



Do actively or passively reclaimed roads support more pollinators?

Lusha Tronstad and Bryan Tronstad

WYNDD, University of Wyoming, tronstad@uwyo.edu

In cooperation with

LB Myers, EOG Resources Inc.

Mike Curran, Abnova Ecological Solution

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Pollinators

- Bees
- Butterflies
- Beetles
- Flies
- Wasps
- Bats
- And others





Why pollinators?

- Transfer pollen among plants (outcrossing)
 - Increase plant genetic diversity
 - Outcrossed plants more resilient and resistant to stress
 - Plants produce more, heavier and a higher percentage of viable seeds
 - Higher nutrition for wildlife

Pollinators and food

- Coffee
- Chocolate
- Nuts
- Fruits
- Tomatoes
- Vegetables
- Agave
- Honey
- Beef and lamb (alfalfa)
- Mule deer and other wildlife



Forbs and flowering shrubs

- ~88% of plants require insect pollination
- Successful reproduction of plants often requires pollinators
- Annual plants must produce viable seeds to persist



Life cycle of solitary bees

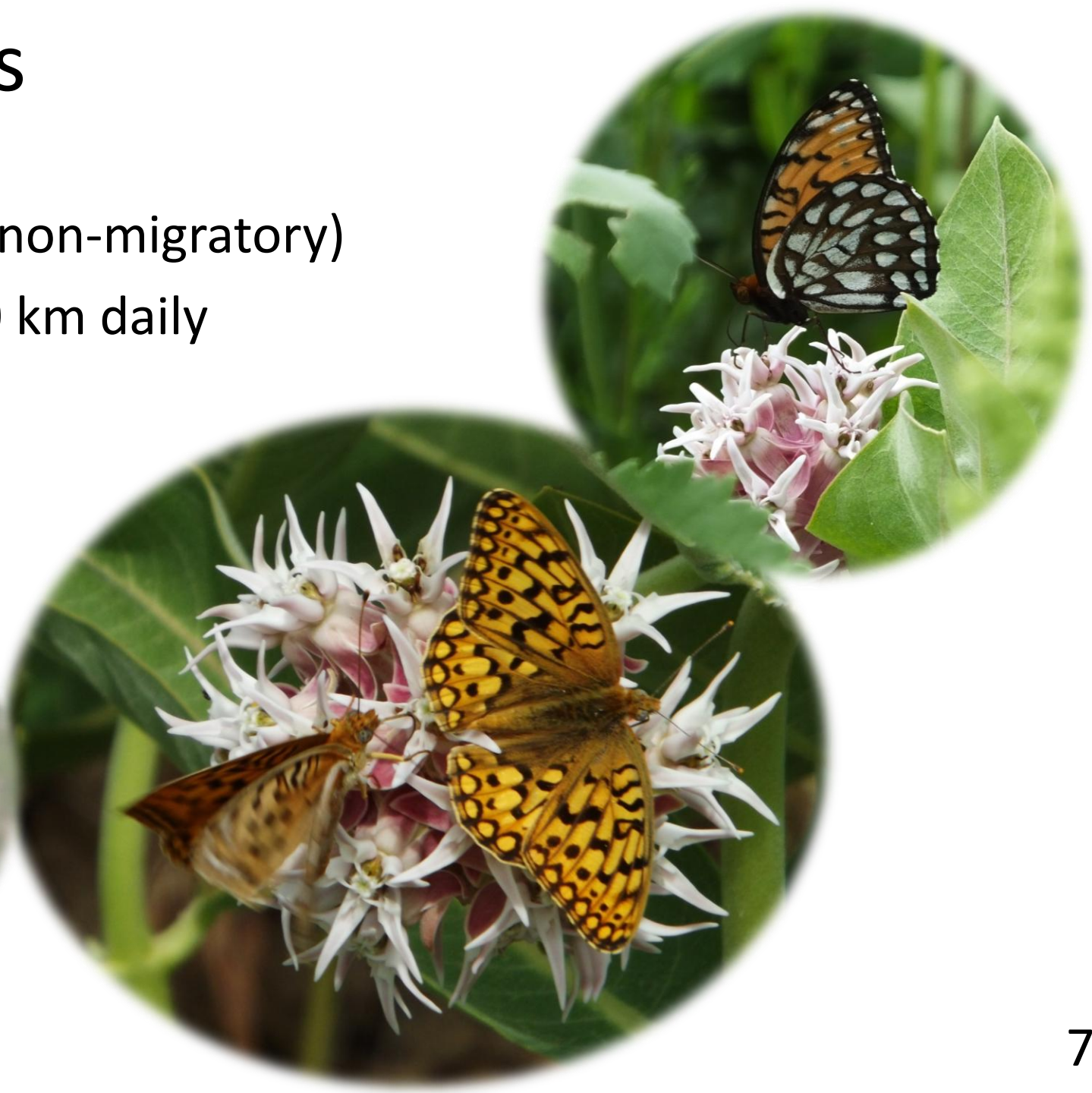
- Complete metamorphosis
- Travel ~100 m to 6.4 km
- Larvae are fed pollen
- Adults eat nectar
- Only insects that actively collect pollen



Generated by ChatGPT

Life cycle of butterflies

- Complete metamorphosis
- Travel 100 m - 11 km daily (non-migratory)
- Individual Monarchs fly <80 km daily
- Caterpillars are herbivores
- Adults eat nectar



Declining pollinators

- Some bee and butterfly species are declining
- Once common species with large ranges are now declining
- 5 bumble bee and 4 butterfly species are being considered for federal protection in Wyoming
 - Lower abundance
 - Range contractions

Large Marble



Regal

Fritillary



Southern Plains
Bumble Bee



Morrison's Bumble
Bee



American Bumble
Bee



Western Bumble Bee



Causes of decline

- Fewer flowers
- Loss of habitat
- Fragmentation of habitat
- Pesticides
- Parasites



REVIEW

POLLINATION

Bee declines driven by combined stress from parasites, pesticides, and lack of flowers

Dave Goulson,* Elizabeth Nicholls, Cristina Botías, Ellen L. Rotheray

Annual Review of Entomology

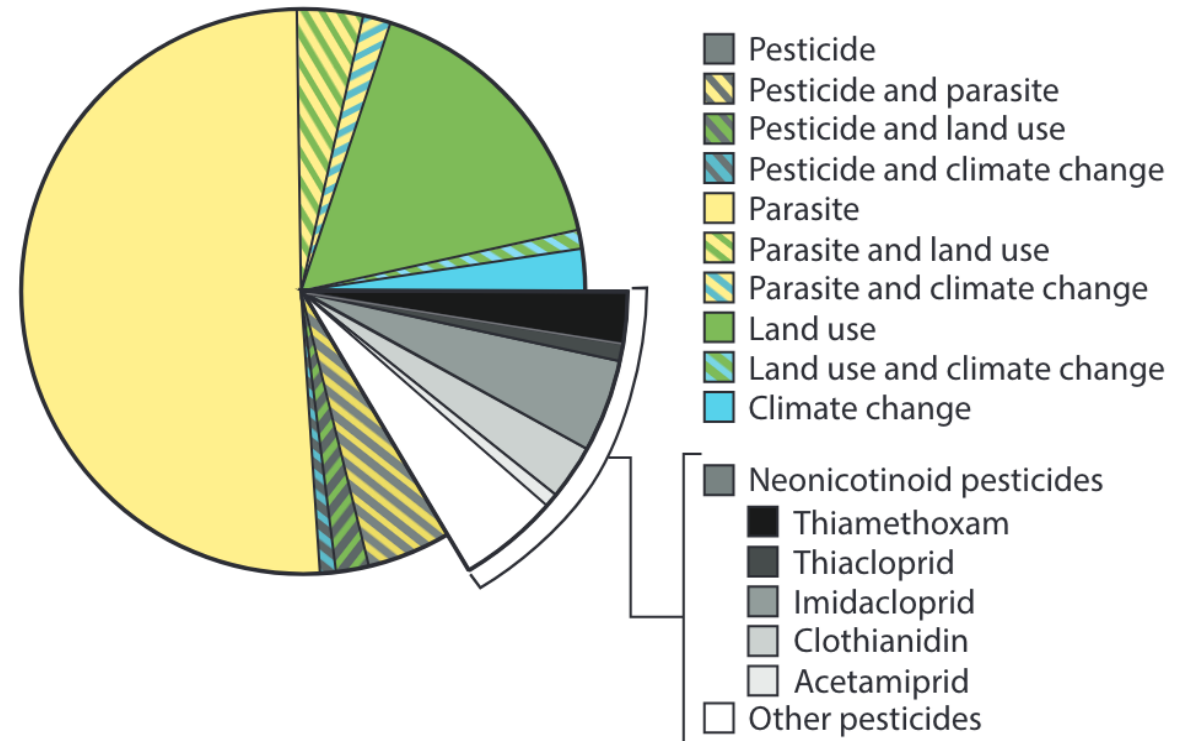
Global Trends in Bumble Bee Health

Sydney A. Cameron^{1,*} and Ben M. Sadd²

¹Department of Entomology, University of Illinois, Urbana, Illinois 61801, USA; email: sacamero@illinois.edu

²School of Biological Sciences, Illinois State University, Normal, Illinois 61790, USA; email: bmsadd@ilstu.edu

Proposed causes of bumble bee decline in peer-reviewed literature



Reclamation = opportunity!

- Seed mixes can improve habitat by including forbs and flowering shrubs
- Unique opportunity to provide critical resources for pollinators
 - Pollen
 - Nectar
- Resources vary among plant species
 - Pollen nutrition varies
 - e.g., Purple prairie clover = high protein
 - Nectar reward varies
 - e.g., Rocky Mountain bee plant = high nectar



Reclamation = opportunity!

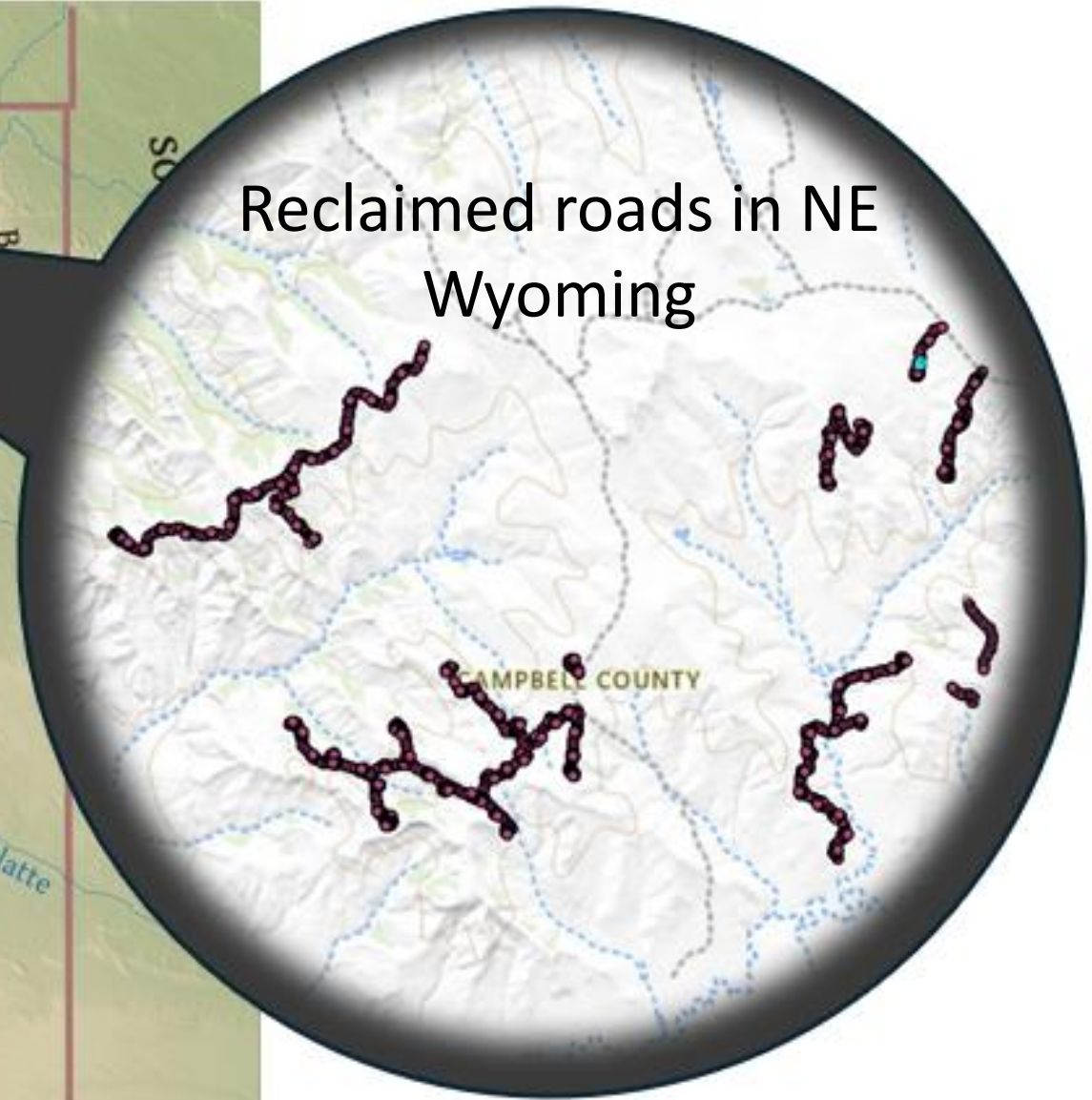
- Need more information on:
 - What plants grow best
 - What flowers are most used by pollinators
 - Provide flowers that bloom throughout summer



Study area



Reclaimed roads in NE
Wyoming



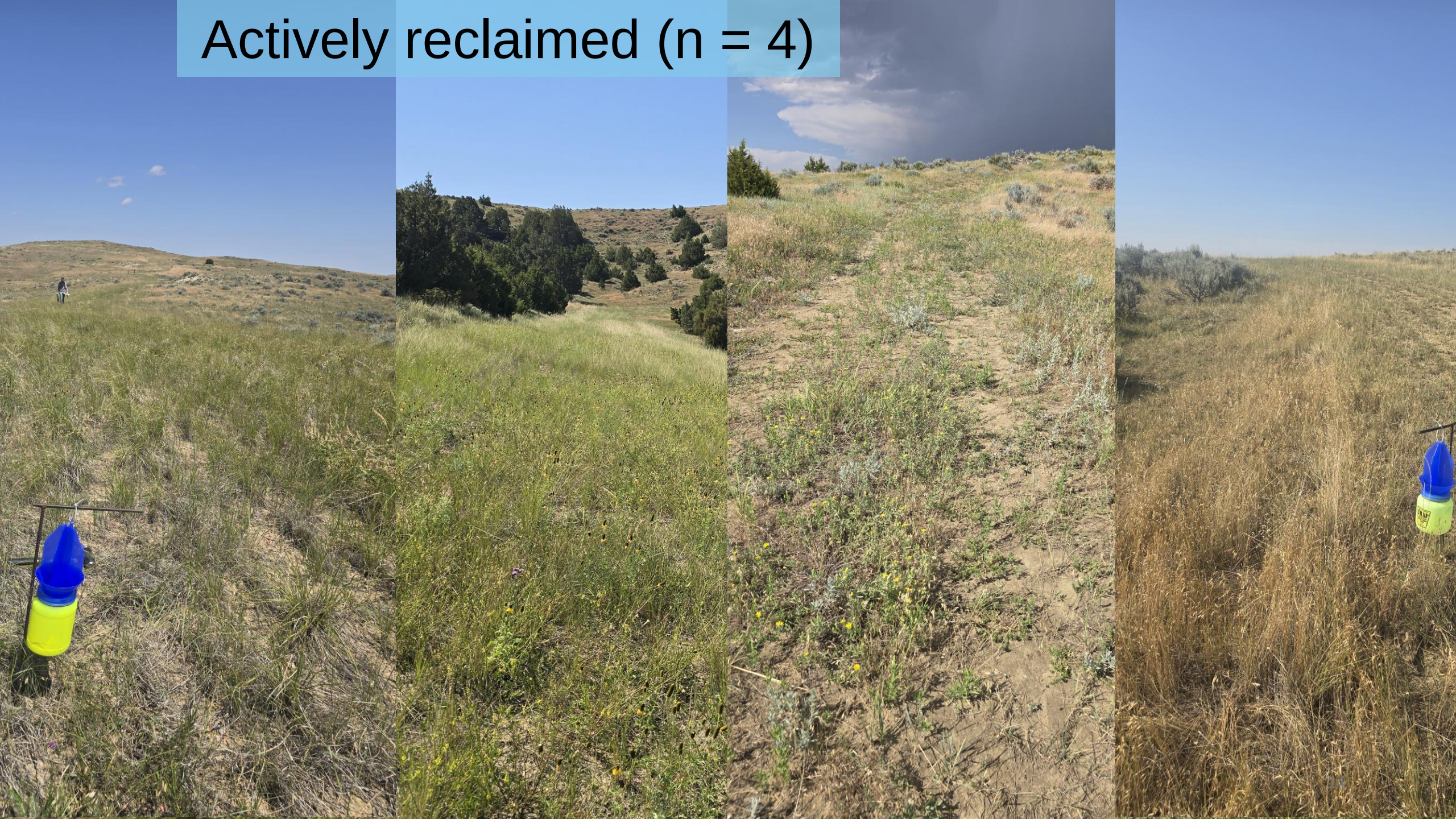
Study design

- Roads constructed in the 1950s
- 4 roads actively reclaimed in 2021 by EOG
- 2 roads passively reclaimed since 2000
- Pollinator surveys conducted in July 2025

Passively reclaimed road



Actively reclaimed (n = 4)



Passively reclaimed (n = 2)



Forbs in seed mix



Scarlet globemallow
(*Sphaeralcea coccinea*)



Prairie coneflower
(*Ratibida columnifera*)



Purple prairie clover (*Dalea
purpurea* var. *purpurea*)



Rocky Mountain
beeplant
(*Cleome serrulata*)

To what degree do actively vs. passively reclaimed roads differ?

Specific questions

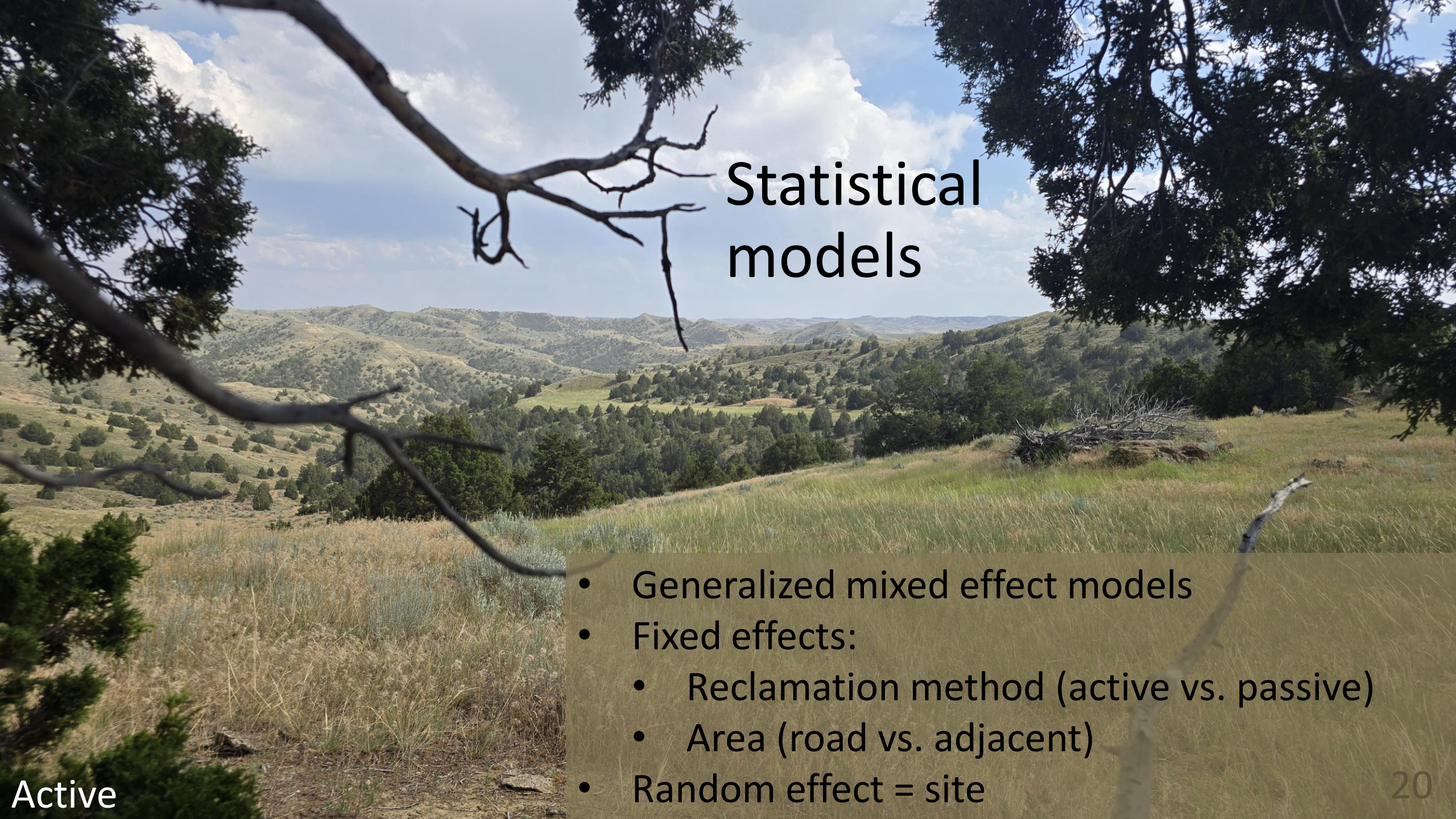
1. Are there more flowers on reclaimed roads compared to the adjacent landscape?
2. Do more pollinators occur along actively reclaimed vs. passively reclaimed roads?

Climate

- Short-grass prairie
- Difficult reclamation conditions
 - Semi-arid
 - Continental climate
 - Thin soil

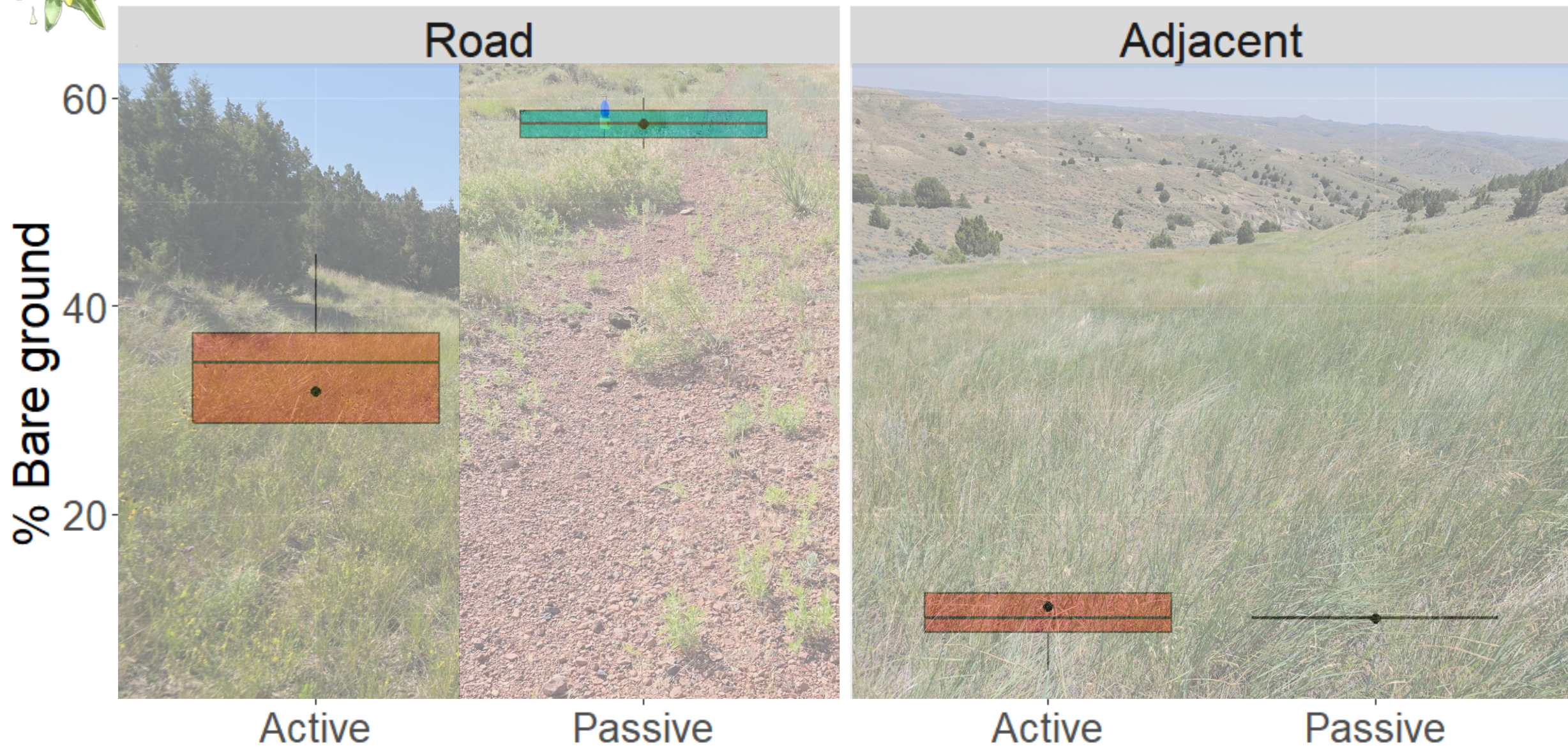
Methods for plant data collection

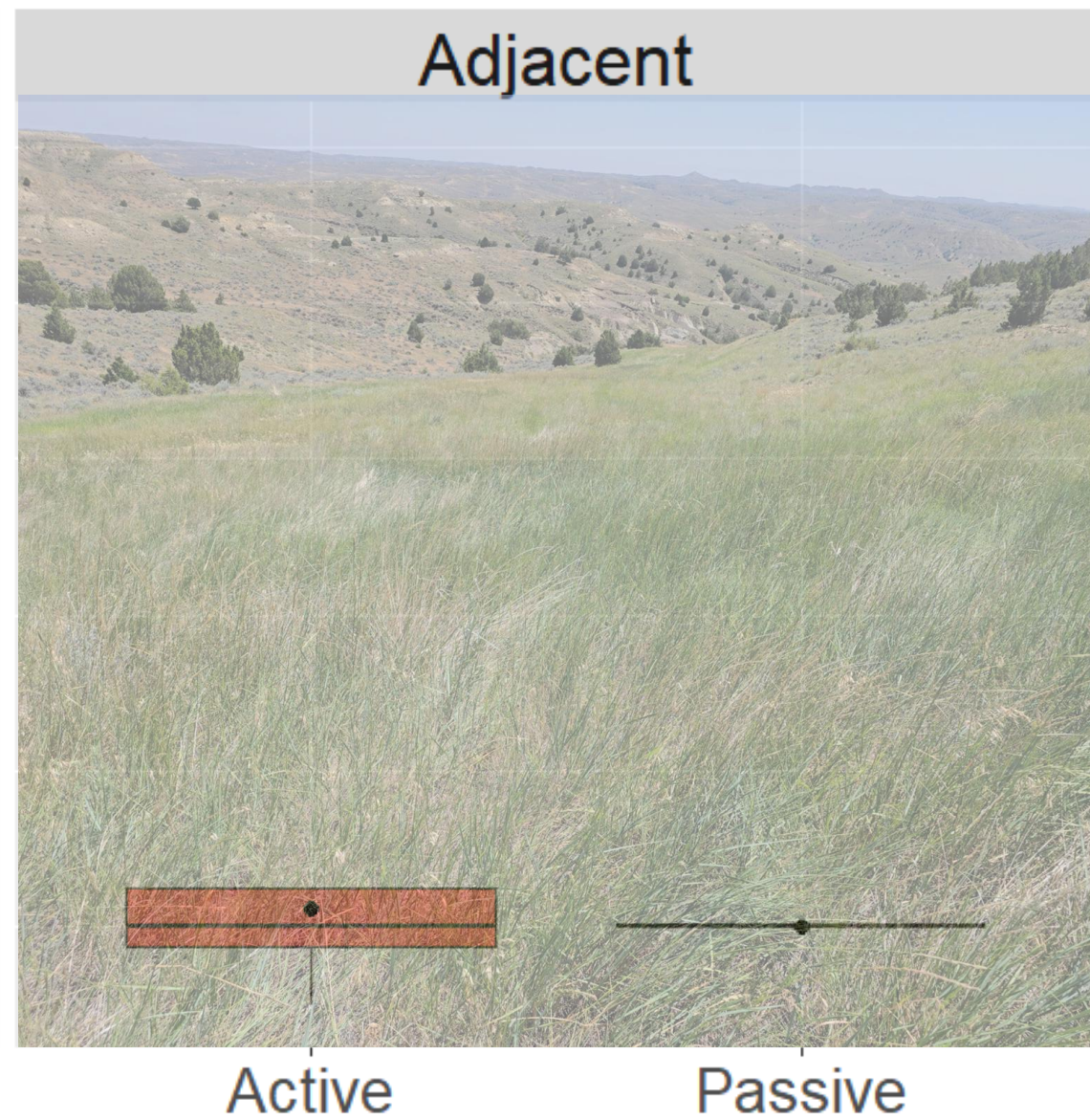
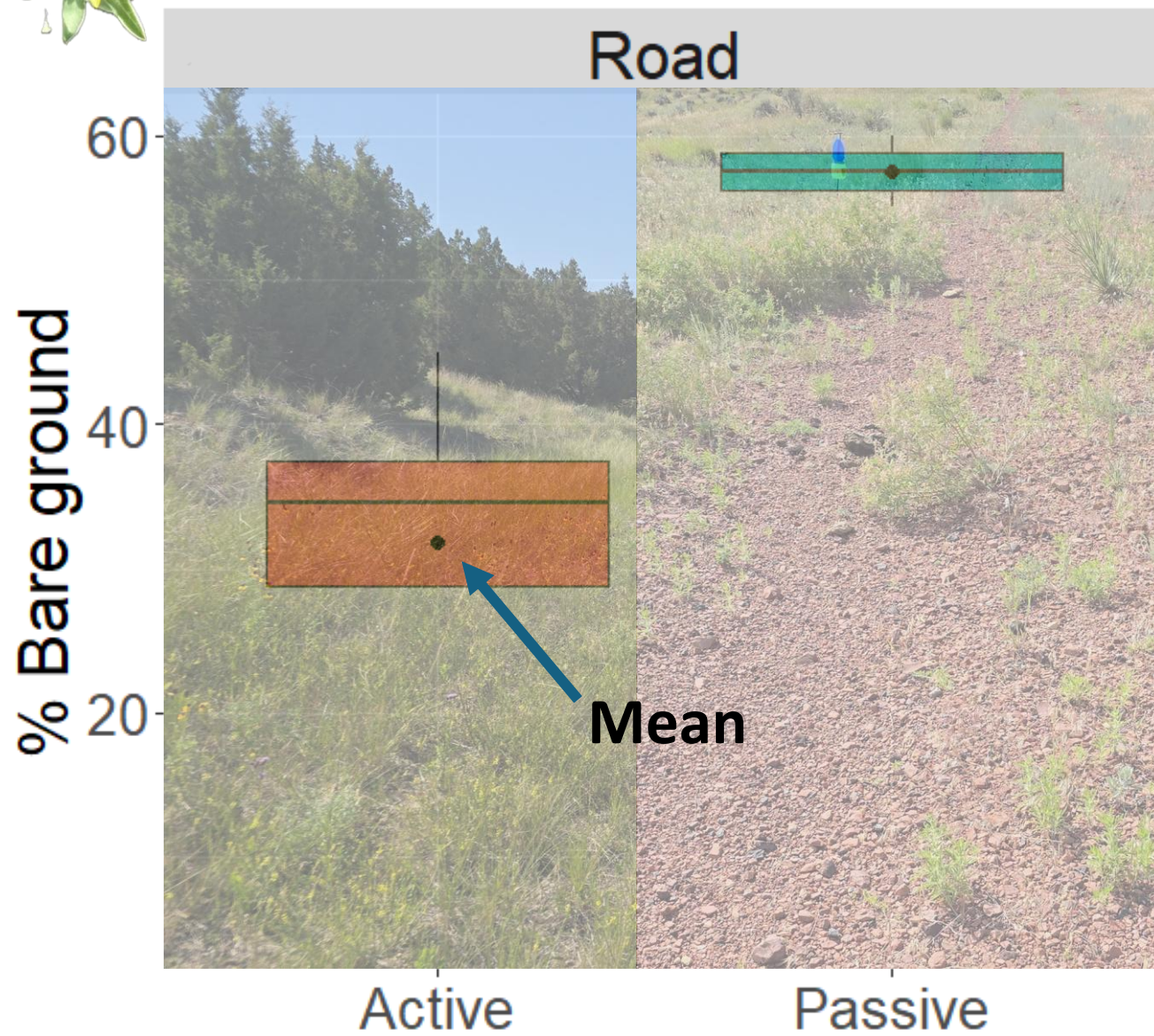
- Identified flowers along road and adjacent areas
 - Categorical abundance
 - Richness
- Visually estimated ground cover on road and adjacent area
 - Bare ground
 - Grass
 - Invasive grass
 - Shrub
 - Forbs

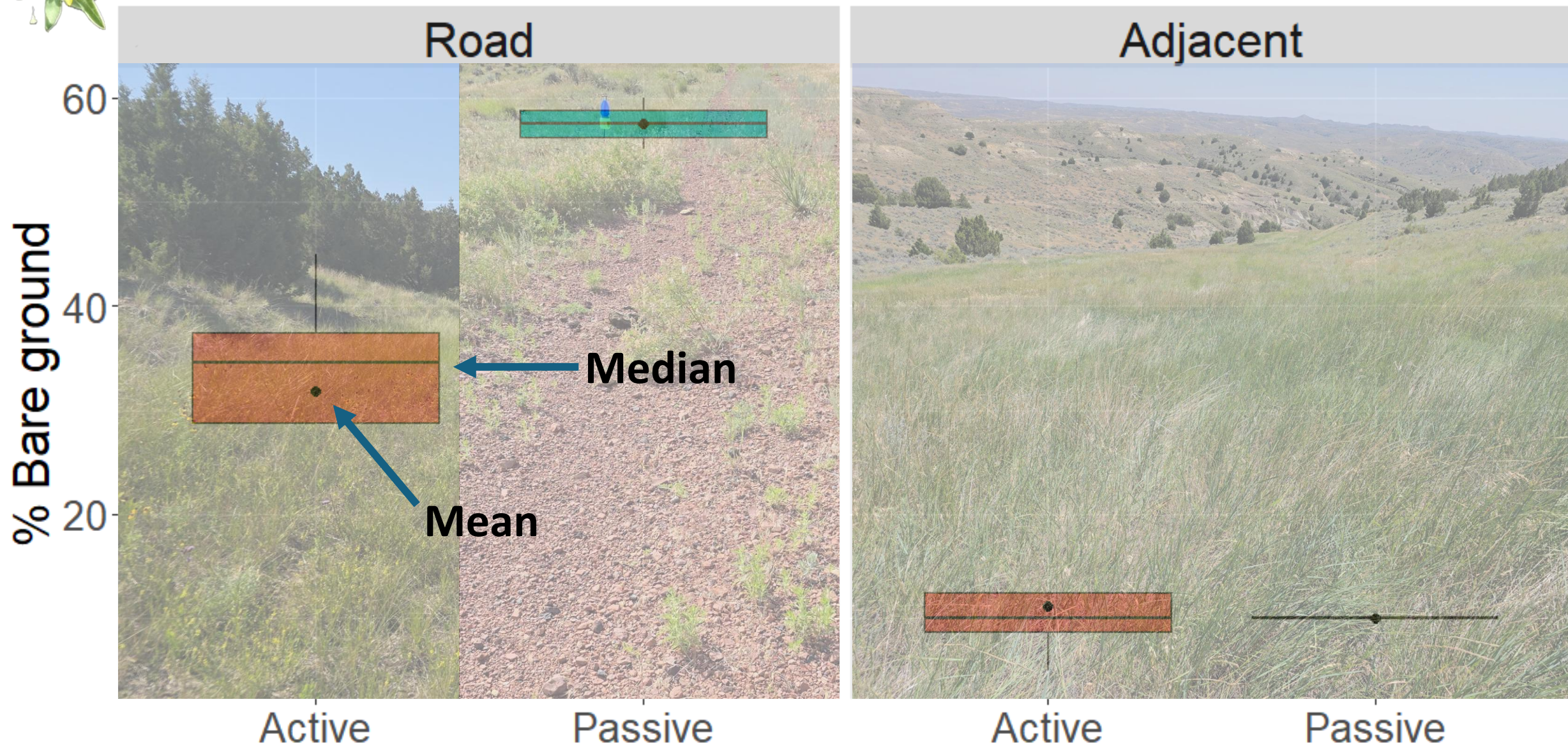


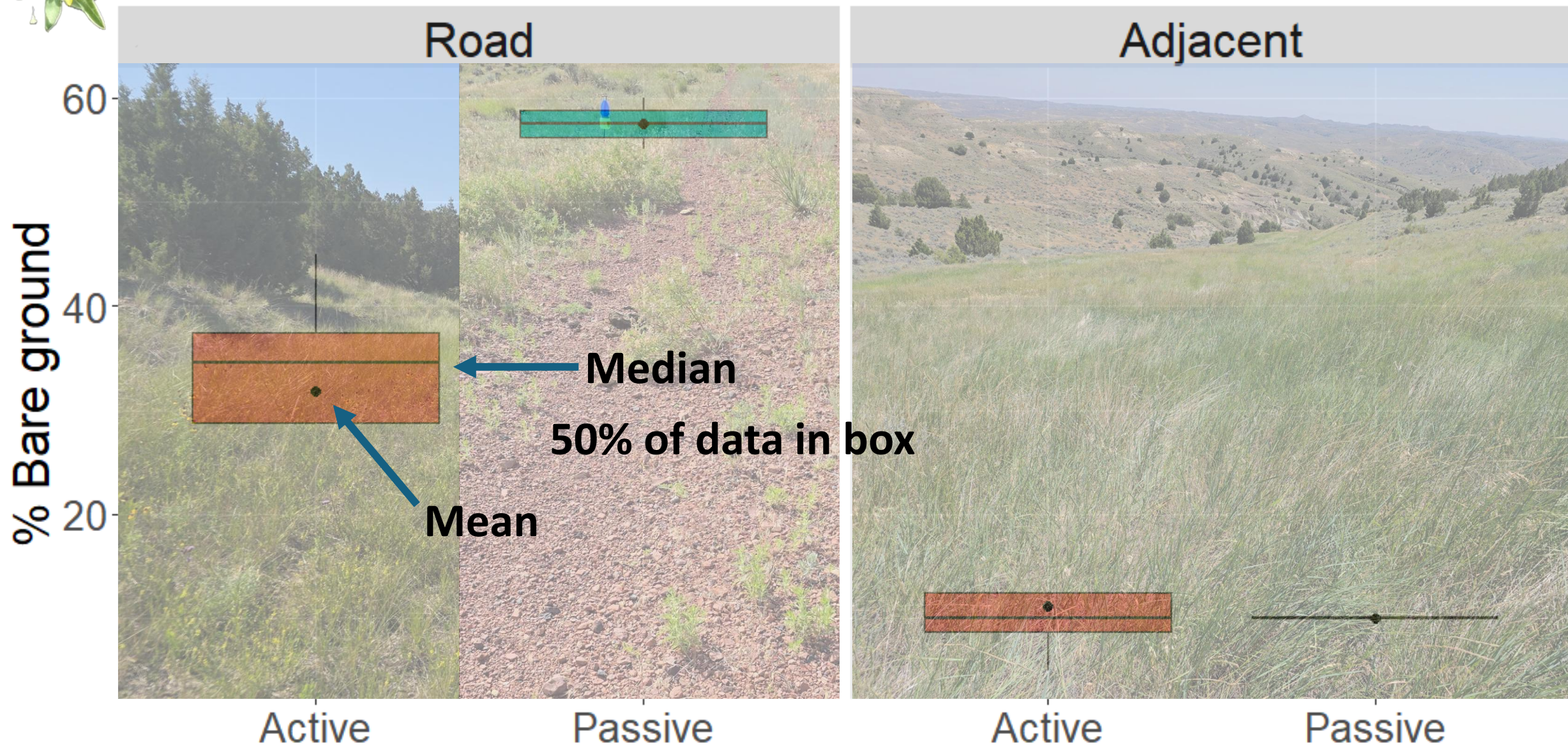
Statistical models

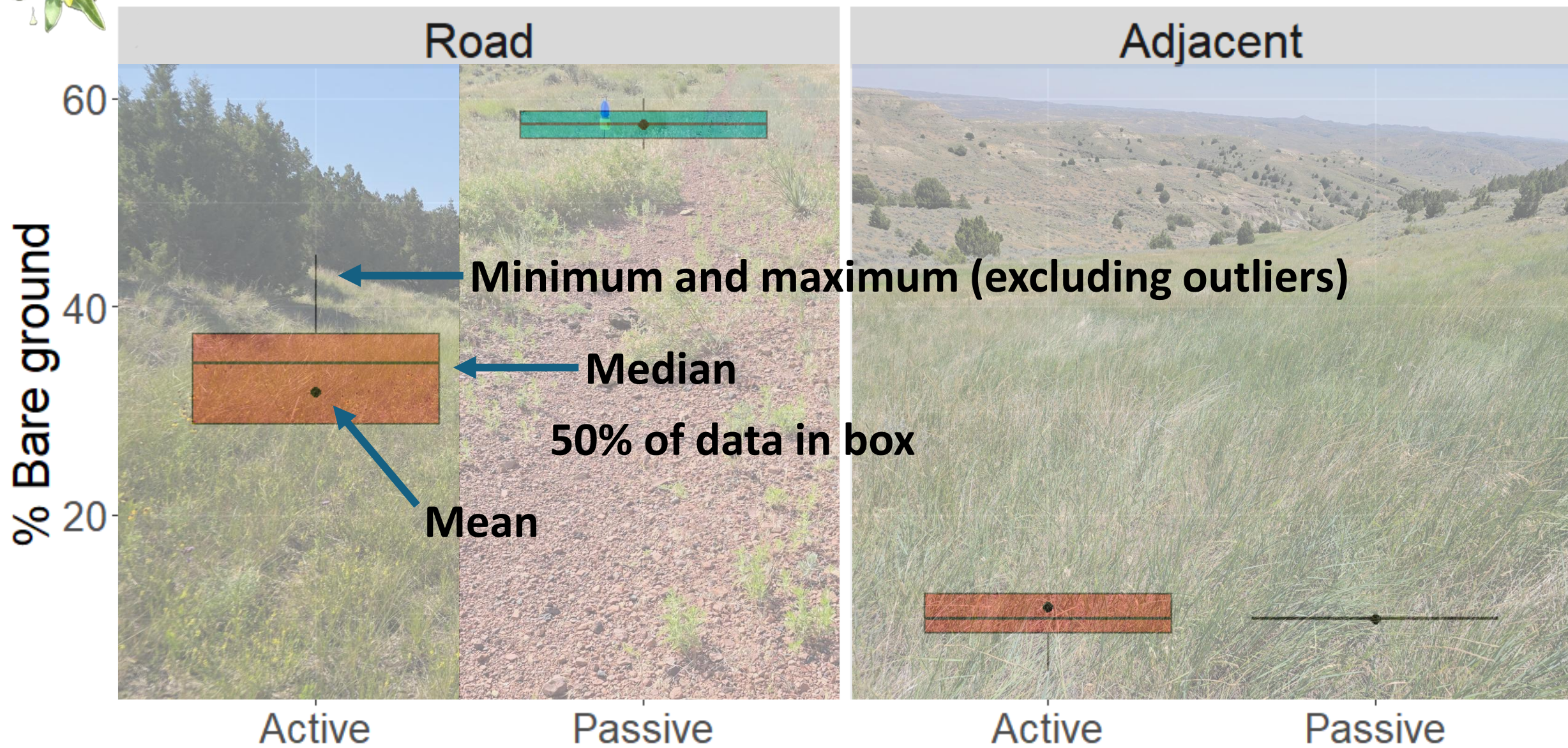
- Generalized mixed effect models
- Fixed effects:
 - Reclamation method (active vs. passive)
 - Area (road vs. adjacent)
- Random effect = site

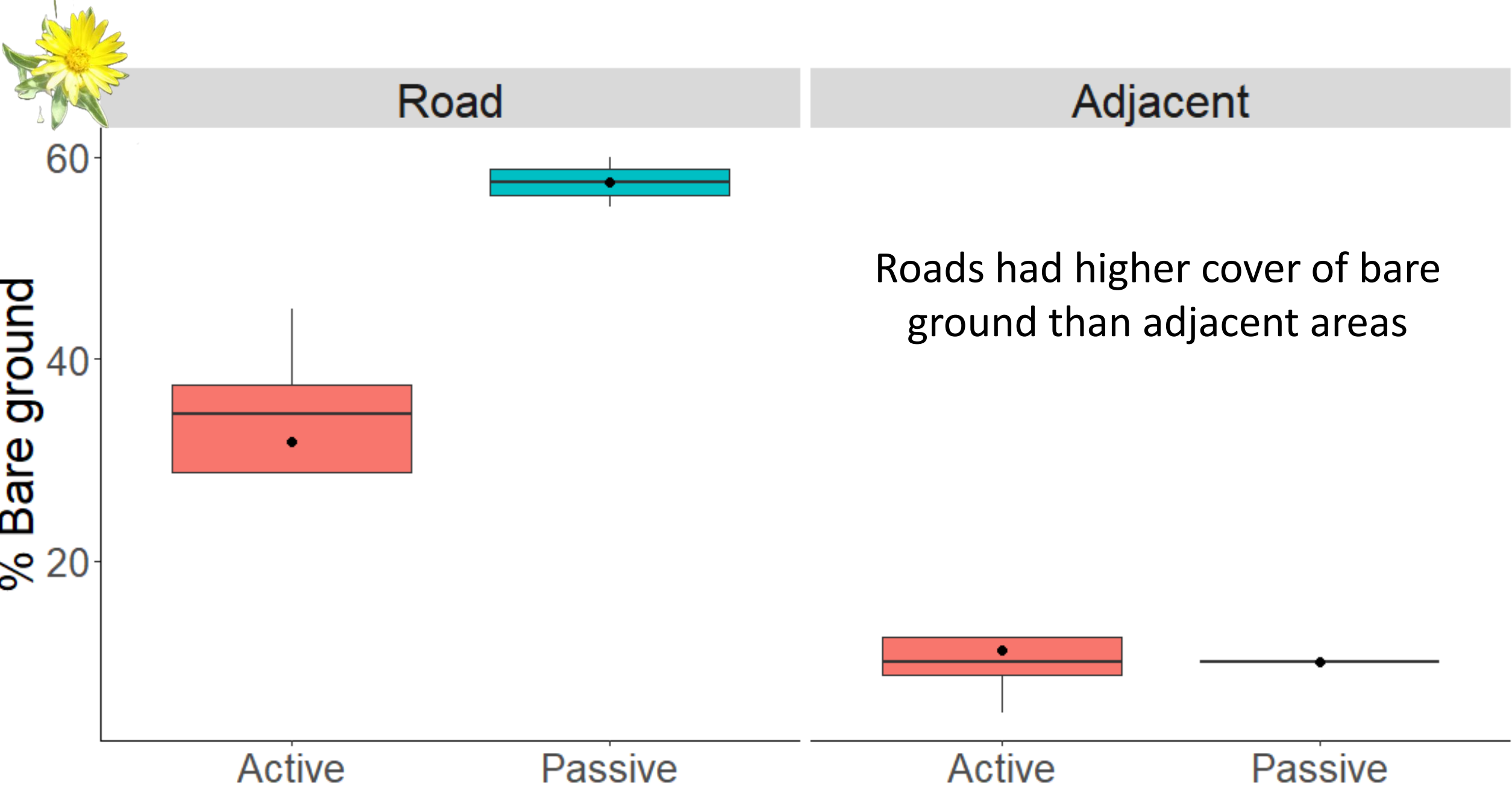


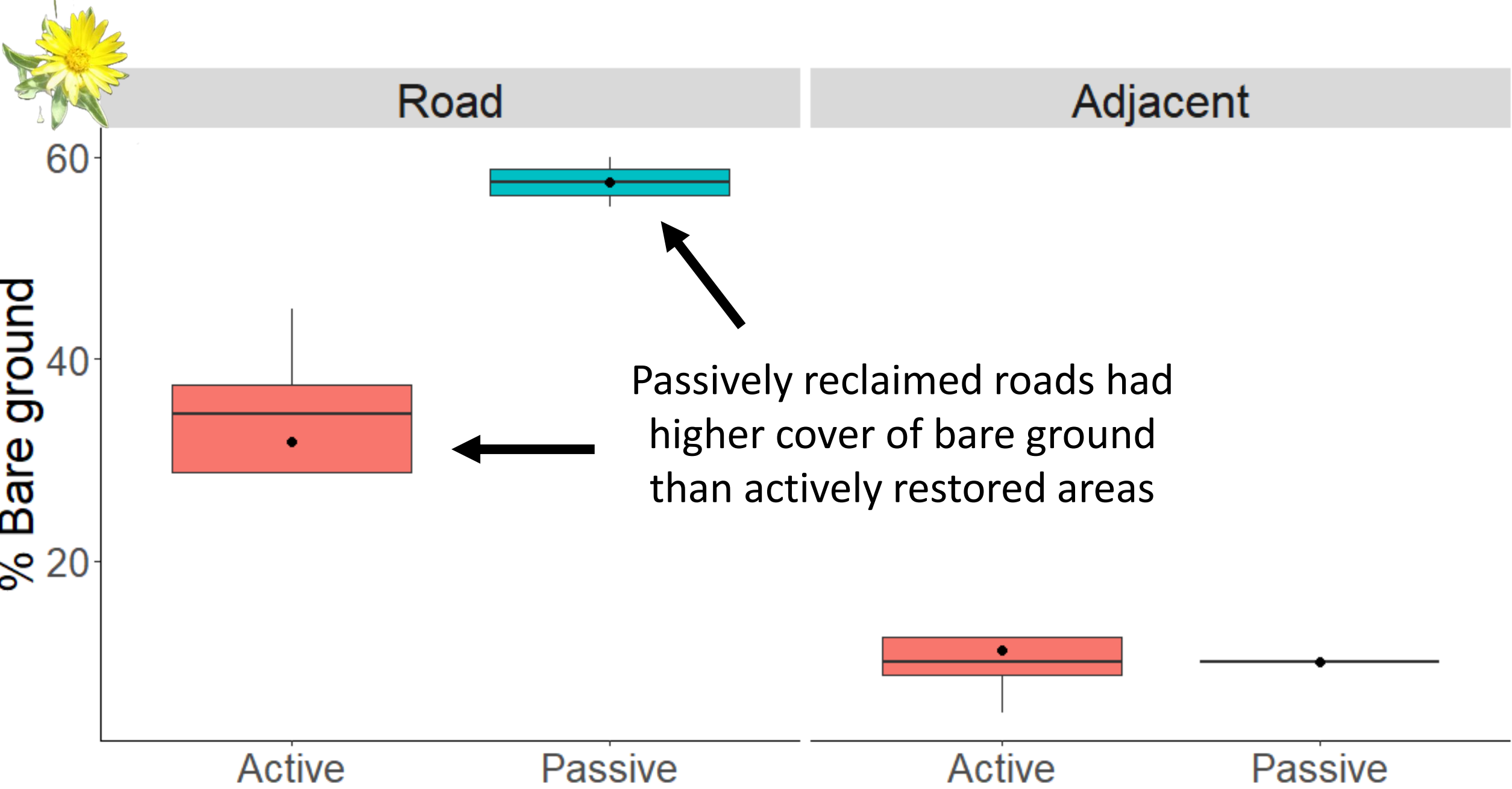






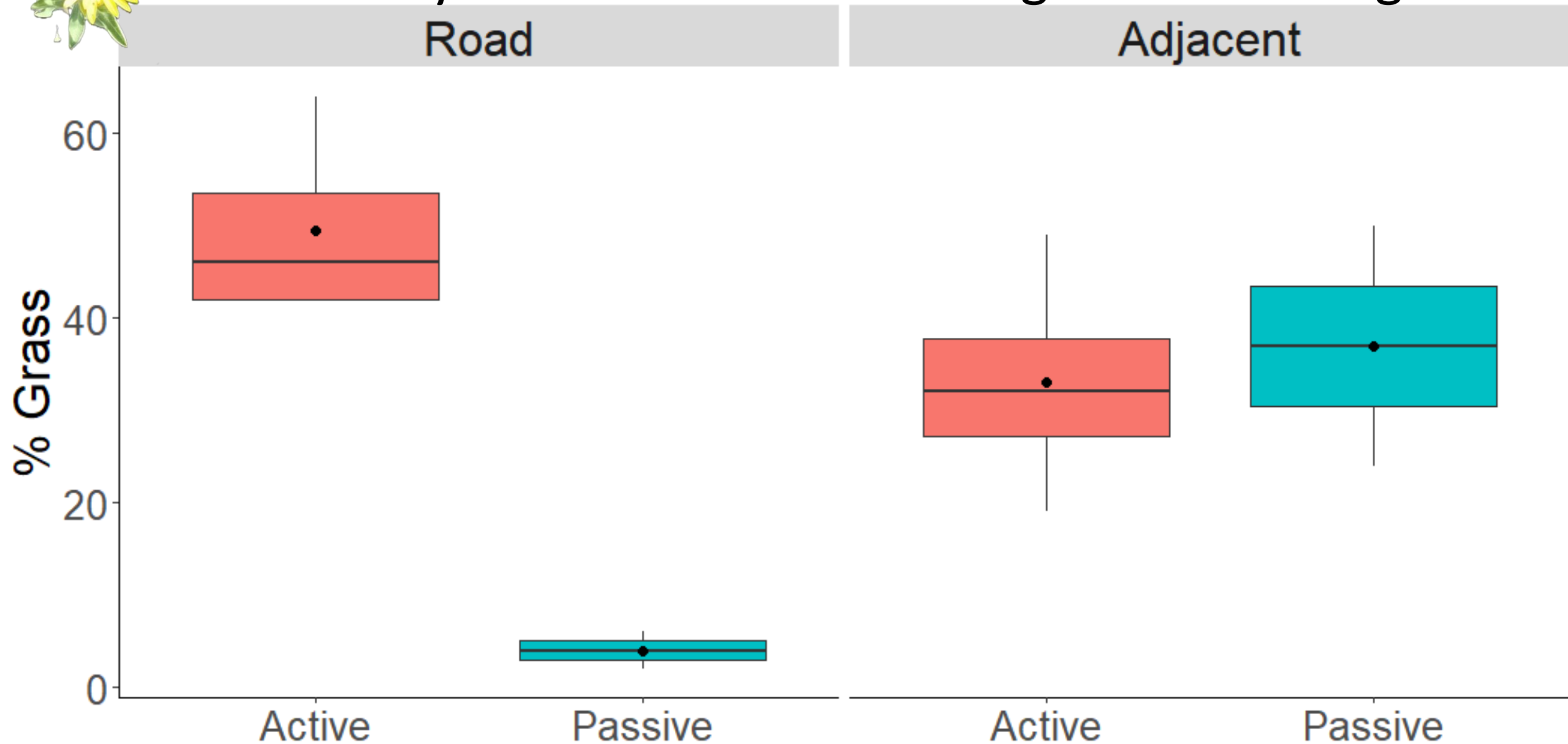






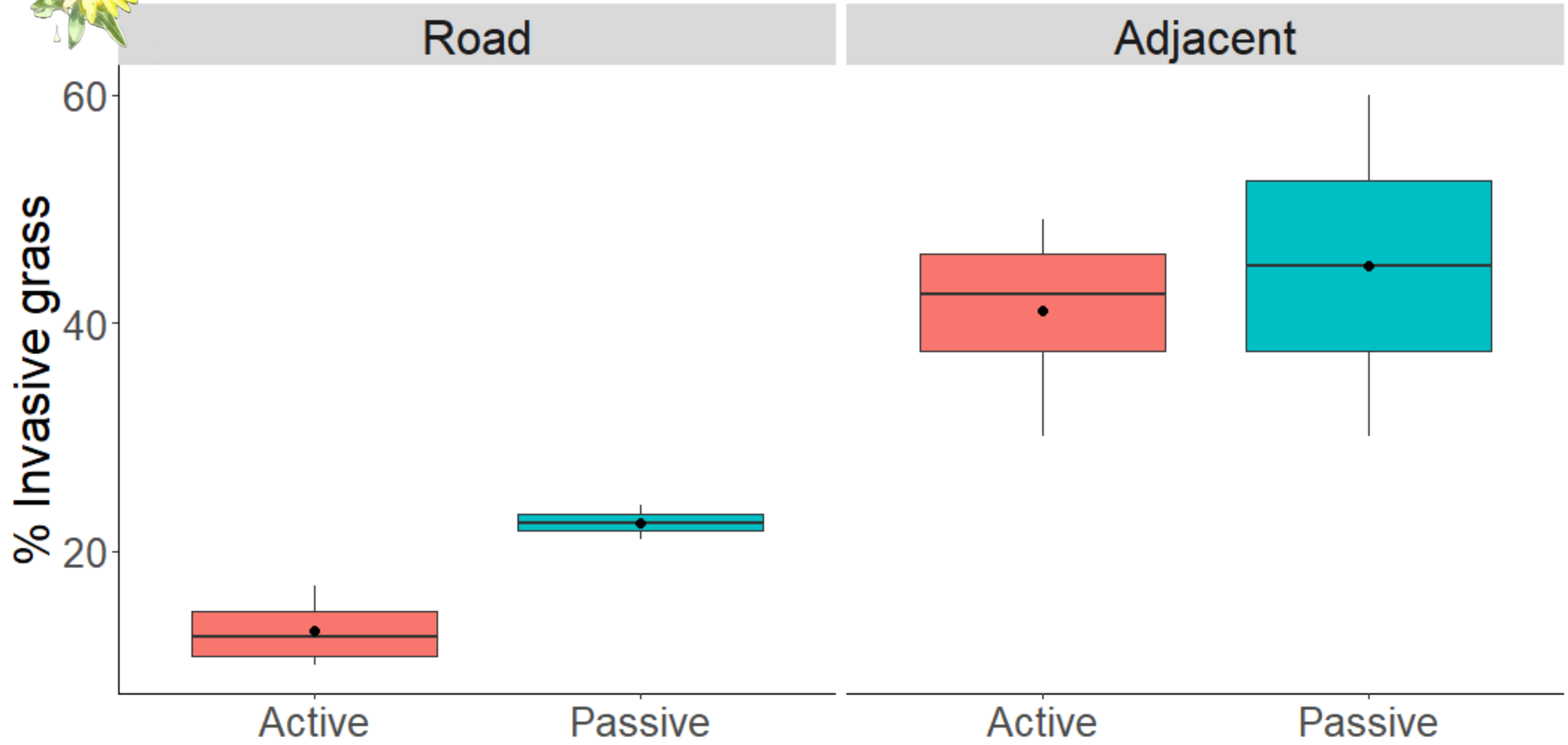


Actively reclaimed roads had highest cover of grass





Roads had lower cover of invasive grasses



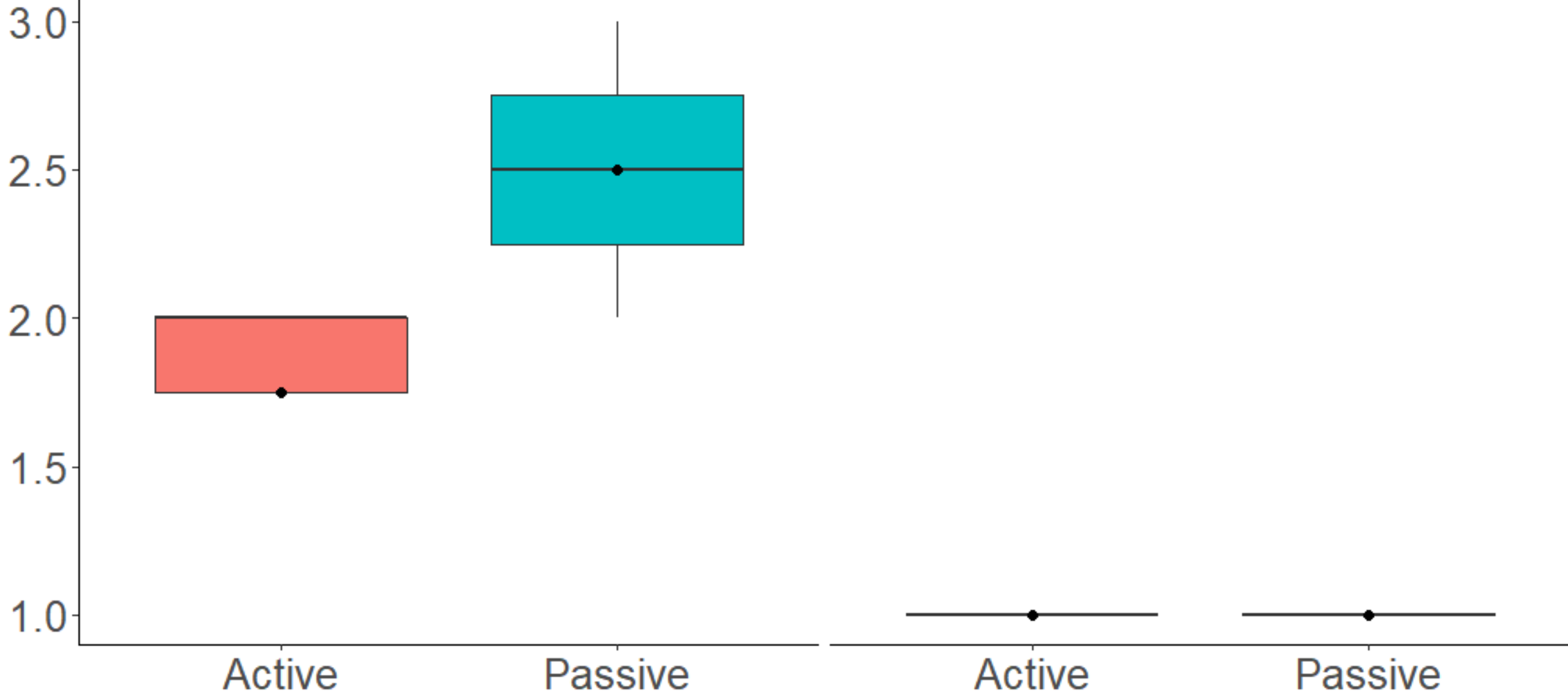


More flowers on roads than adjacent areas

Flower abundance

Road

Adjacent

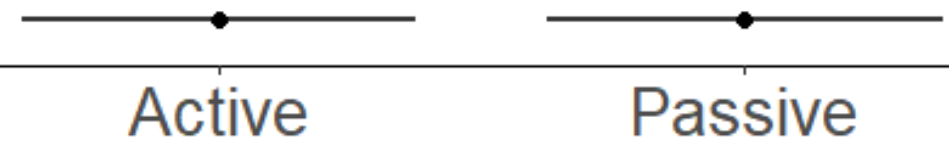
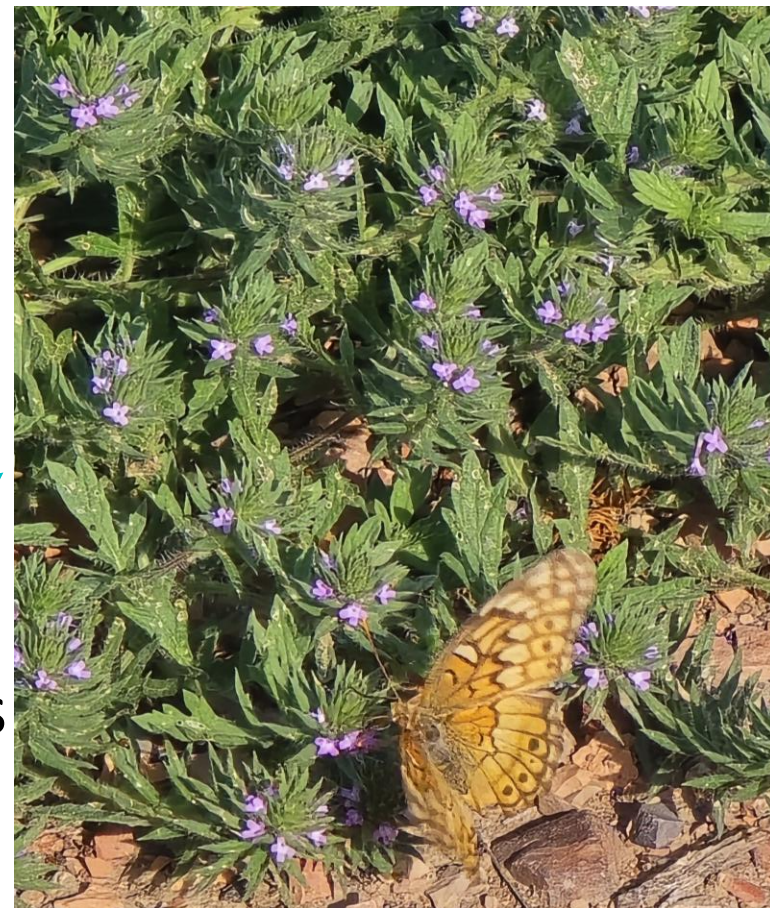
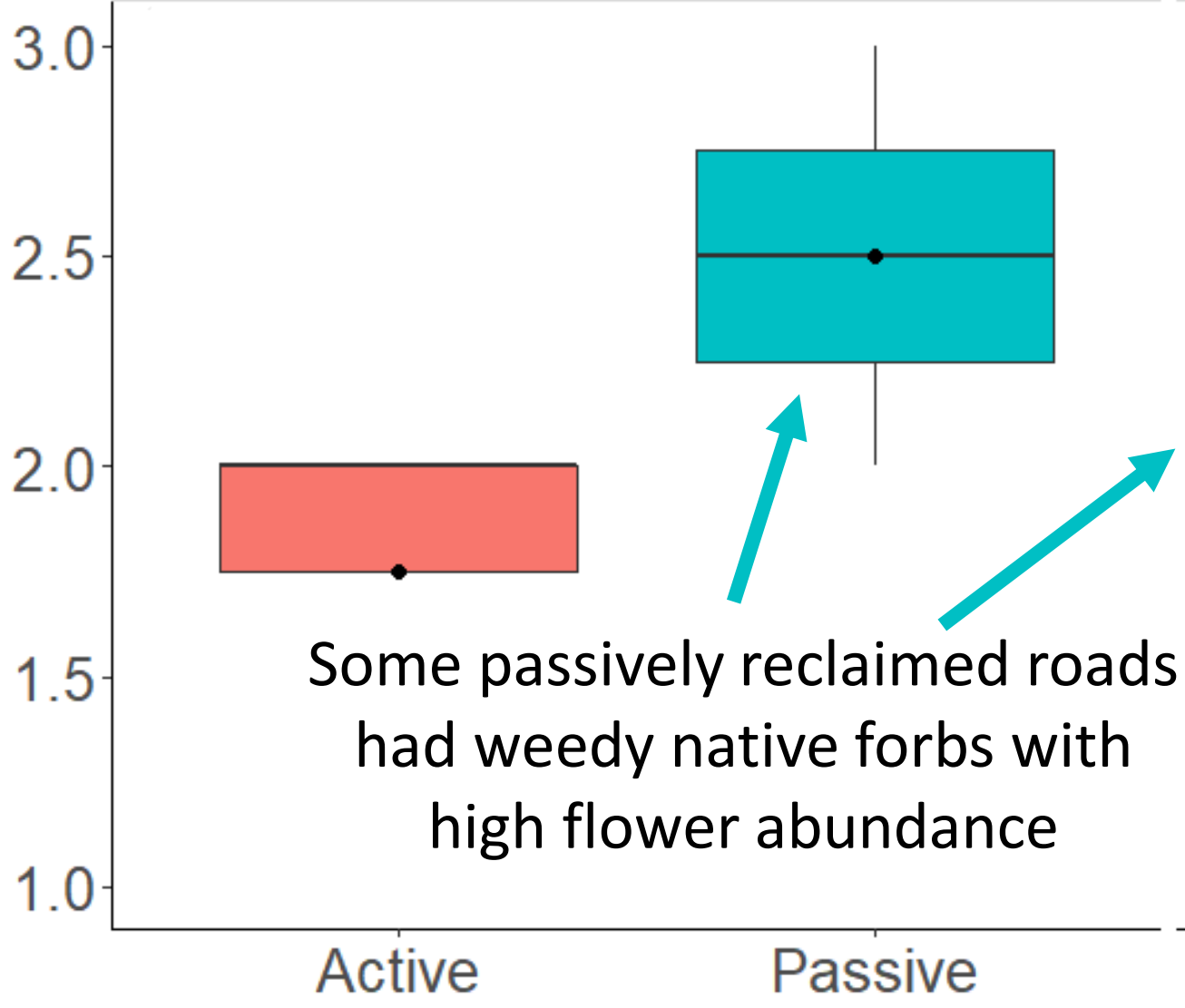




Road

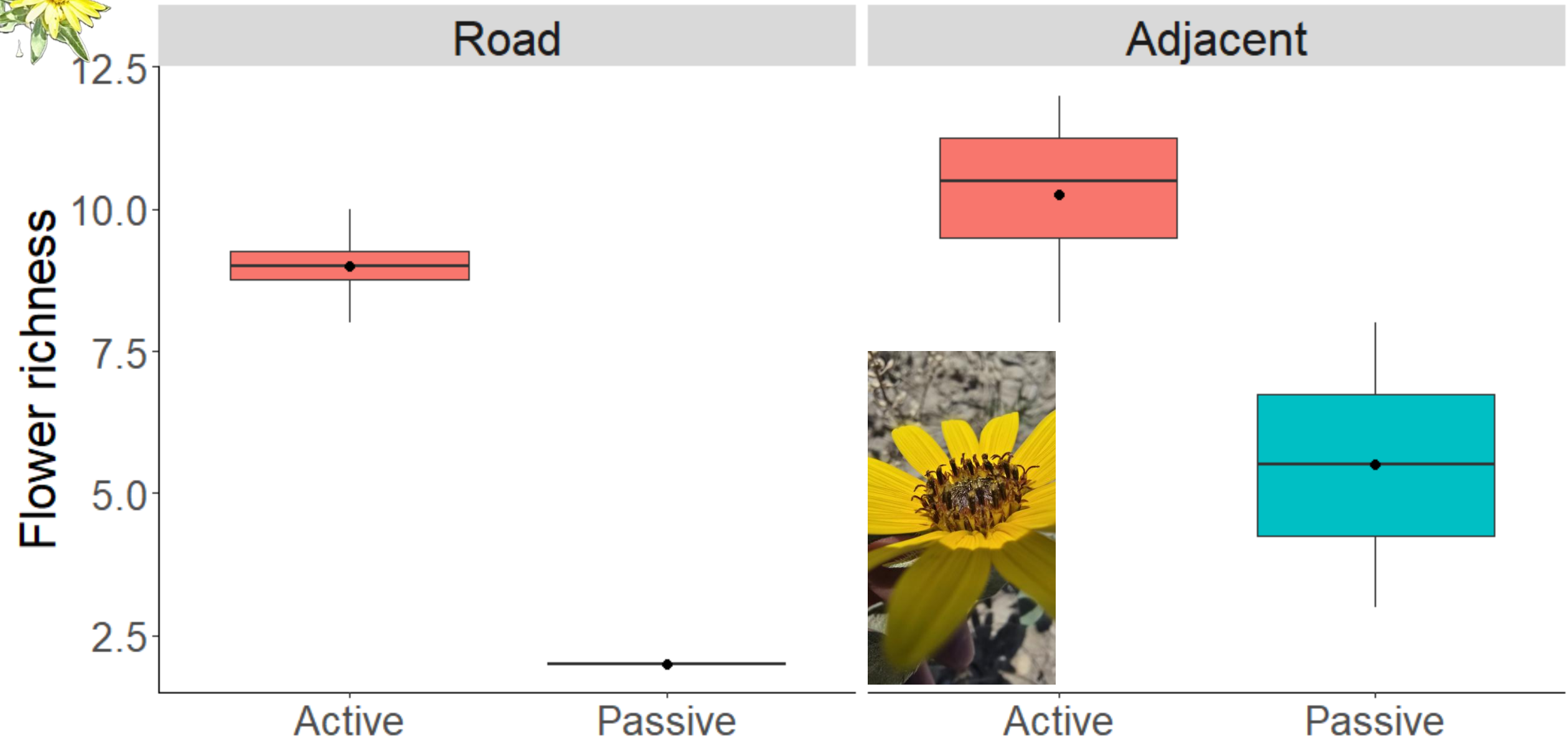
Adjacent

Flower abundance





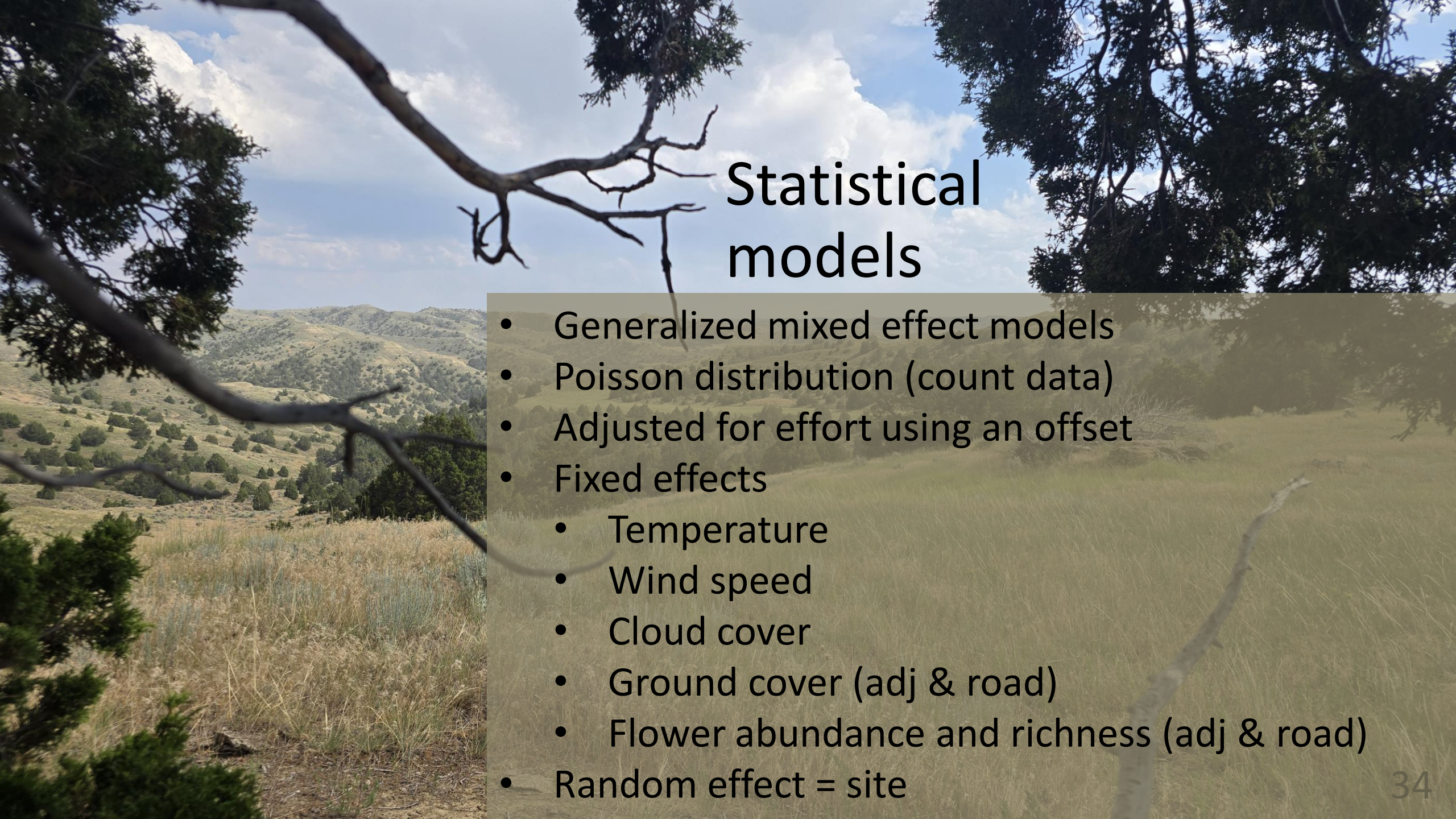
Actively reclaimed roads had flower richness equal to adjacent landscape



Methods for active pollinator surveys

- Walked transects for bees and butterflies
 - 29 -147 minutes
 - 0.5 – 2.4 km
- Counted bees and butterflies observed
 - Counted butterflies by group on the wing
 - Netted a few butterflies of each type to identify species
 - Counted bees observed on flowers
- Noted the flowers that pollinators were visiting



