

APPENDIX 12-III

Ecosystem Mapping Methods

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1. UPLAND ECOSYSTEM MAPPING

Upland ecosystems (or ecosites) were mapped as polygons using Forest Resources Inventory (FRI) data provided by the Ministry of Natural Resources and Forestry (MNR) that were available across the vegetation and wetlands Local Study Area (LSA) and vegetation and wetlands Regional Study Area (RSA) (Table 12-III-1). Ecosites were preferentially used to inform the assessment of upland ecosystems; however, where data were not available to the ecosite level, the broader category of polytype was used to define polygons. Definitions and descriptions of the soils and vegetation associated with ecosite and polytype codes are found in Appendix 12-IV.

Table 12-III-1: Upland Ecosites and Polytypes in the Vegetation and Wetlands Local and Regional Study Areas

Upland Ecosite Code	Upland Ecosite Title
C11	White Pine-Red Pine
C12	Red Pine
C13	Jack Pine-White Pine-Red Pine
C15	Jack Pine
C16	Black Spruce-Pine
C17	Poplar-White Birch
C18	Poplar-White Birch-White Spruce-Balsam Fir
C19	Poplar-Jack Pine-White Spruce-Black Spruce
C21	White Cedar-White Pine-White Birch-White Spruce
C22	White Cedar-Other Conifer
C27	Sugar Maple-White Birch-Poplar-White Pine
C29	Sugar Maple-Yellow Birch
C20	White Pine-Red Pine-White Spruce-White Birch-Trembling Aspen
NE01	Black Spruce-Jack Pine/White Spruce-White Birch
NE02	Jack Pine-Coarse Soil
NE03	White Birch-Trembling Aspen-Black Spruce-Coarse Soil
NE04	Black Spruce-Jack Pine-Coarse Soil
NE05	Black Spruce-Fine/Medium Soil
NE06	Black Spruce-Trembling Aspen/Trembling Aspen-Black Spruce-Jack Pine/Trembling Aspen-Black Spruce-Balsam Fir
NE07	Trembling Aspen-White Birch/Trembling Aspen-White Spruce-White Birch
NE08	Black Spruce-Feathermoss-Sphagnum-Moist Soil
NE09	Black Spruce-Larch/White Spruce-Balsam Fir-White Cedar
NE10	Trembling Aspen-Black Spruce-Balsam Poplar-Moist Soil
NE15	Red Maple
NW04	Cliff
NW05	Talus or Steep Slope
NW07	Rock Barren
NW10	Prairie/Savannah
NW11	Red Pine -White Pine-Jack Pine: Very Shallow Soil
NW12	Black Spruce-Jack Pine: Very Shallow Soil
NW13	Jack Pine-Conifer: Dry-Moderately Fresh Sandy Soil
NW14	Pine-Spruce Mixedwood: Sandy Soil

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Table 12-III-1: Upland Ecosites and Polytypes in the Vegetation and Wetlands Local and Regional Study Areas

Upland Ecosite Code	Upland Ecosite Title
NW15	Red Pine- White Pine: Sandy Soil
NW16	Hardwood-Fir-Spruce Mixedwood: Sandy Soil
NW17	White Cedar: Fresh-Moist, Coarse-Fine Loamy Soil
NW18	Red Pine-White Pine: Fresh, Coarse Loamy Soil
NW19	Hardwood-Fir-Spruce Mixedwood: Fresh, Sandy-Coarse Loamy Soil
NW20	Spruce-Pine/Feathermoss: Fresh, Sandy-Coarse Loamy Soil
NW21	Fir-Spruce Mixedwood: Fresh, Coarse Loamy Soil
NW22	Spruce-Pine/Ledum/Feathermoss: Moist, Sandy-Coarse Loamy Soil
NW23	Hardwood-Fir-Spruce-Mixedwood: Moist, Sandy-Coarse Loamy Soil
NW26	Spruce-Pine/Feathermoss: Fresh, Fine Loamy-Clayey Soil
NW27	Fir-Spruce Mixedwood: Fresh, Silty-Fine Loamy Soil
NW28	Hardwood-Fir-Spruce Mixedwood: Fresh, Silty Soil
NW29	Hardwood-Fir-Spruce Mixedwood: Fresh, Fine Loamy-Clayey Soil
NW30	Black Ash Hardwood: Fresh, Silty-Clayey Soil
NW31	Spruce-Pine/Feathermoss: Moist, Silty-Clayey Soil
NW32	Fir-Spruce Mixedwood: Moist, Silty-Clayey Soil
NW33	Hardwood-Fir-Spruce Mixedwood: Moist, Silty-Clayey Soil
Upland Polytype Code	Upland Polytype Title
BSH	Brush and Alder
GRS	Grass and Meadow
RCK	Rock

Sources: Chambers et al. (1997); MNR (2009); Racey et al. (1996); Taylor et al. (2000).

