

Johnson Creek Park Vegetation Sampling Design Pilot Project

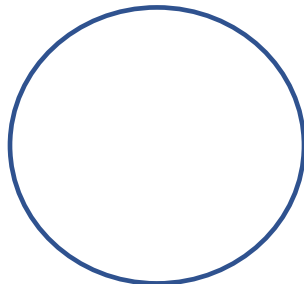
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Field Data Acquisition Design Specifications¹

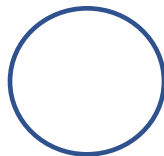
Height Based Structural Cover Classes

Height Ranges	Structural Class
Woody Plants	
20 + Feet	Trees
0 – 20-Feet	Shrubs
Nonwoody Plants	Herbs

Forest Sample Unit (Radius 30-feet / 2826-square feet):



Shrub Sample Unit (Radius 15-feet / 706.5-square feet):



Herbaceous Sample Unit (Radius 10-feet / 314-square feet):



¹ Data points will be located in field using GPS units, temporarily staked at center points, and radii measured using measuring tape. If there are understory vegetation of one or more different structural classes, the appropriate sample plot sizes will be nested at the center points of the tallest structural class.

Areal Percent Cover Classes

Percent Cover Range	Percent Cover Mid-Point
0 - 5	2.5
5 - 25	15
25 - 50	37.5
50 - 75	62.5
75 - 100	87.5

Mapping and Field Data Acquisition Steps:

1. Save existing vegetation access database as template without data.²
2. Save template as new renamed access database.
3. Populate look-up field tables (e.g., plant species list, technician, moisture index, weed index, etc.) using append query using original database as source for the new database.
4. Create an ArcMap project.
5. Export Sample Plot table from new database to Excel spreadsheet.
6. Import spreadsheet to ArcMap project and convert to table that can be edited in ArcMap projects.³
7. In ArcCatalog, create a file geodatabase with thematic representation of vegetation in three feature datasets (Forest, Shrub, Herbaceous).
8. In ArcMap, use aerial imagery to digitize three homogeneous vegetation sample units (Forest, Shrub, Herbaceous) based on vegetation signatures (e.g., image density, texture, tone and shape) in the area of interest (AOI).
9. Use the Create Random Point tool in ArcToolbox to create a “sample plot grid ” point feature class using the constraint boundaries of the previously digitized sample units to help ensure an adequate sample ⁴is generated for each unit.⁵

² Original database designed and built by author for earlier applications.

³ Be sure to change table field data types back to the data types used in the same fields in the original access table.

⁴ A general rule is the larger and more heterogeneity of sample data in the unit, the larger the sample number.

⁵ Be sure to place the respective sample plots generated into the appropriate corresponding feature datasets in the geodatabase as feature classes.

10. Add fields to the attribute tables as is appropriate based on design schema with emphasis of ensuring the creation of a sample plot grid sample plot number field for use in a relationship class with the table generated in step 6.
11. Create a one-to-many relationship class between the sample plot grid (the sample plot locations) and the table that will contain the attributes of the plant species data sampled.
12. Print out fields in table in step 6 (e.g., sample plot number, latitude, longitude, genus, species and percent cover) to create sample forms in preparation for field data collection.
13. Save the sample feature class as a Layer file.
14. Use the Layer to KML tool in ArcToolbox to convert the sample plot grid data to a KML zipped file (KMZ).
15. Convert the KMZ sample plot data to a GPX file in preparation of uploading it to a Garmin GPS unit.⁶
16. Upload the data onto the Garmin GPS unit.⁷
17. At the field site location, use the 'Find' and 'GoTo' functions on the Garmin unit to find and walk to each of the sample plot locations and then record data observations on the field forms printed in step 12.
18. After the field data are collected, use the relationship selection to open and then manually transfer the data into the attribute table related to the sample plot grid in your ArcMap project and then use an Append Query to put that data into the Access database.
19. Use running SQL moisture index and weed index queries informing the Access report to discern sample plot moisture and weed indexes for the AOI, run interpolations using Spatial Analyst tools in ArcToolbox and then classify and map for visualization of these data outputs.
20. Develop plant species dominance and subordinate percent cover thresholds for use in SQL queries to aid the classification of plant communities represented in the AOI.

⁶ The KMZ file must first have the associated KML file extracted in preparation of conversions and transfer to Garmin GPS Units using DNR GPS and Garmin BaseCamp software.

⁷ While these procedures were written for use on computers running on a Windows 10 Operating System and Garmin GPS units, they will vary depending on which computer and GPS technologies are employed.

Johnson Creek Park Vegetation Sampling Layout and Design



Map Author: John Marshall
Date: 08/02/2019

Vegetation Sampling Plan Author: John Marshall

Field Based Random Sample Alternative Solution (Display Only)

Random Number Generator

Random Number Generator (Random Cardinal Directions)

Press the calculate button to select a random cardinal direction.

Minimum and Maximum Cardinal Directions (Range)	
Minimum Cardinal Range:	<input type="text" value="1"/>
Maximum Cardinal Range:	<input type="text" value="8"/>

1 = North | 2 = Northeast | 3 = East | 4 = Southeast | 5 = South | 6 = Southwest | 7 = West | 8 = Northwest

CALCULATE

Random Number Generator (Random Distances)

Press the calculate button to select a random distance.

Please enter the minimum and maximum distances to establish your desired distance range.

<input type="text"/>	<input type="text"/>
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CALCULATE

* JavaScript and HTML / CSS code for calculator written by John Marshall.



To access calculator use the following link:

<https://mitigationcreditdebit.com/RandomNumberGenerator4.html>

Workflow to Display Samples on iPhone

Add KML files from Google Drive

You can import KML and KMZ files from your Google Drive into the Google Earth app (my app only supports the unzipped KML file).

1. Make sure you've installed the [Google Drive app](#).
2. Put the sample plot KML file you extract in preparation for step 15 in a Google Drive folder.
3. On your iPhone or iPad, open the Google Earth app .
4. Tap Menu  > My Places.
5. At the bottom, tap Import KML file.
6. Tap Browse.
7. On the top left, tap Locations.
8. Tap Drive > choose an account.
9. Choose a file. It will be added to your list of places.

Preliminary Hierarchical Stratification of Park into Management / Sample Units

1. Urban Park (e.g., mowed lawn, paved trails, benches, picnic tables, cultivar plants, etc.).
Samples: 1, 2, 3, 12, 13, 14, 15, 40, 41, 43.
2. Wild Park (e.g., maintained to support predominantly native flora and unpaved trails).
Samples: 4, 5, 6, 7, 8, 9, 10, 11, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39.

A. Forested Management / Sample Unit

Forest Management / Sample Unit 1

Samples: 25, 27, 31, 32, 33, 37, 39.

Tree Layer

Shrub Layer

Herbaceous Layer

Forest Management / Sample Unit 2

Samples: 26, 28, 29, 30, 34, 35, 36, 38.

Tree Layer

Shrub Layer

Herbaceous Layer

B. Scrub-Shrub Management / Sample Units

Scrub-Shrub Management / Sample Unit 1

Samples: 22, 23, 24.

Shrub Layer

Herbaceous Layer

Scrub-Shrub Management / Sample Unit 2

Samples: 17, 18, 19, 20, 21.

Shrub Layer

Herbaceous Layer

C. Herbaceous Management / Sample Unit

Herbaceous Management / Sample Unit 1

Samples: 4, 5, 6, 7, 8, 9,10, 11.

Herbaceous Layer

Procedural Steps

1. Urban Park samples were considered outside of the area of interest (AOI) and discarded.
2. Wild Park samples were aggregated and stratified by Management / Sample Units.
3. Multiple SQL queries were used to aggregate plant species sample records by a percent cover threshold and structural class.
4. Management / Sample Units were classified based on dominant structural vegetation classes and dominant species as measured by aggregate relative percent cover.
5. SQL query was used to find the aggregate moisture index and weed index for each sample and the average moisture and weed index for all the samples in the AOI.

Data available at:

<https://jlmstudent.maps.arcgis.com/apps/webappviewer/index.html?id=6147f1a29a0e4a5481ed2464a0dc02a0>

https://drive.google.com/drive/folders/172dTKUyhXHsFzYCMCvN0680_7XG9jT3u?usp=sharing

If you want to download the database from the Google Drive folder be sure to download both the frontend and the backend portions of this split database. Then once it is downloaded, open the frontend and enable the 'External Data' tab in the ribbon. Select 'Linked Table Manager' and check the 'Access' box and select the 'Relink' button. Then navigate to the folder you put the backend portion of the database in and select it. You will be prompted to link to all the tables in the database. Select 'Yes' then 'OK' for each successive one. Once that is complete you will be able to use the controls on the switchboard to access data entry form and focal metrics report. The first time you select one it will take a few seconds to open but should respond much faster after that.

Classification Query Forest Sample Unit 1 Tree Layer >= 37.5 Percent Cover

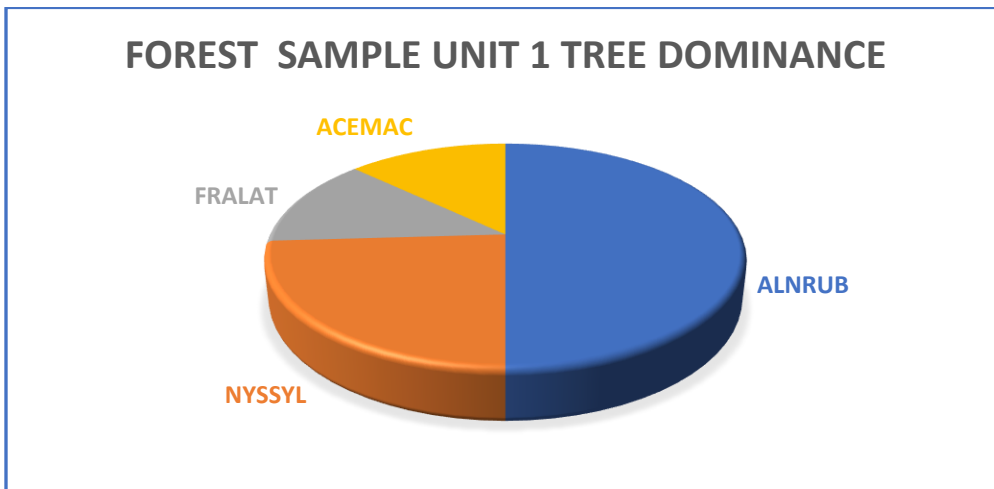
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SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover,
SamplePlot.Layer
```

```
FROM SamplePlot
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```
WHERE (((SamplePlot.SPlotNo)=25 Or (SamplePlot.SPlotNo)=27 Or
(SamplePlot.SPlotNo)=31 Or (SamplePlot.SPlotNo)=32 Or (SamplePlot.SPlotNo)=33 Or
(SamplePlot.SPlotNo)=37 Or (SamplePlot.SPlotNo)=39) AND ((SamplePlot.PCover)>=37.5)
AND ((SamplePlot.Layer)="Tree"));
```

SPlotNo	Genus	Species	PCover	Layer
25	Alnus	rubra	62.5	Tree
31	Fraxinus	latifolia	87.5	Tree
32	Alnus	rubra	87.5	Tree
33	Alnus	rubra	87.5	Tree
39	Acer	macrophyllum	87.5	Tree
27	Nyssa	sylvatica	62.5	Tree
27	Alnus	rubra	37.5	Tree
31	Alnus	rubra	62.5	Tree
32	Nyssa	sylvatica	37.5	Tree
33	Nyssa	sylvatica	62.5	Tree
Total			675	

Species	Dominance
ALNRUB	0.5
NYSSYL	0.24074074
FRALAT	0.12962963
ACEMAC	0.12962963
Sum	1



Classification Query Forest Sample Unit 1 Shrub Layer >= 37.5 Percent Cover

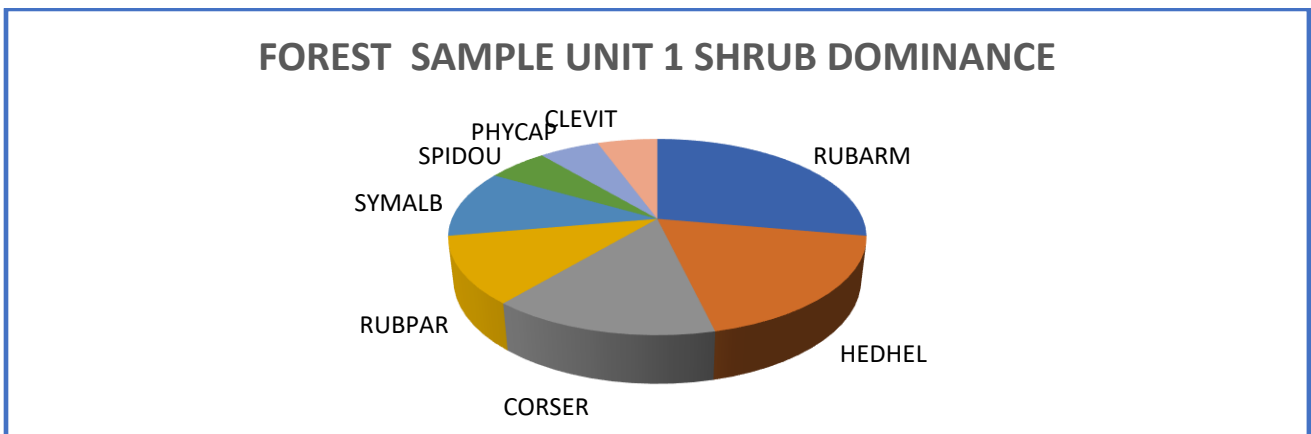
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SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover,
SamplePlot.Layer
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FROM SamplePlot
```

```
WHERE (((SamplePlot.SPlotNo)=25 Or (SamplePlot.SPlotNo)=27 Or
(SamplePlot.SPlotNo)=31 Or (SamplePlot.SPlotNo)=32 Or (SamplePlot.SPlotNo)=33 Or
(SamplePlot.SPlotNo)=37 Or (SamplePlot.SPlotNo)=39) AND ((SamplePlot.PCover)>=37.5)
AND ((SamplePlot.Layer)="Scrub-Shrub"));
```

SPlotNo	Genus	Species	PCover	Layer
27	Rubus	parviflorus	37.5	Scrub-Shrub
31	Cornus	sericea	62.5	Scrub-Shrub
31	Symphoricarpos	albus	37.5	Scrub-Shrub
32	Spiraea	douglasii	37.5	Scrub-Shrub
32	Rubus	parviflorus	37.5	Scrub-Shrub
33	Cornus	sericea	37.5	Scrub-Shrub
33	Physocarpus	capitatus	37.5	Scrub-Shrub
33	Symphoricarpos	albus	37.5	Scrub-Shrub
39	Hedera	helix	87.5	Scrub-Shrub
39	Rubus	armeniacus	62.5	Scrub-Shrub
25	Clematis	vitalba	37.5	Scrub-Shrub
25	Rubus	armeniacus	87.5	Scrub-Shrub
37	Hedera	helix	37.5	Scrub-Shrub
37	Rubus	armeniacus	37.5	Scrub-Shrub
*				
Total			675	

Species	Dominance
RUBARM	0.2777778
HEDHEL	0.1851852
CORSER	0.1481481
RUBPAR	0.1111111
SYMALB	0.1111111
SPIDOU	0.0555556
PHYCAP	0.0555556
CLEVIT	0.0555556
Sum	1



Classification Query Forest Sample Unit 1 Herb Layer >= 37.5 Percent Cover

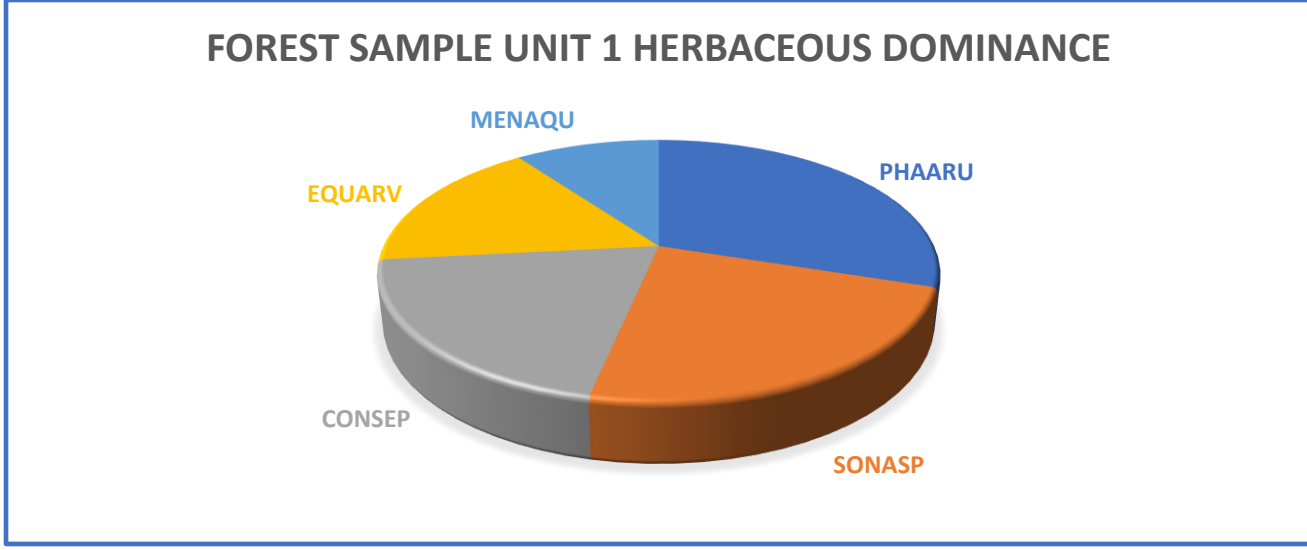
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover, SamplePlot.Layer

