



Conserve. Develop. Educate.

Natural Areas Inventory for the City of Saskatoon

2019 Report

Meewasin 

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Treaty 6 Territory and Homeland of the Métis

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Meewasin 

Meewasin Valley Authority

Created in 1979 by an Act of the Province of Saskatchewan, *the Meewasin Valley Authority Act*, Meewasin is a conservation agency dedicated to conserving the cultural and natural resources of the South Saskatchewan River Valley. It is the means by which the three participating parties (City of Saskatoon, Government of Saskatchewan, and University of Saskatchewan) have chosen to best manage the Meewasin Valley in the South Saskatchewan River Basin. The creation of Meewasin is based on the concept that the partners working together through a single agency – Meewasin – can accomplish more than they could individually.

Meewasin 

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Executive Summary

The Natural Areas Inventory Report was completed to assess the existing Green Network in the City of Saskatoon. It is intended to provide baseline data regarding Saskatoon's Natural Assets (Aquatic, Forested & Shrubland, Grassland) and Enhanced Assets (Green Space and Agricultural Lands). It also analyzes species observations and cultural significance within the Green Network. The Natural Areas Inventory builds upon the success of Meewasin's State of the Valley Report, which focuses on the entire Meewasin Valley. The Natural Areas Inventory was identified as a key action in the Meewasin Valley-wide Resource Management Plan.

The report intent is to support the City of Saskatoon's Green Infrastructure Strategy, and move toward Saskatoon's vision of better integrating and conserving the city's unique ecological network.

VALUES	INDICATORS	METRICS
HEALTH	ECOLOGICAL INTEGRITY	HABITAT QUANTITY CONNECTIVITY SPECIES DOCUMENTATION
	ECOLOGICAL PROTECTIONS	LAND PROTECTIONS CULTURAL DOCUMENTATION
BALANCE & VIBRANCY	AVAILABILITY	USER RATIOS
	ACCESSIBILITY	WALKABILITY

The Green Network accounts for 47% of the city. The largest intact and contiguous habitat patches, the South Saskatchewan River channel (2%) and Cropland (23%) are located on the peripheral areas of the urban built environment reflecting the gradient of urbanization. Many of these habitat patches extend beyond the current City of Saskatoon boundary, into Saskatoon North Partnership for Growth areas.

Overall, 70% of Natural and Enhanced Assets were within or nearby one contiguous network, showing possible connectivity pathways and where there is potential for connectivity to be enhanced.

Site species observations within the City, in addition to the 27 documented palaeontological and archaeological records within Urban Green Space sites, highlights the ecology that needs to be conserved.

Currently, 82% of the population lives within a 5 minute walk of an Urban Green Space. Analysis being done through the City of Saskatoon's Green Infrastructure Strategy is further identifying that the residential areas beyond a 5 min walk also tend to be in neighborhoods with park capacity challenges and are more likely to be flood-prone. The amount and accessibility of Urban Green Space imparts benefits to the community as a whole.

Approximately 30% of Natural Assets were within managed Urban Green Spaces whereas 50% of classified Enhanced Assets fell within managed Urban Green Spaces. Most of the City's natural assets are not managed or protected. Meewasin manages the largest amount of natural areas within the City.

The Natural Areas Inventory highlights the fact that the Meewasin Valley Authority is the largest manager of Natural Assets in the City of Saskatoon at 14% of the total classified Natural Assets. Currently, the City of Saskatoon and the Meewasin Valley Authority combined are involved with the management of only 22% of the total Natural Assets classified within the City of Saskatoon.

The results of the above metrics provide a point-in-time assessment of the status of Natural and Enhanced Assets in the City of Saskatoon. Understanding the current state assists in judicious planning initiatives to protect and enhance the ecology and biodiversity of connected landscapes for the overarching benefit of present and future generations of citizens. The intention of the resulting natural areas database is to support the ongoing long-term planning, assessment, and management of natural areas outlined in the Green Infrastructure Strategy process and the Meewasin Valley-wide Resource Management Plan.

1.0 Introduction

The intention of the Natural Areas Inventory (NAI) report is to support the City of Saskatoon's planning initiatives and the management of urban natural areas with the understanding that these natural areas are integral components of the city's urban fabric. In particular, the Natural Areas Inventory has sought to support the City of Saskatoon's Green Infrastructure Strategy planning, which aims to better integrate and conserve the city's unique ecological network, by providing baseline data regarding the available Natural and Enhanced Assets. In order to better understand the City of Saskatoon's Green Network, a Geographical Information System (GIS) based analysis was undertaken to examine the current state of these Natural and Enhanced Assets.

Several indicators were developed to assess the existing Green Network. These indicators draw upon the work that has been undertaken in the Saskatoon region over the past few decades including: the 1992 Inventory of the Remaining Natural Areas within the Vicinity of Saskatoon and the quinquennial State of the Valley Report Series (SotV) produced by the Meewasin Valley Authority. However, the Natural Areas Inventory expands upon these prior studies while using a similar framework for classifying natural and enhanced assets within the city.








Four core indicators were established to provide a preliminary analysis of the state of Saskatoon's Green Network. These core indicators are associated with specific metrics developed to provide the Green Infrastructure Strategy with a snapshot of the city's natural spaces and a broader understanding of the complex network within which these natural spaces form an integral part of the Saskatoon community and region.

1.1 Objectives

The overall purpose of this project is to identify significant natural and enhanced assets within the City of Saskatoon, with secondary objectives to:

- Develop a framework for the classification and identification of significant natural and enhanced assets in order to support decision-making processes.
- Provide baseline data for the City of Saskatoon's and Meewasin's ongoing assessment, planning, ecological monitoring, and management of urban natural spaces.

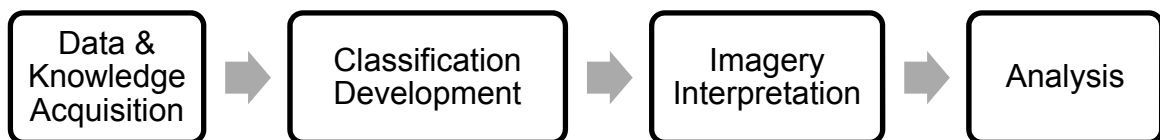
FIGURE 1 METRICS

VALUES	INDICATORS	METRICS
HEALTH	ECOLOGICAL INTEGRITY	<p>HABITAT QUANTITY</p>  <p>CONNECTIVITY</p>  <p>SPECIES DOCUMENTATION</p> 
	ECOLOGICAL PROTECTIONS	<p>LAND PROTECTIONS</p>  <p>CULTURAL DOCUMENTATION</p> 
BALANCE & VIBRANCY	AVAILABILITY	<p>USER RATIOS</p> 
	ACCESSIBILITY	<p>WALKABILITY</p> 

2.0 The Framework

This section details the framework of the Natural Areas Inventory, which was used in order to achieve the identification of significant natural and enhanced assets within the City of Saskatoon. This framework was established to maintain clarity and consistency throughout the project, as well as ensure replicability and transparency for future projects and analyses. The overarching approach which was used underpins the dataset development processes and is integral to understanding the Natural Areas Inventory data and analysis.

The following section outlines the processes and procedures that were followed in order to identify and spatially represent natural areas, including: the reports which were referenced as best practices, the existing datasets that were utilized, the development and application of the classification typology, the digitization methods that were employed, and the preliminary analysis of this inventory.



2.1 Methodology Review

Given the concurrent 2018 State of the Valley study being undertaken by Meewasin, the Natural Areas Inventory draws upon both the existing data and already established methodology. The methodological choices of the Natural Areas Inventory have also been informed by the best practices of similar studies. Prior to the development of the Natural Areas Inventory classification system and methodology design, a document analysis was undertaken in order to assess the relevant GIS practices both locally and in other geographic regions.

TABLE 1 SCAN OF BEST PRACTICES

	Author	Title	Year
Other Geographic Region	Freeman & Buck	Development of an Ecological Mapping Methodology for Urban Areas in New Zealand	2003
	Golder Associates	Final Report: Natural Areas Decision Guide and Loss Assessment	2008
	Credit Valley Conservation	Urban Landscape Scale Analysis: GIS Methodology	2010

	Niagara Peninsula Conservation Authority	Natural Areas Inventory Volume 1	2010
	Credit Valley Conservation	Landscape Scale Analysis of the City of Mississauga: Natural and Semi-Natural Habitats and Opportunities for Enhancement	2012
	Cornell University Department of Natural Resources	Creating a Natural Resources Inventory: A guide for communities in the Hudson River Estuary Watershed	2014
	City of Edmonton	Urban Primary Land and Vegetation Inventory (uPLVI) Interpretation Manual	2014
Saskatoon Studies	Johnson and Weichel Resource Management Consultants	An Inventory of Natural Areas Remaining in the Vicinity of Saskatoon	1992
	Nelson Dynes & Associates	Vegetation Inventory of Saskatoon and Area	1998
	Meewasin Valley Authority	State of the Valley Series	1998, 2003, 2008, 2013, 2018

2.2 Classification System

The above methodological review guided the development of a land use and land cover classification system. The State of the Valley 2018 classification scheme was re-developed so that the updated categories would be comparable to the previous State of the Valley reports, which used the following categories: Habitat, Green Space, Golf Course, River, Pasture, and Cropland. Using the 2013 State of the Valley report as a foundation, additional categories were formed to better reflect the ecological communities being captured by the land use and land cover analysis. Sub-categories were also added based upon the land cover and anthropogenic intensity of the site's land use. As a result, these natural areas are not necessarily representative of, or may not align with the formal boundaries of the City of Saskatoon's zoning and dedicated lands. Green Space was similarly broken down into sub-categories which better represent a balance of the on-the-ground land cover, as well as the human use of the site. While this balance is not deterministic of the ecological conditions present, these categories may have implications for identifying sites of higher quality.

These categories were further refined as the preliminary State of the Valley digitization occurred. For instance, the subcategory of informal green space was generated through the

ongoing identification of a significant number of sites which were distinctive from the formal green space sites in terms of public use, form, and management. Digitized areas, although sometimes comprised of multiple vegetation types, were classified by the dominant vegetation class as interpreted through the orthophoto imagery. Illustrated in the following table is the final NAI classification system used to categorize natural areas.

TABLE 2 NATURAL AREA CLASSIFICATIONS & ATTRIBUTE TABLE CODE

	Category (Cat)	Subcategory (Sub1)	Secondary Subcategory (Sub2)	
The Green Network	Agricultural Lands (SAL)	Cropland (CR)		
		Tame Forage (TF)		
	Natural Assets (SNA)	Grassland Systems (G)	Naturalized Grass (NG)	Known Prairie (KP)
		Aquatic Systems (AS)	Wetland (W)	River (R)
		Naturally Non-Vegetated (NNV)		
		Forested and Shrubland Systems (FSS)	Afforested (A)	Native & Naturalized (NAT)
		Formal Green Space (FGS)	Park & Recreation Lawn (PRL)	Urban Garden (UG)
	Enhanced Assets (SEA)		Planting (P)	Verge (VG)
		Informal Green Space (IGS)	Utility ROW & Lot (U)	Vacant Lots (VL)
			Sport and Recreation Fields (SRF)	Golf Course (GC)
		Outdoor Recreation (OR)		Zoological Park (ZP)

Note: the above Enhanced Asset categories of 'Formal Green Space' and 'Outdoor Recreation' are identified as 'Formal Green Space' within the Green Infrastructure Strategy.

2.3 Definitions and Interpretation

Imagery interpretation is informed by the established classification categories and the ways in which these categories are operationalized. This section details the developed classification definitions for this project. As well, it provides a series of illustrative images which demonstrate how the categories were interpreted. Collectively these details contribute to the establishment of a methodological framework which supports the ongoing analysis of natural areas in the City of Saskatoon. The following catalogue of secondary subcategories is in alphabetical order.

These categories are understood as ecological communities which can be identified and delineated consistently from orthophotos with the aid of other datasets and existing site knowledge. These categories are distinguished based on the visible vegetation cover, as well as the land-use and characteristics of the site.



**AFFORESTED
(A)**

Natural areas established as forest where there was no previous tree cover. Predominated by naturalized tree or shrub cover with identifiable planting patterns. This designation is distinguished by the presence of naturalized understories and surrounding vegetation communities.



**CROPLAND
(Crop)**

Land used for field crops, fallow fields, horticultural crops, sod production, or nurseries.



**GOLF COURSE
(GC)**

Land maintained as turf for the purpose of a golf course.



**KNOWN PRAIRIE
(KP)**

Natural areas comprised mainly by grass cover and which are known to be dominated by native prairie vegetation.



**NATIVE AND
NATURALIZED TREE
AND SHRUB COVER
(NAT)**

Natural areas predominated by native and naturalized tree or shrub cover. This designation is distinguished by the presence of naturalized understories and surrounding vegetation communities.



**NATURALIZED GRASS
(NG)**

Natural areas predominated by grass cover with conditions that are reflective of higher degrees of ecological integrity and lower degrees of anthropogenic intensity. Exhaustive observations for the presence of native species have not been undertaken.



**PLANTING
(P)**

Natural areas which are maintained as transplanted tree and shrub sites or planting beds. These sites occur within traditional turf landscaping.



**PARK AND
RECREATION LAWN
(PRL)**

Land maintained as ornamental grass to serve aesthetic landscaping and recreational purposes. These sites are often publicly accessible and designated as park space.



**RIVER
(R)**

The South Saskatchewan River channel.



**SPORT AND RECREATION
FIELDS
(SRF)**

Land maintained as a grass surface for the purpose of an outdoor sporting or recreational facility.



**TAME FORAGE
(TF)**

Natural areas predominated by grass cover with conditions that are reflective of less naturalization and more recent agricultural production or other anthropogenic disturbance.



**UTILITY RIGHT
OF WAY
(U)**

Land maintained as a grass for the purpose of utility or infrastructure sites and right of ways.



**URBAN GARDEN
(UG)**

Land used for small scale community gardens, allotment gardens, and urban agriculture. These sites do not include larger scale agriculture occurring on University of Saskatchewan lands.



**VERGE
(VG)**

Natural areas predominated by traditional turf landscaping, and which are liminal and linear spaces along roadways, railways, or other land uses. These sites are not naturalized, but have varying levels of maintenance.



**WETLAND
(W)**

Natural areas which are permanently or periodically saturated with water, and are comprised of varying intensities of aquatic and terrestrial vegetation.



**ZOOLOGICAL PARK
(ZP)**

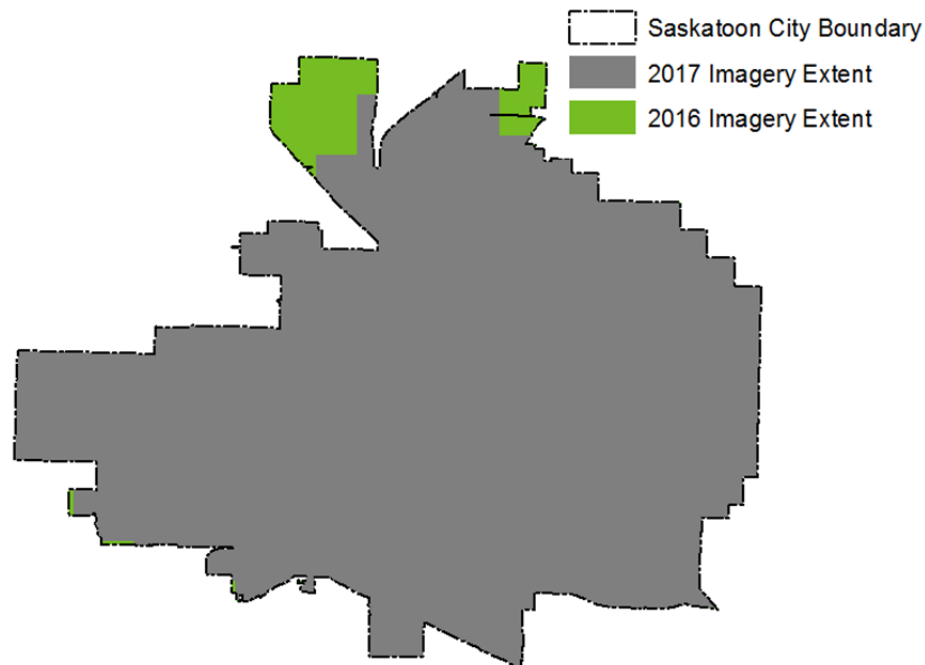
Natural areas utilized as outdoor zoological enclosures.

2.4 Data Sources

Existing spatial data from a variety of sources was reviewed to in order to support the accurate identification and classification of natural areas. These additional GIS data sources were overlaid with one another and the orthoimagery to ensure a greater degree of validity with respect to the classification of natural areas. Within the study area, these data layers mutually informed the identification of landscape features and their delineation.

While the utilization of multiple data sources supports the production of a higher quality output, the characteristics of the orthoimagery used for this interpretation process is a primary determining factor of the resulting NAI dataset by influencing what can be identified and the scale at which it can be identified. Since these natural areas were digitized primarily from this imagery, the dataset accuracy is dependent upon this source data. Two orthoimagery sets were used for this project due to the limited areal extent of the most recent 2017 imagery obtained from the City of Saskatoon, which was supplemented by 2016 imagery acquired through the Saskatchewan Geospatial Imagery Collaborative. This 2017 imagery covered approximately 95% of the City of Saskatoon study area, with the 2016 imagery supplementing the remaining 5%. However, due to the digitization process outlined below, 83% of the total NAI dataset was digitized from the 2017 imagery, with the remaining 17% utilizing the 2016 imagery. The extents of these two orthoimagery sets within the Saskatoon study area are illustrated below.

FIGURE 2 ORTHOIMAGERY EXTENTS





The three significant characteristics of these orthoimagery datasets which were seen to influence the digitization and interpretation processes were pixel ground resolution, emulsion and the time of year the imagery was taken at. The two sets of imagery both feature a true colour emulsion and have unknown dates of data capture, while the 2016 imagery (left) has a 1.5 metre resolution and the 2017 imagery (right) has a 7.5 centimetre resolution.

While this imagery was not captured for the purpose of this project, these characteristics were satisfactory for the manual digitization and visual interpretation process. For the purpose of this project colour-infrared imagery would have been preferable for vegetation interpretation; however, the leaf-on conditions within the two imagery sets was acceptable, although the degree to which the foliage was at full flush when this imagery was captured is unknown.

Google Earth Imagery and the City of Saskatoon's 2013 orthoimagery were also used for multi-temporal comparisons. Comparing imagery of natural areas that was captured over a number of years and time periods was particularly useful for distinguishing grassland system types and understanding the history of disturbance on the landscape, since historical disturbance can be indicative of grassland naturalization and the presence of native species.