2. WETLAND ECOSYSTEM MAPPING

Mapping of wetland polygons in the vegetation and wetlands LSA and vegetation and wetlands RSA was completed using available FRI data (Table 12-III-2). A broader category, polytype, was used to classify polygons as either Open Wetland (OMS) or Treed Wetland (TMS) where data were not available to the ecosite level. An environmental wetlands layer provided by MNRF was used to identify Provincially Significant Wetlands (MNRF 2016). Definitions and descriptions of the soils and vegetation associated with ecosite and polytype codes are found in Appendix 12-IV.

Table 12-III-2: Wetland Ecosites and Polytypes in the Vegetation and Wetlands Local and Regional Study Areas

Wetland Ecosite Code	Wetland Ecosite Title
C31	Black Spruce-Tamarack: very moist mineral and wet organic soils
C32	White Cedar-Black Spruce-Tamarack: very moist mineral and wet organic soils
C33	White Cedar-Other Conifer: very moist to wet soils
C35	Lowland Hardwoods: fresh to very moist soils
NE11	Black Spruce-Labrador Tea-Organic Soil
NE12	Black Spruce-Larch-Labrador Tea-Organic Soil
NE13	Black Spruce-Larch-Speckled Alder/White Cedar-Black Spruce
NE14	Black Spruce-Leatherleaf-Organic Soil
NW34	Treed Bog: Black Spruce/Sphagnum: Organic Soil
NW35	Poor Swamp: Black Spruce: Organic Soil
NW36	Intermediate Swamp: Black Spruce (Tamarack): Organic Soil
NW37	Rich Swamp: Cedar (Other Conifer): Organic Soil
NW38	Rich Swamp: Black Ash (Other Hardwood): Organic-Mineral Soil
NW39	Open Bog: Ericaceous Shrub/Sedge/Sphagnum: Organic Soil
NW40	Treed Fen: Tamarack-Black Spruce/Sphagnum: Organic Soil
NW41	Open Poor Fen: Ericaceous Shrub-Sedge/Sphagnum: Organic Soil
NW42	Open Moderately Rich Fen: Ericaceous Shrub/Sedge: Organic Soil
NW43	Open Extremely Rich Fen: Ericaceous Shrub/Sedge/Brown Moss: Organic Soil
NW44	Thicket Swamp: Organic-Mineral Soil
NW45	Shore Fen: Organic Soil
NW46	Meadow Marsh: Organic-Mineral Soil
NW47	Sheltered Marsh: Emergent: Sedimentary Peat Substrate
NW48	Exposed Marsh: Emergent: Mineral Substrate
NW50	Open Water Marsh: Submergent: Mineral Substrate
Wetland Polytype Code	Wetland Polytype Title
OMS	Open Wetland
TMS	Treed Wetland

Sources: Chambers et al. (1997); MNR (2009); Racey et al. (1996); Taylor et al. (2000).

3. RIPARIAN ECOSYSTEM MAPPING

Riparian habitat is a transition zone between aquatic and terrestrial ecosystems (Austin et al. 2008) and is defined as areas adjacent to rivers and lakes, or ephemeral, intermittent, or perennial streams that differ from surrounding uplands in plant and animal diversity and productivity (Environment Canada 2013). Riparian areas support important biodiversity functions as they provide unique habitat for plants, invertebrates, fish, amphibians, birds and mammals. Riparian zones often function as regional wildlife movement corridors linking otherwise unconnected habitats. While these areas represent a small portion of a given watershed and are not listed as a specific fish habitat, they provide "natural features, functions and conditions that support fish life processes and protect fish habitat as defined by the *Fisheries Act*" (MNR 2010).

Stream order is a measure of the relative size of a natural watercourse. The smallest watercourse is referred to as a first order stream and generally comprises the headwaters of a river system. The stream order increases in the downstream direction as a one watercourse joins another in a river system. For this assessment, riparian areas were defined as all naturally vegetated areas within a 30 meters (m) buffer of the edges of watercourses of stream order 1, 2, 3, 4 and lakes. For stream orders 5 and 6, riparian buffers of 60 m were applied. The 30 m buffer criteria was assumed to represent an appropriate riparian zone width and is consistent with scientific literature and recommendations outlined by MNR (2010) and Environment Canada (2013). Because stream orders 5 and 6 are wider, a larger buffer was used to capture the expected riparian areas associated with these streams.

