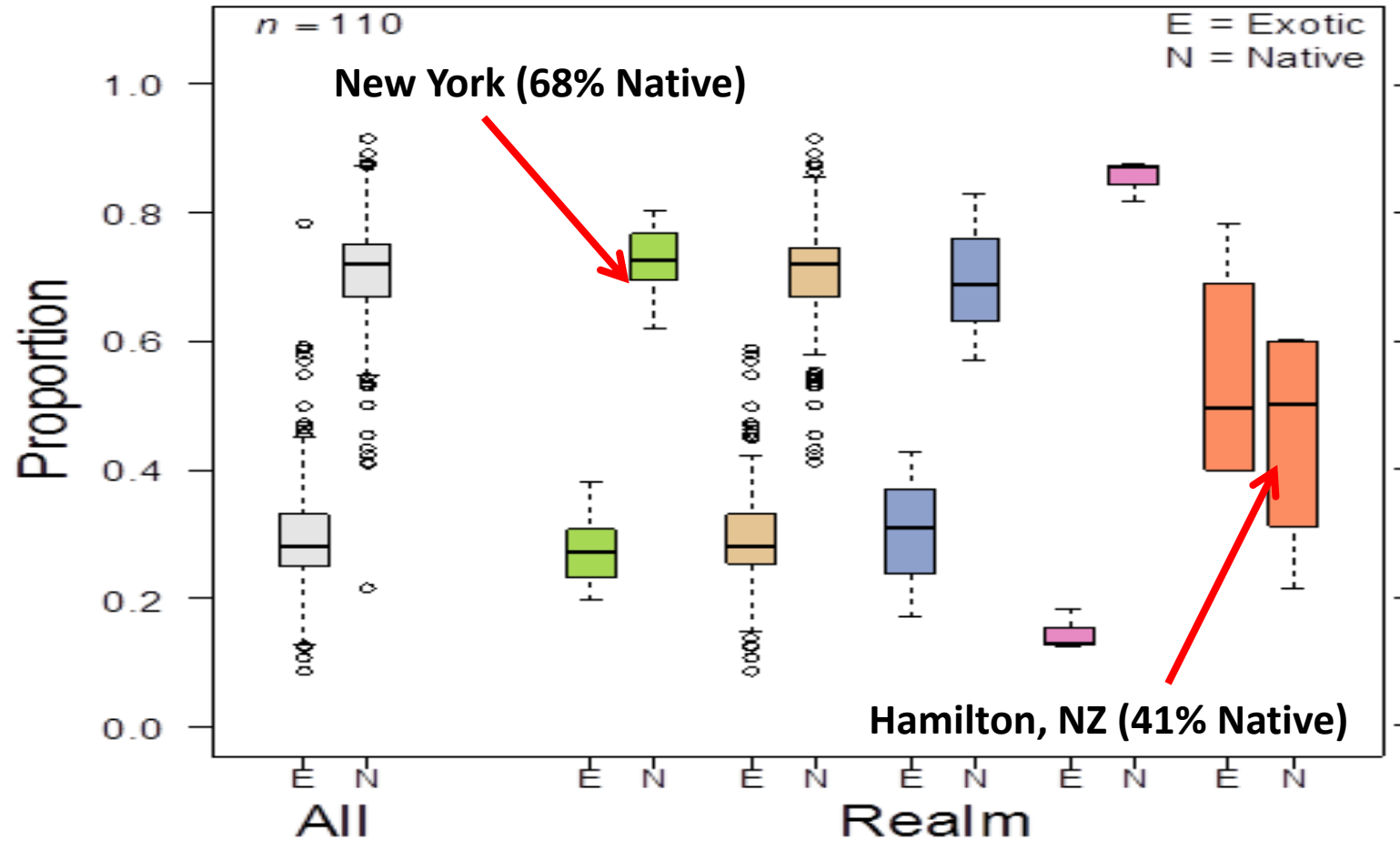
A monarch butterfly with orange and black wings is perched on a cluster of bright orange flowers. The background shows a lush green rooftop garden with various plants and flowers, including white and purple blossoms. In the distance, a city skyline with several tall skyscrapers is visible under a blue sky with light clouds.

