

BEES DO IT, FLIES DO IT:
POLLINATION BIOLOGY AND POLLINATOR
COMMUNITIES OF THE ENDANGERED WILLAMETTE DAISY
IN OREGON PRAIRIES

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Halictus ligatus, D. Cappeart photo





Institute for
Applied Ecology

www.appliedeco.org

Non-profit established 1999 in Corvallis, Oregon, USA

Mission: To conserve native species and habitats through



Washington

Oregon

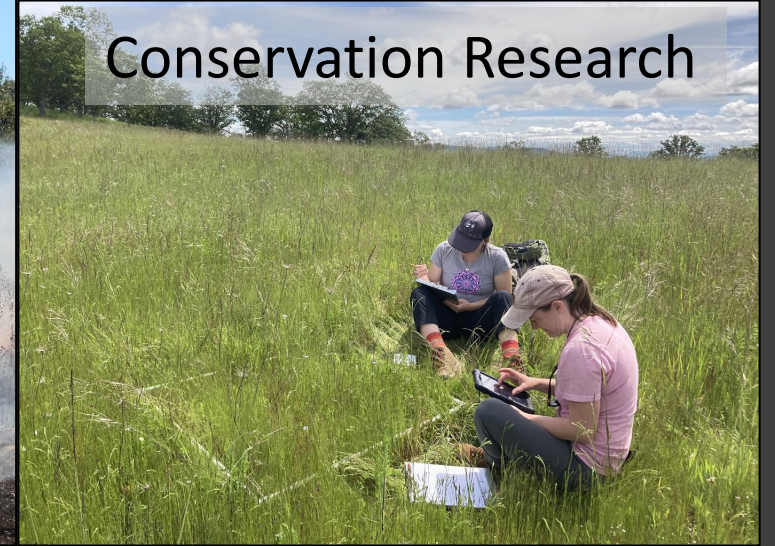

Corvallis

Esri, USGS

Habitat Restoration



Conservation Research



Ecological Education



Plant Materials





Willamette Daisy

Erigeron decumbens

Asteraceae

- Endangered Species
- Perennial
- Reproduces by seed
- Endemic to prairies in the Willamette Valley, Oregon



Goals: What is the role of pollination in the conservation of Willamette daisy?

1. Breeding system of Willamette daisy – Are insects required for pollination? Is the species self-compatible or outbreeding?
2. Is the species pollinator limited? Are there enough pollinators to get the job done? What else affects pollination?
3. Who visits Willamette daisy? What are the most likely pollinators?
4. How does Willamette daisy fit into the prairie pollinator network? What other plants do those pollinators need?





