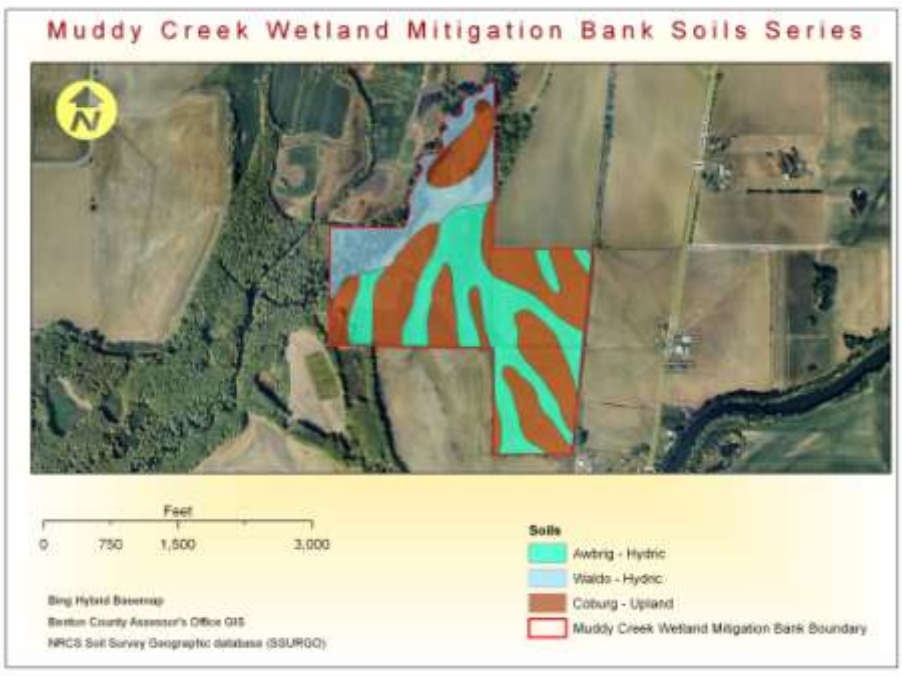
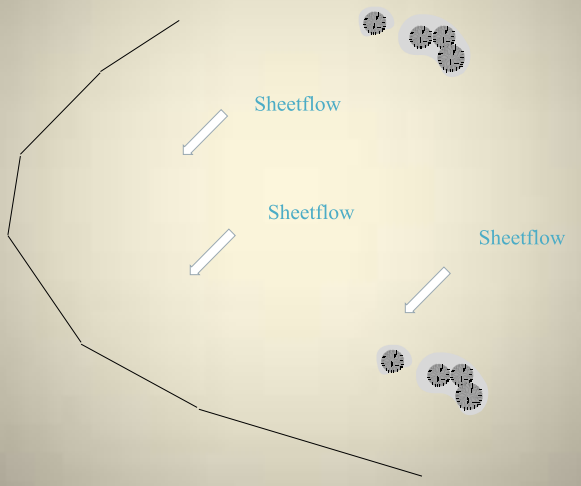
An Analysis of Plant Moisture Indexes and Potentially Dependent Weed Indexes for Wetland Prairie Vegetation at the Muddy Creek Wetland Mitigation Bank

Geography 575
John Marshall


Muddy Creek Wetalnd Mitigation Bank
Elevations - Mean Sea Level
Feet
0 250 500 1,000


Muddy Creek Wetland Mitigation Bank Soils Series
Feet
0 750 1,500 3,000
Bing Hybrid Basemap
Benton County Assessor's Office GIS
NRCS Soil Survey Geographic database (SSURGO)
Soils
Awbrig - Hydric
Waldo - Hydric
Coburg - Upland
Muddy Creek Wetland Mitigation Bank Boundary

Curvilinear Berms Used to Capture Sheetflow and Temporarily Backup Surface Water



Cross-section View of Plant Moisture Index Across Elevation Gradient

Hypothesis:

Moisture Index – 1.0 to 2.0 - Emergent Wetland - Weed Index High
2.0 to 3.0 - Wetland Prairie – Weed Index Low
> 3.0 - Upland – Weed Index High

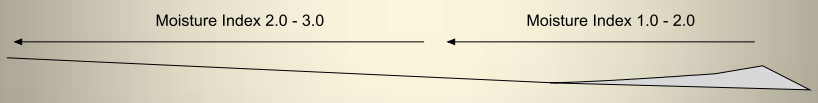


Table 2. Geodatabase Design and Data Organization.