In addition to these spatial datasets, Google Street View and limited informal ground truthing were used to enhance the accuracy of the natural area classifications through providing contextual knowledge about these identified natural areas. Consistency across the software and hardware used and professional staff using it was also maintained in order to further support data reliability. ArcGIS 10.6 was used for the digitization and spatial analysis processes on a desktop computer and were performed by one technical staff member according to an established protocol. During the digitization process the technical staff person regularly checked in with other Meewasin staff with experiential and practical knowledge of the Saskatoon region regarding the process and identified areas of uncertainty.

TABLE 3 GIS DATA

Data Layer	Type	Source	Year	Source Scale / Resolution
City Parks	Vector Polygon	City of Saskatoon	2016	No Metadata
City Pathways	Vector Line	City of Saskatoon	2018	No Metadata
Wetlands	Vector Polygon	City of Saskatoon	2013	No Metadata
Annual Crop Inventory	Raster	Agriculture and Agri-Food Canada	2017	30 m
SotV 2008	Vector Polygon	Meewasin Valley Authority	2008	No Metadata
SotV 2013	Vector Polygon	Meewasin Valley Authority	2016	No Metadata
Google Earth Imagery	Raster	Google	2002-2018	Varied
2013 Orthophotos	Raster	City of Saskatoon	2013	0.075 m
SPOT Satellite Imagery	Raster	Saskatchewan Geospatial Imagery Collaborative	2016	1.5m
2017 Orthophotos	Raster	City of Saskatoon	2017	0.075 m
SotV 2018	Vector Polygon	Meewasin Valley Authority	2019	0.075 m
Natural Areas Inventory	Vector Polygon	Meewasin Valley Authority	2019	0.075 - 1.5m

Projected Coordinate System Used: NAD 1983 CSRS UTM Zone 13N

2.5 Digitization Methods

A manual digitization process was used for delineating features. To perform this digitization ArcGIS 10.6 software was utilized on a desktop computer, and natural areas were traced from the data sources using a computer mouse. Classification was performed alongside digitization, and the resulting vector features were categorized by keypunching the classification codes within the corresponding attribute table. In some cases, polygons were categorized as “unclassified” if the appropriate classification was unknown. These polygons were then subject to further review by the technical staff person and, when necessary, other Meewasin staff.

The process of manual digitization has a number of associated errors which must be acknowledged. The utilization of 2017 and 2016 imagery means that digitized features may

not best represent current real-world conditions. This data represents a point-in-time analysis, which has implications for the identification of features such as wetlands. As a result, this data provides a standardized baseline for informing decision-making, but cannot replace site specific surveys. Regardless of these limitations, this spatial dataset provides a comprehensive representation of Saskatoon’s ecological network.

The geographic scope of the NAI study area was predefined as the City of Saskatoon boundary. Although the study area was limited to natural areas occurring within the city limits, natural areas which were bisected by the city’s political boundary were digitized using the ecological boundary of the natural area. This extended digitization was performed for the secondary subcategory unit, and does not necessarily reflect the larger heterogeneous patch within which the ecological unit may be situated. In the case that other natural areas were identified as occurring within the extended unit, these additional features were also digitized (e.g. wetlands within cropland). This decision better reflects ecological boundaries, but also ensures that all feature geometries can be analyzed. Cumulatively, the extension of bisected natural areas resulted in an additional 4,540 hectares being captured. However, calculations for the total area percentage of natural areas within Saskatoon must exclude or account for this additional 4,540 hectares.

Due to budget and time constraints, the minimum unit to be mapped for the NAI data was set at 2.5 hectares. In digitizing the NAI data the interpreter made informed judgements and visual estimates, based upon their digitizing experience, to distinguish appropriately sized natural areas. The measurement tool was occasionally used to assess feature sizes, although in many cases if the feature was of a questionable size it was included by default, the rationale being that measuring and digitizing required similar inputs of time. In practice a number of exceptions were made in order to capture areas that were visually estimated to be smaller than 2.5 hectares either because of their notability or significance (e.g. all urban gardens or native and naturalized environments within green spaces), or because these ecological units cumulatively constituted an area equal to or greater than the approximate 2.5 hectare threshold.

Conversely, no minimum unit was established for the State of the Valley data. These differing levels of spatial detail are important to recognize for conducting an analysis of polygon geometry. Digitized polygons remained within the respective minimum mapable units calculated from the raster data resolution and the condition that 10 contiguous pixels be required for object identification. The following table summarizes the two datasets which makeup this study.

TABLE 4 SUMMARY OF POLYGON STATISTICS

	State of the Valley	Natural Areas Inventory
Minimum Polygon Size	No Minimum	2.5 ha
Average Polygon Size	0.20 ha	4.22 ha
Minimum Mapable Unit	0.06m ²	22.5m ²
Total Polygons	34,185	2,100

The total polygon values represent the lowest classification tier, rather than the larger habitat patches comprised of multiple land cover types. These features were digitized at a scale of 1:500 utilizing a combination of point-by-point and stream digitizing methods depending on the characteristics of the feature. A streaming tolerance of 1 metre was used and was determined based on a visual assessment of the resulting accuracy.

3.0 The Analysis

The assessment of Saskatoon's existing Green Network is based on the two analytical themes predicated on the values of health, balance, and vibrancy. These values were analyzed through four general indicators and their respective quantitative metrics.

3.1 Health

Indicator: Ecological Integrity

Ecological integrity is an important component of sustainability and wellbeing. Natural landscapes and biological diversity are critical to the preservation of both human and non-human health.

Habitat Quantity

Importance

The question of how much habitat is enough, although contextual, is often important to sustaining species populations and ecological functions and services (Environment Canada, 2013). Given that habitat loss is one of several important factors contributing to the loss of biodiversity across both local and global landscapes (Heinrichs, Bender, & Schumaker, 2016), understanding how much habitat currently exists provides valuable baseline data for understanding both habitat loss and degradation over time and how these processes might impact habitat availability and suitability for various species in the city region. While the total amount of available habitat types is significant when considering the city landscape perspective, the size and spatial configuration of those habitat patches within urban areas are also important for ecological integrity and biodiversity (Elmqvist, Zipperer, & Güneralp, 2016). For instance, in one recent study patch size was determined to have had a positive effect on the species densities of conservation-priority grassland birds in urbanizing areas, indicating that grasslands within urbanizing landscapes may provide value to more regional conservation efforts as a whole (Buxton & Benson, 2016). As a result, understanding patch size is one more measure which can contribute to a better understanding of the state of natural areas within the City of Saskatoon.

Findings

Habitat quantity, as a metric for assessing ecological integrity, was measured by the amount and proportion of the Green Network and its respective Natural and Enhanced Assets within the City of Saskatoon. The primary measurement of this metric is the total hectares for each Natural Areas Inventory Classification Type. Additionally, these percentages were also calculated by city neighbourhoods and suburban development areas (See Appendix Table 1 in Appendix B for the Natural Areas Inventory Category breakdown by neighbourhood).

The analysis of the Natural Areas Inventory dataset showed that the Green Network accounts for 47%, or 11,150 hectares, of the City of Saskatoon. The Green Network includes a diverse array of natural features including: native prairie, wetlands, green space, as well as forage and annual crops. The distribution of these natural areas within the City of Saskatoon is illustrated in Map 1 of Appendix A. As can be seen in the map, the predominance of Agricultural Lands within the City of Saskatoon is a direct result of the difference between Saskatoon's urban footprint and the formal city limits.

FIGURE 3 THE GREEN NETWORK AS A PROPORTION OF THE CITY OF SASKATOON



City of Saskatoon Green Network












The Green Network	47%	11,150 ha	
Natural Assets	14%	3461 ha	
Enhanced Assets	9%	2185 ha	
Agricultural Lands	23%	5504 ha	

FIGURE 4 SASKATOON'S NATURAL ASSETS AS A PROPORTION OF THE CITY OF SASKATOON



City of Saskatoon Natural Assets

Natural Assets	14%	3461 ha	
Aquatic	7%	1595 ha	
Forest & Shrubland	2%	577 ha	
Grassland	5%	1285 ha	
River	2%	388 ha	
Wetland	5%	1207 ha	
Native/Naturalized Forest/Shrubland	1%	372 ha	
Afforested	1%	205 ha	
Known Prairie	1%	327 ha	
Naturalized Grass	4%	958 ha	










Further analysis of the Natural Assets subcategories revealed that the areas classified as wetlands and naturalized grass were the most abundant, making up 1,207 hectares and 958 hectares respectively.

The below figure summarizes Saskatoon's Enhanced Assets by subcategory. Predictably Cropland was primarily located on the periphery of the urbanized landscape, while Green Space was the most prominent natural areas category which occurred within the urbanized environment.

FIGURE 5 SASKATOON'S ENHANCED ASSETS AS A PROPORTION OF THE CITY OF SASKATOON



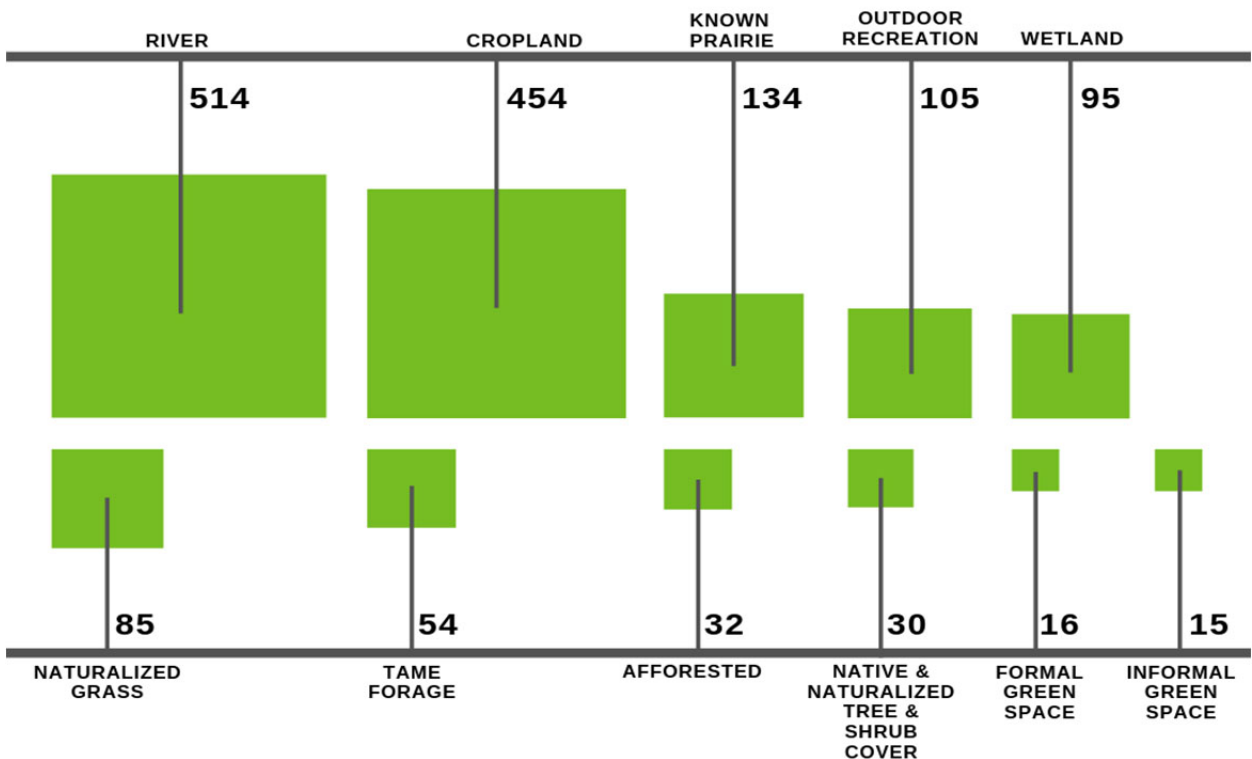
City of Saskatoon Enhanced Assets

Enhanced Assets	9%	2185 ha	
Formal Green Space	4.5%	1047 ha	
Informal Green Space	3.5%	806 ha	
Outdoor Recreation	1%	332 ha	
Park & Recreation Lawn	3.5%	836 ha	
Planting	1%	206 ha	
Verge	3%	702 ha	
Vacant Lot	0.5%	102 ha	
Golf Course	1%	243 ha	

Additionally, the intactness, or size of Saskatoon’s Natural Asset patches were analyzed. Given the fine detail of the State of the Valley portion of the dataset, size statistics for contiguous Natural Asset patches were calculated at the Natural Assets subcategory level. The complete study area was used for reporting since many habitat patches extend beyond the City of Saskatoon boundaries. The distribution of the ten largest Natural Asset subcategory types is illustrated in Map 2 of Appendix A, while Map 3 thematically represents all Natural Asset patches by size. Mapping the distribution of the 10 largest polygons for the Native and Naturalized sub-categories revealed that many of the largest intact and contiguous habitat patches are located on the peripheral areas of the urban built environment reflecting the gradient of urbanization.

The figure below illustrates the maximum patch sizes of Saskatoon’s Green Network subcategories. Unsurprisingly, the South Saskatchewan River channel and the Cropland category had the two largest contiguous patches. The Kernen Prairie site, owned by the University of Saskatchewan, contained the largest extent of known prairie with 134 hectares, which was followed by The Willows Golf Course which amounted to 105 hectares of classified Outdoor Recreation, while the largest contiguous wetland is a part of the Northeast Swale corridor, although not contained within the Northeast Swale portion managed by the Meewasin Valley Authority.

FIGURE 6 PROPORTIONAL SYMBOLS: MAXIMUM PATCH SIZE (HA)



While the size of individual Natural Asset Subcategory types offers some insight into the ecological integrity of Saskatoon’s Green Network, the contiguous patch sizes of habitat patches comprised of one or more Natural Asset Subcategory types was also considered. The below tables and figures below summarize the Natural Assets Inventory through each of these approaches.

TABLE 5 SIZE OF INDIVIDUAL NATURAL ASSET SUBCATEGORY PATCHES

Size Class (ha)	≤ 1	≤ 5	≤ 25	≤ 100	≤ 700	Total
Patch Count	4854	270	101	15	3	5243
Percent of Total City of Saskatoon	2.0%	2.4%	5.1%	2.5%	2.7%	14.6%

TABLE 6 SIZE OF CONTIGUOUS NATURAL ASSET PATCHES

Size Class (ha)	≤ 1	≤ 5	≤ 25	≤ 100	≤ 700	Total
Patch Count	1896	169	69	15	6	2155
Percent of Total City of Saskatoon	1.1%	1.5%	3.4%	2.9%	5.8%	14.6%

Connectivity

Importance

Habitat connectivity and fragmentation have been established as playing an important role in maintaining the ecological integrity of a landscape and are correlated with urbanization (Liu, He, & Wu, 2016). Movement and dispersal across suitable habitat patches plays an important role in sustaining species; however, the implications for “habitat connectivity in highly fragmented landscapes remains largely unknown” (Braaker, Boesch, Ghazoul, Obrist, & Bontadina, 2014). Connectivity is also context dependent in that the distances between patches within a corridor will either fall within or exceed the threshold of various species depending on the movement patterns or dispersal mechanisms of the species being considered. Analyzing land use and land cover alongside patch geometries is one approach for assessing connectivity; however, a number of methods exist to measure this structural connectivity with varying levels of complexity and accuracy (Prugh, 2009). As such, structural connectivity is just one dimension of connectivity as other factors may impact functional connectivity, such as light pollution in the case of bats (Laforge, Pauwels, Faure, Bas, Kerbiriou, Fonderflick, & Besnard, 2019).

Findings

Two Euclidean distance-based measures were used as metrics for assessing ecological integrity. The nature of these tools means that the results should be interpreted with attentiveness to the limitations of these tools, namely that dispersal barriers between patches were not accounted for which likely overestimates connectivity and does not consider species functionality. However, taken together this analysis offers a preliminary examination of possible connectivity pathways and where there is potential for connectivity to be enhanced.

First, a nearest neighbour analysis was performed (using the ArcGIS Near tool) on both the contiguous Natural Asset patches and the contiguous Natural and Enhanced Asset patches. Given the limitations which were presented by the State of the Valley and Natural Areas Inventory datasets, the City of Saskatoon parks data was used to supplement the Green Space patches so that the disaggregation caused by digitized pathways within parks were not considered in this analysis. The following figures and tables illustrate these mean nearest neighbor distances between individual patches, as well as a more detailed breakdown of these distances.

FIGURE 7 NEAREST NEIGHBOUR PROXIMITY ANALYSIS



Analysis found that on average, the Natural Asset patches are within 33.3 metres of their nearest Natural Asset neighbour, while Natural and Enhanced patches are within 19.6 metres from their nearest Natural and Enhanced Asset neighbour. Connectivity of the network can be improved by considering both Natural and Enhanced Assets.

TABLE 7 NEAREST NEIGHBOUR PATCH ANALYSIS: NATURAL ASSETS

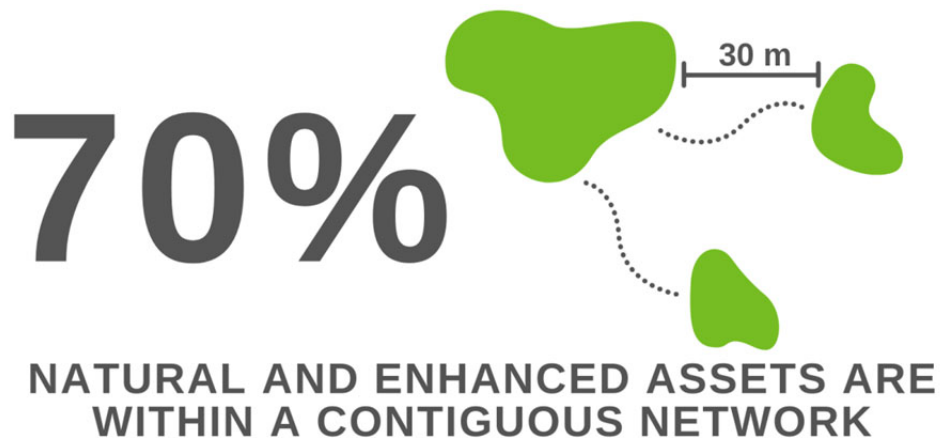
CONTIGUOUS NATURAL ASSET PATCH PROXIMITY						
Nearest Neighbour Distance (Metres)	< 10	10 - 30	30 - 100	100 - 500	500 - 850	Total
Patch Count	1089	510	373	171	12	2155
Percent of Total	50.5%	23.7%	17.3%	7.9%	0.6%	100%

TABLE 8 NEAREST NEIGHBOUR PATCH ANALYSIS: NATURAL AND ENHANCED ASSETS

CONTIGUOUS NATURAL AND ENHANCED PATCH PROXIMITY						
Nearest Neighbour Distance (Metres)	< 10	10 - 30	30 - 100	100 - 500	500 - 850	Total
Patch Count	2328	713	456	243	2	3742
Percent of Total	62.21%	19.05%	12.19%	6.49%	0.05%	100%

Proximity between Natural and Enhanced Asset patches was also measured through a buffer analysis. This buffer analysis was used as a proxy for assessing the city landscapes connectivity, as opposed to looking at individual patches. A total 30 metre buffer distance was assessed around the Natural and Enhanced patches in order to identify the number and spatial extent of patches within a contiguous network. This value was selected as a baseline for analysis given that it fell within the range of the mean nearest neighbour distances; however, future analyses would benefit by considering structural connectivity with respect to the movement of key species or a specific connectivity objective. It was found that at a 30 metre threshold, 78% of Natural and Enhanced Asset patches were within one contiguous network.