Breeding system and Pollen Supplementation

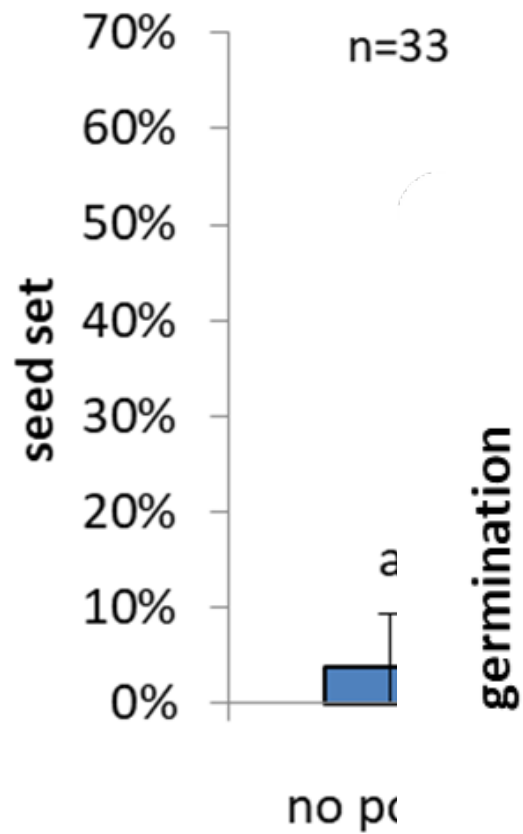


1. Breeding system

Treatments

- No pollen
- Self
- Local cross
- Distant cross





germination



Willamette daisy is a self-incompatible outcrosser with inbreeding depression