Potential riparian habitat was mapped across the vegetation and wetlands LSA and vegetation and wetlands RSA using available MNR data and applying 30 m and 60 m buffers, as described above (Table 12-III-3). All watercourses (i.e., rivers and streams) and lakes available from the MNR water body data set were buffered at the centreline of watercourses and the edge of lakes using the applicable buffer widths. The buffer zone was then overlaid onto the vegetation and wetlands LSA and vegetation and wetlands RSA and FRI map. All naturally vegetated land cover classes within the buffer zone were classified as having riparian habitat potential.

Table 12-III-3: Ecosites and Polytypes with Riparian Habitat Potential in the Vegetation and Wetlands Local and Regional Study Areas

Riparian Ecosite Code	Riparian Ecosite Name
C11	White Pine-Red Pine
C12	Red Pine
C13	Jack Pine-White Pine-Red Pine
C15	Jack Pine
C16	Black Spruce-Pine
C17	Poplar-White Birch
C18	Poplar-White Birch-White Spruce-Balsam Fir
C19	Poplar-Jack Pine-White Spruce-Black Spruce
C20	White Pine-Red Pine-White Spruce-White Birch-Trembling Aspen
C21	White Cedar-White Pine-White Birch-White Spruce
C22	White Cedar-Other Conifer
C27	Sugar Maple-White Birch-Poplar-White Pine
C29	Sugar Maple-Yellow Birch
C31	Black Spruce-Tamarack: very moist mineral and wet organic soils
C32	White Cedar-Black Spruce-Tamarack: very moist mineral and wet organic soils

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Table 12-III-3: Ecosites and Polytypes with Riparian Habitat Potential in the Vegetation and Wetlands Local and Regional Study Areas

Riparian Ecosite Code	Riparian Ecosite Name
C33	White Cedar-Other Conifer: very moist to wet soils
C35	Lowland Hardwoods: fresh to very moist soils
NE01	Black Spruce-Jack Pine/White Spruce-White Birch
NE02	Jack Pine-Coarse Soil
NE03	White Birch-Trembling Aspen-Black Spruce-Coarse Soil
NE04	Black Spruce-Jack Pine-Coarse Soil
NE05	Black Spruce-Fine/Medium Soil
NE06	Black Spruce-Trembling Aspen/Trembling Aspen-Black Spruce-Jack Pine/Trembling Aspen-Black Spruce-Balsam Fir
NE07	Trembling Aspen-White Birch/Trembling Aspen-White Spruce-White Birch
NE08	Black Spruce-Feathermoss-Sphagnum-Moist Soil
NE09	Black Spruce-Larch/White Spruce-Balsam Fir-White Cedar
NE10	Trembling Aspen-Black Spruce-Balsam Poplar-Moist Soil
NE11	Black Spruce-Labrador Tea-Organic Soil
NE12	Black Spruce-Larch-Labrador Tea-Organic Soil
NE13	Black Spruce-Larch-Speckled Alder/White Cedar-Black Spruce
NE14	Black Spruce-Leatherleaf-Organic Soil
NE15	Red Maple
NW01	Beach/Bar
NW03	Bluff
NW10	Prairie/Savannah
NW11	Red Pine -White Pine-Jack Pine: Very Shallow Soil
NW12	Black Spruce-Jack Pine: Very Shallow Soil
NW13	Jack Pine-Conifer: Dry-Moderately Fresh Sandy Soil
NW14	Pine-Spruce Mixedwood: Sandy Soil
NW15	Red Pine- White Pine: Sandy Soil
NW16	Hardwood-Fir-Spruce Mixedwood: Sandy Soil
NW17	White Cedar: Fresh-Moist, Coarse-Fine Loamy Soil
NW18	Red Pine-White Pine: Fresh, Coarse Loamy Soil
NW19	Hardwood-Fir-Spruce Mixedwood: Fresh, Sandy-Coarse Loamy Soil
NW20	Spruce-Pine/Feathermoss: Fresh, Sandy-Coarse Loamy Soil
NW21	Fir-Spruce Mixedwood: Fresh, Coarse Loamy Soil
NW22	Spruce-Pine/Ledum/Feathermoss: Moist, Sandy-Coarse Loamy Soil
NW23	Hardwood-Fir-Spruce-Mixedwood: Moist, Sandy-Coarse Loamy Soil
NW26	Spruce-Pine/Feathermoss: Fresh, Fine Loamy-Clayey Soil
NW27	Fir-Spruce Mixedwood: Fresh, Silty-Fine Loamy Soil
NW28	Hardwood-Fir-Spruce Mixedwood: Fresh, Silty Soil
NW29	Hardwood-Fir-Spruce Mixedwood: Fresh, Fine Loamy-Clayey Soil
NW30	Black Ash Hardwood: Fresh, Silty-Clayey Soil
NW31	Spruce-Pine/Feathermoss: Moist, Silty-Clayey Soil
NW32	Fir-Spruce Mixedwood: Moist, Silty-Clayey Soil
NW33	Hardwood-Fir-Spruce Mixedwood: Moist, Silty-Clayey Soil
NW34	Treed Bog: Black Spruce/Sphagnum: Organic Soil
NW35	Poor Swamp: Black Spruce: Organic Soil

