City of South Burlington Habitat Block Assessment & Ranking 2020

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I. Introduction

In September 2019, Arrowwood Environmental (AE) was retained by the City of South Burlington (SB) Planning Department to conduct an analysis of "forest blocks" within the city for use as an aid in prioritizing regulatory and conservation measures. Following discussion with the SB planning staff and consideration of current conservation biology science, AE proposed to conduct a broader habitat assessment with an initial focus on forested areas but extending to areas of supporting habitat features beyond the current forest edge that provide important and/or critical habitat requirements to the species utilizing the forest habitats. AE developed a methodology to delineate and rank Habitat Blocks throughout the city. The relative ranking of important habitat areas can provide the SB Planning Department an important tool in protecting wildlife habitat for a broad suite of species.

A web-based mapping application is available for viewing the results of this project at: arrowwoodvt.com/sbhb.

II. Background

South Burlington is one of the most populous cities in Vermont at just under 20,000 people and is situated within Chittenden County with a population of more than 161,000. The land area of South Burlington is approximately 16.5 square miles (~10,597 acres). South Burlington is most densely populated and urbanized north and east of Interstate I-89 which divides the city into northern and southern sections. The eastern quadrant south of I-89 is the least developed.

South Burlington does not contain large areas of continuous forest cover. The area with tree canopy within South Burlington totals ~ 3,470 acres or ~ 33% percent of the total land area. Not all the areas with tree cover provide habitat for all species of wildlife found within South Burlington. Some canopy cover consists of no more than trees lining the residential neighborhoods. While city, street, and park trees do not function as diverse wildlife habitat, they do support a variety of avian, insect, and small mammal wildlife such as squirrels and chipmunks. These narrow, and often small areas of forest cover are important to the well-being of both South Burlington's wildlife, and its residents. Studies have revealed that collectively the inhabitants of urban areas experience improved mental health when forested areas, no matter how small, are present where people work, play, and reside (Kaplan and Kaplan 1989).

Habitat Blocks (HB), as defined and delineated by AE in this study, are large enough areas to provide habitat, either permanently, or seasonally for wider ranging species of wildlife such as bobcat, red and grey fox, white-tailed deer, river otter and fisher. These species of wildlife require larger areas (than squirrels or rabbits for example), and a variety of appropriate habitat to fulfill their daily, seasonal, and yearly habitat needs. These needs include security for breeding activities, a variety of food resources, secure cover for raising young, and the presence of water- either for drinking or in the case of aquatic species, as a general habitat.

Habitat Blocks fall within a matrix of land-uses that include urban, residential, agricultural, transportation, and rural uses. Wildlife utilize habitats other than forests. Shrublands, reverting old fields, forested and herbaceous wetlands, stream, lakes and ponds, orchards and other undeveloped lands provide vital space, food, and cover for wildlife. Varying daily, seasonal and yearly food, space and biological needs of some species such as bobcat, fisher (and even white-tailed deer) may necessitate the movement of animals to a variety of different Habitat Blocks as well as to other ancillary supporting habitats.

III. Habitat Blocks

A. Definition

Habitat Blocks developed in this analysis are derived from the idea of "Forest Blocks" with conceptual modifications allowing for the unique habitat situation that exists in South Burlington. Owing to both the land-use history and population density, there are significant portions of land in the city that are not currently forested but contribute to the matrix of important wildlife habitat. Utilizing a broader definition, which is not strictly "forest" allows the consideration of these forest-adjacent areas that contribute to the ability of the Habitat Block to provide sufficient habitat for species to live within the city limits.

Forest blocks, as commonly referenced in Vermont planning are typically mapped, such as through the Vt. Agency of Natural Resource statewide-scale Conservation Design project, as contiguous forested areas. In 2017, the Vt. Legislature passed Act 171, directing municipalities to consider forest blocks in the municipal planning process. The Act 171 definition includes forest in any stage of succession (Vt. ANR, 2018):

> *FOREST BLOCK: a contiguous area of forest in any stage of succession and not currently developed for nonforest use. A forest block may include recreational trails, wetlands, or other natural features that do not themselves possess tree cover and uses exempt from regulation under subsection 4413(d) of this title.*

Since early and mid-successional old-fields, young forests and wetlands are known to contribute, and are probably critical, to South Burlington's current wildlife diversity, we concluded it necessary to consider these forest-adjacent areas in the definition of Forest Blocks. To avoid confusion over terminology, we refer to these areas as Habitat Blocks for the purposes of this analysis.

Habitat blocks are herein defined as contiguous forested and adjacent unmanaged shrubby areas of old field, young forest, and unmanaged wetland. In order to be considered a Habitat Block, the area must be greater than 50% forested. Other considerations were made when defining Habitat Blocks: Developed and active, or predominantly non-woody, agricultural areas were excluded from the block area. Portions of contiguous forest or shrubland that could not be connected by an area wider than 50 meters (~160') were excluded. Habitat Blocks smaller than 20 acres in total size were excluded.

B. Methodology

Habitat Blocks (HB) were developed for the contiguous land area of South Burlington (excluding Lake Champlain & Juniper Island). Each HB was later scored and ranked using a set of parameters developed to identify the best general wildlife habitat value given the existing landscape conditions in South Burlington.

Habitat Block creation and ranking parameter analysis was conducted primarily using high-resolution land-cover data developed by the University of Vermont Spatial Analysis Lab and released in late 2019 (O'Neil-Dunne, 2019). The landcover data was based on current aerial imagery and LiDAR data with a published current-ness date of 2016. This landcover data (LC2016) was provided in various geospatial products including*:

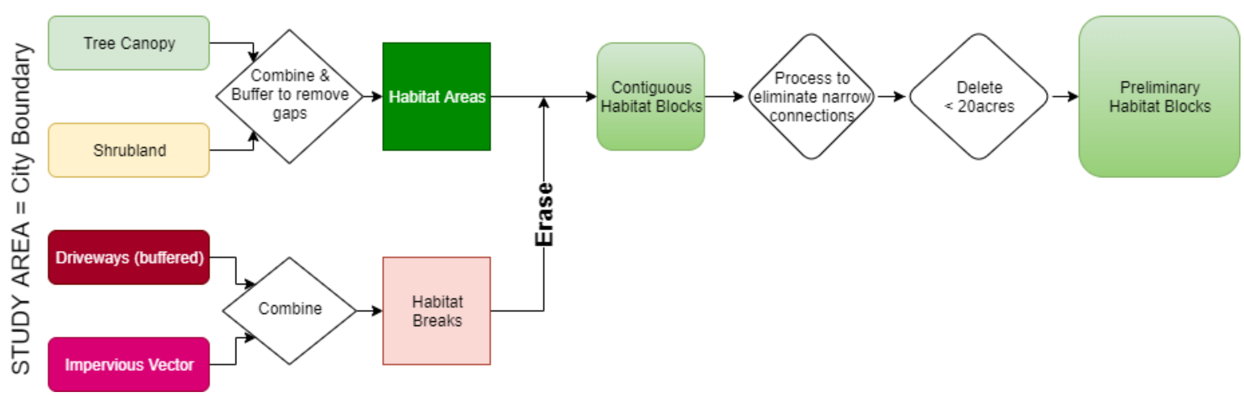
Data*	Type	Comments/South Burlington Specific
Tree Canopy	Vector polygons	subdivided by conifer and hardwood cover type
Shrublands	Vector polygons	Old fields and young forests, no tree canopy
Wetlands	Vector polygons	Appears to significantly overestimate wetland area, overlapping shrubland, mowed lawns, etc. that are unlikely wetland
Agriculture	Vector polygons	Some inclusions of mowed lawn or developed areas
Impervious Surfaces	Vector polygons	Generally comprehensive with some misidentified areas that are typically coincident with other types of development
Building Footprints	Vector polygons	Quite good
Water	1 meter raster	Streams, ponds, other open water. Appears accurate

*Additional data components were available but not utilized in this project

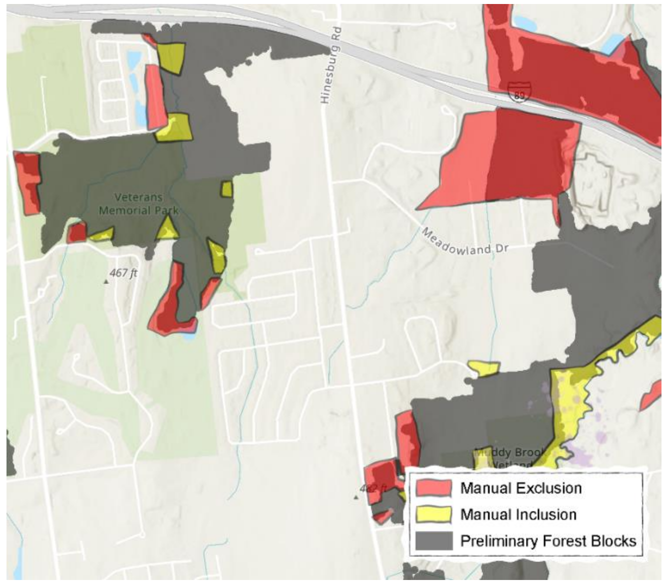
Some other publicly available geospatial data were included where deemed appropriate including: 2019 Vtrans Road centerlines, Vt. DEC Wetland Advisory Layer, 2019 E911 Driveway lines, Vt. Hydrography Dataset stream centerlines. All input data was obtained from the Vermont Center for Geographic Information.

Habitat Blocks were constructed in two iterations. The basic initial modeling developed Preliminary Habitat Blocks to guide early investigations of the South Burlington landscape.

Following this preliminary HB development, AE biologists conducted a windshield survey throughout South Burlington to visually confirm forest conditions. Each preliminary HB was investigated from the road, as were areas excluded in the preliminary processing but flagged as of-interest by the investigators. Areas of note or suggested changes were recorded with GPS equipped field mapping devices.



Subsequent to the windshield survey, it was decided that a maximum area of shrubland cutoff was necessary as at least one preliminary HB was made up entirely of shrubland with no forest area. While these areas may provide some level of habitat for certain species, it was decided that areas of only shrub are not consistent with the project goals for identifying and prioritizing Habitat Blocks for a range of wildlife species.

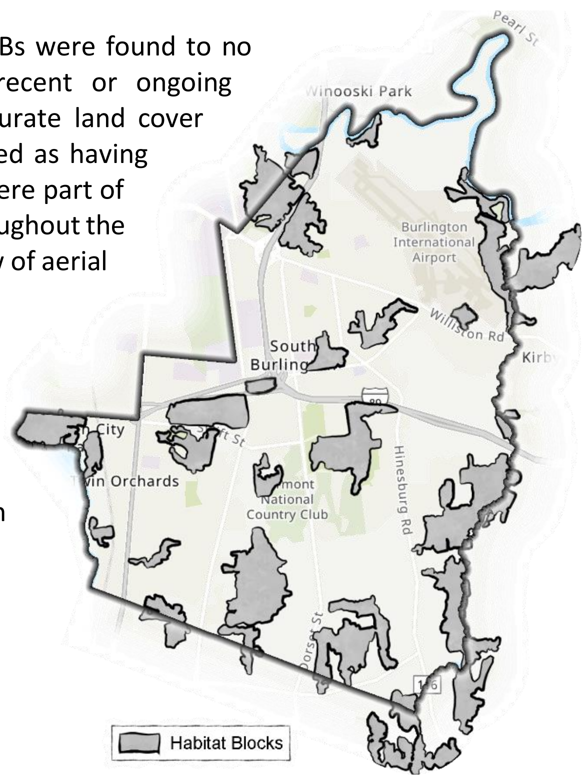


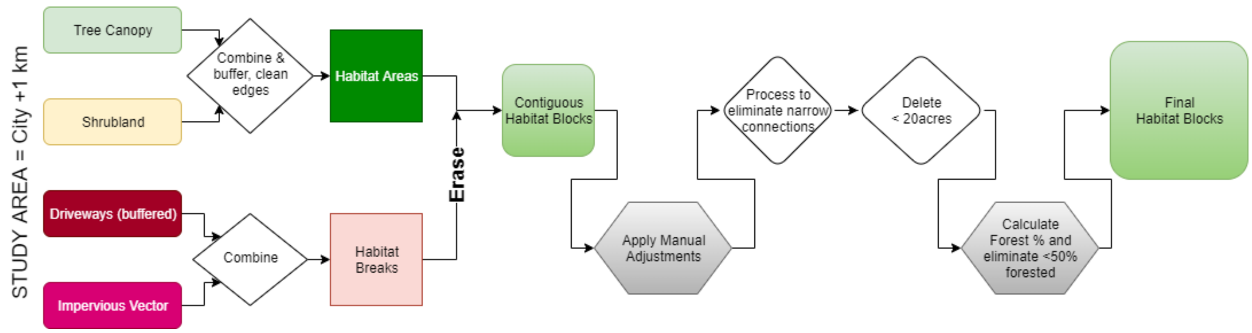
The windshield survey also highlighted a shortfall in the methodology to date where HBs were only delineated within the bounds of the city. It became clear that the relative value of HBs partially within the city limits should consider the portions of the HB that extend outside the limits, notably critical links to the Shelburne Pond area in the south, Muddy Brook corridor to the east, and Winooski River basin in the north. Based on this, we opted to extend the study area 1 kilometer beyond the South Burlington municipal boundary. This distance captured most contiguous forest areas that overlap into South Burlington. Although the city may have less influence on the overall regulatory protection of parts of these HBs, it is important to consider that wildlife do not observe political boundaries and invisible town lines do not limit the current extent or value of a HB.