No evidence of outbreeding depression – distant crosses result in heterosis

0

local

distant

Treatment

Seed set

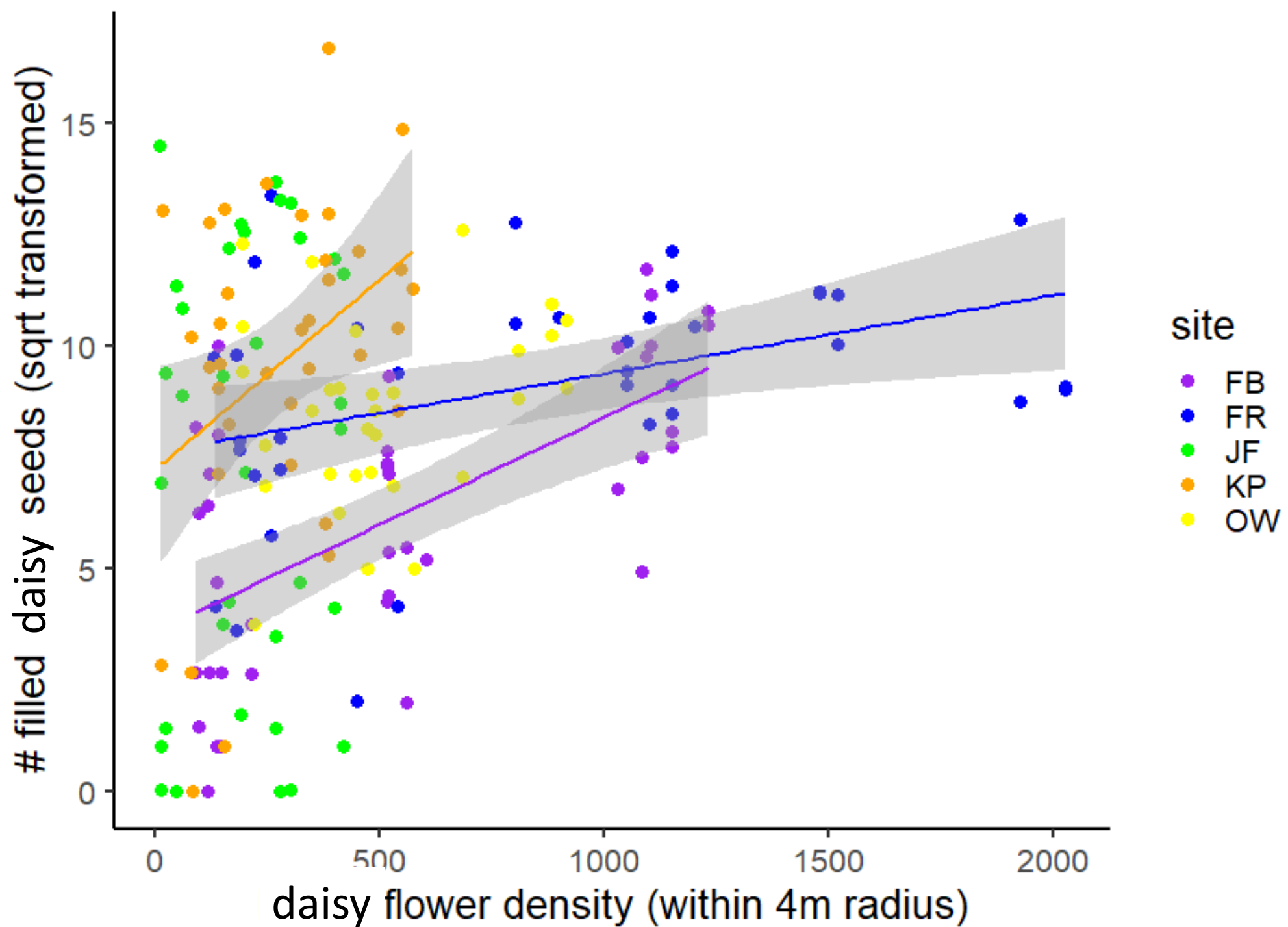


2. Pollinator limitation

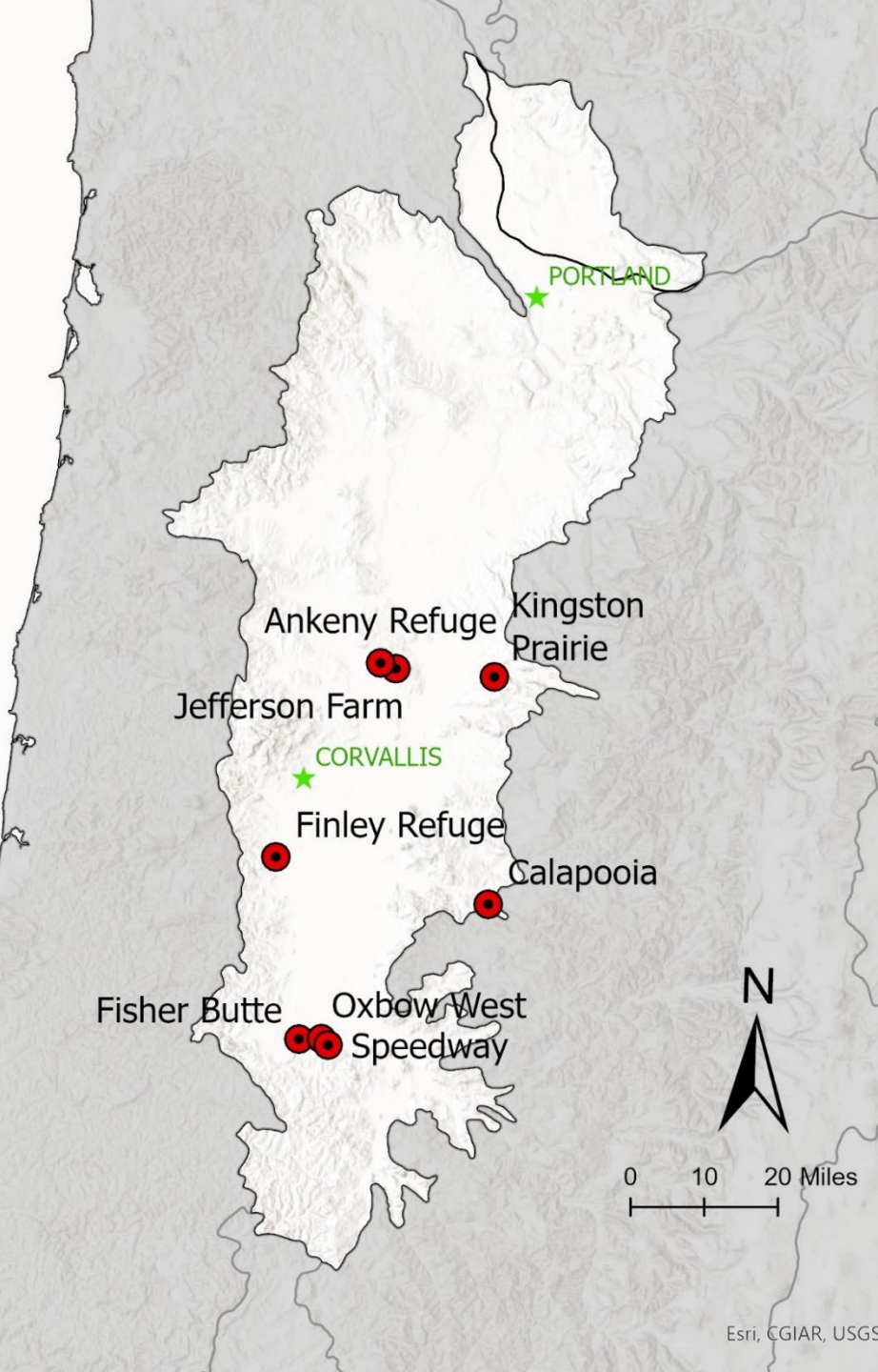