FROM SamplePlot

WHERE (((SamplePlot.SPlotNo)=25 Or (SamplePlot.SPlotNo)=27 Or (SamplePlot.SPlotNo)=31 Or (SamplePlot.SPlotNo)=32 Or (SamplePlot.SPlotNo)=33 Or (SamplePlot.SPlotNo)=37 Or (SamplePlot.SPlotNo)=39) AND ((SamplePlot.PCover)>=37.5) AND ((SamplePlot.Layer)="Herbaceous"));

SPlotNo	Genus	Species	PCover	Layer
37	Sonchus	asper	87.5	Herbaceous
31	Phalaris	arundinaceae	37.5	Herbaceous
32	Phalaris	arrundinacea	37.5	Herbaceous
33	Convolvulus	sepium	37.5	Herbaceous
33	Phalaris	arundinaceae	37.5	Herbaceous
33	Mentha	aquatica var citrata	37.5	Herbaceous
25	Convolvulus	sepium	37.5	Herbaceous
37	Equisetum	arvense	62.5	Herbaceous
Total			375	

Species	Dominance
PHAARU	0.3
SONASP	0.2333333
CONSEP	0.2
EQUARV	0.1666667
MENAQU	0.1
Sum	1



Classification Query Forest Sample Unit 2 Tree Layer >= 37.5 Percent Cover

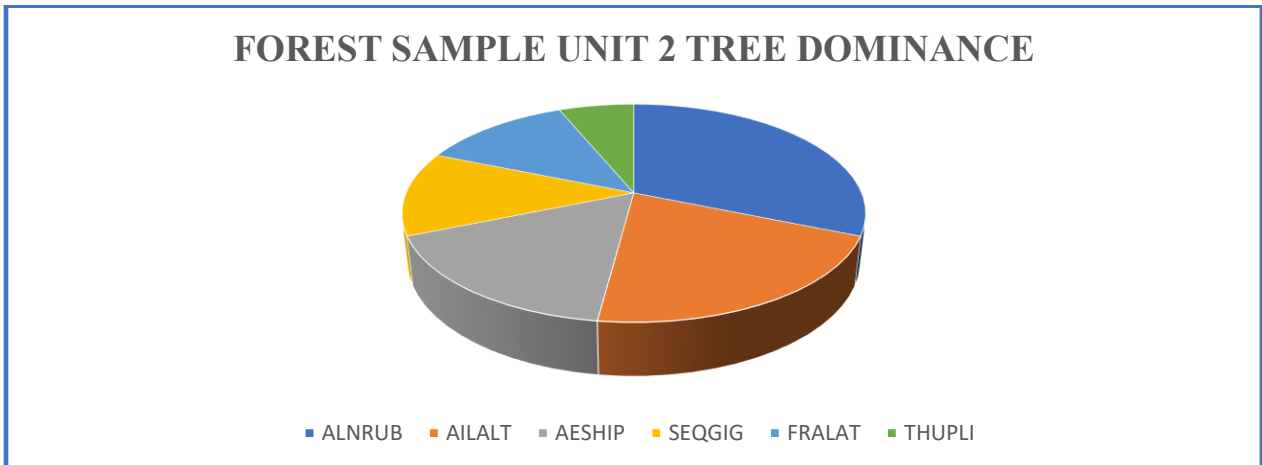
```
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover,
SamplePlot.Layer
```

```
FROM SamplePlot
```

```
WHERE (((SamplePlot.SPlotNo)=26 Or (SamplePlot.SPlotNo)=28 Or
(SamplePlot.SPlotNo)=29 Or (SamplePlot.SPlotNo)=30 Or (SamplePlot.SPlotNo)=34 Or
(SamplePlot.SPlotNo)=35 Or (SamplePlot.SPlotNo)=36 Or (SamplePlot.SPlotNo)=38) AND
((SamplePlot.PCover)>=37.5) AND ((SamplePlot.Layer)="Tree"));
```

SPlotNo	Genus	Species	PCover	Layer
26	Fraxinus	latifolia	62.5	Tree
28	Aesculus	hippocastanum	87.5	Tree
29	Ailanthus	altissima	37.5	Tree
30	Alnus	rubra	62.5	Tree
34	Ailanthus	altissima	62.5	Tree
36	Sequoiadendron	giganteum	87.5	Tree
38	Sequoiadendron	giganteum	37.5	Tree
35	Alnus	rubra	62.5	Tree
26	Alnus	rubra	62.5	Tree
30	Ailanthus	altissima	62.5	Tree
36	Thuja	plicata	37.5	Tree
38	Aesculus	hippocastanum	37.5	Tree
38	Thuja	plicata	37.5	Tree
* Total			737.5	

Species	Dominance
ALNRUB	0.277778
AILALT	0.185185
AESHIP	0.148148
SEQGIG	0.111111
FRALAT	0.111111
THUPLI	0.055556
Sum	1



Classification Query Forest Sample Unit 2 Shrub Layer ≥ 37.5 Percent Cover

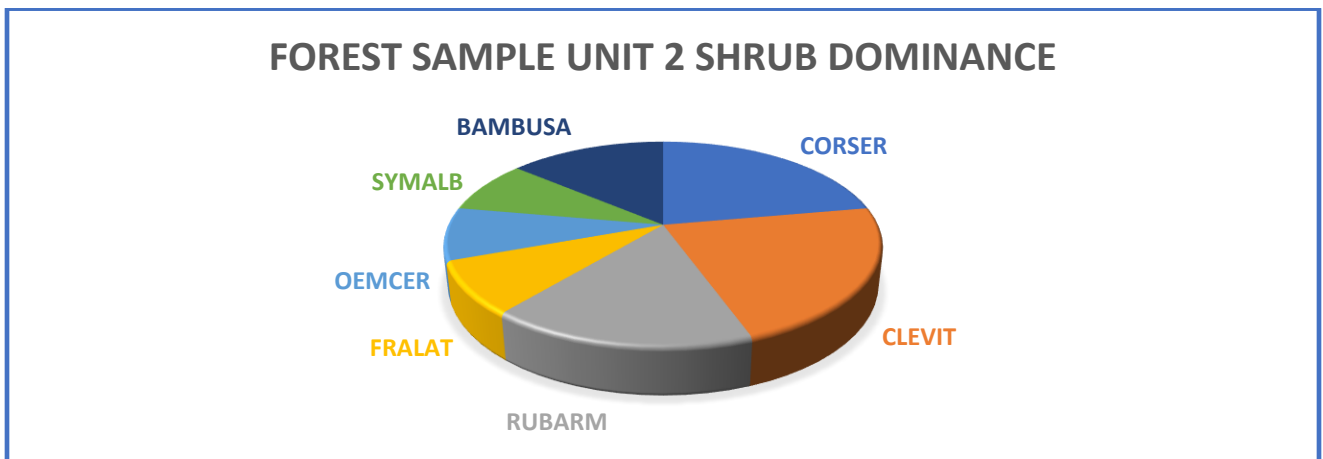
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover, SamplePlot.Layer

FROM SamplePlot

WHERE (((SamplePlot.SPlotNo)=26 Or (SamplePlot.SPlotNo)=28 Or (SamplePlot.SPlotNo)=29 Or (SamplePlot.SPlotNo)=30 Or (SamplePlot.SPlotNo)=34 Or (SamplePlot.SPlotNo)=35 Or (SamplePlot.SPlotNo)=36 Or (SamplePlot.SPlotNo)=38) AND ((SamplePlot.PCover) \geq 37.5) AND ((SamplePlot.Layer)="Scrub-Shrub"));

SPlotNo	Genus	Species	PCover	Layer
35	Bambusa	spp	62.5	Scrub-Shrub
34	Rubus	armeniacus	37.5	Scrub-Shrub
34	Clematis	vitalba	62.5	Scrub-Shrub
29	Cornus	sericea	37.5	Scrub-Shrub
29	Clematis	vitalba	37.5	Scrub-Shrub
29	Rubus	armeniacus	37.5	Scrub-Shrub
30	Cornus	sericea	62.5	Scrub-Shrub
28	Fraxinus	latifolia	37.5	Scrub-Shrub
28	Oemleria	cerasiformis	37.5	Scrub-Shrub
28	Symphoricarpos	albus	37.5	Scrub-Shrub
Total			450	

Species	Dominance
CORSER	0.22222222
CLEVIT	0.22222222
RUBARM	0.16666667
FRALAT	0.08333333
OEMCER	0.08333333
SYMALB	0.08333333
BAMBUSA	0.13888889
Sum	1