ID	Data_Layer	Spatial_ Type	Feature_Class	ArcInfo_ Type	Feature_Dataset	Geodatabase
1	Property	Area	Property Boundary	Polygon Feature Class	Project	Weed/Moisture Index Relationship
2	Soils	Area	Soil Series	Polygon Feature Class	Project	Weed/Moisture Index Relationship
3	Vegetation Mindex	Point	Sample Plot Moisture Indexes	Point Feature Class	Project	Weed/Moisture Index Relationship
4	Vegetation Windex	Point	Sample Plot Weed Indexes	Point Feature Class	Project	Weed/Moisture Index Relationship
5	Vegetation Mclass	Area	Moisture Classes	Raster	Project	Weed/Moisture Index Relationship
6	Vegetation Wclass	Area	Weed Classes	Raster	Project	Weed/Moisture Index Relationship
7	Topography	Line	Elevation Contours	Polyline Feature Class	Project	Weed/Moisture Index Relationship

Vegetation Manager (VEMA)

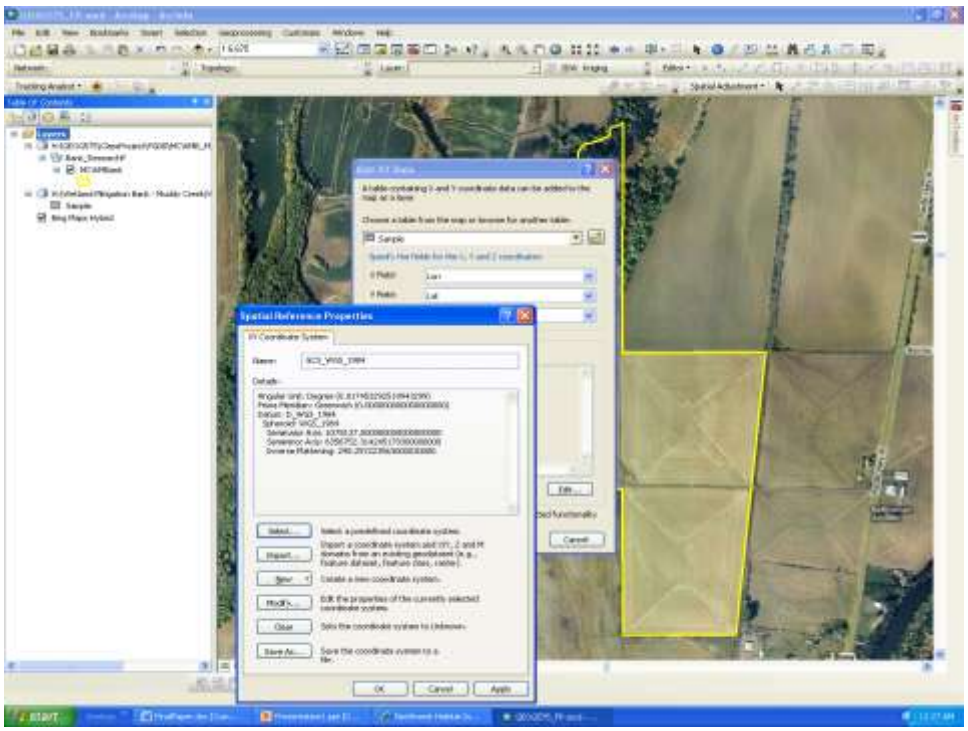
Preparing Data for Analysis

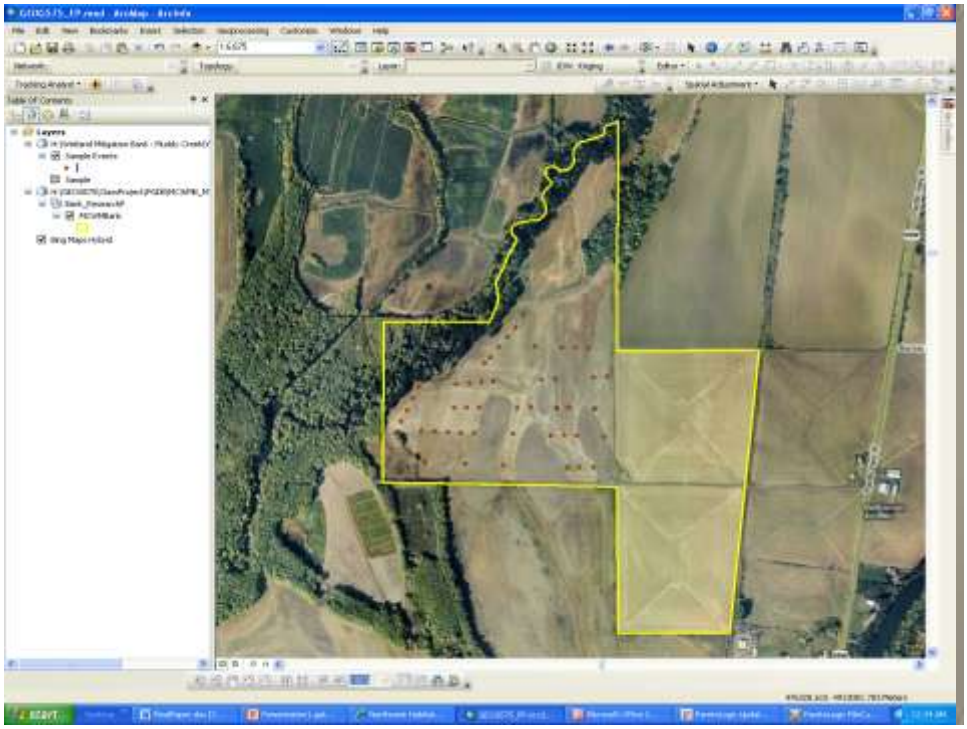
Sample

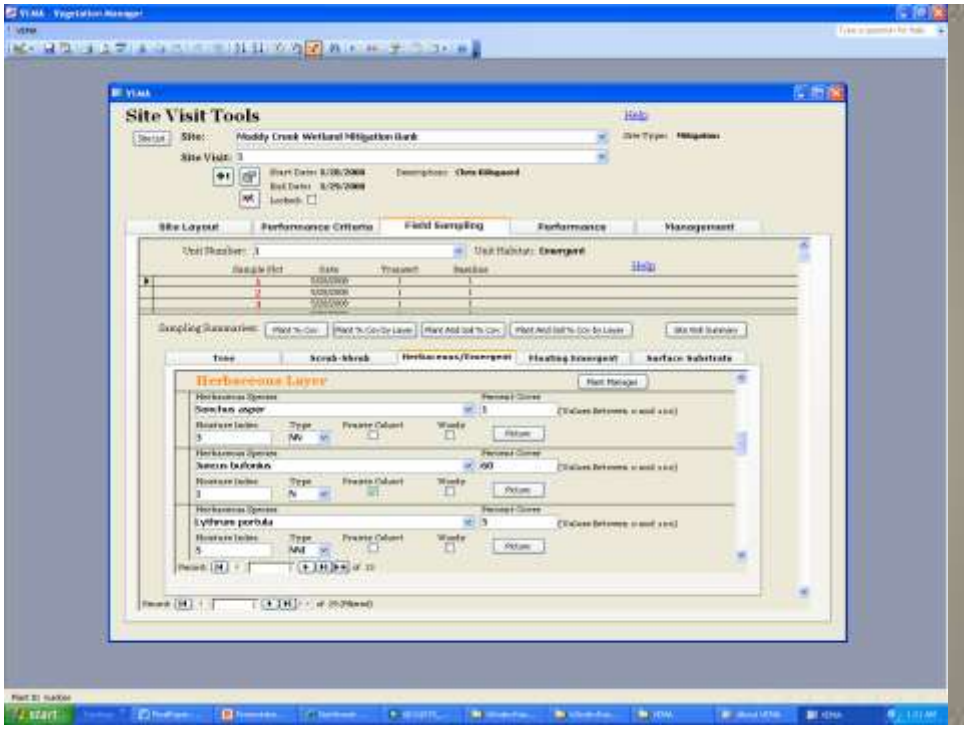
ID1	ID	Number_	Date_	Lat	Lon	Mindex	WIndex
1	1	1	5/28/2008	44.368057	-123.29875	1.6	1.2
2	3	2	5/28/2008	44.368065	-123.299192	1.299999	2
3	2	3	5/28/2008	44.368055	-123.299524	1.6	2.299999
4	4	4	5/28/2008	44.368109	-123.301445	1.399999	1.2
5	5	5	5/28/2008	44.368136	-123.302592	1.6	1.899999
6	7	6	5/28/2008	44.368751	-123.298449	1.5	1.799999
7	9	7	5/28/2008	44.368779	-123.299278	2.2	1.399999
8	10	8	5/28/2008	44.368788	-123.299652	1.6	1.2
9	8	9	5/28/2008	44.368777	-123.300039	2.099999	1.299999
10	11	10	5/28/2008	44.368814	-123.301172	1	0
11	13	11	5/28/2008	44.36884	-123.302333	1.7	1.899999
12	14	12	5/28/2008	44.368839	-123.30272	1.7	2.099999
13	15	13	5/28/2008	44.368848	-123.303107	1.5	2.599999
14	21	15	5/28/2008	44.369405	-123.298743	1.799999	1.2
15	25	16	5/28/2008	44.369413	-123.299517	2	1
16	24	18	5/28/2008	44.369412	-123.299862	1.799999	2.099999
17	27	19	5/28/2008	44.36942	-123.30065	1.899999	1.5
18	20	20	5/28/2008	44.369389	-123.301037	1.6	2.5
19	32	21	5/28/2008	44.37011	-123.298373	1.7	1.899999
20	31	22	5/29/2008	44.370099	-123.298774	1.6	2.099999
21	30	23	5/29/2008	44.370056	-123.299921	1.5	2.799999
22	29	24	5/29/2008	44.370025	-123.300308	1.899999	1.399999
23	33	25	5/29/2008	44.370752	-123.298929	1.1	1.1
24	35	26	5/29/2008	44.370771	-123.299316	1.1	1
25	36	27	5/29/2008	44.37077	-123.299731	1.799999	1
26	34	28	5/29/2008	44.370769	-123.299731	2.2	1.399999
27	37	29	5/29/2008	44.370798	-123.300519	1.2	1.299999
28	12	34	5/29/2008	44.368828	-123.304627	2	1.399999
29	18	35	5/29/2008	44.369076	-123.304504	1.6	2.099999
30	19	36	5/29/2008	44.369335	-123.304326	1.7	2.299999
31	6	45	5/29/2008	44.368176	-123.303781	1	1
32	16	46	5/29/2008	44.368861	-123.303494	1	1
33	17	47	5/29/2008	44.36887	-123.303895	1	0
34	23	48	5/29/2008	44.3694	-123.302184	1	5
35	26	49	5/29/2008	44.369409	-123.302557	1	5
36	22	50	5/29/2008	44.369398	-123.30293	1.5	2.9
37	28	51	5/29/2008	44.369996	-123.301786	1	3