FIGURE 8 NEAREST NEIGHBOUR PATCH ANALYSIS: NATURAL ASSETS AND ENHANCED ASSETS



The total area of these Natural and Enhanced Asset patches accounted for 70% (3934 hectares) of the total area of all Natural and Enhanced Assets within the City of Saskatoon boundaries. Map 4 in Appendix A illustrates the network of these Natural and Enhanced Asset patches when evaluated with a 30 metre distance threshold.

Expansion of the Meewasin Valley Authority conserved corridor within the City of Saskatoon and in coordination with regional growth plans would provide opportunities to enhance and maintain connectivity to adjacent natural areas as City growth occurs. Integration of Enhanced and Agricultural Assets within the Green Infrastructure Strategy planning would lead to significantly improved connectivity of Natural Asset patches.

Species Documentation

Importance

The links between urbanization and threatened species are increasingly being studied. Given that urbanization has been documented as a contributing factor to habitat loss and fragmentation, it has been hypothesized that cities can play a complementary and important role in achieving conservation objectives despite their relatively small footprint (Ives et al. 2016). The complexity of both cities and ecological systems has meant that for some species there are favorable drivers for urban life, such as decreased risk of predation, which also has implications for conservation (Rebolo-Ifrán, Tella, & Carrete, 2017). The presence and absence of species is one key metric for understanding species distributions and relative abundance. As such, the known presence of threatened species is one indicator which has been used to develop and assess conservation and management practices that support biodiversity in urban environments (Esparrago & Kricsfalusy, 2015; Leston & Koper, 2017). While a number of methods for the measurement of biodiversity exist, species observations measured by “[t]he number of species in an assemblage is the most basic and natural measure of diversity” (Gotelli & Chao, 2013, 196).

Findings

Using citizen science species location data from the Saskatchewan Conservation Data Centre, eBirds, and iNaturalist, documented species distributions were analyzed. Each of these datasets was cleaned by removing incomplete records and invasive species records if present and then merged to create one species observations dataset. Given the limitations of this data, namely that citizen science data is biased due to the nature of public observations and that these data do not reflect a systematic inventory of species throughout the City of Saskatoon, determined Urban Green Spaces were used to analyze these observations, rather than digitized natural spaces within the City’s Green Network. These Urban Green Spaces represent the site boundaries of publicly accessible natural areas, and thus represents formal site boundaries as opposed to Natural and Enhanced Asset patches. These Urban Green Space sites were also used for the Ecological Protections metrics and a summary of these 267 sites can be found in Appendix Table 2 of Appendix B.

FIGURE 9 URBAN GREEN SPACE: SPECIES OBSERVATIONS

13,338
SPECIES
OBSERVATIONS

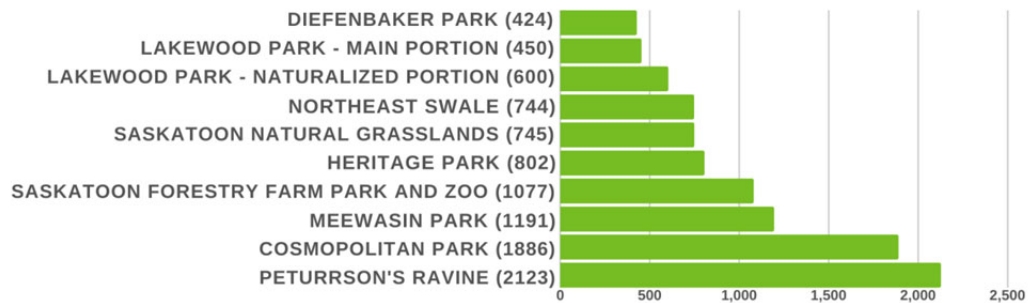


556 SPECIES DOCUMENTED WITHIN CITY LIMITS

In total, 13,338 total species observations were documented within these Urban Green Space sites (with an additional 25 metre search radius). A summary of the 556 species captured across these datasets offers a baseline of observed species occurring within the City of Saskatoon.

Summarized by Urban Green Space sites, this data is representative of the nature watching hot spots within the City of Saskatoon, which may also be correlated with abundance and richness. The following table highlights the top ten sites in Saskatoon with the most observations. Map 5 in Appendix A illustrates the full scope of this analysis, while Appendix Table 3 in Appendix B captures the total list of species observed through these three data collection applications.

TABLE 9 TOTAL SPECIES OBSERVATIONS BY SITE



TOP 10 NATURE WATCHING SITES

Similarly, species summaries were also generated by site and offer a baseline for better understanding of site species observations within the City of Saskatoon, and could be supplemented with other sources such as site planting lists and animal sighting reports. Map 6 of Appendix A illustrates the documented species observations using citizen science data.

While biases in data observation were discussed as one limitation of this analysis, these biases may also be useful, since the absence of species data is indicative of where further data collection may be needed, as opposed to a being a metric for species absence. A list of

the species that were documented within the City of Saskatoon was produced in addition to a thematic map which illustrates the number of total occurrences within each patch.

Collaborative partnerships with conservation and special interest groups such as the Meewasin Valley Authority can provide a more comprehensive monitoring framework and augment data availability in regards to ecological and wildlife monitoring within the City of Saskatoon.

Indicator: Ecological Protections

The protections placed upon natural areas are another important component of sustainability and wellbeing. These protections and conservation efforts contribute to the maintenance and preservation of natural areas and their ecological functions. Protecting natural areas not only contributes to mitigating biodiversity loss, but also contributes to human health through the preservation of important ecological services, including human wellbeing through the preservation of culturally significant areas and the meaningful and varied relationships that people have with these areas.

Land Protections

Importance

Within the City of Saskatoon there are various ownership types, management regimes, and overarching planning frameworks which offer various degrees of protection to the City of Saskatoon's Natural and Enhanced Assets. As biodiversity and ecological loss continues around the world (MacKinnon, Lemieux, Beazley, et al., 2015), understanding the extent and limitations of these various land-uses can support appropriate planning, conservation, and public health efforts. Given that the International Union for the Conservation of Nature (IUCN) defines protected areas as "a clearly defined geographical space, recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values", each of these components are important to understanding the existing protections and opportunities for enhancing protections for Natural Assets (Dudley, 2008).

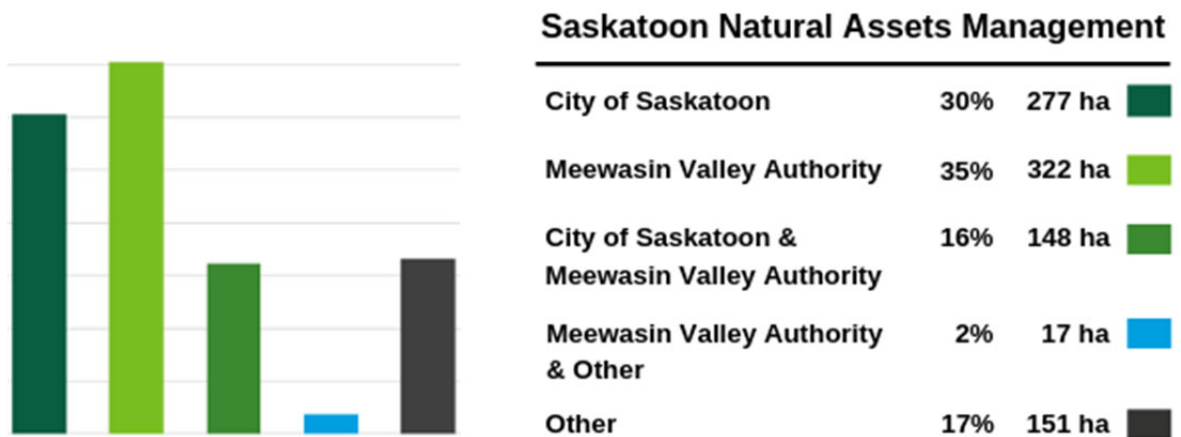
Findings

FIGURE 10 TOTAL NATURAL ASSETS WITHIN AN URBAN GREEN SPACE SITE



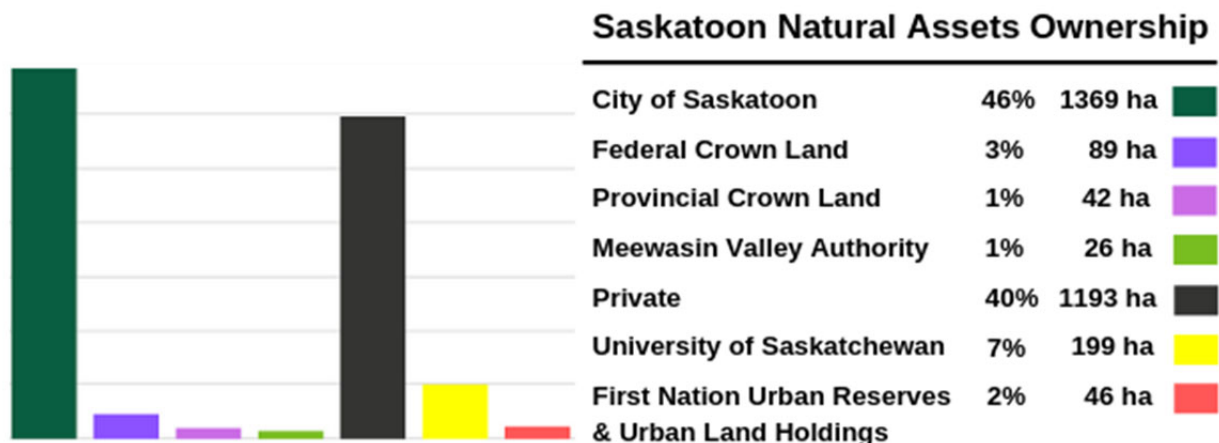
The amount of Natural and Enhanced Assets that are within formal site boundaries and that are managed as natural spaces was one metric used for better understanding the extent of land protections conferred from Saskatoon’s land-use and planning policies. When analyzed by the list of Urban Green Space sites, summarized in Appendix Table 2 of Appendix B, it was determined that of all the classified Natural Assets (excluding the South Saskatchewan River), approximately 30% (915 hectares) were within these managed Urban Green Spaces, whereas 50% (1090 Hectares) of classified Enhanced Assets fell within these managed Urban Green Spaces. The management regimes of these Natural Assets also have implications for land protections.

FIGURE 11 MANAGED NATURAL ASSETS BY MANAGEMENT TYPE



Land ownership was another metric for analyzing the degrees of ecological protection proffered to natural spaces in the City of Saskatoon. Again focusing on the classified Natural Assets that fall within ownership boundaries, the following figure illustrates the breakdown of land ownership within the city.

FIGURE 12 NATURAL ASSETS BY LAND OWNERSHIP TYPE



The portions of Saskatoon’s Green Network which intersected with the Meewasin Valley Authority’s Conservation Zone, Municipal Reserve dedicated land status, and the Migratory Bird Sanctuary were also analyzed. These planning frameworks were identified as also offering degrees of protection to natural spaces. In particular, it was found that 22% (755 hectares) of all Natural Assets fell within one or multiple of these planning frameworks. In total, 2% (75 hectares) were within designated Municipal Reserve lands and less than 1% fell within the Migratory Bird Sanctuary, while 21% (733 hectares) of Natural Assets fell within the Meewasin Valley Authority Conservation Zone.

Potential IUCN candidate sites, as shown in Map 7 of Appendix A, were identified by the Green Infrastructure Strategy Project Team in consultation with the Canadian Council on Ecological Areas and Key Technical Experts. When considering areas within the City of Saskatoon that fulfill criteria for IUCN protected area status, there is potential for protection expansion as well as further enhancement of existing protections. This would also result in recognition by the Government of Saskatchewan Ministry of the Environment as well as Environment and Climate Change Canada. Areas identified as potential candidates account for 3244 hectares of the Green Network, 923 hectares of which would be an additional protection to the Saskatoon Natural Assets Management shown in Figure 11 above. If these protections were fully realized, it would result in up to 14% of the current City of Saskatoon area attaining IUCN status. Of these areas, 1642 hectares consist of Saskatoon Natural Assets, 117 hectares of Enhanced Assets, and 1485 hectares of Agricultural lands. It is noted that no sites would be considered for formal designation without consultation with landowners, the public, or other affected stakeholders.

The prioritization of ecological functionality as future growth occurs is paramount in order to minimize and mitigate potential development impacts on biodiversity and provide ecosystem services to development. The conservation of urban Natural Assets should be given priority within prospective development frameworks.

Cultural Documentation

Importance

Cultural significance is also interrelated with ecological protections. The values that are associated with ecological landscapes both informs what is preserved and why, but these values are also shaped by the landscapes in which we live. As a result, the interrelations between cultural significance and ecological landscapes have important implications for understanding the context of ecological protections within the City of Saskatoon.

Findings

Similar to the Species Documentation analysis, the Government of Saskatchewan Heritage Conservation Branch archaeological and palaeontological records were summarized by Urban Green Space. It is recognized that this dataset only represents one facet of documented cultural significance and does not capture designated Heritage status or other ways in which cultural significance has been ascribed to the Natural and Enhanced Assets of Saskatoon. As a result, this analysis is intended to be complementary to the existing knowledge regarding the designated heritage sites within the City of Saskatoon. In total 27 documented palaeontological and archaeological records intersected with Urban Green Space sites (with an additional 25 metre search radius). These records fell within 10 sites; the summary of these sites and the number of documented records is illustrated in the table below and is represented in Map 8 of Appendix A. Enhancing the protections discussed in the previous section acts to also reinforce cultural protections within the City of Saskatoon.

TABLE 10 ARCHAEOLOGICAL AND PALAEONTOLOGICAL RECORDS SUMMARY

Urban Green Space	Number of Records	Urban Green Space	Number of Records
Alexander MacGillivray Young Park	1	Peturrson's Ravine	2
Diefenbaker Park	1	Sanatorium Site	2
Holiday Park	11	Silverwood Factoria and Heritage Site	2
Northeast Swale	1	Sutherland Beach	3
Peggy McKercher Conservation Area	3	U of S Remediation and Buffer Lands	1

3.2 Balance and Vibrancy

Indicator: Availability

The amount of available urban green space is one important component of providing a balanced and vibrant urban environment that offers benefits to human health and improve wellbeing.

User Ratios

Importance

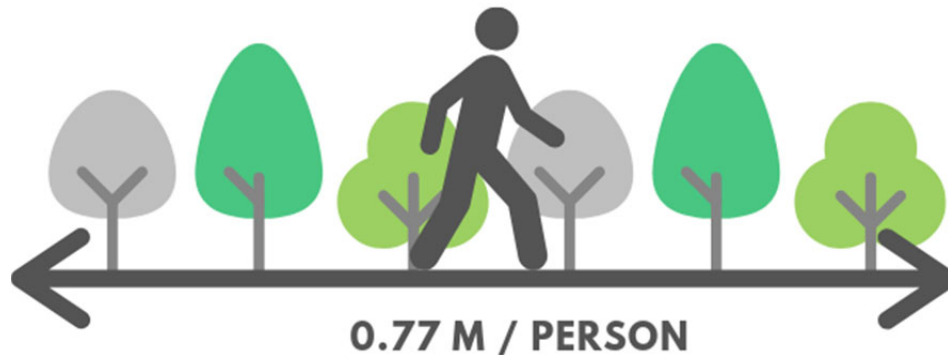
Many studies have been undertaken to analyze the effect of green space on health and wellbeing, and in turn, adverse effects from the decline of exposure to nature (Amoly et al., 2014). For instance, one study determined an association between usage of urban green space areas and improved mental health in adulthood (Hartig et al., 2014). Increased green space availability to users within the City of Saskatoon has an impact on health and welfare of the current and future population.

Findings

The availability of urban green space was measured using the ratio of total green space to total potential users. The user ratio of infrastructure that supports the utilization of natural areas was calculated as the total pathway length in linear metres normalized per person using the total population of Saskatoon. The pathway dataset used to calculate this ratio contains multi-use paths for cycling and walking throughout the city, including both within and outside of parks. This pathway data was then analyzed to reflect the total pathways within the City of Saskatoon's classified Green Network areas (with a 10 metre buffer). As a result, this ratio reflects the availability of surfaced trails within Urban Green Spaces and is not an analysis of the total multi-modal pathways throughout the City of Saskatoon.

In total, 209,878 linear metres of this pathway dataset were found to directly service the City of Saskatoon's Green Network. Using the City of Saskatoon Neighbourhood Profile Report estimated population of 271,000, the trail length per person is 0.77 metres.

FIGURE 13 URBAN GREEN SPACE PATHWAYS PER CAPITA



Indicator: Accessibility

The accessibility of urban green space has important implications for health and wellbeing. The accessibility of these spaces supports the goal of facilitating interaction between people and natural landscapes, as well as providing ecological services.

Walkability

Importance

Determining proximity to green space provides insight into advantageous access of green space by the population. The 2010 Natural England Accessible Natural Greenspace standard referenced by the World Health Organization has recommended that persons should have access to green space at within a 5 minute walk from their home (as cited in World Health Organization, 2016). As stated previously, green space has direct correlation to the overall health and wellbeing of the community. Accessibility is an important factor to consider a broad view of the current state.

Findings

The accessibility of urban green spaces was assessed through analyzing the walking distance from the City of Saskatoon's key urban green spaces, namely City of Saskatoon parks and Meewasin sites. Mean walking speed (Ponizy, L., et al, 2017) was utilized to assess walking distance using the ArcGIS Network Analyst extension to model the pedestrian accessibility of urban green spaces through trail and road routes within the city. Areas of the city were classified based on their proximity, in walking distance minutes, to the access points of these urban green spaces via roadway and pathway network data. The following table captures the parameters of this model.

TABLE 11 GREEN SPACE WALKING DISTANCE

Time	Walking Speed	Distance Threshold
3 minutes	1.4 metres per second	252 metres
5 minutes		420 metres
10 minutes		840 metres

The percent of the population that lives within a 3, 5, and 10 minute walking distance was calculated by selecting the fully developed neighbourhoods of Saskatoon, determining their population data, erasing non-residential areas, and intersecting the walk time polygons. The percent of the residential areas which were associated with each walk time was applied to the population data for a total city and neighbourhood level analysis.