Classification Query Forest Sample Unit 2 Herbaceous Layer >= 15 Percent Cover

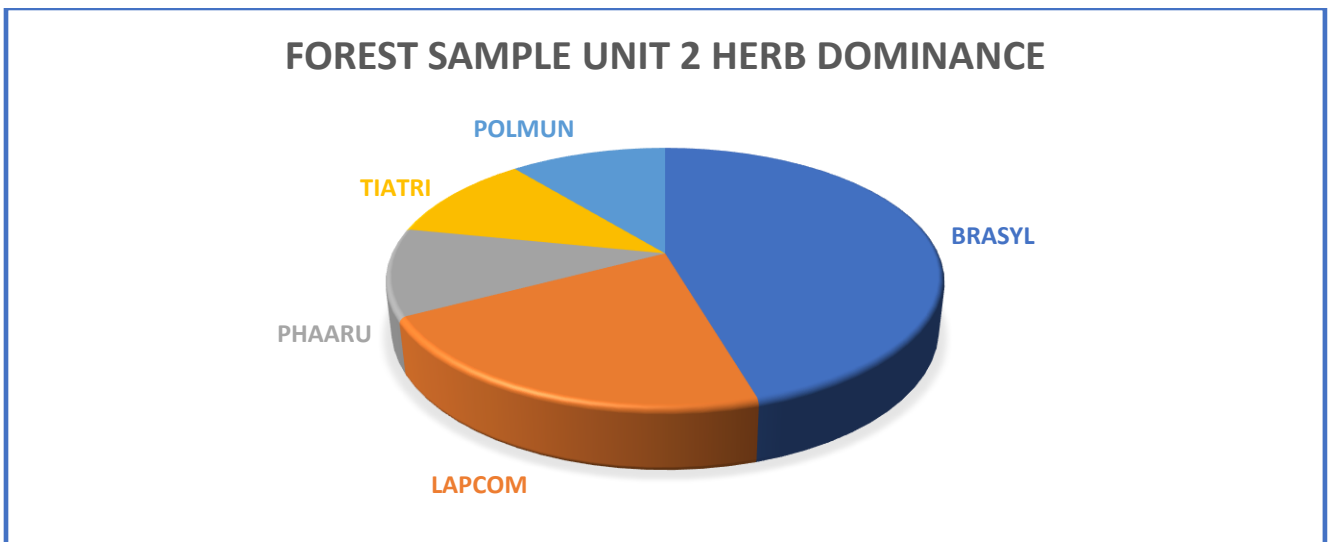
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover, SamplePlot.Layer

FROM SamplePlot

WHERE (((SamplePlot.SPlotNo)=26 Or (SamplePlot.SPlotNo)=28 Or (SamplePlot.SPlotNo)=29 Or (SamplePlot.SPlotNo)=30 Or (SamplePlot.SPlotNo)=34 Or (SamplePlot.SPlotNo)=35 Or (SamplePlot.SPlotNo)=36 Or (SamplePlot.SPlotNo)=38) AND ((SamplePlot.PCover)>=15) AND ((SamplePlot.Layer)="Herbaceous"));

SPlotNo	Genus	Species	PCover	Layer
35	Phalaris	arundinaceae	15	Herbaceous
29	Brachypodium	sylvaticum	62.5	Herbaceous
29	Lapsana	communis	15	Herbaceous
30	Tiarella	trifoliata	15	Herbaceous
28	Polystichum	munitum	15	Herbaceous
36	Lapsana	communis	15	Herbaceous
Total			137.5	

Species	Dominance
BRASYL	0.4545455
LAPCOM	0.2181818
PHAARU	0.1090909
TIATRI	0.1090909
POLMUN	0.1090909
Sum	1



Classification Query Scrub-Shrub Sample Unit 1 Shrub Layer >= 15 Percent Cover

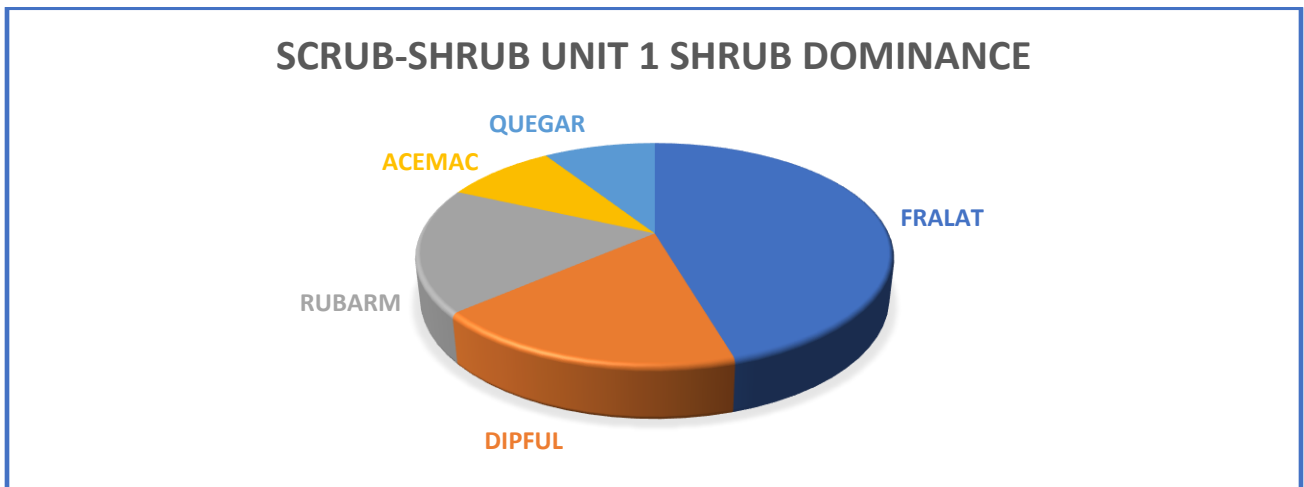
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover, SamplePlot.Layer

FROM SamplePlot

WHERE (((SamplePlot.SPlotNo)=22 Or (SamplePlot.SPlotNo)=23 Or (SamplePlot.SPlotNo)=24) AND ((SamplePlot.PCover)>=15) AND ((SamplePlot.Layer)="Scrub-Shrub"));

SPlotNo	Genus	Species	PCover	Layer
24	Quercus	garryana	15	Scrub-Shrub
24	Acer	macrophyllum	15	Scrub-Shrub
24	Fraxinus	latifolia	37.5	Scrub-Shrub
22	Fraxinus	latifolia	37.5	Scrub-Shrub
22	Dipsacus	fullonum	15	Scrub-Shrub
22	Rubus	armeniacus	15	Scrub-Shrub
23	Dipsacus	fullonum	15	Scrub-Shrub
23	Rubus	armeniacus	15	Scrub-Shrub
Total			165	

Species	Dominance
FRALAT	0.4545455
DIPFUL	0.1818182
RUBARM	0.1818182
ACEMAC	0.0909091
QUEGAR	0.0909091
Sum	1



Classification Query Scrub-Shrub Sample Unit 1 Herbaceous Layer >= 15 Percent Cover

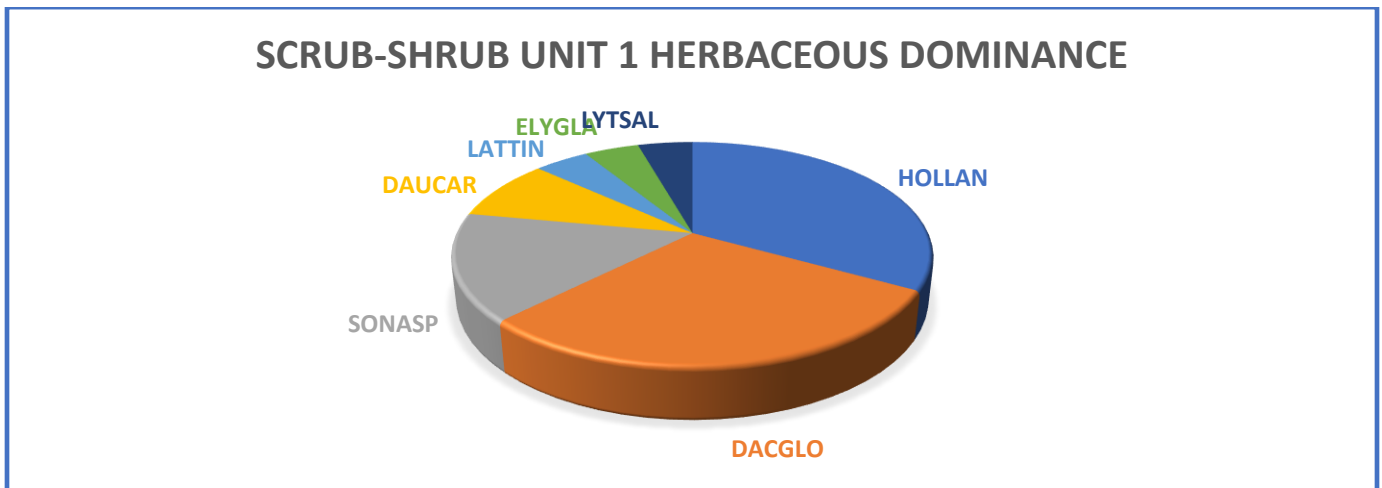
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover, SamplePlot.Layer

FROM SamplePlot

WHERE (((SamplePlot.SPlotNo)=22 Or (SamplePlot.SPlotNo)=23 Or (SamplePlot.SPlotNo)=24) AND ((SamplePlot.PCover)>=15) AND ((SamplePlot.Layer)='Herbaceous'));