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Table 12-III-3: Ecosites and Polytypes with Riparian Habitat Potential in the Vegetation and Wetlands Local and Regional Study Areas

Riparian Ecosite Code	Riparian Ecosite Name
NW36	Intermediate Swamp: Black Spruce (Tamarack): Organic Soil
NW37	Rich Swamp: Cedar (Other Conifer): Organic Soil
NW38	Rich Swamp: Black Ash (Other Hardwood): Organic-Mineral Soil
NW39	Open Bog: Ericaceous Shrub/Sedge/Sphagnum: Organic Soil
NW40	Treed Fen: Tamarack-Black Spruce/Sphagnum: Organic Soil
NW41	Open Poor Fen: Ericaceous Shrub-Sedge/Sphagnum: Organic Soil
NW42	Open Moderately Rich Fen: Ericaceous Shrub/Sedge: Organic Soil
NW43	Open Extremely Rich Fen: Ericaceous Shrub/Sedge/Brown Moss: Organic Soil
NW44	Thicket Swamp: Organic-Mineral Soil
NW45	Shore Fen: Organic Soil
NW46	Meadow Marsh: Organic-Mineral Soil
NW47	Sheltered Marsh: Emergent: Sedimentary Peat Substrate
NW48	Exposed Marsh: Emergent: Mineral Substrate
NW50	Open Water Marsh: Submergent: Mineral Substrate
Riparian Polytype Code	Riparian Polytype Name
BSH	Brush and Alder
FOR	Forest
GRS	Grass and Meadow
ISL	Small Island
TMS	Treed Wetland
OMS	Open Wetland
OTH	Other
RRW	Road Right-of-Way
DAL	Developed Agricultural Land

Sources: Chambers et al. (1997); MNR (2009); Racey et al. (1996); Taylor et al. (2000).

4. DISTURBANCE

Total disturbance (area and percentage) in the and vegetation and wetlands LSA and RSA was calculated from a disturbance layer that was created using available data from the MNR, Ministry of Northern Development and Mines, FRI, and Land Cover 2000. Disturbances were classified as either linear (e.g., roads, transmission lines, rail lines), polygonal (e.g., cutblocks, urban development), or points (e.g., exploration drill holes). Point and linear anthropogenic disturbances were buffered in a Geographic Information System (GIS) to create footprints for each disturbance and to calculate the area and percentage of human disturbance in the vegetation and wetlands LSA and RSA (Table 12-III-4).

Table 12-III-4: Footprints for Developments in the Vegetation and Wetlands Regional Study Area

Type of Development	Feature Type	Footprint Radius or Corridor ^(a) (m)
Rural freeway, 4-lane divided highway	Linear	100
Rural arterial undivided highway	Linear	60
Rural collector undivided road, ramp	Linear	46
Rural local undivided road, street	Linear	20
Rural resource road	Linear	20
Recreation road	Linear	20
Service road	Linear	20
Forestry road	Linear	20
Winter road	Linear	20
Existing access roads	Linear	20
Rail ^(b)	Polygon	Actual
Mineral exploration – drill holes	Point	12.5
Aggregate site (active and inactive)	Polygon	Actual
Mine	Polygon	Actual
Airport	Polygon	Actual
Cottage, residential site, recreation site	Point	5
Cottage, residential site, recreation site	Polygon	Actual
Tourism establishment area	Polygon	actual
Communication/fire tower	Point	21
Utility site	Point	77
Utility line	Linear	40
Power generation station	Point	37
Tank	Polygon	Actual
Waste management site	Polygon	Actual
Forest processing facility	Point	310
Recent harvested (logged) area	Polygon	Actual
Dam/barrier	Point	50
Agriculture	Polygon	Actual

a) A radius was applied to point features and a corridor was applied to line features.

b) Captured by FRI data in buffered line (BFL) polytype.

FRI = Forest Resources Inventory; m = meter.

5. REFERENCES

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