FIGURE 14 URBAN GREEN SPACE WALKING DISTANCE: POPULATION



In total, approximately 53% of the population was calculated to live within a 3 minute walk of an urban green space, an additional 28% within 3 to 5 minute walk, an additional 17% within a 5 to 10 minute walk, and an additional 1% within a walk greater than 10 minutes. The spatial extent of these urban green space service areas is illustrated in Map 10 of Appendix A. Additionally the population percentages for each fully developed City of Saskatoon neighborhood are illustrated by Appendix Table 4 of Appendix B. Analysis being completed through the Green Infrastructure Strategy is identifying that residential areas beyond a 5 minute walk have challenges in relation to park capacity within neighbourhoods, accessibility and flood-proneness. Balancing accessible human use of urban green spaces with the conservation and protection frameworks earlier discussed will provide health and well-being benefits for current and future generations

4.0 Conclusion

This report outlines the baseline data generated through the GIS analysis of the City of Saskatoon's Green Network. Overall the themes of health, and balance and vibrancy were used as an analytical framework. These themes were further broken down into four analysis indicators and several specific metrics. These metrics were chosen to provide a baseline assessment of Natural and Enhanced Assets within the City of Saskatoon. Metrics were chosen that could be measured repeatedly over time, that were linked to the Green Infrastructure Strategy Guiding Principles, and that could be analyzed given the availability of data.

In addition to the development of a framework for the classification of Natural and Enhanced Assets within the City of Saskatoon, and the subsequent identification and digitization of these significant natural spaces, the Natural Areas Inventory provides a preliminary analysis of how much of these natural spaces exist, their spatial relationships with one another, the species that are inhabiting them, the degrees of protection that are conferred to them, and their cultural significance; as well as, their availability and accessibility. These measures can be used to inform decision-making and the strategic planning and integration of these important natural spaces within the urban fabric of Saskatoon.

The purpose of collecting data on the City of Saskatoon's existing Green Network was to provide a baseline understanding of what currently exists, in order to move towards Saskatoon's vision of better integrating and conserving the city's unique ecological network. Following the development of the Natural Areas Inventory GIS dataset, this analysis considered the distribution of natural areas across the city and their spatial relationships to other natural areas, in addition to the urban built environment. The structural connectivity of these natural areas was an important theme in terms of both ecological integrity and the utility of urban green spaces for people.

Altogether, the results of these metrics provide a point-in-time assessment of the status of Natural and Enhanced Assets in the City of Saskatoon. Understanding the current state assists in judicious planning initiatives to protect and enhance the ecology and biodiversity of connected landscapes for the overarching benefit of present and future generations of citizens. The intention of the resulting natural areas database is to support the ongoing long-term planning, assessment, and management of natural areas outlined in the Green Infrastructure Strategy process and the Meewasin Valley-wide Resource Management Plan.

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Appendix A

MAP 1 SASKATOON'S GREEN NETWORK

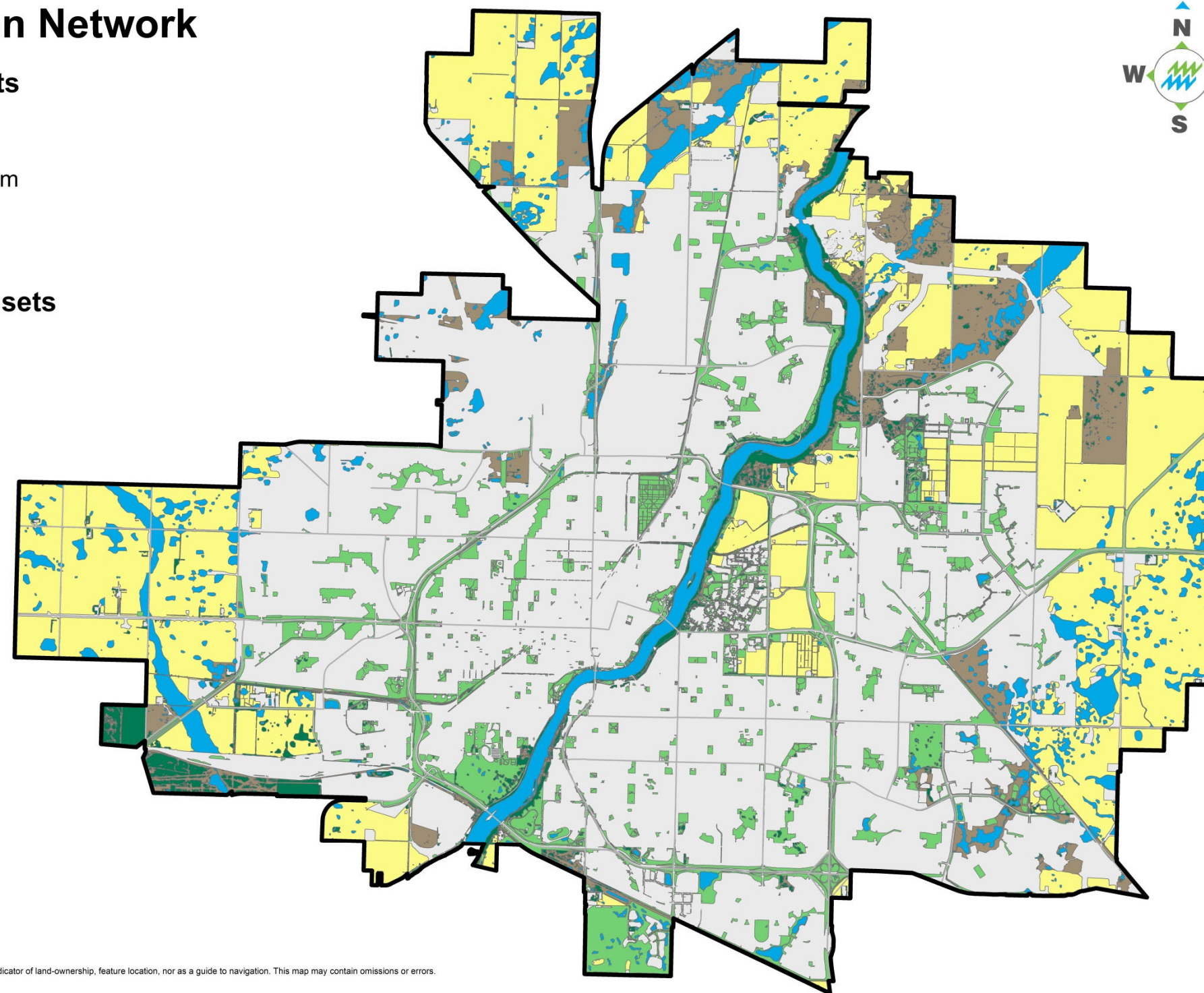
Saskatoon's Green Network

Saskatoon's Natural Assets

-  Aquatic System
-  Forested & Shrubland System
-  Grassland System

Saskatoon's Enhanced Assets

-  Agricultural Lands
-  Green Space



0 1 2 4 KM

Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.

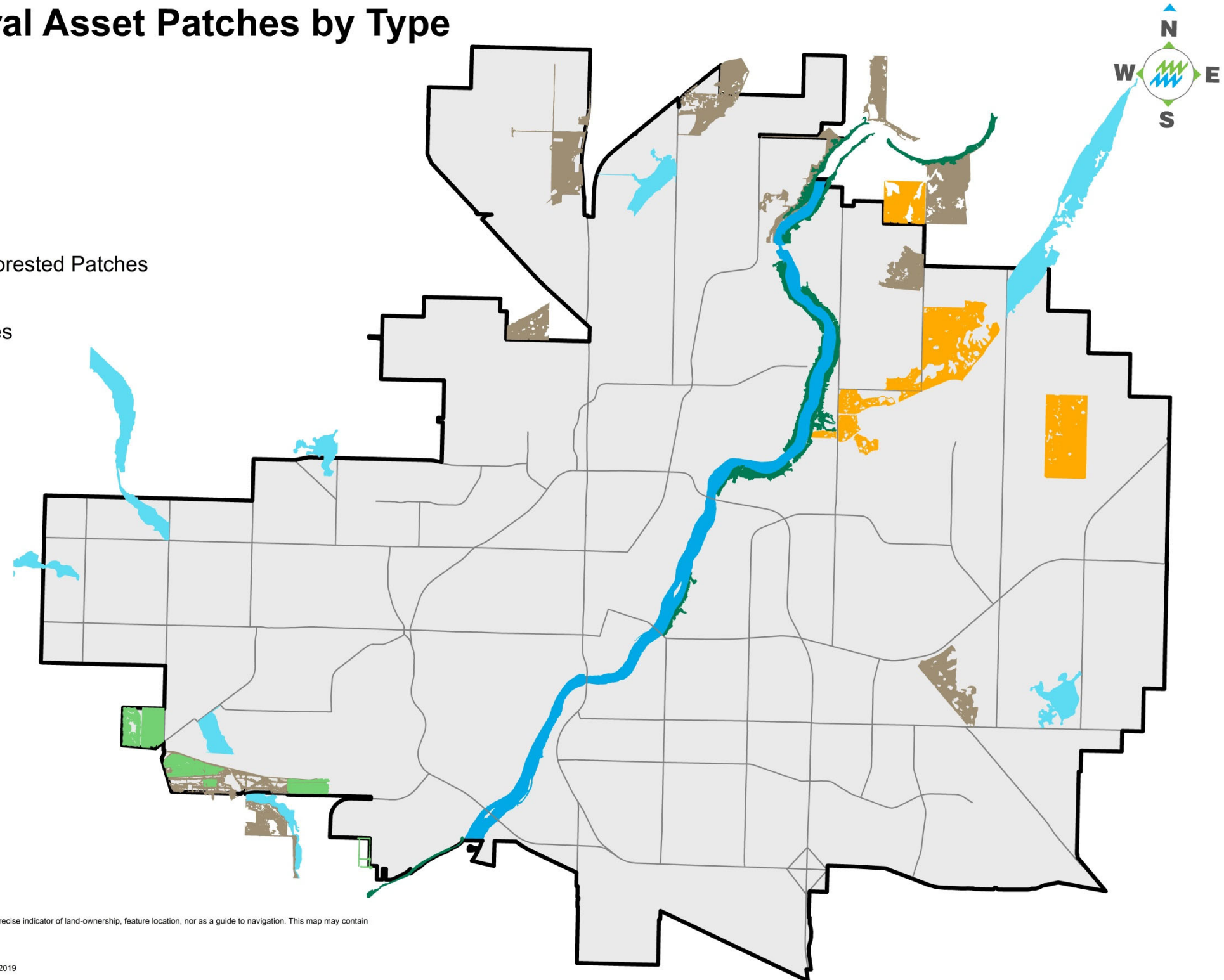
Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019.

Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 19-08-2019

10 Largest Natural Asset Patches by Type

Natural Asset Types

-  Afforested Patches
-  Known Prairie Patches
-  Native and Naturalized Forested Patches
-  Naturalized Grass Patches
-  Wetlands



0 1 2 4 KM

Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.

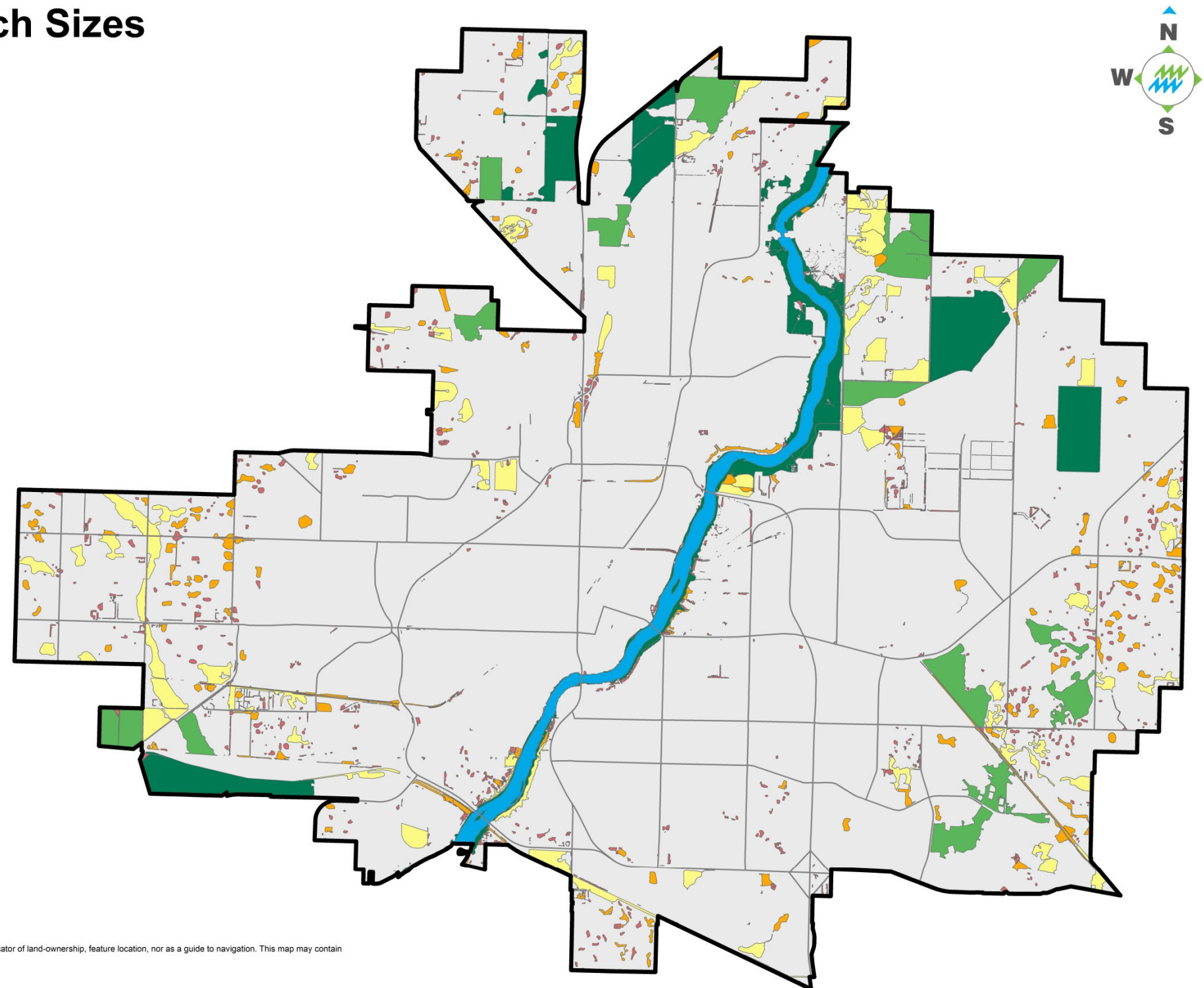
Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019.

Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 16-08-2019

Natural Asset Patch Sizes

Patch Area, Hectares

- $x \leq 1$
- $1 < x \leq 5$
- $5 < x \leq 25$
- $25 < x \leq 100$
- $100 < x < 700$



0 1 2 4 KM

Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.

Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019.




Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 19-08-2019

The Green Network Connectivity

30 Metre Buffer Network

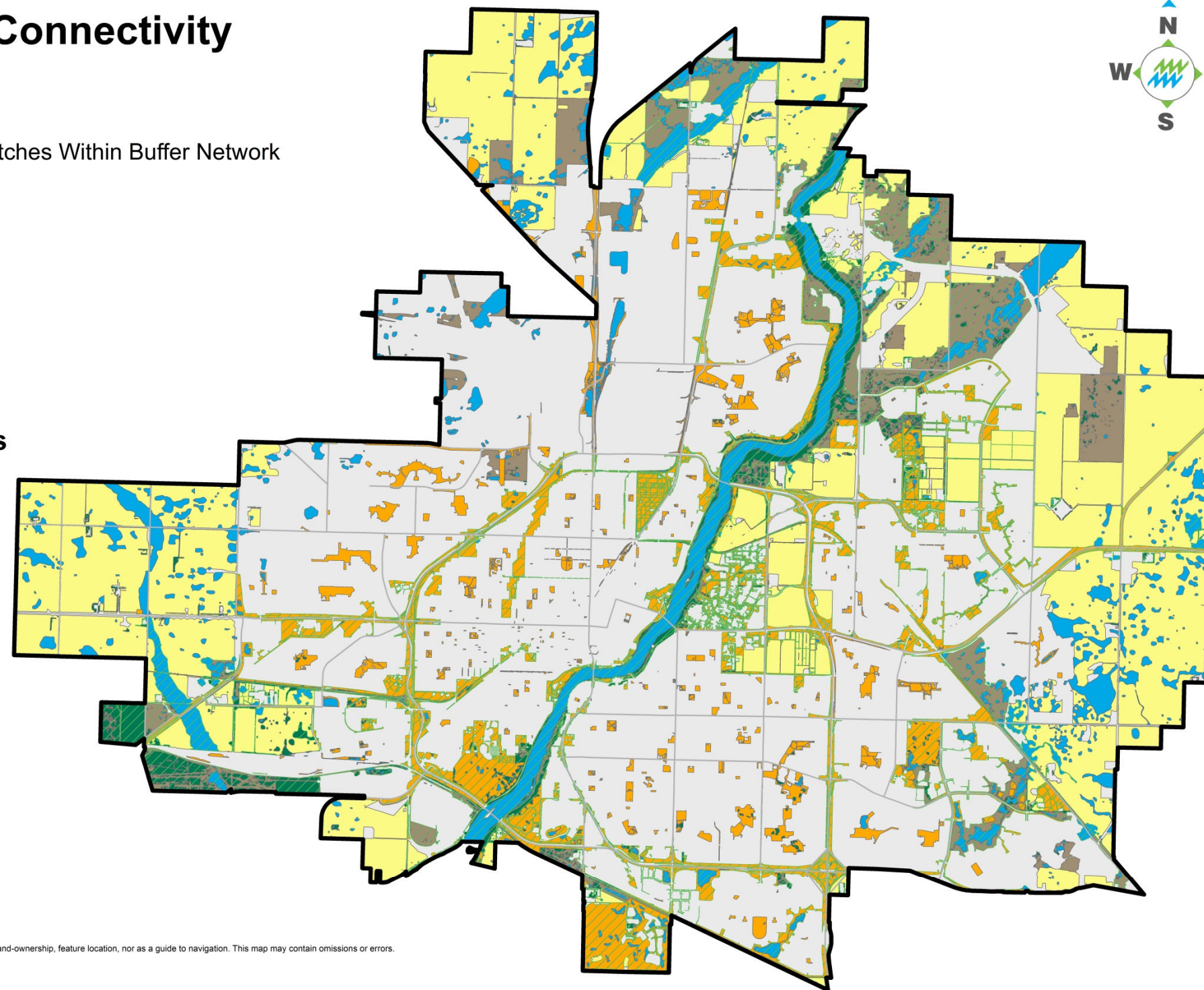
 Natural Asset & Green Space Patches Within Buffer Network