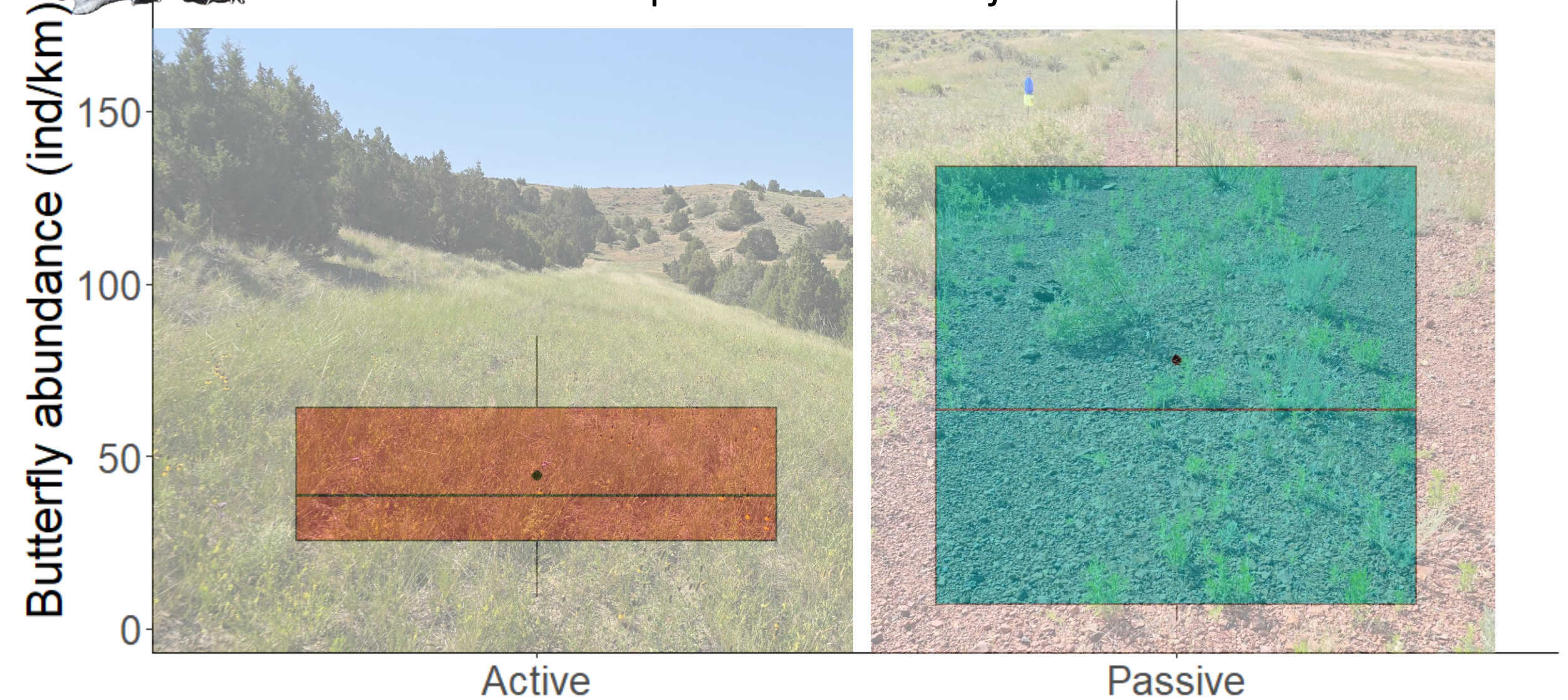


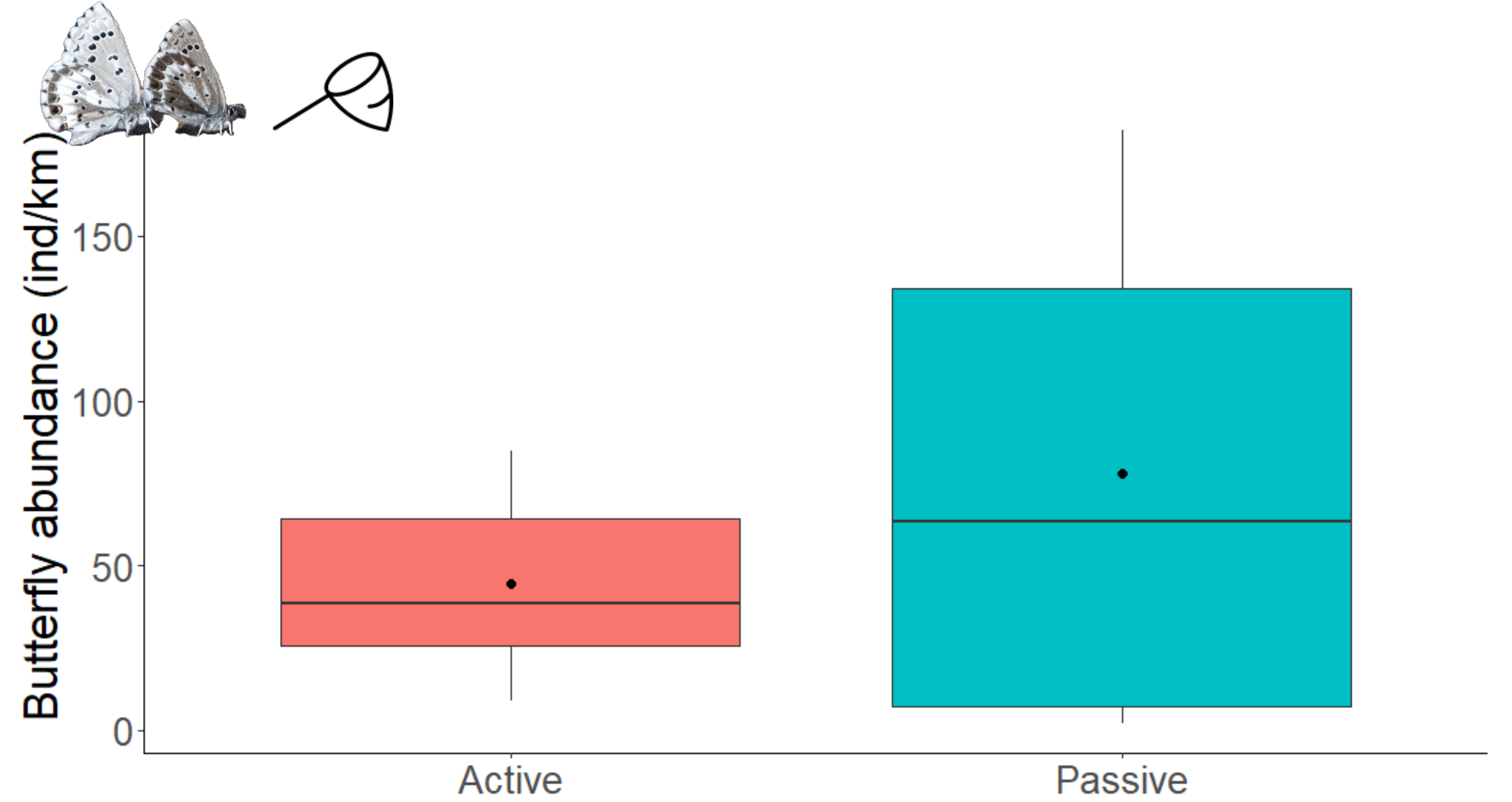
Statistical models

- Generalized mixed effect models
- Poisson distribution (count data)
- Adjusted for effort using an offset
- Fixed effects
 - Temperature
 - Wind speed
 - Cloud cover
 - Ground cover (adj & road)
 - Flower abundance and richness (adj & road)
- Random effect = site

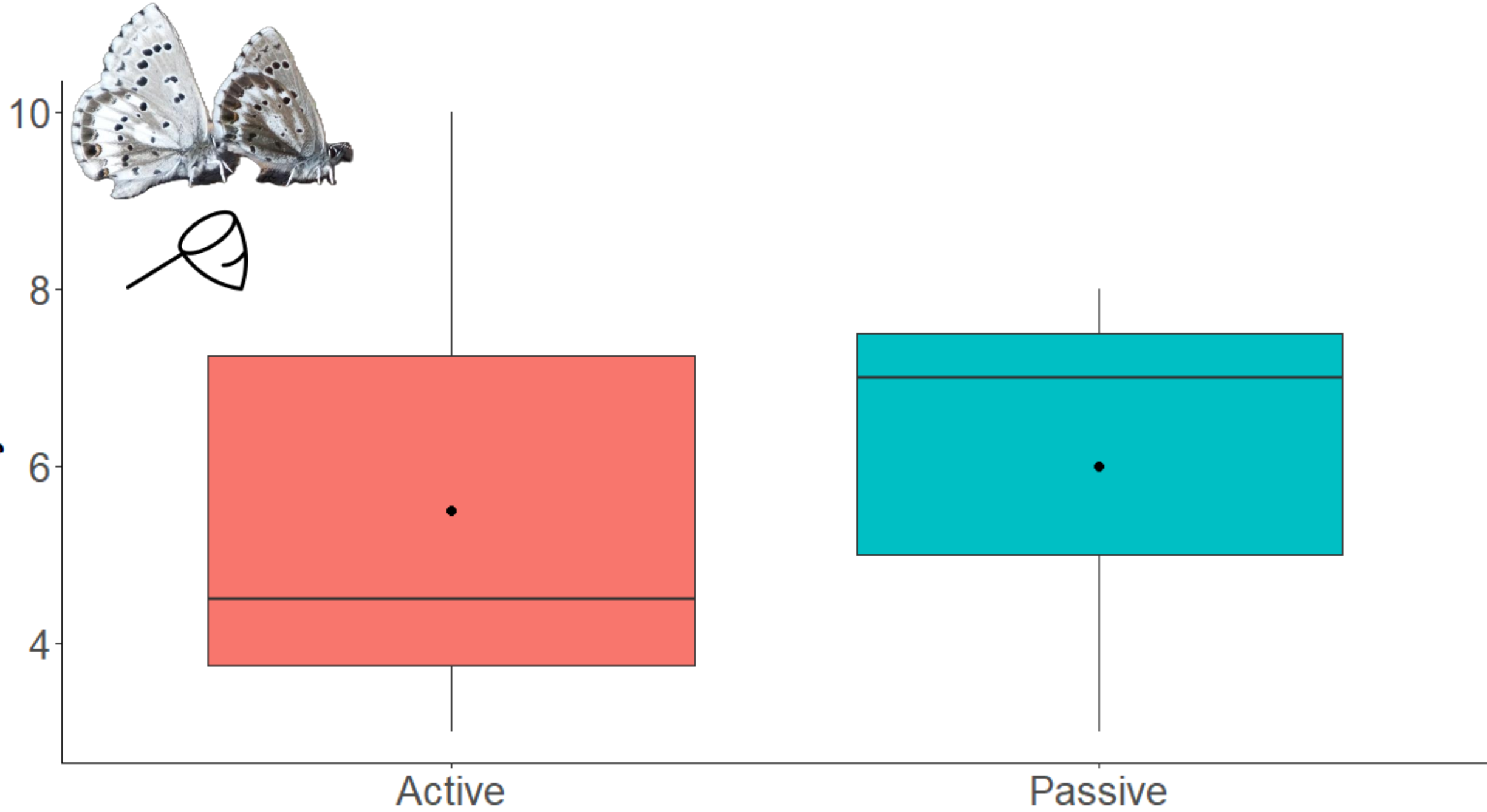


Bees and butterflies are strong fliers thus we did not separate road vs. adjacent areas





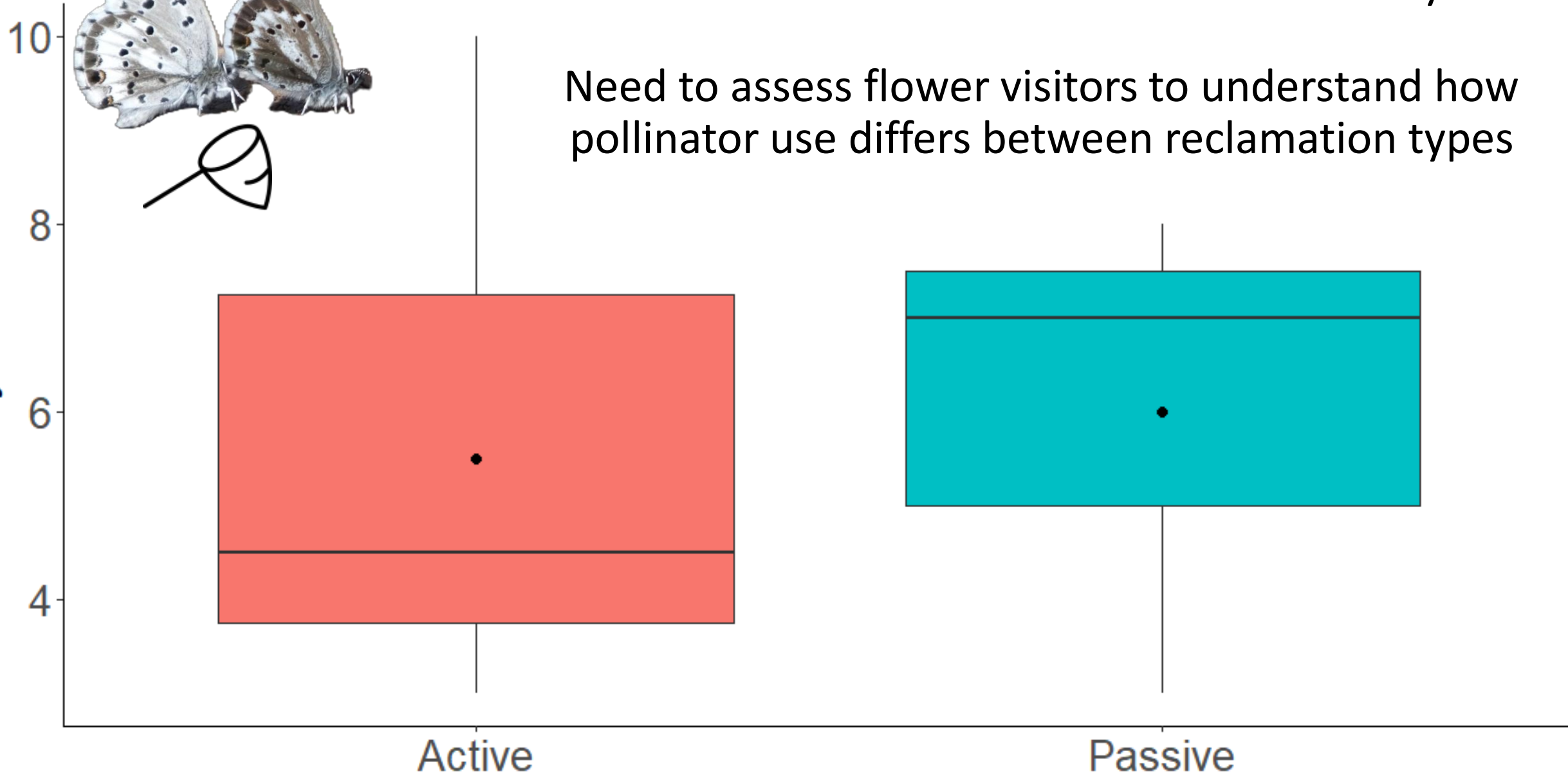
Butterfly richness



Butterflies can move 100 m to 11 km daily!

Need to assess flower visitors to understand how pollinator use differs between reclamation types

Butterfly richness





Bees are using the resources
available in each area



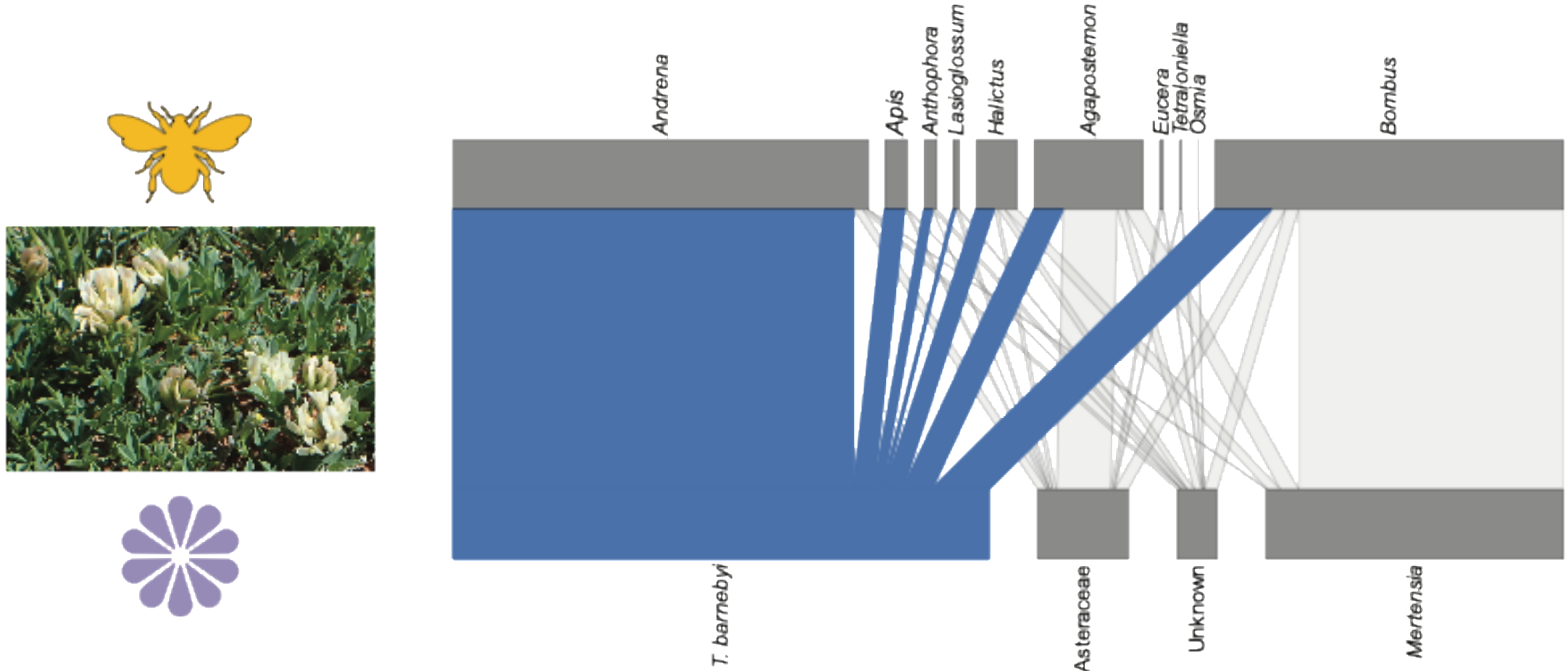
Bee x Flower interactions

- Purple prairie clover - by far the most popular
- Prairie coneflower - occasionally
- Rocky Mountain beeplant - when present