Some significant areas identified as preliminary HBs were found to no longer contain forested habitat features due to recent or ongoing development activity, management changes or inaccurate land cover classification. In addition, some small areas were noted as having been excluded which visual observation determined were part of the HB. A set of Adjustment areas were designated throughout the study area based on the windshield survey and a review of aerial imagery in and around each preliminary HB.

The Habitat Block processing model was reconstructed to extend 1 km beyond the municipal boundary, to exclude HBs less than 50% forested and to include/exclude manual Adjustment areas designated by the investigators.

The processing model for final HB identification follows the illustrated diagram below.





IV. Ranking Parameters

After final development of the Habitat Block boundaries, a set of ranking parameters were developed upon which to assess each HB for its relative value in supporting a diverse suite of wildlife within South Burlington.

Ranking parameters were identified based on current conservation biology principles and the availability of geospatial data and tools to objectively document, measure and score the biological principle in question.

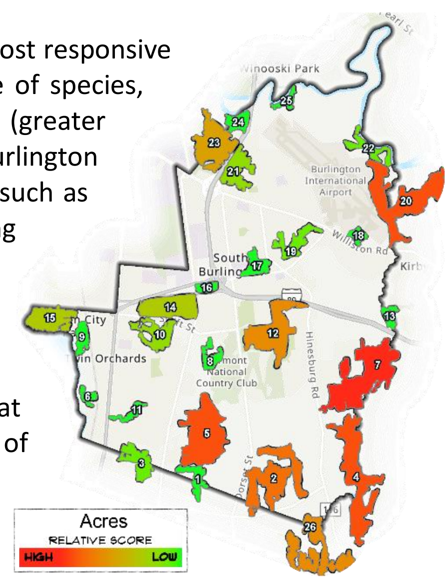
All ranking was conducted using geographic information software and geospatial modeling tools using the inputs discussed in Section II.

Other parameters could focus on the needs of specific species or more complex ways of measuring the HB, but we settled on fundamental concepts, widely accepted as indicative of varying quality habitat conditions for a range of wildlife species with particular emphasis on those wider-ranging species threatened by the increasingly urban and suburban landscape in South Burlington.

What follows is a brief description of each parameter measured, it's biological relevance and methodology for determining the relative value of that parameter within each HB.

A. Area

Area of the HB as the absolute size in acres. This parameter is most responsive to the city's interest in protecting wildlife habitat for a broad suite of species, including those species that have moderate to larger home ranges (greater than a couple hundred acres) such as bobcat and fisher. For South Burlington to succeed in the long-term in maintaining the presence of species such as bobcat and fisher the city needs to preserve much of its remaining larger forested areas in a relatively unfragmented and undeveloped condition. Generally larger HBs provide the template for a greater diversity and abundance of plant communities extending out to nearby or adjacent supporting habitats such as wetlands and shrublands. This abundance and diversity of plants and wildlife habitat in turn provides food, cover, space, and water for wildlife. The range of HB sizes mapped in South Burlington vary from 21 to 289 acres in size.

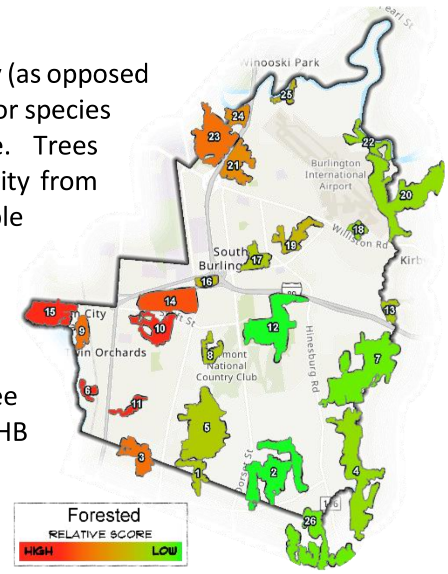


Acreage was calculated for each HB, with larger areas scoring higher.

B. Forested Area

Forested area is a measure of the relative amount of tree canopy (as opposed to shrubland) within the mapped HB. This is an important variable for species that are primarily forest-dwelling species – such as much birdlife. Trees provide food, cover, and for some species that climb trees, security from predators. Mast bearing species such as oak, hickory, ash, and maple are important food sources for many species of wildlife, including white-tailed deer, wild turkeys, and many other species of birds. Trees also provide nesting habitat for tree-dwelling rodents such as squirrels and many bird species.

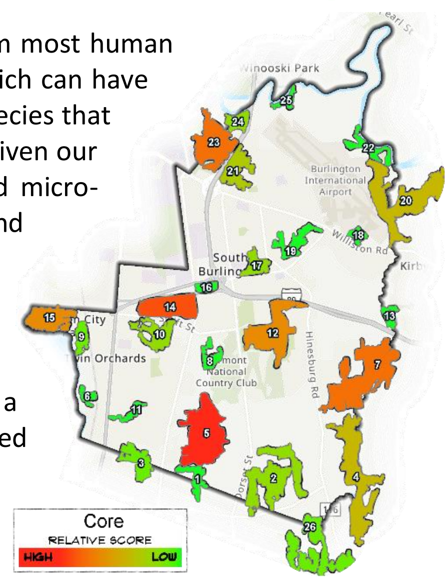
Forested area was measured for each HB using the LC2016 Tree Canopy data. Forested area is represented as the percent of total HB area with canopy cover with larger percentages scoring higher.



C. Core Forest

Core (or interior) forest in the Northeastern United States is defined as forested habitat that is found at least 100 meters from most human disturbances. Many human disturbances create habitat edges which can have negative impacts on some species of wildlife – especially those species that are wary of humans and under the greatest threat from humans given our widespread alteration of the natural world. Edges have altered micro-climates, often contain a non-native and invasive suite of plants and animal species, and, in many instances their presence leads to population declines of species sensitive to enhanced predation and parasitism– especially documented in certain sensitive birds.

