** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT2P22** | Tall lungwort | *Mertensia paniculata* | **T18P5** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT2P22** | Woodland horsetail | *Equisetum sylvaticum* | **T18P5** | low-bush cranberry | *Viburnum edule* | 10 |
| **OT2P22** | Fireweed | *Epilobium angustifolium* | **T18P6** | common horsetail | *Equisetum arvense* | 70 |
| **OT2P22** | Common mitrewort | *Mitella nuda* | **T18P6** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT2P22** | Common horsetail | *Equisetum pratense* | **T18P6** | twinflower | *Linnaea borealis* | 1 |
| **OT2P22** | Tall Larkspur | *Delphinium glaucum* | **T18P6** | cloudberry | *Rubus chamaemorus* | 1 |
| **OT2P22** | Low bush-cranberry | *Viburnum edule* | **T18P6** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT2P22** | Kidney-leaved violet | *Viola renifolia* | **T18P6** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT2P22** | Baneberry | *Actaea rubra* | **T18P7** | bastard toadflax | *Comandra umbellata* | 1 |
| **OT2P22** | Twinflower | *Linnaea borealis* | **T18P7** | common horsetail | *Equisetum arvense* | 20 |
| **OT2P22** | Red-osier dogwood | *Cornus stolinifera* | **T18P7** | Northern bedstraw | *Galium boreale* | 5 |
| **OT2P22** | Bristly Black Currant | *Ribes lacustre* | **T18P7** | Northern bedstraw | *Galium boreale* | 5 |
| **OT2P22** | Showy aster | *Aster conspicuus* | **T18P7** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT2P22** | Saskatoon berry | *Amalanchier alnifolia* | **T18P7** | palmate-leaved coltsfoot | *Petasites palmatus* | 5 |
| **OT2P22** | Cow parsnip | *Heracleum lanatum* | **T18P7** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT2P22** | Green wintergreen | *Pyrola virens* | **T18P7** | common pink wintergreen | *Pyrola asarifolia* | 10 |
| **OT2P23** | Sweet scented bedstraw | *Galium triflorum* | **T18P7** | common pink wintergreen | *Pyrola asarifolia* | 5 |
| **OT2P23** | Prickly rose | *Rosa acicularis* | **T18P7** | dewberry | *Rubus pubescens* | 10 |
| **OT2P23** | Tall lungwort | *Mertensia paniculata* | **T18P7** | dwarf raspberry | *Rubus acaulis* | 30 |
| **OT2P23** | Woodland horsetail | *Equisetum sylvaticum* | **T18P7** | wild red raspberry | *Rubus idaeus* | 30 |
| **OT2P23** | Fireweed | *Epilobium angustifolium* | **T18P7** | Arctic starflower | *Trientalis europaea* | 1 |
| **OT2P23** | Common mitrewort | *Mitella nuda* | **T18P7** | low-bush cranberry | *Viburnum edule* | 5 |
| **OT2P23** | Tall Larkspur | *Delphinium glaucum* | **T18P9** | bastard toadflax | *Comandra umbellata* | 15 |
| **OT2P23** | Dewberry | *Rubus pubescens* | **T18P9** | bunchberry | *Cornus canadensis* | 10 |
| **OT2P23** | Fly honeysuckle | *Lonicera caerulea* | **T18P9** | common horsetail | *Equisetum arvense* | 10 |
| **OT2P23** | Willow | *Salix sp* | **T18P9** | step moss | *Hylocomium splendens* | 1 |
| **OT2P23** | Raspberry | *Rubus ideaus* | **T18P9** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT2P23** | Bristly Black Currant | *Ribes lacustre* | **T18P9** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT2P23** | Cow parsnip | *Heracleum lanatum* | **T18P9** | cloudberry | *Rubus chamaemorus* | 5 |
| **OT2P23** | Red-osier dogwood | *Cornus stolinifera* | **T18P9** | sphagnum | *Sphagnum fuscum* | 10 |
| **OT2P23** | Baneberry | *Actea rubra* | **T19P1** | bunchberry | *Cornus canadensis* | 15 |
| **OT2P23** | Jewelweed | *Impatiens capensis* | **T19P1** | step moss | *Hylocomium splendens* | 80 |
| **OT2P23** | Stinging nettle | *Urtica doica* | **T19P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT2P23** | Shield fern | *Dryopteris carthusiana* | **T19P1** | twinflower | *Linnaea borealis* | 30 |
| **OT2P23** | Canada violet | *Viola canadensis* | **T19P1** | common pink wintergreen | *Pyrola asarifolia* | 5 |
| **OT2P23** | Wild red currant | *Ribes triste* | **T19P1** | prickly rose | *Rosa acicularis* | 10 |
| **OT2P24** | Sweet scented bedstraw | *Galium triflorum* | **T19P1** | dewberry | *Rubus pubescens* | 10 |
| **OT2P24** | Prickly rose | *Rosa acicularis* | **T19P1** | low-bush cranberry | *Viburnum edule* | 20 |
| **OT2P24** | Tall lungwort | *Mertensia paniculata* | **T19P10** | common horsetail | *Equisetum arvense* | 10 |
| **OT2P24** | Woodland horsetail | *Equisetum sylvaticum* | **T19P10** | common Labrador tea | *Ledum groenlandicum* | 10 |
| **OT2P24** | Fireweed | *Epilobium angustifolium* | **T19P10** | palmate-leaved coltsfoot | *Petasites palmatus* | 5 |
| **OT2P24** | Common mitrewort | *Mitella nuda* | **T19P10** | plume moss | *Ptilium crista-castrensis* | 30 |
| **OT2P24** | Tall Larkspur | *Delphinium glaucum* | **T19P10** | cloudberry | *Rubus chamaemorus* | 10 |
| **OT2P24** | Dewberry | *Rubus pubescens* | **T19P10** | dewberry | *Rubus pubescens* | 1 |
| **OT2P24** | Fly honeysuckle | *Lonicera caerulea* | **T19P10** | three-leaved Solomon's-seal | *Smilacina trifolia* | 5 |
| **OT2P24** | Canada violet | *Viola canadensis* | **T19P10** | sphagnum | *Sphagnum fuscum* | 50 |
| **OT2P24** | Raspberry | *Rubus ideaus* | **T19P2** | bunchberry | *Cornus canadensis* | 20 |
| **OT2P24** | Bristly Black Currant | *Ribes lacustre* | **T19P2** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT2P24** | Cow parsnip | *Heracleum lanatum* | **T19P2** | step moss | *Hylocomium splendens* | 40 |
| **OT2P24** | Red-osier dogwood | *Cornus stolinifera* | **T19P2** | twinflower | *Linnaea borealis* | 15 |
| **OT2P24** | Baneberry | *Actea rubra* | **T19P2** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT2P24** | Shield fern | *Dryopteris carthusiana* | **T19P2** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT2P25** | Northern bedstraw | *Galium boreale* | **T19P2** | prickly rose | *Rosa acicularis* | 10 |
| **OT2P25** | Prickly rose | *Rosa acicularis* | **T19P2** | Canada buffaloberry | *Sheperdia canadensis* | 35 |
| **OT2P25** | Bunchberry | *Cornus canadensis* | **T19P2** | low-bush cranberry | *Viburnum edule* | 20 |
| **OT2P25** | Tall lungwort | *Mertensia paniculata* | **T19P3** | common yarrow | *Achillea millefolium* | 1 |
| **OT2P25** | Twinflower | *Linnaea borealis* | **T19P3** | bunchberry | *Cornus canadensis* | 15 |
| **OT2P25** | Fireweed | *Epilobium angustifolium* | **T19P3** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT2P25** | Common mitrewort | *Mitella nuda* | **T19P3** | fairybells | *Disporum trachycarpum* | 1 |
| **OT2P25** | Dewberry | *Rubus pubescens* | **T19P3** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT2P25** | Low bush-cranberry | *Viburnum edule* | **T19P3** | step moss | *Hylocomium splendens* | 40 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT2P25** | Lindsay's aster | *Aster ciliatus* | **T19P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT2P25** | Sarsaparilla | *Aralia nudicaulis* | **T19P3** | twinflower | *Linnaea borealis* | 15 |
| **OT2P25** | Creamy peavine | *Lathyrus ochroleucus* | **T19P3** | tall lungwort | *Mertensia paniculata* | 10 |
| **OT2P25** | Green alder | *Alnus crispa* | **T19P3** | naked bishop's-cap | *Mitella nuda* | 10 |
| **OT2P25** | Fly honeysuckle | *Lonicera caerulea* | **T19P3** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT2P25** | Kidney-leaved violet | *Viola renifolia* | **T19P3** | plume moss | *Ptilium crista-castrensis* | 5 |
| **OT2P26** | Northern bedstraw | *Galium boreale* | **T19P3** | common pink wintergreen | *Pyrola asarifolia* | 10 |
| **OT2P26** | Prickly rose | *Rosa acicularis* | **T19P3** | prickly rose | *Rosa acicularis* | 15 |
| **OT2P26** | Bunchberry | *Cornus canadensis* | **T19P3** | dewberry | *Rubus pubescens* | 5 |
| **OT2P26** | Tall lungwort | *Mertensia paniculata* | **T19P3** | Arctic starflower | *Trientalis europaea* | 10 |
| **OT2P26** | Twinflower | *Linnaea borealis* | **T19P3** | low-bush cranberry | *Viburnum edule* | 25 |
| **OT2P26** | Fireweed | *Epilobium angustifolium* | **T19P4** | bunchberry | *Cornus canadensis* | 20 |
| **OT2P26** | Common mitrewort | *Mitella nuda* | **T19P4** | step moss | *Hylocomium splendens* | 40 |
| **OT2P26** | Common horsetail | *Equisetum pratense* | **T19P4** | common Labrador tea | *Ledum groenlandicum* | 5 |
| **OT2P26** | Dewberry | *Rubus pubescens* | **T19P4** | twinflower | *Linnaea borealis* | 5 |
| **OT2P26** | Low bush-cranberry | *Viburnum edule* | **T19P4** | Schreber's moss | *Pleurozium schreberi* | 50 |
| **OT2P26** | River alder | *Alnus tennuifolia* | **T19P4** | low-bush cranberry | *Viburnum edule* | 40 |
| **OT2P26** | Creamy peavine | *Lathyrus ochroleucus* | **T19P5** | bunchberry | *Cornus canadensis* | 15 |
| **OT2P26** | Fly honeysuckle | *Lonicera caerulea* | **T19P5** | bunchberry | *Cornus canadensis* | 15 |
| **OT2P26** | Canada violet | *Viola canadensis* | **T19P5** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT2P26** | Baneberry | *Actea rubra* | **T19P5** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT2P26** | Showy aster | *Aster conspicuus* | **T19P5** | common horsetail | *Equisetum arvense* | 1 |
| **OT2P26** | Saskatoon berry | *Amalanchier alnifolia* | **T19P5** | step moss | *Hylocomium splendens* | 70 |
| **OT3P1** | Prickly rose | *Rosa acicularis* | **T19P5** | step moss | *Hylocomium splendens* | 70 |
| **OT3P1** | Bunchberry | *Cornus canadensis* | **T19P5** | common Labrador tea | *Ledum groenlandicum* | 10 |
| **OT3P1** | Tall lungwort | *Mertensia paniculata* | **T19P5** | twinflower | *Linnaea borealis* | 20 |
| **OT3P1** | Twinflower | *Linnaea borealis* | **T19P5** | twinflower | *Linnaea borealis* | 20 |
| **OT3P1** | Fireweed | *Epilobium angustifolium* | **T19P5** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT3P1** | Common horsetail | *Equisetum pratense* | **T19P5** | prickly rose | *Rosa acicularis* | 30 |
| **OT3P1** | Low bush-cranberry | *Viburnum edule* | **T19P5** | prickly rose | *Rosa acicularis* | 20 |
| **OT3P1** | Creamy peavine | *Lathyrus ochroleucus* | **T19P5** | three-leaved Solomon's-seal | *Smilacina trifolia* | 1 |
| **OT3P1** | Bromus Grass | *Bromus sp?* | **T19P7** | common horsetail | *Equisetum arvense* | 1 |
| **OT3P1** | Woodland horsetail | *Equisetum sylvaticum* | **T19P7** | step moss | *Hylocomium splendens* | 50 |
| **OT3P1** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T19P7** | common Labrador tea | *Ledum groenlandicum* | 30 |
| **OT3P1** | Common mitrewort | *Mitella nuda* | **T19P7** | twinflower | *Linnaea borealis* | 30 |
| **OT3P1** | Tall Larkspur | *Delphinium glaucum* | **T19P7** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT3P1** | Plume moss | *Ptilium crista-castrensis* | **T19P7** | Schreber's moss | *Pleurozium schreberi* | 1 |
| **OT3P1** | Canada violet | *Viola canadensis* | **T19P7** | plume moss | *Ptilium crista-castrensis* | 40 |
| **OT3P1** | Sarsaparilla | *Aralia nudicaulis* | **T19P8** | step moss | *Hylocomium splendens* | 30 |
| **OT3P1** | Dewberry | *Rubus pubescens* | **T19P8** | common Labrador tea | *Ledum groenlandicum* | 30 |
| **OT3P1** | Stiff clubmoss | *Lycopodium annotinum* | **T19P8** | twinflower | *Linnaea borealis* | 10 |
| **OT3P1** | Canada Buffaloberry | *Shepherdia canadensis* | **T19P8** | Schreber's moss | *Pleurozium schreberi* | 50 |
| **OT3P1** | Green wintergreen | *Pyrola virens* | **T19P8** | plume moss | *Ptilium crista-castrensis* | 15 |
| **OT3P1** | Step moss | *Hylocomium splendens* | **T19P8** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT3P1** | Bog cranberry | *Vaccinium vitis-idaea* | **T19P8** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT3P1** | Kidney-leaved violet | *Viola renifolia* | **T19P9** | Reindeer Lichen | *Cladina rangifera* | 60 |
| **OT3P2** | Prickly rose | *Rosa acicularis* | **T19P9** | common horsetail | *Equisetum arvense* | 1 |
| **OT3P2** | Bunchberry | *Cornus canadensis* | **T19P9** | dwarf scouring-rush | *Equisetum scirpoides* | 1 |
| **OT3P2** | Tall lungwort | *Mertensia paniculata* | **T19P9** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT3P2** | Twinflower | *Linnaea borealis* | **T19P9** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT3P2** | Fireweed | *Epilobium angustifolium* | **T19P9** | common haircap moss | *Polytrichum commune* | 5 |
| **OT3P2** | Common horsetail | *Equisetum pratense* | **T19P9** | three-leaved Solomon's-seal | *Smilacina trifolia* | 1 |
| **OT3P2** | Low bush-cranberry | *Viburnum edule* | **T19P9** | sphagnum | *Sphagnum fuscum* | 20 |
| **OT3P2** | Bromus Grass | *Bromus sp* | **T19P9** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT3P2** | Woodland horsetail | *Equisetum sylvaticum* | **T20P1** | bunchberry | *Cornus canadensis* | 25 |
| **OT3P2** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T20P1** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT3P2** | Common mitrewort | *Mitella nuda* | **T20P1** | common fireweed | *Epilobium angustifolium* | 10 |
| **OT3P2** | Tall Larkspur | *Delphinium glaucum* | **T20P1** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT3P2** | Dewberry | *Rubus pubescens* | **T20P1** | Northern bedstraw | *Galium boreale* | 1 |
| **OT3P2** | Bog cranberry | *Vaccinium vitis-idaea* | **T20P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT3P2** | Showy aster | *Aster conspicuus* | **T20P1** | common pink wintergreen | *Pyrola asarifolia* | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT3P2** | Kidney-leaved violet | *Viola renifolia* | **T20P1** | prickly rose | *Rosa acicularis* | 40 |
| **OT3P2** | Willow | *Salix sp* | **T20P1** | low-bush cranberry | *Viburnum edule* | 40 |
| **OT3P2** | Labrador tea | *Ledum groenlandicum* | **T20P10** | common horsetail | *Equisetum arvense* | 20 |
| **OT3P2** | Schrebers moss | *Pleurozium schreberi* | **T20P10** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT3P3** | Prickly rose | *Rosa acicularis* | **T20P10** | cloudberry | *Rubus chamaemorus* | 1 |
| **OT3P3** | Bunchberry | *Cornus canadensis* | **T20P10** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT3P3** | Tall lungwort | *Mertensia paniculata* | **T20P10** | bog cranberry | *Vaccinium vitis-idaea* | 20 |
| **OT3P3** | Twinflower | *Linnaea borealis* | **T20P2** | bunchberry | *Cornus canadensis* | 15 |
| **OT3P3** | Fireweed | *Epilobium angustifolium* | **T20P2** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT3P3** | Common horsetail | *Equisetum pratense* | **T20P2** | step moss | *Hylocomium splendens* | 15 |
| **OT3P3** | Woodland horsetail | *Equisetum sylvaticum* | **T20P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT3P3** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T20P2** | twinflower | *Linnaea borealis* | 10 |
| **OT3P3** | Common mitrewort | *Mitella nuda* | **T20P2** | tall lungwort | *Mertensia paniculata* | 5 |
| **OT3P3** | Dewberry | *Rubus pubescens* | **T20P2** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT3P3** | Bog cranberry | *Vaccinium vitis-idaea* | **T20P2** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT3P3** | Willow | *Salix sp* | **T20P2** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT3P3** | Labrador tea | *Ledum groenlandicum* | **T20P2** | dewberry | *Rubus pubescens* | 30 |
| **OT3P3** | Schrebers moss | *Pleurozium schreberi* | **T20P2** | Canada buffaloberry | *Sheperdia canadensis* | 5 |
| **OT3P3** | Bog birch | *Betula glandulosa* | **T20P2** | low-bush cranberry | *Viburnum edule* | 40 |
| **OT3P3** | Sphagnum moss | *Sphagnum sp* | **T20P3** | bunchberry | *Cornus canadensis* | 20 |
| **OT3P3** | Dwarf birch | *Betula pumila* | **T20P3** | tall larkspur | *Delphinium glaucum* | 5 |
| **OT3P3** | Blunt leaved orchid | *Habenaria obtusata* | **T20P3** | common horsetail | *Equisetum arvense* | 1 |
| **OT3P3** | Rattlesnake plantain | *Goodyera repens* | **T20P3** | step moss | *Hylocomium splendens* | 90 |
| **OT3P3** | Bristly Black Currant | *Ribes lacustre* | **T20P3** | twinflower | *Linnaea borealis* | 15 |
| **OT3P4** | Prickly rose | *Rosa acicularis* | **T20P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT3P4** | Bunchberry | *Cornus canadensis* | **T20P3** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT3P4** | Tall lungwort | *Mertensia paniculata* | **T20P3** | prickly rose | *Rosa acicularis* | 20 |
| **OT3P4** | Twinflower | *Linnaea borealis* | **T20P3** | low-bush cranberry | *Viburnum edule* | 10 |
| **OT3P4** | Common horsetail | *Equisetum pratense* | **T20P4** | bunchberry | *Cornus canadensis* | 5 |
| **OT3P4** | Woodland horsetail | *Equisetum sylvaticum* | **T20P4** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT3P4** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T20P4** | common horsetail | *Equisetum arvense* | 1 |
| **OT3P4** | Common mitrewort | *Mitella nuda* | **T20P4** | step moss | *Hylocomium splendens* | 35 |
| **OT3P4** | Dewberry | *Rubus pubescens* | **T20P4** | twinflower | *Linnaea borealis* | 10 |
| **OT3P4** | Willow | *Salix sp* | **T20P4** | tall lungwort | *Mertensia paniculata* | 1 |
| **OT3P4** | Labrador tea | *Ledum groenlandicum* | **T20P4** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT3P4** | Sphagnum moss | *Sphagnum sp* | **T20P4** | palmate-leaved coltsfoot | *Petasites palmatus* | 1 |
| **OT3P4** | Rattlesnake plantain | *Goodyera repens* | **T20P4** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT3P4** | Balsam poplar | *Populus balsamifera* | **T20P4** | plume moss | *Ptilium crista-castrensis* | 30 |
| **OT3P4** | Trembling aspen | *Populus tremuloides* | **T20P4** | prickly rose | *Rosa acicularis* | 5 |
| **OT3P4** | Bluejoint | *Calamagrostis candensis* | **T20P4** | dewberry | *Rubus pubescens* | 1 |
| **OT3P4** | Sweet scented bedstraw | *Galium triflorum* | **T20P4** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT3P4** | Kidney-leaved violet | *Viola renifolia* | **T20P4** | low-bush cranberry | *Viburnum edule* | 5 |
| **OT3P4** | Plume moss | *Ptilium crista-castrensis* | **T20P5** | Reindeer Lichen | *Cladina rangifera* | 15 |
| **OT3P4** | Round leaved orchid | *Habenaria orbiculata* | **T20P5** | Northern bedstraw | *Galium boreale* | 1 |
| **OT3P4** | Wild red currant | *Ribes triste* | **T20P5** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT3P4** | Dwarf-scouring rush | *Equisetum scirpoides* | **T20P5** | tall lungwort | *Mertensia paniculata* | 1 |
| **OT3P5** | Prickly rose | *Rosa acicularis* | **T20P5** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT3P5** | Fireweed | *Epilobium angustifolium* | **T20P5** | sphagnum | *Sphagnum fuscum* | 85 |
| **OT3P5** | Willow | *Salix sp* | **T20P5** | bog cranberry | *Vaccinium vitis-idaea* | 20 |
| **OT3P5** | Bunchberry | *Cornus canadensis* | **T20P6** | Reindeer Lichen | *Cladina rangifera* | 80 |
| **OT3P5** | Tall lungwort | *Mertensia paniculata* | **T20P6** | common Labrador tea | *Ledum groenlandicum* | 30 |
| **OT3P5** | Common horsetail | *Equisetum pratense* | **T20P6** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT3P5** | Woodland horsetail | *Equisetum sylvaticum* | **T20P6** | cloudberry | *Rubus chamaemorus* | 1 |
| **OT3P5** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T20P6** | sphagnum | *Sphagnum fuscum* | 5 |
| **OT3P5** | Common mitrewort | *Mitella nuda* | **T20P6** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT3P5** | Dewberry | *Rubus pubescens* | **T20P7** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT3P5** | Labrador tea | *Ledum groenlandicum* | **T20P7** | Schreber's moss | *Pleurozium schreberi* | 60 |
| **OT3P5** | Sphagnum moss | *Sphagnum sp* | **T20P7** | cloudberry | *Rubus chamaemorus* | 1 |
| **OT3P5** | Sweet scented bedstraw | *Galium triflorum* | **T20P7** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT3P5** | Kidney-leaved violet | *Viola renifolia* | **T20P8** | Reindeer Lichen | *Cladina rangifera* | 20 |
| **OT3P5** | Plume moss | *Ptilium crista-castrensis* | **T20P8** | step moss | *Hylocomium splendens* | 60 |
| **OT3P5** | Dwarf-scouring rush | *Equisetum scirpoides* | **T20P8** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT3P5** | Cow parsnip | *Heracleum lanatum* | **T20P8** | Schreber's moss | *Pleurozium schreberi* | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT3P5** | Bristly Black Currant | *Ribes lacustre* | **T20P8** | cloudberry | *Rubus chamaemorus* | 1 |
| **OT3P5** | Showy aster | *Aster conspicuus* | **T20P8** | bog cranberry | *Vaccinium vitis-idaea* | 35 |
| **OT3P5** | Bromus Grass | *Bromus sp* | **T20P9** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT3P5** | Yarrow | *Achillea millefolium* | **T20P9** | cloudberry | *Rubus chamaemorus* | 20 |
| **OT3P5** | American milkvetch | *Astragalus americanus* | **T20P9** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT3P5** | Arrowhead coltsfoot | *Petasites sagittatus* | **T20P9** | bog cranberry | *Vaccinium vitis-idaea* | 20 |
| **OT3P5** | Low bush-cranberry | *Viburnum edule* | **T21P1** | bunchberry | *Cornus canadensis* | 1 |
| **OT3P5** | Twinflower | *Linnaea borealis* | **T21P1** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT3P5** | Tall larkspur | *Delphinium glaucum* | **T21P1** | step moss | *Hylocomium splendens* | 15 |
| **OT3P6** | Prickly rose | *Rosa acicularis* | **T21P1** | twinflower | *Linnaea borealis* | 15 |
| **OT3P6** | Bunchberry | *Cornus canadensis* | **T21P1** | Schreber's moss | *Pleurozium schreberi* | 25 |
| **OT3P6** | Tall lungwort | *Mertensia paniculata* | **T21P1** | common pink wintergreen | *Pyrola asarifolia* | 40 |
| **OT3P6** | Common horsetail | *Equisetum pratense* | **T21P1** | prickly rose | *Rosa acicularis* | 20 |
| **OT3P6** | Woodland horsetail | *Equisetum sylvaticum* | **T21P1** | dewberry | *Rubus pubescens* | 30 |
| **OT3P6** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T21P1** | low-bush cranberry | *Viburnum edule* | 5 |
| **OT3P6** | Common mitrewort | *Mitella nuda* | **T21P10** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT3P6** | Dewberry | *Rubus pubescens* | **T21P10** | cloudberry | *Rubus chamaemorus* | 10 |
| **OT3P6** | Labrador tea | *Ledum groenlandicum* | **T21P10** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT3P6** | Dwarf-scouring rush | *Equisetum scirpoides* | **T21P10** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT3P6** | Bristly Black Currant | *Ribes lacustre* | **T21P2** | bunchberry | *Cornus canadensis* | 30 |
| **OT3P6** | Showy aster | *Aster conspicuus* | **T21P2** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT3P6** | Yarrow | *Achillea millefolium* | **T21P2** | fairybells | *Disporum trachycarpum* | 5 |
| **OT3P6** | Low bush-cranberry | *Viburnum edule* | **T21P2** | common fireweed | *Epilobium angustifolium* | 10 |
| **OT3P6** | Round leaved orchid | *Habenaria orbiculata* | **T21P2** | step moss | *Hylocomium splendens* | 10 |
| **OT3P6** | One flower wintergreen | *Moneses uniflora* | **T21P2** | twinflower | *Linnaea borealis* | 10 |
| **OT3P6** | Rattlesnake plantain | *Goodyera repens* | **T21P2** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT3P6** | Tall larkspur | *Delphinium glaucum* | **T21P2** | prickly rose | *Rosa acicularis* | 20 |
| **OT3P6** | Willow | *Salix sp* | **T21P2** | low-bush cranberry | *Viburnum edule* | 15 |
| **OT3P6** | Woodland strawberry | *Fragaria vesca* | **T21P3** | bunchberry | *Cornus canadensis* | 20 |
| **OT3P6** | Twinflower | *Linnaea borealis* | **T21P3** | fairybells | *Disporum trachycarpum* | 1 |
| **OT3P6** | Canada violet | *Viola canadensis* | **T21P3** | common horsetail | *Equisetum arvense* | 1 |
| **OT3P6** | Sarsaparilla | *Aralia nudicaulis* | **T21P3** | step moss | *Hylocomium splendens* | 80 |
| **OT3P6** | Canada Buffaloberry | *Shepherdia canadensis* | **T21P3** | twinflower | *Linnaea borealis* | 15 |
| **OT3P6** | Kidney-leaved violet | *Viola renifolia* | **T21P3** | palmate-leaved coltsfoot | *Petasites palmatus* | 10 |
| **OT3P6** | Calypso orchid | *Calypso bulbosa* | **T21P3** | common pink wintergreen | *Pyrola asarifolia* | 5 |
| **OT3P7** | Prickly rose | *Rosa acicularis* | **T21P3** | prickly rose | *Rosa acicularis* | 5 |
| **OT3P7** | Bunchberry | *Cornus canadensis* | **T21P3** | dewberry | *Rubus pubescens* | 20 |
| **OT3P7** | Tall lungwort | *Mertensia paniculata* | **T21P4** | bunchberry | *Cornus canadensis* | 1 |
| **OT3P7** | Common horsetail | *Equisetum pratense* | **T21P4** | common horsetail | *Equisetum arvense* | 5 |
| **OT3P7** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T21P4** | step moss | *Hylocomium splendens* | 90 |
| **OT3P7** | Common mitrewort | *Mitella nuda* | **T21P4** | twinflower | *Linnaea borealis* | 1 |
| **OT3P7** | Showy aster | *Aster conspicuus* | **T21P4** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT3P7** | Low bush-cranberry | *Viburnum edule* | **T21P4** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT3P7** | Schrebers moss | *Pleurozium schreberi* | **T21P4** | prickly rose | *Rosa acicularis* | 1 |
| **OT3P7** | Rattlesnake plantain | *Goodyera repens* | **T21P5** | step moss | *Hylocomium splendens* | 20 |
| **OT3P7** | Twinflower | *Linnaea borealis* | **T21P5** | common Labrador tea | *Ledum groenlandicum* | 1 |
| **OT3P7** | Sarsaparilla | *Aralia nudicaulis* | **T21P5** | Schreber's moss | *Pleurozium schreberi* | 55 |
| **OT3P7** | Kidney-leaved violet | *Viola renifolia* | **T21P5** | common haircap moss | *Polytrichum commune* | 5 |
| **OT3P7** | Fireweed | *Epilobium angustifolium* | **T21P5** | plume moss | *Ptilium crista-castrensis* | 20 |
| **OT3P7** | Plume moss | *Ptilium crista-castrensis* | **T21P6** | step moss | *Hylocomium splendens* | 80 |
| **OT3P7** | One-sided wintergreen | *Pyrola secunda* | **T21P6** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT3P7** | Green wintergreen | *Pyrola virens* | **T21P6** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT3P8** | Prickly rose | *Rosa acicularis* | **T21P6** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT3P8** | Bunchberry | *Cornus canadensis* | **T21P6** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT3P8** | Common horsetail | *Equisetum pratense* | **T21P7** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT3P8** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T21P7** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT3P8** | Common mitrewort | *Mitella nuda* | **T21P7** | cloudberry | *Rubus chamaemorus* | 30 |
| **OT3P8** | Round leaved orchid | *Habenaria obtusata* | **T21P7** | sphagnum | *Sphagnum fuscum* | 80 |
| **OT3P8** | Canada violet | *Viola canadensis* | **T21P7** | bog cranberry | *Vaccinium vitis-idaea* | 20 |
| **OT3P8** | Canada Buffaloberry | *Shepherdia canadensis* | **T21P8** | Reindeer Lichen | *Cladina rangifera* | 1 |
| **OT3P8** | Kidney-leaved violet | *Viola renifolia* | **T21P8** | step moss | *Hylocomium splendens* | 80 |
| **OT3P8** | Baneberry | *Actea rubra* | **T21P8** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT3P8** | Schrebers moss | *Pleurozium schreberi* | **T21P8** | plume moss | *Ptilium crista-castrensis* | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT3P8** | Plume moss | *Ptilium crista-castrensis* | **T21P8** | cloudberry | *Rubus chamaemorus* | 5 |
| **OT3P8** | Tall lungwort | *Mertensia paniculata* | **T21P8** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT3P8** | Dewberry | *Rubus pubescens* | **T21P9** | Reindeer Lichen | *Cladina rangifera* | 20 |
| **OT3P8** | Low bush-cranberry | *Viburnum edule* | **T21P9** | common Labrador tea | *Ledum groenlandicum* | 30 |
| **OT3P8** | Twinflower | *Linnaea borealis* | **T21P9** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT3P8** | Green alder | *Alnus crispa* | **T21P9** | common haircap moss | *Polytrichum commune* | 20 |
| **OT3P8** | Bog cranberry | *Vaccinium vitis-idaea* | **T21P9** | cloudberry | *Rubus chamaemorus* | 25 |
| **OT3P8** | Rattlesnake plantain | *Goodyera repens* | **T21P9** | sphagnum | *Sphagnum fuscum* | 30 |
| **OT3P8** | American milkvetch | *Astragalus americanus* | **T21P9** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT3P8** | White birch | *Betula papyrifera* | **T22P1** | bunchberry | *Cornus canadensis* | 10 |
| **OT3P8** | Stiff clubmoss | *Lycopodium annotinum* | **T22P1** | fairybells | *Disporum trachycarpum* | 5 |
| **OT3P8** | Showy aster | *Aster conspicuus* | **T22P1** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT3P9** | Balsam fir | *Abies balsamea* | **T22P1** | blunt-leaved bog orchid | *Habenaria obtusata* | 1 |
| **OT3P9** | Bunchberry | *Cornus canadensis* | **T22P1** | step moss | *Hylocomium splendens* | 60 |
| **OT3P9** | Tall lungwort | *Mertensia paniculata* | **T22P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT3P9** | Common horsetail | *Equisetum pratense* | **T22P1** | twinflower | *Linnaea borealis* | 15 |
| **OT3P9** | Woodland horsetail | *Equisetum sylvaticum* | **T22P1** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT3P9** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T22P1** | palmate-leaved coltsfoot | *Petasites palmatus* | 10 |
| **OT3P9** | Common mitrewort | *Mitella nuda* | **T22P1** | plume moss | *Ptilium crista-castrensis* | 5 |
| **OT3P9** | Dewberry | *Rubus pubescens* | **T22P1** | prickly rose | *Rosa acicularis* | 40 |
| **OT3P9** | Bristly Black Currant | *Ribes lacustre* | **T22P1** | dewberry | *Rubus pubescens* | 5 |
| **OT3P9** | Showy aster | *Aster conspicuus* | **T22P1** | Canada buffaloberry | *Sheperdia canadensis* | 10 |
| **OT3P9** | Low bush-cranberry | *Viburnum edule* | **T22P1** | low-bush cranberry | *Viburnum edule* | 10 |
| **OT3P9** | Tall larkspur | *Delphinium glaucum* | **T22P10** | common Labrador tea | *Ledum groenlandicum* | 10 |
| **OT3P9** | Willow | *Salix sp* | **T22P10** | cloudberry | *Rubus chamaemorus* | 10 |
| **OT3P9** | Twinflower | *Linnaea borealis* | **T22P10** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT3P9** | Canada Buffaloberry | *Shepherdia canadensis* | **T22P10** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT3P9** | Kidney-leaved violet | *Viola renifolia* | **T22P2** | bunchberry | *Cornus canadensis* | 10 |
| **OT3P9** | Black spruce | *Picea mariana* | **T22P2** | common fireweed | *Epilobium angustifolium* | 10 |
| **OT3P9** | Schrebers moss | *Pleurozium schreberi* | **T22P2** | step moss | *Hylocomium splendens* | 1 |
| **OT3P9** | Plume moss | *Ptilium crista-castrensis* | **T22P2** | Schreber's moss | *Pleurozium schreberi* | 1 |
| **OT3P9** | Bog cranberry | *Vaccinium vitis-idaea* | **T22P2** | common pink wintergreen | *Pyrola asarifolia* | 10 |
| **OT3P9** | Sweet scented bedstraw | *Galium triflorum* | **T22P2** | prickly rose | *Rosa acicularis* | 40 |
| **OT3P9** | Prickly rose | *Rosa acicularis* | **T22P2** | dewberry | *Rubus pubescens* | 5 |
| **OT3P10** | Willow | *Salix sp* | **T22P2** | Canada buffaloberry | *Sheperdia canadensis* | 25 |
| **OT3P10** | Bristly Black Currant | *Ribes lacustre* | **T22P2** | low-bush cranberry | *Viburnum edule* | 50 |
| **OT3P10** | Bromus Grass | *Bromus sp* | **T22P3** | bunchberry | *Cornus canadensis* | 20 |
| **OT3P10** | Low bush-cranberry | *Viburnum edule* | **T22P3** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT3P10** | Yellow avens | *Geum macrophyllum* | **T22P3** | step moss | *Hylocomium splendens* | 80 |
| **OT3P10** | Oak fern | *Gymnocarpium dryopteris* | **T22P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT3P10** | Bluejoint | *Calamagrostis candensis* | **T22P3** | twinflower | *Linnaea borealis* | 1 |
| **OT3P10** | Macoun's buttercup | *Ranunculus macounii* | **T22P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT3P10** | Tall lungwort | *Mertensia paniculata* | **T22P3** | prickly rose | *Rosa acicularis* | 30 |
| **OT3P10** | Common horsetail | *Equisetum pratense* | **T22P3** | dewberry | *Rubus pubescens* | 50 |
| **OT3P10** | Woodland horsetail | *Equisetum sylvaticum* | **T22P3** | three-leaved Solomon's-seal | *Smilacina trifolia* | 1 |
| **OT3P10** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T22P4** | bunchberry | *Cornus canadensis* | 20 |
| **OT3P10** | Common mitrewort | *Mitella nuda* | **T22P4** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT3P10** | Dewberry | *Rubus pubescens* | **T22P4** | common horsetail | *Equisetum arvense* | 5 |
| **OT3P10** | Fireweed | *Epilobium angustifolium* | **T22P4** | step moss | *Hylocomium splendens* | 90 |
| **OT3P10** | Sweet scented bedstraw | *Galium triflorum* | **T22P4** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT3P10** | Twinflower | *Linnaea borealis* | **T22P4** | twinflower | *Linnaea borealis* | 10 |
| **OT3P10** | Tall larkspur | *Delphinium glaucum* | **T22P4** | Schreber's moss | *Pleurozium schreberi* | 15 |
| **OT3P10** | Sickle moss | *Drepanocladus uncinatus* | **T22P4** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT3P10** | Wild red currant | *Ribes triste* | **T22P4** | prickly rose | *Rosa acicularis* | 5 |
| **OT3P10** | Arrowhead coltsfoot | *Petasites sagittatus* | **T22P4** | dewberry | *Rubus pubescens* | 1 |
| **OT3P10** | Few flower meadow-rue | *Thalictrum sparsiflorum* | **T22P4** | low-bush cranberry | *Viburnum edule* | 1 |
| **OT3P10** | American speedwell | *Veronica americana* | **T22P5** | common horsetail | *Equisetum arvense* | 5 |
| **OT3P10** | Wild mint | *Mentha arvensis* | **T22P5** | step moss | *Hylocomium splendens* | 5 |
| **OT3P10** | Canada violet | *Viola canadensis* | **T22P5** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT3P10** | Jacob's ladder | *Polemonium caeruleum* | **T22P5** | common haircap moss | *Polytrichum commune* | 5 |
| **OT3P10** | Northern willow-herb | *Epilobium ciliatum* | **T22P5** | cloudberry | *Rubus chamaemorus* | 10 |
| **OT3P10** | Pensylvanian bittercress | *Cardamine pensylvanica* | **T22P5** | three-leaved Solomon's- | *Smilacina trifolia* | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | seal | | |
| **OT4P1** | Bunchberry | *Cornus canadensis* | **T22P5** | sphagnum | *Sphagnum fuscum* | 20 |
| **OT4P1** | Tall lungwort | *Mertensia paniculata* | **T22P6** | Reindeer Lichen | *Cladina rangifera* | 20 |
| **OT4P1** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T22P6** | step moss | *Hylocomium splendens* | 5 |
| **OT4P1** | Low bush-cranberry | *Viburnum edule* | **T22P6** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT4P1** | Twinflower | *Linnaea borealis* | **T22P7** | common Labrador tea | *Ledum groenlandicum* | 20 |
| **OT4P1** | Schrebers moss | *Pleurozium schreberi* | **T22P7** | cloudberry | *Rubus chamaemorus* | 40 |
| **OT4P1** | Plume moss | *Ptilium crista-castrensis* | **T22P7** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT4P1** | Prickly rose | *Rosa acicularis* | **T22P7** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT4P1** | Broom moss | *Dicranum sp* | **T22P8** | common Labrador tea | *Ledum groenlandicum* | 15 |
| **OT4P1** | Step moss | *Hylocomium splendens* | **T22P8** | cloudberry | *Rubus chamaemorus* | 30 |
| **OT4P2** | Bunchberry | *Cornus canadensis* | **T22P8** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT4P2** | Schrebers moss | *Pleurozium schreberi* | **T22P8** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT4P2** | Plume moss | *Ptilium crista-castrensis* | **T22P9** | common Labrador tea | *Ledum groenlandicum* | 15 |
| **OT4P2** | Broom moss | *Dicranum sp* | **T22P9** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT4P2** | Step moss | *Hylocomium splendens* | **T22P9** | cloudberry | *Rubus chamaemorus* | 15 |
| **OT4P2** | Woodland horsetail | *Equisetum sylvaticum* | **T22P9** | sphagnum | *Sphagnum fuscum* | 10 |
| **OT4P3** | Willow | *Salix sp* | **T22P9** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT4P3** | Woodland horsetail | *Equisetum sylvaticum* | **T23P1** | Reindeer Lichen | *Cladina rangifera* | 15 |
| **OT4P3** | Twinflower | *Linnaea borealis* | **T23P1** | common Labrador tea | *Ledum groenlandicum* | 10 |
| **OT4P3** | Arrowhead coltsfoot | *Petasites sagittatus* | **T23P1** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT4P3** | Labrador tea | *Ledum groenlandicum* | **T23P1** | common haircap moss | *Polytrichum commune* | 1 |
| **OT4P3** | Sphagnum moss | *Sphagnum sp* | **T23P1** | cloudberry | *Rubus chamaemorus* | 1 |
| **OT4P3** | Small bog cranberry | *Oxycoccus microcarpus* | **T23P1** | sphagnum | *Sphagnum fuscum* | 10 |
| **OT4P3** | Bog cranberry | *Vaccinium vitis-idaea* | **T23P10** | common yarrow | *Achillea millefolium* | 5 |
| **OT4P3** | Common mitrewort | *Mitella nuda* | **T23P10** | tree moss | *Climacium dendroides* | 1 |
| **OT4P3** | Bristly Black Currant | *Ribes lacustre* | **T23P10** | bunchberry | *Cornus canadensis* | 1 |
| **OT4P3** | Tree moss | *Climacium dendroides* | **T23P10** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT4P3** | Northern Green bog orchid | *Habenaria hyperborea* | **T23P10** | common horsetail | *Equisetum arvense* | 10 |
| **OT4P3** | three leaved solomon's seal | *Smilacina trifolia* | **T23P10** | step moss | *Hylocomium splendens* | 15 |
| **OT4P3** | Agropyron Grass | *Agropyron sp* | **T23P10** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT4P3** | Sedge | *Carex sp* | **T23P10** | twinflower | *Linnaea borealis* | 10 |
| **OT4P4** | Prickly rose | *Rosa acicularis* | **T23P10** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT4P4** | Common horsetail | *Equisetum pratense* | **T23P10** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT4P4** | Woodland horsetail | *Equisetum sylvaticum* | **T23P10** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT4P4** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T23P10** | prickly rose | *Rosa acicularis* | 5 |
| **OT4P4** | Dewberry | *Rubus pubescens* | **T23P10** | dewberry | *Rubus pubescens* | 1 |
| **OT4P4** | Labrador tea | *Ledum groenlandicum* | **T23P10** | Canada buffaloberry | *Sheperdia canadensis* | 70 |
| **OT4P4** | Low bush-cranberry | *Viburnum edule* | **T23P10** | white clover | *Trifolium repens* | 20 |
| **OT4P4** | Willow | *Salix sp* | **T23P10** | low-bush cranberry | *Viburnum edule* | 35 |
| **OT4P4** | Twinflower | *Linnaea borealis* | **T23P2** | common Labrador tea | *Ledum groenlandicum* | 35 |
| **OT4P4** | Canada Buffaloberry | *Shepherdia canadensis* | **T23P2** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT4P4** | Trembling aspen | *Populus tremuloides* | **T23P2** | cloudberry | *Rubus chamaemorus* | 15 |
| **OT4P4** | Creamy peavine | *Lathyrus ochroleucus* | **T23P2** | sphagnum | *Sphagnum fuscum* | 15 |
| **OT4P4** | Step moss | *Hylocomium splendens* | **T23P2** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT4P4** | Agropyron Grass | *Agropyron sp* | **T23P3** | step moss | *Hylocomium splendens* | 15 |
| **OT4P5** | Prickly rose | *Rosa acicularis* | **T23P3** | Schreber's moss | *Pleurozium schreberi* | 70 |
| **OT4P5** | Common horsetail | *Equisetum pratense* | **T23P3** | cloudberry | *Rubus chamaemorus* | 30 |
| **OT4P5** | Woodland horsetail | *Equisetum sylvaticum* | **T23P3** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT4P5** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T23P4** | common horsetail | *Equisetum arvense* | 5 |
| **OT4P5** | Dewberry | *Rubus pubescens* | **T23P4** | step moss | *Hylocomium splendens* | 60 |
| **OT4P5** | Labrador tea | *Ledum groenlandicum* | **T23P4** | Schreber's moss | *Pleurozium schreberi* | 55 |
| **OT4P5** | Low bush-cranberry | *Viburnum edule* | **T23P4** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT4P5** | Twinflower | *Linnaea borealis* | **T23P4** | cloudberry | *Rubus chamaemorus* | 20 |
| **OT4P5** | Canada Buffaloberry | *Shepherdia canadensis* | **T23P4** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT4P5** | Creamy peavine | *Lathyrus ochroleucus* | **T23P5** | bunchberry | *Cornus canadensis* | 15 |
| **OT4P5** | Schrebers moss | *Pleurozium schreberi* | **T23P5** | common horsetail | *Equisetum arvense* | 10 |
| **OT4P5** | Bunchberry | *Cornus canadensis* | **T23P5** | step moss | *Hylocomium splendens* | 40 |
| **OT4P5** | Tall lungwort | *Mertensia paniculata* | **T23P5** | common Labrador tea | *Ledum groenlandicum* | 15 |
| **OT4P5** | One-sided wintergreen | *Pyrola secunda* | **T23P5** | cloudberry | *Rubus chamaemorus* | 40 |
| **OT4P5** | Green wintergreen | *Pyrola virens* | **T23P5** | bog cranberry | *Vaccinium vitis-idaea* | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT4P5** | Sickle moss | *Drepanocladus uncinatus* | **T23P6** | bunchberry | *Cornus canadensis* | 10 |
| **OT4P5** | Blunt-leaved orchid | *Habenaria obtusata* | **T23P6** | common horsetail | *Equisetum arvense* | 20 |
| **OT4P5** | Fireweed | *Epilobium angustifolium* | **T23P6** | step moss | *Hylocomium splendens* | 10 |
| **OT4P5** | Showy aster | *Aster conspicuus* | **T23P6** | common Labrador tea | *Ledum groenlandicum* | 80 |
| **OT4P5** | Sedge | *Carex sp* | **T23P6** | Schreber's moss | *Pleurozium schreberi* | 30 |
| **OT4P6** | Prickly rose | *Rosa acicularis* | **T23P6** | cloudberry | *Rubus chamaemorus* | 30 |
| **OT4P6** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T23P6** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT4P6** | Dewberry | *Rubus pubescens* | **T23P7** | bunchberry | *Cornus canadensis* | 20 |
| **OT4P6** | American milkvetch | *Astragalus americanus* | **T23P7** | fairybells | *Disporum trachycarpum* | 20 |
| **OT4P6** | Low bush-cranberry | *Viburnum edule* | **T23P7** | common horsetail | *Equisetum arvense* | 10 |
| **OT4P6** | Twinflower | *Linnaea borealis* | **T23P7** | step moss | *Hylocomium splendens* | 30 |
| **OT4P6** | Canada Buffaloberry | *Shepherdia canadensis* | **T23P7** | twinflower | *Linnaea borealis* | 30 |
| **OT4P6** | Creamy peavine | *Lathyrus ochroleucus* | **T23P7** | naked bishop's-cap | *Mitella nuda* | 15 |
| **OT4P6** | Schrebers moss | *Pleurozium schreberi* | **T23P7** | common pink wintergreen | *Pyrola asarifolia* | 25 |
| **OT4P6** | Bunchberry | *Cornus canadensis* | **T23P7** | currants | *Ribes sp* | 20 |
| **OT4P6** | Tall lungwort | *Mertensia paniculata* | **T23P7** | dewberry | *Rubus pubescens* | 15 |
| **OT4P6** | Blunt-leaved orchid | *Habenaria obtusata* | **T23P7** | low-bush cranberry | *Viburnum edule* | 25 |
| **OT4P6** | Showy aster | *Aster conspicuus* | **T23P8** | bunchberry | *Cornus canadensis* | 1 |
| **OT4P6** | Sedge | *Carex sp* | **T23P8** | bunchberry | *Cornus canadensis* | 5 |
| **OT4P7** | Prickly rose | *Rosa acicularis* | **T23P8** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT4P7** | Woodland horsetail | *Equisetum sylvaticum* | **T23P8** | common fireweed | *Epilobium angustifolium* | 5 |
| **OT4P7** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T23P8** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT4P7** | Dewberry | *Rubus pubescens* | **T23P8** | Northern bedstraw | *Galium boreale* | 1 |
| **OT4P7** | Low bush-cranberry | *Viburnum edule* | **T23P8** | step moss | *Hylocomium splendens* | 15 |
| **OT4P7** | Twinflower | *Linnaea borealis* | **T23P8** | step moss | *Hylocomium splendens* | 30 |
| **OT4P7** | Creamy peavine | *Lathyrus ochroleucus* | **T23P8** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT4P7** | Schrebers moss | *Pleurozium schreberi* | **T23P8** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT4P7** | Bunchberry | *Cornus canadensis* | **T23P8** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT4P7** | Tall lungwort | *Mertensia paniculata* | **T23P8** | prickly rose | *Rosa acicularis* | 45 |
| **OT4P7** | One-sided wintergreen | *Pyrola secunda* | **T23P8** | prickly rose | *Rosa acicularis* | 75 |
| **OT4P7** | Green wintergreen | *Pyrola virens* | **T23P8** | low-bush cranberry | *Viburnum edule* | 20 |
| **OT4P7** | Blunt-leaved orchid | *Habenaria obtusata* | **T24P10** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT4P7** | Fireweed | *Epilobium angustifolium* | **T24P10** | cloudberry | *Rubus chamaemorus* | 15 |
| **OT4P7** | Showy aster | *Aster conspicuus* | **T24P10** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT4P7** | Kidney-leaved violet | *Viola renifolia* | **T24P10** | bog cranberry | *Vaccinium vitis-idaea* | 10 |
| **OT4P7** | Yarrow | *Achillea millefolium* | **T24P11** | tall larkspur | *Delphinium glaucum* | 5 |
| **OT4P7** | Bromus Grass | *Bromun sp* | **T24P11** | common horsetail | *Equisetum arvense* | 5 |
| **OT4P8** | Prickly rose | *Rosa acicularis* | **T24P11** | sphagnum | *Sphagnum fuscum* | 40 |
| **OT4P8** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T24P12** | common horsetail | *Equisetum arvense* | 10 |
| **OT4P8** | Dewberry | *Rubus pubescens* | **T24P12** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT4P8** | Low bush-cranberry | *Viburnum edule* | **T24P12** | prickly rose | *Rosa acicularis* | 5 |
| **OT4P8** | Twinflower | *Linnaea borealis* | **T24P12** | dwarf raspberry | *Rubus acaulis* | 10 |
| **OT4P8** | Canada Buffaloberry | *Shepherdia canadensis* | **T24P12** | sphagnum | *Sphagnum fuscum* | 40 |
| **OT4P8** | Creamy peavine | *Lathyrus ochroleucus* | **T24P2** | common yarrow | *Achillea millefolium* | 5 |
| **OT4P8** | Schrebers moss | *Pleurozium schreberi* | **T24P2** | common horsetail | *Equisetum arvense* | 20 |
| **OT4P8** | Bunchberry | *Cornus canadensis* | **T24P2** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT4P8** | Tall lungwort | *Mertensia paniculata* | **T24P2** | prickly rose | *Rosa acicularis* | 5 |
| **OT4P8** | One-sided wintergreen | *Pyrola secunda* | **T24P2** | white clover | *Trifolium repens* | 1 |
| **OT4P8** | Green wintergreen | *Pyrola virens* | **T24P3** | common yarrow | *Achillea millefolium* | 5 |
| **OT4P8** | Blunt-leaved orchid | *Habenaria obtusata* | **T24P3** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT4P8** | Fireweed | *Epilobium angustifolium* | **T24P3** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT4P8** | Sweet-scented bedstraw | *Galium boreale* | **T24P3** | common horsetail | *Equisetum arvense* | 10 |
| **OT4P8** | Round-leaf orchid | *Habenaria orbiculata* | **T24P4** | bunchberry | *Cornus canadensis* | 5 |
| **OT4P8** | Rattlesnake plantain | *Goodyera repens* | **T24P4** | common fireweed | *Epilobium angustifolium* | 1 |
| **OT4P8** | American milkvetch | *Astragalus americanus* | **T24P4** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT4P8** | Kidney-leaved violet | *Viola renifolia* | **T24P4** | common haircap moss | *Polytrichum commune* | 10 |
| **OT4P8** | Bromus Grass | *Bromus sp* | **T24P4** | plume moss | *Ptilium crista-castrensis* | 80 |
| **OT4P9** | Prickly rose | *Rosa acicularis* | **T24P4** | prickly rose | *Rosa acicularis* | 1 |
| **OT4P9** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T24P4** | dewberry | *Rubus pubescens* | 1 |
| **OT4P9** | Dewberry | *Rubus pubescens* | **T24P4** | low-bush cranberry | *Viburnum edule* | 15 |
| **OT4P9** | Low bush-cranberry | *Viburnum edule* | **T24P5** | Reindeer Lichen | *Cladina rangifera* | 70 |
| **OT4P9** | Twinflower | *Linnaea borealis* | **T24P5** | crowberry | *Empetrum nigrum* | 20 |
| **OT4P9** | Canada Buffaloberry | *Shepherdia canadensis* | **T24P5** | common Labrador tea | *Ledum groenlandicum* | 50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT4P9** | Creamy peavine | *Lathyrus ochroleucus* | **T24P5** | cloudberry | *Rubus chamaemorus* | 20 |
| **OT4P9** | Schrebers moss | *Pleurozium schreberi* | **T24P5** | sphagnum | *Sphagnum fuscum* | 40 |
| **OT4P9** | Bunchberry | *Cornus canadensis* | **T24P5** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT4P9** | Tall lungwort | *Mertensia paniculata* | **T24P6** | bunchberry | *Cornus canadensis* | 1 |
| **OT4P9** | Green wintergreen | *Pyrola virens* | **T24P6** | common horsetail | *Equisetum arvense* | 1 |
| **OT4P9** | Fireweed | *Epilobium angustifolium* | **T24P6** | common Labrador tea | *Ledum groenlandicum* | 30 |
| **OT4P9** | Sweet-scented bedstraw | *Galium boreale* | **T24P6** | twinflower | *Linnaea borealis* | 15 |
| **OT4P9** | American milkvetch | *Astragalus americanus* | **T24P6** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT4P9** | Kidney-leaved violet | *Viola renifolia* | **T24P6** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT4P9** | Showy aster | *Aster conspicuus* | **T24P6** | prickly rose | *Rosa acicularis* | 5 |
| **OT4P9** | Agropyron Grass | *Agropyron sp* | **T24P6** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT4P10** | Prickly rose | *Rosa acicularis* | **T24P7** | bunchberry | *Cornus canadensis* | 1 |
| **OT4P10** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T24P7** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT4P10** | Twinflower | *Linnaea borealis* | **T24P7** | common horsetail | *Equisetum arvense* | 1 |
| **OT4P10** | Creamy peavine | *Lathyrus ochroleucus* | **T24P7** | step moss | *Hylocomium splendens* | 30 |
| **OT4P10** | Bunchberry | *Cornus canadensis* | **T24P7** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT4P10** | Tall lungwort | *Mertensia paniculata* | **T24P7** | twinflower | *Linnaea borealis* | 15 |
| **OT4P10** | Baneberry | *Actea rubra* | **T24P7** | naked bishop's-cap | *Mitella nuda* | 5 |
| **OT4P10** | Woodland horsetail | *Equisetum sylvaticum* | **T24P7** | nephroma lichen | *Nephroma arctium* | 1 |
| **OT4P10** | Common mitrewort | *Mitella nuda* | **T24P7** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT4P10** | Dewberry | *Rubus pubescens* | **T24P7** | common haircap moss | *Polytrichum commune* | 20 |
| **OT4P10** | Trembling aspen | *Populus tremuloides* | **T24P7** | plume moss | *Ptilium crista-castrensis* | 70 |
| **OT4P10** | One-sided wintergreen | *Pyrola secunda* | **T24P7** | prickly rose | *Rosa acicularis* | 5 |
| **OT4P10** | Schrebers moss | *Pleurozium schreberi* | **T24P8** | Reindeer Lichen | *Cladina rangifera* | 20 |
| **OT4P10** | Kidney-leaved violet | *Viola renifolia* | **T24P8** | common horsetail | *Equisetum arvense* | 15 |
| **OT4P10** | Plume moss | *Ptilium crista-castrensis* | **T24P8** | common Labrador tea | *Ledum groenlandicum* | 1 |
| **OT4P10** | Agropyron Grass | *Agropyron sp* | **T24P8** | plume moss | *Ptilium crista-castrensis* | 50 |
| **OT4P11** | Bluejoint | *Calamagrostis candensis* | **T24P8** | cloudberry | *Rubus chamaemorus* | 5 |
| **OT4P11** | Low bush-cranberry | *Viburnum edule* | **T24P8** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT4P11** | Yellow avens | *Geum macrophyllum* | **T24P9** | crowberry | *Empetrum nigrum* | 15 |
| **OT4P11** | Macoun's buttercup | *Ranunculus macounii* | **T24P9** | cloudberry | *Rubus chamaemorus* | 10 |
| **OT4P11** | Tall lungwort | *Mertensia paniculata* | **T24P9** | three-leaved Solomon's-seal | *Smilacina trifolia* | 25 |
| **OT4P11** | Woodland horsetail | *Equisetum sylvaticum* | **T24P9** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT4P11** | Common mitrewort | *Mitella nuda* | **T25P1** | Reindeer Lichen | *Cladina rangifera* | 5 |
| **OT4P11** | Arrowhead coltsfoot | *Petasites sagittatus* | **T25P1** | bunchberry | *Cornus canadensis* | 5 |
| **OT4P11** | Few flower meadow-rue | *Thalictrum sparsiflorum* | **T25P1** | common horsetail | *Equisetum arvense* | 1 |
| **OT4P11** | Jacob's ladder | *Polemonium caeruleum* | **T25P1** | step moss | *Hylocomium splendens* | 10 |
| **OT4P11** | Jewelweed | *Impatiens capensis* | **T25P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 15 |
| **OT4P11** | Oak fern | *Gymnocarpium dryopteris* | **T25P1** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT4P11** | Baneberry | *Actea rubra* | **T25P1** | common haircap moss | *Polytrichum commune* | 5 |
| **OT4P11** | Kidney-leaved violet | *Viola renifolia* | **T25P1** | plume moss | *Ptilium crista-castrensis* | 1 |
| **OT4P11** | Northern willow-herb | *Epilobium ciliatum* | **T25P1** | prickly rose | *Rosa acicularis* | 5 |
| **OT4P11** | Wild mint | *Mentha arvensis* | **T25P1** | bog cranberry | *Vaccinium vitis-idaea* | 60 |
| **OT4P11** | Small bedstraw | *Galium trifidum* | **T25P10** | crowberry | *Empetrum nigrum* | 5 |
| **OT4P11** | Lady fern | *Athyrium filix-femina* | **T25P10** | common Labrador tea | *Ledum groenlandicum* | 40 |
| **OT4P11** | Balsam groundsel | *Senecio pauperculus* | **T25P10** | cloudberry | *Rubus chamaemorus* | 10 |
| **OT5P1** | Schrebers moss | *Pleurozium schreberi* | **T25P10** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT5P1** | Plume moss | *Ptilium crista-castrensis* | **T25P10** | bog cranberry | *Vaccinium vitis-idaea* | 50 |
| **OT5P1** | Broom moss | *Dicranum sp* | **T25P11** | tall larkspur | *Delphinium glaucum* | 15 |
| **OT5P1** | Step moss | *Hylocomium splendens* | **T25P11** | common horsetail | *Equisetum arvense* | 20 |
| **OT5P1** | Twinflower | *Linnaea borealis* | **T25P11** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT5P1** | Common mitrewort | *Mitella nuda* | **T25P11** | plume moss | *Ptilium crista-castrensis* | 80 |
| **OT5P1** | Rattlesnake plantain | *Goodyera repens* | **T25P12** | common horsetail | *Equisetum arvense* | 30 |
| **OT5P2** | Schrebers moss | *Pleurozium schreberi* | **T25P12** | step moss | *Hylocomium splendens* | 30 |
| **OT5P2** | Plume moss | *Ptilium crista-castrensis* | **T25P12** | Schreber's moss | *Pleurozium schreberi* | 80 |
| **OT5P2** | Broom moss | *Dicranum sp* | **T25P2** | bunchberry | *Cornus canadensis* | 30 |
| **OT5P2** | Step moss | *Hylocomium splendens* | **T25P2** | common horsetail | *Equisetum arvense* | 1 |
| **OT5P3** | Schrebers moss | *Pleurozium schreberi* | **T25P2** | step moss | *Hylocomium splendens* | 30 |
| **OT5P3** | Plume moss | *Ptilium crista-castrensis* | **T25P2** | twinflower | *Linnaea borealis* | 30 |
| **OT5P3** | Step moss | *Hylocomium splendens* | **T25P2** | Schreber's moss | *Pleurozium schreberi* | 5 |
| **OT5P3** | Prickly rose | *Rosa acicularis* | **T25P2** | plume moss | *Ptilium crista-castrensis* | 30 |
| **OT5P3** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T25P2** | bog cranberry | *Vaccinium vitis-idaea* | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT5P3** | Low bush-cranberry | *Viburnum edule* | **T25P3** | common horsetail | *Equisetum arvense* | 15 |
| **OT5P3** | Bunchberry | *Cornus canadensis* | **T25P3** | Northern bedstraw | *Galium boreale* | 1 |
| **OT5P3** | Rattlesnake plantain | *Goodyera repens* | **T25P3** | step moss | *Hylocomium splendens* | 30 |
| **OT5P3** | Showy aster | *Aster conspicuus* | **T25P3** | twinflower | *Linnaea borealis* | 15 |
| **OT5P3** | Bromus Grass | *Bromus sp* | **T25P3** | naked bishop's-cap | *Mitella nuda* | 20 |
| **OT5P4** | Schrebers moss | *Pleurozium schreberi* | **T25P3** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT5P4** | Plume moss | *Ptilium crista-castrensis* | **T25P3** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT5P4** | Broom moss | *Dicranum sp* | **T25P3** | common pink wintergreen | *Pyrola asarifolia* | 15 |
| **OT5P4** | Step moss | *Hylocomium splendens* | **T25P3** | Northern gooseberry | *Ribes oxyacanthoides* | 1 |
| **OT5P4** | Low bush-cranberry | *Viburnum edule* | **T25P3** | prickly rose | *Rosa acicularis* | 10 |
| **OT5P4** | Bunchberry | *Cornus canadensis* | **T25P3** | dewberry | *Rubus pubescens* | 10 |
| **OT5P4** | One-sided wintergreen | *Pyrola secunda* | **T25P4** | bastard toadflax | *Comandra umbellata* | 10 |
| **OT5P5** | Schrebers moss | *Pleurozium schreberi* | **T25P4** | step moss | *Hylocomium splendens* | 20 |
| **OT5P5** | Plume moss | *Ptilium crista-castrensis* | **T25P4** | Schreber's moss | *Pleurozium schreberi* | 35 |
| **OT5P5** | Step moss | *Hylocomium splendens* | **T25P4** | plume moss | *Ptilium crista-castrensis* | 30 |
| **OT5P5** | Low bush-cranberry | *Viburnum edule* | **T25P4** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT5P5** | Bunchberry | *Cornus canadensis* | **T25P5** | common Labrador tea | *Ledum groenlandicum* | 50 |
| **OT5P5** | Prickly rose | *Rosa acicularis* | **T25P5** | cloudberry | *Rubus chamaemorus* | 25 |
| **OT5P5** | Twinflower | *Linnaea borealis* | **T25P5** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT5P5** | Green wintergreen | *Pyrola virens* | **T25P5** | bog cranberry | *Vaccinium vitis-idaea* | 40 |
| **OT5P5** | False lily-of-the-valley | *Mainthemum canadense* | **T25P6** | bunchberry | *Cornus canadensis* | 10 |
| **OT5P6** | Schrebers moss | *Pleurozium schreberi* | **T25P6** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT5P6** | Plume moss | *Ptilium crista-castrensis* | **T25P6** | common fireweed | *Epilobium angustifolium* | 20 |
| **OT5P6** | Step moss | *Hylocomium splendens* | **T25P6** | twinflower | *Linnaea borealis* | 50 |
| **OT5P6** | Bunchberry | *Cornus canadensis* | **T25P6** | plume moss | *Ptilium crista-castrensis* | 50 |
| **OT5P6** | Prickly rose | *Rosa acicularis* | **T25P6** | prickly rose | *Rosa acicularis* | 15 |
| **OT5P6** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T25P6** | bog cranberry | *Vaccinium vitis-idaea* | 20 |
| **OT5P6** | Showy aster | *Aster conspicuus* | **T25P7** | bunchberry | *Cornus canadensis* | 15 |
| **OT5P6** | Labrador tea | *Ledum groenlandicum* | **T25P7** | tall larkspur | *Delphinium glaucum* | 1 |
| **OT5P6** | Bromus Grass | *Bromus sp* | **T25P7** | step moss | *Hylocomium splendens* | 50 |
| **OT5P7** | Prickly rose | *Rosa acicularis* | **T25P7** | twinflower | *Linnaea borealis* | 15 |
| **OT5P7** | Woodland horsetail | *Equisetum sylvaticum* | **T25P7** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT5P7** | Dewberry | *Rubus pubescens* | **T25P7** | Schreber's moss | *Pleurozium schreberi* | 30 |
| **OT5P7** | Schrebers moss | *Pleurozium schreberi* | **T25P7** | plume moss | *Ptilium crista-castrensis* | 5 |
| **OT5P7** | Bunchberry | *Cornus canadensis* | **T25P7** | prickly rose | *Rosa acicularis* | 40 |
| **OT5P7** | Haircap moss | *Polytrichum sp* | **T25P7** | bog cranberry | *Vaccinium vitis-idaea* | 20 |
| **OT5P7** | Plume moss | *Ptilium crista-castrensis* | **T25P7** | low-bush cranberry | *Viburnum edule* | 15 |
| **OT5P7** | Sphagnum moss | *Sphagnum sp* | **T25P8** | common Labrador tea | *Ledum groenlandicum* | 60 |
| **OT5P7** | Reindeer lichen | *Cladina rangiferina* | **T25P8** | cloudberry | *Rubus chamaemorus* | 5 |
| **OT5P7** | Labrador tea | *Ledum groenlandicum* | **T25P8** | sphagnum | *Sphagnum fuscum* | 90 |
| **OT5P7** | Bromus Grass | *Bromus sp* | **T25P8** | bog cranberry | *Vaccinium vitis-idaea* | 50 |
| **OT5P8** | Bluejoint | *Calamagrostis canadensis* | **T25P9** | crowberry | *Empetrum nigrum* | 1 |
| **OT5P8** | Kidney-leaved violet | *Viola renifolia* | **T25P9** | common Labrador tea | *Ledum groenlandicum* | 50 |
| **OT5P8** | Yellow avens | *Geum macrophyllum* | **T25P9** | cloudberry | *Rubus chamaemorus* | 15 |
| **OT5P8** | Northern willow-herb | *Epilobium ciliatum* | **T25P9** | sphagnum | *Sphagnum fuscum* | 100 |
| **OT5P8** | Small bedstraw | *Galium trifidum* | **T25P9** | bog cranberry | *Vaccinium vitis-idaea* | 40 |
| **OT5P8** | Sphagnum moss | *Sphagnum sp* | **T3P1** | common yarrow | *Achillea millefolium* | 1 |
| **OT5P8** | Common horsetail | *Equisetum pratense* | **T3P1** | tree moss | *Climacium dendroides* | 1 |
| **OT5P8** | Sickle moss | *Drepanocladus uncinatus* | **T3P1** | wild strawberry | *Fragaria virginiana* | 15 |
| **OT5P8** | Tree moss | *Climacium dendroides* | **T3P1** | Northern bedstraw | *Galium boreale* | 1 |
| **OT5P9** | Step moss | *Hylocomium splendens* | **T3P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT5P9** | Low bush-cranberry | *Viburnum edule* | **T3P1** | twinflower | *Linnaea borealis* | 5 |
| **OT5P9** | Bunchberry | *Cornus canadensis* | **T3P1** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT5P9** | Prickly rose | *Rosa acicularis* | **T3P1** | currants | *Ribes sp* | 5 |
| **OT5P9** | Twinflower | *Linnaea borealis* | **T3P1** | prickly rose | *Rosa acicularis* | 5 |
| **OT5P9** | Woodland horsetail | *Equisetum sylvaticum* | **T3P1** | dwarf raspberry | *Rubus acaulis* | 1 |
| **OT5P9** | Sweet-scented bedstraw | *Galium boreale* | **T3P2** | common yarrow | *Achillea millefolium* | 5 |
| **OT5P9** | Pensylvanian bittercress | *Cardamine pensylvanica* | **T3P2** | bunchberry | *Cornus canadensis* | 1 |
| **OT5P9** | Small bedstraw | *Galium trifidum* | **T3P2** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT6P1** | Bunchberry | *Cornus canadensis* | **T3P2** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P1** | Prickly rose | *Rosa acicularis* | **T3P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 10 |
| **OT6P1** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T3P2** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P1** | Dewberry | *Rubus pubescens* | **T3P2** | common pink wintergreen | *Pyrola asarifolia* | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT6P1** | Low bush-cranberry | *Viburnum edule* | **T3P2** | prickly rose | *Rosa acicularis* | 1 |
| **OT6P1** | Common horsetail | *Equisetum pratense* | **T3P2** | common plantain | *Plantago major* | 1 |
| **OT6P1** | Twinflower | *Linnaea borealis* | **T3P3** | bunchberry | *Cornus canadensis* | 15 |
| **OT6P1** | Step moss | *Hylocomium splendens* | **T3P3** | common horsetail | *Equisetum arvense* | 1 |
| **OT6P1** | Showy aster | *Aster conspicuus* | **T3P3** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P1** | Common mitrewort | *Mitella nuda* | **T3P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT6P1** | Blunt-leaved orchid | *Habenaria obtusata* | **T3P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P1** | Creamy peavine | *Lathyrus ochroleucus* | **T3P3** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT6P1** | Schrebers moss | *Pleurozium schreberi* | **T3P3** | currants | *Ribes sp* | 10 |
| **OT6P1** | One-sided wintergreen | *Pyrola secunda* | **T3P3** | prickly rose | *Rosa acicularis* | 5 |
| **OT6P1** | Fireweed | *Epilobium angustifolium* | **T3P3** | common plantain | *Plantago major* | 1 |
| **OT6P1** | Kidney-leaved violet | *Viola renifolia* | **T4P1** | bunchberry | *Cornus canadensis* | 10 |
| **OT6P1** | Yarrow | *Achillea millefolium* | **T4P1** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT6P1** | American milkvetch | *Astragalus americanus* | **T4P1** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P1** | Sweet-scented bedstraw | *Galium boreale* | **T4P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P1** | Bristly Black Currant | *Ribes lacustre* | **T4P1** | twinflower | *Linnaea borealis* | 1 |
| **OT6P2** | Bunchberry | *Cornus canadensis* | **T4P1** | prickly rose | *Rosa acicularis* | 1 |
| **OT6P2** | Prickly rose | *Rosa acicularis* | **T4P1** | common plantain | *Plantago major* | 1 |
| **OT6P2** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T4P2** | common yarrow | *Achillea millefolium* | 1 |
| **OT6P2** | Dewberry | *Rubus pubescens* | **T4P2** | tree moss | *Climacium dendroides* | 10 |
| **OT6P2** | Twinflower | *Linnaea borealis* | **T4P2** | bunchberry | *Cornus canadensis* | 5 |
| **OT6P2** | Common mitrewort | *Mitella nuda* | **T4P2** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT6P2** | Creamy peavine | *Lathyrus ochroleucus* | **T4P2** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P2** | Schrebers moss | *Pleurozium schreberi* | **T4P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P2** | One-sided wintergreen | *Pyrola secunda* | **T4P2** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P2** | Fireweed | *Epilobium angustifolium* | **T4P2** | Northern gooseberry | *Ribes oxyacanthoides* | 1 |
| **OT6P2** | Round-leaved orchid | *Habenaria orbiculata* | **T4P3** | tree moss | *Climacium dendroides* | 5 |
| **OT6P2** | Labrador tea | *Ledum groenlandicum* | **T4P3** | bunchberry | *Cornus canadensis* | 20 |
| **OT6P2** | Bog cranberry | *Vaccinium vitis-idaea* | **T4P3** | wild strawberry | *Fragaria virginiana* | 20 |
| **OT6P2** | Step moss | *Hylocomium splendens* | **T4P3** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P2** | Northern bastard toadflax | *Geocaullon lividum* | **T4P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P2** | Agropyron Grass | *Agropyron sp* | **T4P3** | twinflower | *Linnaea borealis* | 5 |
| **OT6P3** | Bunchberry | *Cornus canadensis* | **T4P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P3** | Prickly rose | *Rosa acicularis* | **T4P3** | black spruce | *Picea mariana* | 1 |
| **OT6P3** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T4P3** | prickly rose | *Rosa acicularis* | 1 |
| **OT6P3** | Twinflower | *Linnaea borealis* | **T4P3** | common plantain | *Plantago major* | 1 |
| **OT6P3** | Schrebers moss | *Pleurozium schreberi* | **T5P1** | tree moss | *Climacium dendroides* | 1 |
| **OT6P3** | Round-leaved orchid | *Habenaria orbiculata* | **T5P1** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT6P3** | Labrador tea | *Ledum groenlandicum* | **T5P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P3** | Step moss | *Hylocomium splendens* | **T5P1** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P3** | Rattlesnake plantain | *Goodyera repens* | **T5P1** | black spruce | *Picea mariana* | 25 |
| **OT6P3** | Balsam poplar | *Populus balsamifera* | **T5P1** | trembling aspen | *Populus tremuloides* | 5 |
| **OT6P3** | Tall lungwort | *Mertensia paniculata* | **T5P1** | currants | *Ribes sp* | 20 |
| **OT6P3** | Common horsetail | *Equisetum pratense* | **T5P1** | prickly rose | *Rosa acicularis* | 10 |
| **OT6P4** | Willow | *Salix sp* | **T5P2** | common yarrow | *Achillea millefolium* | 1 |
| **OT6P4** | Woodland horsetail | *Equisetum sylvaticum* | **T5P2** | tree moss | *Climacium dendroides* | 5 |
| **OT6P4** | Common mitrewort | *Mitella nuda* | **T5P2** | bunchberry | *Cornus canadensis* | 1 |
| **OT6P4** | Twinflower | *Linnaea borealis* | **T5P2** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P4** | Arrowhead coltsfoot | *Petasites sagittatus* | **T5P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P4** | Northern willow-herb | *Epilobium ciliatum* | **T5P2** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P4** | Bunchberry | *Cornus canadensis* | **T5P2** | balsam poplar | *Populus balsamifera* | 1 |
| **OT6P4** | Sphagnum moss | *Sphagnum sp* | **T5P2** | currants | *Ribes sp* | 1 |
| **OT6P4** | Plume moss | *Ptilium crista-castrensis* | **T5P2** | prickly rose | *Rosa acicularis* | 5 |
| **OT6P4** | Dwarf birch | *Betula pumila* | **T5P3** | tree moss | *Climacium dendroides* | 10 |
| **OT6P4** | Pinesap | *Monotropa Hypopitis* | **T5P3** | bunchberry | *Cornus canadensis* | 1 |
| **OT6P4** | Agropyron Grass | *Agropyron sp* | **T5P3** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT6P5** | Calypso orchid | *Calypso bulbosa* | **T5P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT6P5** | Bunchberry | *Cornus canadensis* | **T5P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P5** | Prickly rose | *Rosa acicularis* | **T5P3** | black spruce | *Picea mariana* | 1 |
| **OT6P5** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T5P3** | trembling aspen | *Populus tremuloides* | 40 |
| **OT6P5** | Dewberry | *Rubus pubescens* | **T5P3** | prickly rose | *Rosa acicularis* | 5 |
| **OT6P5** | Twinflower | *Linnaea borealis* | **T5P3** | dwarf raspberry | *Rubus acaulis* | 1 |
| **OT6P5** | Step moss | *Hylocomium splendens* | **T5P3** | common plantain | *Plantago major* | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT6P5** | Creamy peavine | *Lathyrus ochroleucus* | **T6P1** | bunchberry | *Cornus canadensis* | 1 |
| **OT6P5** | Kidney-leaved violet | *Viola renifolia* | **T6P1** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT6P5** | American milkvetch | *Astragalus americanus* | **T6P1** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P5** | Sweet-scented bedstraw | *Galium boreale* | **T6P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P5** | Tall lungwort | *Mertensia paniculata* | **T6P1** | twinflower | *Linnaea borealis* | 1 |
| **OT6P5** | Schrebers moss | *Pleurozium schreberi* | **T6P1** | black spruce | *Picea mariana* | 1 |
| **OT6P5** | Bog cranberry | *Vaccinium vitis-idaea* | **T6P1** | trembling aspen | *Populus tremuloides* | 20 |
| **OT6P5** | Green wintergreen | *Pyrola virens* | **T6P1** | plume moss | *Ptilium crista-castrensis* | 5 |
| **OT6P5** | Wild red currant | *Ribes triste* | **T6P1** | currants | *Ribes sp* | 1 |
| **OT6P5** | Agropyron Grass | *Agropyron sp* | **T6P1** | prickly rose | *Rosa acicularis* | 10 |
| **OT6P6** | Rattlesnake plantain | *Goodyera repens* | **T6P1** | Canada buffaloberry | *Sheperdia canadensis* | 1 |
| **OT6P6** | Common horsetail | *Equisetum pratense* | **T6P2** | Reindeer Lichen | *Cladina rangifera* | 1 |
| **OT6P6** | Prickly rose | *Rosa acicularis* | **T6P2** | tree moss | *Climacium dendroides* | 10 |
| **OT6P6** | Woodland horsetail | *Equisetum sylvaticum* | **T6P2** | bunchberry | *Cornus canadensis* | 1 |
| **OT6P6** | Schrebers moss | *Pleurozium schreberi* | **T6P2** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT6P6** | Bunchberry | *Cornus canadensis* | **T6P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P6** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T6P2** | twinflower | *Linnaea borealis* | 15 |
| **OT6P6** | Common mitrewort | *Mitella nuda* | **T6P2** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P6** | One-sided wintergreen | *Pyrola secunda* | **T6P2** | nephroma lichen | *Nephroma arctium* | 5 |
| **OT6P6** | Twinflower | *Linnaea borealis* | **T6P2** | black spruce | *Picea mariana* | 1 |
| **OT6P6** | Wild vetch | *Vicia americana* | **T6P2** | plume moss | *Ptilium crista-castrensis* | 10 |
| **OT6P7** | Willow | *Salix sp* | **T6P2** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT6P7** | Sweet-scented bedstraw | *Galium boreale* | **T6P2** | currants | *Ribes sp* | 5 |
| **OT6P7** | Plume moss | *Ptilium crista-castrensis* | **T6P2** | prickly rose | *Rosa acicularis* | 1 |
| **OT6P7** | Bunchberry | *Cornus canadensis* | **T6P2** | common plantain | *Plantago major* | 1 |
| **OT6P7** | Prickly rose | *Rosa acicularis* | **T6P3** | common yarrow | *Achillea millefolium* | 1 |
| **OT6P7** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T6P3** | bunchberry | *Cornus canadensis* | 5 |
| **OT6P7** | Common horsetail | *Equisetum pratense* | **T6P3** | wild strawberry | *Fragaria virginiana* | 5 |
| **OT6P7** | Schrebers moss | *Pleurozium schreberi* | **T6P3** | Northern bedstraw | *Galium boreale* | 1 |
| **OT6P7** | Reindeer lichen | *Cladina rangiferina* | **T6P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **OT6P7** | Bog cranberry | *Vaccinium vitis-idaea* | **T6P3** | twinflower | *Linnaea borealis* | 5 |
| **OT6P7** | Woodland horsetail | *Equisetum sylvaticum* | **T6P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT6P7** | Dwarf-scouring rush | *Equisetum scirpoides* | **T6P3** | Schreber's moss | *Pleurozium schreberi* | 40 |
| **OT6P7** | Tall lungwort | *Mertensia paniculata* | **T6P3** | common pink wintergreen | *Pyrola asarifolia* | 5 |
| **OT6P7** | Agropyron Grass | *Agropyron sp* | **T6P3** | currants | *Ribes sp* | 15 |
| **OT6P8** | Willow | *Salix sp* | **T6P3** | prickly rose | *Rosa acicularis* | 5 |
| **OT6P8** | Arrowhead coltsfoot | *Petasites sagittatus* | **T6P3** | Canada buffaloberry | *Sheperdia canadensis* | 40 |
| **OT6P8** | Labrador tea | *Ledum groenlandicum* | **T7P2** | tree moss | *Climacium dendroides* | 1 |
| **OT6P8** | Sphagnum moss | *Sphagnum sp* | **T7P2** | bunchberry | *Cornus canadensis* | 5 |
| **OT6P8** | Bog cranberry | *Vaccinium vitis-idaea* | **T7P2** | fairybells | *Disporum trachycarpum* | 10 |
| **OT6P8** | Common mitrewort | *Mitella nuda* | **T7P2** | Northern bedstraw | *Galium boreale* | 5 |
| **OT6P8** | Bristly Black Currant | *Ribes lacustre* | **T7P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT6P8** | three leaved solomon's seal | *Smilacina trifolia* | **T7P2** | flat-fruited meadow rue | *Thalictrum sparsiflorum* | 1 |
| **OT6P8** | Cloudberry | *Rubus chamaemorus* | **T7P2** | common blueberry | *Vaccinium myrtilloides* | 1 |
| **OT6P8** | Common horsetail | *Equisetum pratense* | **T7P3** | bog birch | *Betula glandulosa* | 1 |
| **OT6P8** | One-sided wintergreen | *Pyrola secunda* | **T7P3** | bunchberry | *Cornus canadensis* | 10 |
| **OT6P8** | Lapland buttercup | *Ranunculus lapanicus* | **T7P3** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT6P8** | Agropyron Grass | *Agropyron sp* | **T7P3** | step moss | *Hylocomium splendens* | 5 |
| **2010** | | | **T7P3** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **Plot** | **Species Common Name** | **Species Scientific Name** | **T7P3** | naked bishop's-cap | *Mitella nuda* | 1 |
| **OT7P1** | Baneberry | *Actaea rubra* | **T7P3** | black spruce | *Picea mariana* | 1 |
| **OT7P1** | Agropyron Grass | *Agropyron sp* | **T7P3** | prickly rose | *Rosa acicularis* | 1 |
| **OT7P1** | Green alder | *Alnus crispa* | **T7P3** | dwarf raspberry | *Rubus acaulis* | 5 |
| **OT7P1** | Fringed aster | *Aster ciliolatus* | **T7P3** | willows | *Salix sp* | 20 |
| **OT7P1** | Fireweed | *Epilobium angustifolium* | **T7P3** | common blueberry | *Vaccinium myrtilloides* | 1 |
| **OT7P1** | Creamy peavine | *Lathyrus ochroleucus* | **T7P4** | tree moss | *Climacium dendroides* | 1 |
| **OT7P1** | White spruce | *Picea glauca* | **T7P4** | bunchberry | *Cornus canadensis* | 5 |
| **OT7P1** | Balsam poplar | *Populus balsamifera* | **T7P4** | fairybells | *Disporum trachycarpum* | 5 |
| **OT7P1** | Trembling aspen | *Populus tremuloides* | **T7P4** | Northern bedstraw | *Galium boreale* | 1 |
| **OT7P1** | Prickly rose | *Rosa acicularis* | **T7P4** | prickly rose | *Rosa acicularis* | 1 |
| **OT7P1** | Raspberry | *Rubus ideaus* | **T7P4** | dwarf raspberry | *Rubus acaulis* | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **OT7P1** | Low bush-cranberry | *Viburnum edule* | **T7P4** | willows | *Salix sp* | 1 |
| **OT7P2** | Baneberry | *Actaea rubra* | **T7P4** | flat-fruited meadow rue | *Thalictrum sparsiflorum* | 1 |
| **OT7P2** | Agropyron Grass | *Agropyron sp* | **T7P4** | common blueberry | *Vaccinium myrtilloides* | 1 |
| **OT7P2** | Green alder | *Alnus crispa* | **T7P4** | Richardson's geranium | *Geranium richardsonii* | 1 |
| **OT7P2** | Heartleaf arnica | *Arinca cordifolia* | **T8P1** | common yarrow | *Achillea millefolium* | 1 |
| **OT7P2** | Fringed aster | *Aster ciliolatus* | **T8P1** | tree moss | *Climacium dendroides* | 1 |
| **OT7P2** | Bunchberry | *Cornus canadensis* | **T8P1** | bunchberry | *Cornus canadensis* | 5 |
| **OT7P2** | Fireweed | *Epilobium angustifolium* | **T8P1** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT7P2** | Woodland strawberry | *Fragaria vesca* | **T8P1** | Northern bedstraw | *Galium boreale* | 1 |
| **OT7P2** | Creamy peavine | *Lathyrus ochroleucus* | **T8P1** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT7P2** | Twinflower | *Linnaea borealis* | **T8P1** | prickly rose | *Rosa acicularis* | 5 |
| **OT7P2** | Common mitrewort | *Mitella nuda* | **T8P1** | flat-fruited meadow rue | *Thalictrum sparsiflorum* | 1 |
| **OT7P2** | White spruce | *Picea glauca* | **T8P2** | tree moss | *Climacium dendroides* | 1 |
| **OT7P2** | Balsam poplar | *Populus balsamifera* | **T8P2** | bunchberry | *Cornus canadensis* | 1 |
| **OT7P2** | Trembling aspen | *Populus tremuloides* | **T8P2** | fairybells | *Disporum trachycarpum* | 1 |
| **OT7P2** | Prickly rose | *Rosa acicularis* | **T8P2** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT7P2** | Raspberry | *Rubus ideaus* | **T8P2** | step moss | *Hylocomium splendens* | 1 |
| **OT7P2** | Low bush-cranberry | *Viburnum edule* | **T8P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT7P3** | Agropyron Grass | *Agropyron sp* | **T8P2** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **OT7P3** | Green alder | *Alnus crispa* | **T8P2** | twining honeysuckle | *Lonicera dioica* | 20 |
| **OT7P3** | Sarsaparilla | *Aralia nudicaulis* | **T8P2** | common pink wintergreen | *Pyrola asarifolia* | 1 |
| **OT7P3** | Heartleaf arnica | *Arinca cordifolia* | **T8P2** | prickly rose | *Rosa acicularis* | 5 |
| **OT7P3** | Fringed aster | *Aster ciliolatus* | **T8P2** | flat-fruited meadow rue | *Thalictrum sparsiflorum* | 5 |
| **OT7P3** | Fireweed | *Epilobium angustifolium* | **T8P3** | fairybells | *Disporum trachycarpum* | 5 |
| **OT7P3** | Balsam poplar | *Populus balsamifera* | **T8P3** | Northern bedstraw | *Galium boreale* | 1 |
| **OT7P3** | Trembling aspen | *Populus tremuloides* | **T8P3** | twining honeysuckle | *Lonicera dioica* | 1 |
| **OT7P3** | Prickly rose | *Rosa acicularis* | **T8P3** | currants | *Ribes sp* | 1 |
| **OT7P3** | Raspberry | *Rubus ideaus* | **T8P3** | prickly rose | *Rosa acicularis* | 5 |
| **OT7P3** | Low bush-cranberry | *Viburnum edule* | **T8P3** | dwarf raspberry | *Rubus acaulis* | 1 |
| **OT7P4** | Baneberry | *Actaea rubra* | **T8P3** | flat-fruited meadow rue | *Thalictrum sparsiflorum* | 1 |
| **OT7P4** | Agropyron Grass | *Agropyron sp* | **T8P4** | common yarrow | *Achillea millefolium* | 1 |
| **OT7P4** | Green alder | *Alnus crispa* | **T8P4** | bog birch | *Betula glandulosa* | 1 |
| **OT7P4** | Fringed aster | *Aster ciliolatus* | **T8P4** | wild strawberry | *Fragaria virginiana* | 10 |
| **OT7P4** | Bunchberry | *Cornus canadensis* | **T8P4** | Northern bedstraw | *Galium boreale* | 1 |
| **OT7P4** | Woodland strawberry | *Fragaria vesca* | **T8P4** | black spruce | *Picea mariana* | 1 |
| **OT7P4** | Trembling aspen | *Populus tremuloides* | **T8P4** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **OT7P4** | Prickly rose | *Rosa acicularis* | **T8P4** | prickly rose | *Rosa acicularis* | 1 |
| **OT7P4** | Raspberry | *Rubus ideaus* | **T8P4** | flat-fruited meadow rue | *Thalictrum sparsiflorum* | 5 |
| **OT7P4** | Low bush-cranberry | *Viburnum edule* | **T8P5** | bluejoint | *Calamagrostis canadensis* | 80 |
| **OT7P5** | Agropyron Grass | *Agropyron sp* | **T9P1** | Reindeer Lichen | *Cladina rangifera* | 30 |
| **OT7P5** | Green alder | *Alnus crispa* | **T9P1** | common Labrador tea | *Ledum groenlandicum* | 70 |
| **OT7P5** | Fringed aster | *Aster ciliolatus* | **T9P1** | common haircap moss | *Polytrichum commune* | 5 |
| **OT7P5** | Bromus Grass | *Bromus sp* | **T9P1** | sphagnum | *Sphagnum fuscum* | 80 |
| **OT7P5** | Bunchberry | *Cornus canadensis* | **T9P1** | bog cranberry | *Vaccinium vitis-idaea* | 1 |
| **OT7P5** | Fireweed | *Epilobium angustifolium* | **T9P2** | Reindeer Lichen | *Cladina rangifera* | 5 |
| **OT7P5** | Fescue | *Festuca sp* | **T9P2** | common Labrador tea | *Ledum groenlandicum* | 70 |
| **OT7P5** | Woodland strawberry | *Fragaria vesca* | **T9P2** | sphagnum | *Sphagnum fuscum* | 80 |
| **OT7P5** | Northern gooseberry | *Ribes oxyacanthoides* | **T9P2** | bog cranberry | *Vaccinium vitis-idaea* | 5 |
| **OT7P5** | Prickly rose | *Rosa acicularis* | **T9P3** | common horsetail | *Equisetum arvense* | 1 |
| **OT7P5** | Raspberry | *Rubus ideaus* | **T9P3** | step moss | *Hylocomium splendens* | 1 |
| **OT7P6** | Baneberry | *Actaea rubra* | **T9P3** | common Labrador tea | *Ledum groenlandicum* | 30 |
| **OT7P6** | Agropyron Grass | *Agropyron sp* | **T9P3** | Schreber's moss | *Pleurozium schreberi* | 20 |
| **OT7P6** | Bunchberry | *Cornus canadensis* | **T9P3** | common haircap moss | *Polytrichum commune* | 10 |
| **OT7P6** | Tall larkspur | *Delphinium glaucum* | **T9P3** | sphagnum | *Sphagnum fuscum* | 60 |
| **OT7P6** | Shield fern | *Dryopteris carthusiana* | **T9P3** | bog cranberry | *Vaccinium vitis-idaea* | 15 |
| **OT7P6** | Fireweed | *Epilobium angustifolium* | **T9P4** | Reindeer Lichen | *Cladina rangifera* | 1 |
| **OT7P6** | Woodland strawberry | *Fragaria vesca* | **T9P4** | bunchberry | *Cornus canadensis* | 5 |
| **OT7P6** | Twinflower | *Linnaea borealis* | **T9P4** | wild strawberry | *Fragaria virginiana* | 1 |
| **OT7P6** | Palmate-leaved coltsfoot | *Petasites palmatus* | **T9P4** | Northern bedstraw | *Galium boreale* | 1 |
| **OT7P6** | Prickly rose | *Rosa acicularis* | **T9P4** | step moss | *Hylocomium splendens* | 10 |