SPlotNo	Genus	Species	PCover	Layer
22	Sonchus	asper	15	Herbaceous
24	Holcus	lanatus	37.5	Herbaceous
24	Daucus	carota	15	Herbaceous
24	Lathyrus	tingitanus	15	Herbaceous
24	Elymus	glaucus	15	Herbaceous
24	Sonchus	asper	37.5	Herbaceous
22	Holcus	lanatus	37.5	Herbaceous
22	Dactylis	glomerata	62.5	Herbaceous
22	Daucus	carota	15	Herbaceous
23	Holcus	lanatus	37.5	Herbaceous
23	Lythrum	salicaria	15	Herbaceous
23	Dactylis	glomerata	37.5	Herbaceous
Total			340	

Species	Dominance
HOLLAN	0.33088235
DACGLO	0.29411765
SONASP	0.15441176
DAUCAR	0.08823529
LATTIN	0.04411765
ELYGLA	0.04411765
LYTSAL	0.04411765
Sum	1



Classification Query Scrub-Shrub Sample Unit 2 Shrub Layer >= 15 Percent Cover

SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species, SamplePlot.PCover, SamplePlot.Layer

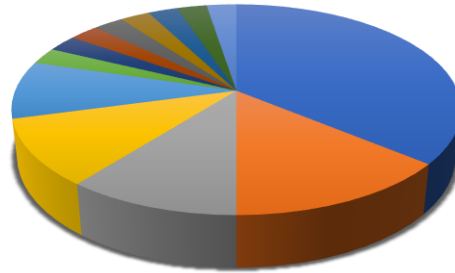
FROM SamplePlot

WHERE (((SamplePlot.SPlotNo)=17 Or (SamplePlot.SPlotNo)=19 Or (SamplePlot.SPlotNo)=10 Or (SamplePlot.SPlotNo)=21 Or (SamplePlot.SPlotNo)=18 Or (SamplePlot.SPlotNo)=20) AND ((SamplePlot.PCover)>=15) AND ((SamplePlot.Layer)="Scrub-Shrub"));

SPlotNo	Genus	Species	PCover	Layer
17	Quercus	rubra	37.5	Scrub-Shrub
17	Corylus	cornuta v californic	15	Scrub-Shrub
17	Clematis	vitalba	15	Scrub-Shrub
17	Cytisus	scoparius	15	Scrub-Shrub
17	Rubus	armeniacus	37.5	Scrub-Shrub
18	Rubus	armeniacus	37.5	Scrub-Shrub
18	Clematis	vitalba	37.5	Scrub-Shrub
18	Hedera	helix	62.5	Scrub-Shrub
18	Fraxinus	latifolia	15	Scrub-Shrub
18	Crataegus	douglasii	15	Scrub-Shrub
18	Corylus	cornuta v californic	15	Scrub-Shrub
19	Acer	macrophyllum	15	Scrub-Shrub
19	Rubus	armeniacus	62.5	Scrub-Shrub
19	Quercus	rubra	15	Scrub-Shrub
19	Clematis	vitalba	15	Scrub-Shrub
20	Prunus	avium	15	Scrub-Shrub
20	Clematis	vitalba	15	Scrub-Shrub
20	Rubus	armeniacus	37.5	Scrub-Shrub
20	Corylus	cornuta v californic	15	Scrub-Shrub
21	Quercus	garryana	15	Scrub-Shrub
21	Holodiscus	discolor	15	Scrub-Shrub
21	Corylus	cornuta v californic	15	Scrub-Shrub
21	Malus	spp	15	Scrub-Shrub
10	Rubus	armeniacus	37.5	Scrub-Shrub
* Total			590	

Species	Dominance
RUBARM	0.36016949
CLEVIT	0.13983051
HEDHEL	0.1059322
CORCOR	0.10169492
QUERUB	0.08898305
QUEGAR	0.02542373
CRADOU	0.02542373
ACEMAC	0.02542373
PRUAVI	0.02542373
HOLDIS	0.02542373
CYTSCO	0.02542373
MALSPP	0.02542373
FRALAT	0.02542373
Sum	1

SCRUB-SHRUB UNIT 2 SHRUB DOMINANCE



■ RUBARM ■ CLEVIT ■ HEDHEL ■ CORCOR ■ QUERUB ■ QUEGAR ■ CRADOU
■ ACEMAC ■ PRUAVI ■ HOLDIS ■ CYTSCO ■ MALSPP ■ FRALAT

Classification Query Scrub-Shrub Sample Unit 2 Herbaceous Layer >= 15 Percent Cover

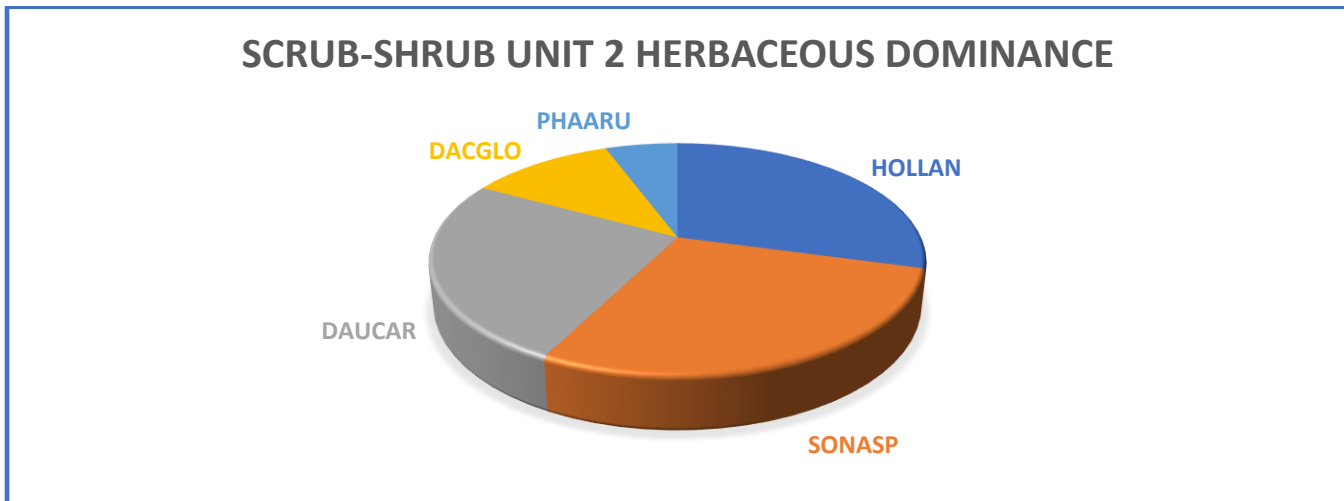
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species,
SamplePlot.PCover, SamplePlot.Layer

FROM SamplePlot

WHERE (((SamplePlot.SPlotNo)=17 Or (SamplePlot.SPlotNo)=19 Or
(SamplePlot.SPlotNo)=10 Or (SamplePlot.SPlotNo)=21 Or
(SamplePlot.SPlotNo)=18 Or (SamplePlot.SPlotNo)=20) AND
((SamplePlot.PCover)>=15) AND ((SamplePlot.Layer)="Herbaceous"));

SPlotNo	Genus	Species	PCover	Layer
21	Phalaris	arundinaceae	15	Herbaceous
17	Daucus	carota	15	Herbaceous
17	Dactylis	glomerata	15	Herbaceous
18	Daucus	carota	15	Herbaceous
18	Sonchus	asper	37.5	Herbaceous
18	Dactylis	glomerata	15	Herbaceous
18	Holcus	lanatus	15	Herbaceous
21	Sonchus	asper	37.5	Herbaceous
21	Holcus	lanatus	62.5	Herbaceous
21	Daucus	carota	37.5	Herbaceous
Total			265	

Species	Dominance
HOLLAN	0.29245283
SONASP	0.283018868
DAUCAR	0.254716981
DACGLO	0.113207547
PHAARU	0.056603774
Sum	1



Classification Query Herbaceous Sample Unit Herbaceous Layer >= 15 Percent Cover

```
SELECT SamplePlot.SPlotNo, SamplePlot.Genus, SamplePlot.Species,
SamplePlot.PCover, SamplePlot.Layer
```

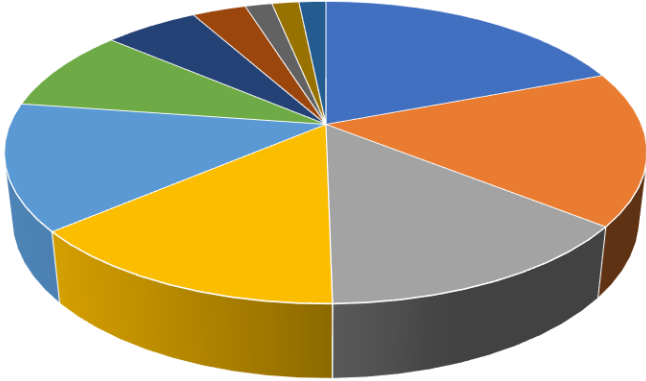
```
FROM SamplePlot
```

```
WHERE (((SamplePlot.SPlotNo)=4 Or (SamplePlot.SPlotNo)=5 Or
(SamplePlot.SPlotNo)=6 Or (SamplePlot.SPlotNo)=7 Or (SamplePlot.SPlotNo)=8
Or (SamplePlot.SPlotNo)=9 Or (SamplePlot.SPlotNo)=10 Or
(SamplePlot.SPlotNo)=11) AND ((SamplePlot.PCover)>=15) AND
((SamplePlot.Layer)='Herbaceous'));
```