VEMAData.mdb File Sample Table

1. Added To Arc-Map (Add XY Data) As a sample event;
2. Export sample event to geodatabase feature class;
3. Add Fields – feature class attribute table (Mindex and WIndex);
4. Populate Fields using VEMA semi-automatic MI calculator;
5. Export attribute table as text file;
6. Import text file to MicrosoftAccess;
7. Mindex and WIndex fields copied in MicrosoftAccess;
8. Mindex and WIndex fields pasted in Excel; and
9. Mindex and WIndex field selected, filtered, and run through Excel scatter plot regression analysis.






Site Visit Tools
Help
Site:
Moddy Creek Wetland Mitigation Bank
Site Visit:
Site Layout
Performance Criteria
Field Sampling
Performance
Management
Herbaceous Layer
Spartina alterniflora
Juncus bufonius
Lythrum portula

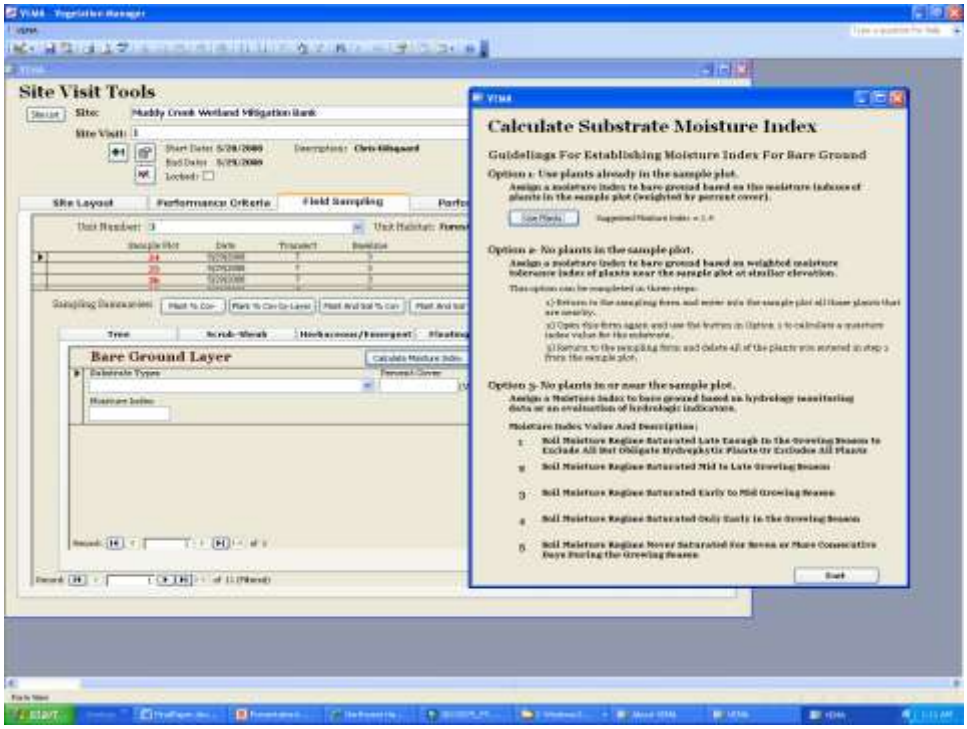
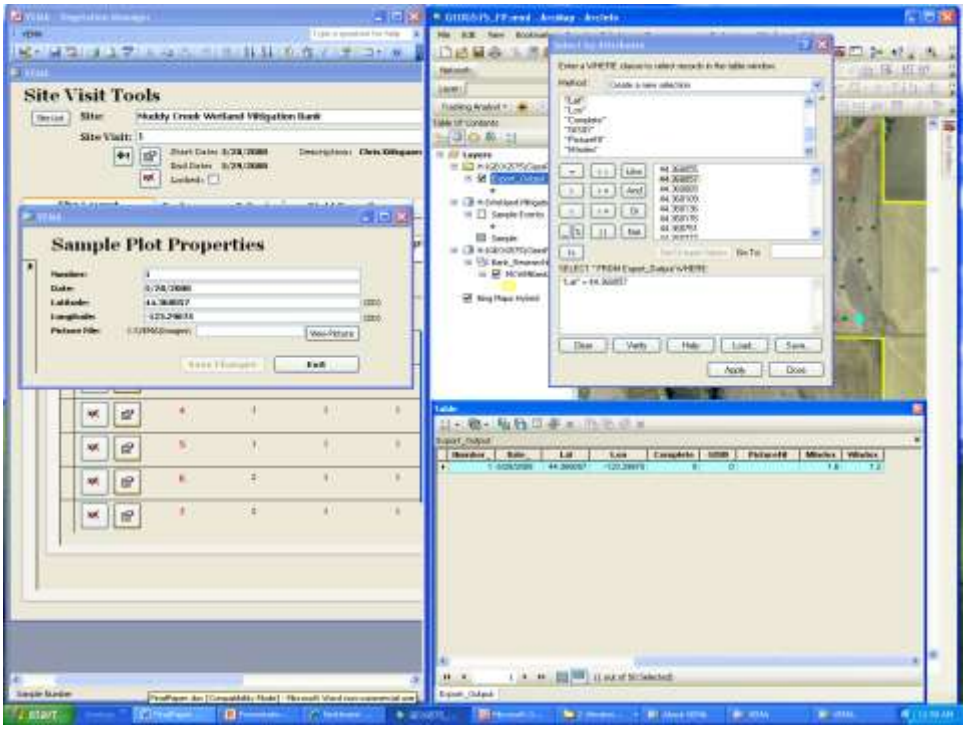
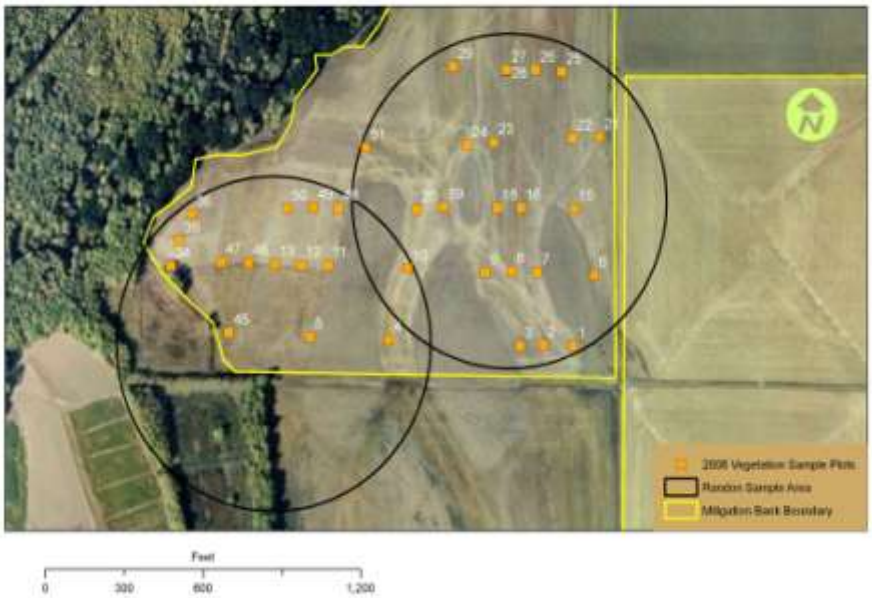