| | | |
|---|---|---|
| **OT7P6** | Raspberry | *Rubus ideaus* |
| **OT7P7** | Green alder | *Alnus crispa* |
| **OT7P7** | Sarsaparilla | *Aralia nudicaulis* |
| **OT7P7** | Fringed aster | *Aster ciliolatus* |
| **OT7P7** | Bunchberry | *Cornus canadensis* |
| **OT7P7** | Fireweed | *Epilobium angustifolium* |
| **OT7P7** | Common mitrewort | *Mitella nuda* |
| **OT7P7** | Palmate-leaved coltsfoot | *Petasites palmatus* |
| **OT7P7** | Trembling aspen | *Populus tremuloides* |
| **OT7P7** | Prickly rose | *Rosa acicularis* |
| **OT7P7** | Low bush-cranberry | *Viburnum edule* |
| **OT7P8** | Agropyron Grass | *Agropyron sp* |
| **OT7P8** | Bromus Grass | *Bromus sp* |
| **OT7P8** | Northern gooseberry | *Ribes oxyacanthoides* |
| **OT7P8** | Raspberry | *Rubus ideaus* |
| **OT8P1** | Labrador tea | *Ledum groenlandicum* |
| **OT8P1** | Cloudberry | *Rubus chamaemorus* |
| **OT8P1** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P1** | Bog cranberry | *Vaccinium vitis-idaea* |
| **OT8P2** | Labrador tea | *Ledum groenlandicum* |
| **OT8P2** | Black spruce | *Picea mariana* |
| **OT8P2** | Cloudberry | *Rubus chamaemorus* |
| **OT8P2** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P2** | Bog cranberry | *Vaccinium vitis-idaea* |
| **OT8P3** | Labrador tea | *Ledum groenlandicum* |
| **OT8P3** | Cloudberry | *Rubus chamaemorus* |
| **OT8P3** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P3** | small Bog cranberry | *Vaccinium oxycoccos* |
| **OT8P3** | Bog cranberry | *Vaccinium vitis-idaea* |
| **OT8P3** | Sphagnum moss | *sphagnum* |
| **OT8P4** | Bazzania | *Bizzania trilobata* |
| **OT8P4** | Schrebers moss | *Pleurozium schreberi* |
| **OT8P4** | Cloudberry | *Rubus chamaemorus* |
| **OT8P4** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P4** | Bog cranberry | *Vaccinium vitis-idaea* |
| **OT8P5** | Step moss | *Hylocomium splendens* |
| **OT8P5** | Labrador tea | *Ledum groenlandicum* |
| **OT8P5** | Black spruce | *Picea mariana* |
| **OT8P5** | Schrebers moss | *Pleurozium schreberi* |
| **OT8P5** | Cloudberry | *Rubus chamaemorus* |
| **OT8P5** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P5** | Bog cranberry | *Vaccinium vitis-idaea* |
| **OT8P6** | Step moss | *Hylocomium splendens* |
| **OT8P6** | Labrador tea | *Ledum groenlandicum* |
| **OT8P6** | Black spruce | *Picea mariana* |
| **OT8P6** | Schrebers moss | *Pleurozium schreberi* |
| **OT8P6** | Cloudberry | *Rubus chamaemorus* |
| **OT8P6** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P6** | Bog cranberry | *Vaccinium vitis-idaea* |
| **OT8P7** | Step moss | *Hylocomium splendens* |
| **OT8P7** | Labrador tea | *Ledum groenlandicum* |
| **OT8P7** | Black spruce | *Picea mariana* |
| **OT8P7** | Schrebers moss | *Pleurozium schreberi* |
| **OT8P7** | Cloudberry | *Rubus chamaemorus* |
| **OT8P7** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P7** | Bog cranberry | *Vaccinium vitis-idaea* |
| **OT8P8** | Labrador tea | *Ledum groenlandicum* |
| **OT8P8** | Cloudberry | *Rubus chamaemorus* |
| **OT8P8** | Sphagnum moss | *Sphagnum sp.* |
| **OT8P8** | Bog cranberry | *Vaccinium vitis-idaea* |