Saskatoon's Natural Assets

-  Aquatic System
-  Forested & Shrubland System
-  Grassland System

Saskatoon's Enhanced Assets

-  Agricultural Lands
-  Green Space



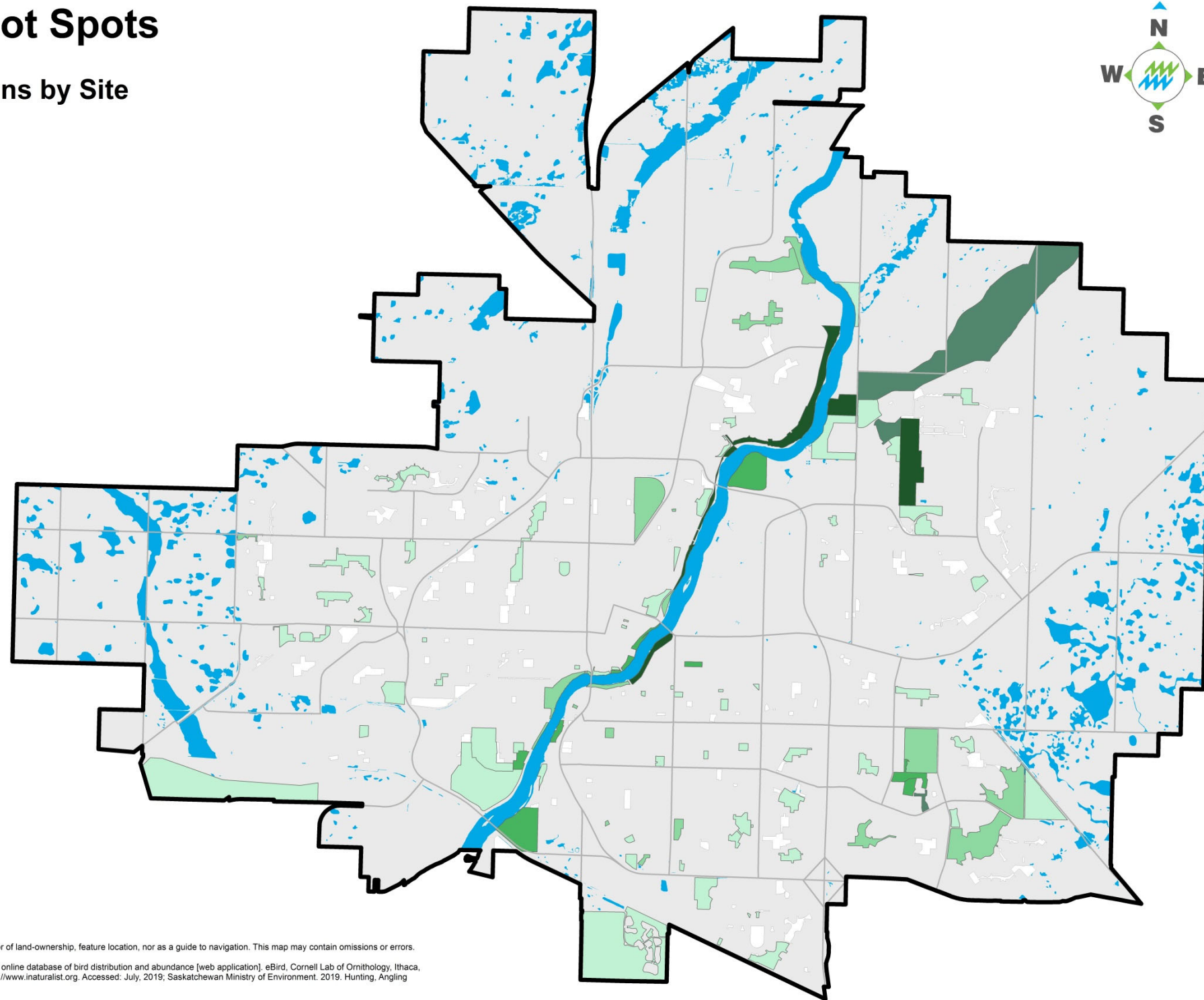
0 1 2 4 KM

Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.
Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019.
Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 19-08-2019

Nature Watching Hot Spots

Total Number of Observations by Site

- 0
- 1 - 25
- 26 - 200
- 201 - 600
- 601 - 1000
- 1001 - 2123

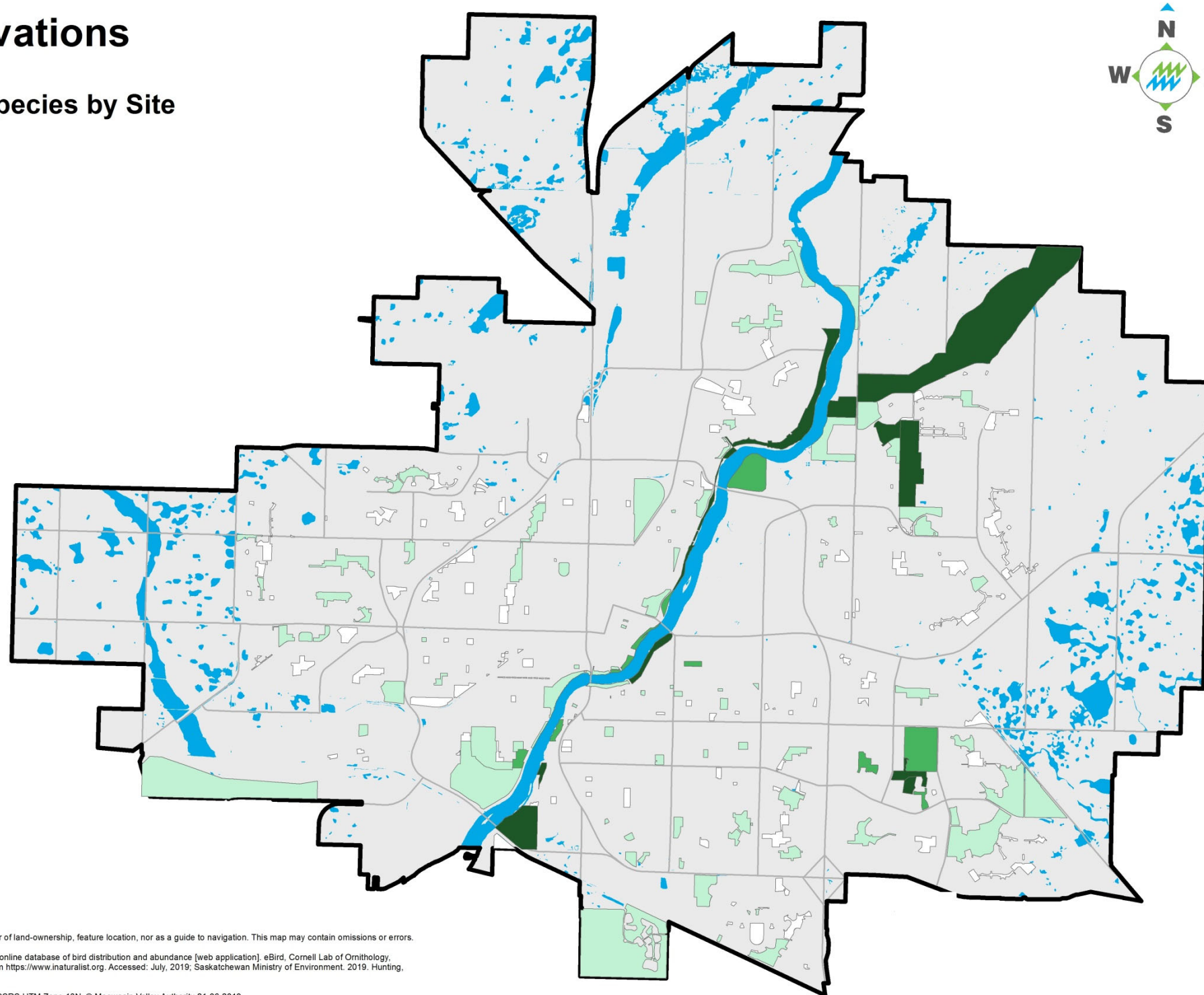


Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.
Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019; eBird, 2019. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: <http://www.ebird.org>. Accessed: July, 2019; iNaturalist. Available from <https://www.inaturalist.org>. Accessed: July, 2019; Saskatchewan Ministry of Environment. 2019. Hunting, Angling and Biodiversity Information of Saskatchewan (HABISask). Accessed: July, 2019.
Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 21-06-2019

Site Species Observations

Total Number of Recorded Species by Site

- 0
- 1 - 50
- 51 - 100
- > 100



0 1 2 4 KM

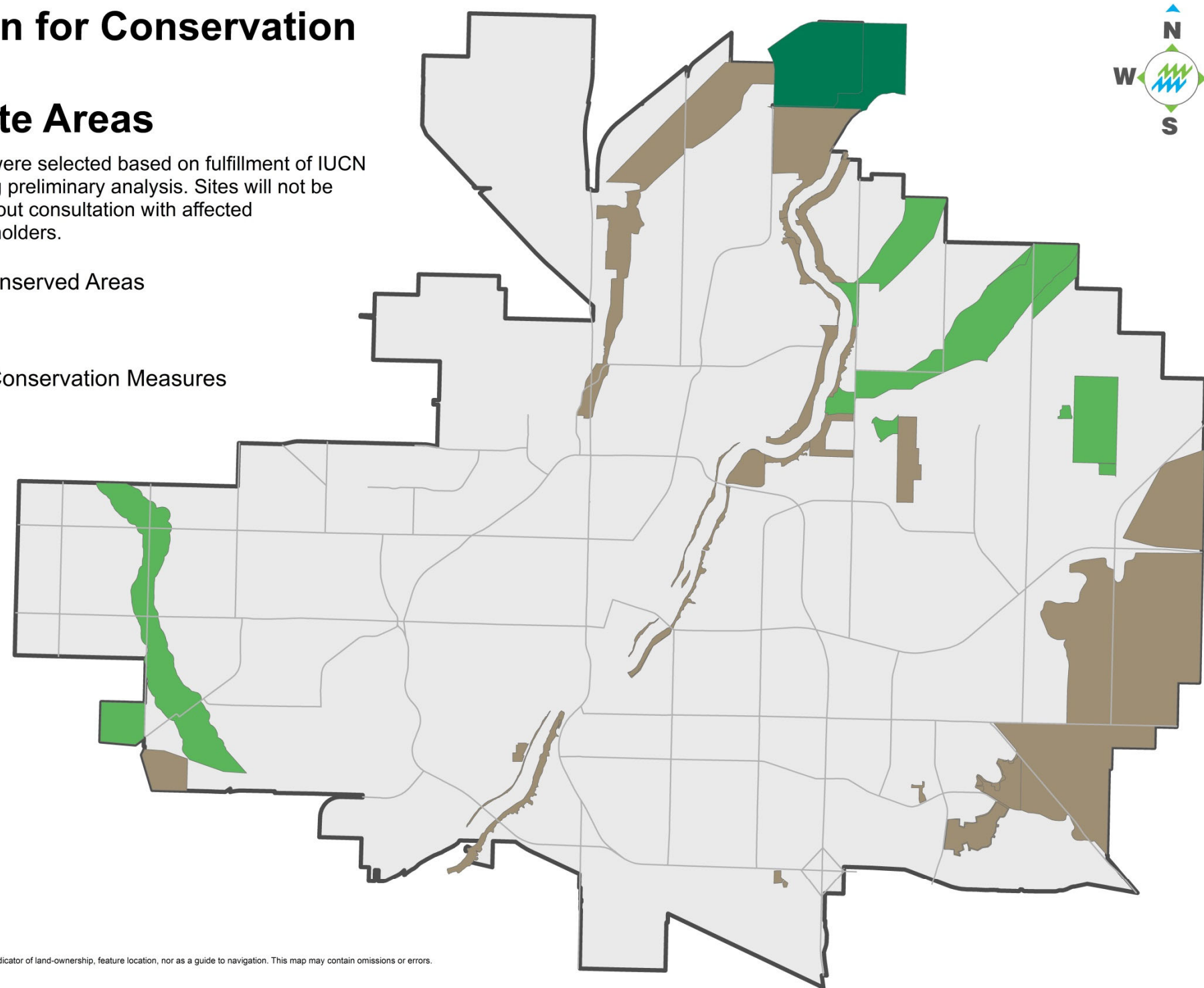
Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.
 Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019; eBird, 2019. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: <http://www.ebird.org>. Accessed: July, 2019; iNaturalist. Available from <https://www.inaturalist.org>. Accessed: July, 2019; Saskatchewan Ministry of Environment. 2019. Hunting, Angling and Biodiversity Information of Saskatchewan (HABISask). Accessed: July, 2019.

Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019. Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 21-06-2019

International Union for Conservation of Nature (IUCN) Potential Candidate Areas

Note: Potential IUCN candidate sites were selected based on fulfillment of IUCN criteria for protected area status during preliminary analysis. Sites will not be considered for formal designation without consultation with affected landowners, the public, or other stakeholders.

- Indigenous Protected and Conserved Areas
- Protected Area
- Other Effective Area-Based Conservation Measures



0 1 2 4 KM

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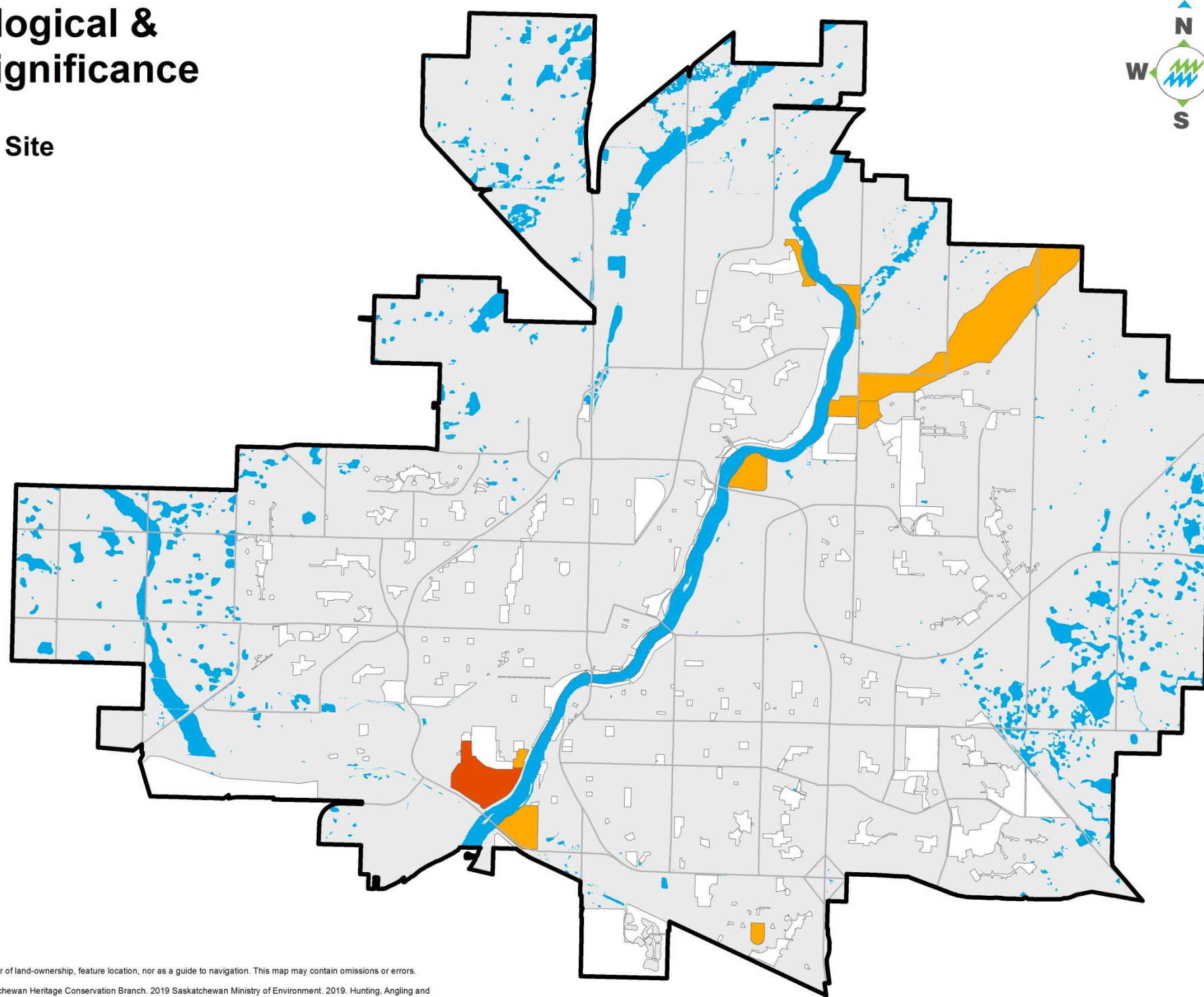
Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019.

Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 03-10-2019

Sites with Archaeological & Palaeontological Significance

Total Number of Records by Site

- 0
- 1 - 3
- 4 - 11

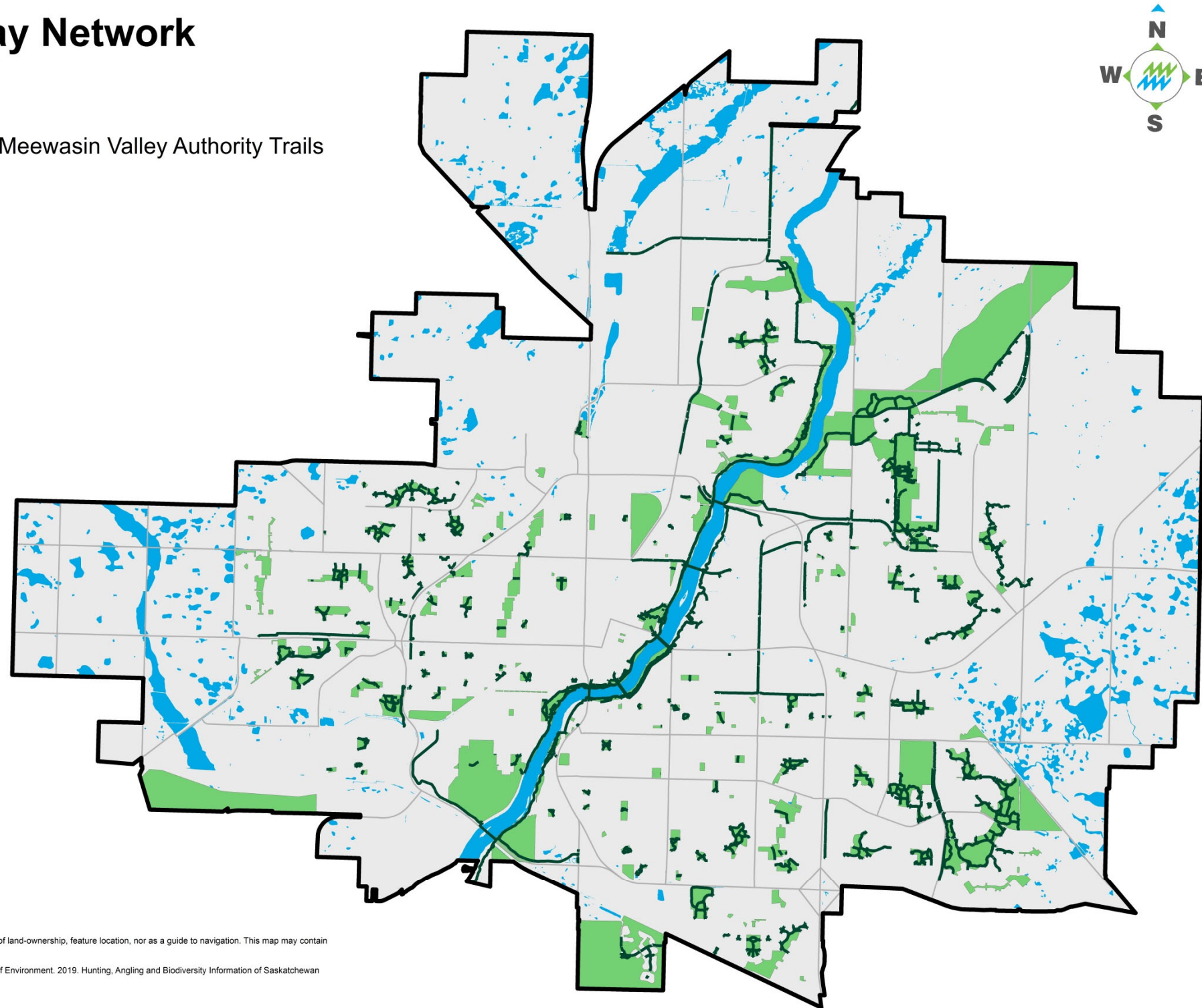


Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.
Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019; Government of Saskatchewan Heritage Conservation Branch. 2019 Saskatchewan Ministry of Environment. 2019. Hunting, Angling and Biodiversity Information of Saskatchewan (HABISask), Accessed: July, 2019.
Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 21-06-2019

Saskatoon's Pathway Network

Pathway Network

- City of Saskatoon Pathways & Meewasin Valley Authority Trails
- Publicly Accessible Sites



Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.

Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019; Saskatchewan Ministry of Environment, 2019. Hunting, Angling and Biodiversity Information of Saskatchewan (HABISask), Accessed: July, 2019.

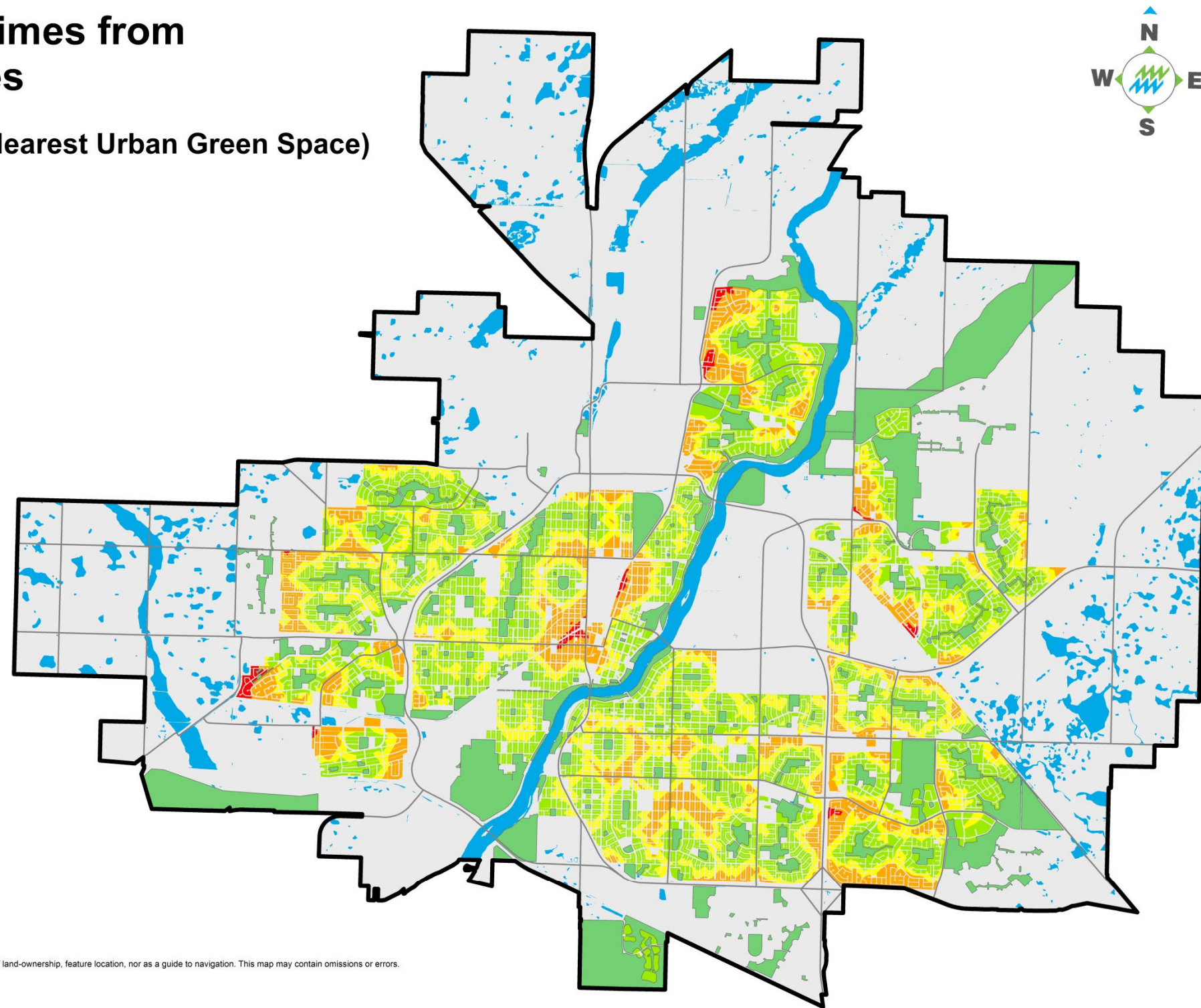
Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 21-06-2019

Walking Distance Times from Urban Green Spaces

Walking Time (Minutes to Nearest Urban Green Space)

- 0 - 3
- 3 - 5
- 5 - 10
- > 10

- Urban Green Space



0 1 2 4 KM

Disclaimer: This map is for illustrative purposes only. Do not rely on it as being a precise indicator of land-ownership, feature location, nor as a guide to navigation. This map may contain omissions or errors.

Data Sources: Meewasin Valley Authority, 2019; City of Saskatoon 2019.

Projection: NAD 1983 CSRS UTM Zone 13N. © Meewasin Valley Authority 16-08-2019

Appendix B

APPENDIX TABLE 1 NATURAL AREAS INVENTORY CATEGORIES BY NEIGHBOURHOOD

Neighbourhood	Built	Agricultural Lands	Enhanced Assets	Natural Assets
Adelaide/Churchill	89.89%		9.15%	0.97%
Agpro Industrial	32.51%	26.62%	11.24%	29.63%
Agriplace	85.43%	0.01%	12.70%	1.86%
Airport Business Area	70.13%		13.95%	15.92%
Airport Management Area	87.14%	0.05%	1.30%	11.50%
Arbor Creek	82.84%		16.91%	0.25%
Aspen Ridge	67.69%	25.05%	0.18%	7.09%
Avalon	85.71%		12.45%	1.84%
Blairmore Development Area	5.51%	78.81%	0.26%	15.42%
Blairmore Suburban Centre	63.85%		33.96%	2.19%
Brevoort Park	89.89%		9.97%	0.14%
Briarwood	82.51%		10.43%	7.06%
Brighton	63.36%	5.73%	2.67%	28.24%
Buena Vista	86.55%		7.91%	5.54%
Caswell Hill	93.31%		6.69%	
Central Business District	90.62%		5.96%	3.42%
Central Industrial	92.62%		6.94%	0.44%
City Park	82.31%		12.89%	4.80%
CN Industrial	72.56%	0.16%	15.33%	11.95%
CN Yards Management Area	52.46%	0.33%	2.03%	45.18%
College Park	89.56%		10.44%	
College Park East	82.82%		16.54%	0.64%
Confederation Park	89.90%		10.10%	
Confederation Suburban Centre	70.35%		29.03%	0.62%
Diefenbaker Management Area	15.40%	12.91%	43.42%	28.26%
Dundonald	91.91%		8.09%	
Eastview	78.61%		19.56%	1.83%
Elk Point	76.61%	13.02%	0.02%	10.36%
Erindale	85.39%		12.23%	2.38%
Evergreen	82.43%	0.02%	16.90%	0.65%
Exhibition	83.98%		14.49%	1.54%
Fairhaven	87.41%		11.53%	1.06%
Forest Grove	90.12%		9.88%	
Gordie Howe Management Area	18.65%		69.43%	11.92%
Greystone Heights	90.46%		9.54%	

Grosvenor Park	93.53%		6.47%	
Hampton Village	84.64%		15.18%	0.17%
Haultain	96.47%		3.53%	
Hillcrest Management Area	9.61%	18.37%	30.98%	41.03%
Holiday Park	77.03%		8.77%	14.20%
Holliston	94.36%		5.64%	
Holmwood Development Area	8.01%	75.35%	1.69%	14.95%
Hudson Bay Industrial	90.99%		4.99%	4.01%
Hudson Bay Park	75.16%		24.60%	0.23%
Kelsey - Woodlawn	67.22%		31.18%	1.60%
Kensington	89.02%	2.83%	5.55%	2.60%
King George	81.93%		16.03%	2.04%
Lakeridge	87.85%		12.15%	
Lakeview	85.73%		13.03%	1.24%
Lakewood Suburban Centre	39.17%		8.18%	52.65%
Lawson Heights	81.77%		12.05%	6.18%
Lawson Heights Suburban Centre	68.55%		31.45%	
Marquis Industrial	72.41%	4.94%	11.16%	11.49%
Massey Place	88.50%		11.47%	0.02%
Mayfair	95.46%		4.54%	
Meadowgreen	80.15%		19.57%	0.28%
Montgomery Place	68.23%	18.01%	7.26%	6.50%
Mount Royal	82.55%		17.39%	0.05%
North Development Area	11.93%	55.69%	0.30%	32.09%
North Industrial	95.21%		3.24%	1.55%
North Park	86.15%		8.77%	5.08%
North West Development Area	11.04%	65.91%	1.20%	21.85%
Nutana	87.77%		4.24%	7.99%
Nutana Park	84.18%		15.25%	0.56%
Nutana Suburban Centre	73.52%		22.79%	3.69%
Pacific Heights	83.60%		16.40%	
Parkridge	80.26%		16.77%	2.98%
Pleasant Hill	90.51%		9.45%	0.04%
Queen Elizabeth	90.39%		9.61%	
Richmond Heights	69.26%		26.54%	4.20%
River Heights	77.56%		13.85%	8.59%
Riversdale	92.33%		7.28%	0.38%
Rosewood	73.67%	10.16%	4.23%	11.94%
SaskPower Management Area	37.62%	45.64%	5.18%	11.56%
Silverspring	73.61%		9.07%	17.32%
Silverwood Heights	78.03%		11.87%	10.11%

South Development Area	35.87%	48.17%	17.98%	64.72%
South East Development Area	38.65%	27.01%	27.77%	6.57%
South West Development Area	12.43%	42.19%	4.12%	41.26%
South West Industrial	74.57%		23.94%	1.48%
Stonebridge	74.13%	0.78%	17.82%	7.28%
Sutherland	72.33%	6.97%	20.68%	0.02%
Sutherland Industrial	83.33%		16.30%	0.37%
The Willows	18.21%	4.73%	68.73%	8.33%
U of S Lands East Management Area	3.23%	68.03%	1.37%	27.38%
U of S Lands Management Area	37.47%	37.91%	18.21%	6.41%
U of S Lands North Management Area	16.93%	34.50%	8.87%	39.69%
U of S Lands South Management Area	22.15%	54.44%	22.46%	0.95%
University Heights Development Area	19.68%	51.01%	3.38%	44.70%
University Heights Suburban Centre	68.71%	0.02%	31.25%	0.02%
Varsity View	92.90%		7.10%	
West Industrial	88.23%		10.46%	1.30%
Westmount	76.71%		23.29%	
Westview	85.51%		14.42%	0.07%
Wildwood	68.75%		25.16%	6.09%
Willowgrove	81.85%	0.00%	17.99%	0.16%

APPENDIX TABLE 2 LIST OF MANAGED URBAN GREEN SPACE SITES

17th Street	Buena Vista	Ernest Lindner
Achs	C Jack MacKenzie	Evelyn G Edwards
Adams	Cahill	Evergreen Square
Adelaide	Cannam	Exhibition
AH Browne	Canon Smith	Father Basil Markle
Al Anderson	Caswell Dog Park	Forest
Albert	Cecil A Wheaton	Forest Grove Linkage
Albert Milne	CF Patterson	Fortosky
Albert Oulton	CF Patterson North	Foster
Albert Recreational Unit	Charlottetown Park	Fred Mendel
Alexander MacGillivray Young	Chief Darcy Bear	Fred Mitchell Memorial
Alfred Bence	Christine Morris	Friendship
Andrew MacDougall	Churchill	Funk
Anita Langford	City Hall Square	Gabriel Dumont
Anna McIntosh	Claude Petit	GD Archibald Memorial
Arbor Creek	Cosmopolitan	GD Archibald North
Arbor Creek Linear	CP Seeley	GD Archibald West
Archibald McDonald	Crocus	Genereux
AS Wright	Crocus Prairie	Geoff Hughes Baseball Complex
Ashworth Holmes	Cumberland	George Dyck
Atchison Field	Dan Worden	George H Clare
Atlantic	Dave King	George S Alexander
Avalon	Diefenbaker	Glacier
Avalon Dog Park	DL Hamilton	Glen H Penner
Balsam	Don Ross	Gordie Howe Sports Complex
Beckett Green	Donald Koyl	Gougeon
Bev M Dyck	Donna L Birkmaier	Grace Adam Metawewinihk North
Bishop James P Mahoney	Dr Gerhard Herzberg North	Grace Adam Metawewinihk South
Bitz	Dr Gerhard Herzberg South	Graham
Blair Nelson	Dr J Valens	Greenbryre
Boughton Park	Dr Seager Wheeler	Greystone
Boykowich	Draggins Car Club	Grosvenor
Braithwaite	Dundonald	Hampton Village Square
Brevoort Park North	Dutchak	Harold Tatler North
Brevoort Park South	Ed Jordan	Harold Tatler South
Briarwood	Edward McCourt	Henry Baker
Briarwood Lake	Edward S Blain	Henry Kelsey
Briarwood Linear	Elaine Hnatyshyn	Henry Kelsey North
Budz Green	Elaine Hnatyshyn West	Herbert S Sears

Herbert Stewart	Les Kerr	Pleasant Hill
Heritage	Lions Century	Poplar
Heritage Green	Lt Colonel D Walker	Prebble
Hillcrest Memorial Gardens and Funeral Home	Lt General GG Simonds	President Murray
Hilliard Gardner	Mackay	Raoul Wallenberg
Holiday	Mahoney	RCAF Memorial
Holiday Park	Mark Thompson	Rendall
Holland	Marlborough	Richard St. Barbe Baker Afforestation Area
Holliston	Marr	Richards
Horn	Marriot	Rik Steernberg
Howard Harding	Marshall Hawthorne	River Landing Park
Hyde	Massey	Riversdale Kiwanis
Idylwyld	Meadowgreen	Robert H Freeland
Isinger	Meadowlark	Robert Hunter East
James Anderson	Meewasin	Robert Hunter West
James Girgulis	Mendel	Rochdale
Jeffery	Montgomery	Rod V Real
Jeffrey J Charlebois	Morris T Cherneskey	Rosewood Square
Jill Postlethwaite	Morton	Rotary
John Avant	Mount Royal	Rouillard
John Brockelbank	North Park	Rugby Fields
John Cameron	Northeast Swale	Sanatorium Site
John Duerkop	Nutana Cemetery	Saskatoon Forestry Farm Park and Zoo
John Lake	Nutana Kiwanis	Saskatoon Golf and Country Club
Kate Waygood	Nutana Kiwanis North	Saskatoon Natural Grasslands
Kershaw	Optimist	Scott
Kilburn	Oren Willson	SED Industrial #3
Kinsmen	Owen Mann	Senator J Hnatyshyn
Kistikan	Pacific	Senator James Gladstone
Kiwanis Memorial	Parc Canada	Sidney L Buckwold
Klombies	Parkridge	Sifton
Kopko	Patricia Roe	Silverspring
Korpan	Paul Mostoway	Silverspring Linear
Kusch	PCR Banting	Silverwood
Lacoursiere	Peggy McKercher Conservation Area	Silverwood Adilman Linkage
Lakeview	Peter H Currie	Silverwood Factoria and Heritage Site
Lakewood	Peter Pond	St Andrews
Larkhaven	Peter Zakreski	St Patrick
Latham	Peturrson's Ravine	St. Joseph Easement
Leif Erickson	Pierre Radisson	Steve Patola

Struthers	Umea	Wiggins
Sutherland	Umea Vast	Wildwood
Sutherland Beach	University Heights	William Anderson
Swick	Varley	William Sarjeant
Szumigalski	Victoria	Willowgrove Square
The Willows	WA Reid	Wilson
Thornton	Wallace	WJL Harvey
TJ Quigley	Walter Wood	WJL Harvey South
Trounce Pond	Weaver	Woodlawn Cemetery
U of S Remediation and Buffer Lands	Westmount	WW Ashley