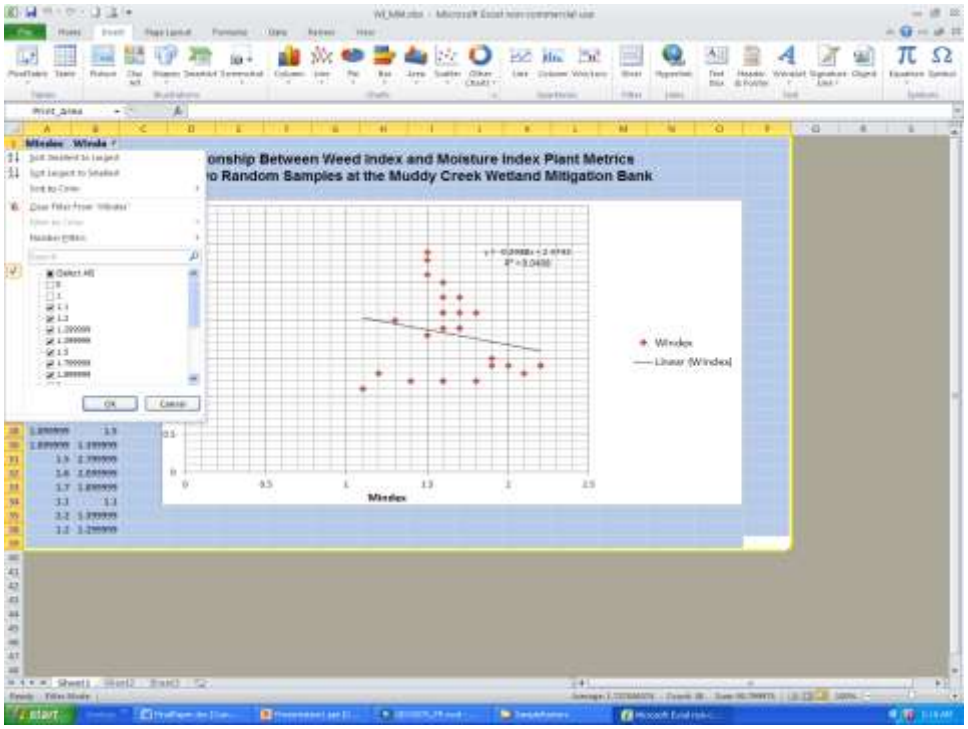
Table 1 Prevalence Index Calculator.