| | | | |
|---|---|---|---|
| **T9P4** | cream-colored vetchling | *Lathyrus ochroleucus* | 1 |
| **T9P4** | twinflower | *Linnaea borealis* | 5 |
| **T9P4** | naked bishop's-cap | *Mitella nuda* | 1 |
| **T9P4** | nephroma lichen | *Nephroma arctium* | 10 |
| **T9P4** | Schreber's moss | *Pleurozium schreberi* | 10 |
| **T9P4** | common pink wintergreen | *Pyrola asarifolia* | 5 |
| **T9P4** | currants | *Ribes sp* | 1 |
| **T9P4** | prickly rose | *Rosa acicularis* | 5 |
| **T9P5** | bunchberry | *Cornus canadensis* | 1 |
| **T9P5** | wild strawberry | *Fragaria virginiana* | 1 |
| **T9P5** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **T9P5** | twinflower | *Linnaea borealis* | 10 |
| **T9P5** | tall lungwort | *Mertensia paniculata* | 5 |
| **T9P5** | currants | *Ribes sp* | 1 |
| **T9P5** | prickly rose | *Rosa acicularis* | 5 |
| **T9P5** | low-bush cranberry | *Viburnum edule* | 20 |
| **T9P6** | tree moss | *Climacium dendroides* | 5 |
| **T9P6** | bunchberry | *Cornus canadensis* | 5 |
| **T9P6** | wild strawberry | *Fragaria virginiana* | 1 |
| **T9P6** | step moss | *Hylocomium splendens* | 10 |
| **T9P6** | cream-colored vetchling | *Lathyrus ochroleucus* | 5 |
| **T9P6** | twinflower | *Linnaea borealis* | 1 |
| **T9P6** | dwarf raspberry | *Rubus acaulis* | 5 |

# APPENDIX D - ABMI DATA COLLECTION PROTOCOLS USED FOR SURVEYS OF THE WILLMORE WILDERNESS PARK BY ALBERTA PARKS, TOURISM, AND RECREATION

## Shrub and 2-Dimensional Ground Cover:

This protocol is designed to measure shrubs and ground vegetation.
2-dimensional cover of the ground layer and shrub layer are measured at each 5 x 5 m plot within each of the four quadrants (Figure 1.0).

**Field Equipment:**

Not applicable.

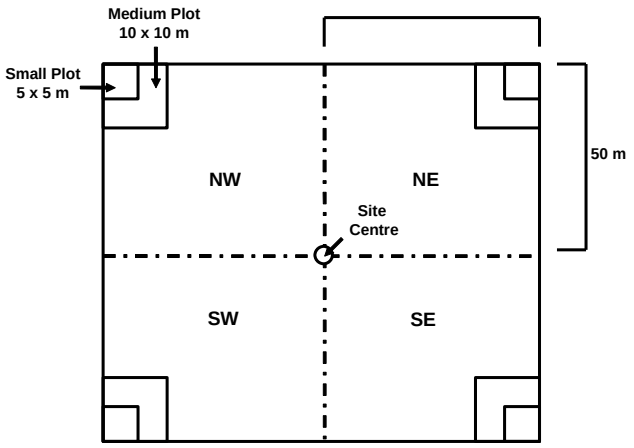


Figure 1.0

**Protocol:**

A. Shrub layer: 2-dimensional cover of shrubs and small trees is estimated in increments of 0%, <1%, and 5%.
•Shrubs are defined as non-tree woody vascular plants >0.5 m in height.
•Small trees are defined as trees <1.3 m in height.
•Shrub/small tree cover is estimated independently for two height categories (>0.5 to <1.3 m high, and >1.3 m high). Note: Each of these estimates cannot be greater than 100%.
•The first estimate of 2-dimensional cover is the percent cover that would be recorded if a photograph were taken at 1.3 m above the ground and foliage from all shrubs/trees <0.5 m was excluded.
•The second estimate of 2-dimensional cover is the percent cover that would be recorded if a photograph were taken at 5.0 m above the ground and foliage from all shrubs/trees <1.3 m was excluded.

B. 2-dimensional ground cover is estimated as:
• The percentage of the 5 x 5 m plot covered by shrubs/trees, grasses, sedges/rushes, all other vascular plants combined, mosses, lichens, fungi, litter (dead vegetation plus downed woody material <2 cm in diameter), wood (live and dead trees >1.3 m tall, plus downed woody material >2 cm diameter), water, bare ground, rock, and animal matter. • Estimates are recorded in 0%, <1%, and 5% increments and represent the percent cover that would be recorded when taking a photograph 0.5 m above the ground. Values must sum to 100%.

## Trees, Snags and Stumps:

This protocol is designed to measure tree, snag and stump densities and sizes. Data are collected from two nested plots with the 10 x 10 m plot encompassing the smaller 5 x 5 m plot (Figure 2.0).

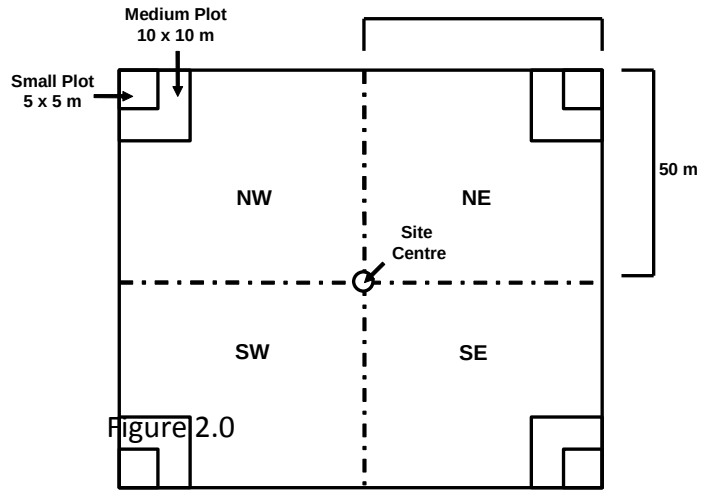


Figure 2.0

**Field Equipment:**

50 cm DBH calipers (1 mm increments)
10 m carpenters tape
100 m measuring tape
Vertex hypsometer with transponder.

**Protocol:**

Overall, six trees (≥ 7 cm DBH) are fully measured in each quadrant. Trees are selected initially in the 5x5m plot and if necessary, from the
10 x 10 m plot to fulfill the six tree quota. Living trees should be selected before snags. Information is collected by moving sequentially from the 5x5 m plot to the 10x10 m plot.

**5 x 5 m Square Plot**:

•Measure 6 trees with ≥ 7 cm DBH and record species, condition (dead or alive), DBH and top height.
•If more than 6 trees exist in the plot, select the trees closest to the sequential points indicated in Figure 3.0.
•Count the number of stems <7 DBH for trees, snags and stumps; differentiate by species and indicate condition (dead or alive).
•Count the number of stems ≥ 7 cm DBH for trees, snags and stumps; differentiate by species and indicate condition (dead or alive).

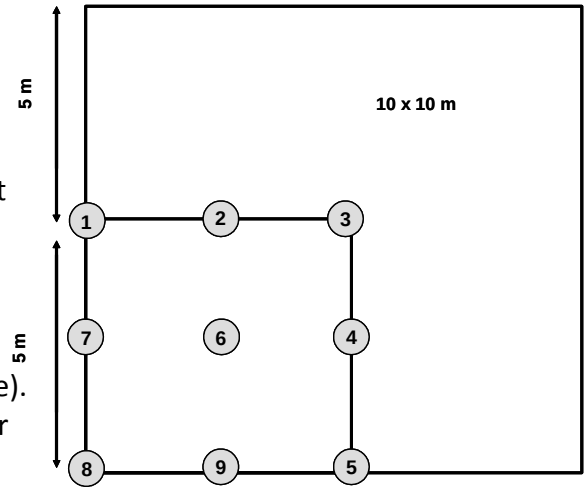


Figure 3.0

## 10 x 10 L-Shaped Plot:

•If the 6 tree quota is not fulfilled in the 5 x 5m plot, measure and record species, condition, DBH and top height for the remaining trees.
•If there are not enough trees in the 10 x 10m, measure snags with ≥ 7 cm DBH to fulfill the 6 tree quota. Record species, condition, DBH and top height.
•Trees are selected closest to the sequential points indicated in Figure 4.0.
•Count the number of stems with <7 DBH for trees, snags and stumps; differentiate by species and indicate condition (dead or alive).
•Count the number of stems with ≥ 7 cm DBH for trees, snags and stumps; differentiate by species and indicate condition (dead or alive).

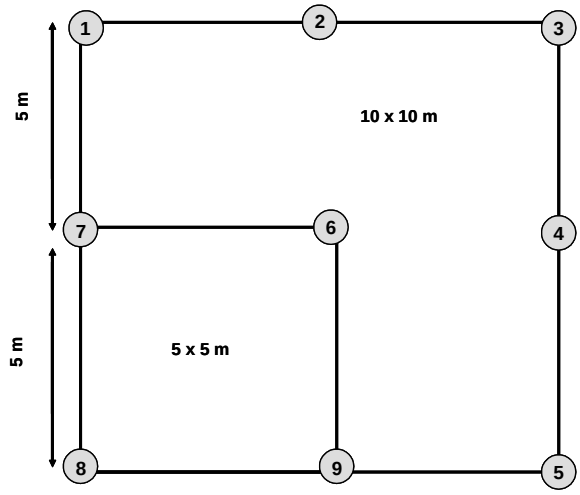


Figure 4.0

**Note:**

• Snags must be ≥1.3 m high and leaning no more than 45° from vertical to be included.
• For all stumps, record species (if possible), condition (dead), diameter inside the bark at the top of the stump and top height.
• For each tree, use a vertex hypsometer to measure the top height. Top height will be measured to the highest living part of the tree.
•All trees must be within each quadrant area and cannot be measured twice (i.e., select a different tree if it is the closest to more than one location).
• Measure trees and snags on the boundary of the plot only if greater than half of the bole is within the plot.

## Canopy Cover

This protocol is designed to measure canopy cover within the site.

**Field Equipment:**

Spherical (concave) densitometer.

**Protocol:**
• Take readings in each cardinal direction from the inside edge of the 5 x 5 m plot.

• A total of four readings for each quadrant and sixteen for the entire site must be recorded. Record the canopy cover when: facing north, facing east, facing south, facing west.
• Hold the densitometer in the palm of your hand at elbow height (with your arm bent at a right angle) and ensure that it is level.
• Imagine four dots equally spaced in each of the twenty-four squares on the densitometer (creating four equal quarters). Count the dots (or quarters) that are in canopy openings and record the number of **open dots** (or quarters) on the data sheet.
• Record '96' in the absence of canopy cover.

## Breeding Birds:

This protocol is designed to measure presence and relative abundance of breeding birds.

**Field Equipment:**

Omni directional microphone
Recording unit
Tripod
Backpack
Laptop Computer (Minimum 2.5 GB drive space).

**Protocol:**

• Bird recordings begin within thirty minutes prior to sunrise.

• Nine point count stations are surveyed in a grid pattern with a spacing of 300 m between stations (Figure 5.0).

• Point count station 1 is at the site centre. Locations of the other eight stations are determined by GPS.

• Unless inhibited, conduct bird surveys starting at point count station 1, and proceeding in numerical order (counter-clockwise) until all point counts have been conducted.

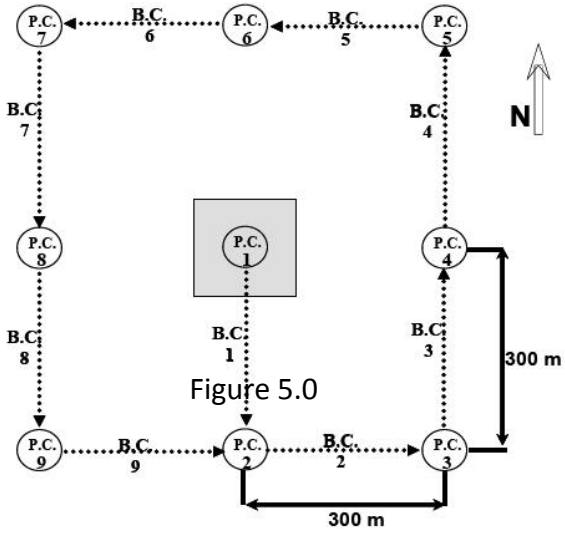


Figure 5.0

•**Prior** to commencing the bird recording, state the technician's name, date, site, point count number and time of recording for each point count by speaking aloud while recording.

Figure 5.0

• At each point count station, record bird vocalizations for a period of 10 minutes using the omni-directional microphone connected to a recording unit. Move the recording equipment to the North or South (keeping the right microphone on the East side) and as far from the microphone as possible; this will deliver any obstructive noise equally to the left and right microphones. Headphones must not be left open on the ground – they are to be worn or placed in the pelican case to avoid distortion on the recording. It is imperative that recording levels be standardized to avoid clipping the sound files. Set the recording level based on the value for the particular model of microphone being used and maintain this setting

consistently among sites regardless of wind or environmental conditions. Ensure that all point count recordings are made at greater than or equal to 320 kbps.

• Depress the tone standard for a minimum of 5 seconds at the start of each bird recording to standardize recording intensity.

• During each 10 minutes recording session, scan the area around the station using binoculars. For all birds observed (even those that are vocalizing), state the species, number of individuals, flock sizes for all birds flying overhead and distance they are from the microphones. Record potential factors that may bias the number of bird vocalizations detected such as wind speed, precipitation, and human-caused noise.

• If a bird station is obstructed, note the cause for the absence of data and continue to the next accessible bird point count station.

• Bird recording files are digitally transferred/backed-up from the portable recording hard drive to a laptop computer nightly. After the transfer of data files is complete, re-label the temporary file names with permanent file names. Label each point count as 'Willmore' underscore 'year' underscore 'site' underscore 'station' (e.g., Willmore_2010_E5_2).

## Vascular Plant Searches and Relative Density:

This protocol is designed to detect as many species of vascular plants as possible during a time constrained search within the 1 ha area.

**Field Equipment:**

Plant press
Paper bags
Plastic bags

**Protocol:**

A. Vascular plant searches

• Firstly, 10 minutes are spent in each quadrant recording the observed vascular plant species.

• Organize the plant species on the data sheet by group (grasses, trees, shrubs, herbs) to avoid recording the same species multiple times.

• Unknown species can be quickly identified during the initial 10 minute search, but if unable to identify the species quickly, collect the specimen from a population of greater than 5 individuals, outside the plot if possible. Specimens are assigned a unique specimen number and carried with the technician to avoid multiple collections in each quadrant. Unidentified specimens are labeled as UNK-Site Number-Quadrant-Specimen Number e.g. UNK-E5-NE-05.

• Secondly, a 20 minute search is conducted in each of the four quadrants (a total of 80 minutes). Record all possible vascular species.

• Commence all 20 minute searches at plot centre and move in a clockwise direction around the quadrant staying approximately 5-10 m from the quadrant edge. Stop every four or five steps to examine the plants in the immediate area. Ensure that all habitat types in the quadrant are searched for vascular plants.

• Always start the surveys in the NE quadrant and progress clockwise to the next quadrant (NE, SE, SW and NW).

• Field guides should not be used during the 20 minute search; instead, collect specimens of unknown or uncertain vascular plant species. Following the 20 minute search, quickly identify the species using field guides. Unknown specimens are labeled and placed in a plant press for identification during the evening. On the data sheet record the unique reference code, UNK-Site Number-Quadrant-Specimen Number, (e.g. UNK-E5-NE-05) and complete an unknown species label with date, site number, collector's name and the unique reference code.

• For specimens that cannot be identified in the evening, remove them from the field press and place them a different plant press for temporary storage. Ensure that the field data sheet reference code matches the label included with the specimen in the plant press.

B. Relative Density of Common Vascular Plants

Vascular plant searches do not provide estimates of abundance for each of the species. Thus, coarse estimates of relative density are determined for common species at the center of each quadrant.

• Prior to each 20-minute search in the quadrant, stand at the plot center to survey the 10 x 10 m plot.

• Determine which vascular plant species are 'common' or 'dominant' within the 10 x 10 m plot.

• Common species are present in >50% of the 10 x 10 m plot. Place a 'C' on the data sheet beside species that are common. Some quadrants may contain many common species while other quadrants may not contain any.

• From the common species, determine which has the highest percent cover. Label this as the dominant species and place 'D' on the data sheet beside that species.

**Parks Coverage/Shrub Cover %:**

## Edge Searches

-5 minute timed searches

# APPENDIX E - PLOT SPECIFIC EXAMPLES OF NON-CONFORMANCE WITH POSSIBLE REASON FOR NON-CONFORMANCE FOR FUTURE VERIFICATION AND STUDY.

Site E3, Plot 5

Site E3 is located in the Eastern part of the Willmore Wilderness Park, approximately 47 km southeast of the town of Grand Cache. It is at a relatively low elevation within the park with a mixture of boreal and alpine vegetation. Its non-conformance could be due to disturbance. As can be seen in Figure 1, plot 5 was offset from the main data collection area and at the time of production of the ArcGIS basemap imagery it is quite apparent that it is a more meadow-like cover than the other, predominantly forested, plots at site E3. Northern rough fescue grass (*Festuca altaica*) was found to densely cover 90 percent of this particular 1x1 m survey plot (Figure 2, Table 1). Grasses in general tend to be fast growing, shade intolerant, and quite competitive with regards to local resources (water, nutrients, etc.) (Sims and Mueller-Dombois 1968). This difference in cover may be attributable to disturbance that allowed meadow-like vegetation to colonize. As most forms of anthropogenic disturbance (i.e. harvesting) do not occur within the park we can assume that this would be a natural disturbance, such as a fire or flood, given this plot's proximity to predicted flow channels. Whether due to disturbance or not, the fescue grass appears to have found favourable conditions at this plot and colonised quickly, leading to not only the establishment but also the maintenance of this grassy meadow cover type until such time as tree and shrub species can re-establish. The presence and prevalence of grass could have skewed the calculated VI value for this plot toward the dry end of the VI scale.

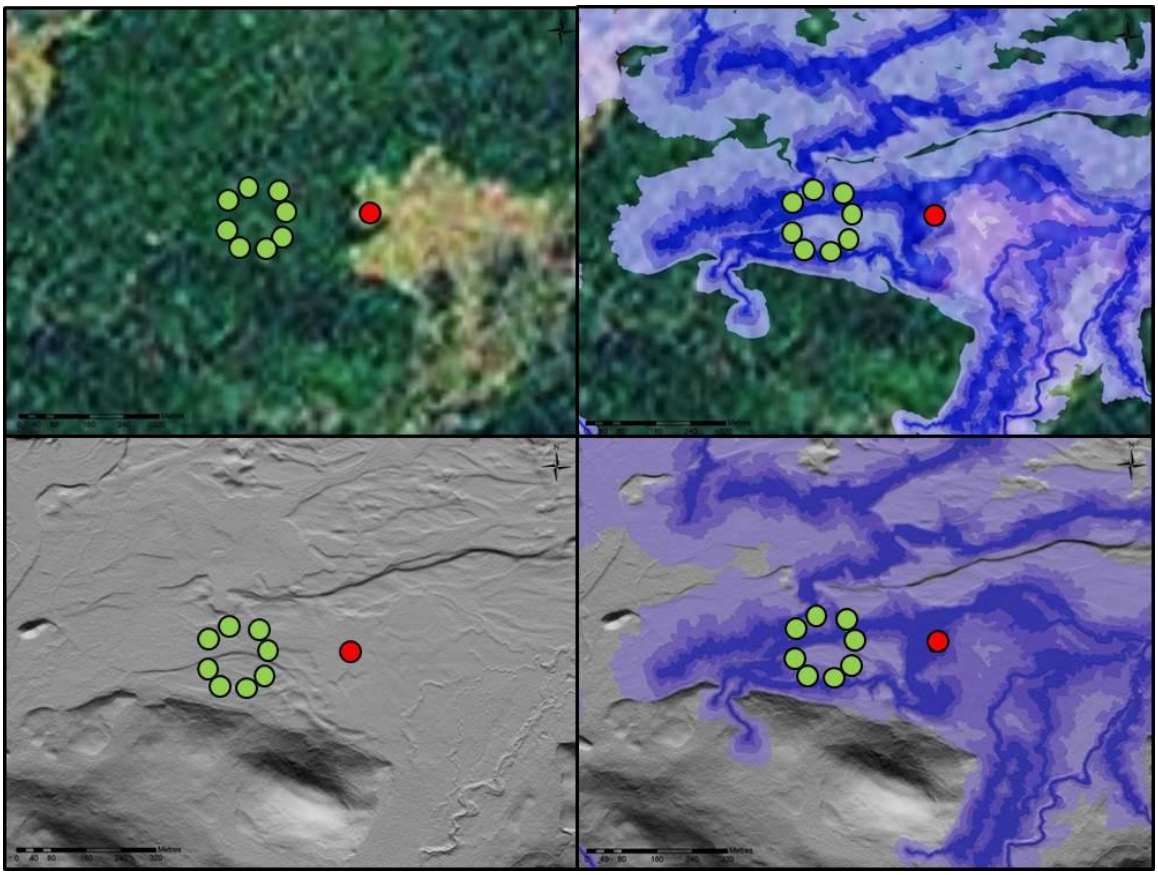


Figure 1. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site E3 in the Willmore Wilderness Park, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Figure 2. Vegetation at Site E3, plot 5 in the Willmore Wilderness Park, dominated by northern rough fescue (*Festuca altaica*) and monkshood (*Achillea delphinifolium*).

Table 1. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site E3, plot 5 in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| common yarrow | *Achillea millefolium* | 2 | 1 | 4 | 1 | 0.12 | 1480 | 1 | 329 |
| monkshood | *Aconitum delphinifolium* | 3 | 0 | 8 | 10 | 0.12 | 1480 | 0.73 | 329 |
| yellow columbine | *Aquilegia flavescens* | 5 | 4 | 6 | 1 | 0.12 | 1480 | 0.73 | 329 |
| sedge | *Carex sp* | 5 | 0 | 5 | 1 | 0.12 | 1480 | 0.73 | 329 |
| northern rough fescue | *Festuca altaica* | 2 | 0 | 5 | 90 | 0.12 | 1480 | 0.73 | 329 |
| alpine hedysarum | *Hedysarum alpinum* | 2 | 0 | 5 | 1 | 0.12 | 1480 | 0.73 | 329 |

Site E9, Southeast Corner Plot

Site E9 is located in the Southern part of the Willmore Wilderness Park, approximately 53 km South-southeast of the town of Grand Cache. It is at a mid-range elevation within the park with mostly alpine meadow vegetation. In the instance of the southeast corner plot at site E9 the non-conformance appears to be related to underlying wet areas mapping rather than to the predicted moisture-vegetation relationship. The vegetation recorded at this plot included moist to hydric species yet the DTW for the plot is predicted to be nearly 4m (Table 2). As can be seen in Figure 3, site E9 is in a relativelyflat plateau where it may be difficult to determine the exact flow pattern. A close-up examination of the southeast corner plot in Figure 4 shows it to be situated within a small, arced ridge that may act as a catchment, making this corner wetter than the 4 ha DTW predicts. In fact, when comparing DTW mapping produced with a 4 ha flow initiation versus a 1 ha flow initiation, we see that the 1 ha DTW map indicated a higher wetness for the plot. In this case the non-conformance between vegetation and DTW suggests that the appropriate flow initiation point for the DTW mapping may vary with topographic scale and variability.

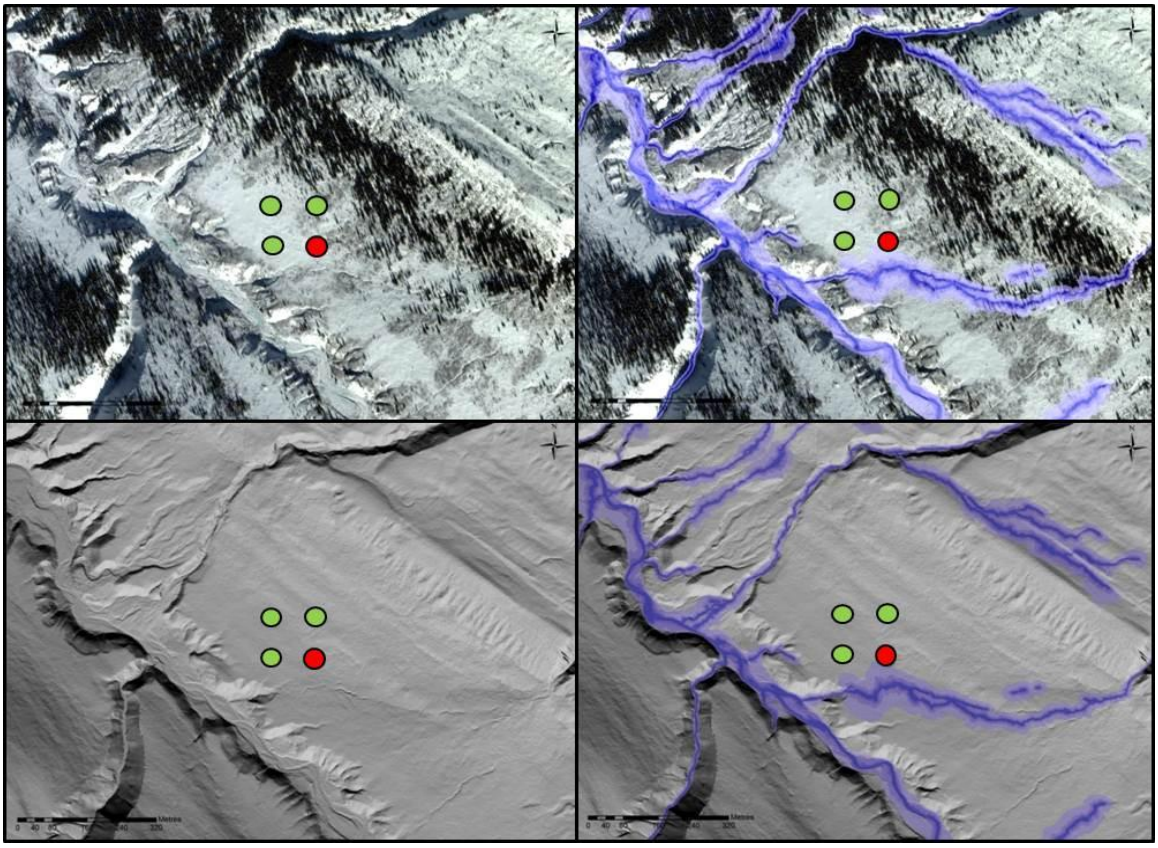


Figure 3. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site E9 in the Willmore Wilderness Park, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

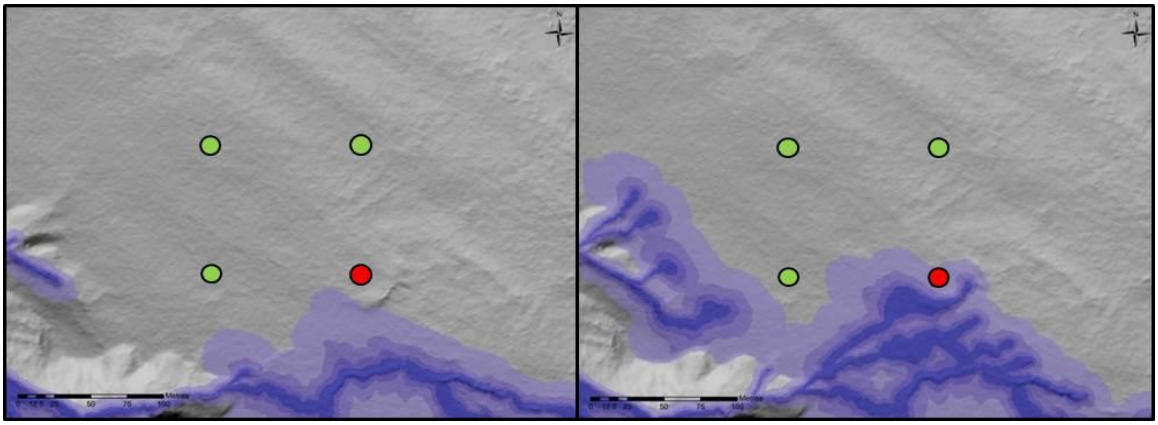


Figure 4. DEM images, with DTW mapping derived for 4 hectare flow initiation (left) and for 1 hectare flow initiation (right), for site E9 in the Willmore Wilderness Park, shown at a representative fraction of 1:1500. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Table 2. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site E9, Southeast corner plot in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| smooth willow | *Salix glauca* | 5 | 4 | 8 | 25 | 3.89 | 1948 | 8.50 | 213 |
| Farr's willow | *Salix farriae* | 5 | 2 | 8 | 1 | 3.89 | 1948 | 8.50 | 213 |
| false mountain willow | *Salix pseudomonticola* | 6 | 2 | 8 | 1 | 3.89 | 1948 | 8.50 | 213 |
| bog birch | *Betula glandulosa* | 8 | 2 | 8 | 1 | 3.89 | 1948 | 8.50 | 213 |
| water sedge | *Carex aquatilus* | 7 | 6 | 8 | 50 | 3.89 | 1948 | 8.50 | 213 |
| Arctic blackberry | *Rubus arcticus* | 6 | 5 | 8 | 2 | 3.89 | 1948 | 8.50 | 213 |
| fowl bluegrass | *Poa palustris* | 5 | 0 | 8 | 1 | 3.89 | 1948 | 8.50 | 213 |
| common cotton grass | *Eriophorum angustifolium* | 7 | 1 | 8 | 1 | 3.89 | 1948 | 8.50 | 213 |

Site H1, Northeast Corner Plot

Site H1 is located in the Eastern part of the Willmore Wilderness Park, approximately 56 km southeast of the town of Grand Cache. It is at a relatively high elevation within the park with predominantly alpine vegetation. The reason for the non-conformance of the northeast corner plot is most likely has to do with where the plot is physically situated on the landscape. The xeric to submesic vegetation at this plot does not correlate to the very high DTW for this plot (Table 3). Though this could be another minor instance of non-conformance in the DTW itself, it is more likely that the plot supports vegetation associated with higher moisture because of the catchment of surface water coupled with the plot's aspect. As can be seen in Figure 5, the northeast corner plot is located at the base of a small ridge and has a very shaded North aspect. These factors could mean that it is an area of discharge and that it is slower to dry out than the surrounding area.

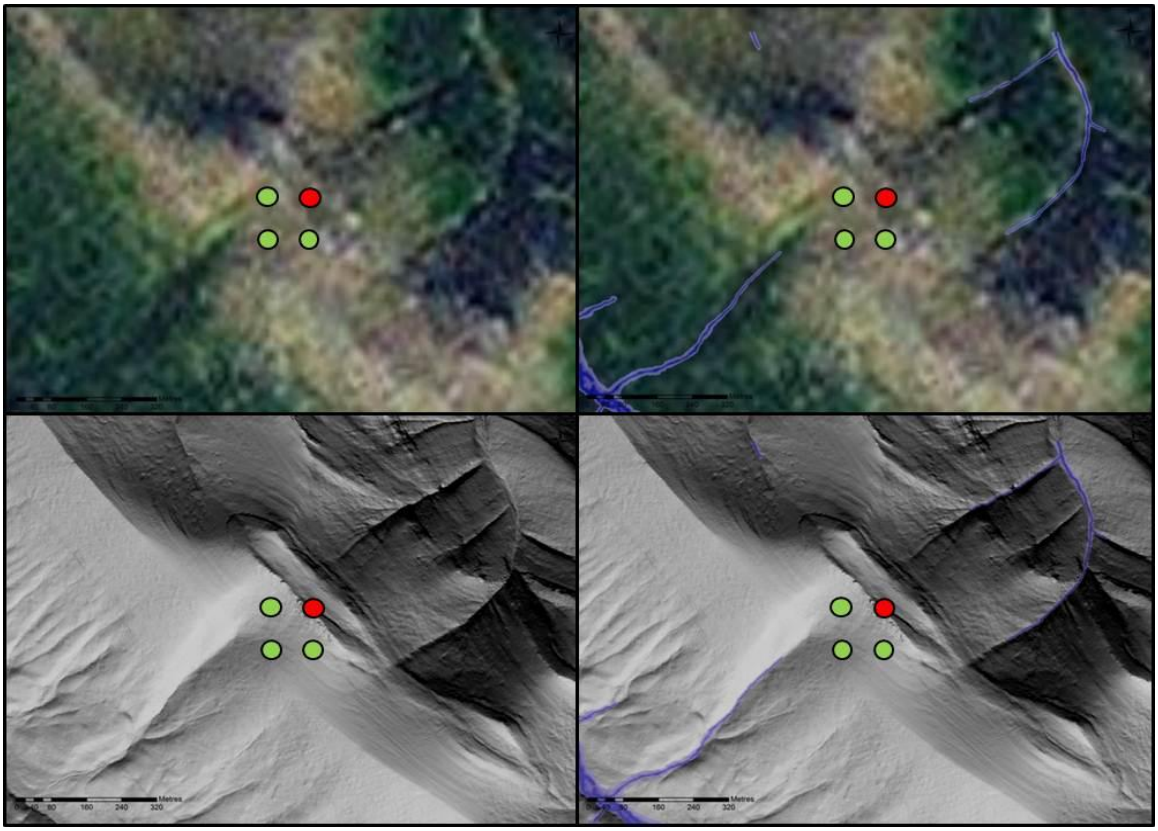


Figure 5. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site H1 in the Willmore Wilderness Park, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Table 3. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site H1, Northeast corner plot in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| one-flowered cinquefoil | *Potentilla uniflora* | 2 | 0 | 6 | 1 | 119.25 | 2133 | 26.01 | 52 |
| rock sedge | *Carex rupestris* | 1 | 0 | 3 | 1 | 119.25 | 2133 | 26.01 | 52 |
| three-toothed saxifrage | *Saxifraga tricuspidata* | 2 | 0 | 8 | 1 | 119.25 | 2133 | 26.01 | 52 |
| white mountain avens | *Dryas octopetala* | 3 | 2 | 8 | 1 | 119.25 | 2133 | 26.01 | 52 |
| mountain sagewort | *Artemisia norvegica* | 2 | 0 | 7 | 1 | 119.25 | 2133 | 26.01 | 52 |
| timberline bluegrass | *Poa glauca* | 3 | 1 | 5 | 1 | 119.25 | 2133 | 26.01 | 52 |
| spotted saxifrage | *Saxifraga bronchialis* | 2 | 0 | 4 | 1 | 119.25 | 2133 | 26.01 | 52 |
| alpine bistort | *Polygonum viviparum* | 5 | 0 | 8 | 1 | 119.25 | 2133 | 26.01 | 52 |
| Alaska harebell | *Campanula lasiocarpa* | 3 | 0 | 8 | 1 | 119.25 | 2133 | 26.01 | 52 |
| Northern rough fescue | *Festuca altaica** | 1 | 0 | 5 | 1 | 119.25 | 2133 | 26.01 | 52 |
| snow willow | *Salix reticulata* | 3 | 1 | 6 | 1 | 119.25 | 2133 | 26.01 | 52 |
| Northern rough fescue | *Festuca altaica** | 1 | 0 | 5 | 1 | 119.25 | 2133 | 26.01 | 52 |
| alpine aster | *Aster alpinus* | 2 | 1 | 4 | 1 | 119.25 | 2133 | 26.01 | 52 |
| fragrant sedge | *Carex nardina* | 2 | 0 | 7 | 1 | 119.25 | 2133 | 26.01 | 52 |
| inflated oxytrope | *Oxytropis podocarpa* | 2 | 0 | 4 | 1 | 119.25 | 2133 | 26.01 | 52 |
| Northern white mountain avens | *Dryas integrifolia* | 3 | 2 | 4 | 10 | 119.25 | 2133 | 26.01 | 52 |
| milk vetches | *Astragalus sp* | 3 | 1 | 6 | 1 | 119.25 | 2133 | 26.01 | 52 |
| compound-leaved fleabane | *Erigeron compositus* | 2 | 0 | 5 | 1 | 119.25 | 2133 | 26.01 | 52 |
| long-leaved chickweed | *Stellaria longifolia* | 5 | 0 | 8 | 1 | 119.25 | 2133 | 26.01 | 52 |
| cliff selaginella | *Selaginella scopulorum* | 2 | 2 | 3 | 1 | 119.25 | 2133 | 26.01 | 52 |
| Drummond's anemone | *Anemone lithophila* | 3 | 2 | 5 | 1 | 119.25 | 2133 | 26.01 | 52 |

Site H4, Northeast Corner Plot

Site H4 is located in the southeastern part of the Willmore Wilderness Park, approximately 52 km southeast of the town of Grand Cache. It is at a relatively high elevation within the park with predominantly alpine vegetation. Only one species was recorded at this plot, Northern rough fescue (*Festuca altaica*) with only 10 percent ground cover (Table 4). This gives the image of a small patch of grass growing out of scree, which is most likely the case at this plot. The non-conformance of the northeast corner plot is likely due to a natural process interfering with the DTW prediction by making the site drier than it would be otherwise. As can be seen in Figure 6, the site is

situated on undulating terrain near the foot of a larger slope. Many areas like this in the Willmore Wilderness Park are prone to rock fall that leads to the formation of talus or scree slopes. These deposits of broken rock being deposited over the terrain can cause areas that are much more rapidly drained than is natural (Pierson 1982) at the surface and so would strongly affect vegetation-DTW correlation. In any case, very low cover, and only one species, would be enough to skew the VI determination for this plot.

