

A photograph of a field of yellow wildflowers, likely a species of Aster or similar, in bloom. The flowers are in the foreground and middle ground, with some in sharp focus. The background shows a clear blue sky and several utility poles with power lines stretching across the horizon. The overall scene is bright and sunny, suggesting a clear day.

Using City Corridors as Pollinator Habitat

Camia Lowman

POLLINATORS 101

- If you eat fruit, drink coffee, or love flowers, you are relying on pollinators
- 90% of flowering plants on earth rely on pollinators to reproduce
- Annual value of pollinators to US agriculture is over \$14 billion

(USDA, 2016)



USDA

NATIVE BEES

- 4,000 native bee species in the US
- Texas is home to 1,100 species of native bees

(Neff, 2016)



NATIVE BEES VS HONEY BEES

- Honey bees pollinate at 72% efficiency, while native bees pollinate at 91% efficiency

(Winfree et al, 2007)

- Native bees are active for more hours of the day and during bad weather

(Mader et al, 2010)



Earth Observatory

“200 native bees can do the same level of pollination as a hive of honey bees containing over 10,000 workers”

(Warriner, 2012)



National Geographic



Green Sweat Bee

Agapostemon, Halictus, Lasioglossum

Jim McCulloch



Polyester Bee

Colletes

calphotos.berkeley.edu



Longhorn Bee

Melissodes

Susan Vogelmissicka



Bumble Bee

Bombus

discoverlife.org



Mining Bee

Andrena

BugGuide.net



Carpenter Bee

Xylocopa

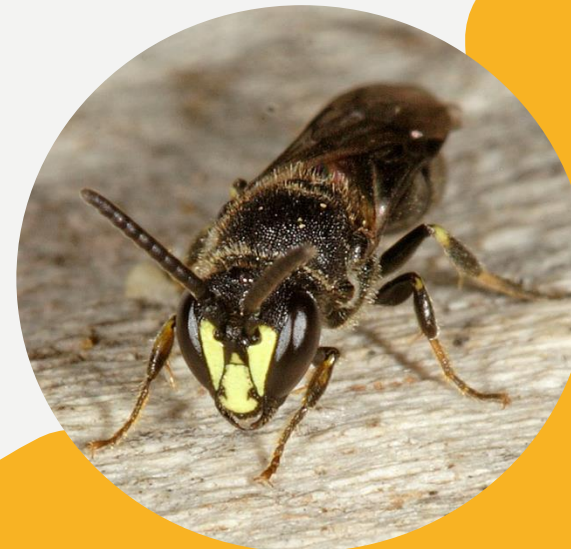
Camia Lowman



Leafcutter Bee

Megachile

Flickr photos terraincognita96



Yellow Faced Bee

Hylaeus

Bees, Wasps, & Ants Recording Society

OTHER POLLINATORS



Butterflies



Moths



Hummingbirds



Flies



Beetles



Wasps



Ants

POLLINATOR DECLINES

- Habitat loss
- Forage loss
- Dispersal challenges
- Pesticides
- Disease

(Potts et al, 2010)