SPlotNo	Genus	Species	PCover	Layer
6	Phalaris	arundinaceae	62.5	Herbaceous
7	Agrostis	stolonifera	62.5	Herbaceous
4	Equisetum	telmateia	15	Herbaceous
4	Dactylis	glomerata	62.5	Herbaceous
4	Sonchus	asper	15	Herbaceous
4	Brachypodium	sylvaticum	37.5	Herbaceous
7	Dactylis	glomerata	15	Herbaceous
5	Plantago	lanceolata	15	Herbaceous
5	Phalaris	arundinaceae	37.5	Herbaceous
5	Sonchus	asper	37.5	Herbaceous
5	Daucus	carota	37.5	Herbaceous
5	Holcus	lanatus	15	Herbaceous
6	Sonchus	asper	37.5	Herbaceous
6	Agrostis	stolonifera	62.5	Herbaceous
6	Holcus	lanatus	15	Herbaceous
8	Sonchus	asper	62.5	Herbaceous
8	Holcus	lanatus	37.5	Herbaceous
8	Agrostis	stolonifera	15	Herbaceous
9	Daucus	carota	15	Herbaceous
9	Phalaris	arundinaceae	15	Herbaceous
9	Tanacetum	vulgare	15	Herbaceous
9	Agrostis	stolonifera	37.5	Herbaceous
9	Dactylis	glomerata	15	Herbaceous
11	Solidago	lepida	15	Herbaceous
11	Equisetum	telmateia	15	Herbaceous
11	Brachypodium	sylvaticum	87.5	Herbaceous
11	Holcus	lanatus	15	Herbaceous
11	Dactylis	glomerata	37.5	Herbaceous
11	Phalaris	arundinaceae	15	Herbaceous
*				
Total			925	

Species	Dominance
AGRSTO	0.191891892
SONASP	0.164864865
PHAARU	0.140540541
DACGLO	0.140540541
BRASYL	0.135135135
HOLLAN	0.089189189
DAUCAR	0.056756757
EQUTEL	0.032432432
TANVUL	0.016216216
SOLLEP	0.016216216
PLALAN	0.016216216
Sum	1

HERBACEOUS UNIT HERB LAYER DOMINANCE



■ AGRSTO ■ SONASP ■ PHAARU ■ DACGLO ■ BRASYL ■ HOLLAN ■ DAUCAR ■ EQUDEL ■ TANVUL ■ SOLLEP ■ PLALAN

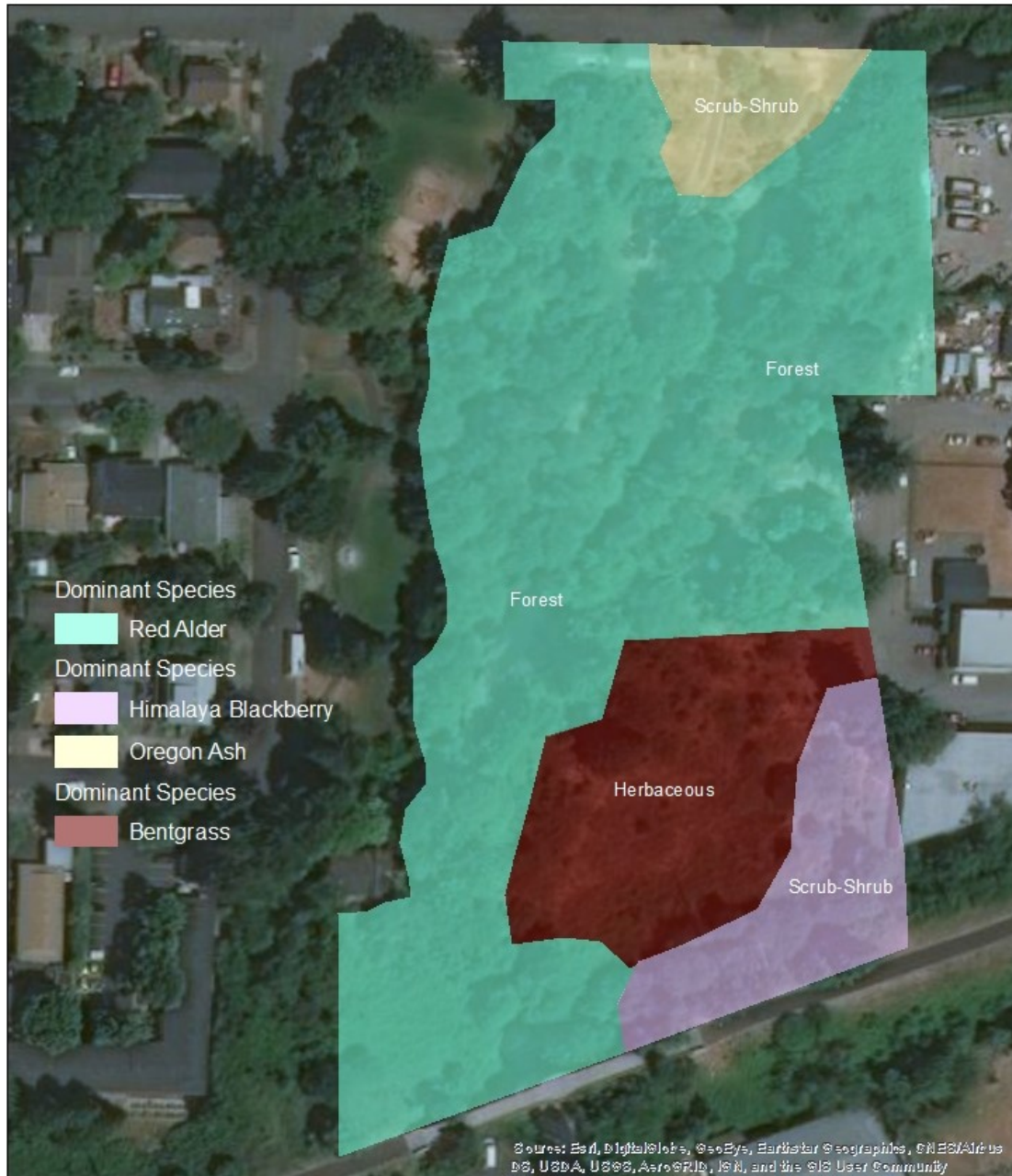
Johnson Creek Park AOI Dominant Structural Vegetation Classification



Map Compiled August 14, 2019

Field Data Collection, Map Cartography, and
Geoprocessing Completed by Volunteer Field
Naturalist John Marshall.

Johnson Creek Park AOI Dominant Species by Structural Vegetation Classification



Map Compiled August 14, 2019

Field Data Collection, Map Cartography, and Geoprocessing Completed by Volunteer Field Naturalist John Marshall.

SamplePlot.SPlotNo	PCoverTotal	MoistureIndexTotal	WeedIndTotal	SPMoistureIndex	SPWeedIndex	SamplePlot.Latitude	SamplePlot.Longitude
18	325	1187.5	1055	3.65384615384615	3.24615384615385		
19	210	787.5	680	3.75	3.23809523809524		
20	152.5	595	407.5	3.90163934426229	2.67213114754098		
21	222.5	762.5	572.5	3.42696629213483	2.57303370786517		
22	187.5	585	867.5	3.12	4.62666666666667		
23	150	435	555	2.9	3.7		
24	187.5	675	532.5	3.6	2.84		
25	270	882.5	980	3.26851851851852	3.62962962962963		
26	300	837.5	527.5	2.79166666666667	1.75833333333333		
27	210	700	447.5	3.33333333333333	2.13095238095238		
28	365	1440	717.5	3.94520547945205	1.96575342465753		
29	260	957.5	1010	3.68269230769231	3.88461538461538		
30	330	975	727.5	2.95454545454545	2.20454545454545		
31	327.5	837.5	525	2.55725190839695	1.6030534351145		
32	320	927.5	617.5	2.8984375	1.9296875		
33	405	1087.5	947.5	2.68518518518519	2.33950617283951		
34	262.5	895	1002.5	3.40952380952381	3.81904761904762		
35	242.5	807.5	587.5	3.3298969072165	2.42268041237113		
36	325	1295	652.5	3.98461538461538	2.00769230769231		
37	295	1132.5	870	3.83898305084746	2.94915254237288		
38	310	1245	702.5	4.01612903225806	2.26612903225806		
39	330	1305	1115	3.95454545454545	3.37878787878788		
40							
41							
42							
43							
44							