- Open pollinated
- Supplemented



Flower
density
increases
reproduction





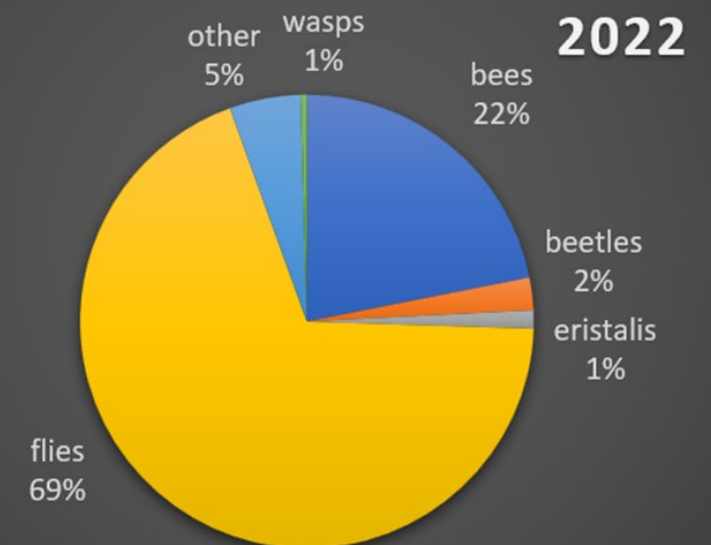
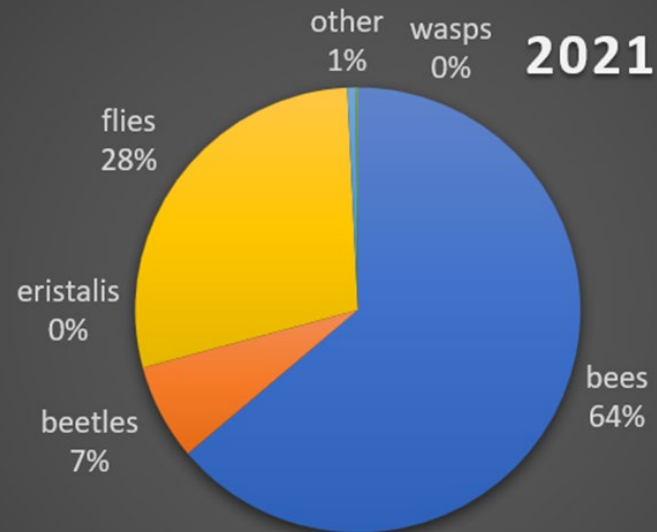
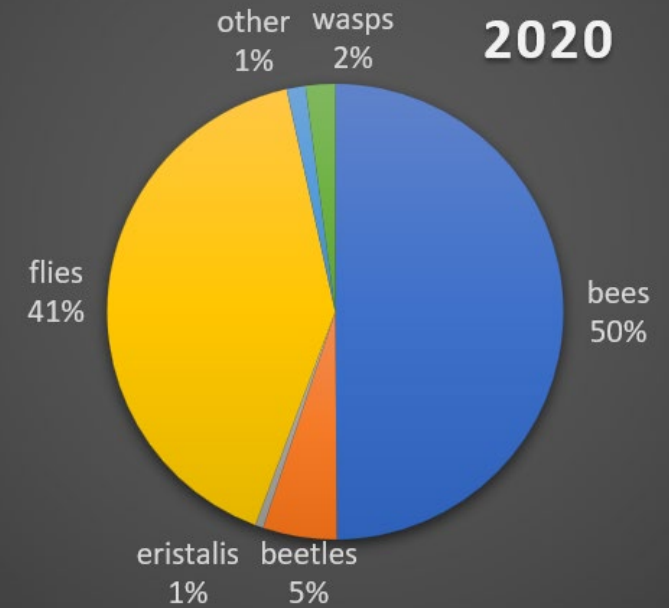
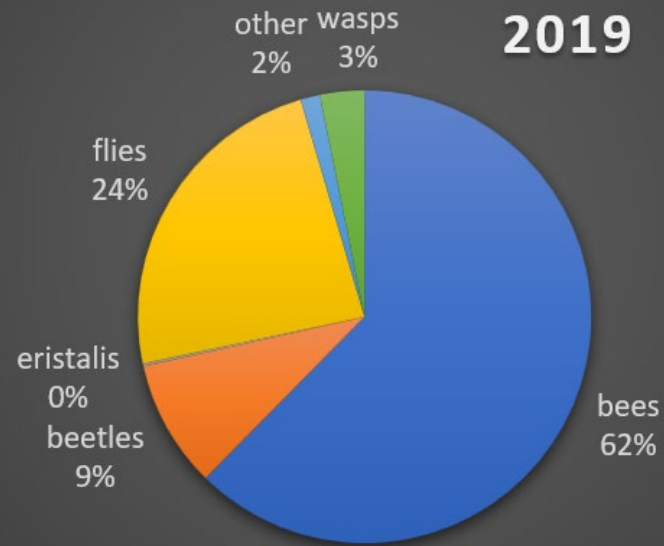


