**Simpson Diversity Index Investigations**

Ms. Simmons was wandering around a meadow in Europe during the summer of 2014. She decided to survey the vegetation. She did a total of 5 quadrats (A, B, C, D, & E) of 50x50cm and she recorded each species she found and the number of individual plants.

The meadow was on a gentle slope with a stream at the bottom. Her hypothesis was that there will be more diversity at the base of the slope, in quadrat E, as the soil is deeper and it always has water from the stream when compared to quadrats at the top of the slope.

You will need to use the data she recorded from the quadrats as well as the Simpson Diversity Index to calculate the diversity values for each quadrat (A through E) to determine if Ms. Simmons’ hypothesis is correct. You will also calculate species richness, relative species evenness, and relative dominance.

Below is a map of the meadow and the placed quadrats. Underneath is a table with the species found in each quadrat which are represented with letters L through X.

stream

A

B

C

D

E

|  |  |  |  |
| --- | --- | --- | --- |
|  | Quadrat species name | Common name | Scientific name |
| 1 | L | Bilberry | Vaccinium mytillus |
| 2 | M | Buttercup | Ranunculus acris |
| 3 | N | Common sorrel | Rumex acetosa |
| 4 | O | Hoary cinquefoil | Pontentilla argentea |
| 5 | P | Lesser Stitchwort | Stellaria graminea |
| 6 | Q | Osier | Salix sap |
| 7 | R | Rose Bay Willowherb | Epilobium agustifolium |
| 8 | S | Sneezewort | Achillea ptarmica |
| 9 | T | Sweet vernal grass | Anthoxanthum odoratum |
| 10 | U | Timothy | Phelum pratense |
| 11 | V | Tufted vetch | Vicia cracca |
| 12 | W | Wavy hairgrass | Deschampsia flexuosa |
| 13 | X | Yarrow | Achillea milliflolia |

http://sciencebitz.com/wp-content/uploads/2012/02/codecogseqn-2.png

Must show your work for full credit! You may use a separate sheet of paper if you wish.

**Quadrat A** **Quadrat B**

W W X X X X X X X

W W W X X X X X X

W W W X X X X X X

W W W W X X X X

W W W W W X X X X

W W W W W M M M M M

W W W W W W M M M M

W W W W W W P P P P

W W W W W W S S S

W X X X X X X X X

X W X X X X X X X

X W W W X X X X X

X X W W X X X X X

X X X W W X X X X

X X X X W X X X X

X X X X X W X X X

M M N N X X X X W

M M N N X X X W W

Simpson Index: Relative Evenness:

Species Richness: Relative Dominance:

Simpson Index: Relative Evenness:

Species Richness: Relative Dominance:

**Quadrat C** **Quadrat D**

W W W W W W W W

W W W W W W W W

W W W W W W W

W W W W W W W W W

W W W W W W W W

Q Q Q Q Q W W W W

Q Q Q Q Q Q Q Q W X X

Q Q Q Q Q Q Q Q X X X

R S S L L L O O O X X X

R L L L O O O O O X X

V V V V V V V V V V V

V V V V V V V V V V V

V V V V V V V V V V V

V V V V V V V V X X S

V V V V V V V V X S S

V V V V V V V V X S S

V V V V V V V V X S S

V V V V V V V V X U U

V V V V V V V V X U U

V V V V V V V V X W W

X X X X X V X W W

Simpson Index: Relative Evenness:

Species Richness: Relative Dominance:

Simpson Index: Relative Evenness:

Species Richness: Relative Dominance:

**Quadrat E**

**Analysis Questions**

1. Which of the quadrats is most diverse? Support your conclusion with experimental data.

2. Based on your answer above, was Ms. Simmons’ hypothesis supported? If not, provide an alternative hypothesis based on your diversity calculations.

3. Explain how immigration and emigration can affect species diversity and richness.

S S S S S S S S S S

S S S S S S S S S S

O O S S S S S S S S

O O O S S S S S S S S

O O O O S S S S S S S

O O O O O S S S S S S

W W W W O O S S S S S

V V T N O O O O S S S

V T N N O O O OO S S

T T N N O O O O O S S

Simpson Index: Relative Evenness:

Species Richness: Relative Dominance: