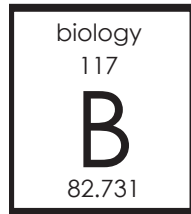




SYMPOSIUM

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Volume 2 Issue 1



MAPPING THE MOVEMENTS OF OVERWINTERING WESTERN MONARCH BUTTERFLIES (*DANAUS PLEXIPPUS*) AT THE PISMO BEACH MONARCH BUTTERFLY GROVE USING ARCGIS SOFTWARE

A RESEARCH ARTICLE

by Brett Johnson, Jesse Wycko, Daniel Goldthwaite, and Tyler Brown

Purpose

Dr. Villablanca of the Cal Poly Biology Department commissioned this project with the goal of tracking Monarch Butterfly spatial redistribution in anticipation of or response to severe weather events. We believe that Monarchs cluster non-preferentially on introduced Eucalyptus trees until midwinter when they begin to cluster preferentially on native conifers. Based on the efforts of a previous group of students, it has been determined that, over a two-week time period in mid-winter, Monarchs spend the majority of their time on native conifers. We set out to clearly demonstrate Monarch Butterfly spatial redistribution in either anticipation of or response to severe weather.

Overview

Severe weather events occurred on October 31, 2014 when 1.04" of rainfall fell on Pismo Beach in a 24-hour period. A cold front and light showers moved over San Luis Obispo County on Nov. 13, and on Nov. 19, about 1/10" fell on the Pismo Coastal area. Relative to the span of our study, low barometric pressure was observed around Nov. 1 and Nov. 10 to 11 (Fig. 1).

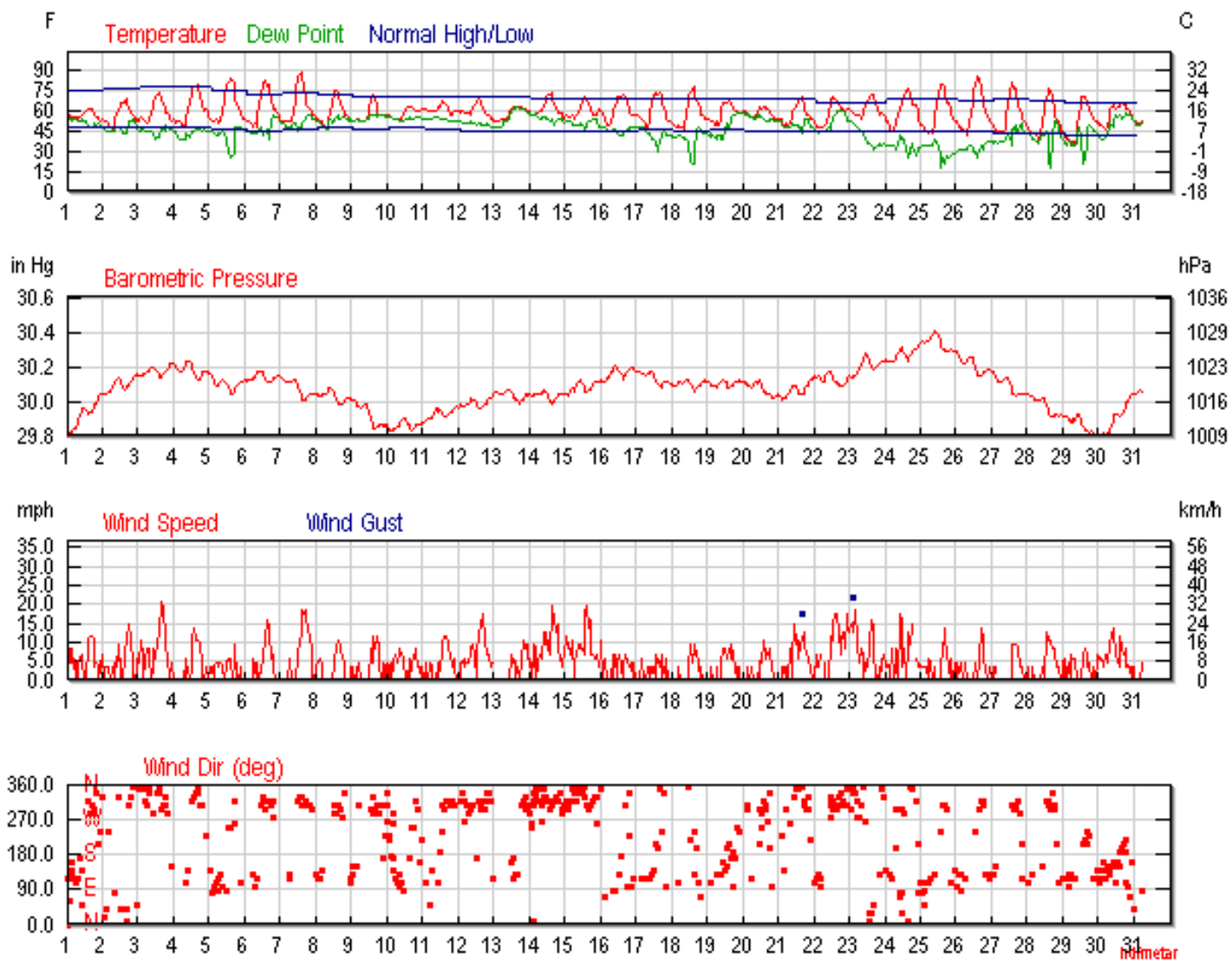


Figure 1. Meteorological data for the Pismo area November 2014 (weatherunderground.com).

Methods

Equipment:

- Binoculars
- Rangefinder
- Data sheets
- Anemometer
- Spotting telescope
- Pismo Grove map
 - Major Grid (Fig. 3)
 - Minor Grid (Fig. 4)

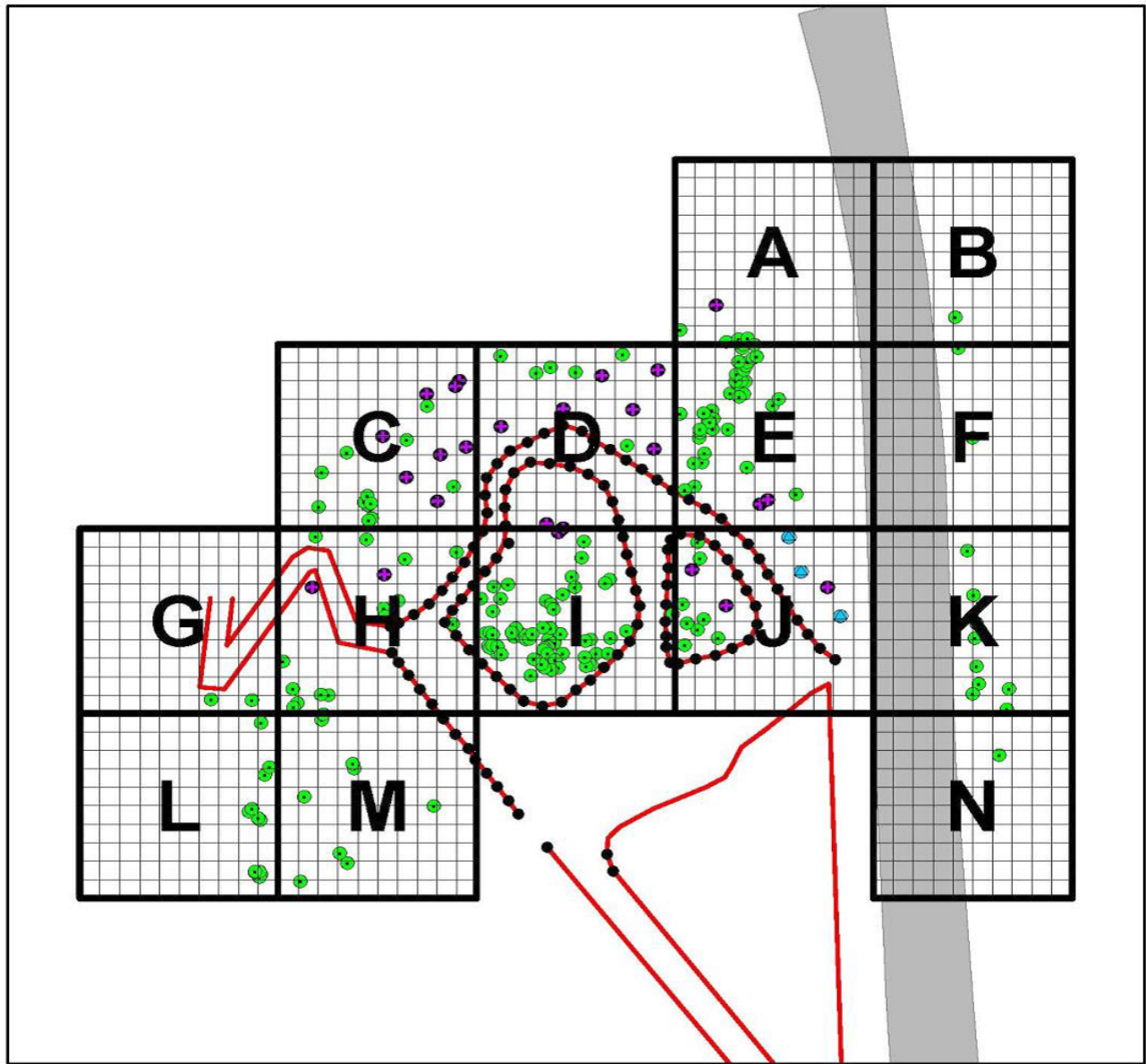
Data was collected by teams of 1 to 4 researchers at sunrise for 23 consecutive days, beginning Nov. 1, 2014 and ending Nov. 23, 2014. Using standardized counting techniques taught to us by State Parks Interpreter Danielle Patterson, we estimated the size, location, and height of each cluster of butterflies observed in the Pismo Monarch Butterfly Grove (PMBG) (Fig. 2).



Figure 2. Pismo Monarch Butterfly Grove

Each cluster of butterflies was assigned a height estimate at the top and bottom of the cluster to the nearest meter. Hand-held rangefinders were used to determine this height value from directly underneath the cluster. A count estimate was then performed by two individuals so an average value could be assigned. We limited our estimations to a 20% margin of error between counter or a recount was performed. Using previously generated grid maps (created by a previous group of students), we determined the individual trees on which each cluster of butterflies was located. We first examined the Major Grid (Fig. 3) and decided which Major Cell the cluster resided in. Each Major Cell contained a Minor Grid (Fig. 4). We estimated the location of each cluster to the nearest 10' x 10' cell of the Minor Grid. We then recorded every cluster's Major and Minor Grid location, butterfly count estimate, tree identifier, and height on our data sheets.

Pismo Butterfly Major Grid Index



Legend

- Cypress
- Eucalyptus
- Monterey pine
- Posts
- Fence
- Road

0 100 200 Feet



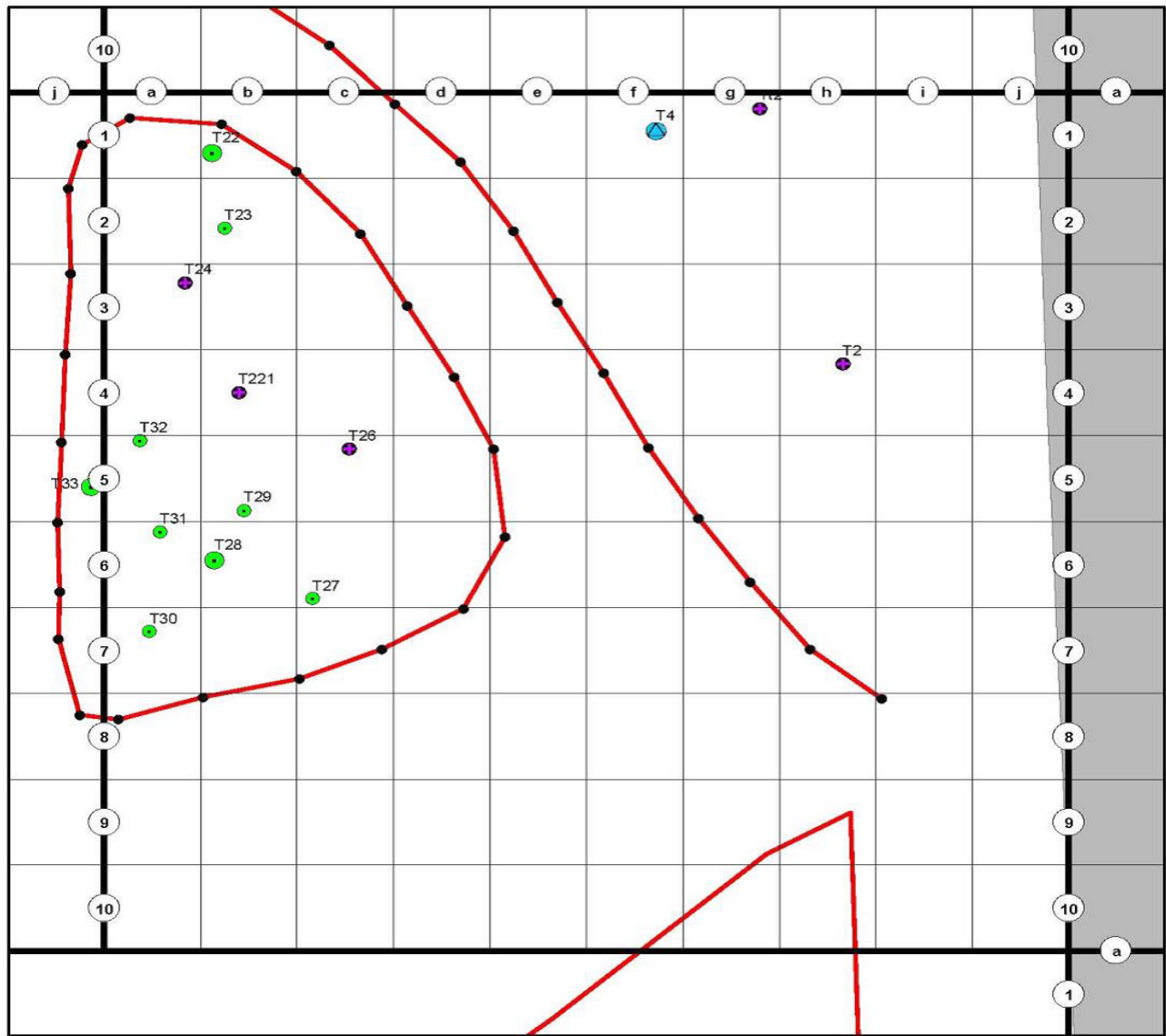
Monarch Alert
CAL POLY
SAN LUIS OBISPO



NRES GIS 2013

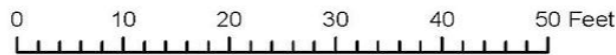
Figure 3. Major Grid

Pismo Butterfly Grid J



Legend

- ▲ CY
- ▲ EU
- ▲ MP
- Posts
- Fence
- Road



Monarch Alert
CAL POLY
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NRES GIS 2013

Figure 4. Minor Grid

Collected data was entered into one Excel spreadsheet, saved as a .csv file type, and imported into ArcMap. The Major and Minor Grids, roads, and fences created in ArcMap by the previous student research groups were reused and added in as base layers. We then used several tools available in ArcMap to display butterfly density redistribution.

The “Table to Table” tool was used to convert the .csv file into a .dbf file (Fig 5). This file type can be added into ArcMap as an attribute table (Fig. 6).

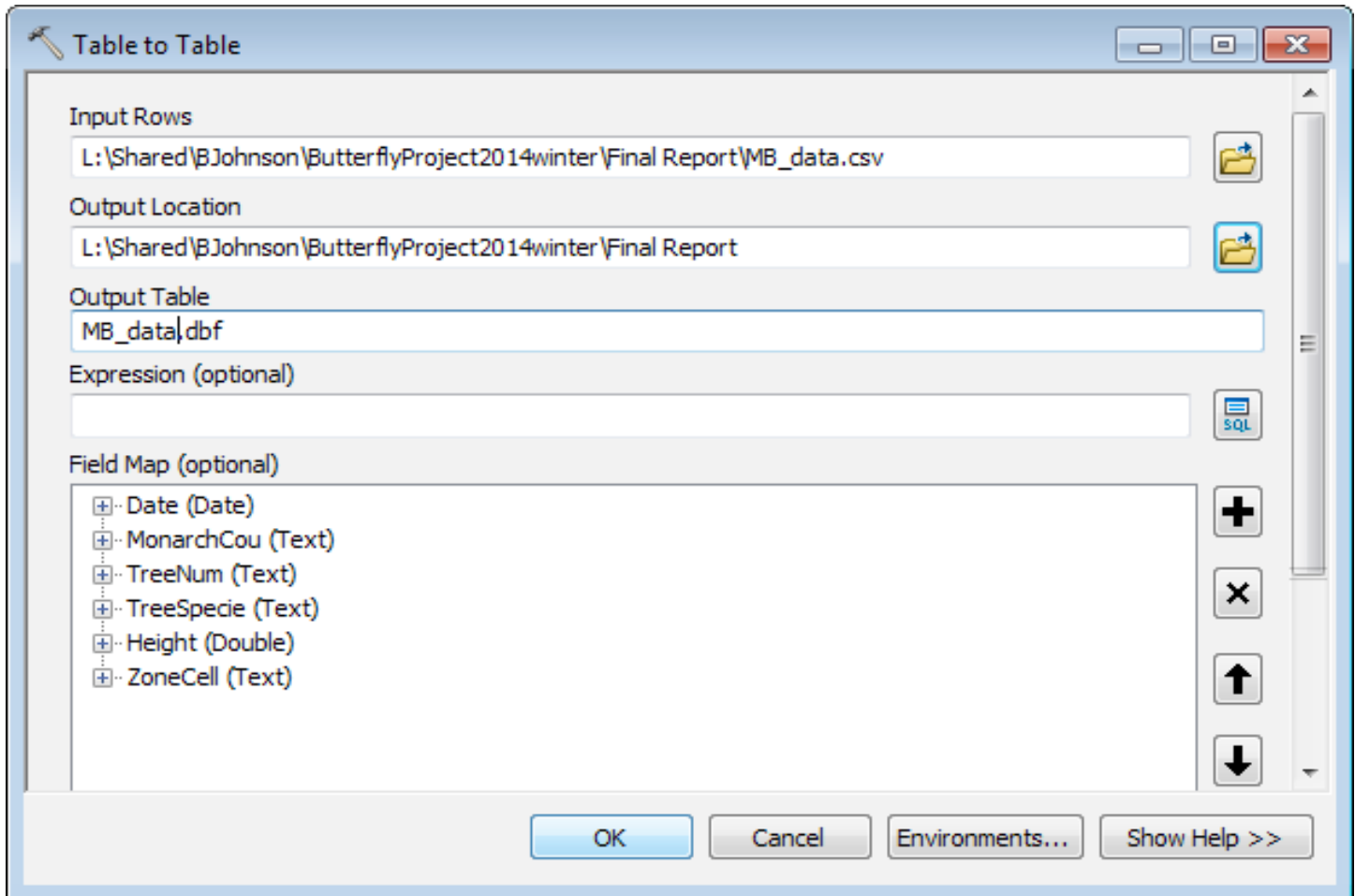


Figure 5. “Table to Table” tool

	OID	Date	MonarchCou	TreeNum	Tree Specie	Height	ZoneCell
▶	0	11/1/2014	12	T63	E	3	D-i-1
	1	11/1/2014	45	T63	E	3	D-i-1
	2	11/1/2014	15	T63	E	3	D-i-1
	3	11/1/2014	22	T63	E	4	D-h-1
	4	11/1/2014	45	T63	E	4	D-h-1
	5	11/1/2014	15	T63	E	4	D-h-1
	6	11/1/2014	55	T63	E	4	D-h-1
	7	11/1/2014	36	T63	E	4	D-h-1
	8	11/1/2014	28	T69	E	10	D-e-3
	9	11/1/2014	1200	T70	E	10.5	D-d-4
	10	11/1/2014	48	T70	E	10	D-d-4
	11	11/1/2014	32	T70	E	11	D-d-4
	12	11/1/2014	18	T70	E	10	D-d-4
	13	11/1/2014	11	T70	E	10	D-d-4
	14	11/1/2014	41	T70	E	11	D-d-4
	15	11/1/2014	140	T70	E	11	D-d-4
	16	11/1/2014	260	T70	E	10	D-c-4
	17	11/1/2014	55	T70	E	10	D-c-4
	18	11/1/2014	28	T70	E	10	D-c-4
	19	11/1/2014	30	T70	E	10	D-c-4
	20	11/1/2014	65	T81	E	7	C-i-8
	21	11/1/2014	14	T81	E	7	C-i-8
	22	11/1/2014	40	T81	E	7	C-i-8
	23	11/1/2014	15	T81	E	7	C-i-8
	24	11/1/2014	18	T81	E	7	C-i-8
	25	11/1/2014	30	T81	E	7	C-i-8
	26	11/1/2014	30	T81	E	7	C-i-9
	27	11/1/2014	110	T94	E	8	C-h-8
	28	11/1/2014	80	T94	E	8	C-h-8
	29	11/1/2014	12	T94	E	8	C-h-8
	30	11/1/2014	110	T100	C	8	D-b-10
	31	11/1/2014	35	T100	C	8	D-b-10
	32	11/1/2014	12	T100	C	8	D-b-10
	33	11/1/2014	18	T100	C	8	D-b-10
	34	11/1/2014	330	T100	C	12	D-c-9
	35	11/1/2014	210	T100	C	12	D-c-9
	36	11/1/2014	45	T100	C	12	D-c-9
	37	11/1/2014	95	T100	C	14	D-d-9
	38	11/1/2014	22	T142	E	12	I-a-5

1 (0 out of 961 Selected)

MB_data

Figure 6. Attribute Table

The “Create Address Locator” tool was used to assign each unique 10’ x 10’ cell in the Minor Grid to a field labeled “ZoneCell” (Fig. 7). Our Minor Grid layer was used as the primary table and the attribute field “MinorGridLabel” was used as the Key Field.

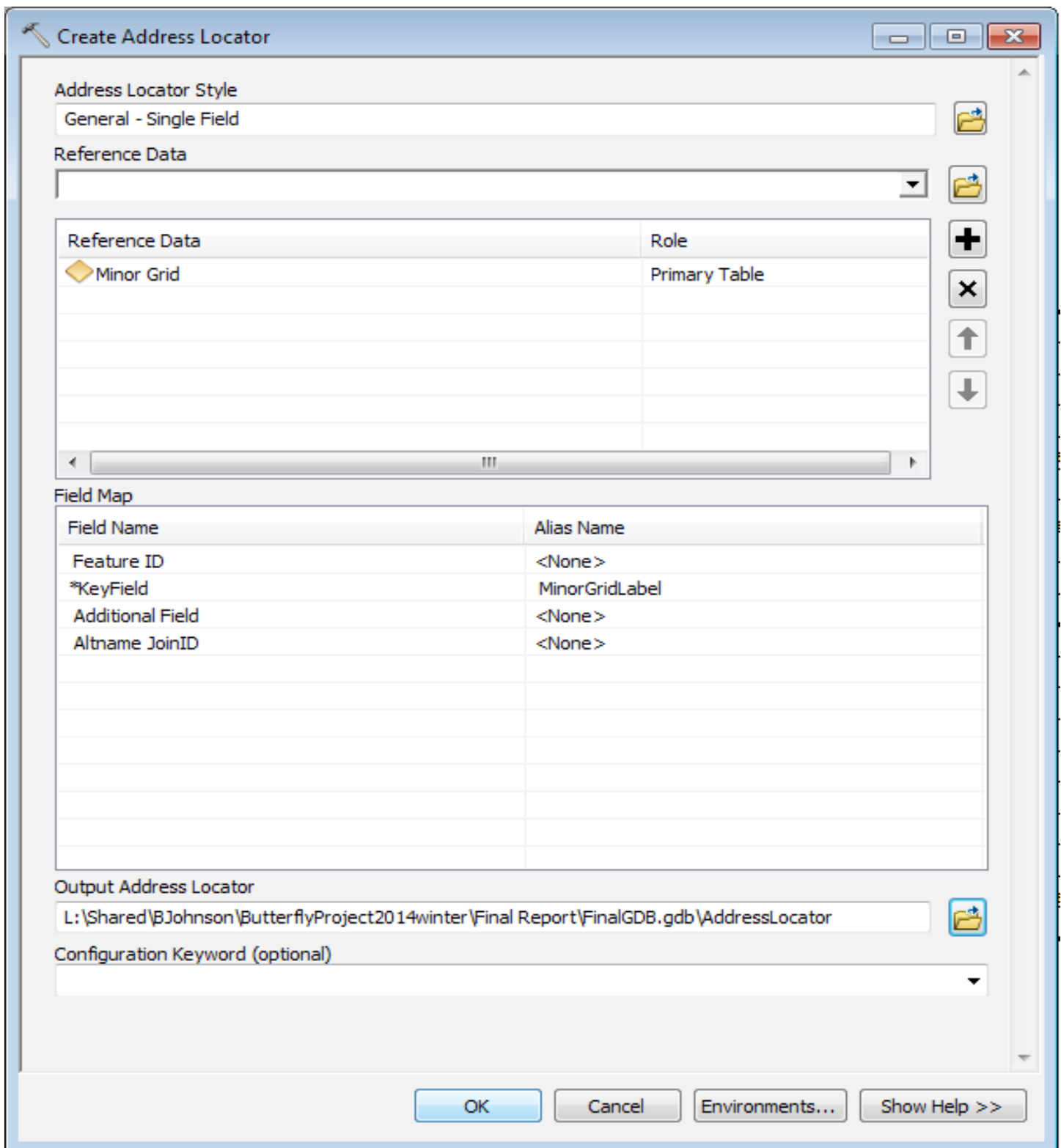


Figure 7: “Create Address Locator” tool

We then geocoded the addresses assigned to each individual cluster to the newly created addresses using the “Geocode Addresses” tool (Fig 8). This process linked the recorded “ZoneCell” data to the addresses on the Minor Grid. We set geocoding options for spelling sensitivity to be 100% (Fig. 9). This resulted in 100% matched addresses (Fig. 10).