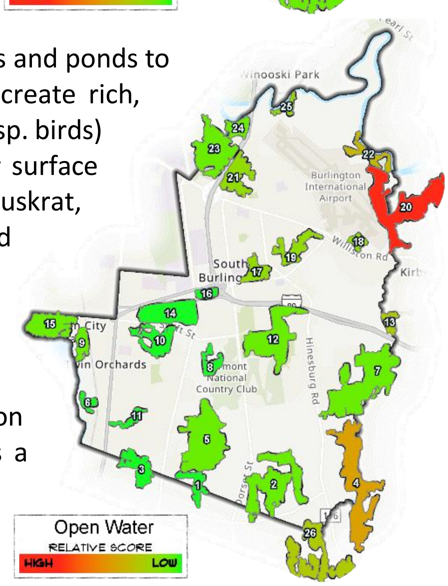
Core forest was derived by applying an internal 100M buffer to the outside edge of each HB and measuring the remaining area as a percentage of the whole. HBs containing a larger percent Core scored higher.



D. Surface Water Coverage

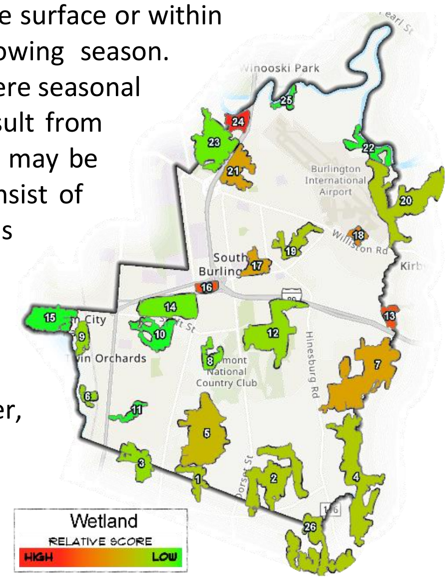
The presence of water within an HB provides numerous benefits to wildlife. Terrestrial wildlife depends on water in streams and ponds to meet its daily drinking needs. The presence of water can also create rich, productive, and diverse insect life which some wildlife prey upon (esp. birds) forming the basis of the food chains. Ponds, streams, and other surface waters provide vital habitat for aquatic species such as mink, muskrat, otter, water shrews, and a whole host of water-associated birds and waterfowl. Many species of amphibians and reptiles including frogs, toads, turtles, and snakes contribute to species diversity as well as being food sources for wider-ranging species that inhabit these waterways and nearby habitats.

Water within HBs was measured from the LC2016 1M resolution raster data classified as "Open Water". Water was calculated as a percentage of the total HB area. Higher percentages score higher.



E. Wetland Coverage

Wetlands are natural communities where water remains near the surface or within the rooting zone of plants for extended periods during the growing season. Wetlands are often associated with margins of stream and ponds where seasonal flooding causes the water to overflow out of its bank, but also result from upwelling of groundwater or the collection of rainwater. Wetlands may be dominated by woody plants such as willows and red maple or consist of largely herbaceous plants like cattails and sedges. In general, wetlands are fertile and productive, and provide the photosynthetic fuel to support expansive food chains- starting with insect life all the way up through South Burlington's predators such as bobcat, coyote, and fisher. A wide variety of wildlife, including mammals, amphibians, reptiles, and birds utilize and rely upon wetlands for the food, cover, and water resources that they provide.

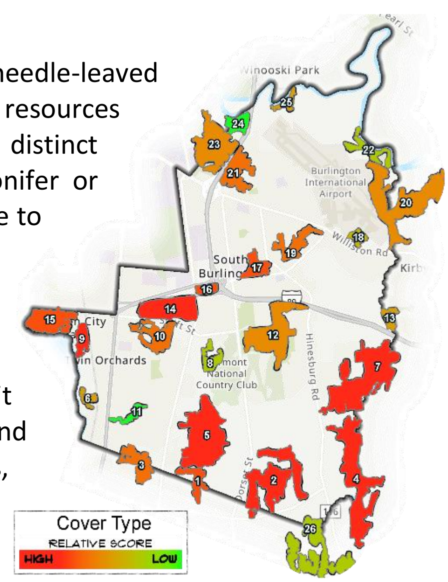


While the LC2016 data provided a wetland-specific product, our analysis found it to be highly inaccurate, at least on the South Burlington landscape. AE has conducted numerous professional wetland field delineations throughout the city over the course of many years and comparing some of this past work with the LC2016 product indicated significant discrepancies- primarily presenting as sometimes significant overestimations of wetland area. The Vt. Agency of Natural Resources maintains an "Advisory Wetland Layer" which contains wetland mapping of varying detail conducted at the municipal, or project level. Wetlands for the entire city were mapped by wetland ecologist Cathy O'Brien in the early 2000's and this mapping is provided in the Advisory Wetland Layer. While some significant landscape changes, and improved mapping techniques and technology, have occurred since that time, it remains the best representation of wetland areas across the city. Since we are only concerned with currently undeveloped areas in this analysis, the wetland loss or changes to development since the mapping are irrelevant.

The wetland coverage parameter was calculated as the percentage of mapped wetland within the total HB. Higher percentages were scored higher.

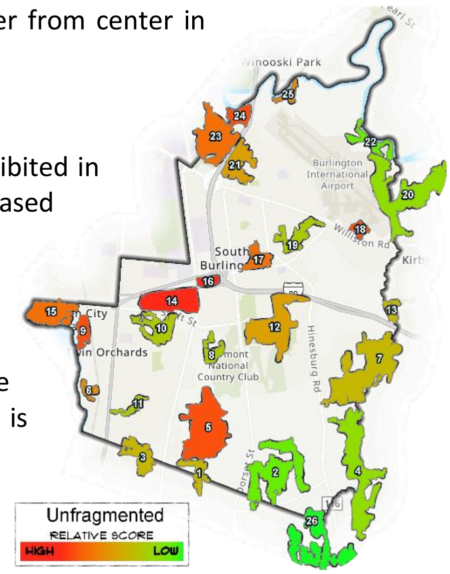
F. Cover Type

Wildlife utilize both broad-leaved deciduous forest and needle-leaved evergreen (conifer) forest for cover, nesting habitat, and for the food resources they provide. This parameter measures the evenness of these two distinct forest types within a HB. If an HB consists of 100% of either conifer or deciduous forest – some wildlife may be absent from that HB or have to move to access food or cover resources elsewhere. Many species have been shown to prefer a mix of cover types to meet a variety of their biological needs. Certain bird species preferentially utilize broad-leaved trees and their food (nuts and fruits) resources while others may use evergreen trees and the cones they provide. The fruit of deciduous tree species such as oak, beech, maple, hickories and dogwoods provide food resources for wildlife including mammals, amphibians, and birdlife. Cone-bearing trees such as hemlock, white cedar, and white pine provide food and cover for a variety of wildlife including white-tailed deer, wild turkeys, and numerous



species of birds. A balanced forest in terms of these two types of distinct tree groups provides resources that support a wider range of species.

