A hive of activity…

by Lillie and Kamryn

> Nature will bear the closest inspection. She invites us to lay our eye level with her smallest leaf and take an insect view of its plan.
>
> Henry David Thoreau

Purpose

An exploratory study was conducted to better understand the diversity of insects at Conservancy Park Bellevue. Research compared the native grass field with the non-native plants on the trail.

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FIGURE 1: TWO SITES FOR INSECT COLLECTION – YELLOW: NON-NATIVE, BLUE: NATIVE

Methods

Two plots were mapped out at Conservancy Park: one was a 15x15 meter square plot randomly placed in a native grass field, and the other plot followed the main trail around the Conservancy Park pond (~0.25 mile).

Insects in the native grass plot were collected by sweeping butterfly nets at random throughout the plot at varying heights for 2 minutes; the native grass averaged 1 meter tall. This plot was surveyed by two people. Insects in the trail plot were also collected by sweeping butterfly nets at random along the ground and across edge vegetation that bordered the trail; there was no specific time limit set for the trail collection, but it took about 10 minutes to survey the whole trail (the trail was split into two sections so the researchers could cover more ground).

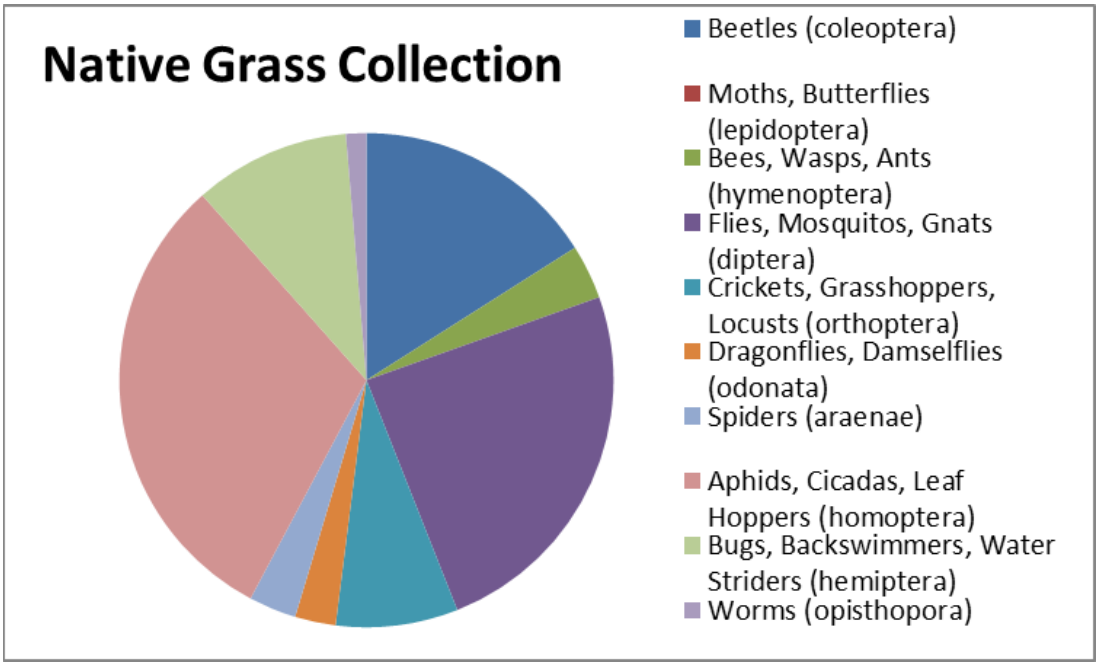
At the end of a collection, bugs were dumped into gallon size Ziploc bags from the butterfly nets (This was the hardest part of the whole collection! Eight or more bees were set free before being stored in the Ziploc bags, because they were very angry and eager to sting.). The Ziploc bags were sealed and later stored in a freezer.

Back at the office, the insects were dumped out of the frozen Ziploc bags and organized into 10 major insect orders. The number of individuals representing each order from each plot collection were counted and recorded. A Shannon Diversity Index calculation was then used to compare the diversity of the native grasses versus the trail vegetation.