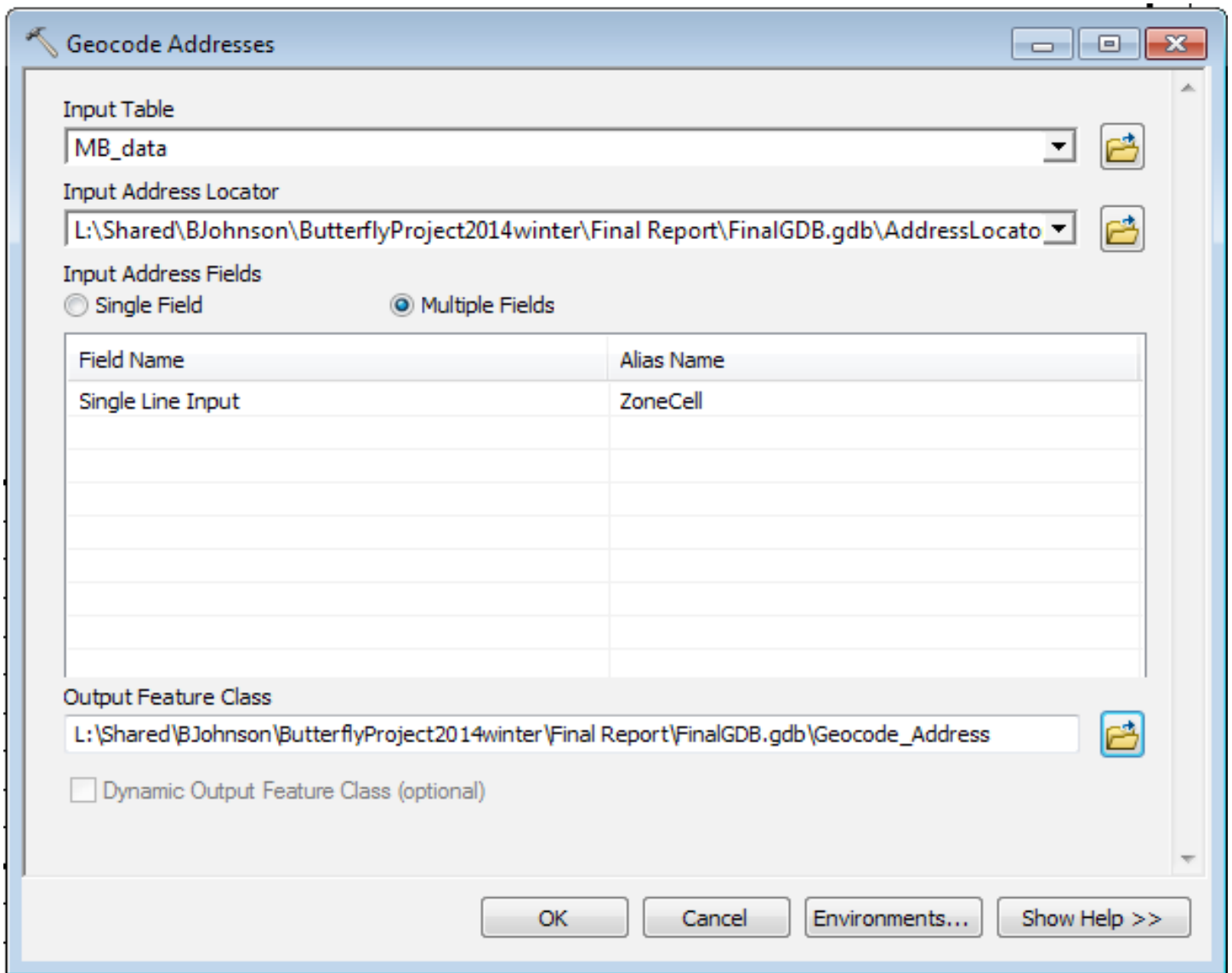


Figure 8: “Geocode Addresses” tool

Geocoding Options ✕

Matching Options

<None>

Spelling sensitivity:

Minimum candidate score:

Minimum match score:

Intersections

Connectors: Separate connectors by a space, e.g. "& @ , /"

Output Options

Side offset: ▼

End offset: ▼

Match if candidates tie

Output Fields

X and Y coordinates Standardized address

Reference data ID Percent along

Figure 9: Geocoding Options

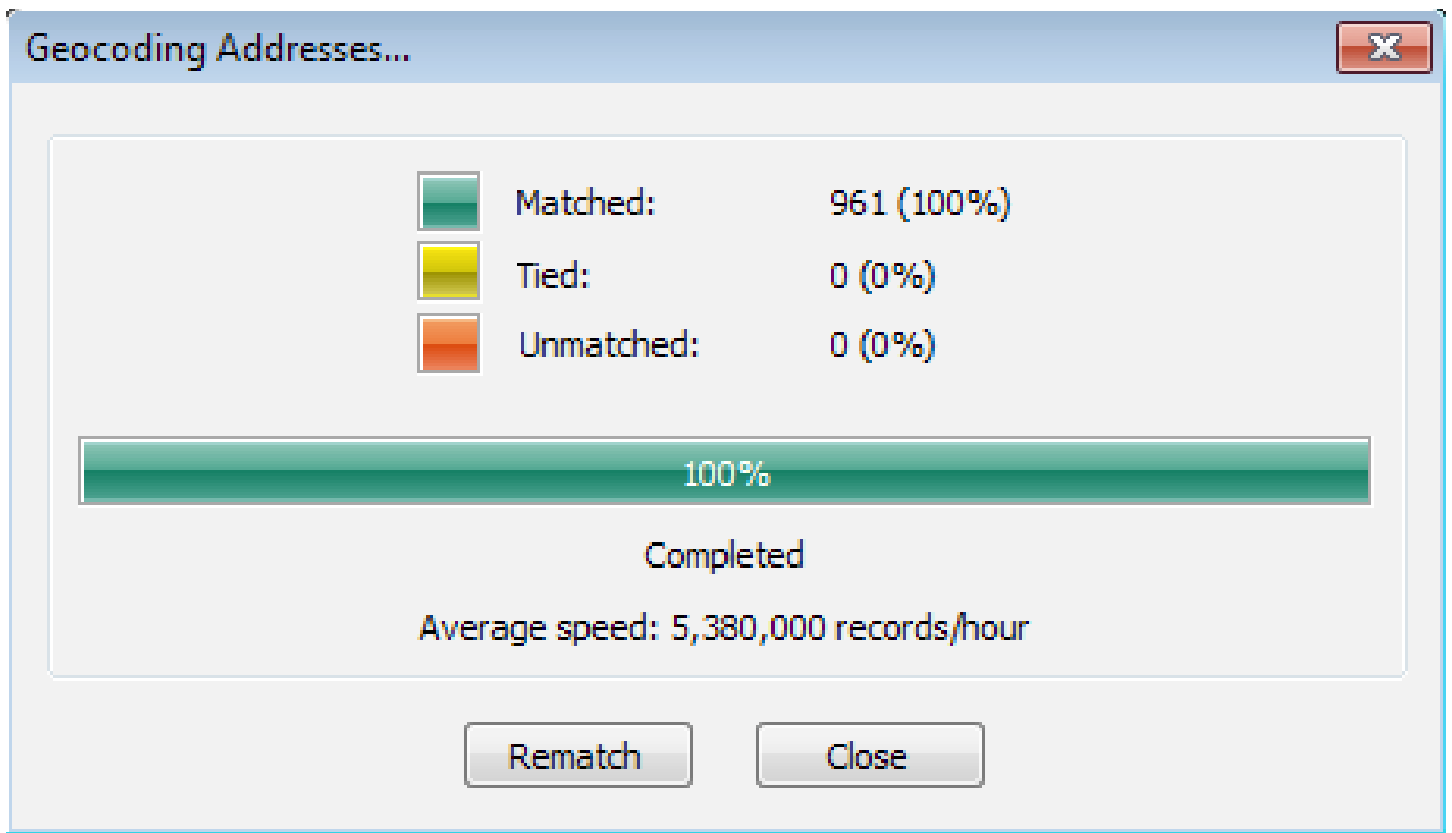


Figure 10: Geocoding Matches

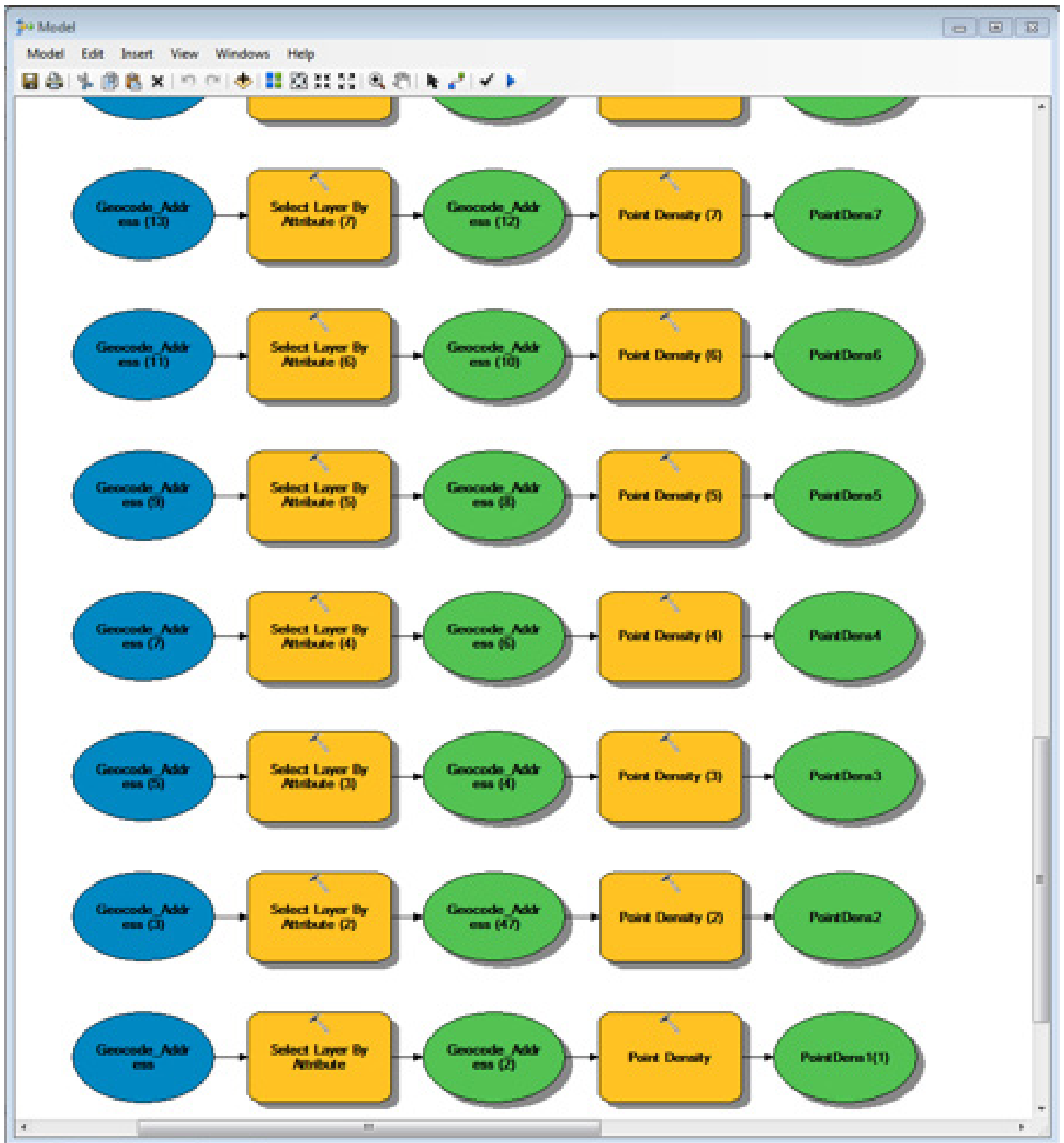


Figure 11: Model Builder

We began creation of the model by adding the “Geocode_Address” layer to our blank model. We then used the “Select Layer by Attribute” tool to select the first date, Nov. 1. Then we took the output of this tool and used the “Point Density” tool to display butterfly density in the PMBG on Nov. 1. From there, we replicated this model for each of the other twenty-two dates. Then, we went to each line of the model and changed the “Select by Attribute” tool query to select each individual date. We then renamed each of the final outputs to correlate with the date of interest. This model supplied us with twenty-three point density maps—one for each day of our study (Appendix A). We then created a point density map for the entirety of the study period using the “Point Density” tool (Fig. 12). This yielded the PMBG Point Density Map (Fig. 13).

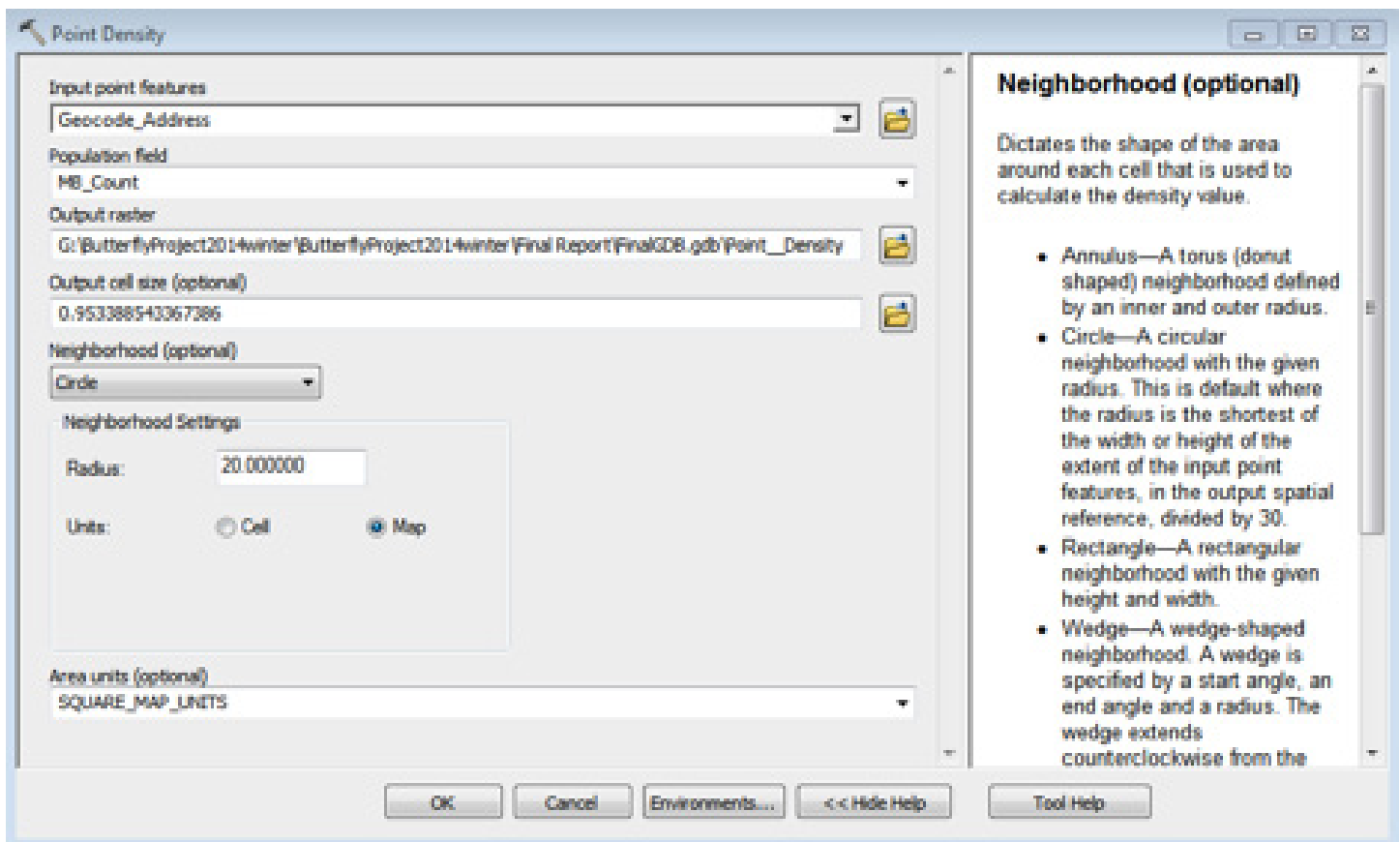


Figure 12: “Point Density” tool

November 2014 - Pismo Monarch Grove Population Density



Figure 13: Pismo Beach Monarch Butterfly Grove point density map

We used the “Feature to 3D By Attribute” tool to convert our “Height” attribute field into a Z-value useable in ArcScene (Fig. 14).

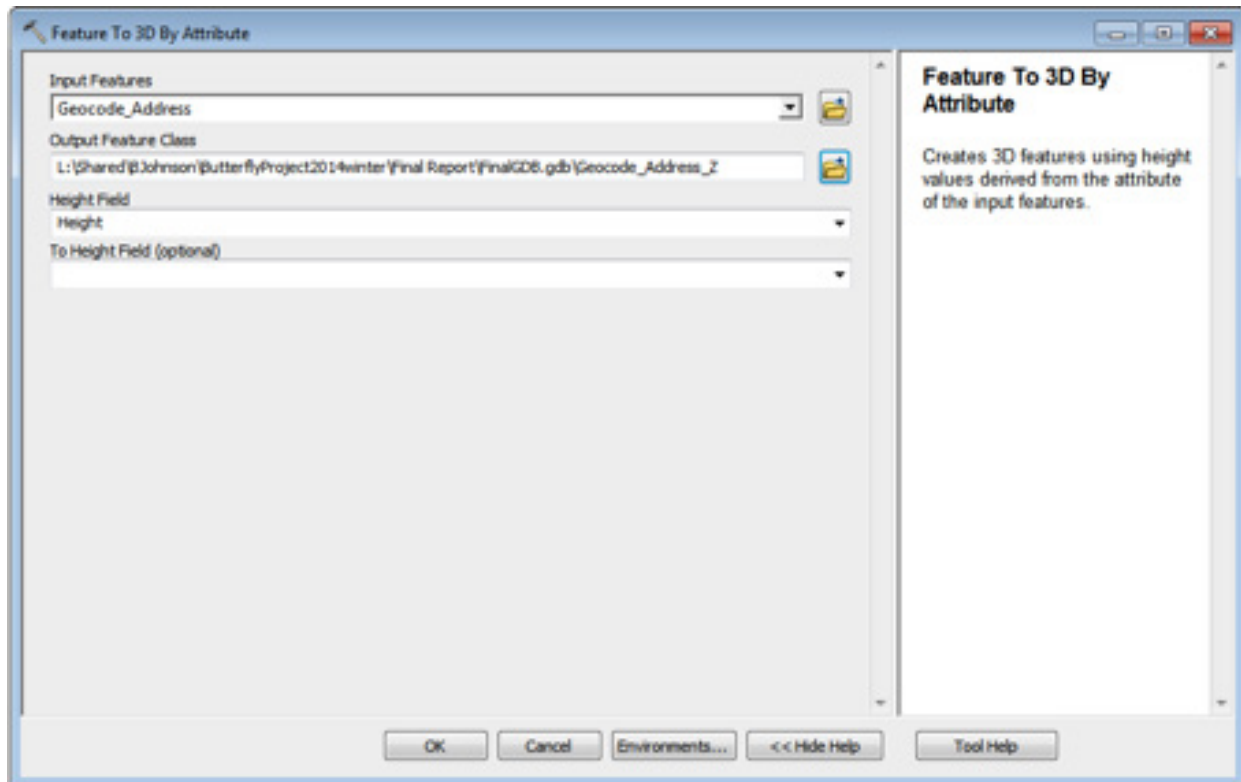


Figure 14: “Feature to 3D By Attribute” tool

We then opened ArcScene 10.2.2 and added in our base layers: the road, fence, and Major/Minor grids (Fig. 15).

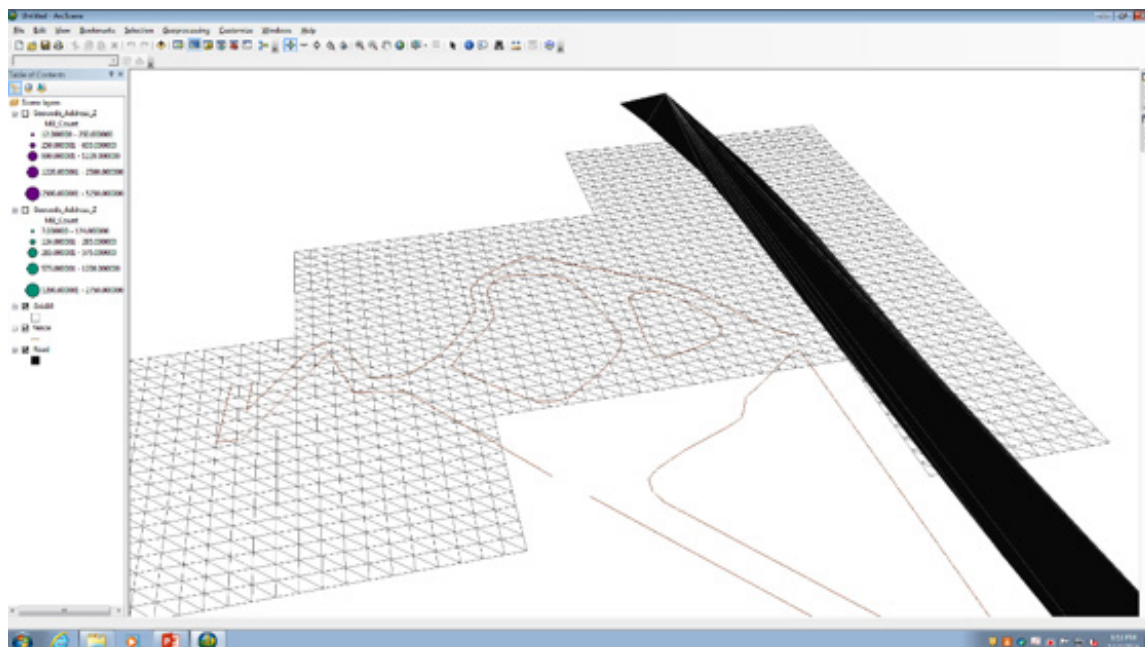


Figure 15: ArcScene Base Layers

We took the output of the “Feature to 3D by Attribute” tool, a layer named “Geocode_Address_Z,” and opened that layer in ArcScene (Fig. 16). We duplicated this layer and used Definition Query (found under properties) to nullify Cypress trees in the first layer and Eucalyptus trees in the second. This allowed us to show Cypress and Eucalyptus trees in the grove at the same time as different colors. We enabled time and elevation from features for both of these layers.

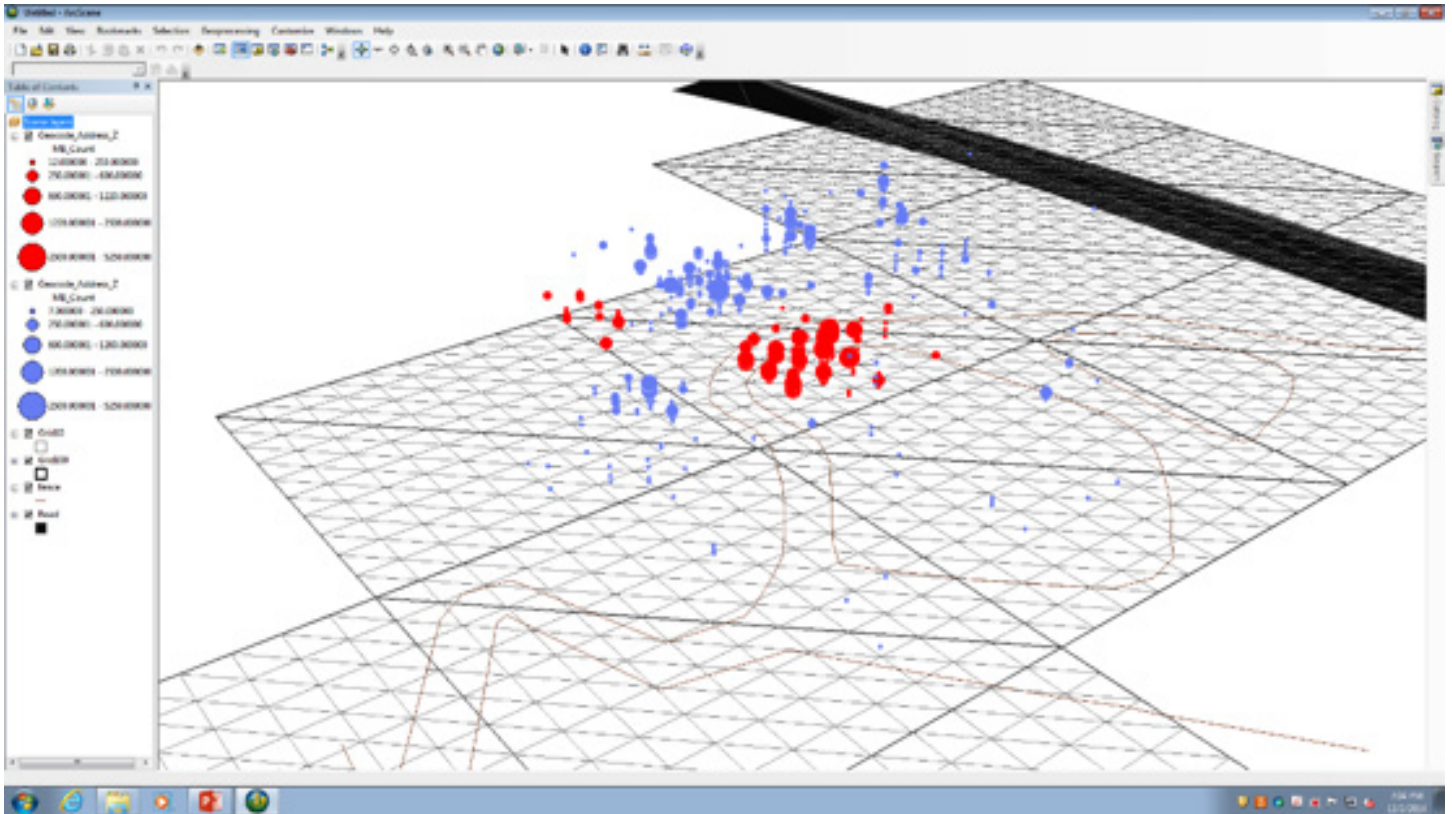


Figure 16: ArcScene Layers

To create a video animation with time enabled, we opened the Animation Manager and shot several keyframes (Fig. 17). Our animation is available in supplemental materials.

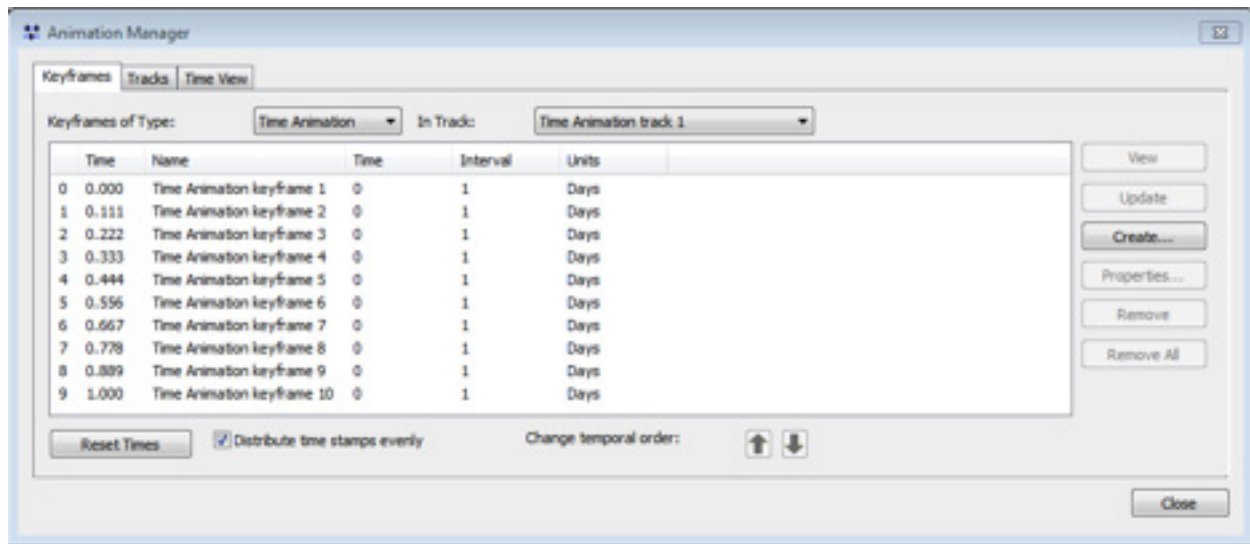


Figure 17: Animation Manager

Results

Over the course of our study, the number of Monarchs in the grove grew dramatically. On November 1, we saw about 3,400 individuals, and on November 23, we saw just over 13,000 individuals. We noticed that clustering on the central Cypress tree became the densest by the end of our study, housing the most Monarchs. We also noticed that many of the clusters moved to greater heights as time went on, which we attribute to decreasing temperatures. Additionally, the butterflies tended to cluster in the center of the grove, leading us to believe that their affinity for the Cypress tree may be a result of its location rather than its physical characteristics. Perhaps the protection of the surrounding Eucalyptus trees is more important to Monarch survival than any benefits of clustering on a Cypress tree. The central location of the Cypress led us to believe that it is the most sheltered from outside winds. We were able to produce many useable products in both ArcMap and ArcScene. We created a Point Density map for each day of our study and the study period as a whole. We show cluster redistribution from day-to-day in ArcScene, taking into account the height of each cluster. We also provided twenty-three days of useful count estimates at the PMBG.

Acknowledgements

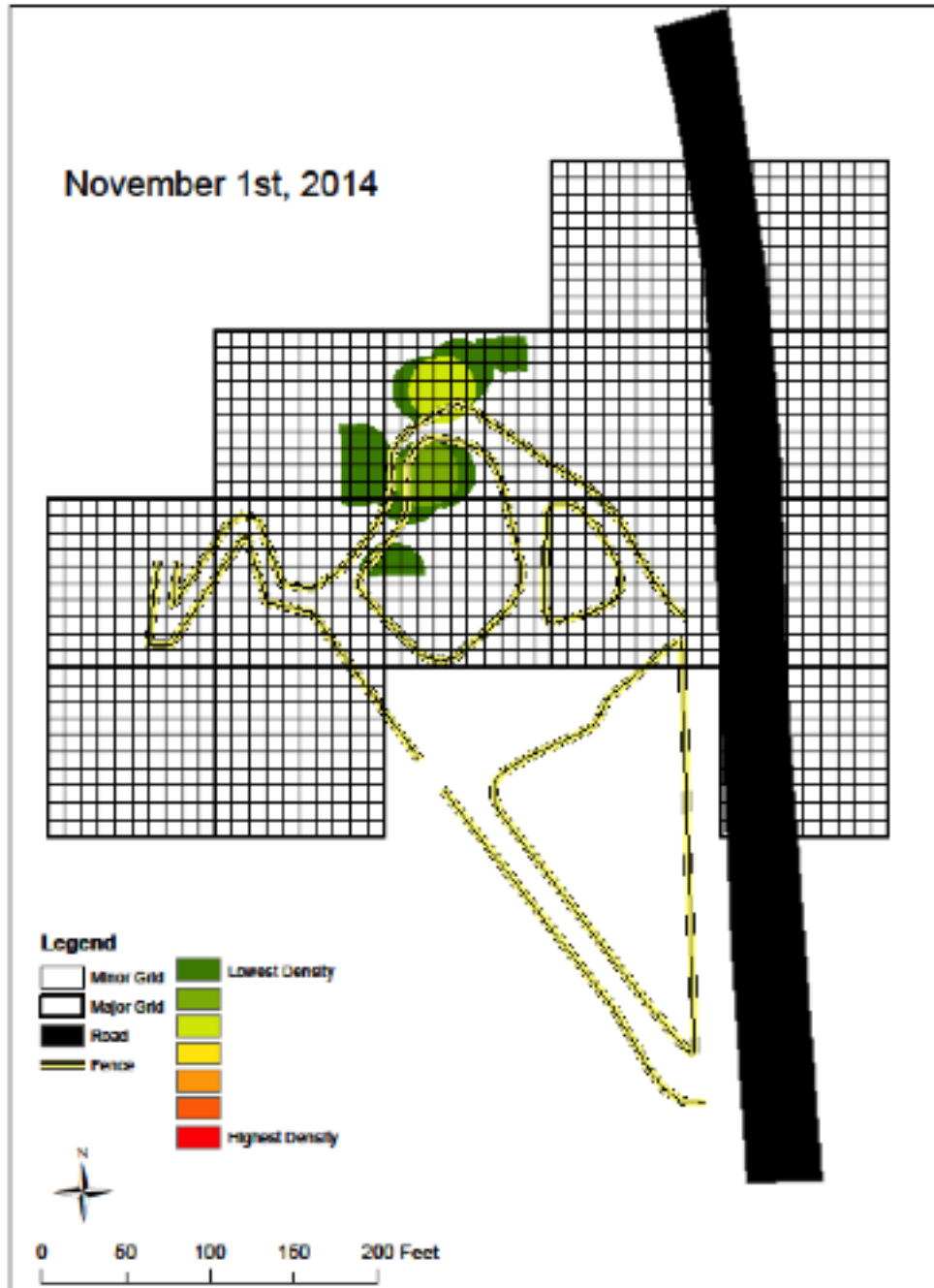
We would first like to thank Dr. Francis Villablanca of the Cal Poly Biology department for providing inspiration and guidance to both our group and our predecessors. We would also like to thank David Yun for organizing the project and introducing us to the topic, as well as providing valuable guidance in using ArcGIS. We would like to thank Danielle Patterson of California State Parks for training our group in data collection techniques and providing us with specific information on the Pismo Monarch Butterfly Grove. We would like to thank the Cal Poly Wildlife Club for allowing us to present our project to their members. Finally, we would like to thank the following people for committing valuable time and effort into helping us collect the vital field data that made this project possible:

Nicole Durtschi
Jessica Copeland
Hannah Brown
Taylor Steele
Jasmid Rodriguez
Brandi Bergreen
Emily Dektar

Thank you again, everyone. This project would not have been possible without all of your help!

Appendix A

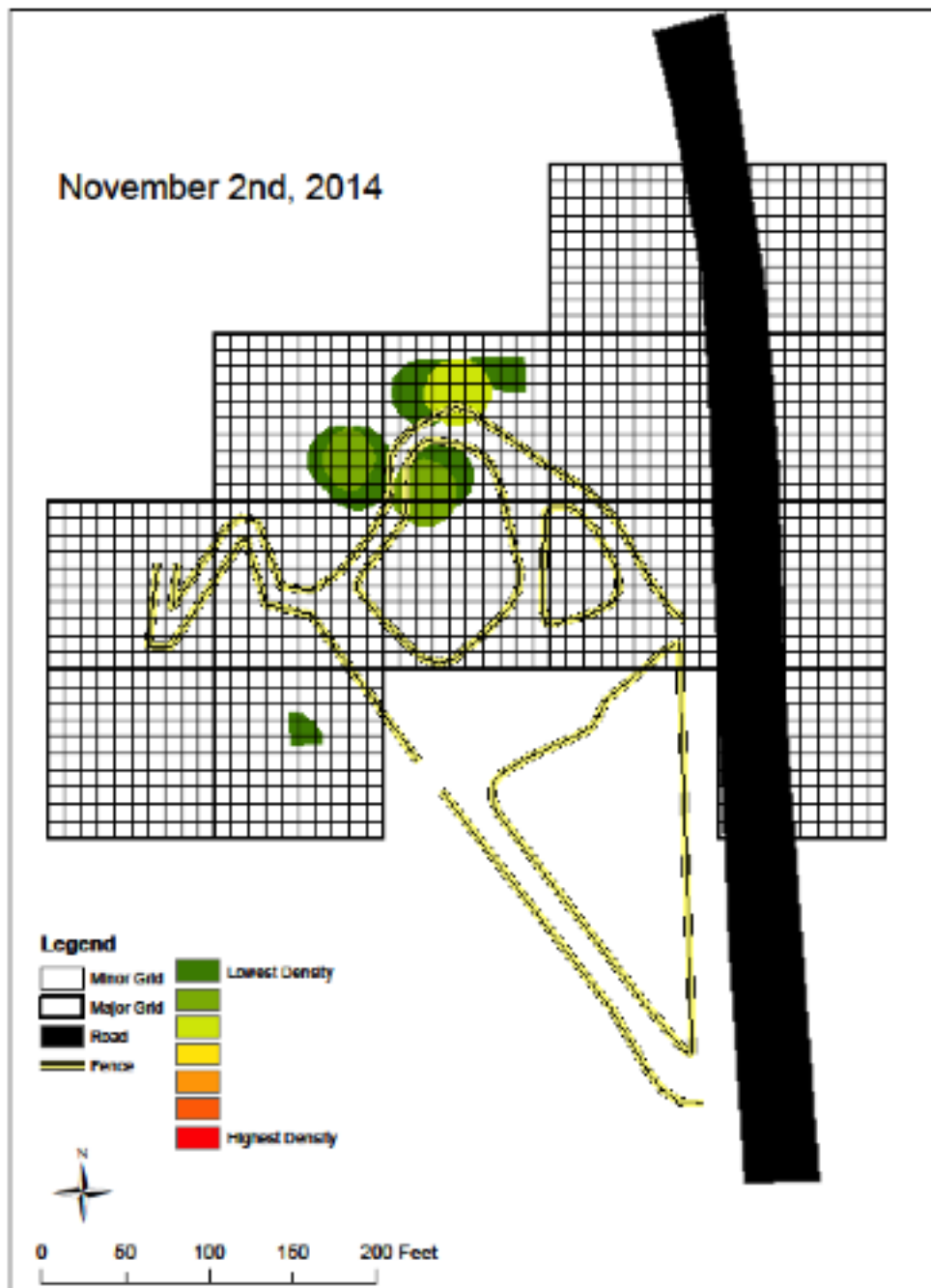
November 2014 - Pismo Monarch Grove Population Density