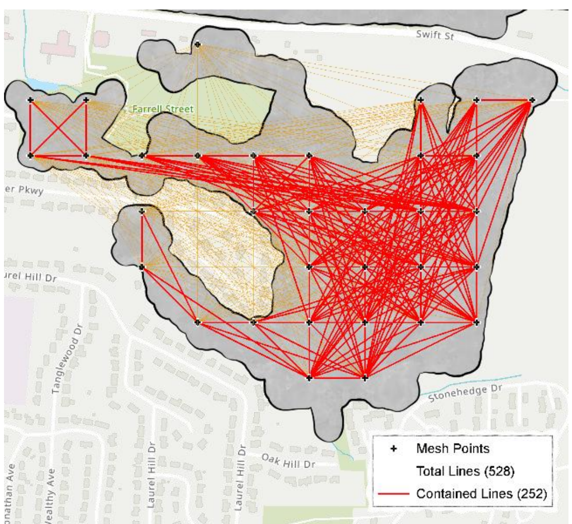
Cover type was derived from the LC2016 vector canopy data which is classified by conifer/deciduous cover. Canopy type was measured as the deciduous area divided by total forested area to give a range of 0-1. Values closer to 0.5 (50%) were scored higher, while values further from center in either direction, 0 (0%) and 1(100%), were scored lower.



G. Fragmentation

Fragmentation is a measure of the broken-ness or "edginess" exhibited in the geometry of the HB. Greater amounts of edge result in increased disturbance penetration into the HB and decrease the ability of wildlife to live free of exposure to humans and human development. Some species, such as the skunk, and squirrels have adapted well and thrive in the presence of humans. Other species such as the bobcat, fisher, and river otter are more wary of humans and tend to use these fragmented habitats less than those that remain wilder. This measure is an index of the amount of human activity located within an HB.

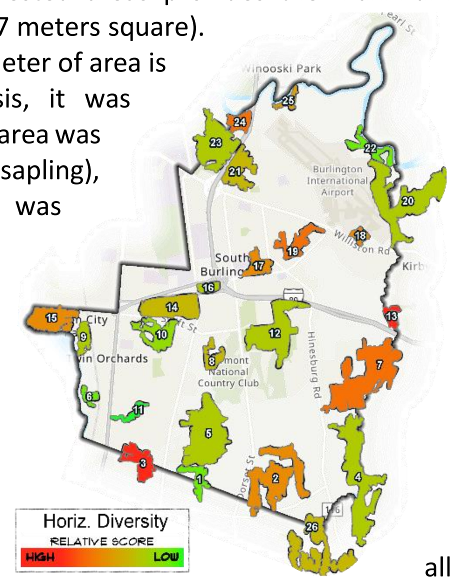
The fragmentation measure borrowed the underlying concept of "Effective Mesh Size" (Jaeger, 2000), a tool used in some cases to measure fragmentation by predicting permeability across broad landscapes. The foundational concept, generally stated, is- how possible is movement between any 2 points on a landscape. For this less complex analysis, we generated a fixed grid of points within each HB on a regular 100M x 100M pattern. Lines were drawn from each point within an HB to every other point within the HB and those lines falling totally within the HB were tallied. HBs with more fragmentation (such as an indentation or fingers extending out from the center) would have fewer lines fully contained within the HB boundary. Fragmentation was represented as interior line count divided by total line count; higher values were scored higher (less fragmented).



H. Horizontal Diversity (cover type/canopy height)

Horizontal diversity measures the number of structural forest changes across the HB. In this case we measured structural diversity as a combination of the varying vegetative canopy heights and the diversity of canopy changes between conifer and deciduous forest communities encountered as one moves across the HB. This woody plant structure forms the template for the food, cover, and nesting resources for mammals, bird, amphibians, reptiles, and insects. All things being equal – the greater number of structurally different plant communities an HB contains – the greater the wildlife diversity the HB will harbor.

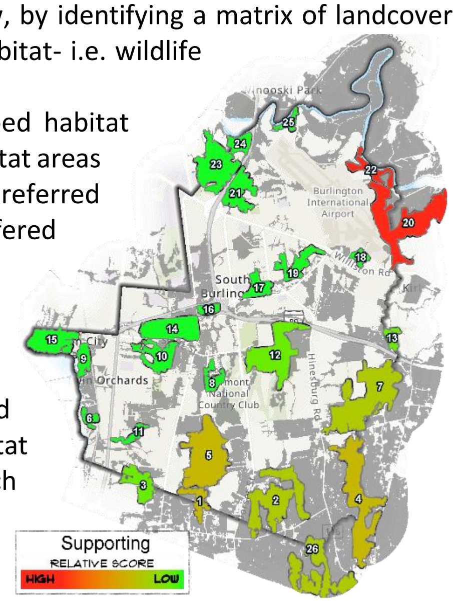
Horizontal diversity was measured based on a combination of the cover types described above and an analysis of high-resolution LiDAR elevation data to construct a normalized digital surface model, or nDSM. A nDSM measures the difference in absolute measured height of objects off the surface of the earth and "bareearth" elevation- i.e. ground level. The resulting calculation in forested areas provides the maximum vegetative height at the resolution of the source data (in this case, 0.7 meters square). Because the resulting vegetative height value for every ~1/2 square meter of area is too detailed to provide meaningful information for this analysis, it was generalized to 10Mx10M resolution, meaning every 100 square meter area was assigned a maximum vegetation height value of low (shrub), medium (sapling), or high (tree). The longest edge to edge axis within each HB was programmatically identified, and each change in cover type and generalized canopy height was tallied along the line. Total number of changes were divided by line length to give a horizontal diversity value for each HB. Higher values were scored higher (greater horizontal diversity).