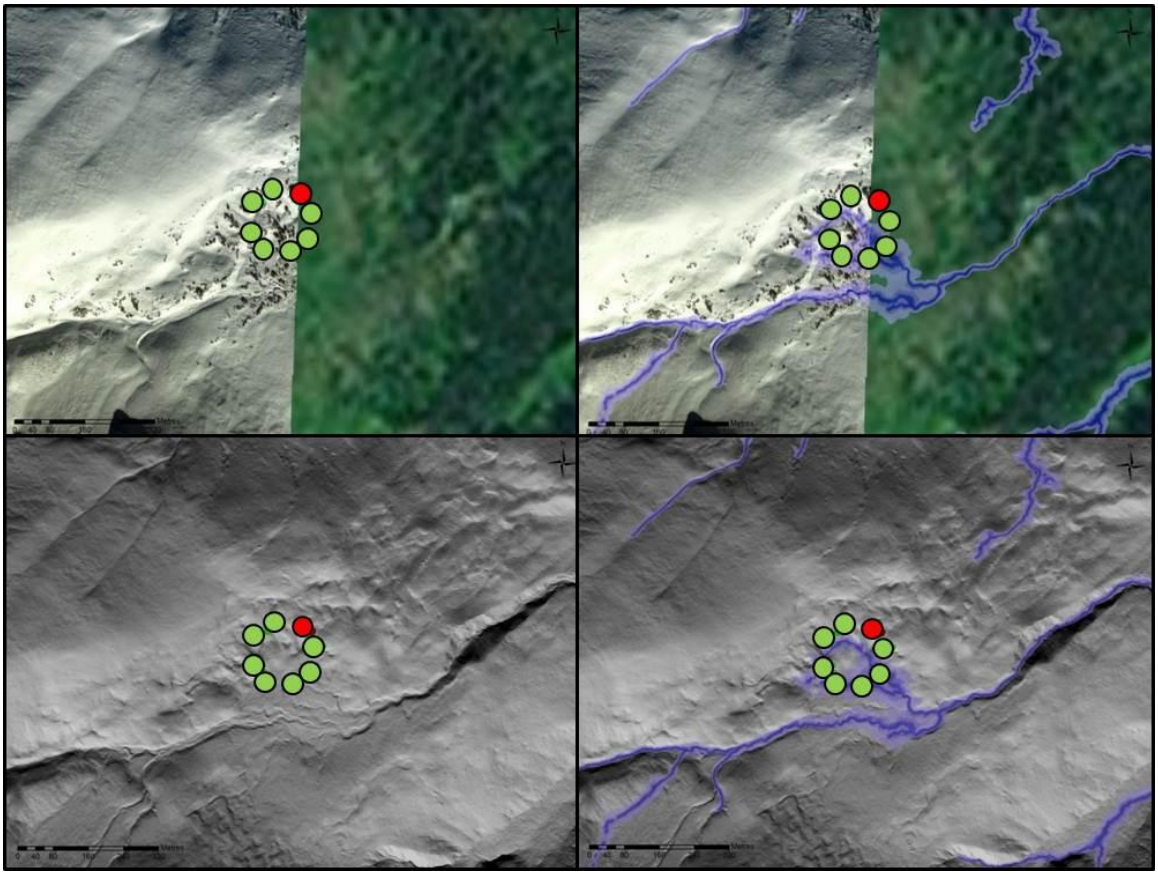


Figure 6. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site H4 in the Willmore Wilderness Park, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Table 4. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site H4, Northeast corner plot in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| Northern rough fescue | *Festuca altaica* | 1 | 0 | 5 | 5 | 4.10 | 2059 | 8.45 | 331 |

Site S9, Plot 3

Site S9 is located in the southwestern part of the Willmore Wilderness Park, approximately 50 km southwest of the town of Grand Cache. It is at a relatively high elevation within the park with predominantly alpine vegetation (Table 5). PThe non-conformance of plot 3 is quite simply explained. The site is situated at the foot of a significant slope (Figure 7), with scree (talus) deposits (Figure 8) burying most vegetation.. Also, the increased rapidity of drainage meant that the two trace vegetation species recorded were dry ones. Both factors would strongly skew the calculated VI for this plot toward the dry end of the scale.

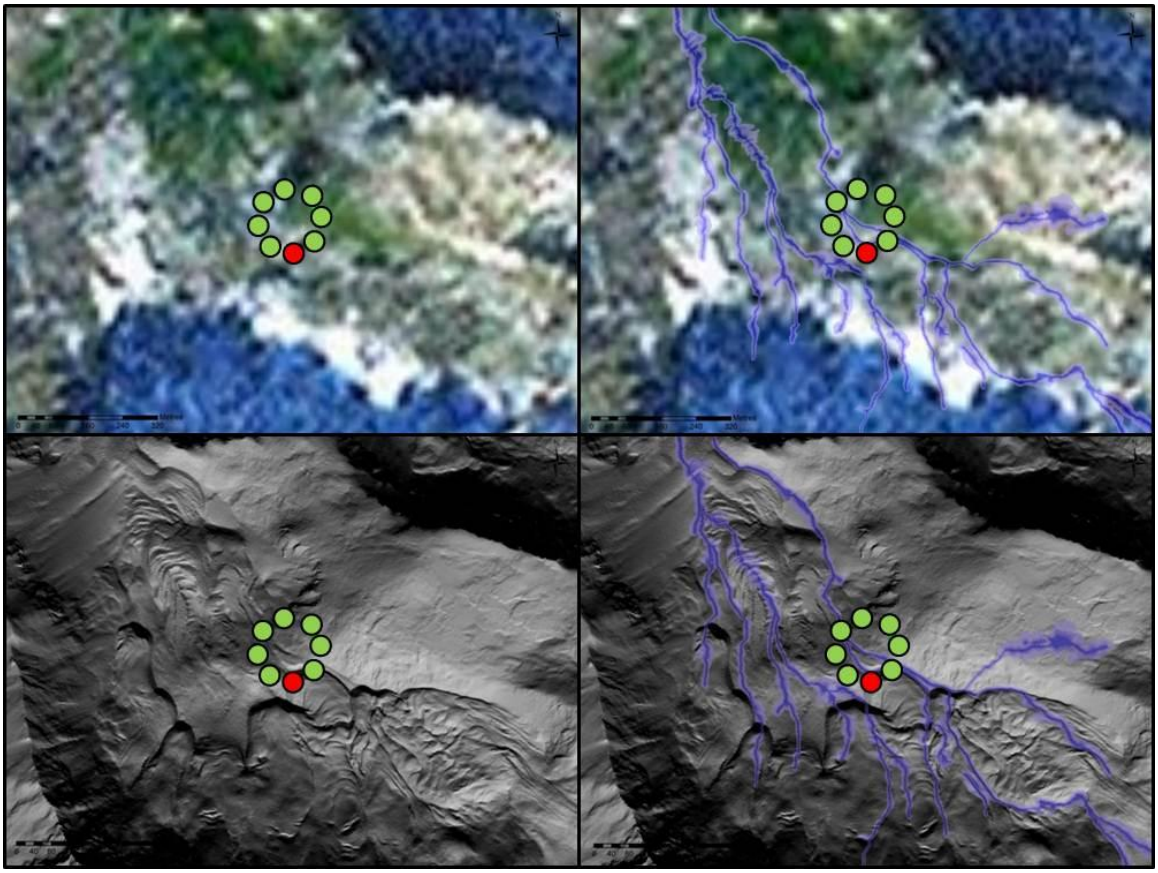


Figure 7. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site S9 in the Willmore Wilderness Park, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Figure 8 S9, plot 3 in the Willmore Wilderness Park. Scree (talus) deposit covering vegetation on the survey plot.

Table 5. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site S9, plot 3 in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| white mountain avens | *Dryas octopetala* | 3 | 2 | 8 | 1 | 6.06 | 2028 | 68.90 | 319 |
| alpine fescue | *Festuca brachyphylla* | 2 | 0 | 2 | 1 | 6.06 | 2028 | 68.90 | 319 |

Site S16, Plot 6

Site S16 is located in the Western part of the Willmore Wilderness Park, approximately 43 km southwest of the town of Grand Cache. It is at a high to mid-range elevation within the park with predominantly alpine vegetation. The non-conformance of plot 6 is most

likely related to calculation of the plot VI value. The vegetation recorded at this plot leads to VI that is lower than predicted for the DTW at the plot. The only xeric species recorded at the plot was Northern rough fescue (*Festuca altaica*), which composed a large percentage of a plot with otherwise mesic species. Because its index value is so low and because it covered 20 percent of the plot, this would be enough to skew the VI for the plot toward the dry end of the scale (Figure 10, Table 6). There could also be an aspect effect at this plot as it was on the southern face of a slope, aiding the presence of drier species (Figure 9).

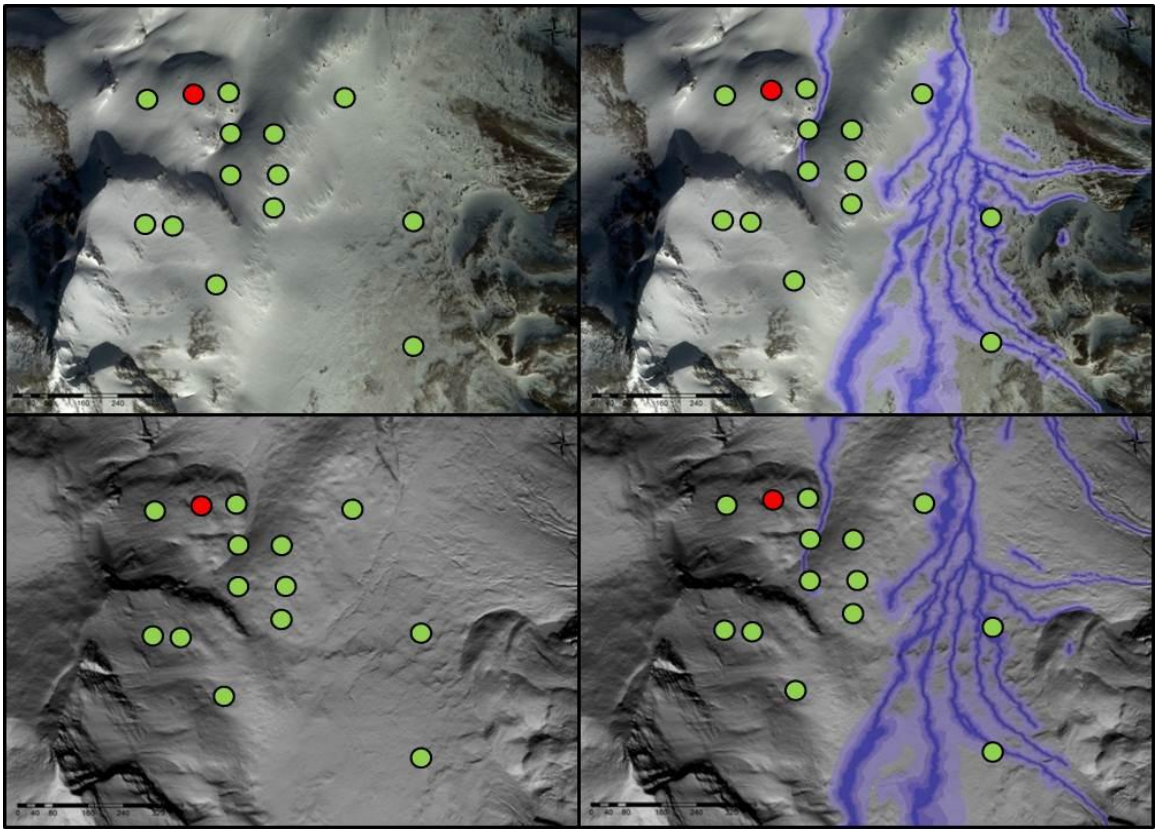


Figure 9. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site S16 in the Willmore Wilderness Park, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Figure 10. Example photo of the vegetation present at site S16, plot 6 in the Willmore Wilderness Park.

Table 6. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site S16, plot 6 in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| alpine everlasting | *Antennaria alpina* | 3 | 0 | 7 | 5 | 29.71 | 1952 | 44.58 | 61 |
| Western mountain-heather | *Cassiope mertensiana* | 4 | 3 | 5 | 35 | 29.71 | 1952 | 44.58 | 61 |
| Northern rough fescue | *Festuca altaica* | 2 | 0 | 5 | 20 | 29.71 | 1952 | 44.58 | 61 |
| rock willow | *Salix vestita* | 3 | 0 | 8 | 30 | 29.71 | 1952 | 44.58 | 61 |
| yellow heather | *Phyllodoce glanduliflora* | 3 | 0 | 8 | 10 | 29.71 | 1952 | 44.58 | 61 |

Site S19, northwest corner plot

Site S19 is located very near the centre of the Willmore Wilderness Park, approximately 20 km south of the town of Grand Cache. It is at a relatively high elevation within the park with predominantly alpine vegetation. The non-conformance is not pronounced as some other plots but is detectable. The vegetation at this plot is predominantly sub-xeric which would correlate well to the DTW of 35 m for the plot (Table 7). However, the calculated VI appears to be skewed toward the wet end of the scale. This is most likely due to the fact that the only species found in any abundance was Arctic willow (*Salix arctica*), a mesic species that can tolerate a wide range of moisture regimes forms dense colonies (Pojar and MacKinnon 1994). The presence of the willow may also stem from the fact that this plot is located at a low position on a North-facing slope, making it retain surface moisture longer (Figure 11). This patch of willow being the only species significant abundance would skew the calculated VI for this plot toward a more mesic one.

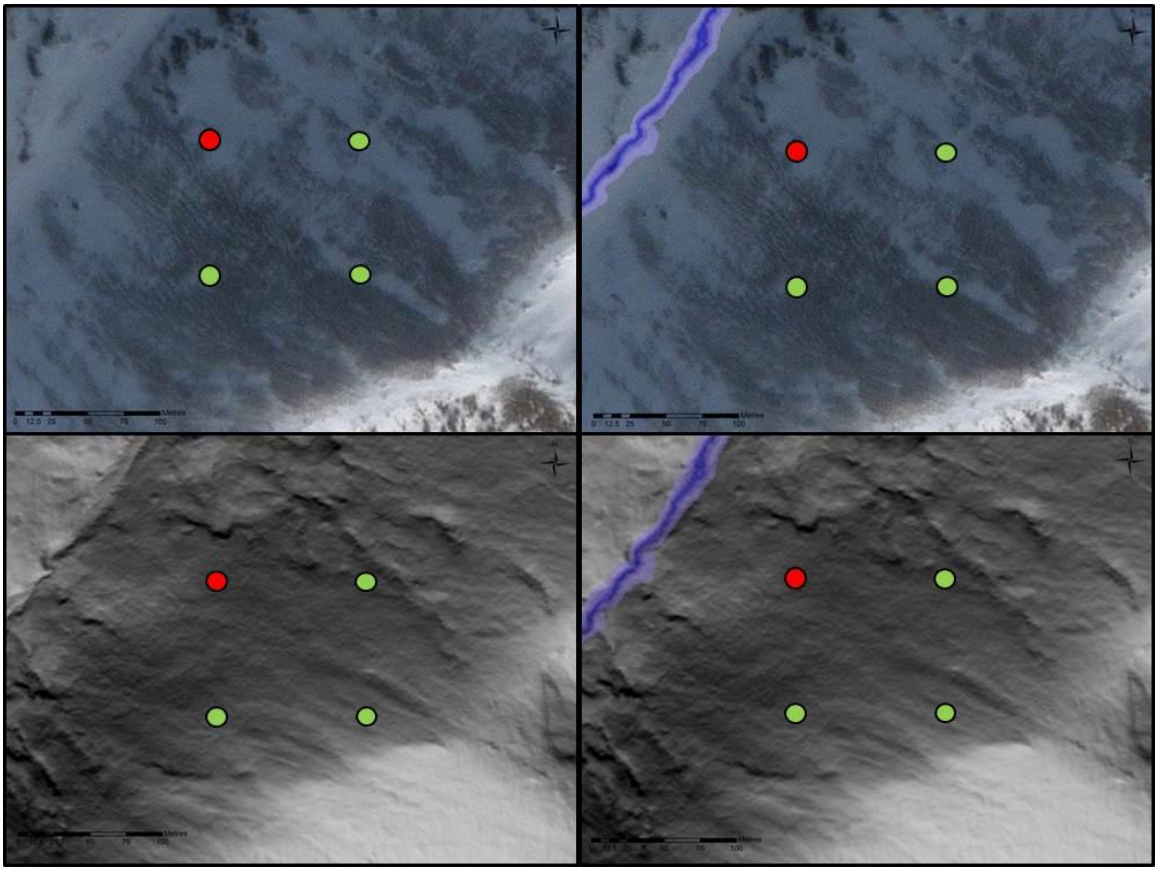


Figure 11. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site S19 in the Willmore Wilderness Park, shown at a representative fraction of 1:1500. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Table 7. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site S19, northwest corner plot in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| Arctic willow | *Salix arctica* | 4 | 0 | 8 | 30 | 35.06 | 2036 | 41.91 | 340 |
| three-toothed saxifrage | *Saxifraga tricuspidata* | 2 | 0 | 8 | 1 | 35.06 | 2036 | 41.91 | 340 |
| Northern white mountain avens | *Dryas integrifolia* | 3 | 2 | 4 | 5 | 35.06 | 2036 | 41.91 | 340 |
| alpine fescue | *Festuca brachyphylla* | 2 | 0 | 2 | 1 | 35.06 | 2036 | 41.91 | 340 |
| alpine mouse-ear chickweed | *Cerastium beeringianum* | 2 | 1 | 3 | 1 | 35.06 | 2036 | 41.91 | 340 |
| alpine wood-rush | *Luzula arcuata* | 2 | 1 | 7 | 1 | 35.06 | 2036 | 41.91 | 340 |
| inflated oxytrope | *Oxytropis podocarpa* | 2 | 0 | 4 | 1 | 35.06 | 2036 | 41.91 | 340 |
| one-flowered cinquefoil | *Potentilla uniflora* | 2 | 0 | 6 | 1 | 35.06 | 2036 | 41.91 | 340 |
| dwarf scouring-rush | *Equisetum scirpoides* | 5 | 1 | 8 | 1 | 35.06 | 2036 | 41.91 | 340 |
| moss campion | *Silene acaulis* | 2 | 1 | 3 | 1 | 35.06 | 2036 | 41.91 | 340 |
| purple saxifrage | *Saxifraga oppositifolia* | 2 | 0 | 5 | 1 | 35.06 | 2036 | 41.91 | 340 |
| large-flowered lousewort | *Pedicularis capitata* | 4 | 1 | 7 | 1 | 35.06 | 2036 | 41.91 | 340 |
| three-toothed saxifrage | *Saxifraga tricuspidata* | 2 | 0 | 8 | 1 | 35.06 | 2036 | 41.91 | 340 |
| low larkspur | *Delphinium bicolor* | 2 | 1 | 4 | 1 | 35.06 | 2036 | 41.91 | 340 |

Site W9, Northwest Corner Plot

Site W9 is also located very near the centre of the Willmore Wilderness Park, only a few kilometres from Site S19, and approximately 24 km south of the town of Grand Cache. It is at a relatively low elevation within the park with a mixture of boreal and alpine vegetation. The non-conformance could be a false positive for wetness with regards to the DTW map as the site is located on a large, flat area (Figure 12). The problem could also stem from the types of species present and how these obtain moisture. The species recorded at this plot are mostly sub-mesic to sub-hygric in terms of moisture preference which would correspond to the DTW predicted for this plot (Table 8). One of the species present was reindeer lichen (*Cladina rangifera*) which, as a species of lichenlacking roots which obtains moisture over itssurface. Because they tolerate desiccation, lichens can often grow in very harsh conditions, even on bare rock. Since the vegetation inventories in this study strived to be as complete as possible, lichens were included in the data. It is possible that inclusion of lichens non-vascular plants (e.g. mosses) may not be appropriate in all cases as they are not drawing on the water table at all to meet their moisture requirements (Hoefnagels 2005), however, they are likely to be influenced by the atmospheric humidity at the surface of the substrates. In the case of the plot in question, as no one species had a markedly stronger presence than the others. However, the presence of *C. rangiferina* on the plot was enough to skew the calculated VI toward the dry end of the scale. When it was removed from the plot average, the VI value for the plot rose by half an index value.

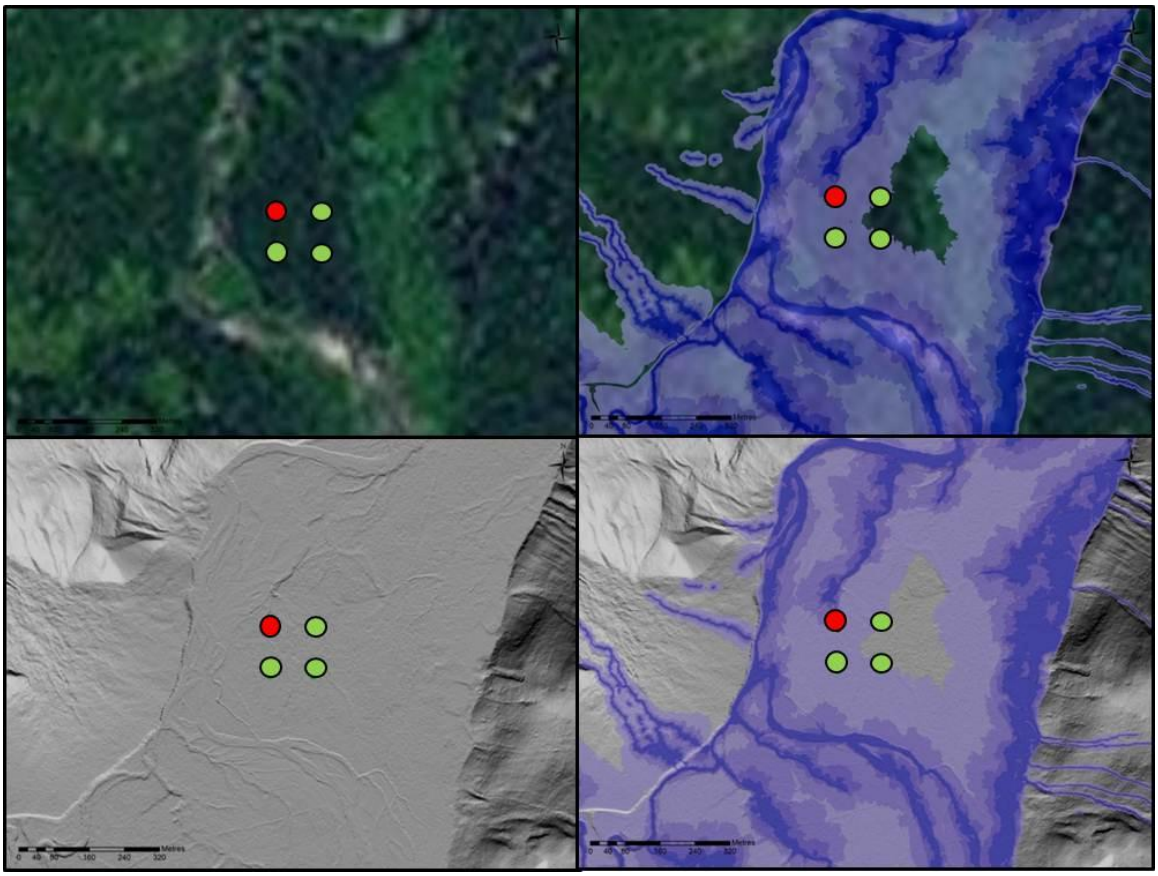


Figure 12. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site W9 in the Willmore Wilderness Park, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Table 8. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site W9, Northwest corner plot in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| white spruce | *Picea glauca* | 4 | 0 | 8 | 5 | 1.64 | 1389 | 1.90 | 247 |
| lodgepole pine | *Pinus contorta* | 3 | 1 | 8 | 4 | 1.64 | 1389 | 1.90 | 247 |
| balsam fir | *Abies balsamea* | 5 | 4 | 7 | 1 | 1.64 | 1389 | 1.90 | 247 |
| heart-leaved arnica | *Arnica cordifolia* | 3 | 1 | 5 | 5 | 1.64 | 1389 | 1.90 | 247 |
| tall bilberry | *Vaccinium membranaceum* | 4 | 0 | 8 | 3 | 1.64 | 1389 | 1.90 | 247 |
| stiff club-moss | *Lycopodium annotinum* | 4 | 0 | 7 | 1 | 1.64 | 1389 | 1.90 | 247 |
| Reindeer Lichen | *Cladina rangifera* | 1 | 1 | 6 | 2 | 1.64 | 1389 | 1.90 | 247 |
| racemose everlasting | *Antennaria racemosa* | 3 | 0 | 7 | 1 | 1.64 | 1389 | 1.90 | 247 |
| common fireweed | *Epilobium angustifolium* | 3 | 2 | 7 | 1 | 1.64 | 1389 | 1.90 | 247 |
| one-sided wintergreen | *Orthilia secunda* | 3 | 2 | 7 | 1 | 1.64 | 1389 | 1.90 | 247 |
| dwarf bilberry | *Vaccinium caespitosum* | 2 | 0 | 8 | 1 | 1.64 | 1389 | 1.90 | 247 |
| Nootka lupine | *Lupinus nootkatensis* | 5 | 4 | 8 | 1 | 1.64 | 1389 | 1.90 | 247 |
| common pink wintergreen | *Pyrola asarifolia* | 4 | 0 | 8 | 1 | 1.64 | 1389 | 1.90 | 247 |

Site W10, Northwest Corner Plot

Site W10 is located in the southern part of the Willmore Wilderness Park, approximately 45 km south of the Town of Grand Cache. It is at a relatively low elevation within the park with mostly boreal vegetation. The non-conformance is most likely partly due to a slight discrepancy of the DTW map for the area. As can be seen in Figure 13, the DTW map shows the northwest corner plot as being on the edge of a small catchment area leading to a small flow channel area. Given the presence of *Ledum groenlandicum* (Table 9), it is possible that that area of wetness extends a bit further than predicted by the DTW map. This non-conformance could also be due to pure chance of *Ledum groenlandicum* happening to germinate and survive on the edge of its typical habitat. In either case, with only three species recorded at this plot a single small cluster of *Ledum groenlandicum* would be enough to skew the calculated plot VI toward the wet end of the scale.