Created By: Bret Johnson
Tyler Brown
Daniel Goldthwaite
Jesse Wyoko

12/4/2014

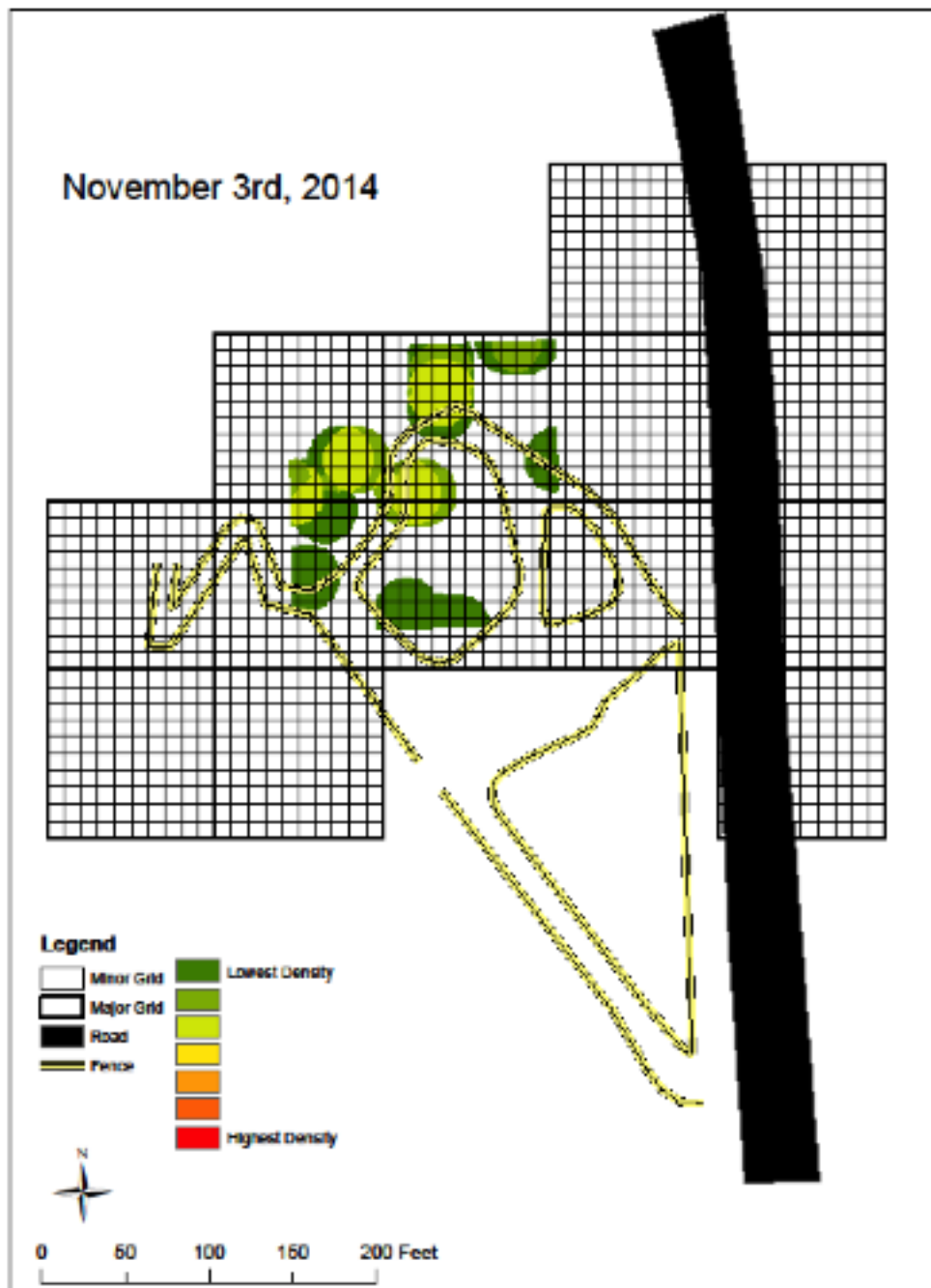
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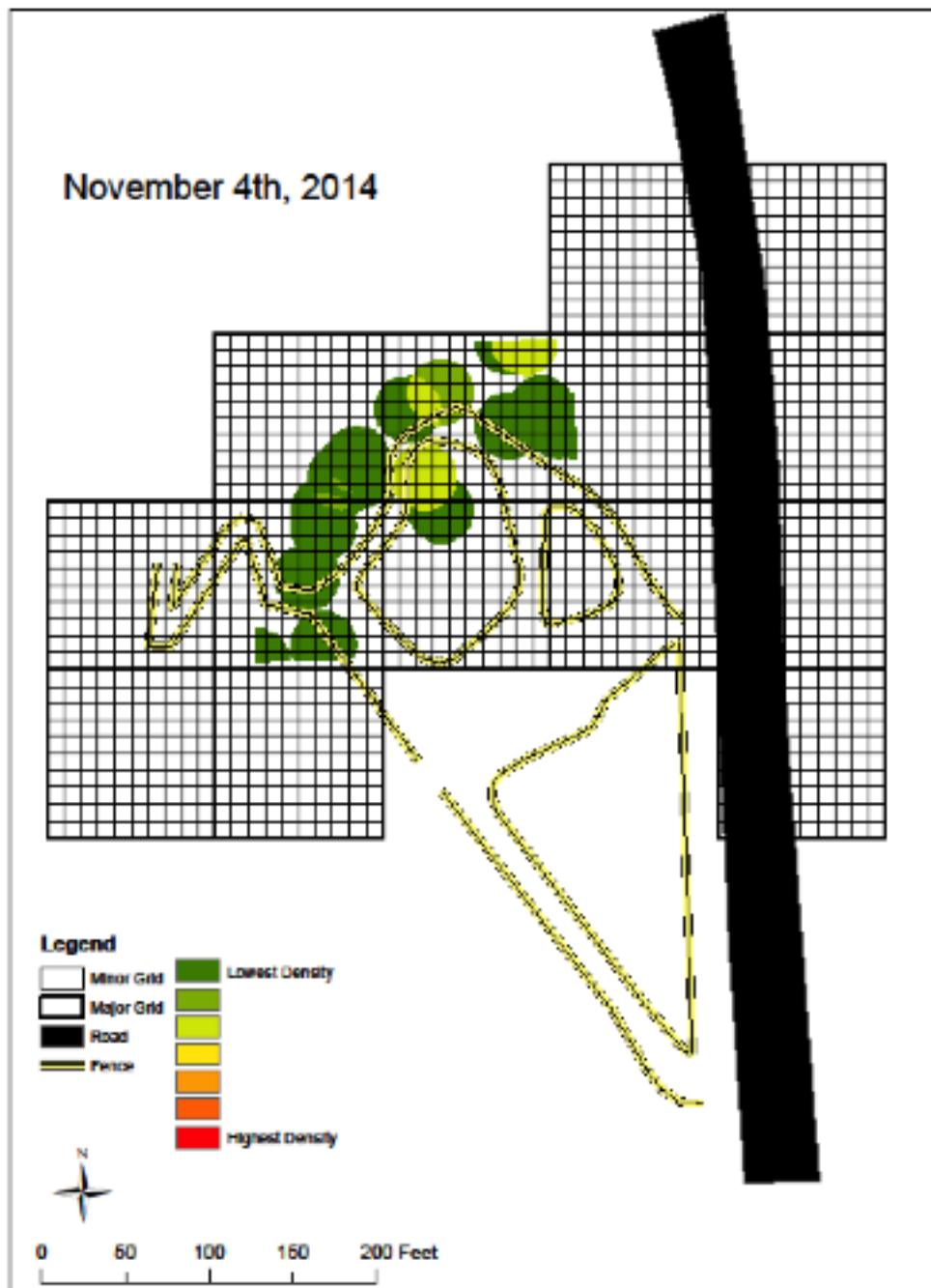
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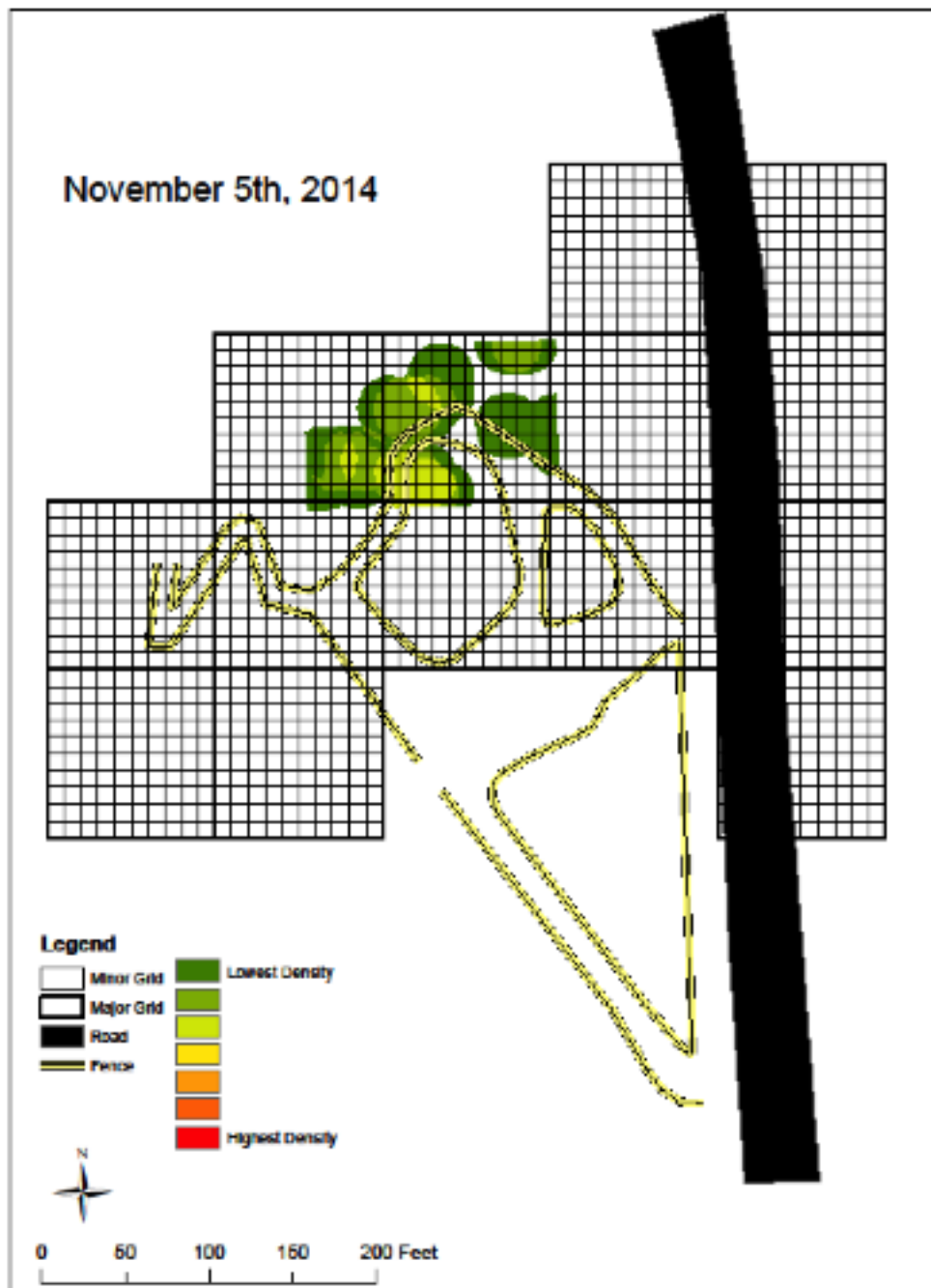
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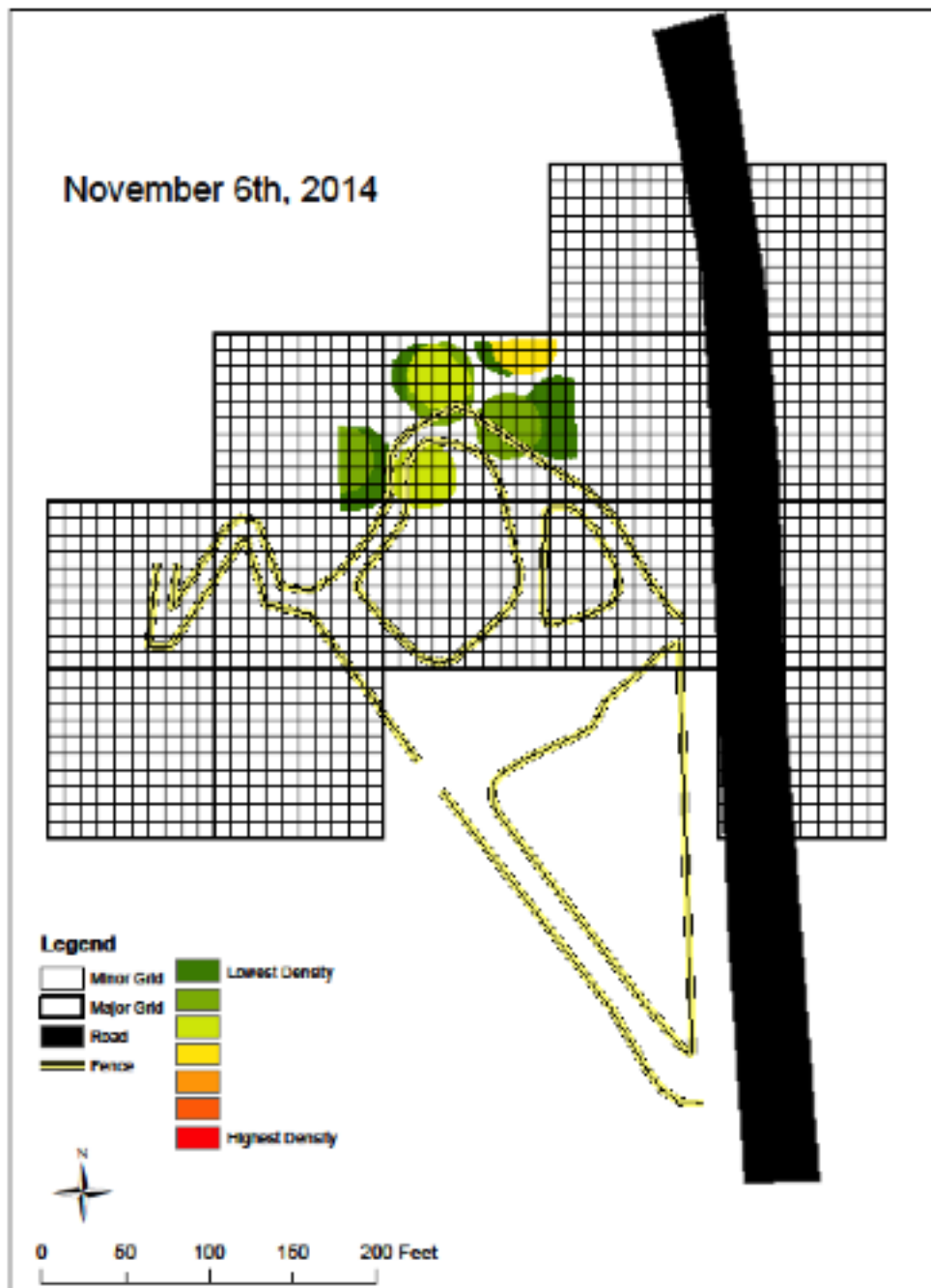
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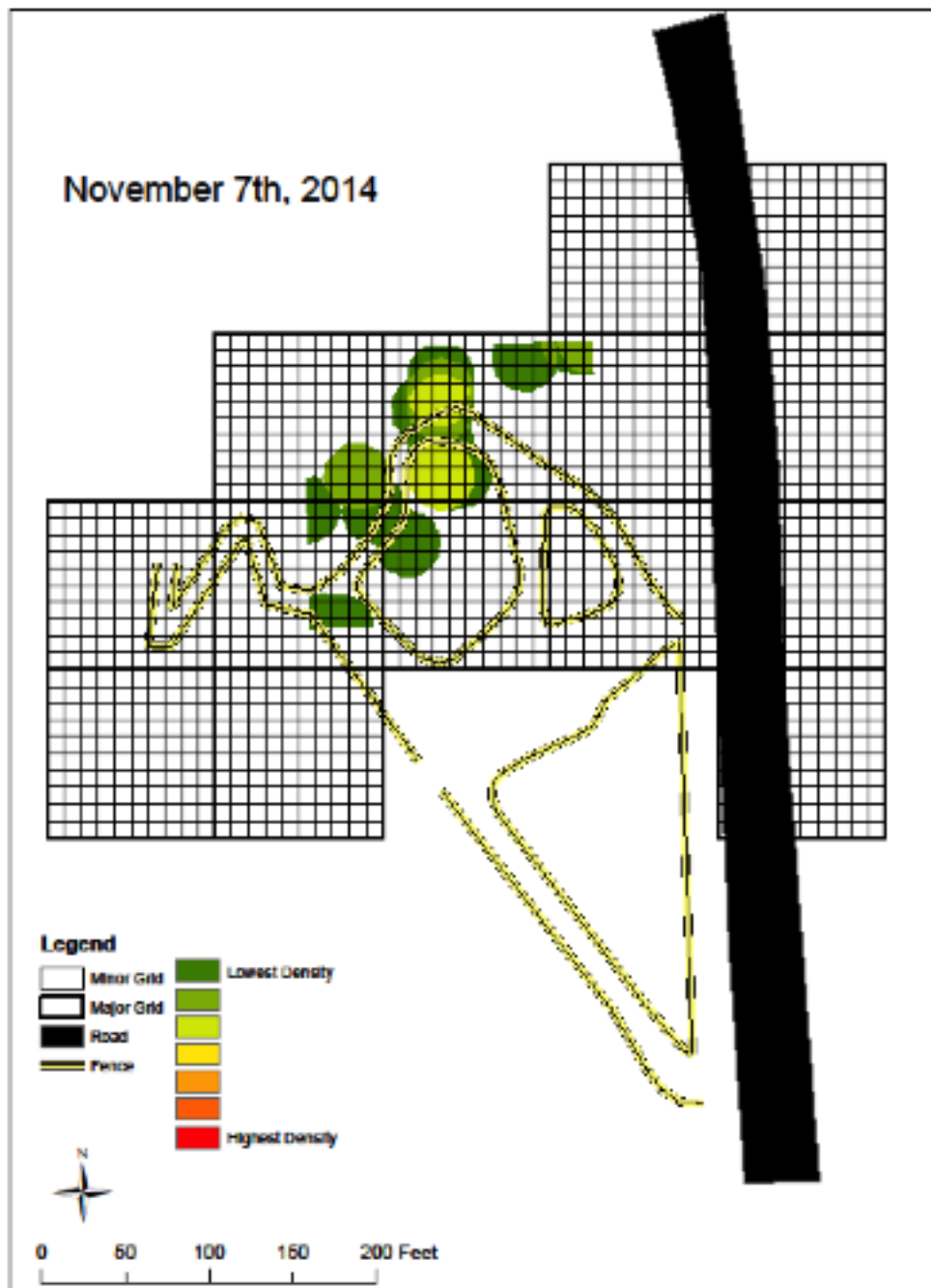
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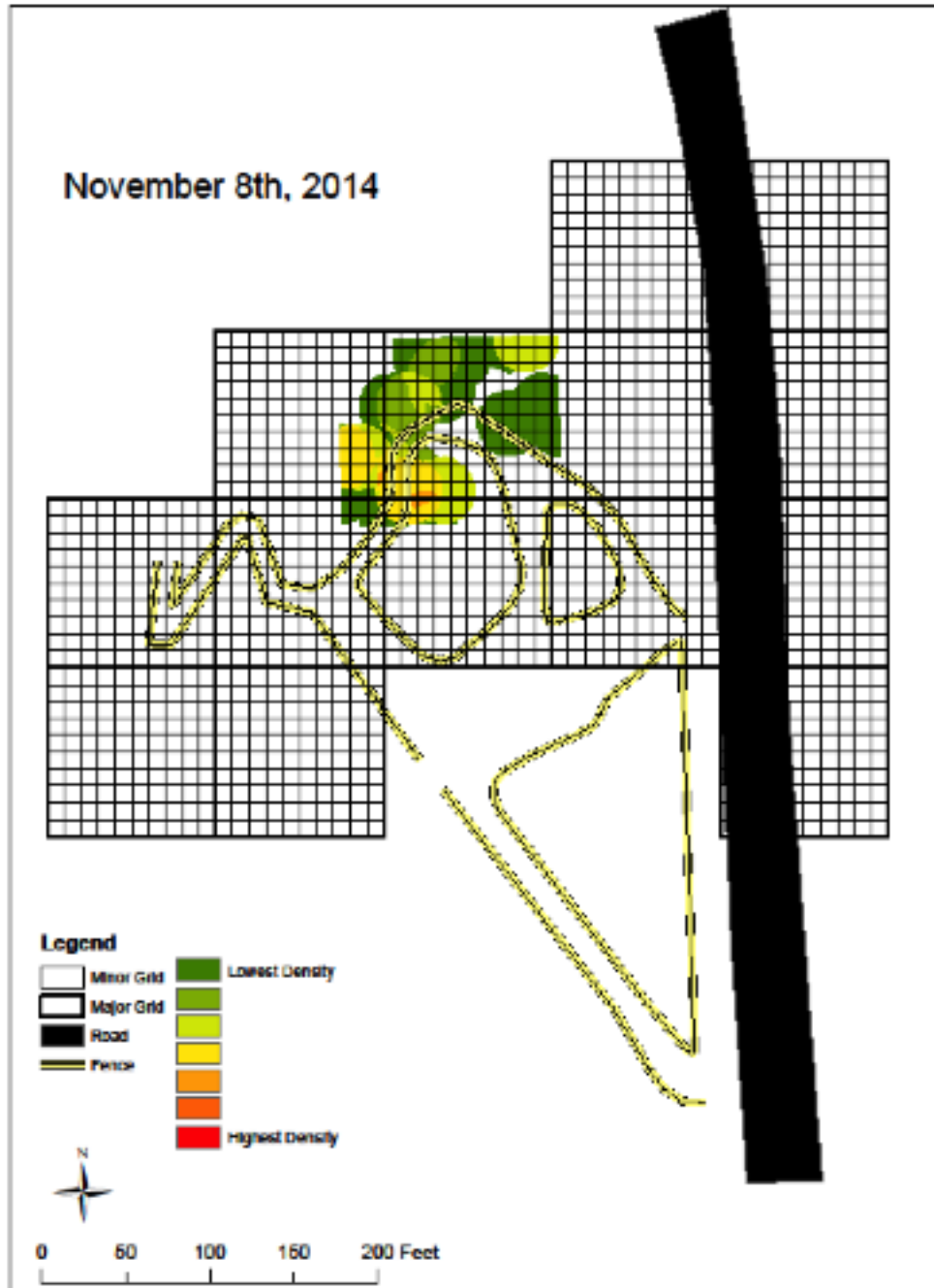
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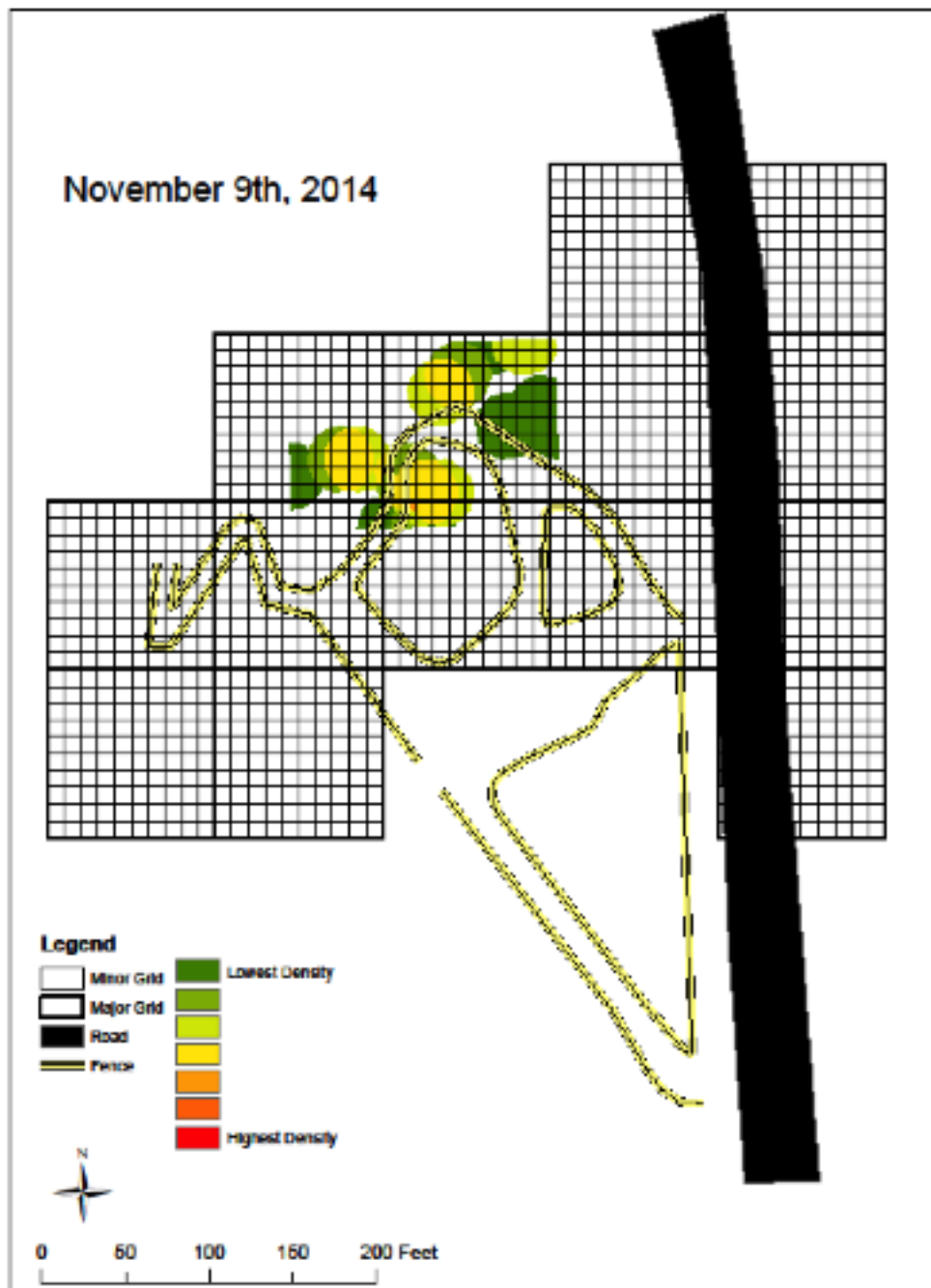
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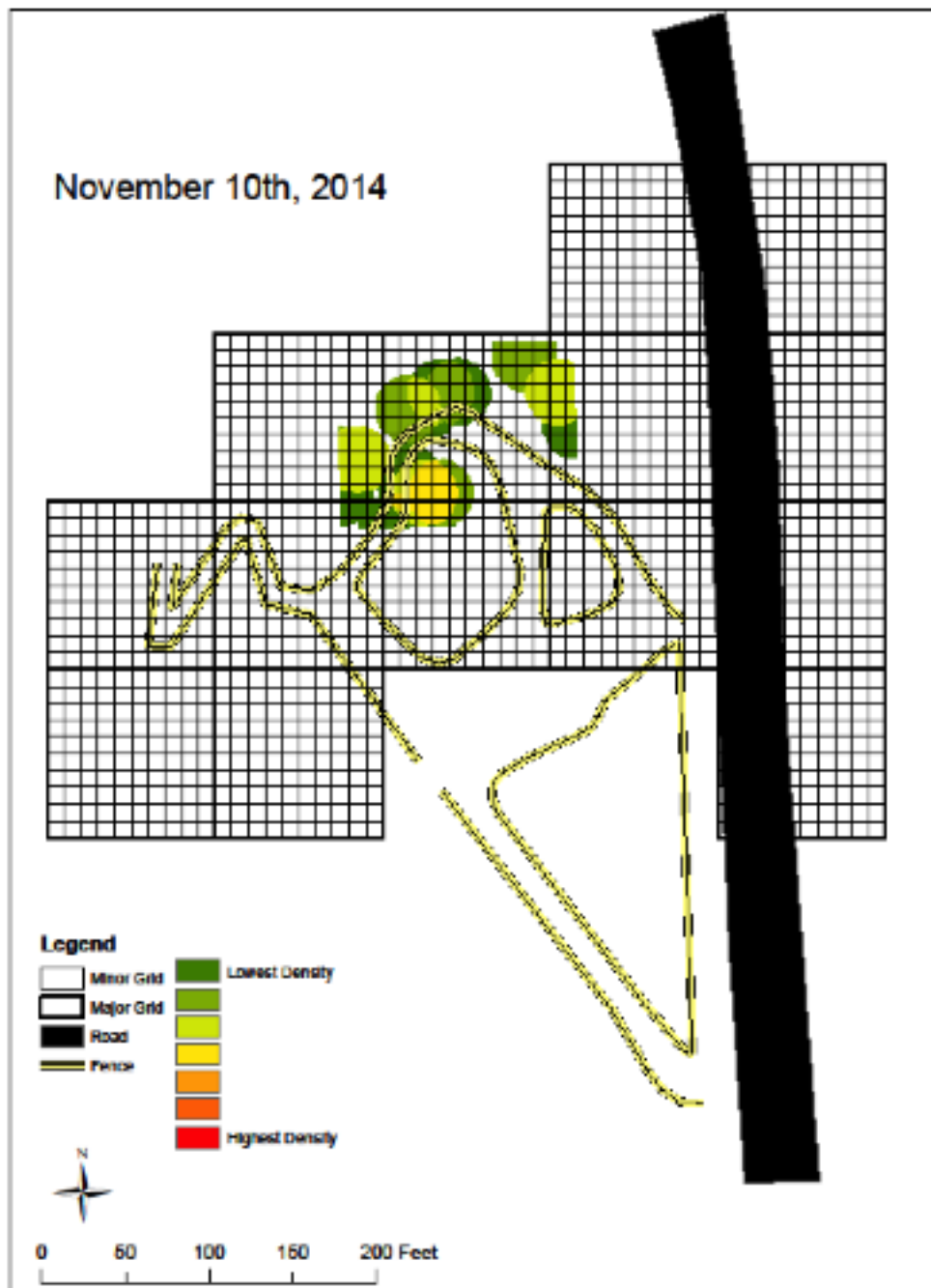
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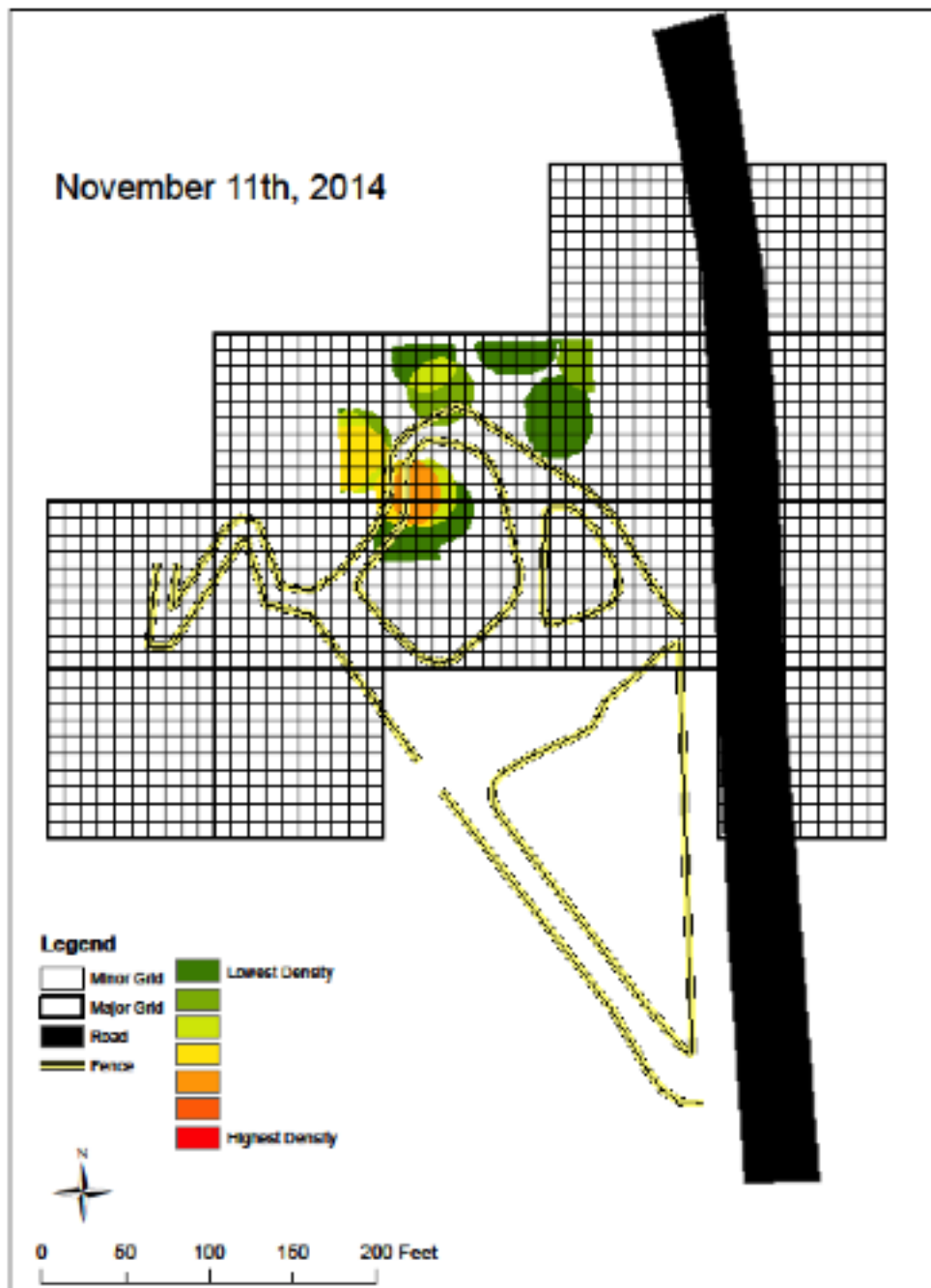
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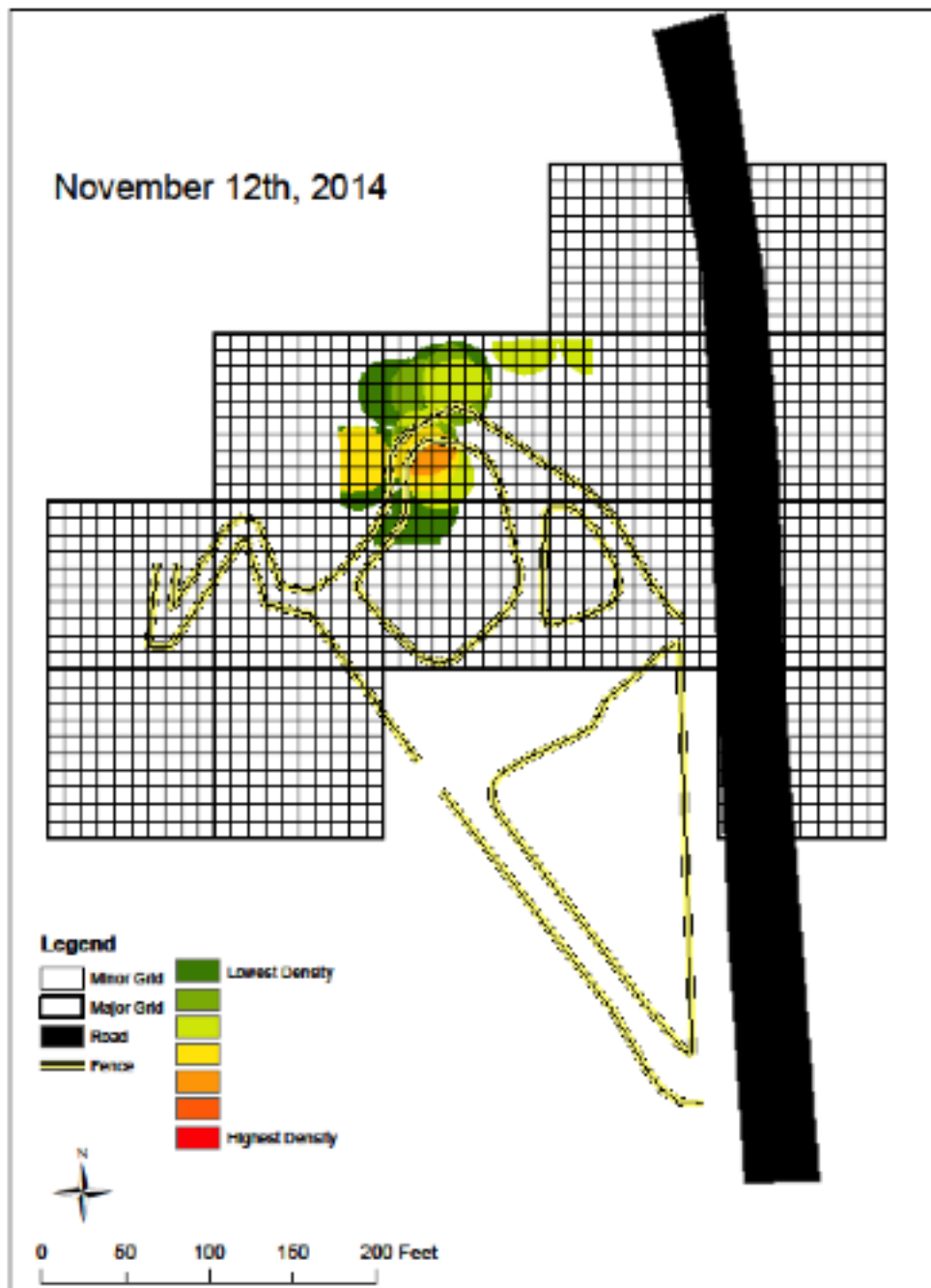
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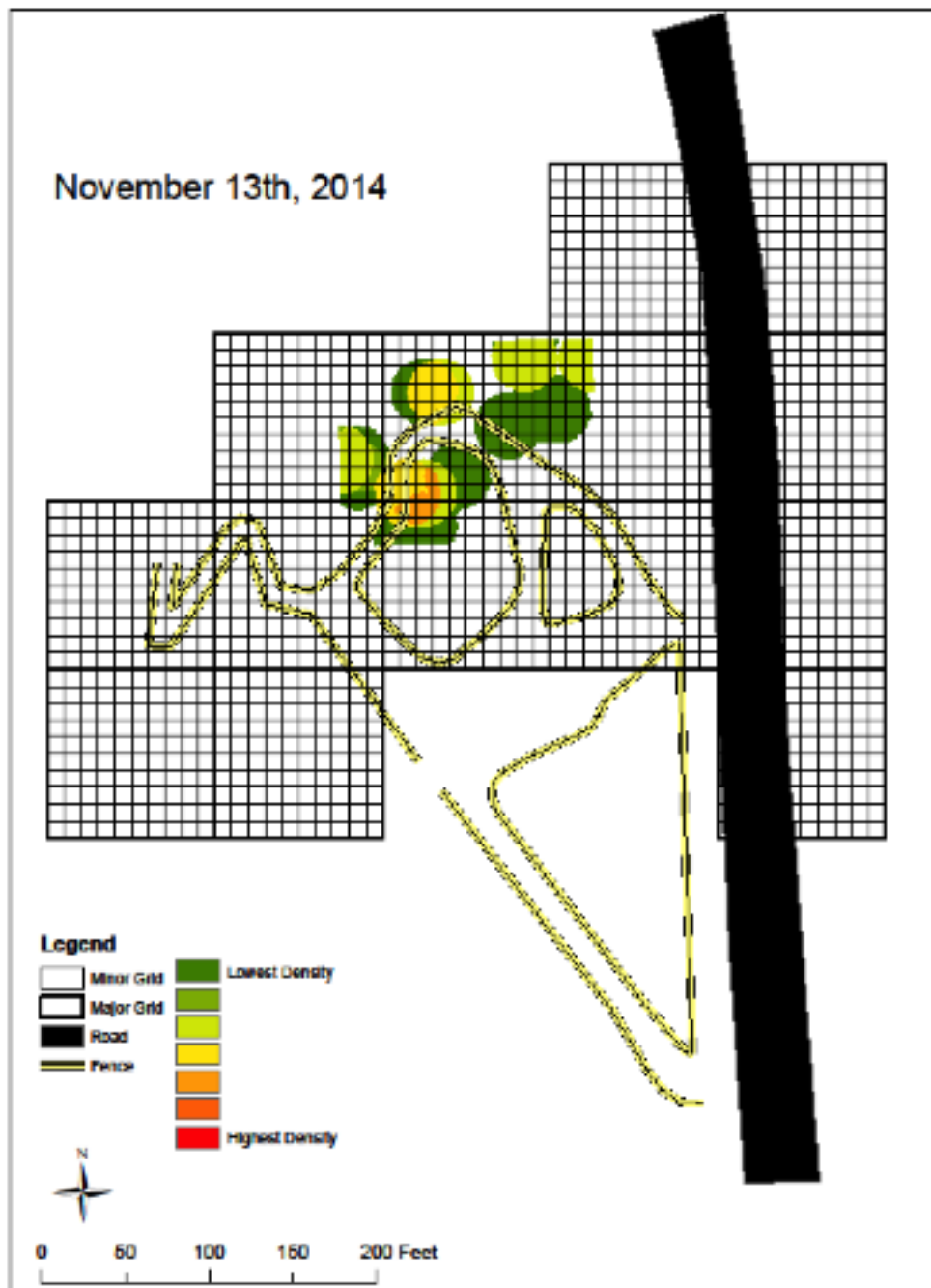