3.4491772100951

2.84465678475887

Average MIndex

Average WIndex

Page 1 of 1

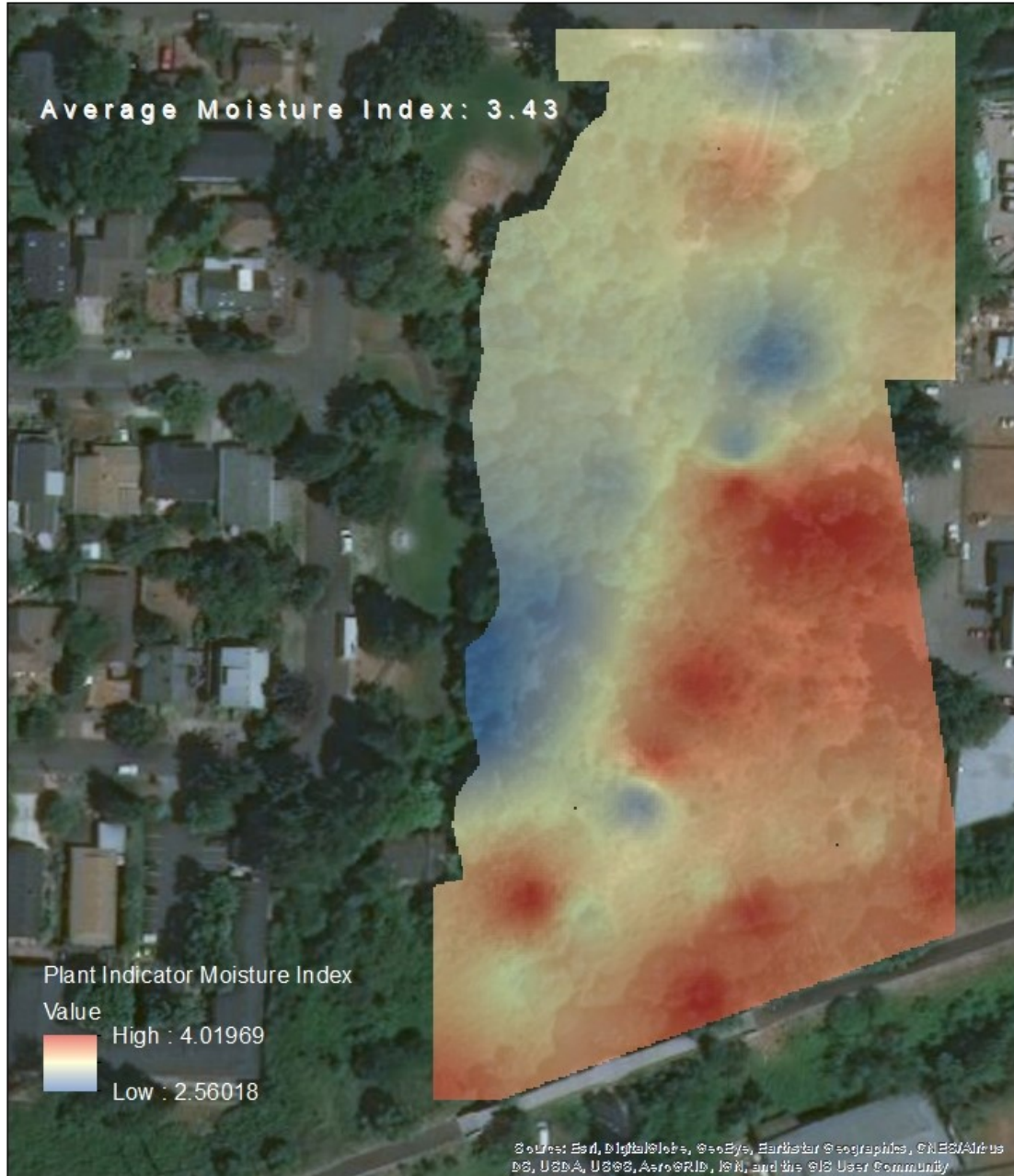
```
SELECT SamplePlot.SPlotNo, Sum(SamplePlot.PCover) AS PCoverTotal,
Sum([PCover]*[MIndex]) AS MoistureIndexTotal, Sum([PCover]*[WIndex]) AS
WeedIndTotal, ([MoistureIndexTotal]/[PCoverTotal]) AS SPMoistureIndex,
([WeedIndTotal]/[PCoverTotal]) AS SPWeedIndex, SamplePlot.Latitude,
SamplePlot.Longitude
```

```
FROM SamplePlot
```

```
GROUP BY SamplePlot.SPlotNo, SamplePlot.Latitude, SamplePlot.Longitude;
```

* Access database was created, populated with data, and run through queries and reports created by John Marshall.

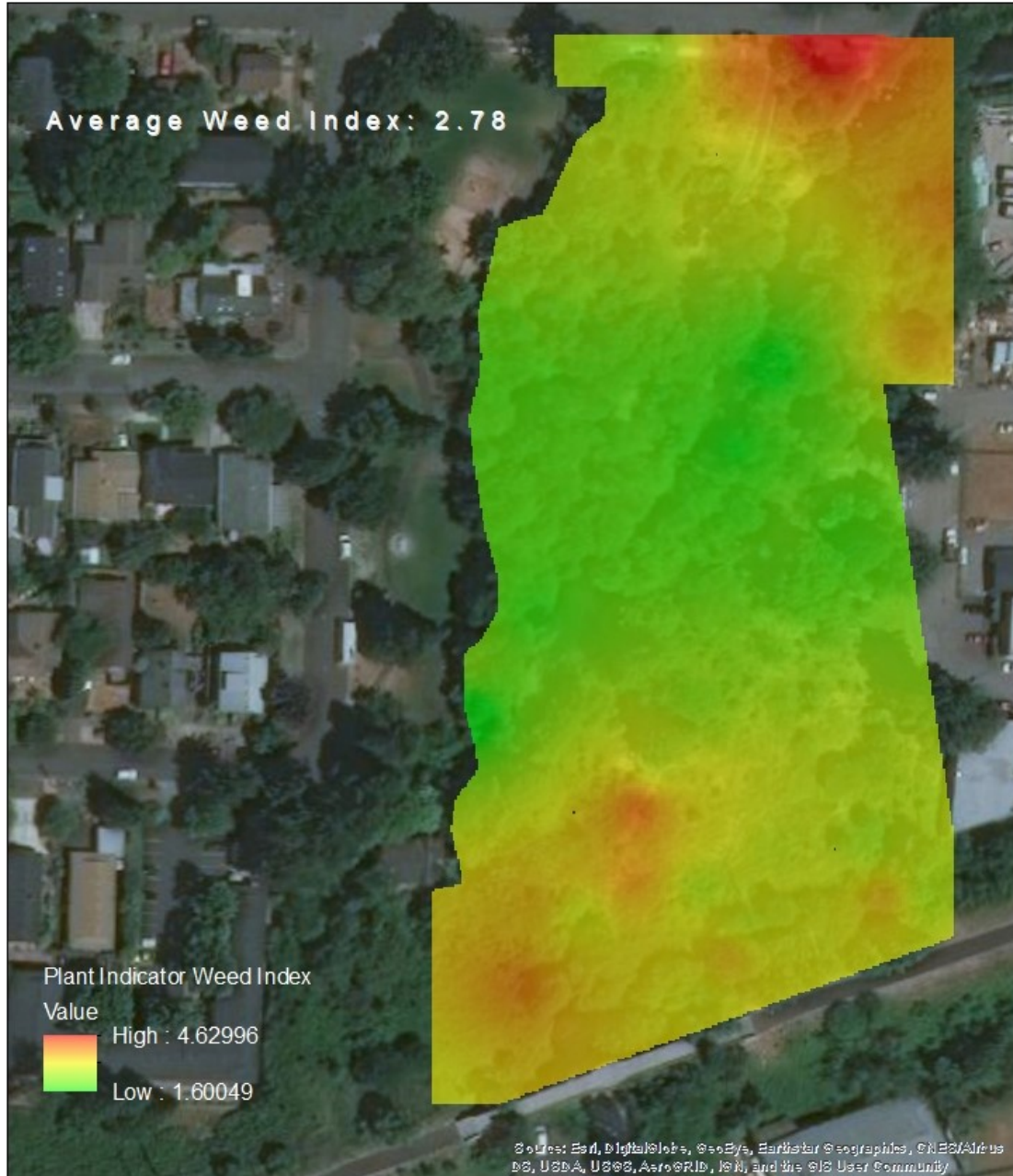
Johnson Creek Park AOI Plant Indicator Predicted Moisture Surface (Lower Values Indicate Predictors of Higher Soil Moisture Saturation)



Map Compiled August 13, 2019

Field Data Collection, Map Cartography, and Geoprocessing Completed by Volunteer Field Naturalist John Marshall.