Is there evidence for the use of native plants over non-natives in urban areas? A review.

Elena Tartaglia & Myla Aronson
Rutgers, The State University of NJ

Urban floras are primarily native but urban horticulture still uses non-natives and remains a primary invasion source.

On average, 70% of plant species are native in cities.



City policies are increasingly mandating the use of native plants.
Is there evidence to support this?



NYC Pollinator Place Garden

- 17 across city parks (2021)
- At least 60% of the plants are non-cultivar species native to NYC region.

We reviewed literature to ask whether differences exist between native and non-native plants in their...

ability to support urban faunal biodiversity (PAI)



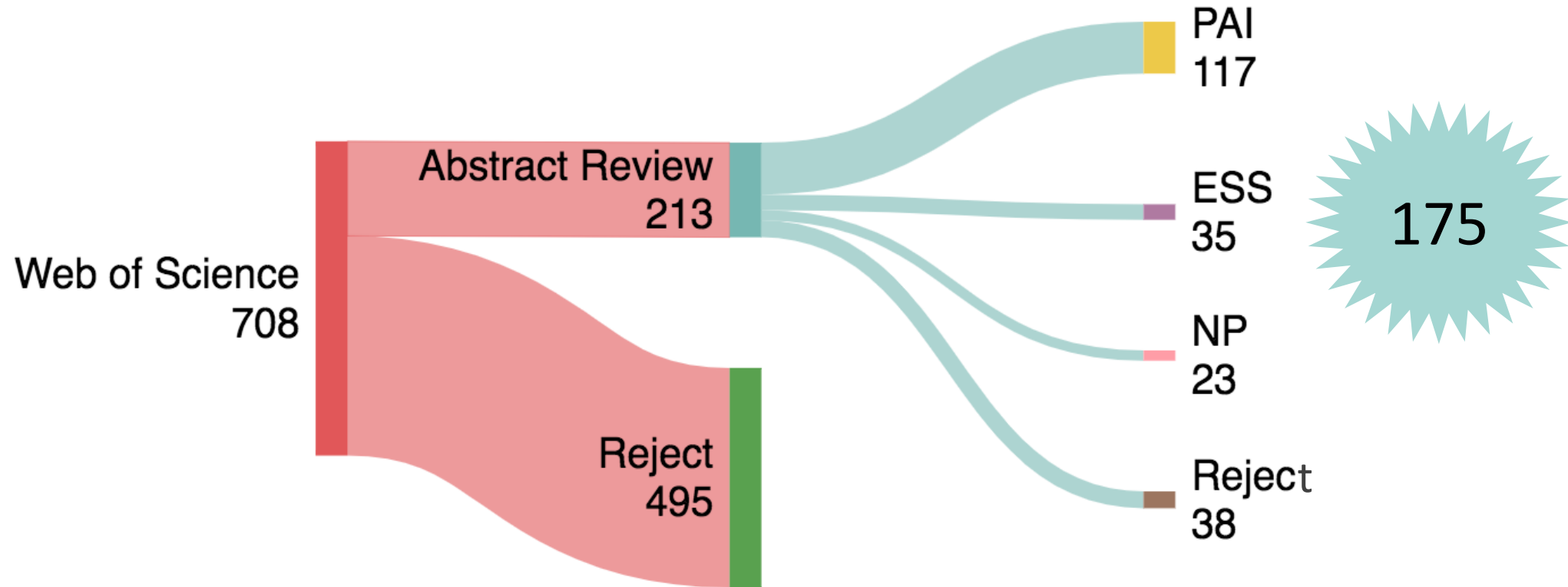
provisioning of urban ecosystem services (ESS)



physiological performance in urban areas (NP)



Methods: Paper Search & Selection



Criteria:

- 1) compared native and non-native species or examined native plant performance
- 2) was conducted in suburban or urban landscapes
- 3) response variables included diversity and/or abundance of fauna to individual species or vegetation composition; ecosystem services; native plant growth or physiological performance

Methods: Data Extraction into Google Forms

Data	Explanation
Publication Info	Publication year; Journal
Location Info	City(-ies); Country(-ies); Biogeographic realm
Land Use	Land use categories: Agriculture, Brownfields, Commercial/business, Industrial, Parks, Remnant natural areas, Residential, Vacant lots, Other
Habitat Type	Habitat type as defined by plant community: Desert, Early successional field, Forest, Freshwater wetland, Green roof, Hardscape, Managed landscaping, Natural or semi-natural grassland, Riparian, Shrubland, Wastelands, Other
Congeners?	Whether the study compared native & non-native plants w/in same genus



Descriptive counts

Methods: Data Extraction into Google Forms

Data	Explanation	Paper Category
Taxa	Taxon or taxa examined in the study: Amphibians, Arachnids, Arthropod assemblages, Bats, Bees, Beetles, Birds, Lepidoptera, Reptiles	PAI
Response Metric	Abundance, Biomass, Composition, Diversity, Herbivory, Population growth, Reproduction, Richness, Survival, Traits	PAI
Ecosystem Service	Air (Air quality, Oxygen production, Heat reduction), Carbon (Storage, Sequestration), Biodiversity support, Pest control, Water (Water quality, Groundwater recharge, Stormwater runoff, Water use efficiency), Health & wellbeing, Food (Pollination, Food provisioning), Nutrients (Nitrogen cycling, Decomp), Cultural services, Econ Value	ESS
Performance Metric	Fitness, Growth, Survival, Other	NP