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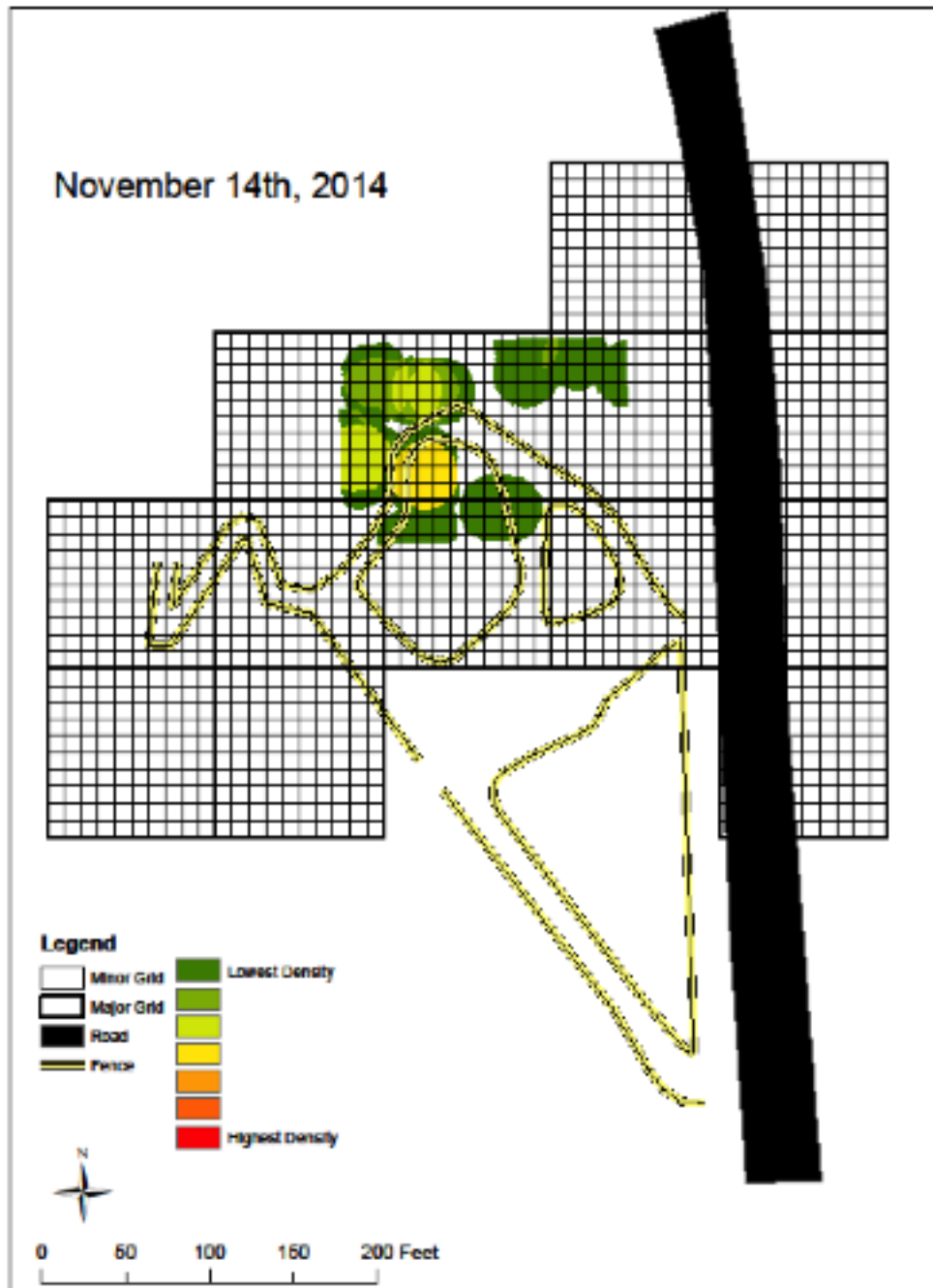
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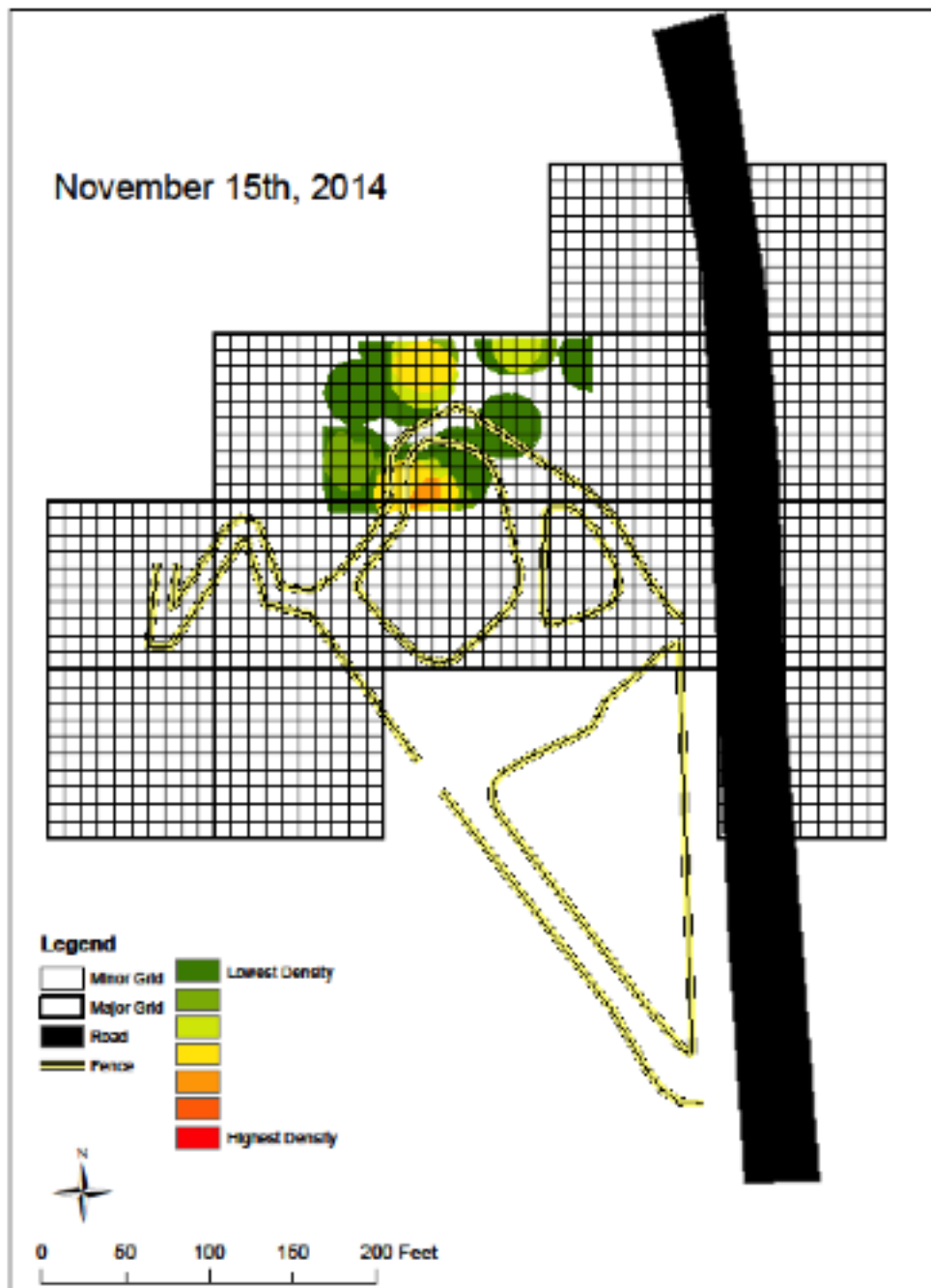
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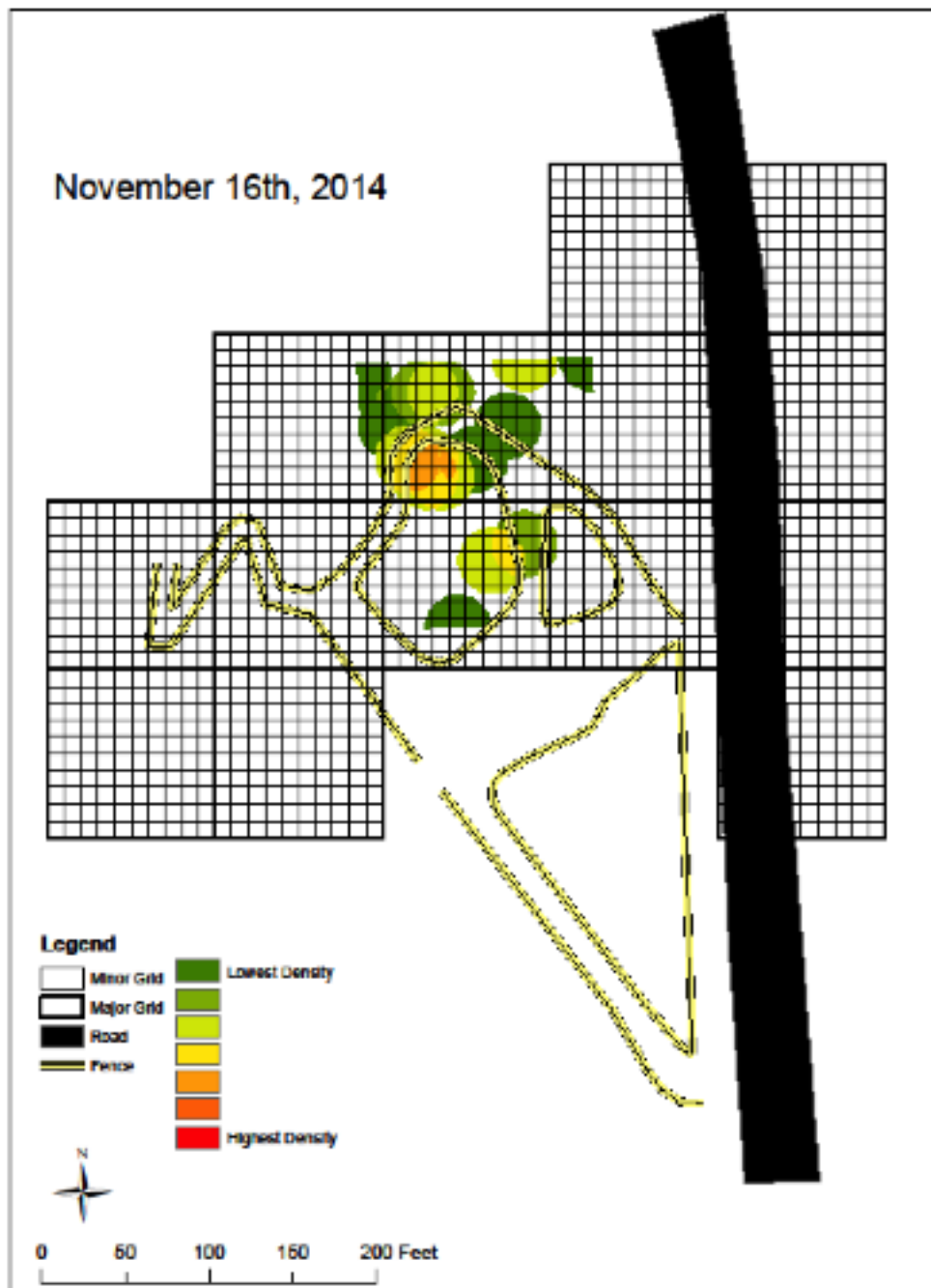
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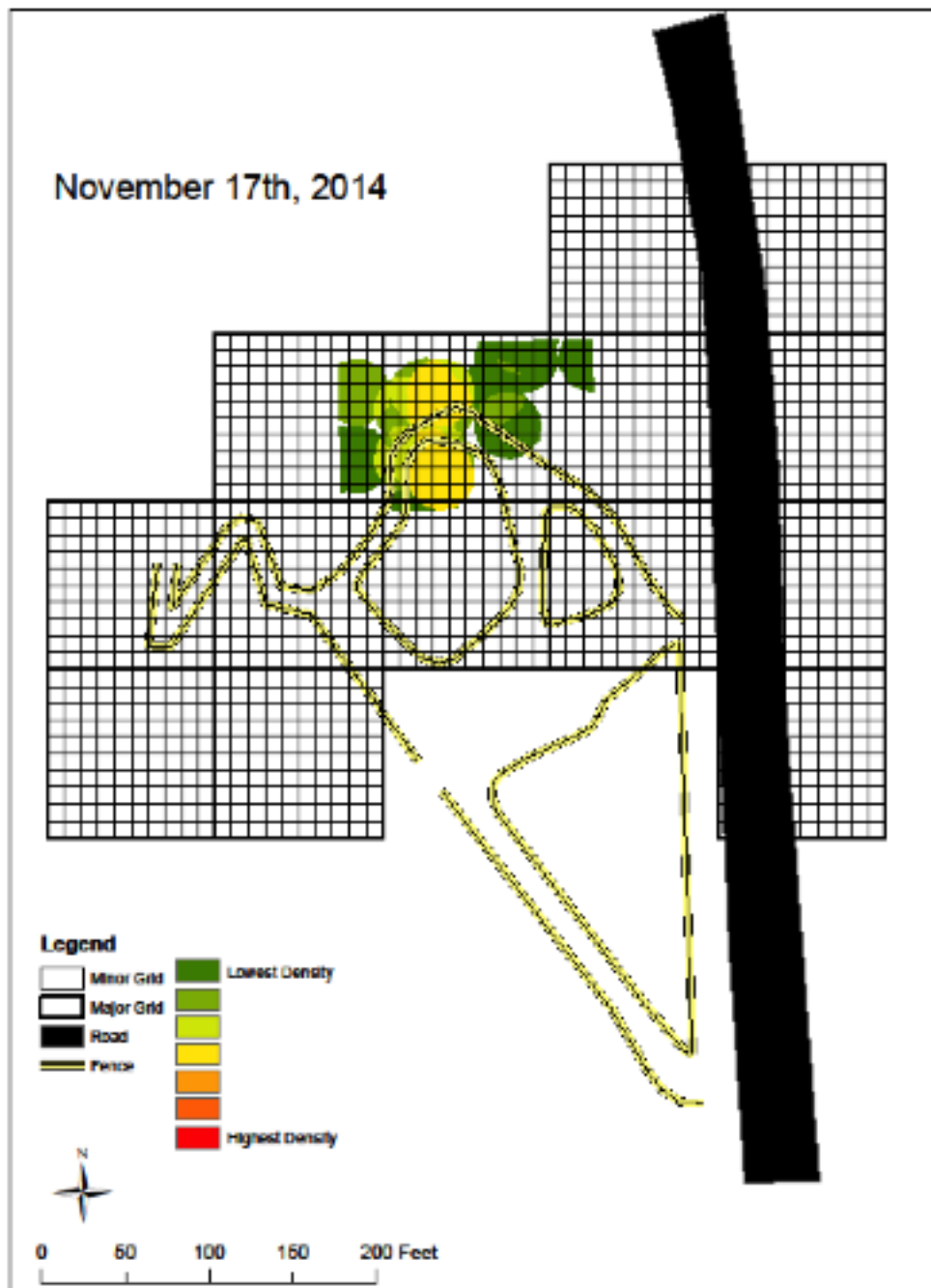
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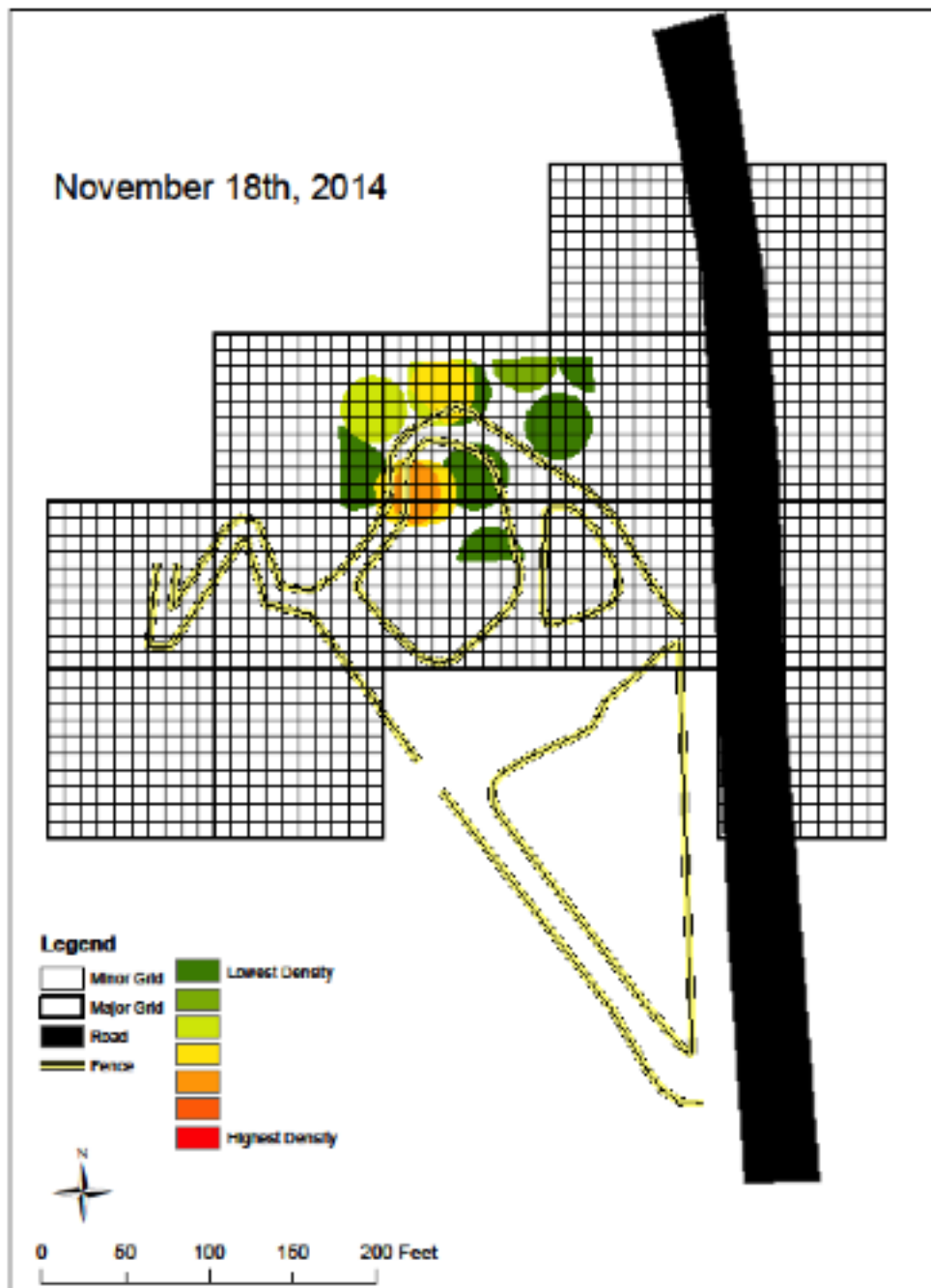
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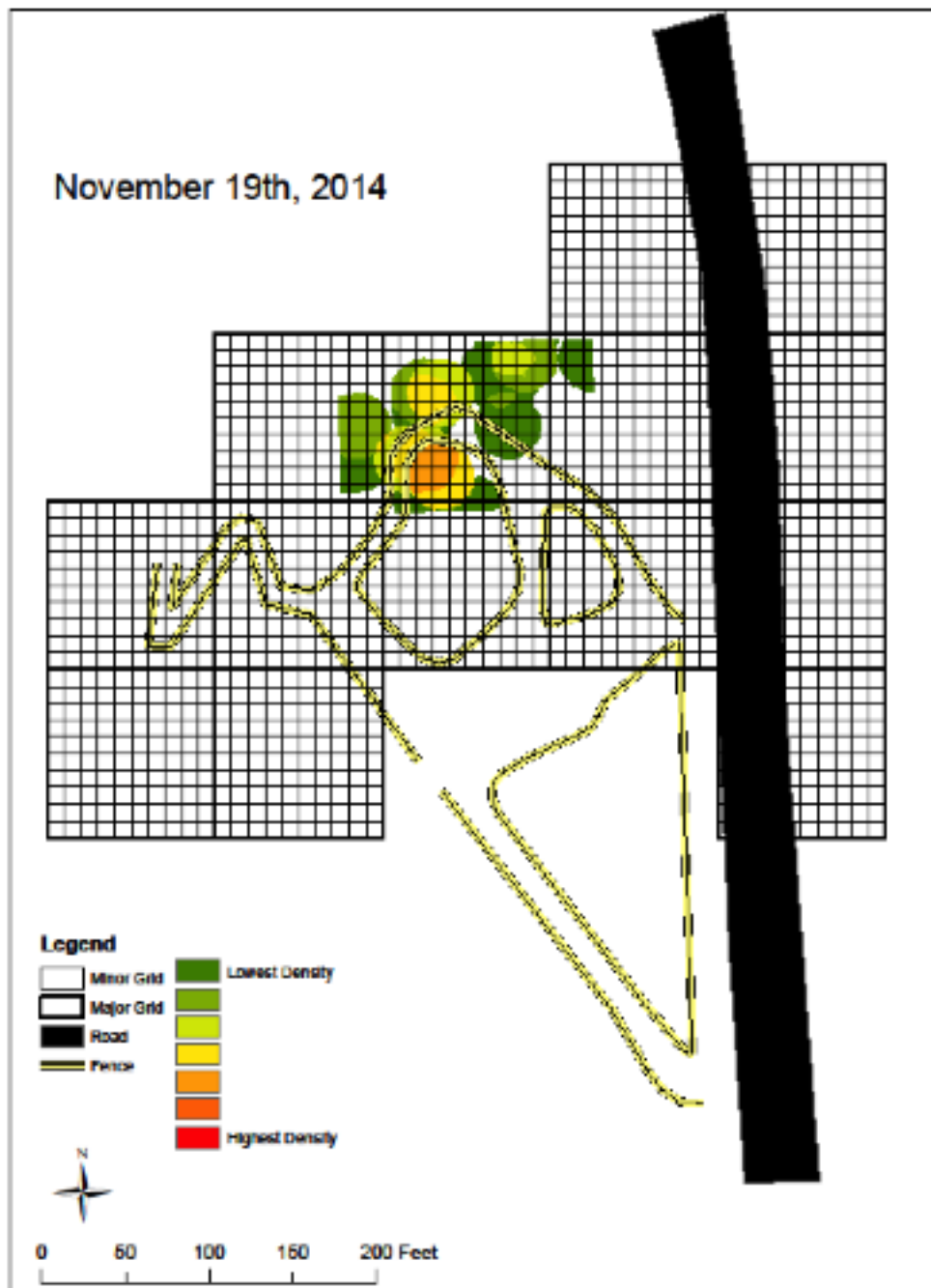
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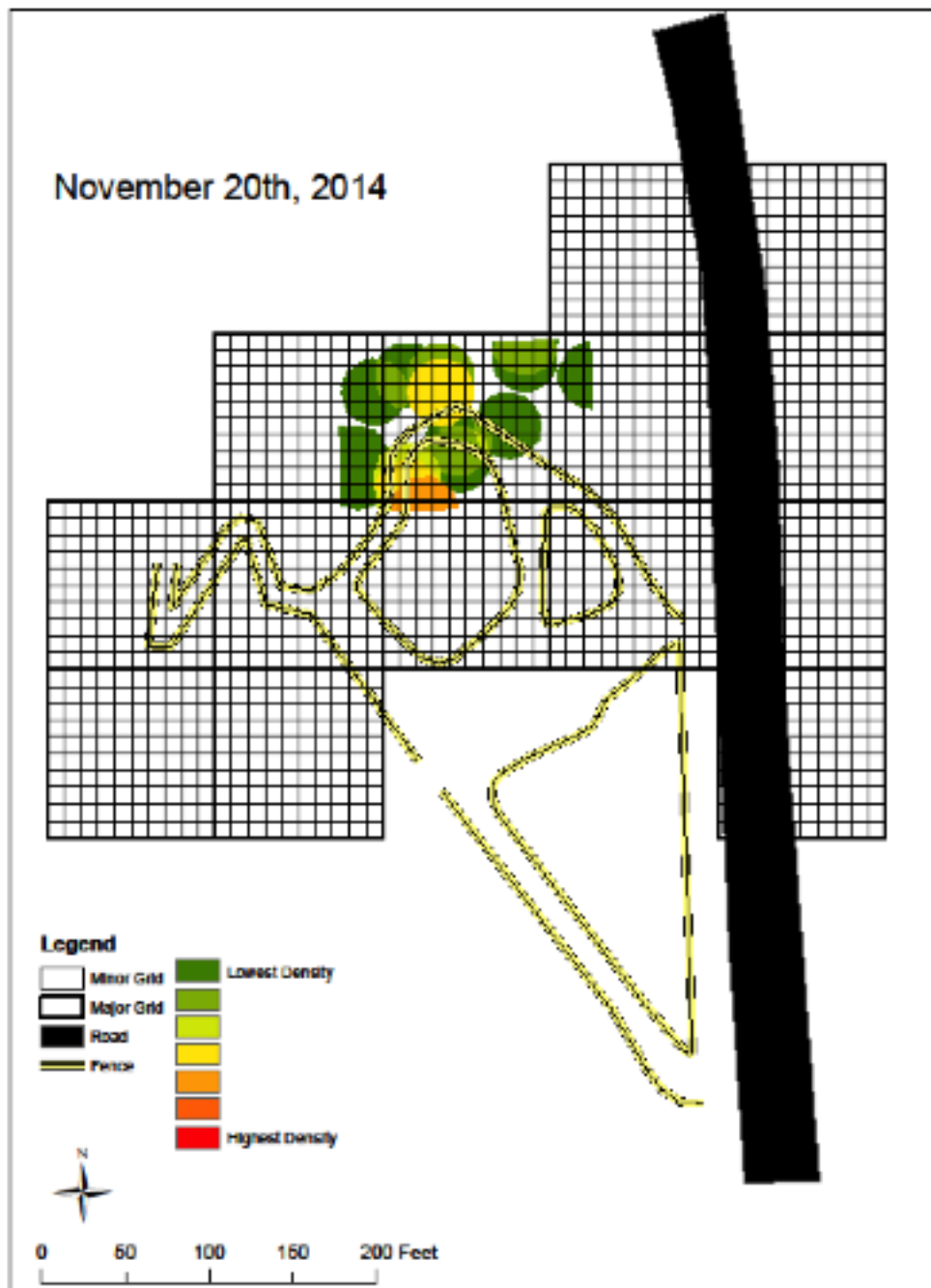
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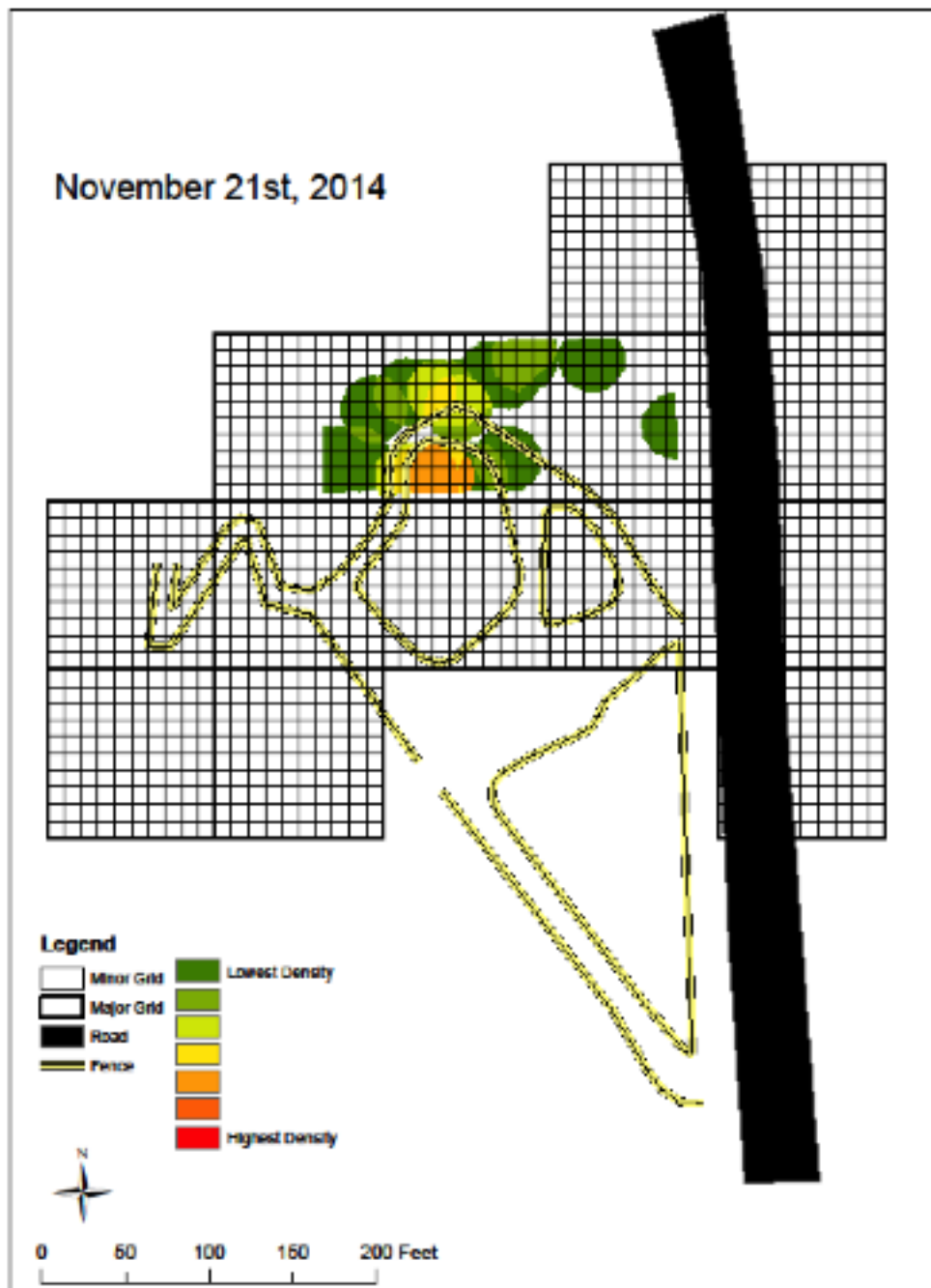
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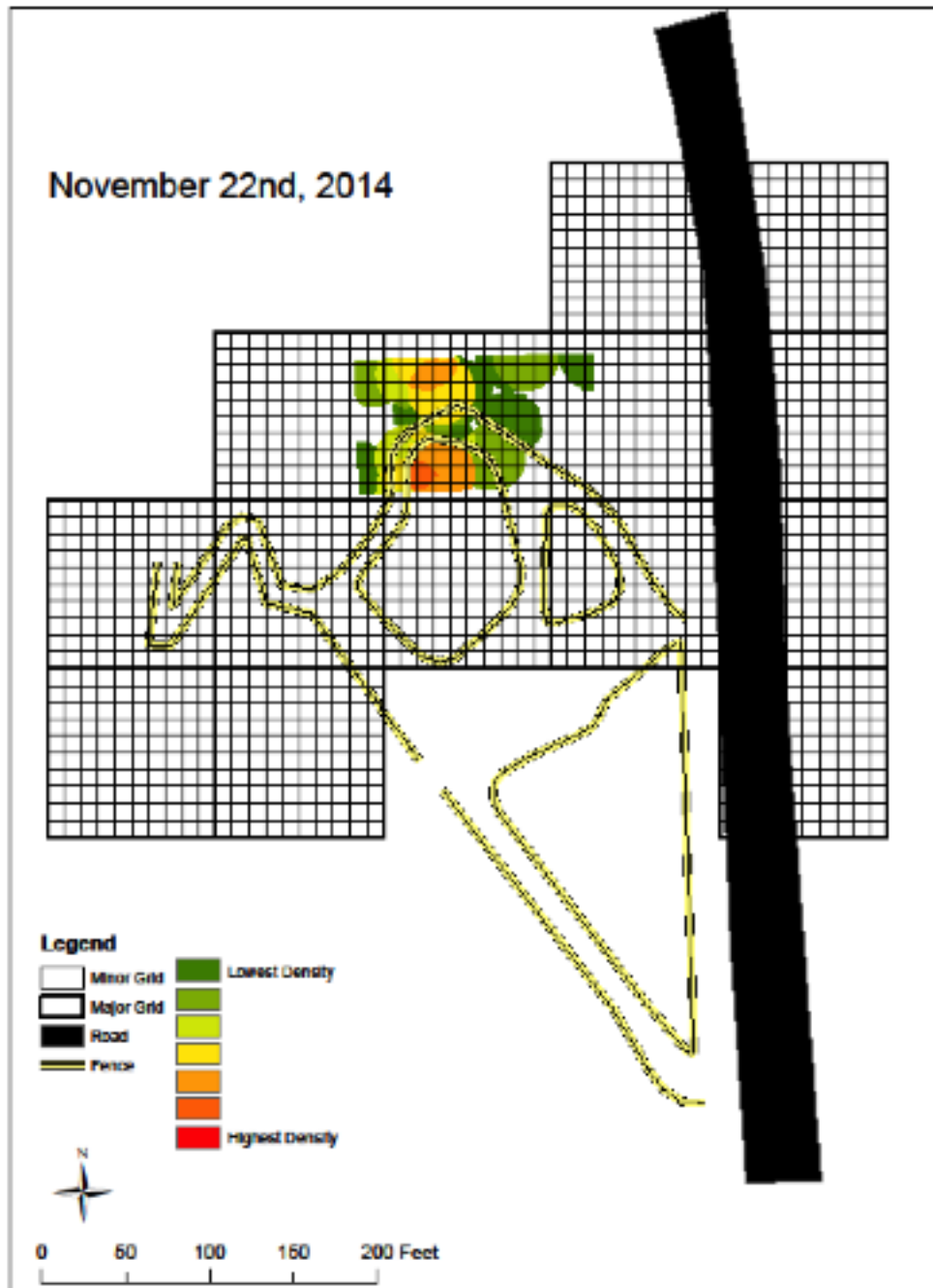
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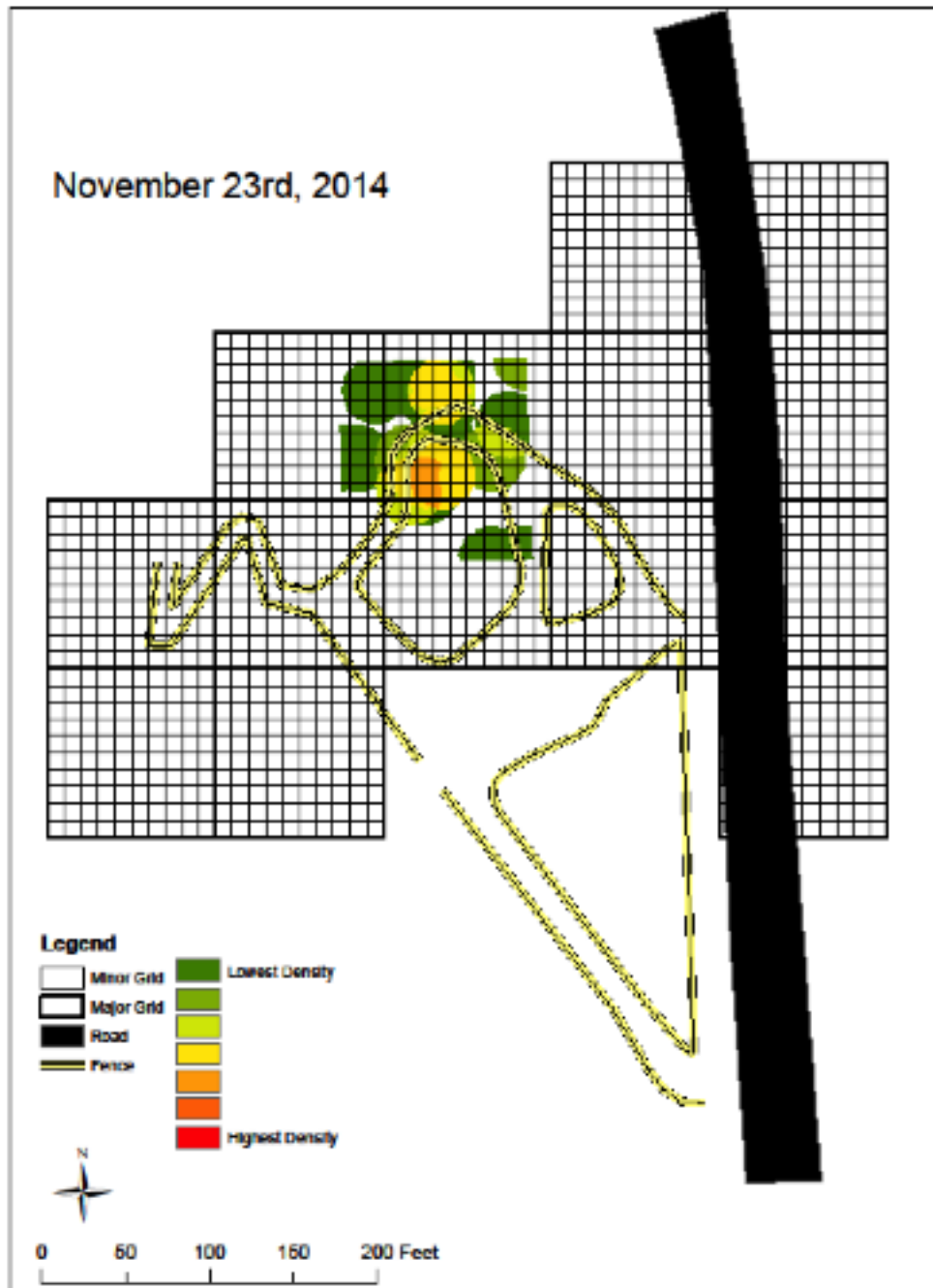
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12/4/2014