Results

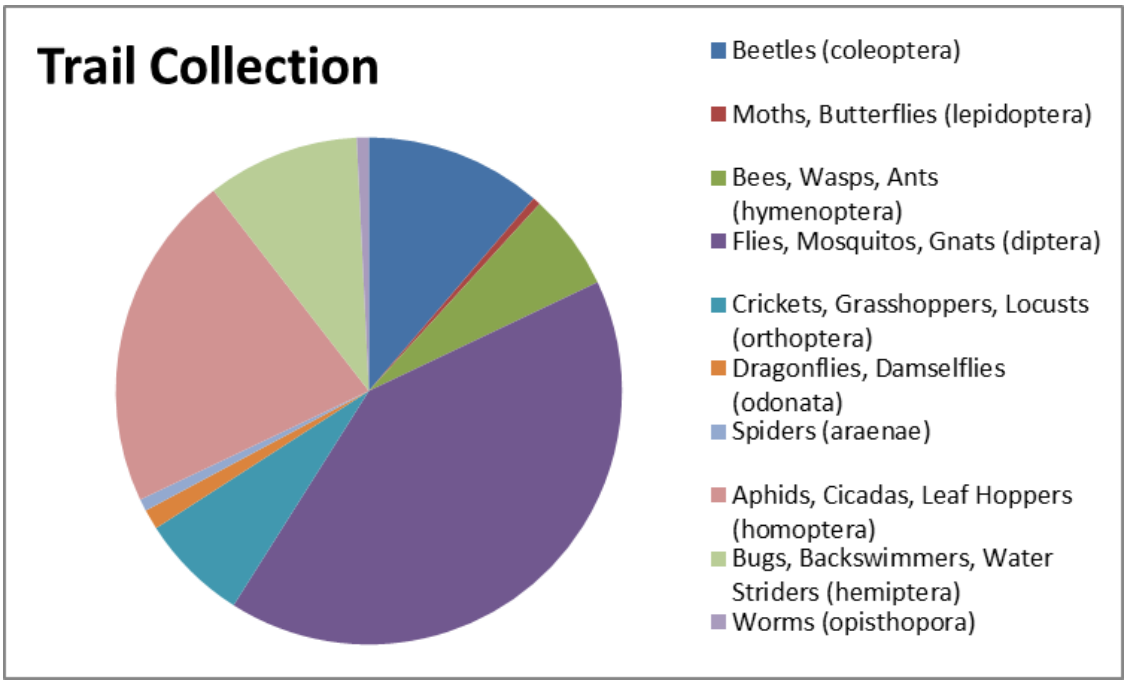
NATIVE GRASS COLLECTION

Order	Count
Beetles (*coleoptera*)	72
Moths, Butterflies (*lepidoptera*)	N/A
Bees, Wasps, Ants (*hymenoptera*)	16
Flies, Mosquitos, Gnats (diptera)	110
Crickets, Grasshoppers, Locusts (*orthoptera*)	36
Dragonflies, Damselflies (*odonata*)	12
Spiders (*araenae*)	14
Aphids, Cicadas, Leaf Hoppers (*homoptera*)	138
Bugs, Backswimmers, Water Striders (*hemiptera*)	46
Worms (*opisthopora*)	6
TOTAL	450



TRAIL COLLECTION

Order	Count
Beetles (*coleoptera*)	44
Moths, Butterflies (*lepidoptera*)	2
Bees, Wasps, Ants (*hymenoptera*)	24
Flies, Mosquitos, Gnats (diptera)	160
Crickets, Grasshoppers, Locusts (*orthoptera*)	27
Dragonflies, Damselflies (*odonata*)	5
Spiders (*araenae*)	3
Aphids, Cicadas, Leaf Hoppers (*homoptera*)	84
Bugs, Backswimmers, Water Striders (*hemiptera*)	38
Worms (*opisthopora*)	3
TOTAL	390