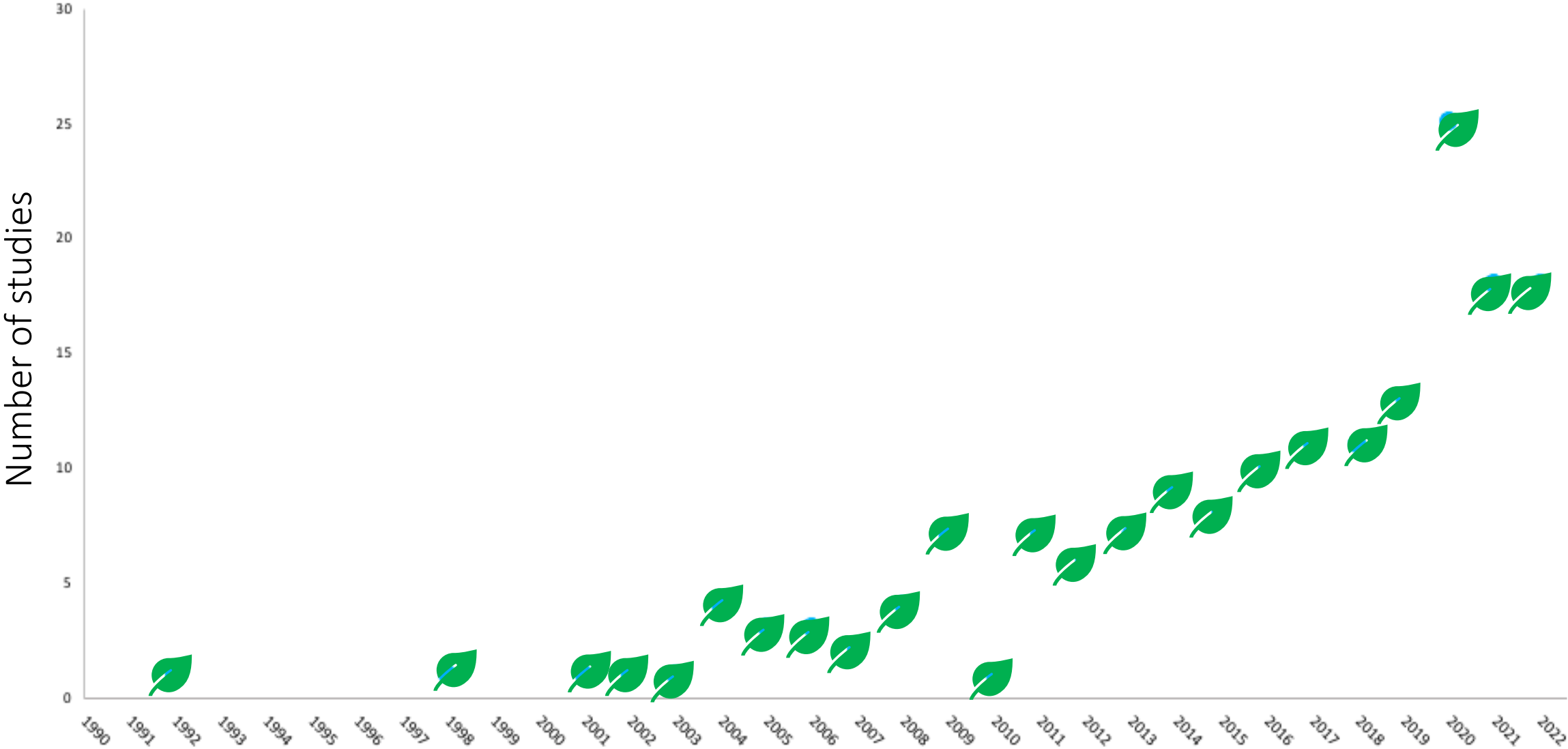
 Descriptive counts

Effect	Explanation
Native > Non-native	<ul style="list-style-type: none"> • Fauna favored native plants over non-natives or native plants drove increases in occupancy, abundance or other metric • Native plants contributed more to ecosystem service provisioning than non-natives • Native plants outperformed non-natives in ability to survive, grow, or other response metric
Native < Non-native	<ul style="list-style-type: none"> • Fauna favored non-native plants or non-native plants drove increases in occupancy, abundance or other metric • Non-native plants contributed more to ecosystem service provisioning • Non-native plants outperformed natives in ability to survive, grow, or other response metric
Native = Non-native (Neutral)	No difference in effects between native and non-native plants
Mixed	Effects differed by scale, plant species or other metric