44% of honeybees lost in the last year,

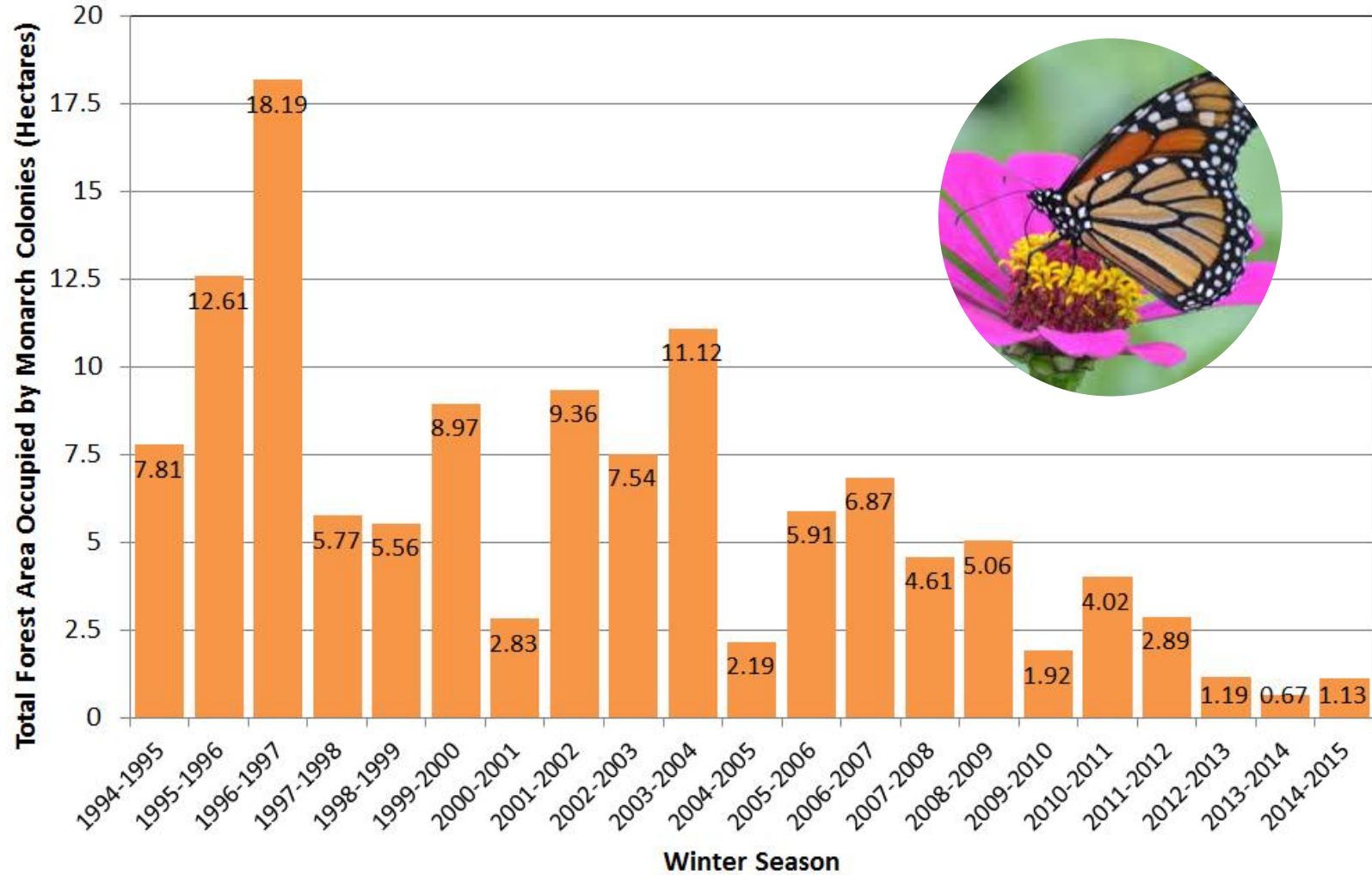
- April 2015 – March 2016

(US Department of Agriculture, 2016)



© Rob Curtis / The Early Birder

Total Area Occupied by Monarch Colonies At Overwintering Sites in Mexico 1994/1995 - 2014/2015



data from 1994-2003 were collected by personnel of the Monarch Butterfly Biosphere Reserve (MBBR) of the National Commission of Protected Natural Areas (CONANP) in Mexico. Data from 2004-2015 were collected by the WWF-Telcel Alliance, in coordination with the Directorate of the MBBR. 2000-01 population number as reported by Garcia-Serrano et. al (The Monarch Butterfly: Biology and Conservation, 2004)

CAN CITIES SAVE POLLINATORS?

- Federal government's National Pollinator Health Strategy
 - Enhance 7 million acres of land for pollinators over the next 5 years
- Urban areas can act as important habitats for pollinators
- Bee biodiversity in cities found to be as high as, or even higher than in nearby rural areas

(Baldock et al, 2015)

- California case study showed creating pollinator habitat significantly increased pollinator diversity and abundance

(M'Gonigle et al, 2015)

PLANT A DIVERSITY OF FLOWERING PLANTS

ENHANCE NESTING AND EGG-LAYING SITES

USE POLLINATOR-FRIENDLY MANAGEMENT PRACTICES

LANDSCAPING FOR POLLINATORS

- Install plants with diverse bloom times
- Plant a variety of flower shapes and sizes
- Diverse colors
- Include Native Plants
 - Well-adapted to local soils and climates
- Don't use pesticide
- Avoid modern hybrids