3. Insect visitors to Willamette daisy

- 8 prairies in the Willamette Valley, Oregon
- 6 hours of observation & netting at each site
- Multiple visits over the 3-week pollination window



3. Willamette daisy floral visitors: >100 taxa



Halictus tripartitis



Eupeodes fumipennis



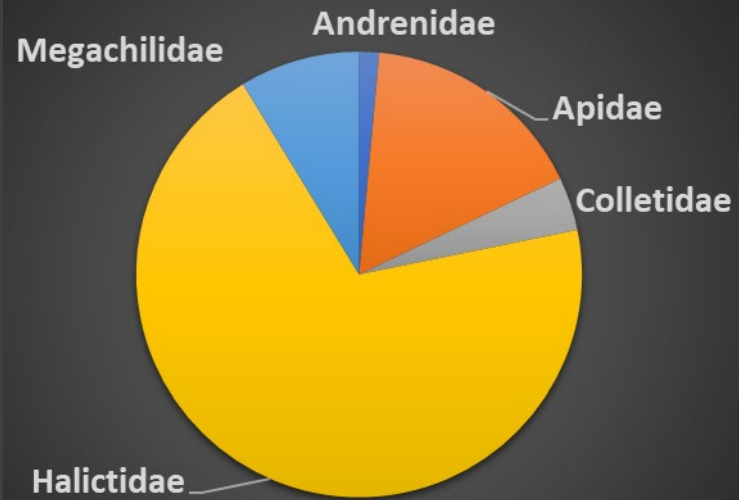
Ceratina acantha



Conophorus sp



Bees visiting daisies



Melissodes sp



Lasioglossum titusi



Andrena candida



EMEC_HR_2014_386
CA YOLO Rominger Forb
38 35 522 W121 59 116
1 May 2014
Ceanothus