Plant-pollinator networks

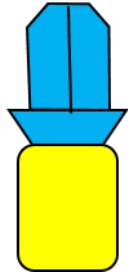
- Future direction to tailor seed mixes to better support pollinators



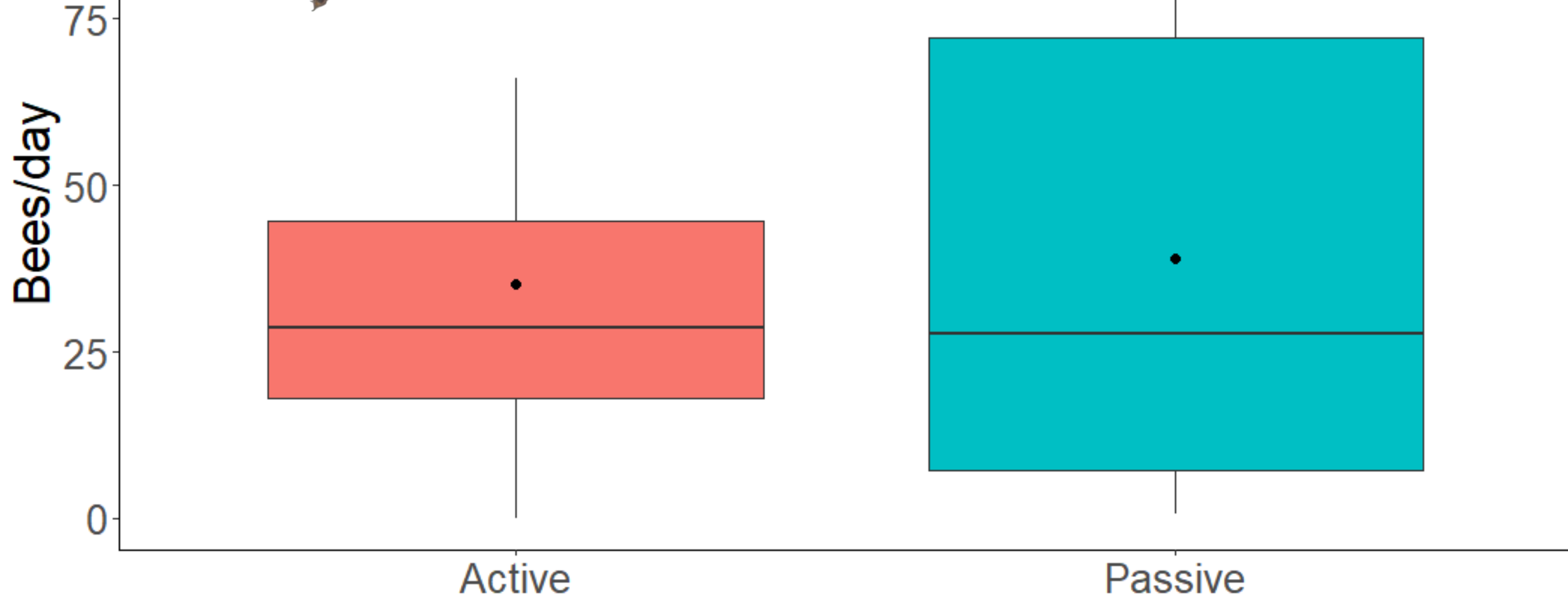
Methods for passive pollinator sampling

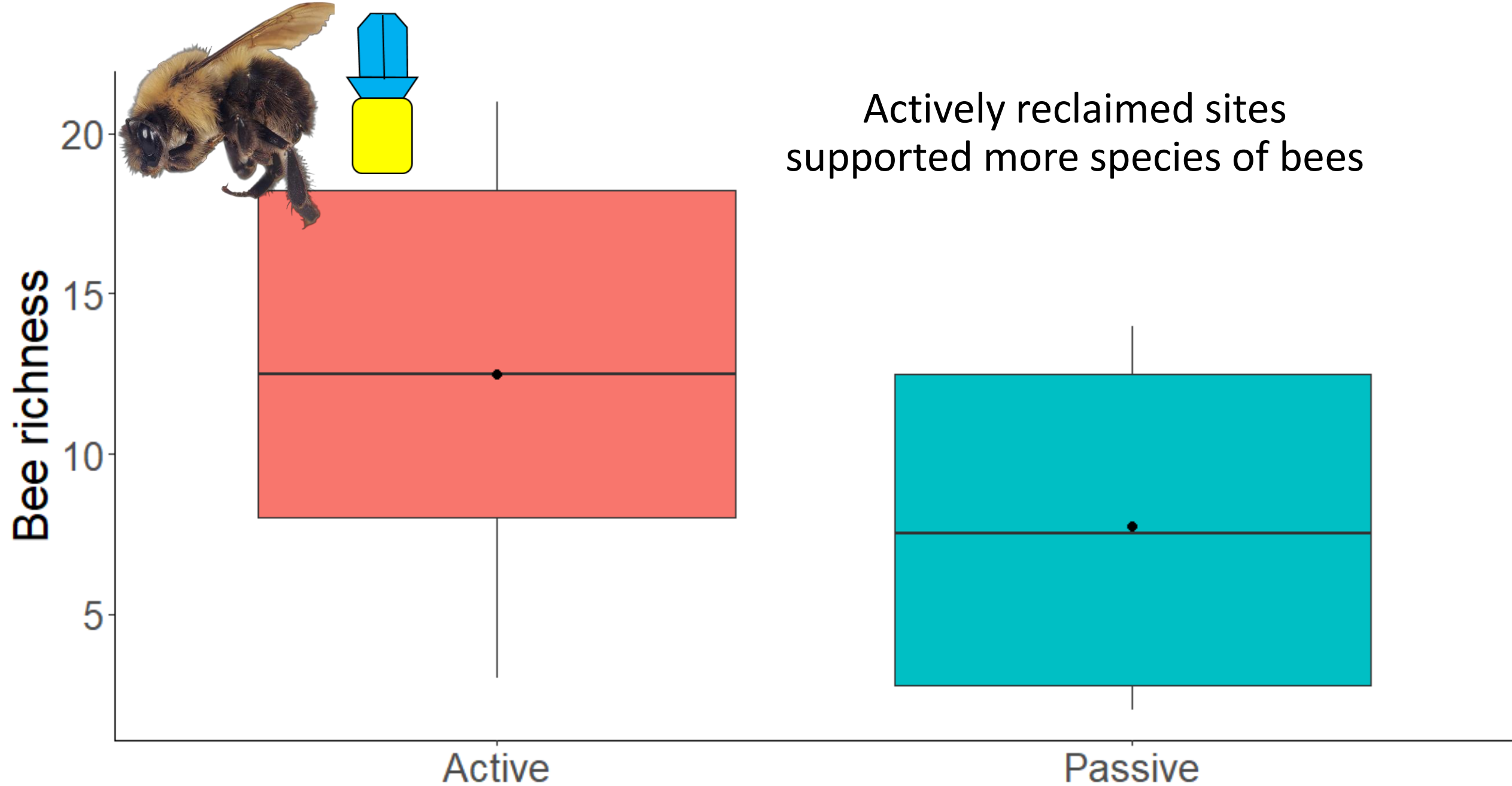
- Vane traps
 - Underused tool to assess bee communities
 - Deployed for <48 hours
 - Measured temperature and wind speed at deployment and retrieval
 - Short deployment to conserve bees





Bee abundance did not differ between reclamation types





Bombus fervidus populations were the most abundant we have encountered in Wyoming!

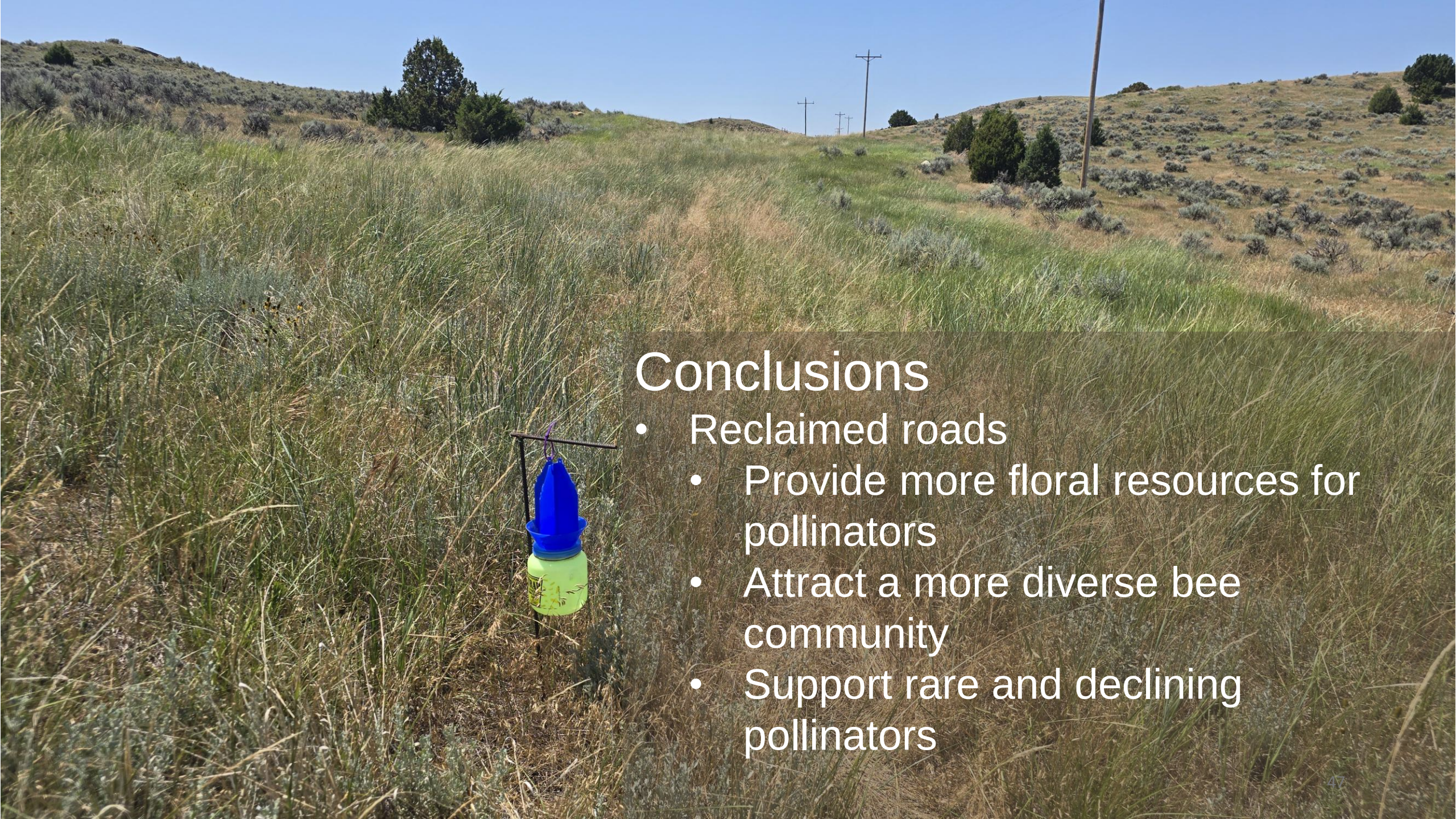


First observation in Wyoming!



Xenoglossa albata



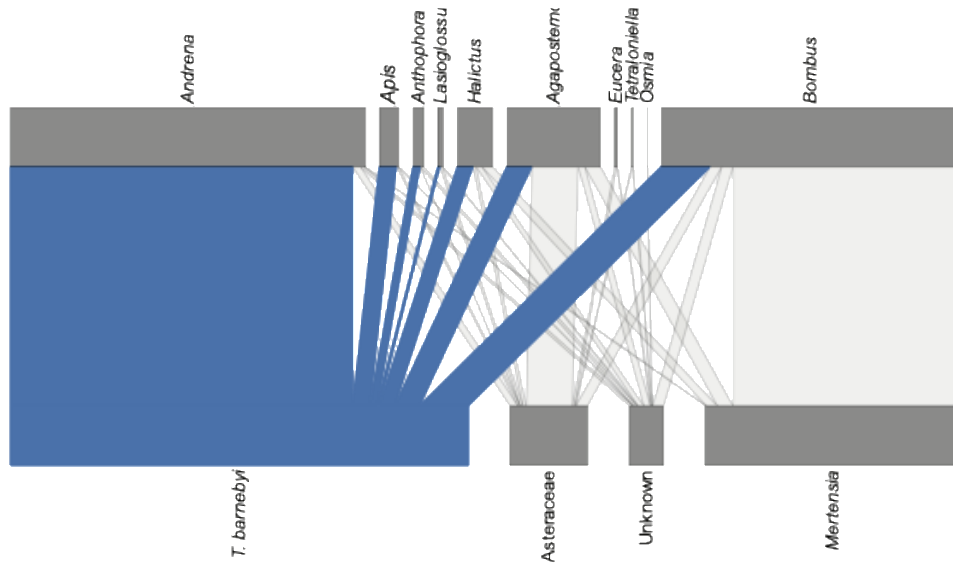
A photograph of a grassy field under a clear blue sky. In the foreground, a blue and yellow bee trap is visible. The background shows rolling hills with sparse vegetation and a few utility poles.

Conclusions

- Reclaimed roads
 - Provide more floral resources for pollinators
 - Attract a more diverse bee community
 - Support rare and declining pollinators

Future directions

- Additional non-lethal surveys
- Assess flower visitation
- Create pollination networks to optimize forb species seeded



Thank you to EOG for funding the project!



Questions