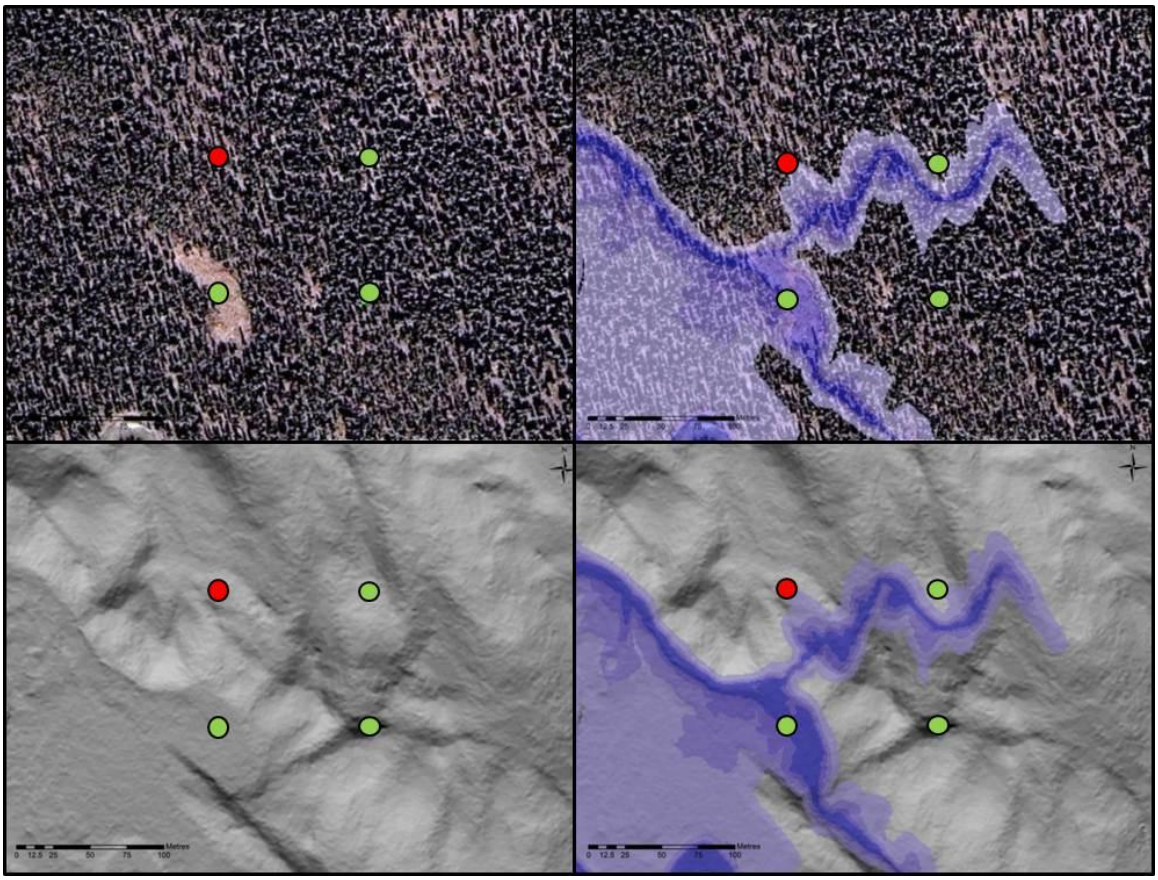


Figure 13. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for site W10 in the Willmore Wilderness Park, shown at a representative fraction of 1:1500. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Table 9. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for site W10, Northwest corner plot in the Willmore Wilderness Park.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| subalpine fir | *Abies lasiocarpa* | 5 | 4 | 6 | 25 | 2.76 | 1312 | 6.41 | 141 |
| common Labrador tea | *Ledum groenlandicum* | 7 | 3 | 8 | 35 | 2.76 | 1312 | 6.41 | 141 |

Transect OT7, Plot 5

Transect OT7 is located in the southern part of the EMEND research site, just outside of the parking/staging area in the Southern part of the EMEND area. It is at a relatively high elevation for EMEND and as is all of the EMEND site is covered by boreal vegetation. In the instance of the plot 5 on Transect OT7 the non-conformance is most likely due to species competition and succession dynamics. Though it is somewhat difficult to see in Figure 14, plot 5 of this transect fell under an opening in the main canopy due to two large trees that had fallen down. This would cause an influx of more shade intolerant, early successional species as were observed here (Figure 15, Table 10) (Chávez 2010). Since this type of species tend to be more mesic to xeric in their moisture preferences, this influx would be enough to skew the calculated plot VI toward the xeric end of the scale. Since the area also shows evidence of mounds and depressions it is also possible that the wet area indicated by the DTW map is a false positive and does not extend as far as point 5 of the transect, the only one predicted to be this wet.

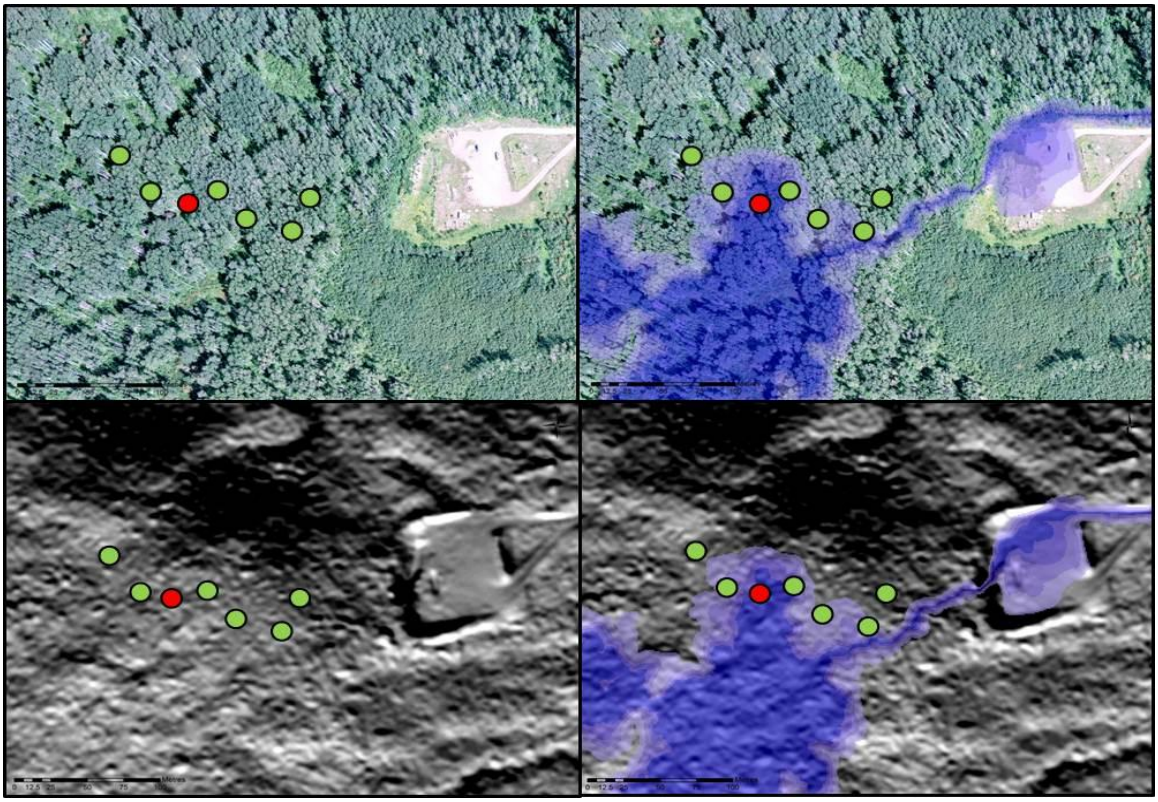


Figure 14. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for transect OT7, plot 5 in the EMEND Research Area, shown at a representative fraction of 1:1500. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Figure 15. Example photo of the vegetation present at transect OT7, plot 5 in the EMEND Research Area. Light can be seen coming through a large canopy opening above the plot.

Table 10. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for transect OT7, plot 5 in the EMEND Research Area.

| Common Name | Scientific Name | Moisture Index | | | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | |
| agropyron grasses | *Agropyron sp* | 3 | 0 | 5 | 0.24 | 881 | 4.27 | 245 |
| green alder | *Alnus crispa* | 3 | 1 | 6 | 0.24 | 881 | 4.27 | 245 |
| Lindley's aster | *Aster ciliolatus* | 3 | 1 | 4 | 0.24 | 881 | 4.27 | 245 |
| bromus grass | *Bromus sp* | 3 | 1 | 5 | 0.24 | 881 | 4.27 | 245 |
| bunchberry | *Cornus canadensis* | 4 | 2 | 7 | 0.24 | 881 | 4.27 | 245 |
| common fireweed | *Epilobium angustifolium* | 3 | 2 | 7 | 0.24 | 881 | 4.27 | 245 |
| fescues | *Festuca sp* | 2 | 0 | 8 | 0.24 | 881 | 4.27 | 245 |
| woodland strawberry | *Fragaria vesca* | 3 | 1 | 5 | 0.24 | 881 | 4.27 | 245 |
| Northern gooseberry | *Ribes oxyacanthoides* | 5 | 3 | 7 | 0.24 | 881 | 4.27 | 245 |
| prickly rose | *Rosa acicularis* | 3 | 1 | 5 | 0.24 | 881 | 4.27 | 245 |
| wild red raspberry | *Rubus idaeus* | 5 | 3 | 6 | 0.24 | 881 | 4.27 | 245 |

Transect T8, Plot 5

Transect T8 is located in the Northern part of the EMEND research site, just off of the main north-south road running through the EMEND site. It is at a relatively high elevation for EMEND and as is all of the EMEND site is covered by boreal vegetation. In the instance of the plot 5 on Transect OT7 the explanation for non-conformance is most likely natural disturbance. As can be seen in Figure 16, the plot in question is at the margin of a wet area. This already wet area is also known to be prone to periodic flooding by beavers (*Castor canadensis*). This flooding would change the hydrological dynamics of the plot which would make it easily acceptable that a hygric species such as *Calamagrostis canadensis* (Table 11) to establish and thrive there (Lieffers *et al*. 1993). It should also be noted that this area is subject to heavy anthropogenic disturbance as there are a number of roads and trails in close proximity. Any data collected in this area may be affected as a result.

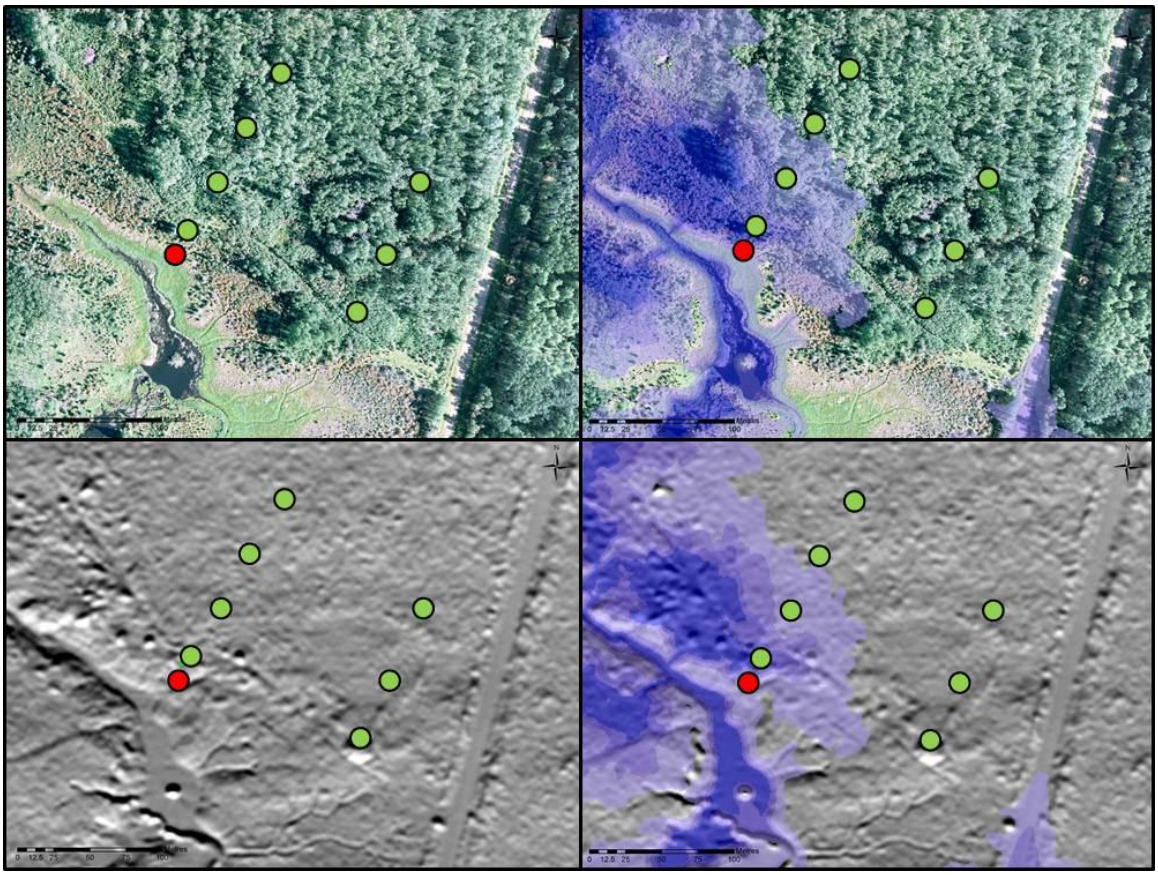


Figure 16. Basemap (top) and DEM (bottom) images, with (right) and without (left) DTW mapping, for transect T8 in the EMEND Research Area, shown at a representative fraction of 1:5000. Circles represent vegetation survey plots with plots shown in red representing the non-conformance plots.

Table 11. Species-specific xeric to hydric vegetation moisture indexing for species recorded as well as percent ground cover, DTW (m), elevation (m), percent slope, and aspect (degrees) values for transect T8, plot 5 in the EMEND Research Area.

| Common Name | Scientific Name | Moisture Index | | | % G.C. | DTW | Elev | % Slo | Asp |
|---|---|---|---|---|---|---|---|---|---|
| | | Pref | Min | Max | | | | | |
| bluejoint | *Calamagrostis canadensis* | 6 | 1 | 7 | 80 | 0.74 | 695 | 10.79 | 177 |

## ~~POTENTIAL APPLICATIONS OF WORK~~

~~The ability to accurately predict sites where different vegetation types are likely to be found, or may have the potential to establish, has widespread natural resource management implications. If GIS data could be used to predict vegetation types, potential habitat/risk maps can be produced for different applications across the landscape. These maps would provide valuable a priori knowledge that can be used to streamline landscape management and planning before entering the field, saving time and resources. One immediate impact of the work in this thesis is that, for the first time, DTW technology is providing links to understanding ecological function and structure. With further time and research these links may be expanded for applications in silviculture, site indexing, tree growth and yield, biodiversity, and forest stand structure.~~

~~There are also potential applications in environmental science and conservation. The approach might be employed in combination with other soil-moisture and climate change models to assess and predictively map vegetation change with changing climate and moisture gradients (Woodward 1987, Neilson 1995). In essentially undisturbed areas, the outlined approach could allow for: ready visualizations of likely encroachment pathways taken by invasive species, locating and delineating potential endangered flora habitat elements, and locating possible faunal habitat elements. This approach could also aid in delineating potentially vulnerable areas for specific flora and fauna to anticipated disturbances. Many rare and invasive species have very specific soil moisture requirements. Invasive species programs could then be focused in areas where patterns~~

~~show highest risk of spread (Lieffers 1993). At the same time, areas can be weighted based on their potential to support rare species before being allocated for development in land use plans. This would provide one more means of stratifying sampling efforts for rare or elusive species which is often a difficulty in plant ecology (McDonald 2004). Other potential operational and land management applications would include assignment or confirmation of eco-site classifications and wetland delineations, the selection of site-suited plant species for reclaiming disturbed locations, planning trails and access routes that are designed to minimize disturbance to floral and faunal habitat elements. These maps may also provide additional means of identifying areas that may provide moisture concerns for forestry operations.~~

~~In restoration and reclamation, it is helpful to be able to predict the influence of local topography on both pre-disturbance and post-disturbance variations soil moisture regime and the related vegetation patterns. While high-resolution DEMs may not be available for mapping pre-disturbance conditions, it is possible to approximate the pre-existing patterns based on coarser resolution DEMs where available. To assess disturbed areas, the resulting maps could be utilized to predict the pathways of invasive vegetation based on the species-specific dispersal methods and moisture requirements according to do-nothing scenarios taking into account influence of the surrounding, undisturbed areas (Harper *et al*. 2005). Examples include making line-specific restoration plans from established lineal inventories and deriving indices regarding re-vegetation, browse & forage, trafficability, and line-of-sight (Nash 2010). The VI mapping approach based on DTW mapping could also potentially be used to predict and assess the magnitude of~~

~~disturbance impact on local vegetation (Latifovica *et al*. 2005; Sitters *et al*. 2011). For heavily disturbed areas, the described methods have the potential to be used for mapping locations that may aid or detract from achieving desired re-vegetation goals based on modelled evidence of excessive soil wetness or dryness.~~

~~VI maps based on soil moisture regimes may become an important filter in mapping the distribution of plant and animal species and communities by way of multispectral and hyperspectral image analyses (Ghiyamat 2010). They could also have the potential to be used to as one indicator of species richness across the landscape.~~

## ~~SUGGESTIONS FOR FUTURE WORK~~

~~Future avenues for improvement of the DTW-based VI mapping approach should address refining its predictive value in dealing with (i) landform based differences in soil drainage (e.g., sandy alluvial plans would generally be drier than morainal and colluvial surface deposits), (ii) topographic differences pertaining to discharge versus recharge areas: the former would be somewhat drier than the latter, depending on local curvatures, and (iii) further consideration of slope, aspect, elevation, and climate conditions. In order to address any of these concerns, it is recommended that further field data be collected in areas targeted as falling within the extremes of such values, so that the model can be calibrated for them. Examples of these areas to be targeted for further sampling would include areas of steep slope, North and South facing slopes, and areas of high elevation. Another area of expansion would be additional plot-based vegetation indexing in direct~~

~~reference to Ellenberg indicators and factors such as local changes in precipitation, soil nutrient availability, acidity, salinity, and light availability, thereby determining how these factors also affect plot-specific species occurrences and vegetation type in relation to local topography and other factors in North America specifically.~~

# VITA

Candidate's Name: Douglas Hiltz

Place and Date of Birth: Kentville, NS; May 1, 1984

Institutions Attended:

University of New Brunswick, 2009-2013, Masters of Science in Forestry (Candidate)

University of New Brunswick, 2007-2009, Bachelor of Science in Forestry and Environmental Management

Maritime College of Forest Technology, 2005-2007, Diploma in Forest Technology Program

Publications:

Hiltz D., Gould J., Ogilvie J., and Arp P. A. 2012. Modeling and mapping vegetation type by soil moisture regime across boreal landscapes. In Reclamation and restoration of boreal ecosystems: Attaining sustainable development, ed. D. Vitt, pp. 56-75. Cambridge, UK: Cambridge University Press.

White B., Ogilvie J., Campbell D.M.H., Hiltz D., Gauthier B., Chisholm H.K., Wen H.K., Murphy P.N.C., and Arp P.A. 2012. Using the Cartographic Depth-to-Water Index to Locate Small Streams and Associated Wet Areas across Landscapes. Canadian Water Resources Journal 37.4 (2012): 333-347.

Presentations:

Predictive modelling and mapping of vegetation patterns using cartographic depth-to-water index - Oral Presentation at Ersi Canada 2013 Atlantic User Conference, November 2013, Halifax, Nova Scotia

Landscape-wide Mapping of Vegetation Type by Soil Moisture Regime Using LiDAR derived Depth-to-water Data - Oral Presentation at GDSI 13 Global Geospatial Conference, May 2012, Quebec City, Quebec

Indexing Plant Communities and Tracking Rare and Invasive Plants based on Depth-to-Water Mapping For Regional Land-use Planning - Poster presentation at the Atlantic Provinces Council on the Sciences 2011 Student Conference, March 2011, Halifax, Nova Scotia

Identifying Rare Plant Communities and Invasive Plant Planning Using Depth-to-Water Mapping - Poster presentation at the 2010 Canadian Institute of Forestry Annual General Meeting and Conference - Regional Land Use Planning in a Global Economy, September 2010, Jasper, Alberta