Xerces Society

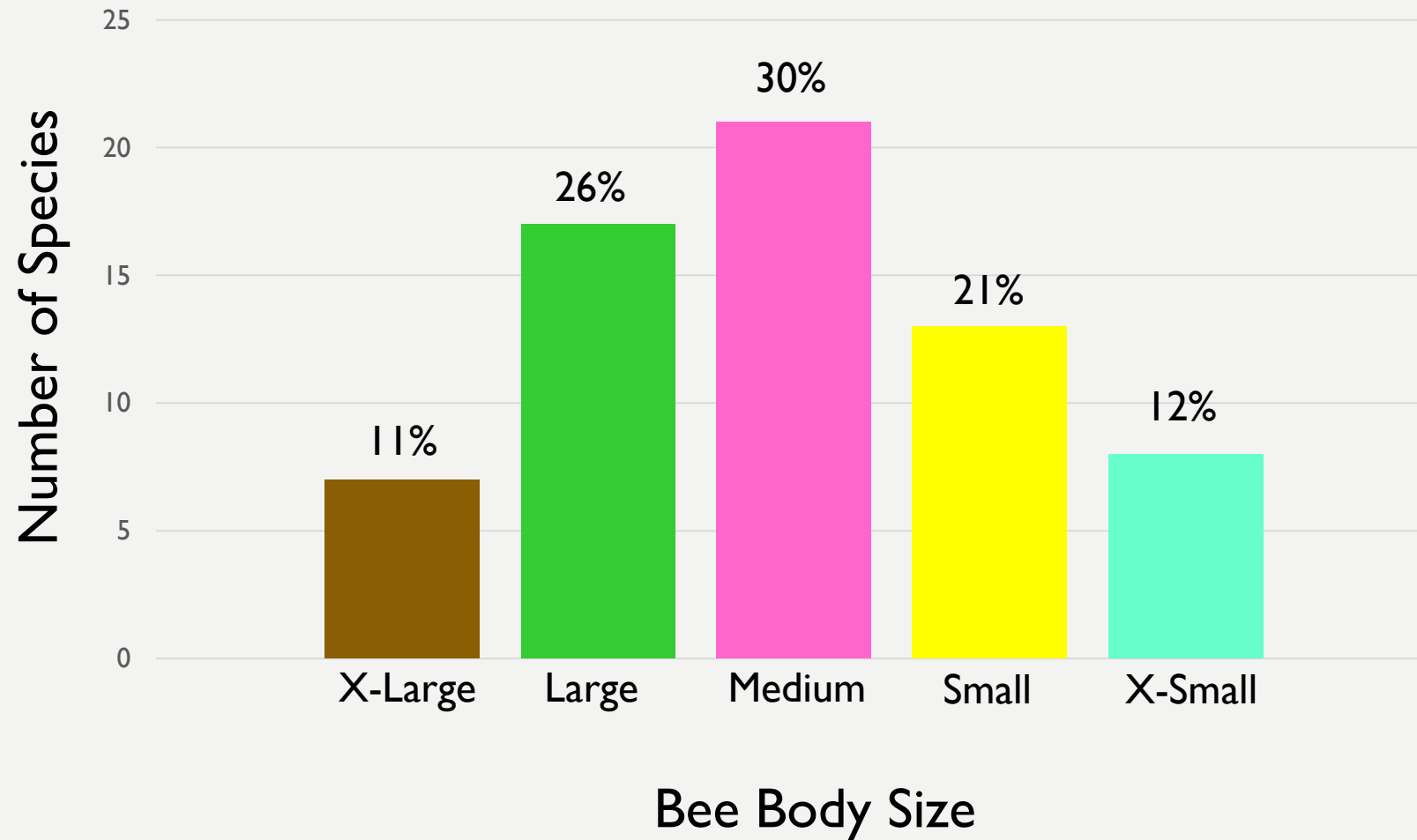
LANDSCAPING FOR POLLINATORS

- 15 ft² area
- Group a minimum of 5-7 plants of same species together
- Areas with good south-eastern exposure
- Protected from winds