♀ *Andrena candida*

2 mm

Osmia sp



D. Cappaert photos

Hoverflies - Syrphidae



Toxomerus marginatus



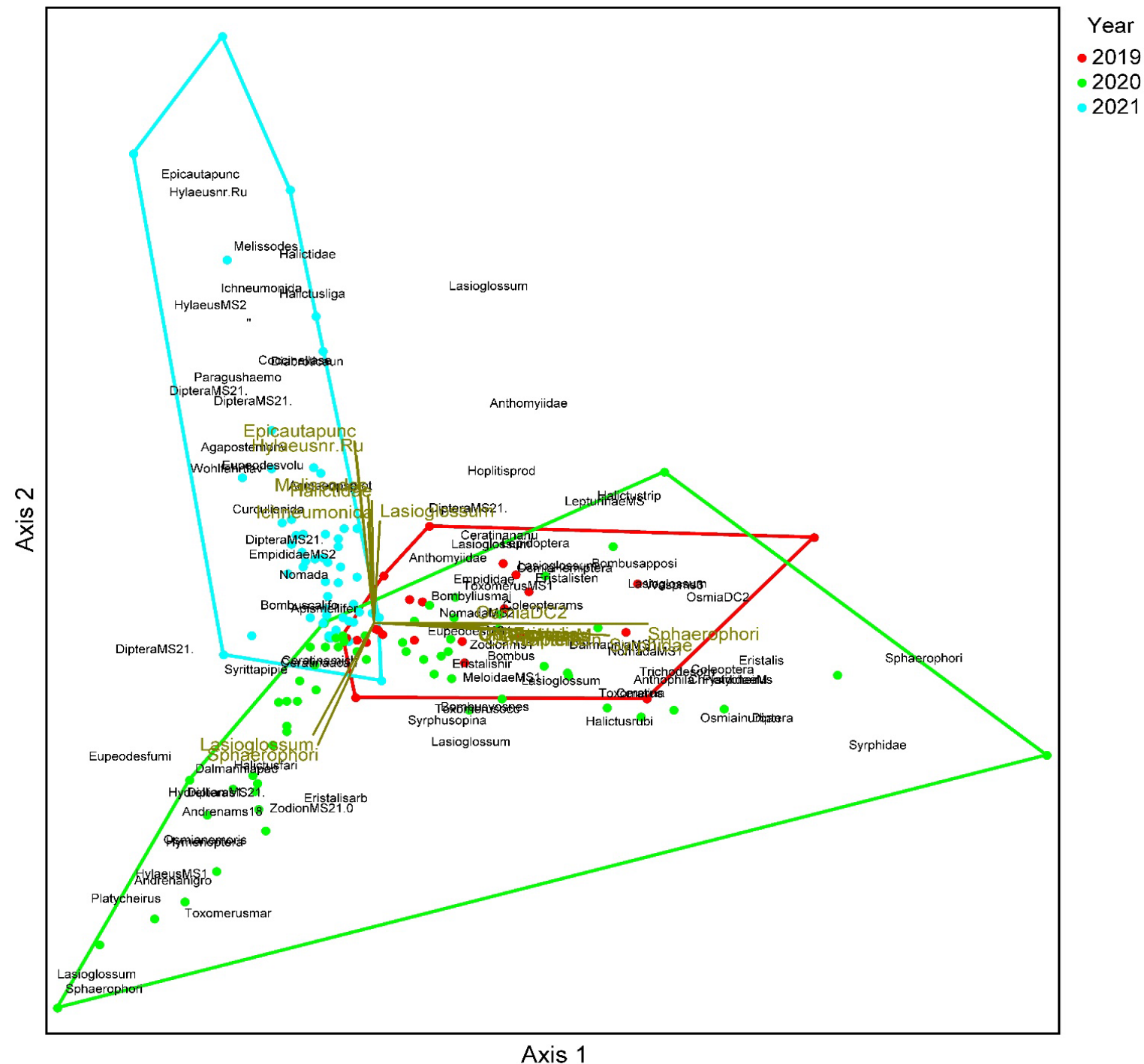
*Toxomerus
occidentalis*

D. Cappeart photos

4. Pollinator communities

Year to year variation in insect communities

Principal Components Analysis



Pollinator network observations

- 6 samples per site per year
- 10-30 minutes per plant species per sample
- Blooming plants quantified with random transects