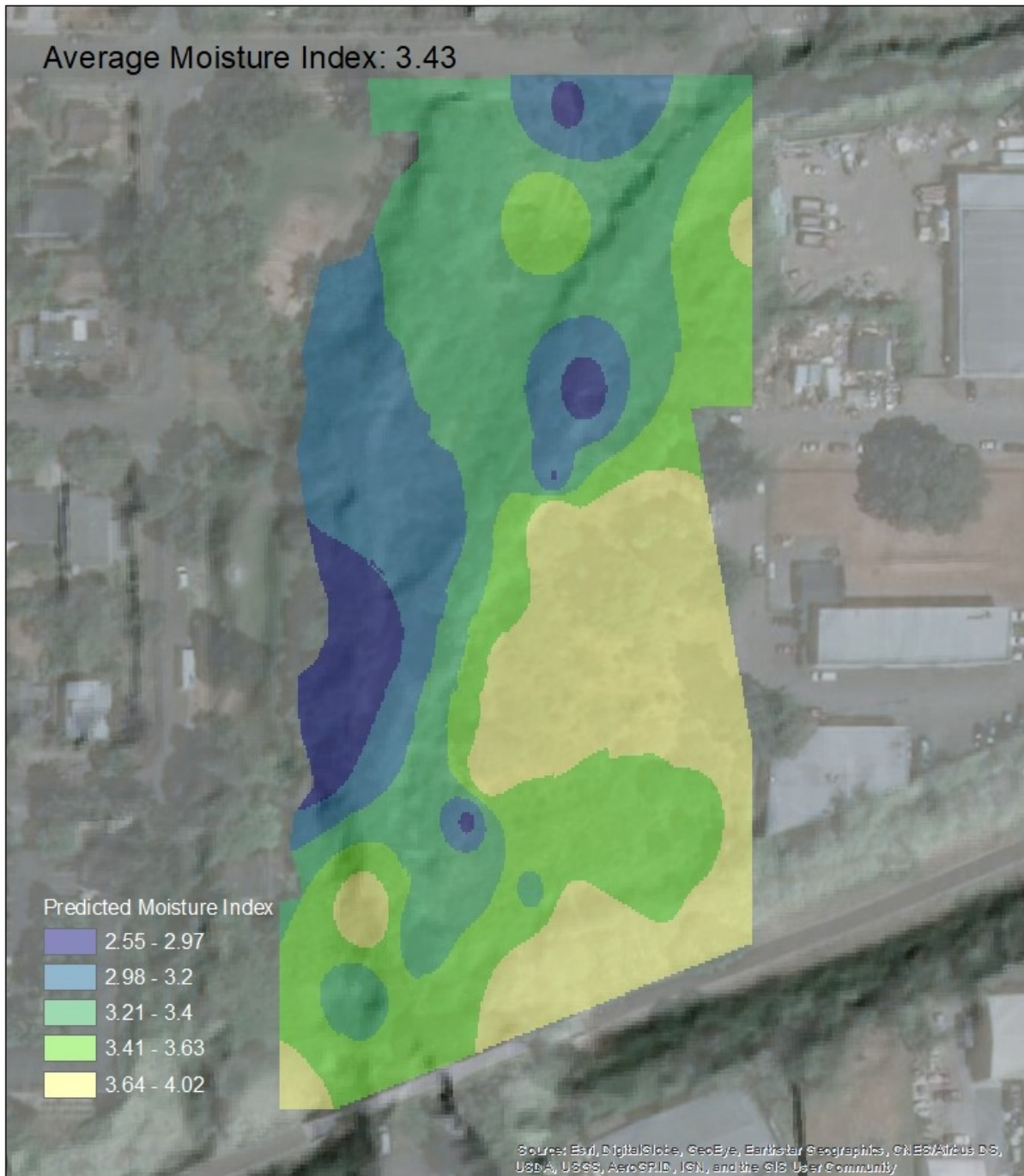
Johnson Creek Park AOI Plant Indicator Predicted Weed Surface (Lower Values Indicate Predictors of Lower Risk of Dominance by Nonnative Invasive Plants)



Map Compiled August 13, 2019

Field Data Collection, Map Cartography, and Geoprocessing Completed by Volunteer Field Naturalist John Marshall.

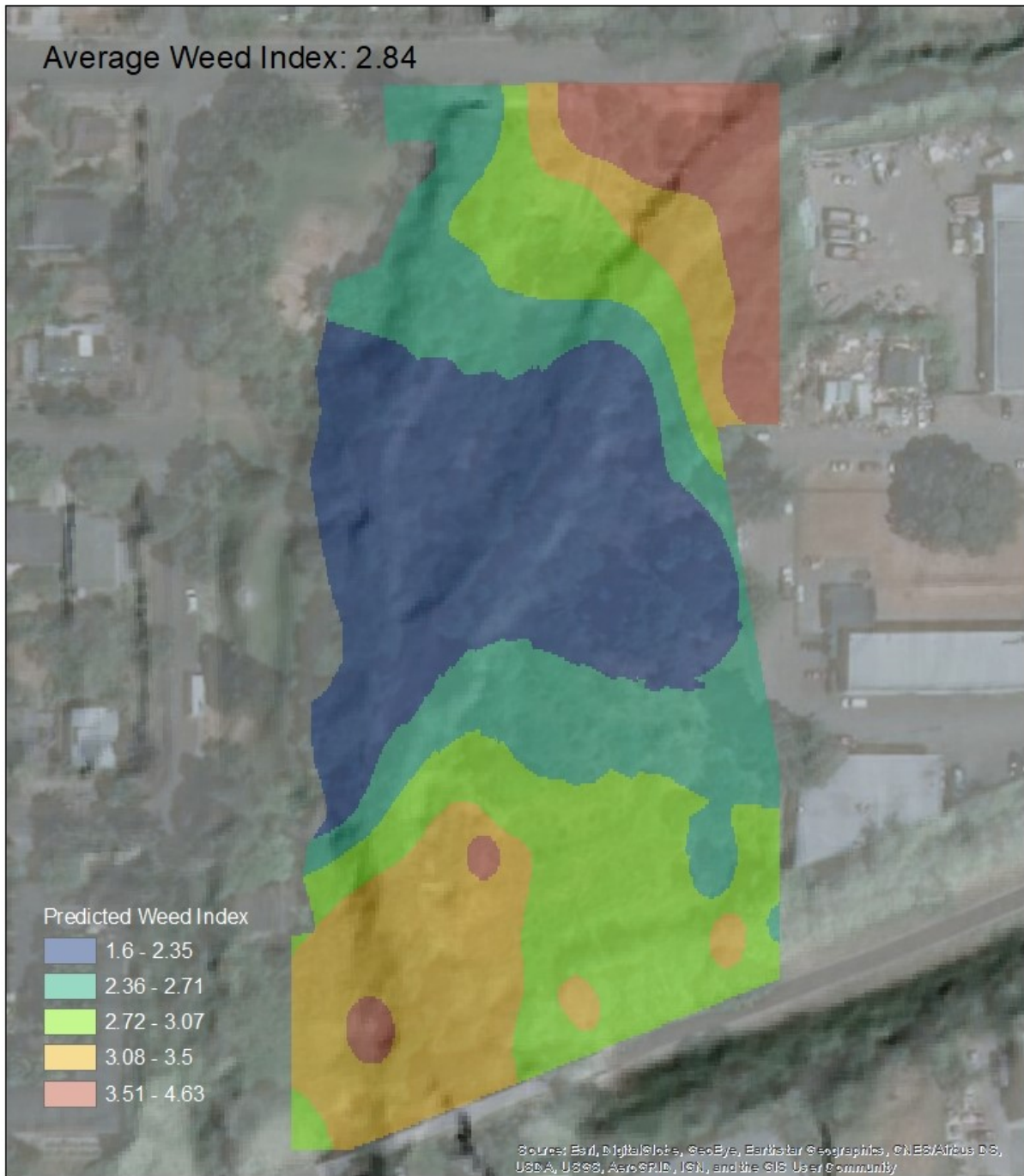
Johnson Creek Park Vegetation Predicted Moisture Index



Map Author: John Marshall
Date: 08/02/2019

Vegetation Sampling Plan, Field Collection, Mapping,
and Geoprocessing by John Marshall

Johnson Creek Park Vegetation Predicted Weed Index



Map Author: John Marshall
Date: 08/02/2019

Vegetation Sampling Plan, Field Collection, Mapping,
and Geoprocessing by John Marshall

RESOURCES USED

US Army Corps of Engineers Plant Database

http://wetland-plants.usace.army.mil/nwpl_static/v33/home/home.html

USDA Natural Resource Conservation Service Plants Database

<https://plants.sc.egov.usda.gov/java/>

Crystal Springs and Lower Johnson Creek, Healthy Park, Healthy Portland

<https://www.portlandoregon.gov/parks/article/155517>

Vegetation Summaries for Johnson Creek Park

<https://www.portlandoregon.gov/shared/cfm/image.cfm?id=155685>

Johnson Creek Watershed Characterization

<https://www.portlandoregon.gov/bes/article/214368>

Portland Maps (Open Data – Trees)

<http://gis-pdx.opendata.arcgis.com/datasets/street-trees/data?geometry=-123.299%2C45.368%2C-120.686%2C45.705>

Portland Parks Maps (Open Data – Trees)

<http://gis-pdx.opendata.arcgis.com/datasets/parks-tree-inventory>

Portland Parks Maps (Open Data – Vegetation)

<http://gis-pdx.opendata.arcgis.com/datasets/vegetation>

Hoyt Arboretum Herbarium Database

<https://hoystarboretum.gardenexplorer.org/>

Oregon State University Herbarium Native Plant / Weed Identification

<https://bpp.oregonstate.edu/herbarium/plantweed-identification>

Oregon State University Herbarium Oregon Flora Atlas

<http://www.oregonflora.org/atlas.php>

<http://www.oregonflora.org/gallery.php>