I. Supporting Habitat

Supporting habitats adjacent to HBs but not meeting the requirements to be included in the block itself may include streams, ponds, wetlands, shrublands, agricultural land and orchards. These all contribute to an HB by providing a range of tangential habitat elements that benefit wildlife. The vegetation in supporting habitats is more frequently or recently managed than HBs and they exhibit low to moderate levels of more intensive human disturbance. While supporting habitats do not typically offer the protection and diversity found in HBs, they function as a buffer, or padding from human disturbance around the HB and provide additional area wildlife use to fulfill their requirements, venturing into them for food, and to a lesser degree cover, space and water. In South Burlington, supporting habitats are notable for their ability to function as habitat for prey-base species, such as rabbits, rodents, and turkey, which contribute to the survival of wider-ranging wildlife occupying the HBs. Supporting habitat also forms the foundation for analyzing connected habitats, a separate parameter discussed below, by identifying a matrix of landcover types preferred for movement between HBs or patches of better habitat- i.e. wildlife corridors.

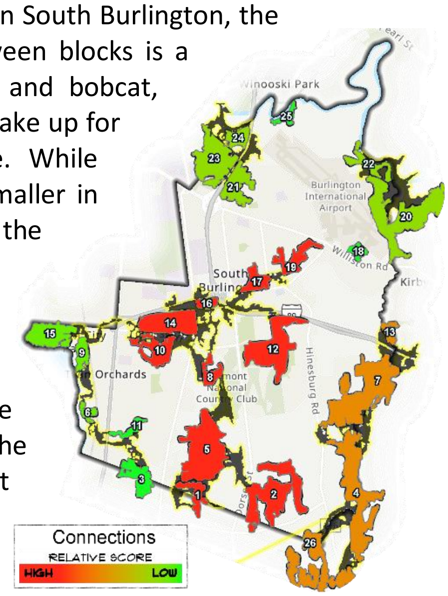
The supporting habitat parameter was defined as non-developed habitat areas directly contiguous with a HB, but still separated from other habitat areas by roads, development, and impervious surfaces. As documented preferred habitat areas, especially as movement corridors, streams and a buffered area around them were combined with tree canopy (LC2016), shrubland (LC2016), wetland (LC2016), and agricultural lands (LC2016). Although we did not utilize the LC2016 wetland data in the wetland parameter analysis, it was included here as much of the inaccuracy inherent in that data is coincident with shrub and agricultural lands also being incorporated in the supporting habitat modeling. Impervious surfaces (LC2016) were eliminated and each supporting habitat area was then assigned to its adjacent HB.



Supporting habitat was measured as the total combined area of HB and adjacent supporting habitat in acres. Larger areas scored higher.

J. Contiguous Connected Habitat

Because of the smaller and already fragmented nature of the HBs in South Burlington, the ability to move across the landscape in stepping-stone fashion between blocks is a critically important HB parameter. For species such as fox, fisher, and bobcat, accessing multiple HBs and their intermeshed supporting habitats to make up for the smaller, more fragmented nature of the HBs is of vital importance. While home range sizes of animals such as fisher and bobcat may trend smaller in landscapes as fragmented and urban as is much of South Burlington – the ability to move across a patchwork of HBs utilizing relatively wild supporting and connecting lands is a primary factor in ensuring the continued presence of these species in this part of Chittenden County. Four of the six top ranked HBs maintain connectivity to forested habitat outside of South Burlington in Williston or Shelburne. For bobcat, home ranges in the wild are often several hundred acres (or larger) in size so the continued presence of this species in South Burlington is dependent upon the presence of landscapes that remain permeable and provide connections for the bobcat.



To measure contiguous connected habitat, a corridor analysis was conducted to model likely preferred wildlife travel corridors across the South Burlington landscape. The supporting habitat served as the foundation of the corridor modeling process, with each land cover type assigned a "cost" value representing the ease or preference of the inherent conditions for traveling between HBs. A cost-distance analysis combined landscape cost with distance from each HB for every 25 square meter block of the city. Buildings and a 50' buffer around them were considered impermeable, interstate highways were assigned the greatest cost to intersect, followed by the major roads- Shelburne Road and Williston Road. Streams and 10' on either side were assigned the least-cost owing to their preference as travel routes, especially to cross roads. Narrow hedgerows have been shown to provide preferential movement corridors for bobcats in particular in South Burlington and the surrounding area, so tree canopy was considered a low-cost option as well (Freeman 2017). The table below details cost scores assessed across land cover and feature types.

Feature Type	Cost	Comments
Streams + 10' either side	1	Least cost/most likely
Tree Cover	2	
Shrubland	3	
Wetland	4	
Agricultural Land	5	
Background matrix	10	Assumes wildlife will reluctantly cross lawns, parking lots, roads, etc.
State Highways	20	
Interstate Highways	50	Highest cost/least likely
Buildings + 50	NONE	Considered impenetrable

A matrix of overall corridor preference value across the entire study area was then evaluated. The highest 20% of the corridor preference scores throughout the study area were extracted and designated likely wildlife corridors. We then measured the combined area of corridor and Habitat Block that are connected in acres. Higher acreage was scored higher. There were 6 groups of interconnected HBs resulting, with 2 additional HBs without a connection meeting our thresholds to another HB.

V. Scoring Methodology

In the initial processing, each parameter was assigned a value on its own scale such as acres, percent, etc. For each parameter, an equal interval scale of 1-10 was established between the highest and lowest values assigned to that parameter in the original analysis. Highest scoring values in each parameter were assigned a score of 10, lowest a score of 1.

This provided a consistent scoring approach for each parameter. Since the scores assigned were dependent upon the highest and lowest values determined in this analysis, these scores are only relative to the other Habitat Blocks identified and assessed in this study.