APPENDIX TABLE 3 SUMMARY OF OBSERVED SPECIES IN SASKATOON URBAN GREEN SPACES

Scientific Name	Common Name
ACANTHIS FLAMMEA	COMMON REDPOLL
ACANTHIS HORNEMANNI	HOARY REDPOLL
ACCIPITER COOPERII	COOPER'S HAWK
ACCIPITER GENTILIS	NORTHERN GOSHAWK
ACCIPITER STRIATUS	SHARP-SHINNED HAWK
ACHILLEA MILLEFOLIUM	COMMON YARROW
ACTAEA RUBRA	RED BANEBERRY
ACTITIS MACULARIUS	SPOTTED SANDPIPER
ADALIA BIPUNCTATA	TWO-SPOTTED LADYBUG
AECHMOPHORUS OCCIDENTALIS	WESTERN GREBE
AEGOLIUS ACADICUS	NORTHERN SAW-WHET OWL
AEGOLIUS FUNEREUS	BOREAL OWL
AESHNA INTERRUPTA	VARIABLE DARNER
AGASTACHE FOENICULUM	ANISE HYSSOP
AGELAIUS PHOENICEUS	RED-WINGED BLACKBIRD
AGRIPHILA	
AIX SPONSA	WOOD DUCK
ALISMA GRAMINEUM	NARROW-LEAVED WATER PLANTAIN
ALLIUM TEXTILE	TEXTILE ONION
ALLONEMOBIUS	ROBUST GROUND CRICKETS
AMARANTHUS CALIFORNICUS	CALIFORNIA AMARANTH
AMBLYSCIRTES	ROADSIDE-SKIPPERS
AMMOSPIZA LECONTEII	LECONTE'S SPARROW
AMMOSPIZA NELSONI	NELSON'S SPARROW
ANARTA	
ANAS ACUTA	NORTHERN PINTAIL
ANAS CRECCA	GREEN-WINGED TEAL
ANAS PLATYRHYNCHOS	MALLARD
ANDRENA	MINING BEES
ANDROSACE SEPTENTRIONALIS	PYGMY-FLOWER ROCK-JASMINE
ANEMONASTRUM CANADENSE	MEADOW ANEMONE
ANEMONE	ANEMONES, THIMBLEWEEDS, AND WINDFLOWERS
ANEMONE MULTIFIDA	CUTLEAF ANEMONE
ANSER ALBIFRONS	GREATER WHITE-FRONTED GOOSE
ANSER CAERULESCENS	SNOW GOOSE
ANSER CAERULESCENS X BRANTA HUTCHINSII	SNOW X CACKLING GOOSE (HYBRID)
ANSER ROSSII	ROSS'S GOOSE
ANTENNARIA NEGLECTA	FIELD PUSSYTOES

ANTHUS RUBESCENS	AMERICAN PIPIT
ANTHUS SPRAGUEII	SPRAGUE'S PIPIT
ANTIGONE CANADENSIS	SANDHILL CRANE
ANURAEOPSIS FISSA	
APIS MELLIFERA	WESTERN HONEY BEE
APOCYNUM ANDROSAEMIFOLIUM	SPREADING DOGBANE
APOCYNUM CANNABINUM	HEMP DOGBANE
AQUILA CHRYSAETOS	GOLDEN EAGLE
ARANEUS	ANGULATE AND ROUND SHOULDERED ORBWEAVERS
ARCHILOCHUS COLUBRIS	RUBY-THROATED HUMMINGBIRD
ARCTIUM	BURDOCKS
ARCTOSTAPHYLOS UVA-URSI	BEARBERRY
ARDEA HERODIAS	GREAT BLUE HERON
ARPHIA CONSPERSA	ORANGE-WINGED GRASSHOPPER
ARTEMISIA	WORMWOODS AND SAGEBRUSHES
ARTEMISIA FRIGIDA	FRINGED SAGEBRUSH
ASIO FLAMMEUS	SHORT-EARED OWL
ASIO OTUS	LONG-EARED OWL
ASTRAEUS	BAROMETER EARTHSTARS
ASTRAGALUS AUSTRALIS	INDIAN MILK-VETCH
ASTRAGALUS CICER	CHICKPEA MILKVETCH
ASTRAGALUS CRASSICARPUS	GROUND-PLUM
ASTRAGALUS FLEXUOSUS	FLEXIBLE MILKVETCH
ASTRAGALUS PECTINATUS	NARROWLEAF MILKVETCH
AULACOSEIRA	
AYTHYA AFFINIS	LESSER SCAUP
AYTHYA AMERICANA	REDHEAD
AYTHYA COLLARIS	RING-NECKED DUCK
AYTHYA MARILA	GREATER SCAUP
AYTHYA MARILA/AFFINIS	GREATER/LESSER SCAUP
AYTHYA VALISINERIA	CANVASBACK
BOECHERA RETROFRACTA	REFLEXED ROCKCRESS
BOISEA RUBROLINEATA	WESTERN BOXELDER BUG
BOISEA TRIVITTATA	EASTERN BOXELDER BUG
BOLBOSCHOENUS	
BOMBUS BOREALIS	NORTHERN AMBER BUMBLE BEE
BOMBUS HUNTII	HUNT'S BUMBLE BEE
BOMBUS TERNARIUS	TRICOLORED BUMBLE BEE
BOMBYCILLA	WAXWINGS
BOMBYCILLA CEDRORUM	CEDAR WAXWING
BOMBYCILLA GARRULUS	BOHEMIAN WAXWING

BOMBYCILLA GARRULUS/CEDRORUM	BOHEMIAN/CEDAR WAXWING
BOMBYLIUS MAJOR	GREATER BEE FLY
BONASA UMBELLUS	RUFFED GROUSE
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN
BOUTELOUA GRACILIS	BLUE GRAMA
BOVISTA	TRUE PUFFBALLS
BRACTEACOCCLUS	
BRANTA CANADENSIS	CANADA GOOSE
BRANTA HUTCHINSII	CAACKLING GOOSE
BUBO SCANDIACUS	SNOWY OWL
BUBO VIRGINIANUS	GREAT HORNED OWL
BUCEPHALA ALBEOLA	BUFFLEHEAD
BUCEPHALA CLANGULA	COMMON GOLDENEYE
BUTEO JAMAICENSIS	RED-TAILED HAWK
BUTEO LAGOPUS	ROUGH-LEGGED HAWK
BUTEO PLATYPTERUS	BROAD-WINGED HAWK
BUTEO REGALIS	FERRUGINOUS HAWK
BUTEO SWAINSONI	SWAINSON'S HAWK
CAENURGINA	
CALCARIUS LAPPONICUS	LAPLAND LONGSPUR
CALIDRIS MINUTILLA	LEAST SANDPIPER
CALIDRIS PUSILLA	SEMIPALMATED SANDPIPER
CALIDRIS SUBRUFICOLLIS	BUFF-BREASTED SANDPIPER
CANDELARIA CONCOLOR	CANDLEFLAME LICHEN
CANIS LATRANS	COYOTE
CAPSELLA BURSA-PASTORIS	SHEPHERD'S-PURSE
CARDELLINA CANADENSIS	CANADA WARBLER
CARDELLINA PUSILLA	WILSON'S WARBLER
CARDINALIS CARDINALIS	NORTHERN CARDINAL
CAREX	TRUE SEDGES
CAREX EBURNEA	BRISTLE-LEAVED SEDGE
CASTOR CANADENSIS	CANADIAN BEAVER
CATHARTES AURA	TURKEY VULTURE
CATHARUS FUSCESCENS	VEERY
CATHARUS GUTTATUS	HERMIT THRUSH
CATHARUS MINIMUS	GRAY-CHEEKED THRUSH
CATHARUS USTULATUS	SWAINSON'S THRUSH
CELASTRINA LUCIA	LUCIA AZURE
CERASTIUM	
CERASTIUM ARVENSE	FIELD CHICKWEED
CERATODON PURPUREUS	REDSHANK

CERCYONIS	WOOD-NYMPHS
CERTHIA AMERICANA	BROWN CREEPER
CHAOBORUS	
CHARADRIUS VOCIFERUS	KILLDEER
CHENOPODIUM GLAUCUM SALINUM	
CHLIDONIAS NIGER	BLACK TERN
CHONDESTES GRAMMACUS	LARK SPARROW
CHORDEILES MINOR	COMMON NIGHTHAWK
CHORTOPHAGA VIRIDIFASCIATA	GREEN-STRIPED GRASSHOPPER
CHROICOCEPHALUS PHILADELPHIA	BONAPARTE'S GULL
CHRYSOPERLA	COMMON GREEN LACEWINGS
CICINDELA DUODECIMGUTTATA	TWELVE-SPOTTED TIGER BEETLE
CICINDELA REPANDA	BRONZED TIGER BEETLE
CINCLUS MEXICANUS	AMERICAN DIPPER
CIRCUS HUDSONIUS	NORTHERN HARRIER
CIRSIIUM UNDULATUM	WAVYLEAF THISTLE
CISTOTHORUS PALUSTRIS	MARSH WREN
CISTOTHORUS PLATENSIS	SEDGE WREN
CLADONIA	PIXIE CUP LICHENS
CLADONIA CARIOSA	SPLIT-PEG LICHEN
CLANGULA HYEMALIS	LONG-TAILED DUCK
CLEMATIS LIGUSTICIFOLIA	WESTERN VIRGIN'S BOWER
CLEOME	SPIDER FLOWERS
CLOSTERIUM	
COCCINELLA HIEROGLYPHICA	HIEROGLYPHIC LADY BEETLE
COCCINELLA SEPTEMPUNCTATA	SEVEN-SPOTTED LADY BEETLE
COCCOTHRAUSTES VESPERTINUS	EVENING GROSBEAK
COELASTRUM	
COELIOXYS	CUCKOO LEAF-CUTTER BEES
COLAPTES AURATUS	NORTHERN FLICKER
COLIAS	CLOUDED YELLOWS
COLUMBA LIVIA	ROCK PIGEON
COMANDRA UMBELLATA	BASTARD TOADFLAX
COMANDRA UMBELLATA PALLIDA	PALE BASTARD TOADFLAX
CONOCEPHALUS FASCIATUS	SLENDER MEADOW KATYDID
CONTOPUS COOPERI	OLIVE-SIDED FLYCATCHER
CONTOPUS SORDIDULUS	WESTERN WOOD-PEWEE
COPRINELLUS	
CORISPERMUM HOOKERI VAR. HOOKERI	HOOKER'S BUGSEED
CORISPERMUM PALLASII	PALLAS' BUGSEED
CORISPERMUM VILLOSUM	HAIRY BUGSEED

CORNUS ALBA	WHITE DOGWOOD
CORNUS SERICEA	RED OSIER DOGWOOD
CORVUS	CROWS AND RAVENS
CORVUS BRACHYRHYNCHOS	AMERICAN CROW
CORVUS CORAX	COMMON RAVEN
COSMARIUM	
CYANOCITTA CRISTATA	BLUE JAY
CYGNUS COLUMBIANUS	TUNDRA SWAN
CYMBELLA	
CYPRIPEDIUM PARVIFLORUM VAR. MAKASIN	SMALL YELLOW LADY'S SLIPPER
DACTYLOBIOTUS	
DALEA PURPUREA	PURPLE PRAIRIE CLOVER
DASIPHORA FRUTICOSA	SHRUBBY CINQUEFOIL
DESMODESMUS	
DISSOTROCHA MACROSTYLA	
DRYOBATES PUBESCENS	DOWNY WOODPECKER
DRYOBATES PUBESCENS/VILLOSUS	DOWNY/HAIRY WOODPECKER
DRYOBATES VILLOSUS	HAIRY WOODPECKER
DUMETELLA CAROLINENSIS	GRAY CATBIRD
DYTISCUS	
EGRETTA THULA	SNOWY EGRET
ELAEAGNUS	
ELAEAGNUS COMMUTATA	WOLF WILLOW
ELATINE TRIANDRA	LONGSTEM WATER-WORT
ELEOCHARIS	SPIKERUSHES
ELEOCHARIS ENGELMANNII	ENGELMANN'S SPIKE-RUSH
ELEODES	DESERT STINK BEETLES
ELYMUS GLAUCUS SSP. GLAUCUS	BLUE WILD RYE
EMPIDONAX ALNORUM	ALDER FLYCATCHER
EMPIDONAX ALNORUM/TRAILLII	ALDER/WILLOW FLYCATCHER (TRAILL'S FLYCATCHER)
EMPIDONAX FLAVIVENTRIS	YELLOW-BELLIED FLYCATCHER
EMPIDONAX MINIMUS	LEAST FLYCATCHER
ENALLAGMA	BLUETS
ENALLAGMA ANNEXUM	NORTHERN BLUET
ENALLAGMA BOREALE	BOREAL BLUET
ENCYONOPSIS MICROCEPHALA	
EQUISETUM HYEMALE	ROUGH HORSETAIL
EREBIA DISCOIDALIS	RED-DISKED ALPINE
EREBIA EPIPSODEA	COMMON ALPINE
EREMOPHILA ALPESTRIS	HORNED LARK
ERIGERON	FLEABANES AND HORSEWEEDS

ERISTALIS	
ERYSIMUM INCONSPICUUM	SMALL-FLOWER PRAIRIE WALLFLOWER
EUGLENA	
EUPHAGUS CAROLINUS	RUSTY BLACKBIRD
EUPHAGUS CYANOCEPHALUS	BREWER'S BLACKBIRD
EVARCHA HOYI	HOY'S JUMPING SPIDER
FALCIPENNIS CANADENSIS	SPRUCE GROUSE
FALCO	TYPICAL FALCONS
FALCO COLUMBARIUS	MERLIN
FALCO PEREGRINUS	PEREGRINE FALCON
FALCO SPARVERIUS	AMERICAN KESTREL
FESTUCA HALLII	PLAINS ROUGH FESCUE
FRAGARIA	STRAWBERRIES
FRAGARIA VIRGINIANA	VIRGINIA STRAWBERRY
FRAGILARIA	
FRAXINUS	ASHES
FULICA AMERICANA	AMERICAN COOT
GAILLARDIA ARISTATA	COMMON GAILLARDIA
GALIUM BOREALE	NORTHERN BEDSTRAW
GALLINAGO DELICATA	WILSON'S SNIPE
GASTERUPTION	
GAVIA IMMER	COMMON LOON
GEOTHLYPIS PHILADELPHIA	MOURNING WARBLER
GEOTHLYPIS TRICHAS	COMMON YELLOWTHROAT
GEUM TRIFLORUM	PRAIRIE SMOKE
GLYCYRRHIZA LEPIDOTA	WILD LICORICE
GRYLLUS	
HABRONATTUS	PARADISE JUMPING SPIDERS
HABRONATTUS CUSPIDATUS	PRAIRIE ORNAMENTED JUMPING SPIDER
HAEMORHOUS CASSINII	CASSIN'S FINCH
HAEMORHOUS MEXICANUS	HOUSE FINCH
HAEMORHOUS PURPUREUS	PURPLE FINCH
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE
HALICTUS CONFUSUS	CONFUSING FURROW BEE
HELICTOTRICHON HOOKERI	SPIKE-OAT
HELORUS ANOMALIPES	
HESPERIS MATRONALIS	DAME'S ROCKET
HETEROTHECA VILLOSA	HAIRY GOLDENASTER
HEUCHERA RICHARDSONII	PRAIRIE ALUMROOT
HIERACIUM UMBELLATUM	CANADA HAWKWEED
HIPPODAMIA TREDECIMPUNCTATA	13-SPOTTED LADY BEETLE

HIRSCHFELDIA INCANA	SHORTPOD MUSTARD
HIRUNDO RUSTICA	BARN SWALLOW
HISTRIONICUS HISTRIONICUS	HARLEQUIN DUCK
HOLOPHRYA SIMPLEX	
HYDROPROGNE CASPIA	CASPIAN TERN
HYLES GALLII	GALIAM SPHINX MOTH
HYLOCICHLA MUSTELINA	WOOD THRUSH
HYPHANTRIA CUNEA	FALL WEBWORM MOTH
HYPOSOTER	
ICTERUS GALBULA	BALTIMORE ORIOLE
ICTIDOMYS TRIDECIMLINEATUS	THIRTEEN-LINED GROUND SQUIRREL
IRPEX LACTEUS	MILK-WHITE TOOTHED POLYPORE
IXOREUS NAEVIUS	VARIED THRUSH
JUNCO HYEMALIS	DARK-EYED JUNCO
JUNCUS BALTICUS	BALTIC RUSH
JUNIPERUS	JUNIPERS
JUNIPERUS COMMUNIS	COMMON JUNIPER
KRASCHENINNIKOVIA LANATA	WINTERFAT
LANIUS BOREALIS	NORTHERN SHRIKE
LANIUS LUDOVICIANUS EXCUBITORIDES	LOGGERHEAD SHRIKE
LARIX	LARCHES
LARUS	LARGE WHITE-HEADED GULLS
LARUS ARGENTATUS	HERRING GULL
LARUS CALIFORNICUS	CALIFORNIA GULL
LARUS DELAWARENSIS	RING-BILLED GULL
LARUS FUSCUS	LESSER BLACK-BACKED GULL
LARUS GLAUCOIDES	ICELAND GULL
LARUS HYPERBOREUS	GLAUCOUS GULL
LARUS SCHISTISAGUS	SLATY-BACKED GULL
LATHYRUS LATIFOLIUS	BROAD-LEAVED SWEET PEA
LATHYRUS OCHROLEUCUS	PALE VETCHLING
LECANORA	RIM LICHENS
LEPADELLA ACUMINATA	
LEPUS AMERICANUS	SNOWSHOE HARE
LEPUS TOWNSENDII	WHITE-TAILED JACKRABBIT
LESTES	POND SPREADWINGS
LESTES CONGENER	SPOTTED SPREADWING
LETHE ANTHEDON	NORTHERN PEARLY-EYE
LEUCOPHAEUS PIPIXCAN	FRANKLIN'S GULL
LIMENITIS ARTHEMIS	RED-SPOTTED ADMIRAL
LIMNODROMUS SCOLOPACEUS	LONG-BILLED DOWITCHER

LIMOSA FEDOA	MARbled GODWIT
LINUM LEWISII	LEWIS FLAX
LITHOBATES PIPIENS	NORTHERN LEOPARD FROG
LITHOSPERMUM INCISUM	FRINGED PUCCOON
LOMATIUM MACROCARPUM	BIGSEED BISCUITROOT
LONICERA DIOICA	GLAUCOUS HONEYSUCKLE
LOPHODYTES CUCULLATUS	HOODED MERGANSER
LOXIA CURVIROSTRA	RED CROSSBILL
LOXIA LEUCOPTERA	WHITE-WINGED CROSSBILL
LYGODESMIA JUNCEA	RUSH SKELETONPLANT
MAIANTHEMUM STELLATUM	STARRY FALSE SOLOMON'S-SEAL
MALACOSOMA	
MARECA AMERICANA	AMERICAN WIGEON
MARECA STREPERA	GADWALL
MEDICAGO LUPULINA	BLACK MEDICK
MEGACERYLE ALCYON	BELTED KINGFISHER
MEGACHILE ROTUNDATA	ALFALFA LEAFCUTTER BEE
MELANOPLUS	
MELANOPLUS BIVITTATUS	TWO-STRIPED GRASSHOPPER
MELILOTUS ALBUS	WHITE SWEET-CLOVER
MELOE IMPRESSUS	
MELOSPIZA GEORGIANA	SWAMP SPARROW
MELOSPIZA LINCOLNII	LINCOLN'S SPARROW
MELOSPIZA MELODIA	SONG SPARROW
MENTHA CANADENSIS	AMERICAN CORNMINT
MERGUS MERGANSER	COMMON MERGANSER
MERGUS SERRATOR	RED-BREASTED MERGANSER
MESOSTENUS THORACICUS	
MICROCYCLOPS RUBELLUS	
MICROTHAMNION	
MNIOTILTA VARIA	BLACK-AND-WHITE WARBLER
MOLOTHRUS ATER	BROWN-HEADED COWBIRD
MOMPHA BREVIVITTELLA	
MONARDA FISTULOSA	WILD BERGAMOT
MUHLENBERGIA CUSPIDATA	PLAINS MUHLENBERGIA
MUSTELA	WEASELS
MUSTELA FRENATA	LONG-TAILED WEASEL
MYADESTES TOWNSENDI	TOWNSEND'S SOLITAIRE
MYIARCHUS CRINITUS	GREAT CRESTED FLYCATCHER
MYRMICA	
NEOLEMA	