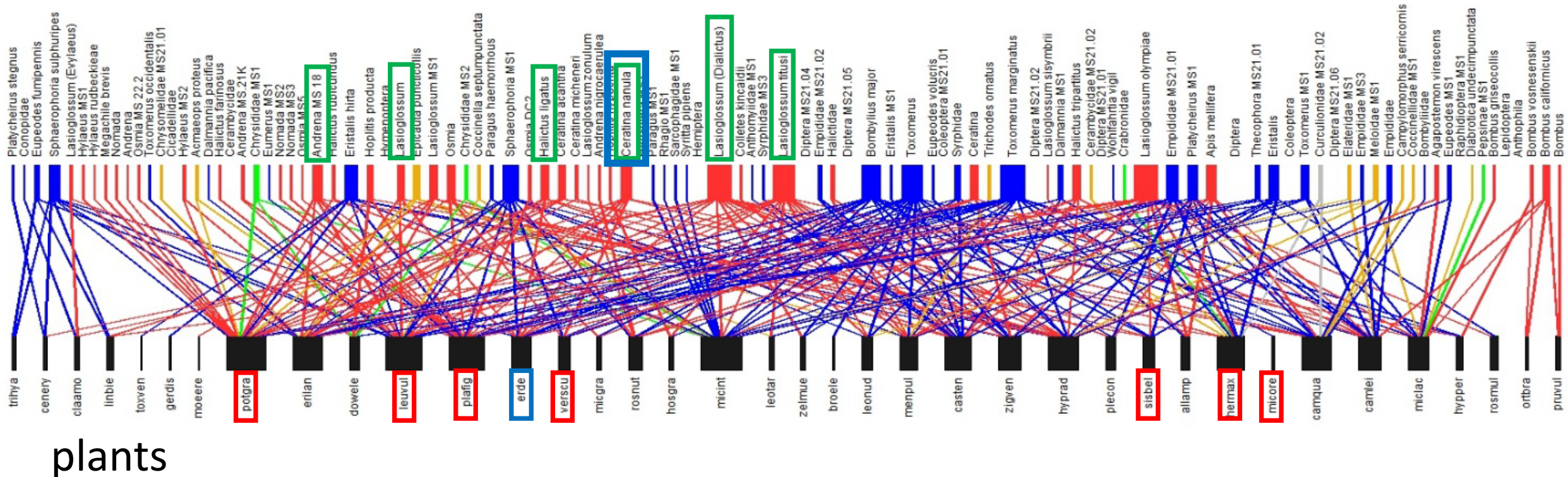


Willamette daisy is part of a plant-pollinator network: interacting communities

insects

- bees
- flies
- beetles
- wasps

Oxbow West
2019-2022



A complex network graph visualization. The graph consists of numerous nodes, represented by small circles, and a dense web of edges connecting them. The nodes and edges are color-coded: red, blue, and yellow. The network is highly interconnected, with many nodes having multiple connections. The overall structure is elongated and somewhat irregular, with a higher density of connections in the center and more sparse connections towards the edges. The background is white, and the graph is set against a black border.

dsnut
 dipul
 marore
 vicvii
 cytsco
 rubarm
 linbie
 lupore
 pruvul
 zelmue
 viccra
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 daucar
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 sidcam
 grihir
 antcot
 crecap
 clapur
 lupalb
 sidrir
 broele
 telphi sp
 senjac
 hyprad
 madele
 acmpar
 achmil
 parvis
 creset
 leotar
 leourul
 hermas
 claamo
 diccon
 lomrud
 vicia sp1
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 erilan
 vicsat
 gerdis
 camqua
 plecon
 myodis
 yodon sp
 caslev
 shearn
 lupbic
 ranocc
 valloc
 sweep
 cenery



Conclusions

- Willamette daisy requires pollinators
- Self incompatible
 - Distant crosses increase fitness
- Pollen limited
 - Restoring high densities may improve seed production
- Diverse pollinator fauna
 - But can't take them for granted at any time or place
- Complex pollinator networks
 - Restoring diverse plants could improve pollinator populations
- Many questions remain
 - How effective are flies as pollinators?
 - What are the effects of restoration practices on pollinator communities?



Halictus ligatus, D. Cappeart photo



**US Army Corps
of Engineers.**

Thank you!