Calculations

H = Diversity Index
S = Species Count
P_i = proportion of S made up of the ith species

$$H = -\sum_{i-1}^{S} p_i * \ln p_i$$

E_H = Shannon's Diversity

$$E_H = H/\ln S$$

Native Grass Collection			pi	pi*ln(pi)
Beetles (coleoptera)	72		0.16	-0.293213034
Moths, Butterflies (lepidoptera)	0		0	0
Bees, Wasps, Ants (hymenoptera)	16		0.035555556	-0.118636759
Flies, Mosquitos, Gnats (diptera)	110		0.244444444	-0.34436532
Crickets, Grasshoppers, Locusts (orthoptera)	36		0.08	-0.202058292
Dragonflies, Damselflies (odonata)	12		0.026666667	-0.096649092
Spiders (araenae)	14		0.031111111	-0.107961475
Aphids, Cicadas, Leaf Hoppers (homoptera)	138		0.306666667	-0.362478129
Bugs, Backswimmers, Water Striders (hemiptera)	46		0.102222222	-0.233128632
Worms (opisthopora)	6		0.013333333	-0.057566508
TOTAL	450		1	-1.81605724
				*-1
			H=	1.81605724
			H/lnS	0.826523269
			S= 9 "species" -orders represented	
			% diverse	82.65232689

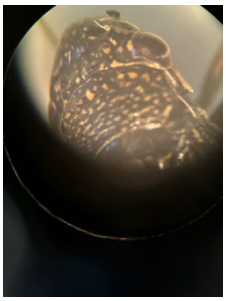
Trail Collection			pi	pi*ln(pi)
Beetles (coleoptera)	44		0.112820513	-0.24616952
Moths, Butterflies (lepidoptera)	2		0.005128205	-0.027041023
Bees, Wasps, Ants (hymenoptera)	24		0.061538462	-0.171574948
Flies, Mosquitos, Gnats (diptera)	160		0.41025641	-0.365527353
Crickets, Grasshoppers, Locusts (orthoptera)	27		0.069230769	-0.184867607
Dragonflies, Damselflies (odonata)	5		0.012820513	-0.055855241
Spiders (araenae)	3		0.007692308	-0.037442573
Aphids, Cicadas, Leaf Hoppers (homoptera)	84		0.215384615	-0.330686449
Bugs, Backswimmers, Water Striders (hemiptera)	38		0.097435897	-0.22688539
Worms (opisthopora)	3		0.007692308	-0.037442573
TOTAL	390		1	-1.683492676
				*-1
			H=	1.683492676
			H/lnS	0.73113158
			S= 10 "species" - orders represented	
			% diverse	73.11315797

Conclusion

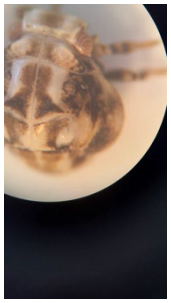
The native grasses showed more diversity (82.65%) across insect orders compared to the trail diversity (73.11%). Despite the trail collection having at least one individual representing all 10 insect orders compared

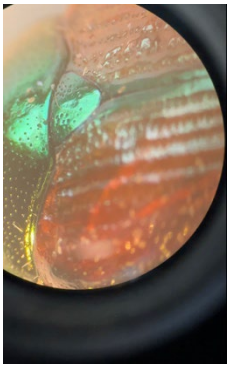
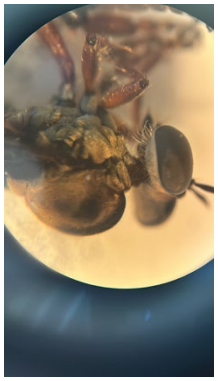
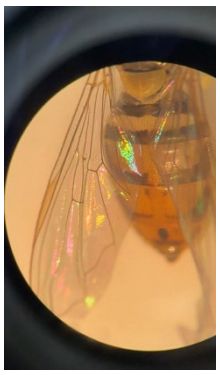
to the native grasses having all but one order represented (Lepidoptera), the proportion of individuals in each order was more even across the native grass collection







Project Inspired by the Bug Chicks (https://thebugchicks.com)

Dr. Parker from NKU assisted in project idea and design