Appendix B

Over-wintering Monarch Butterfly Project Monarch Count Data Sheet

DATE 11/1/2014 SITE NAME Pismo

Observers 1 Observer name(s) Beth Johnson

Count Time Span 7:15am to 8:35am Total Count Time (Min) 80

Cloud/Fog Cover 20 % Precipitation (circle one): none drizzle rain

Temp (°C) (approx) Wind (m/s) (~40-45) Wind (Beaufort) 3 Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
12	D	h2.1	T69	Enc	3.5m	3.2m
45	D	h2.1	T63	Enc	3.5m	3.0m
16	D	h2	T63	Enc	3.5m	3.4m
22	D	h2	T63	Enc	4.0	3.8m
45	D	h2	T63	Enc	4.5m	4.2m
15	D	h2	T63	Enc	4.4m	4.2m
55	D	h2	T63	Enc	4.4m	4.0m
36	D	h2	T63	Enc	4.2m	4.0m
28	D	e3	T69	Enc	9.8m	9.7m
1200	D	d4	T70	Enc	10.5	9.8m
48	D	d4	T70	Enc	10.2	9.8
32	D	d4	T70	Enc	11.0	10.5
18	D	d4	T70	Enc	10.5	10.4
11	D	d4	T70	Enc	10.5	10.4
41	D	d4	T70	Enc	11.1	10.5
140	D	d4	T70	Enc	11.0	10.6

Total in Clusters: _____ (include count from next pg) Total # Trees: _____

Loners: THH THH THH THH THH THH THH THH THH THH

Sunners: _____

Fliers: THH THH

Grounders (live): 11

Grand Total: _____ (sum of all clustered butterflies plus loners, sunners, fliers, etc.)

Mating Monarchs: _____

Dead Monarchs: _____

Other Notes: Rain last night. Began to drizzle 8:35am → I

on leaving - raining pretty hard, actually!
(1.04" @ Pismo Beach from Friday into Saturday)

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/2/14 SITE NAME Pismo Grove
 # Observers 2 Observer name(s) Beth Johnson
 Count Time Span 6:30am to 1:00pm Total Count Time (Min) 45
 Cloud/Fog Cover 0 % Precipitation (circle one): none drizzle rain
 Temp (°C) 60°F Wind (mi/s) 2-3 Wind (Beaufort) 2 Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
120	D	12	T63	Enc	6.5	6.3
65	D	2	T63	Enc	6.6	6.5
30	D	2	T63	Enc	7.0	6.9
22	D	h2	T63	Enc	7.0	7.0
16	D	h2	T63	Enc	6.8	6.8
12	D	h2	T63	Enc	6.5	6.5
8	D	h2	T63	Enc	6.8	6.8
45	D	h2	T63	Enc	7.0	6.8
32	D	e3	T69	Enc	10.2	10.1
55	D	e4	T70	Enc	9.2 9.2	7.0
70	D	e4	T70	Enc	10.3	9.5
45	D	e4	T70	Enc	10.5	10.3
22	D	e4	T70	Enc	10.3	10.3
60	D	e4	T70	Enc	10.5	10.3
16	D	e4	T70	Enc	10.9	10.8
7	D	e4	T70	Enc	8 10.8	10.8

Total in Clusters:	(include count from next pg)	Total # Trees:
# Loners:	<u>III III III III</u>	Tally every butterfly of each type that you see throughout the site.
# Sunners:	<u>IIII</u>	
# Fliers:	<u>II</u>	
# Grounders (live):	<u>I</u>	
Grand Total:	(sum of all clustered butterflies plus loners, sunners, fliers, etc.)	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	<u>(1) orange tag, couldn't read it.</u>

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
350	D	c4	T70	Enc	11.0	10.8
90	D	c4	T70	Enc	11.2	11.0
55	D	c4	T70	Enc	11.8	11.6
450	D	c4	T70	Enc	12.0	11.0
130	D	c4	T70	Enc	11.5	11.2
18	D	c4	T70	Enc	11.6	11.6
28	D	am c4	T70	Enc	10.2	10.8
20	D	am c4	T70	Enc	9.2	9.2
60	D	am c4	T70	Enc	9.2	9.1
45	D	c4	T70	Enc	9.4	9.4
115	D	c4	T70	Enc	9.8	9.4
120	D	c4	T70	Enc	10.0	9.5
55	D	c4	T70	Enc	9.8	9.7
10	D	c4	T70	Enc	10.1	10.1
38	D	c4	T70	Enc	10.3	10.2
55	D	c4	T70	Enc	9.9	9.6
22	D	c4	T70	Enc	10.0	10.0
32.5	D	d4	T100	Cyp	16.0	15.0
250	D	c10	T100	Cyp	12.0	11.0
50	D	c10	T100	Cyp	13.5	13.0
300	D	c10	T100	Cyp	13.8	13.0
65	D	c10	T100	Cyp	13.9	12.6
25	D	c10	T100	Cyp	13.2	13.0
80	C	i8	T81	Enc	8.1	8.0
25	C	i8	T81	Enc	8.0	8.0
20	C	i8	T81	Enc	7.9	7.8
50	C	i8	T81	Enc	9.2	9.0
110 35	C	i9	T81	Enc	10.5	10.4
130	C	i9	T81	Enc	8.0	7.2
60	C	i9	T81	Enc	8.8	8.6
110	C	i8	T81	Enc	11.0	10.0
175	C	i9	T91	Enc	8.4	8.0
200	C	i9	T91	Enc	9.8	9.0
150	M	e5	T192	Enc	10.0	8.5

Please add any counts on this page to the total tally on the previous page.