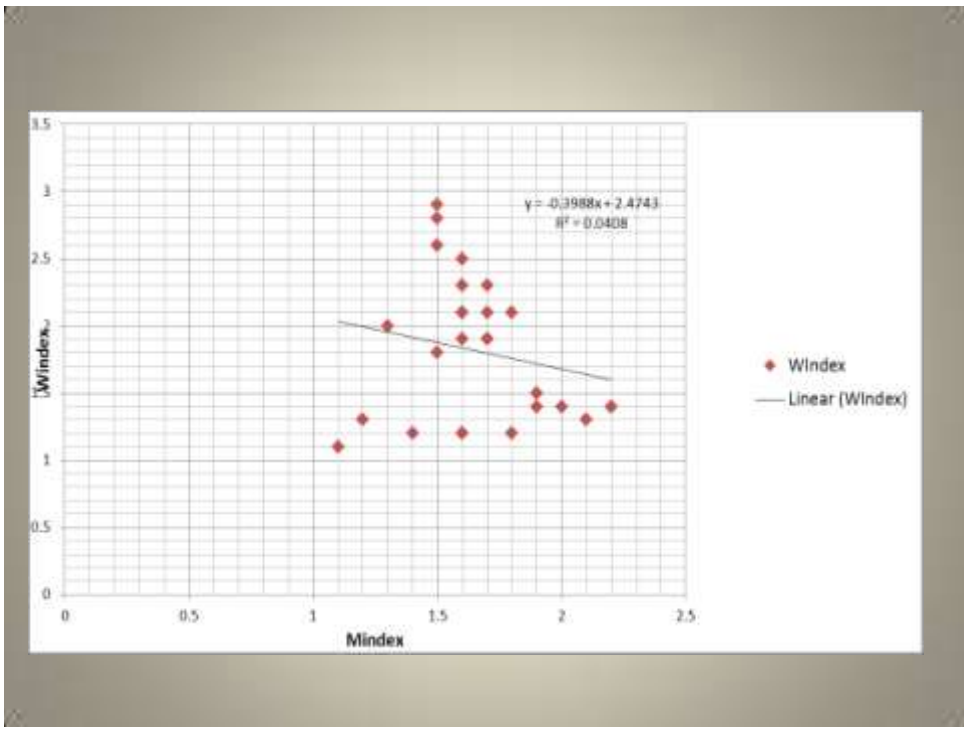
Species	Indicator Status		Cover Class			Weighted Cover Class		
ALGE	1		63			63		
CAUN	1.5		3			4.5		
DECE	2		15			30		
HOBR	1.5		3			4.5		
JUTE	1.5		15			22.5		
RONU	2		15			30		
			0			0		
MEPU	1		15			15		
ELPA	1		63			63		
			0			0		
			0			0		
			0			0		
BAREG	1.2109		4			4.8438		Prevalence Index
			196			237.34		**1.211**
			192			232.5		**1.211**



Sub-sample of Muddy Creek Wetland Mitigation Bank 2008 Vegetation Sample Plots.




onship Between Weed Index and Moisture Index Plant Metrics
o Random Samples at the Muddy Creek Wetland Mitigation Bank
y = -0.3988x + 2.4743
R² = 0.0408
WIndex
Linear (WIndex)
Mindex


y = -0.3988x + 2.4743
R² = 0.0408
WIndex
Linear (WIndex)
WIndex
Mindex
0
0.5
1
1.5
2
2.5
3
3.5

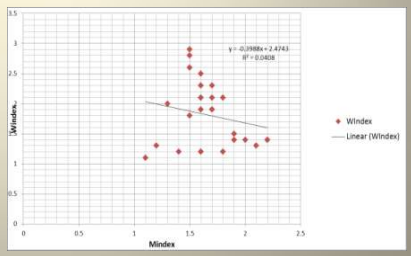
Most of the Muddy Creek Wetland Mitigation Bank Samples Fall Into the Emergent Wetland Moisture Index Range

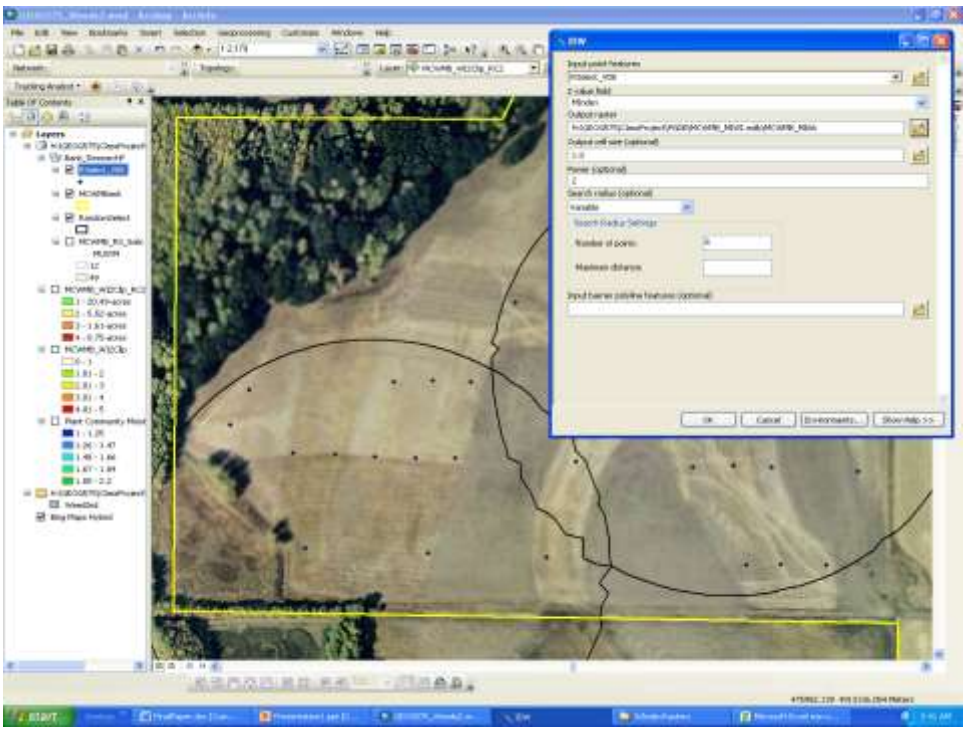
Hypothesis:

Moisture Index – 1.0 to 2.0 - Emergent Wetland - Weed Index High
2.0 to 3.0 - Wetland Prairie – Weed Index Low
> 3.0 - Upland – Weed Index High

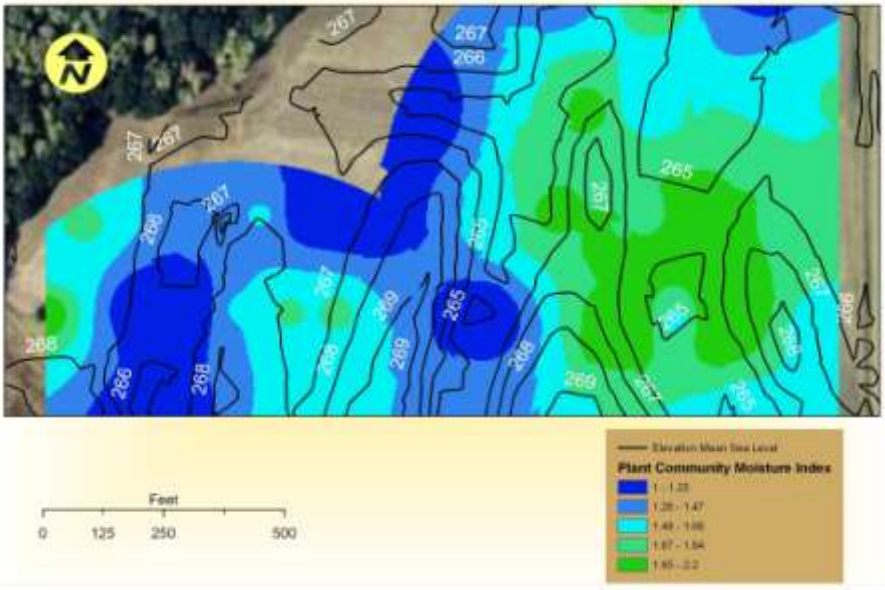
Moisture Index 2.0 - 3.0

Moisture Index 1.0 - 2.0

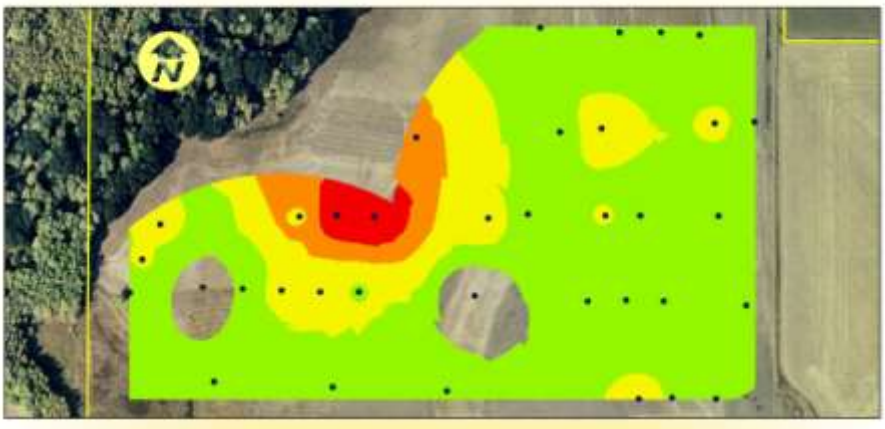


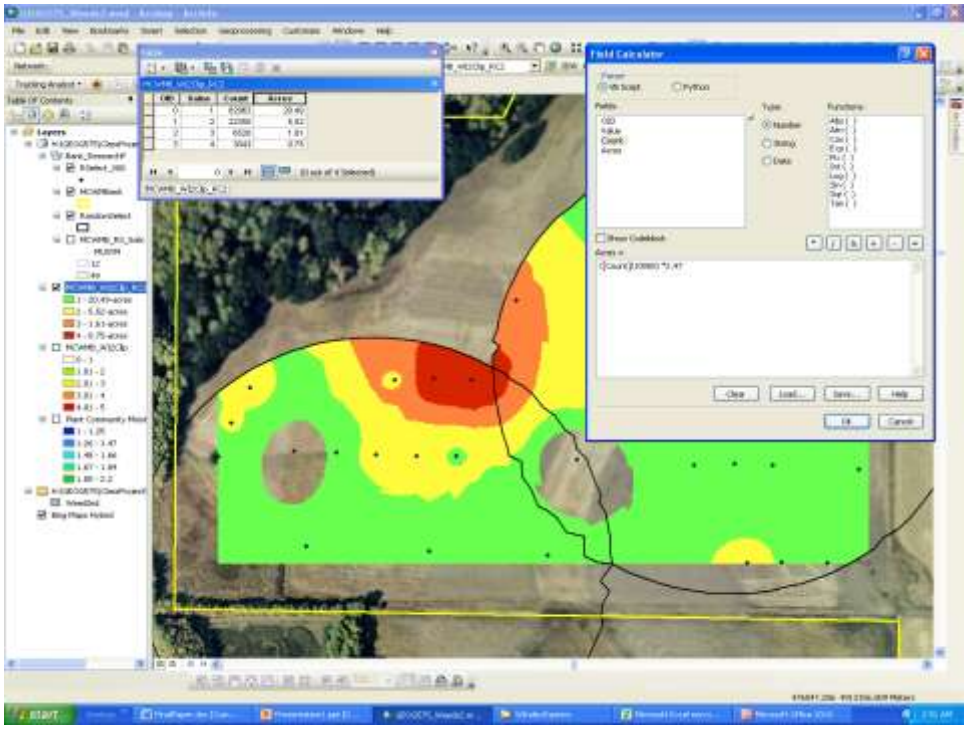


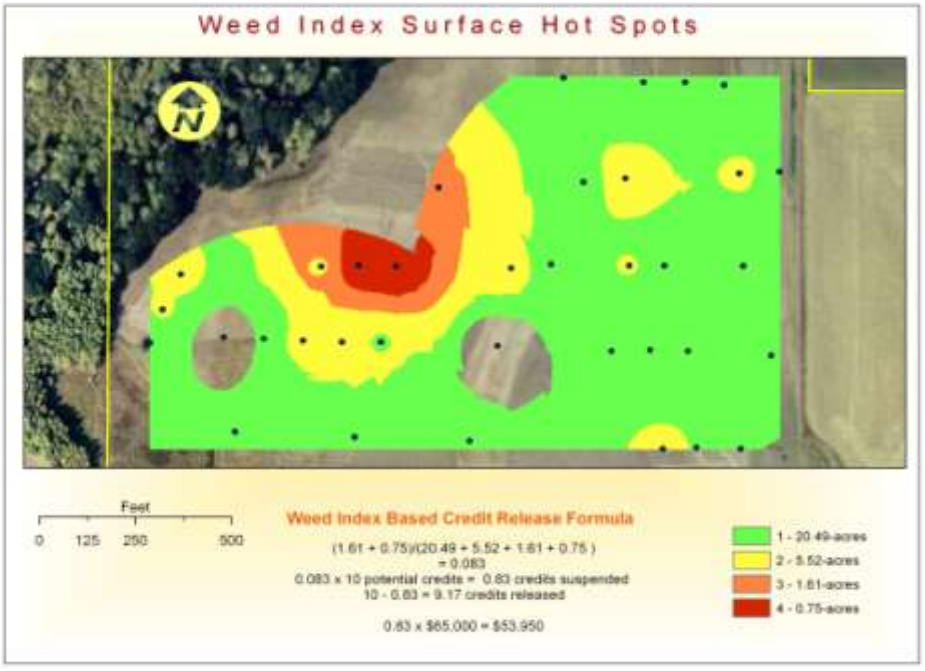
Moisture Index Surface in Relation to Land Surface Elevations



Weed Index Surface Hot Spots




Field Calculator


Weed Index Surface Hot Spots
N
Feet
0
125
250
500
Weed Index Based Credit Release Formula
(1.61 + 0.75)/(20.49 + 5.52 + 1.61 + 0.75)
= 0.083
0.083 x 10 potential credits = 0.83 credits suspended
10 - 0.83 = 9.17 credits released
0.83 x $65,000 = $53,950
1 - 20.49-acres
2 - 5.52-acres
3 - 1.61-acres
4 - 0.75-acres

Conclusions

- An Excel spreadsheet scatter plot calculates an r^2 value of 0.04 for the sampled data, indicating there is no statistically verifiable evidence of a dependent relationship between plant weed indexes and the plant moisture indexes associated with the 2008 sample plots collected at the Muddy Creek Wetland Mitigation Bank;
- However, the scatter plot also clearly shows the majority of the 2008 sample plots exhibit moisture indexes lower than 2.0, indicating the area represented is trending toward a wetter wetland type (emergent) than the one targeted for analysis (wetland prairie);
- No conclusions can be drawn from these data regarding whether there is a dependent relationship between a weed index and an intermediate moisture index surface generally between 2.0 and 3.0. Wet prairie sites with better representation of that moisture index range should be examined; and
- GIS tools may be useful in helping mitigation bank sponsors focus their management resources on problem areas and help regulators and resource agencies define quantifiable and defensible credit release schedules to that will incentivize good stewardship.

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