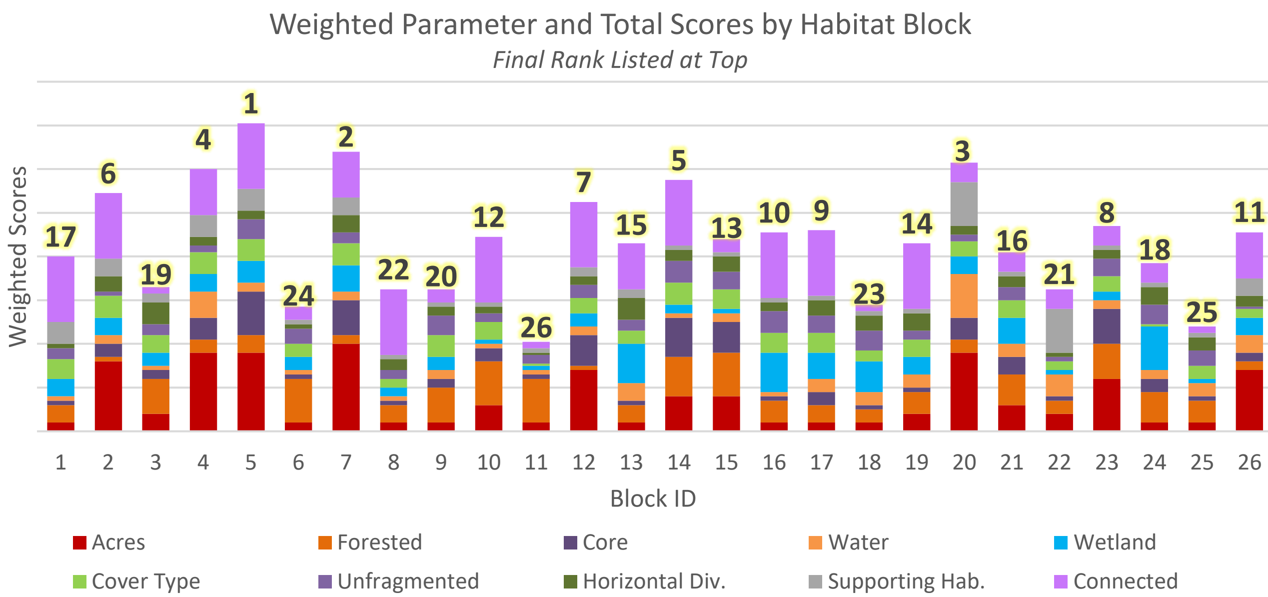
VI. Parameter Weighting

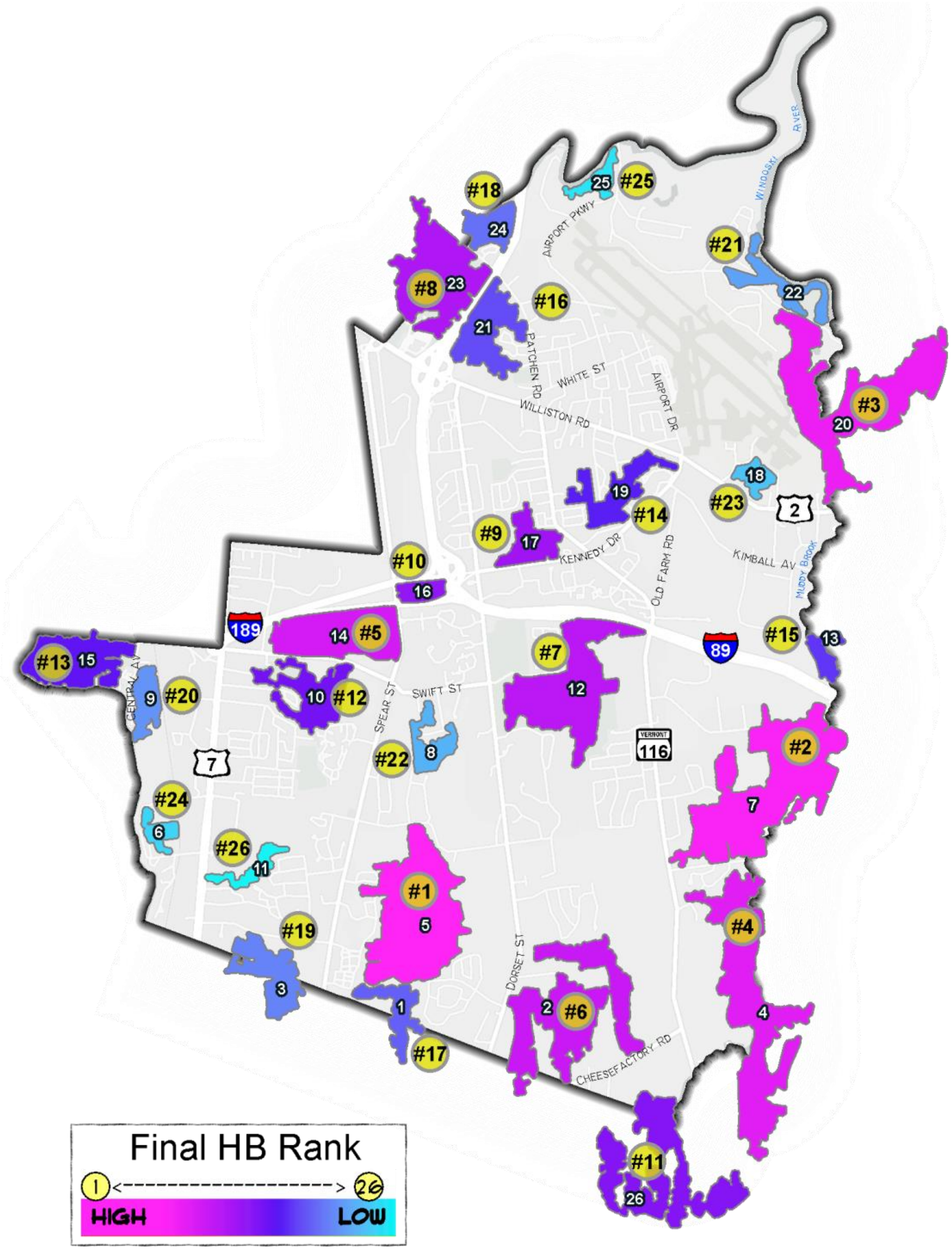
Each parameter has varying influence on the ranking of the importance of an HB to the wildlife population in South Burlington. With each parameter scored using a consistent 1-10 scale, weights were assigned to each parameter for the purpose of calculating an overall ranking among all 26 HBs in the study area. Weights were assigned as a percent of a whole (100%) representing the relative importance of that parameter. Weights were assigned based on our understanding of the project objectives, principles of modern conservation biology, the unique landscape situation in South Burlington, and best professional judgement.

Parameter	Weight
Area	20 %
Forested Area	10 %
Core Forest	10 %
Surface Water	10 %
Wetland	10 %
Cover	5 %
Fragmentation	5 %
Horizontal Diversity	5 %
Supporting Habitat	10 %
Connected Habitat	15 %
Total:	100 %

VII. Final Ranking

Ranking of Habitat Blocks is derived directly from the weighted scores of each of the 10 parameters analyzed for each HB. Each of the 26 HBs received a ranking from 1-26, with 1 being the best, representing the highest weighted score, and 26 the lowest.





VIII. Results & Discussion

Twenty-six individual Habitat Blocks were delineated, scored for 10 biological parameters, and ranked based on their relative weighted scores. As might be expected, the larger, more intact remaining Habitat Blocks were ranked the highest. A data summary table is provided below.