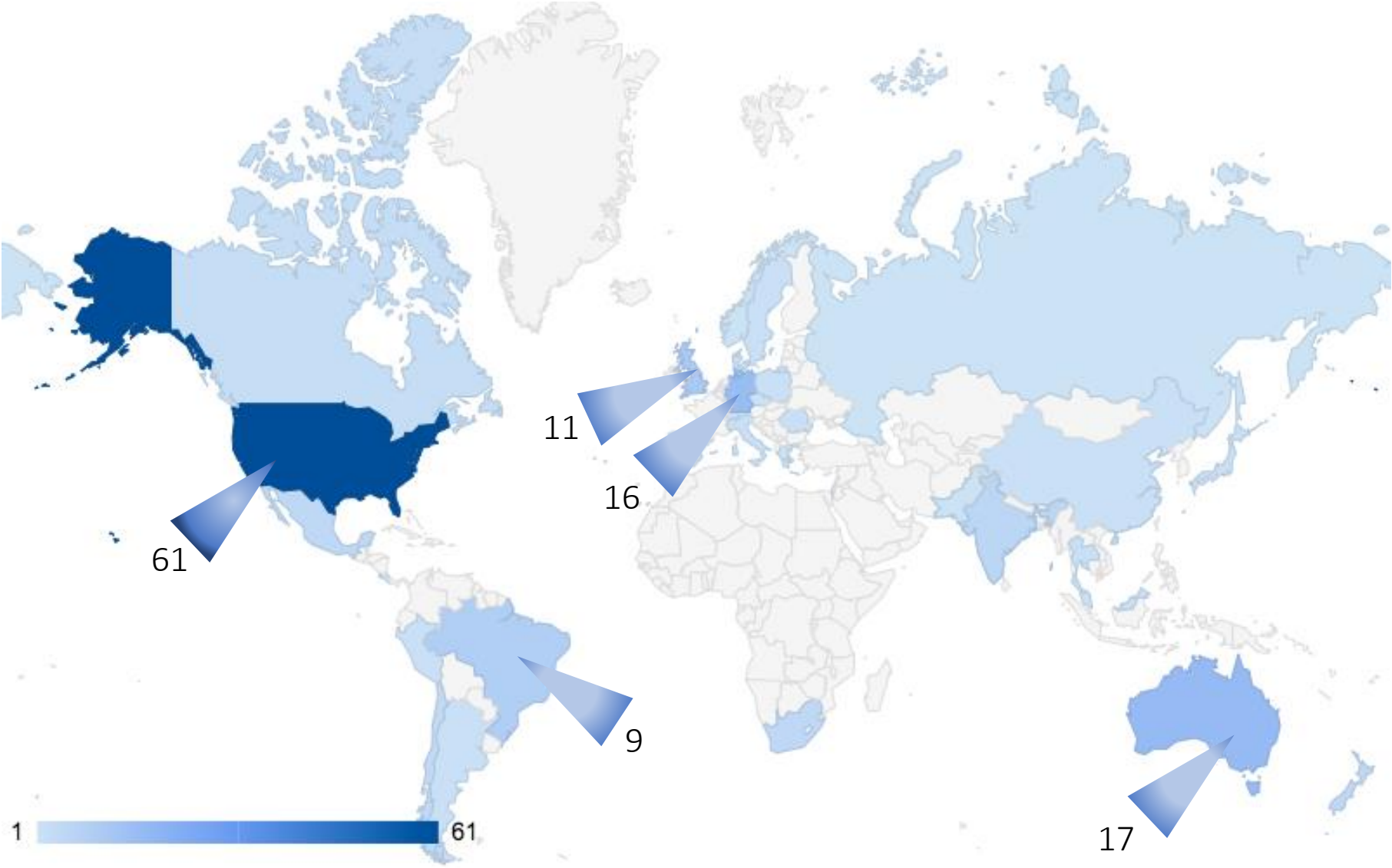


Count of studies

Descriptive trends: Research is on the rise!



Descriptive trends: Where is research occurring?



Descriptive Trends: Most studies occurred in...



Parks
67

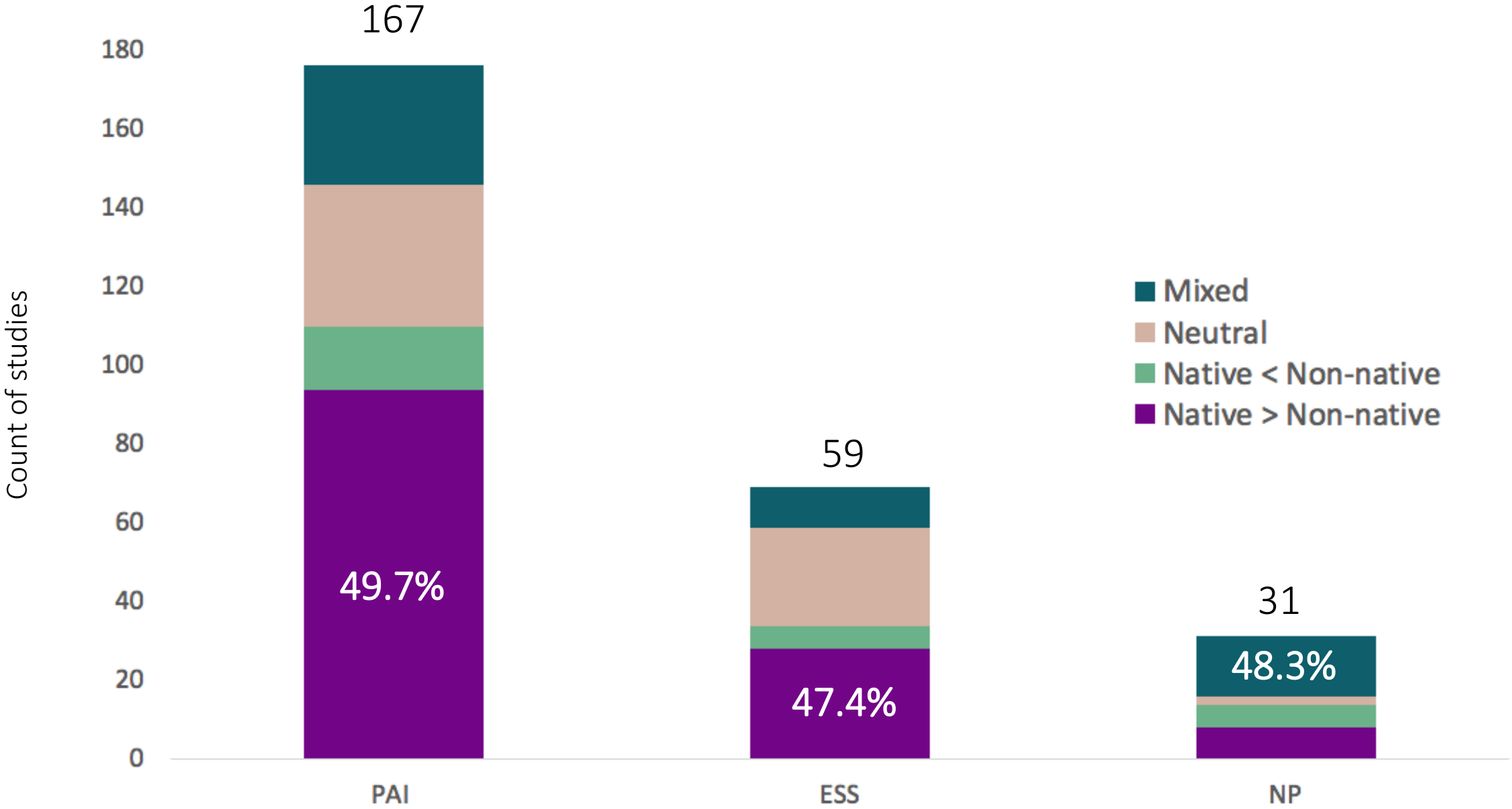


Residential yards/gardens
59

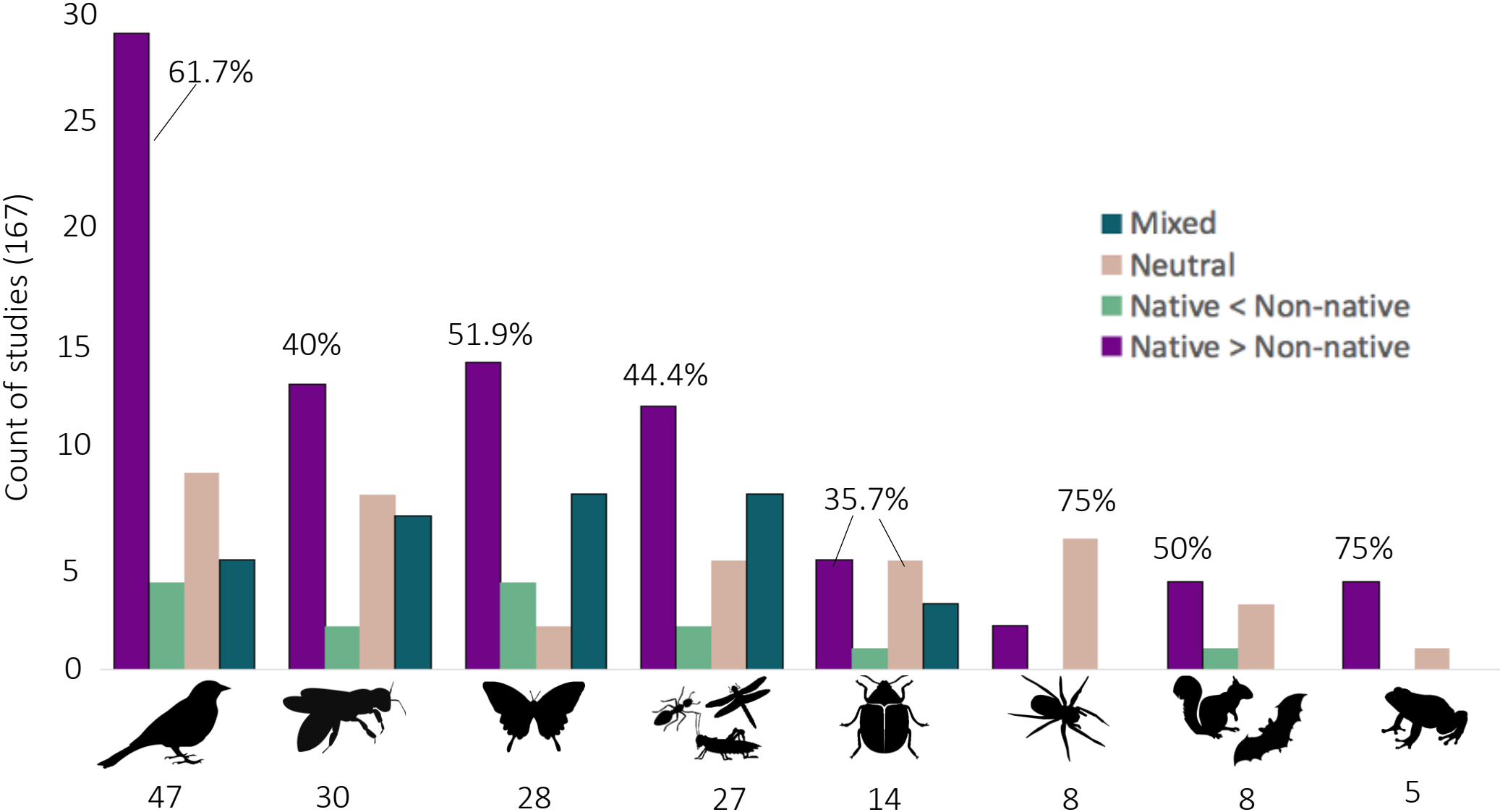


Remnant forest
40

Effects: Natives outperformed non-natives in PAI and ESS studies.



PAI Effects: 49.7% of PAI studies demonstrated target taxa benefitting from native plants.



Native plants are essential for maintaining urban fauna.