80 M e5 T192 Enc 13.0 12.0

DATE 11/29/02
 TIME 08:00
 11/29/02

**Over-wintering Monarch Butterfly Project
 Monarch Count Data Sheet**

DATE November 3rd SITE NAME Pismo
 # Observers 4 Observer name(s) Conroy, Smith, and Taylor
 Count Time Span 06:00 to 8:00 AM Total Count Time (Min) 93
 Cloud/Fog Cover 16 % Precipitation (circle one) (none) drizzle rain
 Temp (C) 11.2 Wind (m/s) 0.0 Wind (Beaufort) _____ Wind direction NW
52.9 typical

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
50	E	a3	T11	euc	12.0	11.0
24	E	a9	T11	euc	11.0	11.1
16	E	a9	T11	euc	11.5	11.0
13	E	a8	T11	euc	11.5	11.0
51	E	a8	T11	euc	12	11.5
100	D	d3	T63	euc	19.0	18.5
157	D	d5	T70	euc	19.0	18.5
52	D	d5	T70	euc	17.5	17.2
70	D	d7	T63	euc	18.5	18.2
125	D	d1	T63	euc	18.0	17.7
230	D	d1	T63	euc	18.5	18.0
47	D	d1	T63	euc	18.0	17.8
15	D	d1	T63	euc	18.0	17.9
200	D	d4	T70	euc	18.0	14.0
120	D	d4	T70	euc	15.0	14.5
140	D	d4	T70	euc	14.0	13.5

Total in Clusters: _____ (include empty from next pg) Total # Trees: _____
 # Loners: 111
 # Summers: _____
 # Fliers: 111 111 111 111
 # Grounders (live): _____
 Grand Total: _____ (sum of all observed butterflies plus loners, summers, fliers, etc.)
Fully every butterfly of each type that you see throughout the site.

Mating Monarchs: _____
 # Dead Monarchs: _____
 Other Notes: _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
30	D	d5	T70	euc	13.8	12.5
42	D	d4	T70	euc	16.0+5.5	15.5 15.5
22	D	d4	T70	euc	16.0	15.5
76	D	d4	T70	euc	16.5	15.5
25	D	d4	T70	euc	8.5	7.0
217	D	d4	T70	euc	6.5	5.5
193	D	d4	T70	euc	7.5	8.5
66	D	d3	T70	euc	6.0 6.5	6.0
29	D	d3	T70	euc	6.5	6.0
27	D	d3	T70	euc	7.0	6.5
132	D	d3	T70	euc	8.5	7.0
115	D	d2	T70	euc	7.5	7.0
224	D	d2	T70	euc	9.5	7.0
124	D	d2	T70	euc	8.5	9.0

Please add any counts on this page to the total tally on the previous page.

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE: 11/3/14 SITE NAME: Primo

Observers: 4 Observer name(s): Tyler & Daniel

Count Time Span: 6:30 to 9:30am Total Count Time (Min): 11

Cloud/Fog Cover: 10 % Precipitation (circle one): none drizzle rain

Temp (°C): 7.1 Wind (m/s): _____ Wind (Default): _____ Wind direction: _____

11.2°C

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
30	J	a8	T150	E	7.0	6.9
24	J	a8	T150	E	7.0	6.9
14	J	a9	T150	E	7.2	7.1
11	J	a9	T150	E	7.2	7.1
26	J	b6	T150	E	7.5	7.3
19	J	b6	T150	E	7.8	7.3
27	J	b7	T150	E	8.5	8.4
47	J	b7	T150	E	8.5	8.4
45	J	b7	T150	E	9.0	8.9
14	J	b7	T150	E	9.0	8.9
17	J	b7	T150	E	9.0	8.9
16	J	b7	T150	E	10-11 9.0	10.4 8.9
57	J	b7	T150	E	10.5	10.4
42	H	c5	T150	E	11.0	10.9
18	H	d5	T150	E	12.0	11.9
21	H	e5	T150	E	12.0	11.9

vertical

50'

Total in Clusters: _____	(include counts from next pg)	Total # Trees: _____
# Larvae: _____		
# Sunsets: _____		Tally every butterfly of each type that you see throughout the site.
# Fliers: <u>714</u> <u>1111</u>		
# Grounders (live): _____		
Grand Total: _____	(sum of all clustered butterflies plus larvae, sunsets, fliers, etc.)	

Mating Monarchs: _____
Dead Monarchs: _____
Other Notes: _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
10	A	f1	T198	E	10.0	7.5 9.7
12	H	g1	T222	E	4m	8.9
104	H	g2	T222	E	5.2	5.0
131	H	g2	T222	E	9.2	5.0
153	C	e10	T89	E	5.8	5.7
4	C	e10	T89	E	5.9	5.7
25	C	e10	T89	E	6.1	6.4
22	C	e10	T89	E	6.1	6.4
24	C	e10	T89	E	6.1	6.0
15	C	e10	T89	E	6.1	6.0
17	C	e10	T89	E	6.5	6.0
24	C	e10	T89	E	11.0	11
22	C	e10	T89	E	11.0	11
24	C	e10	T89	E	11.0	11
20	C	e10	T89	E	11	11
40	C	e10	T89	E	11	11
50	C	e10	T89	E	11	11
30	C	e10	T89	E	11	11
15	C	e10	T89	E	11	11
25	C	e10	T89	E	11	11
4	C	e10	T89	E	11	11
20	C	e10	T89	E	11	11
40	C	f10	T89	E	11	11
24	C	f10	T89	E	11	11
55	C	f10	T89	E	11	11
41	C	f10	T89	E	11	11
15	C	f10	T89	E	11	11
43	C	f10	T89	E	11	11
38	C	f10	T89	E	11	11
47	C	f10	T89	E	11	11
28	C	f10	T89	E	11	11
10	C	h8	T91	E	9.9	9.5
70	C	h8	T91	E	9.5	9.5
10	E	h5	T91	E	9.5	9.4

yellow 100
100

add 2
add 1

add for height

Please add any counts on this page to the total tally on the previous page.

K. Enticewald

Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet

DATE 11/4/14 SITE NAME Pismo
 # Observers 24 Observer name(s) Grant, Jessica, Emily, Nicole
 Count Time Span 6:30am to 8:30 Total Count Time (Min) 120
 Cloud/Fog Cover 10 % Precipitation (circle one): (none) drizzle rain
 Temp (°C) 48°F Wind (mph) _____ Wind (Beaufort) 1 Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
100	E	B6	T39	Eucalyptus	13	13 14
65	E	B6	T39	Euc	13	13 14
35	E	B6	T39	Euc	13	13 14
26	E	B6	T39	Euc	13	13 14
23	E	B6	T39	Euc	13	13 14
95	E	A6	T39	Euc	14	14
68	E	A6	T39	Euc	14	14
75	E	A6	T39	Euc	14	14
20	D	j5	T38	Euc	10	10
23	D	h6	T34	Euc	8	8
60	D	h6	T36	Euc	8	8
32	D	h6	T36	Euc	8	8
40	D	h6	T36	Euc	8	8
28	D	h6	T36	Euc	9	9
24	D	h6	T36	Euc	9	9
925	D	i2	T63	Euc	27	6

Total in Clusters: _____ (include count from next page) Total # Trees: _____
 # Timers: ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ (30)
 # Summers: ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ (25)
 # Fliers: ~~111~~ ~~111~~ ~~111~~ ~~111~~ ~~111~~ (30)
 # Grounders (live): /
 Grand Total: _____ (sum of all clustered butterflies plus timers, summers, fliers, etc.)

Tally every butterfly of each type that you see throughout the site.

Mating Monarchs: _____
 # Dead Monarchs: 1
 Other Notes: 2 yellow tag within hiving on

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Chr Height (bottom) (m)
300	D	i1	T63	Euc.	10	9
425	D	i1	T63	Euc.	9	8
175	D	i1	T63	Euc.	11	10
200	D	i2	T63	Euc.	8	8
130	D	h1	T63	Euc.	9	8
60	D	h1	T63	Euc.	8	8
650	D	c9	T100	Cypress	18	16
150	D	c9	T100	Cyp	17	16
125	D	c9	T100	Cyp	13	13
23	D	c9	T100	Cyp	13	13
575	D	c9	T100	Cyp	12	12
150	D	d1	T100	Cyp	12	12
25 25	D	d4	T70	euc	4	4
900	D	d4	T70	euc	12	11
300	D	A	T70	euc	11	11
90	D	b5	T69	euc	21	21
30	D	b5	T69	euc	21	21
100	D	b5	T69	euc	20	21
90	D	b5	T70	euc	11	11
90	D	b5	T70	euc	11	11
28	D	b5	T70	euc	10	10
70	D	b5	T70	euc	10	10
55	D	d5	T70	euc	11	11
130	C	i8	T81	Euc	8	8
83	C	i9	T81	Euc	8	8
80	C	i8	T81	Euc	9	9
80	C	H9	T94	Euc	12	12
60	C	H9	T94	Euc	13	13
70	C	H9	T94	Euc	13	13
130	H	G2	T222	Euc	8 7	7
20	H	G2	T222	Euc	7	7
70	H	G1	F144	Euc	10	10
250	H	G1	F144	Euc	12	12
80	H	F5	T134	Euc	12	12

Please add any counts on this page to the total tally on the previous page.

50	H	G9	T196	Euc	8	8
27	H	G10	T194	Euc	7	7

-Extend

Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet

DATE 11/5/14 SITE NAME Pismo Beach
Observers _____ Observer name(s) Tyler, Brandi, Kyle
Count Time Span 6:15 to 7:50 Total Count Time (Min) 95
Cloud/Fog Cover _____ % Precipitation (circle one): none drizzle rain
Temp (°C) 16.1 Wind (m/s) 3 Wind (Beaufort) _____ Wind direction _____

orange
tags

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
307	E	a7	T39	E	13	12m
40	E	a6	T39	E	12	12m
85	D	b6	T34	E	10	10m
140	D	b6	T34	E	11	11m
170	D	i2	T63	E	12	12m
200	D	i1	T63	E	8	8m
25	D	b2	T63	E	8	8m
180	D	h2	T63	E	15	15m
96	D	h2	T63	E	13	13m
200	D	h2	T63	E	11	11m
270	D	d3	T70	E	10	10m
65	D	d3	T70	E	14	14m
75	D	d4	T70	E	11	11m
375	D	c5	T70	E	11	10m
380	D	b5	T70	E	11	10m
215	D	b5	T70	E	10	10m

Total in Clusters: _____	<i>(include count from next pg)</i>	Total # Trees: _____
# Loners: THH LH THH THH THH		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners: _____		
# Fliers: THH THH THH LH THH THH THH		
# Grounders (live): \emptyset		
Grand Total: _____	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs: \emptyset	
# Dead Monarchs: \emptyset	
Other Notes:	

Entred

Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet

DATE 11/6/14 SITE NAME Pismo
 # Observers 3 Observer name(s) Brett, Emily, Nicole
 Count Time Span 6:20 to 8:00 Total Count Time (Min) 100
 Cloud/Fog Cover 10 % Precipitation (circle one): (none) drizzle rain
 Temp (°C) 13.5 Wind (m/s) 1.3 m/s Wind (Beaufort) _____ Wind direction NE

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
55, 55 (55)	E	b6	T40	Euc	9	9
22, 25 (47)	E	b6	T40	Euc	10	10
80, 20 (20)	E	b6	T40	Euc	10	10
10, 13 (12)	E	a6	T40	Euc	6	6
24, 30 (27)	E	a6	T40	Euc	6	6
20, 22 (21)	E	a6	T40	Euc	6	6
40, 50 (45)	E	a6	T40	Euc	11	11
60, 20 (55)	E	a5	T38	Euc	8	8
75, 80 (77)	D	b6	T34	Euc	9	9
120, 170 (145)	D	b6	T34	Euc	10	10
22, 22 (22)	D	b6	T34	Euc	10	10
24, 25 (25)	D	b6	T34	Euc	10	10
100, 105 (105)	D	b6	T34	Euc	10	10
50, 55 (55)	D	a6	T34	Euc	10	10
80, 80 (80)	D	b6	T34	Euc	11	11
18, 19 (18)	D	b6	T34	Euc	12	12

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: 		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners: 		
# Fliers: 		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	<u>1</u> <i>(note his poor wing condition)</i>
# Dead Monarchs:	
Other Notes:	

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
50,65 (58)	D	h6	T34	Euc	11	11
45,46 (45)	D	h6	T34	Euc	11	11
100,100 (100)	D	h6	T34	Euc	12	12
675,600 (635)	D	i1	T63	Euc	7	6
50,60 (55)	D	i1	T63	Euc	6	6
80,110 (95)	D	i1	T63	Euc	6	6
70,60 (75)	D	i1	T63	Euc	7	6
65,65 (65)	D	h1	T63	Euc	6	6
260,300 (280)	D	i1	T63	Euc	11	10
1000,1100 (1050)	D	i1	T63	Euc	13	10
400,450 (425)	D	i2	T63	Euc	11	9
92,80 (80)	D	d4	T70	Euc	6	5
(15)	H	h2	Caln	Euc	6	6
140,180 (160)	D	d3	T70	Euc	67	65
(250)	C	h8	T61222	Euc	11	10
(115)	C	h8	T61222	Euc	12	10
(275)	C	h8	T61222	Euc	13	11
410,450 (425)	D	d4	T70	Euc	10	9
(35)	C	i9	T81	Euc	7	7
(300)	C	i8	T81	Euc	12	11
420,550 (485)	D	d3	T70	Euc	12	10
(15)	C	i8	T81	Euc	8	8
525,600 (575)	D	d3	T70	Euc	11	10
200,280 (240)	D	d4	T69	Euc	19	19
70,90 (80)	D	d4	T69	Euc	19	19
600,700 (650)	D	C9	T100	Cyp	10	9
400,450 (425)	D	C9	T100	Cyp	11	10
270,350 (300)	D	C9	T100	Cyp	11	11
220,250 (235)	D	C9	T100	Cyp	13	13
325,370 (333)	D	C9	T100	Cyp	17	16
220,300 (250)	D	C3	T70	Euc	12	11

Please add any counts on this page to the total tally on the previous page.

checked

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/7/14 SITE NAME Pisum
Observers 2 Observer name(s) Tyler, Jasmin, Jesse, Rendi
Count Time Span 6:20 to 7:35 Total Count Time (Min) 75
Cloud/Fog Cover 50% % Precipitation (circle one): none drizzle rain
Temp (°C) 14.2 Wind (m/s) 0.1 Wind (Beaufort) _____ Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
415 270	E	b1	T5565	E	15	14
300	E	c1	T5965	E	14	14
270	E	c2	T5965	E	9	9
210	D	i2	T63	E	12	12
115	D	i2	T63	E	11	11
255	D	i2	T63	E	7	7
265	D	d4	T70	E	8	8
230	D	d5	T70	E	10	10
160	D	d5	T70	E	9	9
162 100	D	d5	T70	E	9	9
100	D	c5	T69	E	15	15
285	D	d4	T69	E	10	10
100	D	d4	T69	E	11	11
31	D	d3	T69	E	11	11
45	D	d3	T69	E	11	11
135	L	i9	T83	E	7	7

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners:		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:	11	
# Fliers:	111	
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

* checked

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11-8-14 SITE NAME Pismo
 # Observers Observer name(s) Paul, Hannah, Jesse, Daniel
 Count Time Span 6:15 to 8:00 Total Count Time (Min)
 Cloud/Fog Cover 100 % Precipitation (circle one): none drizzle rain
 Temp (°C) 13.2 Wind (m/s) 0 Wind (Beaufort) 0 Wind direction 0

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
260 / 300	I	A2	F-97	E	12	12
130 / 160	I	C2	F-97	F	22	22
70 / 70	F	C2	F-97	E	22	22
90 / 90	D	C10	T-100	C	10	10
100 / 105	D	C-10	T-100	C	10	10
240 / 260	D	B-70	T-100	C	12	11
900 / 1050	D	B-9	T-100	C	11	10
1250 / 1300	D	d-10	T-100	C	21	20
1000 / 950	D	b-5	T-70	E	13	13 12
100 / 110	D	a-5	T-70	E	13	13
350 / 320	C	i-8	F-81	E	9	9
1700 / 1600	C	i-8	T-81	E	14	12
350 / 300	C	j-8	T-81	E	8	8
300 / 270	C	h-8	T-94	F	12	12
470 / 520	C	h-8	F-94	E	11	11
210 / 190	C	h-8	T-94	E	10	10

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: <u>20</u>		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers: <u>3</u>		
# Grounders (live): <u>1</u>		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

R. Entel

Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet

DATE 11-9-14 SITE NAME Pismo

Observers 4 Observer name(s) Daniel, Hannah, Nicole, Emily

Count Time Span 6:15 to 8:00 Total Count Time (Min) _____

Cloud/Fog Cover 10% % Precipitation (circle one): (none) drizzle rain ¹⁰

Temp (°C) 12.2 Wind (m/s) 0.7 Wind (Beaufort) _____ Wind direction E

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
300 / 270	I	A2	T99	E	12	12
110 / 140	I	B2	T99	E	13	13
180 / 170	I	C2	T99	E	22	22
90 / 70	I	C2	T99	E	22	22
60 / 50	I	C2	T99	E	22	22
100 / 90	O	C10	T100	C	10	10
1400 / 1500	O	C10	T100	C	12	11
550 / 500	O	B9	T100	C	11	10
625 / 650	O	B9	T100	C	11	10
1600 / 1500	O	D10	T100	C	21	20
190 / 210	O	D10	T100	C	21	20
200 / 160	C	h-3	T94	E	10	10
600 / 550	C	h-3	T94	E	11	11
350 / 350	C	h-3	T94	E	12	12
300 / 250	C	i-7	T81	E	8	8
250 / 290	C	i-7	T81	E	9	9

Total in Clusters:	(include count from next pg)	Total # Trees:
# Loners:		Tally every butterfly of each type that you see throughout the site.
# Sunners:		
# Fliers: 1		
# Grounders (live):		
Grand Total:	(sum of all clustered butterflies plus loners, sunners, fliers, etc.)	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

& Entw.

Over-wintering Monarch Butterfly Project Monarch Count Data Sheet

DATE 11/9/14 SITE NAME _____

Observers 2 Observer name(s) Emily, Nicole

Count Time Span 6:20 to 7:57 Total Count Time (Min) _____

Cloud/Fog Cover 100 % Precipitation (circle one): none drizzle rain

Temp (°C) 12.2 Wind (m/s) .2 Wind (Beaufort) _____ Wind direction S

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
55, 55 (55)	E	a6	T40	Euc	9	9
49, 30 (35)	E	a6	T40	Euc	4	4
28, 35 (32)	E	a6	T40	Euc	4	4
16, 20 (18)	E	a6	T40	Euc	4	4
11, 15 (13)	E	a6	T40	Euc	4	4
52, 90 (50)	E	-j5(D)	T39	Euc	5	5
45, 51 (50)	E	-j5(D)	T39	Euc	10	10
15, 16 (18)	D	h6	T34	Euc	7	7
20, 80 (95)	D	h6	T34	Euc	8	8
400, 425 (412)	D	i2	T63	Euc	12	11
450, 710 (417)	D	i2	T63	Euc	13	12
85, 120 (102)	D	i2	T63	Euc	6	6
28, 40 (34)	D	i2	T63	Euc	6	6
140, 150 (145)	D	i2	T63	Euc	8	7
10, 20 (110)	D	i2	T63	Euc	8	7
120, 150 (135)	D	i2	T63	Euc	8	7

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: <u>1 1 1 1 1</u>		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers: <u>1</u>		
# Grounders (live): <u>1</u>		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

1 dragonfly

* actual

Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet

DATE 11-10-14 SITE NAME Pisma
 # Observers 3 Observer name(s) Daniel, Tyler, Brandi
 Count Time Span 6:35 to 8:15 Total Count Time (Min) _____
 Cloud/Fog Cover 100 % Precipitation (circle one): (none) drizzle rain
 Temp (°C) 14.4 Wind (m/s) 0.5 Wind (Beaufort) _____ Wind direction E

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
245 / 240	I	A2	T-99	E	12	12
140 / 165	I	C2	T-99	E	22	22
75 / 75	I	C2	T-99	E	22	22
65 / 65	I	C2	T-99	E	22	22
58 / 65	D	C10	T-100	C	12	11
75 / 75	D	C10	T-100	C	12	11
600 / 600	D	B9	T-100	C	12	11
700 / 700	D	B9 d10	T-100	C	21	20
190 / 190	D	d-10	T-100	C	21	20
220 / 230	C	1-8	T-81	E	9	8
570 / 950	C	i-7	T-81	E	13	12
240 / 230	C	i-7	T-81	E	9	8
200 / 200	C	h-8	T-94	E	12	12
500 / 280	C	h-8	T-94	E	11	11
120 / 120	C	h-8	T-94	E	10	10
20 / 20	C	h-10	T-89	E	8	8

1600/1700

200

Total in Clusters:	(include count from next pg)	Total # Trees:
# Loners:	3	Tally every butterfly of each type that you see throughout the site.
# Summers:		
# Fliers:	12	
# Grounders (live):		
Grand Total:	(sum of all clustered butterflies plus loners, summers, fliers, etc.)	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/11/14 SITE NAME _____
 # Observers 4 Observer name(s) Scott, Emily, Nicole, Jennifer
 Count Time Span 6:21 to 7:46 Total Count Time (Min) 85
 Cloud/Fog Cover 80 % Precipitation (circle one): none drizzle rain
 Temp (°C) 18.6 Wind (m/s) 0 Wind (Beaufort) 0 Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
45,48 (47)	C	i7	T81	Euc	7	7
160,110 (165)	C	i7	T81	Euc	7	7
100,120 (110)	C	i7	T81	Euc	9	9
50,55 (53)	C	i7	T81	Euc	8	8
100,120 (16)	C	i7	T81	Euc	10	10
70,100 (95)	C	i7	T81	Euc	10	10
100,135 (133)	C	i7	T81	Euc	10	10
170,190 (10)	C	i7	T81	Euc	10	10
340,370 (355)	C	i7	T81	Euc	11	10
85,100 (92)	C	i8	T81	Euc	11	11
80,420 (425)	C	i8	T81	Euc	11	10
45,65 (55)	C	i8	T81	Euc	10	10
75,110 (102)	C	i8	T81	Euc	10	10
50,60 (55)	C	i8	T81	Euc	10	10
110,115 (112)	C	i8	T81	Euc	9	9
55,55 (55)	C	i8	T81	Euc	8	8

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: <u>14</u>		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners: <u>1</u>		
# Fliers: <u>14</u>	<u>20</u>	
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/11/14 SITE NAME _____
 # Observers 4 Observer name(s) Brett, Emily, Streater, Jessica
 Count Time Span 6:21 to 7:46 Total Count Time (Min) 85
 Cloud/Fog Cover 80 % Precipitation (circle one): none drizzle rain
 Temp (°C) 18.6 Wind (m/s) 0 Wind (Beaufort) 0 Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
2000, 1500 (1750)	D	b10	T100	C	10 10	9
180, 200 (190)	D	b10	T100	C	10	10
150, 160 (155)	D	b10	T100	C	11	11
500, 600 (550)	D	c10	T100	C	14	13
200, 210 (210)	D	b10	T100	C	13	13
40, 60 (50)	D F	d2	T100	C	8	8
250, 300 (275)	D	b10	T100	C	12	12
200, 250 (225)	D	c10	T100	C	22	22
1500, 1600 (1550)	D	c10	T100	C	22	21
200, 180 (190)	D	b10	T100	C	21	21
200, 150 (175)	D	b10	T100	C	20	20
125, 115 (150)	I	b4	T99	E	9	9
50, 70 (60)	E	a6	T40	E	9	9
60, 75 (67)	E	a6	T40	E	7	7
40, 45 (43)	E	a5	T39	E	8	8
1000 600, 700 (650)	E	c2	T50	E	7	7

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: 11 11	<i>Tally every butterfly of each type that you see throughout the site.</i>	
# Sunners: 111		
# Fliers: 111		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