NEOSCONA	SPOTTED ORBWEAVERS
NEOTAMIAS	WESTERN CHIPMUNKS
NEOTAMIAS MINIMUS	LEAST CHIPMUNK
NEOVISON VISON	AMERICAN MINK
NICROPHORUS	BURYING BEETLES
NITZSCHIA	
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON
NYMPHALIS ANTIOPA	MOURNING CLOAK
NYMPHALIS L-ALBUM	COMPTON TORTOISESHELL
ODOCOILEUS HEMIONUS	MULE DEER
ODOCOILEUS VIRGINIANUS	WHITE-TAILED DEER
OENEIS	ARCTICS
OENOTHERA BIENNIS	COMMON EVENING-PRIMROSE
OENOTHERA SUFFRUTESCENS	SCARLET BEEBLOSSOM
ONDATRA ZIBETHICUS	MUSKRAT
OPHIOGOMPHUS SEVERUS	PALE SNAKETAILED
OPHION	OPHION WASPS
OPORORNIS AGILIS	CONNECTICUT WARBLER
ORCHELIMUM GLADIATOR	GLADIATOR MEADOW KATYDID
OREOTHLYPIS CELATA	ORANGE-CROWNED WARBLER
OREOTHLYPIS PEREGRINA	TENNESSEE WARBLER
OREOTHLYPIS RUFICAPILLA	NASHVILLE WARBLER
OXYRRHEXIS CARBONATOR TEXANA	
OXYTROPIS	LOCOWEED
OXYTROPIS CAMPESTRIS	YELLOW OXYTROPIS
OXYTROPIS CAMPESTRIS SPICATA	NORTHERN YELLOW POINT-VETCH
OXYURA JAMAICENSIS	RUDDY DUCK
PACKERA CANA	WOOLLY GROUNDSEL
PANDION HALIAETUS	OSPREY
PARKESIA NOVEBORACENSIS	NORTHERN WATERTHRUSH
PARTHENOCISSUS QUINQUEFOLIA	VIRGINIA CREEPER
PASSER DOMESTICUS	HOUSE SPARROW
PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW
PASSERELLA ILIACA	FOX SPARROW
PEDIASTRUM	
PEDIOMELUM ESCULENTUM	LARGE INDIAN BREADROOT
PELECANUS ERYTHORHYNCHOS	AMERICAN WHITE PELICAN
PENSTEMON GRACILIS	LILAC PENSTEMON
PENSTEMON PROCERUS	SMALL-FLOWER BEARDTONGUE
PERDIX PERDIX	GRAY PARTRIDGE
PERISOREUS CANADENSIS	CANADA JAY

PERSICARIA PENNSYLVANICA	PINKWEED
PETROCHELIDON PYRRHONOTA	CLIFF SWALLOW
PHACUS	
PHALACROCORAX AURITUS	DOUBLE-CRESTED CORMORANT
PHASIANUS COLCHICUS	RING-NECKED PHEASANT
PHEUCTICUS LUDOVICIANUS	ROSE-BREASTED GROSBEAK
PHLOX HOODII	SPINY PHLOX
PHYMATA	JAGGED AMBUSH BUGS
PHYSARIA	BLADDERPOD
PHYSARIA ARENOSA	GREAT PLAINS BLADDERPOD
PHYSCIA	ROSETTE LICHENS
PICA HUDSONIA	BLACK-BILLED MAGPIE
PICOIDES ARCTICUS	BLACK-BACKED WOODPECKER
PICOIDES DORSALIS	AMERICAN THREE-TOED WOODPECKER
PIERIS RAPAE	CABBAGE WHITE
PINICOLA ENUCLEATOR	PINE GROSBEAK
PINNULARIA	
PIPILO ERYTHROPHthalmus	EASTERN TOWHEE
PIPILO MACULATUS	SPOTTED TOWHEE
PIRANGA LUDOVICIANA	WESTERN TANAGER
PLANTAGO MAJOR	GREATER PLANTAIN
PLECTROPHENAX NIVALIS	SNOW BUNTING
PODICEPS AURITUS	HORNED GREBE
PODICEPS GRISEGENA	RED-NECKED GREBE
PODICEPS NIGRICOLLIS	EARED GREBE
PODILYMBUS PODICEPS	PIED-BILLED GREBE
POECILE ATRICAPILLUS	BLACK-CAPPED CHICKADEE
POECILE HUDSONICUS	BOREAL CHICKADEE
POLYPHYLLA DECEMLINEATA	TEN-LINED JUNE BEETLE
POOECETES GRAMINEUS	VESPER SPARROW
POPULUS BALSAMIFERA	BALSAM POPLAR
POPULUS DELTOIDES	EASTERN COTTONWOOD
POPULUS TREMULOIDES	TREMBLING ASPEN
PORCELLIO SPINICORNIS	BRICKWORK WOODLOUSE
PORZANA CAROLINA	SORA
POTENTILLA	CINQUEFOILS
POTENTILLA ANSERINA	COMMON SILVERWEED
POTENTILLA ANSERINA SSP. YUKONENSIS	YUKON SILVERWEED
POTENTILLA CONCINNA	ALPINE CINQUEFOIL
POTENTILLA CONCINNA VAR. CONCINNA	EARLY CINQUEFOIL
POTENTILLA LASIODONTA	SANDHILLS CINQUEFOIL

POTENTILLA PENNSYLVANICA	PRAIRIE CINQUEFOIL
POTENTILLA SUPINA SSP. PARADOXA	BUSHY CINQUEFOIL
PRIONYX	
PRISMATOLAIMUS	
PROCYON LOTOR	COMMON RACCOON
PROGNE SUBIS	PURPLE MARTIN
PRUNUS VIRGINIANA	CHOKE CHERRY
PSEUDOMICROTHORAX	
PULSATILLA NUTTALLIANA	EASTERN PASQUEFLOWER
PYROBOMBUS	
PYROLA	WINTERGREENS
PYROLA ASARIFOLIA	BOG WINTERGREEN
QUISCALUS QUISCULA	COMMON GRACKLE
RANUNCULUS CYMBALARIA	ALKALI BUTTERCUP
RECURVIROSTRA AMERICANA	AMERICAN AVOCET
REGULUS CALENDULA	RUBY-CROWNED KINGLET
REGULUS SATRAPA	GOLDEN-CROWNED KINGLET
RHAMNUS CATHARTICA	COMMON BUCKTHORN
RIBES	CURRENTS
RIBES AUREUM	GOLDEN CURRANT
RIBES OXYACANTHOIDES	CANADIAN GOOSEBERRY
RIBES OXYACANTHOIDES SSP. SETOSUM	BRISTLY GOOSEBERRY
RIPARIA RIPARIA	BANK SWALLOW
ROSA	ROSES
ROSA ARKANSANA	PRAIRIE ROSE
RUDBECKIA HIRTA	BLACK-EYED SUSAN
RUMEX	DOCKS
RUMEX ACETOSA	COMMON SORREL
RUMEX CRISPUS	CURLY DOCK
RUMEX OCCIDENTALIS	WESTERN DOCK
RUMEX PULCHER	FIDDLE DOCK
RUSAVSKIA ELEGANS	ELEGANT SUNBURST LICHEN
SALIX	WILLOWS
SAMBUCUS RACEMOSA	RED-BERRIED ELDER
SAPONARIA OFFICINALIS	COMMON SOAPWORT
SAYORNIS PHOEBE	EASTERN PHOEBE
SAYORNIS SAYA	SAY'S PHOEBE
SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM
SCHOENOPECTUS	
SEIURUS AUROCAPILLA	OVENBIRD
SENECIO INTEGERRIMUS	TALL WESTERN GROUNDSEL

SETOPHAGA CASTANEA	BAY-BREASTED WARBLER
SETOPHAGA CITRINA	HOODED WARBLER
SETOPHAGA CORONATA	YELLOW-RUMPED WARBLER
SETOPHAGA DOMINICA	YELLOW-THROATED WARBLER
SETOPHAGA MAGNOLIA	MAGNOLIA WARBLER
SETOPHAGA PALMARUM	PALM WARBLER
SETOPHAGA PENNSYLVANICA	CHESTNUT-SIDED WARBLER
SETOPHAGA PETECHIA	YELLOW WARBLER
SETOPHAGA RUTICILLA	AMERICAN REDSTART
SETOPHAGA STRIATA	BLACKPOLL WARBLER
SETOPHAGA TIGRINA	CAPE MAY WARBLER
SETOPHAGA VIRENS	BLACK-THROATED GREEN WARBLER
SHEPHERDIA ARGENTEA	SILVER BUFFALOBERRY
SIALIA CURRUCOIDES	MOUNTAIN BLUEBIRD
SISYRINCHIUM	BLUE-EYED GRASSES
SISYRINCHIUM MONTANUM	STRICT BLUE-EYED GRASS
SITTA CANADENSIS	RED-BREASTED NUTHATCH
SITTA CAROLINENSIS	WHITE-BREASTED NUTHATCH
SOLIDAGO	GOLDENRODS
SOLIDAGO CANADENSIS	CANADA GOLDENROD
SOREX	LONG-TAILED SHREWS
SPATULA CLYPEATA	NORTHERN SHOVELER
SPATULA CYANOPTERA	CINNAMON TEAL
SPATULA DISCORS	BLUE-WINGED TEAL
SPEYERIA APHRODITE	APHRODITE FRITILLARY
SPHAERALCEA COCCINEA	SCARLET GLOBEMALLOW
SPHYRAPICUS VARIUS	YELLOW-BELLIED SAPSUCKER
SPINUS PINUS	PINE SISKIN
SPINUS TRISTIS	AMERICAN GOLDFINCH
SPIRODELA POLYRHIZA	GREATER DUCKWEED
SPIZELLA PALLIDA	CLAY-COLOURED SPARROW
SPIZELLA PASSERINA	CHIPPING SPARROW
SPIZELLA PUSILLA	FIELD SPARROW
SPIZELLOIDES ARBOREA	AMERICAN TREE SPARROW
STELGIDOPTERYX SERRIPENNIS	NORTHERN ROUGH-WINGED SWALLOW
STELLARIA	CHICKWEEDS
STERNA HIRUNDO	COMMON TERN
STREPTOPELIA DECAOCTO	EURASIAN COLLARED-DOVE
STURNELLA NEGLECTA	WESTERN MEADOWLARK
STURNUS VULGARIS	EUROPEAN STARLING
SYMPETRUM	MEADOWHAWKS

SYMPETRUM CORRUPTUM	VARIEGATED MEADOWHAWK
SYMPETRUM INTERNUM	CHERRY-FACED MEADOWHAWK
SYMPETRUM OBTRUSUM	WHITE-FACED MEADOWHAWK
SYMPHORICARPOS	SNOWBERRIES
SYMPHORICARPOS ALBUS	COMMON SNOWBERRY
SYMPHORICARPOS OCCIDENTALIS	WESTERN SNOWBERRY
SYMPHYOTRICHUM	AMERICAN ASTERS
SYMPHYOTRICHUM ERICOIDES	WHITE HEATH ASTER
SYMPHYOTRICHUM LAEVE	SMOOTH BLUE ASTER
SYNURA	
TABELLARIA	
TACHYGINETA BICOLOR	TREE SWALLOW
TARAXACUM OFFICINALE	COMMON DANDELION
TAXIDEA TAXUS	AMERICAN BADGER
TELAMONA	
TEPHROSERIS PALUSTRIS	MARSH FLEAWORT
TETRAGNATHA	
THAMNOPHIS	GARTER SNAKES
THAMNOPHIS RADIX	PLAINS GARTER SNAKE
THERMOPSIS RHOMBIFOLIA	FALSE LUPINE
THLASPI ARVENSE	FIELD PENNY-CRESS
TIPULA	
TOXICODENDRON RYDBERGII	WESTERN POISON IVY
TOXOMERUS MARGINATUS	MARGINED CALLIGRAPHER
TOXOSTOMA RUFUM	BROWN THRASHER
TRAGOPOGON DUBIUS	YELLOW SALSIFY
TRAGOPOGON PRATENSIS	MEADOW SALSIFY
TRIFOLIUM REPENS	WHITE CLOVER
TRINGA FLAVIPES	LESSER YELLOWLEGS
TRINGA MELANOLEUCA	GREATER YELLOWLEGS
TRINGA MELANOLEUCA/FLAVIPES	GREATER/LESSER YELLOWLEGS
TRINGA SEMIPALMATA	WILLET
TRINGA SOLITARIA	SOLITARY SANDPIPER
TROGLODYTES AEDON	HOUSE WREN
TROGLODYTES HIEMALIS	WINTER WREN
TURDUS MIGRATORIUS	AMERICAN ROBIN
TYMPANUCHUS PHASIANELLUS	SHARP-TAILED GROUSE
TYPHA ANGUSTIFOLIA	NARROW-LEAVED CATTAIL
TYPHA LATIFOLIA	BROADLEAF CATTAIL
TYRANNUS TYRANNUS	EASTERN KINGBIRD
TYRANNUS VERTICALIS	WESTERN KINGBIRD

UROCITELLUS RICHARDSONII	RICHARDSON'S GROUND SQUIRREL
URTICA DIOICA	STINGING NETTLE
VAGINICOLA	
VANESSA CARDUI	PAINTED LADY
VIBURNUM OPULUS AMERICANUM	HIGHBUSH CRANBERRY
VICIA	VETCHES
VICIA AMERICANA	AMERICAN VETCH
VIOLA CANADENSIS	CANADA VIOLET
VIOLA CANADENSIS RUGULOSA	CANADA VIOLET
VIOLA NUTTALLII	NUTTALL'S VIOLET
VIOLA PEDATIFIDA	CROWFOOT VIOLET
VIREO GILVUS	WARBLING VIREO
VIREO OLIVACEUS	RED-EYED VIREO
VIREO PHILADELPHICUS	PHILADELPHIA VIREO
VIREO SOLITARIUS	BLUE-HEADED VIREO
VORTICELLA	
XANTHIUM STRUMARIUM	ROUGH COCKLEBUR
XANTHOCEPHALUS XANTHOCEPHALUS	YELLOW-HEADED BLACKBIRD
XANTHOMENDOZA	
XANTHOSARUS	
XYSTICUS	GROUND CRAB SPIDERS
ZENaida MACROURA	MOURNING DOVE
ZIZIA APTERA	HEART-LEAF GOLDEN ALEXANDERS
ZONOTRICHIA ALBICOLLIS	WHITE-THROATED SPARROW
ZONOTRICHIA LEUCOPHRYS	WHITE-CROWNED SPARROW
ZONOTRICHIA QUERULA	HARRIS'S SPARROW

APPENDIX TABLE 4 URBAN GREEN SPACE NEIGHBOURHOOD WALKABILITY

Percent of Livable Area Within Walk Time Catchment				
Neighbourhood	0 – 3 (min)	3 – 5 (min)	5 – 10 (min)	> 10 (min)
Adelaide/Churchill	42.05	29.52	28.43	
Arbor Creek	70.52	16.85	9.47	3.16
Avalon	54.44	35.44	9.81	
Blairmore Suburban Centre	83.61	16.37	0.00	0.02
Brevoort Park	45.90	28.14	25.95	
Briarwood	67.35	25.36	12.37	
Buena Vista	44.77	39.61	15.62	
Caswell Hill	26.24	23.56	42.47	7.73
Central Business District	48.76	19.76	31.18	0.30
City Park	33.61	23.06	38.80	4.53
College Park	37.52	38.51	23.97	
College Park East	45.09	40.80	14.11	
Confederation Park	45.51	29.96	24.15	0.38
Confederation Suburban Centre	20.61	8.50	58.24	
Dundonald	43.72	34.69	21.59	
Eastview	54.64	29.35	15.97	0.04
Erindale	53.85	37.04	9.11	
Exhibition	78.08	28.46	0.00	
Fairhaven	56.04	28.77	15.19	
Forest Grove	45.21	25.50	29.29	
Greystone Heights	61.71	35.59	2.70	
Grosvenor Park	69.75	30.25		
Hampton Village	74.81	21.72	3.47	
Haultain	31.63	44.29	24.08	
Holiday Park	75.96	24.04	0.00	
Holliston	60.55	35.01	4.44	
Hudson Bay Park	59.63	28.60	11.76	
Kelsey - Woodlawn	30.76	37.79	31.45	
King George	76.25	23.52	0.23	
Lakeridge	38.20	26.51	34.28	
Lakeview	33.20	27.47	42.80	1.87
Lakewood Suburban Centre	84.90	15.10		
Lawson Heights	45.72	34.76	19.52	
Lawson Heights Suburban Centre	95.05	4.95		
Massey Place	62.07	37.93		0.00
Mayfair	48.90	28.92	22.18	
Meadowgreen	60.86	26.14	7.66	0.00

Montgomery Place	33.91	21.48	41.72	0.93
Mount Royal	65.85	29.32	4.30	
North Park	70.15	26.91	2.94	
Nutana	67.94	26.83	2.88	
Nutana Park	44.87	35.60	19.53	
Nutana Suburban Centre	58.06	32.82	9.12	
Pacific Heights	40.56	32.53	26.33	0.02
Parkridge	39.67	24.04	24.17	11.69
Pleasant Hill	65.65	30.53	3.82	
Queen Elizabeth	37.84	37.81	24.35	
Richmond Heights	84.99	15.01		
River Heights	43.06	27.92	29.02	
Riversdale	39.21	23.65	35.92	1.22
Silverspring	54.50	20.41	23.59	1.50
Silverwood Heights	45.47	21.74	27.18	5.61
Sutherland	63.79	27.59	8.61	0.01
The Willows	100.00			
University Heights Suburban Centre	38.23	51.22	10.54	
Varsity View	65.81	28.44	5.74	
Westmount	62.37	30.51	7.12	
Westview	63.51	29.89	6.19	
Wildwood	58.83	24.57	20.50	0.00
Willowgrove	66.34	28.13	5.54	0.00



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