Conclusions

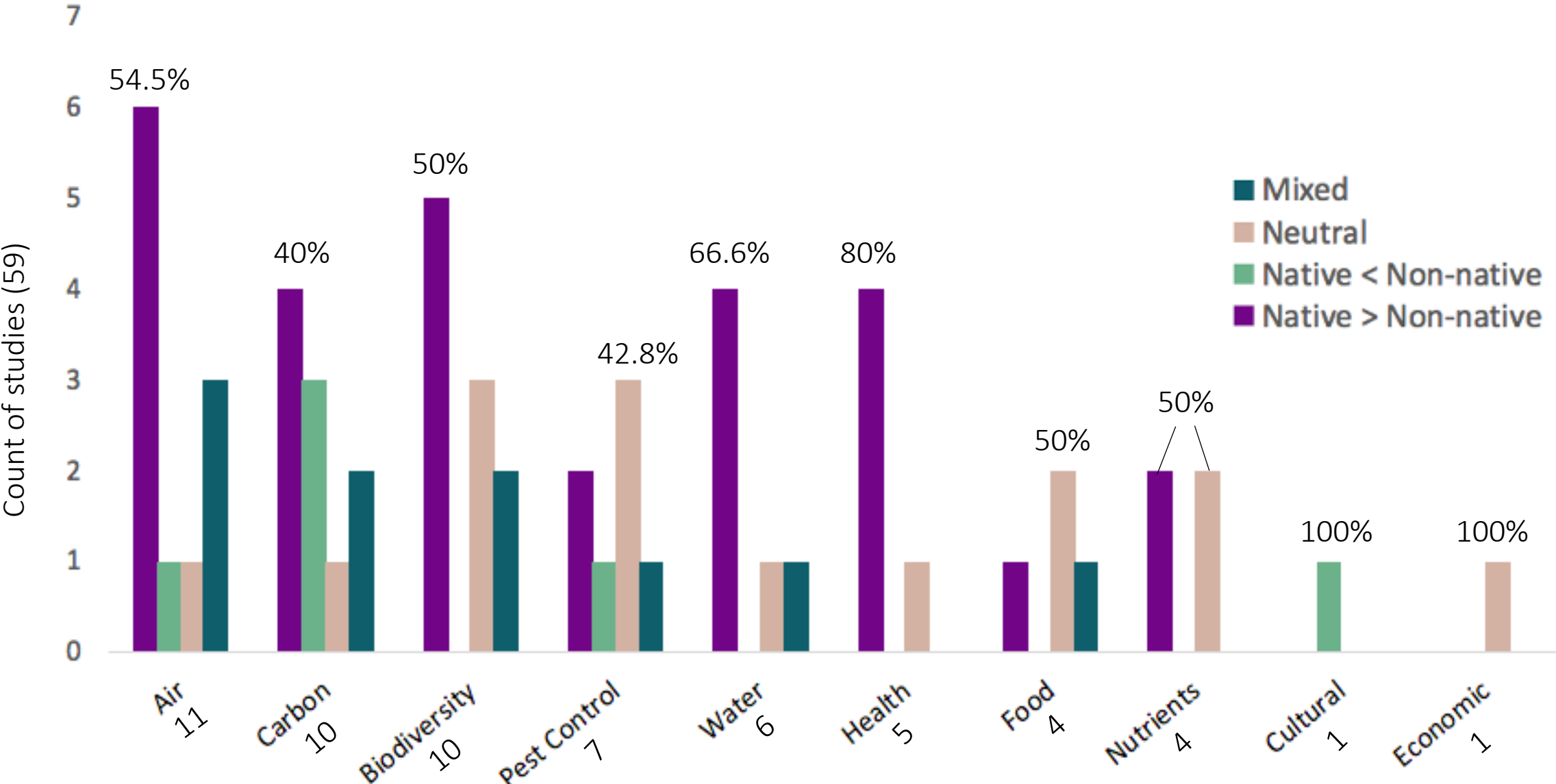
- Plant origin matters for supporting urban animal biodiversity
- Native plants support more specialists (esp. arthropods)
- Birds / occupancy most studied taxon and response

Future Directions

- What's happening with other taxa?
- More specific response metrics
- For Lepidoptera, more studies on herbivory and oviposition



ESS Effects: Natives outperformed non-natives in 47.4% of ESS studies.



Natives generally outperform non-natives for ESS.

Conclusions

- Most studies focused on trees
- Plants in general provision ESS
- Non-natives may be chosen for specific traits (shade) or cultural value

Future Directions

- Far fewer studies than PAI
- Do non-natives contribute more to ecosystem *disservices*?
- Direct comparison studies needed



We need more studies comparing physiological performance.

Conclusions...

- Native plants *can* be used in urban horticulture
- Research opportunities!

Future Directions

- Trait changes
- Direct comparisons of native and non-native plants
- Common garden experiments

An aerial photograph of a city park during autumn. The trees are in various stages of color change, from green to bright yellow and orange, with some reds appearing. A paved road with a few cars and a set of train tracks run parallel to the water's edge. In the background, a city skyline is visible under a clear sky.

There IS evidence for the use of native plants in urban areas.
Urban greenspaces must support multiple ecosystem functions.

Questions



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