While the smallest blocks were generally ranked low on their own, we stress that it remains important to consider the connectivity of larger HBs when making decisions about prioritization of Habitat Block protection in South Burlington. Some small patches situated critically between two larger blocks may have less value on their own, but as a stepping-stone for maintaining functional wildlife population connections between the higher ranked blocks, the small patch could be critical. We encourage the city to consider not just Habitat blocks, but critical connections between them, when planning for wildlife habitat protections. South Burlington is somewhat unique in Vermont for having a bustling urban atmosphere, while also retaining a network of critical natural habitats that provide a diverse suite of wildlife the ability to maintain a foothold around the margins of the developed, more urban core. This interface is valued by the residents of the South Burlington and beneficial on a larger scale for maintaining biological diversity and resiliency at the landscape level.

In Vermont municipalities such as South Burlington that do not support large swaths of continual forest cover, smaller habitat patches become vital for maintaining wildlife populations. The Habitat Blocks in South Burlington range from 21 acres to over 289 acres in size which are likely too small by themselves to support breeding populations of wide-ranging wildlife species such as bobcat and fisher. It is only through the interconnectedness of South Burlington's (and other adjacent town's) Habitat Blocks and the presence of supporting wildlife habitats that animals such as fisher, river otter, and bobcat are still found in the town.

South Burlington will long have red fox, skunk, cottontail rabbits, and likely even white-tailed deer – even if some degradation or loss of Habitat Blocks occurs. These species have proven themselves adaptable to considerable human disturbance if left fragments of forest for daytime cover. However, if South Burlington continues to want to be graced by the presence of a bobcat, fisher, the occasional moose or black bear, and a diversity of birds, amphibians, reptiles and native vegetative communities, it will have to maintain Habitat Blocks and connections between the in-town and out-of-town forested habitats.

The South-east Quadrant contains both the highest number of Habitat Blocks as well as 5 of the 10 top ranked Habitat Blocks. Several of these Habitat Blocks are documented habitat for bobcat whose home-ranges are likely centered around Shelburne Pond to the south. These larger intact blocks also provide some of the best Core habitat supporting a diversity of bird species that are unlikely to be present otherwise. Other important Habitat Blocks follow Muddy Brook along the eastern edge of the city, including 3 of the 5 top ranked HBs. This corridor, if kept relatively unfragmented, can function as a movement corridor and habitat for both wide-ranging species such as bobcat, coyote, and fisher but also for the more habitat-specific species such as mink and river otter, several amphibians and reptiles. Muddy Brook also provides important habitat for waterfowl, shorebirds, and riparian species such as belted kingfisher. The East Woods and Centennial Woods HBs both rank in the top 10 and are located closest to the region's urban core. The refuge they provide, made accessible by some stepping-stone smaller blocks and relatively intact corridors are responsible for the last remaining vestiges of wildness in closest proximity to South Burlington and Burlington's population centers.

A web-based mapping application is available for viewing the results of this project at: arrowwoodvt.com/sbhb

Rank: *High* — *Low* **Individual Scores**: *Highest (8-10)* *Lowest (1-3)* **Overall Score**: *High* — *Low*

Block ID	Location	Overall Rank	Acres	Parameter Scores: Size	Forested	Core	Surface Water	Wetland	Canopy Type	Frag-mentation	Horizontal Diversity	Supporting Habitat	Connected Habitat	Overall Weighted
1	Straddling south-central city boundary.	17	45.93	1	4	1	1	4	9	5	2	5	10	4
2	East of Dorset St, North of Cheesefactory Rd	6	221.12	8	1	3	2	4	10	2	7	4	10	5.45
3	Blueberry/Great Swamp, east of South Village	19	74.76	2	8	2	1	3	8	5	10	2	1	3.3
4	Along Muddy Brook, extending east and south into Williston. East of Hinesburg Rd	4	257.95	9	3	5	6	4	10	3	4	5	7	6
5	South of Nowland Farm Road, between Spear St. & Dorset St. "Great Swamp"	1	241.27	9	4	10	2	5	10	9	4	5	10	7.05
6	West of railroad tracks, east of Lake, between Bartlett Bay Rd and Holmes Rd.	24	21.17	1	10	1	1	3	6	7	2	1	2	2.85
7	Along Muddy Brook, Van Sicklen Rd to I-89.	2	289.52	10	2	8	2	6	10	5	8	4	7	6.4
8	West of country club, between Swift St & Nowland Farm Rd.	22	38.51	1	4	1	1	2	4	4	5	1	10	3.25
9	Potash Brook corridor east of Queen City Park.	20	37.49	1	8	2	2	3	10	9	4	1	2	3.25
10	South of Swift St. Vicinity of Farrell St. Park.	12	83.04	3	10	3	1	1	8	4	3	1	10	4.45
11	Stream corridor south of UVM Hort. Farm to Route 7	26	25.96	1	10	1	1	1	1	4	1	1	1	2.05
12	Dorset Park Natural Area, north to I-89	7	186.97	7	1	7	2	3	7	6	4	2	10	5.25
13	Along Muddy Brook, just north of I-89	15	24.44	1	4	1	4	9	6	5	10	2	7	4.3
14	East Woods Natural Area	5	128.44	4	9	9	1	2	10	10	5	1	10	5.75
15	Red Rocks Park	13	103.62	4	10	7	2	1	9	8	7	1	2	4.4
16	Potash Brook between I- I89 lanes east of Spear St.	10	21.47	1	5	1	1	9	9	10	4	1	10	4.55
17	East of South Burlington High School	9	47.40	1	4	3	3	6	9	8	7	1	10	4.6
18	Stream and wetland complex between southern end of Airport and Williston Rd	23	22.10	1	3	1	3	7	5	9	7	1	1	2.9
19	Potash Brook Corridor, northwest of Kennedy Dr, east of Hinesburg Rd.	14	69.46	2	5	1	3	4	8	4	8	1	10	4.3
20	East of airport, extending east into Williston.	3	257.18	9	3	5	10	4	7	3	4	10	3	6.15
21	Between I-89, Patchen Rd & Williston Rd	16	87.02	3	7	4	3	6	8	6	5	1	3	4.1
22	Muddy Brook Park, along bank of Winooski River	21	52.55	2	3	1	5	1	4	2	2	10	3	3.25
23	Centennial Woods, extending into Burlington	8	160.68	6	8	8	2	2	7	8	4	1	3	4.7
24	Valley Ridge area, between I-89 and Winooski River	18	39.65	1	7	3	2	10	1	9	8	1	3	3.85
25	Winooski Gorge Natural Area	25	23.71	1	5	1	3	1	6	7	6	1	1	2.4
26	South of Cheesefactory Rd. in far southern corner of City. Extends to Shelburne Pond.	11	188.01	7	2	2	4	4	4	1	5	4	7	4.55

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