Solid yellow tag
 ID# 34215
 1 (877) 897 7740

Solid orange tag:
 ID: A0533
 1 (520)-861-0646

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/12/14 SITE NAME Pismo Beach
 # Observers 3 Observer name(s) Tyler, Brandi, Jesse
 Count Time Span 6:30 to 7:45 Total Count Time (Min) 75
 Cloud/Fog Cover 30% Precipitation (circle one): none drizzle/ rain
 Temp (°C) 15.3 Wind (m/s) 0.0 Wind (Beaufort) _____ Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
260/240	I	b3	T99	E	10m	10m
150/130	I	c1	T99	E	10m	14
75/75	I	c2	T99	E	20	20
140/130	I	c1	T100	C	10	10
2500/2300	D	c8	T100	C	9	8
340/320	D	c7	T100	C	9	9
950/725	D	c7	T100	C	10	9
1700/1300	D	d9	T100	C	17	16
50/50	E	c1	T59	E	9	9
520/470	E	c1	T56	E	9	9
700/760	E	a2	T56	E	17	16
240/360	E	c1	T56	E	22	22
550/476	D	i2	T63	E	16	15
700/700	D	i2	T63	F	15	14
400/300	D	i2	T63	E	11	10
450/410	D	d3	T69	E	20	20

Total in Clusters:	<i>(include count from next page)</i>	Total # Trees:
# Loners:	<u> + 30</u>	<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers:	<u> </u>	
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

Orange tag A0268
 phone: (320)-
 yellow tag: 54215, phone: 1-877-897-7740

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/13/14 SITE NAME _____
 # Observers 3 Observer name(s) Brett, Nicole, Emily
 Count Time Span 6:36am to 8:05 Total Count Time (Min) 84 91
 Cloud/Fog Cover 100 % Precipitation (circle one): none drizzle rain
 Temp (°C) 13.6 Wind (m/s) 0 Wind (Beaufort) 0 Wind direction N/A

Orange
A0480

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
42, 45 (92)	E	a5	T40	Euc	9	9
36, 37 (76)	E	a5	T40	Euc	6	6
45, 45 (95)	D	j5	T38	Euc	7	7
50, 60 (55)	D	h6	T39	Euc	6	6
520 (18)	D	h6	T39	Euc	6	6
720, 750 (765)	E	c2	T50	E	8	6
90, 120 (105)	E	c2	T50	E	9	9
35, 55 (45)	E	c2	T50	E	8	8
140, 175 (168)	E	c2	T50	E	9	9
240, 250 (245)	E	c2	T50	E	9	9
650, 650 (650)	D	i2	T63	E	9	6
650, 500 (575)	D	i1	T63	Euc	8	8
600, 900 (650)	D	i2	T63	Euc	9	10
1100, 1200 (1600)	D	d4	T70	Euc	11	13
125, 200 (108)	D	d4	T70	Euc	11	11
350, 520 (425)	D	c4	T70	Euc	10	10

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: 11 11	Tally every butterfly of each type that you see throughout the site.	
# Sunners: 11 11		
# Fliers: 11 11		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	Very light drizzle ~ 7am

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/14/14 SITE NAME Pismo
 # Observers 4 Observer name(s) Tyler, Brandi, Jasnid, Jessica
 Count Time Span 6:30 to _____ Total Count Time (Min) _____
 Cloud/Fog Cover 60 % Precipitation (circle one) none drizzle rain
 Temp (°C) 15.2 Wind (m/s) 0 Wind (Beaufort) _____ Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
275/240	I	a1	T109	B/E	20	20
100/125	I	a1	T109	E	20	20
150/190	D	t20	T100	C	10	10
1400/1250	D	c9	T100	C	11	10
850/700	D	c9	T100	C	13	12
300/450	D	c7	T100	C	11	11
1700/1750	D	c9	T100	C	18	17
160/120	I	b3	T99	E	10	10
120/90	I	c2	T99	E	18	18
120/135	I	c2	T99	E	16	16
180/200	C	i9	T91	E	11	11
320/350	C	i8	T91	E	9	9
225/225	C	i8	T91	E	12	12
80/75	C	i8	T81	E	8	8
550/500	C	i8	T81	E	12	11
125/100	C	i9	T81	E	8	8

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners:		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Summers:		
# Fliers:		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, summers, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

Extend.

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/15/14 SITE NAME Aisano
 # Observers 4 Observer name(s) Brett, Henry, Jesse, Daniel
 Count Time Span 6:40am to 8am Total Count Time (Min) 80
 Cloud/Fog Cover 0 % Precipitation (circle one): none drizzle rain
 Temp (°C) 13.3 Wind (m/s) 0.2 Wind (Beaufort) _____ Wind direction NE

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
518 (16)	D	h6	T34	E	9	9
35, 25 (30)	D	h6	T34	E	10	10
120, 120 (120)	D	h6	T34	E	10	10
300, 300 (300)	E	c2	T80	E	8	7
30, 30 (30)	E	c2	T50	E	10	10
350, 380 (365)	D	i1	T83	E	8	7
600, 600 (600)	D	i1	T63	E	9	10
380, 400 (390)	D	h1	T63	E	8	8
110, 120 (115)	D	h1	T63	E	7	7
1800, 1900 (1800)	D	c3	T70	E	13	11
60, 90 (75)	D	B4	T70	E	9	9
850, 900 (875)	D	c2	T69	E	20	19
340, 400 (370)	D	h1	T69	E	21	20
70, 100 (85)	D	a1	T69	E	20	20
280, 200 (200)	C	i4	T76	C	17	16
100, 120 (110)	C	i4	T76	C	18	18

Total in Clusters: _____ (include count from next pg) **Total # Trees:** _____

Loners: ~~|||||~~

Sunners: ~~|||||~~

Fliers: |

Grounders (live): |

Grand Total: _____ (sum of all clustered butterflies plus loners, sunners, fliers, etc.)

Tally every butterfly of each type that you see throughout the site.

# Mating Monarchs:	
# Dead Monarchs:	1
Other Notes:	

External

Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet

DATE 11/16/14 SITE NAME _____
 # Observers 2 Observer name(s) Elaine, Nicole
 Count Time Span 6:40 to 7:38 Total Count Time (Min) 58
 Cloud/Fog Cover 10 % Precipitation (circle one): (none) drizzle rain
 Temp (°C) 15.6 Wind (m/s) .2 Wind (Beaufort) 1 Wind direction _____

orange tag
A0480

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
380, 420 (400)	I	i3	T218	Euc	7	7
550, 410 (405)	I	i3	T218	Euc	8	7
200, 240 (220)	I	g4	T218	Euc	7	7
380, 400 (390)	I	g4	T218	Euc	8	8
190, 200 (195)	I	g4	T218	Euc	9	9
650, 750 (750)	I	g4	T218	Euc	10	8
120, 130 (120)	I	g4	T218	Euc	11	10
170, 250 (210)	I	i3	T609	Euc	17	17
520, 620 (630)	D	i2	T63	Euc	8	8
600, 720 (660)	D	i2	T63	Euc	10	9
360, 460 (40)	D	i2	T63	Euc	10	9
320, 350 (335)	D	i2	T63	Euc	8	7
300, 360 (330)	D	i2	T63	Euc	6	6
120, 120 (120)	D	h6	T34	Euc	0	0
100, 100 (100)	D	h6	T34	Euc	10	10
100, 120 (110)	E	c2	T49	Euc	6	6

yellow tag

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: <u>17/11</u>		Tally every butterfly of each type that you see throughout the site.
# Sunners: <u>1</u>		
# Fliers: <u>11/11/14</u>		
# Grounders (live): <u>1</u>		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

Entral

Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet

DATE 11-16-14 SITE NAME Pismo
 # Observers 4 Observer name(s) Daniel, Hannah
 Count Time Span 6:30 to 7:30 Total Count Time (Min) _____
 Cloud/Fog Cover 10 % Precipitation (circle one): none drizzle rain
 Temp (°C) 15.6 Wind (m/s) 0.2 Wind (Beaufort) _____ Wind direction W

	# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
1100	1000/1200	D	C9	T100	C	10	9
425	400/450	D	C9	T100	C	11	10
1225	1250/1300	D	b8	T100	C	10	9
70	750/750	D	C7	T100	C	10	9
525	525/550	D	C8	T100	C	17	16
	700/650	D	C9	T100	C	17	16
	1250/1500	D	C9	T100	C	17	16
	250/250	D	d4	T70	E	11	10
	950/900	D	d4	T70	E	11	10
	700/650	D	C4	T69	E	21	20
	400/350	D	b5	T69	E	21	20
	200/150	D	a6	T69	E	21	20
	400/480	C	i3	T76	C	20	19
	250/250	D	F8	T100	C	11	10
	150/120	I	e-3	T69	E	10	9

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: <u>18</u>		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers: <u>20</u>		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 17 NOV SITE NAME Pismo
 # Observers 3 Observer name(s) Daniel, Taylor, Tyler
 Count Time Span 06:30 to 7:40 Total Count Time (Min) _____
 Cloud/Fog Cover 0 % Precipitation (circle one): gone drizzle rain
 Temp (°C) 48°F Wind (m/s) 0.2 Wind (Beaufort) _____ Wind direction N
17.2°C

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
425/425	D	b6	T34	E	11	11
270/250	E	c2	T50	E	9	9
900/840	D	d4	T70	E	20	19
375/425	D	c4	T70	E	19	19
300/350	D	c4	T70	E	20	20
225/225	D	c5	T70	E	20	20
450/400	D	b5	T70	E	20	20
375/375	D	b5	T70	E	19	19
325/300	D	d4	T69	E	11	11
650/700	D	d4	T69	E	12	11
700/650	D	d5	T69	E	12	11
300/300	D	d5	T69	E	12	12
200/200	D	c5	T69	E	11	11
195/175	D	c4	T70	E	16	16
150/175	D	c2	T100	C	9	9
1000/1000	D	b8	T100	C	11	9

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: THH THH THH THH 11	<i>Tally every butterfly of each type that you see throughout the site.</i>	
# Sunners:		
# Fliers:		
# Grounders (live): 1		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/18/14 SITE NAME Pismo
 # Observers Observer name(s) Brett, Emily, Jessica, Nicole
 Count Time Span to Total Count Time (Min)
 Cloud/Fog Cover 30 % Precipitation (circle one): ☐ drizzle rain
 Temp (°C) 50^F Wind (m/s) 0 Wind (Beaufort) 0 Wind direction

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
40, 102 (110)	C	h8	T94	E	11	11
80, 75 (78)	C	h8	T94	E	10	10
70, 70 (70)	C	h8	T94	E	10	10
50, 60 (55)	C	i9	T81	E	10	10
40, 40 (40)	C	i9	T81	E	11	11
600, 700 (650)	C	j5	T76	C	16	16
250, 350 (300)	C	j5	T76	C	17	17
150, 200 (175)	C	j5	T76	C	18	18
180, 200 (190)	C	j5	T76	C	19	19
75, 95 (85)	C	j5	T76	C	19	19
125, 135 (130)	C	j5	T76	C	16	16
2000, 2200 (2100)	D	h10	T100	C	12	11
1000, 1000 (1000)	D	b10	T100	C	13	12
1000, 1200 (1100)	D	b10	T100	C	13	13
4200, 4500 (4350)	B	c10	T100	C	19	17
175, 150 (161)	D	e9	T109	C	11	11

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: THH THH THH THH THH THH THH THH THH THH	<i>Tally every butterfly of each type that you see throughout the site.</i>	
# Sunners:		
# Fliers:		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/18/14 SITE NAME Pismo
 # Observers 2 Observer name(s) Nicole, Emily
 Count Time Span 6:42 to 7:33 Total Count Time (Min) 51
 Cloud/Fog Cover 30 % Precipitation (circle one): none drizzle rain
 Temp (°C) _____ Wind (m/s) 0 Wind (Beaufort) 0 Wind direction _____
50°F

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
130,120 (150)	I	a4	T218	Euc	12	9
25,30 (28)	E	a6	T39	Euc	9	9
110,120 (115)	D	a4	T34	Euc	9	9
60,80 (70)	D	a4	T34	Euc	10	10
65,85 (75)	D	a1	T34	Euc	10	10
170,180 (175)	D	a4	T34	Euc	11	10
25,30 (28)	D	a4	T34	Euc	12	12
300,480 (390)	D	i2	T63	Euc	7	7
110,160 (150)	D	i2	T63	Euc	9	9
120,560 (490)	D	i2	T63	Euc	11	10
180,260 (220)	E	c2	T49	Euc	7	7
100,480 (410)	D	d4	T70	Euc	8	8
600,1700 (1650)	D	d4	T70	Euc	10	9
230,300 (265)	D	d4	T70	Euc	8	8
150,195 (153)	D	d3	T69	Euc	12	12
550,600 (575)	D	d3	T69	Euc	20	19

average
470

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners: <u>11</u>		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers:		
# Grounders (live): <u>1</u>		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	<u>1</u>
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/19/14 SITE NAME Pismo
 # Observers 2 Observer name(s) Tyler, Brandi
 Count Time Span 6:45 to 7:32 Total Count Time (Min) _____
 Cloud/Fog Cover 95 % Precipitation (circle one): none drizzle rain
 Temp (°C) 12.7 Wind (m/s) 0.00 Wind (Beaufort) _____ Wind direction _____

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
250/230	C	h9	T94	E	11	11
220/190	C	i8	T81	E	11	11
475/400	D	c10	T100	C	10	10
2000/1750	D	b9	T100	C	11	10
1450/1300	D	h9	T100	C	11	10
4800/3900	D	h9	T100	C	12	16
600/675	C	i6	T76	C	25 17	16
475/450	D	c5	T69	E	18	18
300/350	D	d4 c4	T69	E	17	17
125/100	D	d4 c4	T69	E	5	15
250/225	D	c4	T70	E	9	9
1100/1050	D	d4	T70	E	11	10
425/425	D	d4	T70	E	9	8
850/750	D	i2	T63	E	12	11
150/200	D	h1	T63	E	10	10
325/250	D	i2	T63	E	8	9

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners:		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers: 1		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/20/14 SITE NAME Pisano
 # Observers 3 Observer name(s) Bro. H, Emily, Nicole
 Count Time Span 6:45 to 7:50 Total Count Time (Min) 65
 Cloud/Fog Cover 00 % Precipitation (circle one): none drizzle rain
 Temp (°C) _____ Wind (m/s) 0.2 Wind (Beaufort) _____ Wind direction N
60°F

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
120, 110 (120)	D	h6	T34	Euc	8	8
120, 150 (135)	D	h6	T34	Euc	10	9
180, 210 (195)	D	h6	T34	Euc	10	9
40, 50 (70)	D	h6	T34	Euc	9	9
45, 50 (48)	D	h6	T34	Euc	11	11
320, 350 (345)	E	c3	T49	Euc	8	8
420, 500 (460)	D	i1	T63	Euc	7	7
380, 480 (430)	D	i2	T63	Euc	11	11
160, 150 (155)	D	i2	T63	Euc	10	10
250, 250 (265)	D	d4	T70	Euc	12	11
180, 200 (190)	D	d4	T70	Euc	11	11
250, 320 (285)	D	d3	T69	Euc	20	20
320, 380 (350)	D	d3	T69	Euc	20	20
240, 240 (240)	D	b3	T69	Euc	20	20
400, 300 (340)	D	b3	T69	Euc	19	19
260, 220 (240)	C	j4	T76	Cyp	17	17

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners:		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers: / /		
# Grounders (live): 		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	<u>orange tag</u>

Date: 11/21/14

Site: Pismo

Observ: 2

Obs. Names: Jessica, Tyler

Count time span: 6:45 to 7:27

Cloud/fog cover: 10% Precip: None

Temp: 11.0°C Wind: 0.1 m/s

Time	Temp (C)	Temp (F)	Wind (m/s)	Wind (mph)	Clouds (%)	Precip (mm)
6:45	11.0	52	0.1	0.2	10	0.0
6:46	11.0	52	0.1	0.2	10	0.0
6:47	11.0	52	0.1	0.2	10	0.0
6:48	11.0	52	0.1	0.2	10	0.0
6:49	11.0	52	0.1	0.2	10	0.0
6:50	11.0	52	0.1	0.2	10	0.0
6:51	11.0	52	0.1	0.2	10	0.0
6:52	11.0	52	0.1	0.2	10	0.0
6:53	11.0	52	0.1	0.2	10	0.0
6:54	11.0	52	0.1	0.2	10	0.0
6:55	11.0	52	0.1	0.2	10	0.0
6:56	11.0	52	0.1	0.2	10	0.0
6:57	11.0	52	0.1	0.2	10	0.0
6:58	11.0	52	0.1	0.2	10	0.0
6:59	11.0	52	0.1	0.2	10	0.0
7:00	11.0	52	0.1	0.2	10	0.0
7:01	11.0	52	0.1	0.2	10	0.0
7:02	11.0	52	0.1	0.2	10	0.0
7:03	11.0	52	0.1	0.2	10	0.0
7:04	11.0	52	0.1	0.2	10	0.0
7:05	11.0	52	0.1	0.2	10	0.0
7:06	11.0	52	0.1	0.2	10	0.0
7:07	11.0	52	0.1	0.2	10	0.0
7:08	11.0	52	0.1	0.2	10	0.0
7:09	11.0	52	0.1	0.2	10	0.0
7:10	11.0	52	0.1	0.2	10	0.0
7:11	11.0	52	0.1	0.2	10	0.0
7:12	11.0	52	0.1	0.2	10	0.0
7:13	11.0	52	0.1	0.2	10	0.0
7:14	11.0	52	0.1	0.2	10	0.0
7:15	11.0	52	0.1	0.2	10	0.0
7:16	11.0	52	0.1	0.2	10	0.0
7:17	11.0	52	0.1	0.2	10	0.0
7:18	11.0	52	0.1	0.2	10	0.0
7:19	11.0	52	0.1	0.2	10	0.0
7:20	11.0	52	0.1	0.2	10	0.0
7:21	11.0	52	0.1	0.2	10	0.0
7:22	11.0	52	0.1	0.2	10	0.0
7:23	11.0	52	0.1	0.2	10	0.0
7:24	11.0	52	0.1	0.2	10	0.0
7:25	11.0	52	0.1	0.2	10	0.0
7:26	11.0	52	0.1	0.2	10	0.0
7:27	11.0	52	0.1	0.2	10	0.0

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
100/100	D	c10	T100	C	10	10a
2500/2000	D	b9	T100	C	14	10
100/80	D	c9	T100	C	12	11
460/500	D	c9	T100	C	12	12
750/900	D	c9	T100	C	14	14
5000/4500	D	d9	T100	C	16	15
75/75	D	d9 f9	T108	C	11	11
170/150	D	f9	T108	C	9	9
850/800	D	c8	T108 T10	E	12	11
350/450	D	c8	T108 T10	E	10	10
250/200	D	c4	T108 T10	E	9	9
150/200	D	d4	T108 T10	E	9	9
450/500	D	d4	T108 T10	E	15	18
250/200	D	d4	T108 T10	E	16	16
180/200	D	c4	T108 T10	E	19	19
250/350	D	b4	T69	E	15	15
300/300	D	j5	T76	C	16	16
320/300	D	j5	T76	C	15	15
300/400	D	i2	T63	E	17	11
120/100	D	h2	T63	E	10	10
400/450	D	i2	T63	E	8	8
200/200	D	h3	T39	E	23	23
80/100	D	g3	T69	E	23	23
250/250	E	c2	T58	E	8	8
200/150	E	h6	T34	E	10	10
80/80	C	i8	T81	E	12	12
50/70	C	i8	T81	E	10	10
20/20	C	i8	T81	E	8	8
100/75	C	h7	T94	E	11	11
60/50	C	h8	T94	E	10	10
50/50	C	g8	T94	E	10	10
250/300	D	h8	T109	E	20	20
150/100	D	g9	T109	E	18	18

Please add any counts on this page to the total tally on the previous page.

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/22/19 SITE NAME BSMNO
 # Observers 4 Observer name(s) Marshall Brett, Jeff, Daniel
 Count Time Span 6:45 to 8:05 Total Count Time (Min) 20 min
 Cloud/Fog Cover 0 % Precipitation (circle one): none drizzle rain
 Temp (°C) 10.2 Wind (m/s) 0.2 Wind (Beaufort) _____ Wind direction NE

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
50, 50 (50)	D	b6	T34	E	10	10
50, 60 (55)	D	b6	↓		10	10
60, 70 (65)	D	b6			11	11
70, 90 (80)	D	b6	↓		12	11
45, 40 (45)	D	b6	↓		11	11
50, 60 (55)	D	b6	T34		10	10
60, 70 (65)	D	b4	T70		9	9
90, 90 (90)	D	b4	↓		9	9
25, 30 (28)	b	b4			9	7
120, 140 (130)	D	d4	↓		9	9
310, 350 (330)	D	d4	↓		10	10
260, 290 (275)	D	d4	↓		12	10
300, 320 (310)	D	c5	↓		11	10
130, 140 (135)	D	c3	T70		16	16
700, 800 (750)	D	c2	T69		19	18
20, 15 (18)	D	c2	T69	↓	18	18

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners:		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers: /		
# Grounders (live): /		
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11-22-14 SITE NAME Dismo
 # Observers _____ Observer name(s) Daniel Hannah, Brett Jesse
 Count Time Span 6:45 to 8:00 Total Count Time (Min) _____
 Cloud/Fog Cover _____ % Precipitation (circle one): none drizzle rain
 Temp (°C) 10.6 Wind (m/s) 0.6 Wind (Beaufort) _____ Wind direction N/E

	# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
425	450/400	D	C-10	T100	C	10	8
265	295/250	D	C-9	T100	C	15	13
1450	1400/1500	D	6-10	T100	C	11	9.5
393	390/375	D	6-8	T100	C	10	10
250	275/225	D	6-8	T100	C	10	10
1000	950/1050	D	6-8	T100	C	14	14
95	110/80	D	C-8	T100	C	13	12
435	420/450	D	d-9	T100	C	14	13
700	650/750	D	d-9	T100	C	17	16
800	900/800	D	d-9	T100	C	17	17
455	450/460	D	d-9	T100	C	17	17
4250	4000/4500	D	d-9	T100	C	18	16
104	110/97	D	g-8	T-108	C	11.5	11.5
450	450/450	D	g-8	T-108	C	12	11
130	150/120	D	g-8	T-108	C	12	11
510	520/500	I	d-7	T-109	E	21	20

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners:	15	<i>Tally every butterfly of each type that you see throughout the site.</i>
# Sunners:		
# Fliers:	4	
# Grounders (live):	11	
Grand Total:	<i>(sum of all clustered butterflies plus loners, sunners, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

**Over-wintering Monarch Butterfly Project
Monarch Count Data Sheet**

DATE 11/23/14 SITE NAME Pismo
 # Observers 4 Observer name(s) Emily, Nicole, Daniel, Hannah
 Count Time Span 6:45 to 7:35 Total Count Time (Min) 50
 Cloud/Fog Cover 20 % Precipitation (circle one): none drizzle rain
 Temp (°C) 13.5 Wind (m/s) 2 Wind (Beaufort) _____ Wind direction N

# Monarchs Clustered	Zone (ex: A)	Cell (ex: a2)	Tree #	Tree Species	Cluster Height (top) (m)	Clstr Height (bottom) (m)
50,50 (50)	I	14	T28	Euc	6	6
160,160 (175)	I	14	T28	Euc	8	7
140,160 (150)	D	16	T34	Euc	10	10
80,80 (90)	D	16	T34	Euc	11	11
200,200 (20)	D	16	T34	Euc	12	11
300,250 (225)	D	12	T63	Euc	7	6.5
200,200 (220)	D	12	T63	Euc	9	9
350,400 (375)	D	12	T63	Euc	10	9
200,200 (100)	E	13	T49	Euc	8	8
220,200 (240)	D	13	T69	Euc	20	20
240,280 (260)	D	14	T69	Euc	19	19
180,200 (190)	D	14	T69	Euc	20	20
200,280 (260)	D	14	T69	Euc	20	20
180,170 (110)	D	14	T69	Euc	19	19
140,160 (150)	D	15	T70	Euc	10	10
100,110 (105)	D	14	T70	Euc	9	9

Total in Clusters:	<i>(include count from next pg)</i>	Total # Trees:
# Loners:		<i>Tally every butterfly of each type that you see throughout the site.</i>
# Summers:		
# Fliers: <u>777</u>		
# Grounders (live):		
Grand Total:	<i>(sum of all clustered butterflies plus loners, summers, fliers, etc.)</i>	

# Mating Monarchs:	
# Dead Monarchs:	
Other Notes:	

Appendix C

	A	B	C	D	E	F
1	Date	MonarchCount	TreeNum	TreeSpecies	Height	ZoneCell
2	11/1/2014	12	T63	E	3	D-i-1
3	11/1/2014	45	T63	E	3	D-i-1
4	11/1/2014	15	T63	E	3	D-i-1
5	11/1/2014	22	T63	E	4	D-h-1
6	11/1/2014	45	T63	E	4	D-h-1
7	11/1/2014	15	T63	E	4	D-h-1
8	11/1/2014	55	T63	E	4	D-h-1
9	11/1/2014	36	T63	E	4	D-h-1
10	11/1/2014	28	T69	E	10	D-e-3