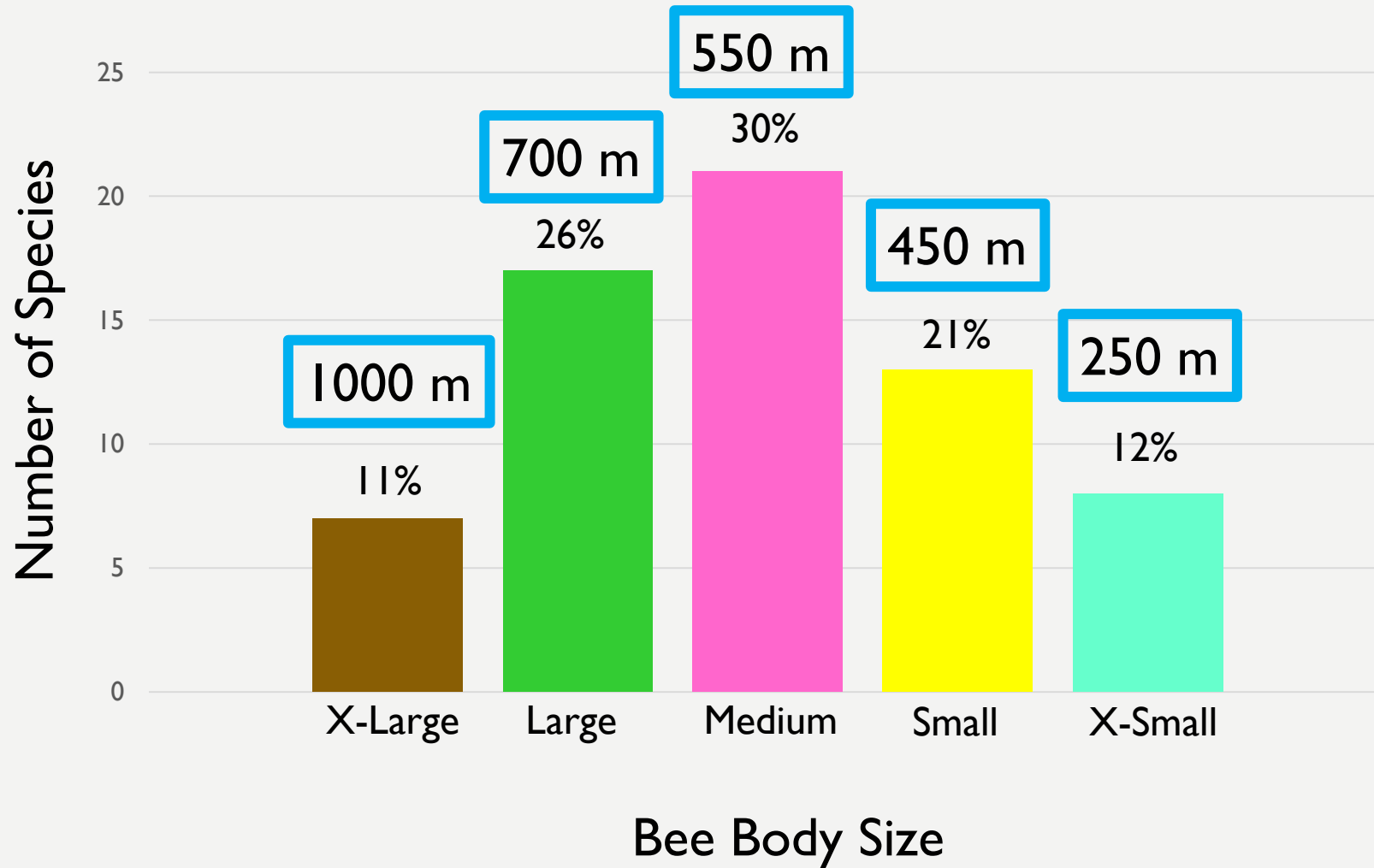


Xerces Society

Houston Bees



Houston Bees



CREATE AND PROTECT NESTING SITES



Texas Parks and Wildlife Department



Wudwerx

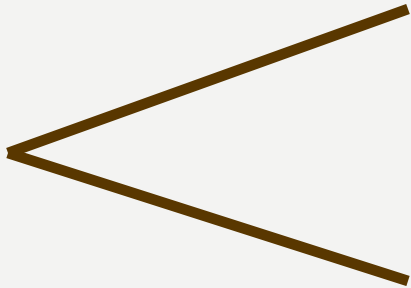


20 %
Nesting

80 %
Foraging

20 %
Nesting

80 %
Foraging



75 %
Ground

25 %
Wood

POLLINATOR-FRIENDLY MANAGEMENT PRACTICES

- Protect sloped or well-drained ground sites
- Allow dead trees to stand
- Limit pruning dead or dying branches with hollow stems
- Limit mowing grassy areas with low, dense cover
- Avoid pesticides
- Minimize mulch



Leafcutter bee. Jessica Womack.

List of Approved Shrubs

Common Name	Botanical Name
Japanese Boxwood	<i>Buxus microphylla japonica</i>
Dwarf Euonymus	<i>Euonymus japonica</i> "Microphylla"
Silver King Euonymus	<i>Euonymus japonica</i> "Silver King"
Dwarf Gardenia	<i>Gardenia jasminoides</i> "Radicans"
Dwarf Burford Holly	<i>Ilex cornuta</i> "Burfordii Nana"
Dwarf Chinese Holly	<i>Ilex cornuta</i> "Rotunda"
Compact Japanese Holly	<i>Ilex crenata</i> "Compacta"
Dwarf Yaupon Holly	<i>Ilex vomitoria</i> "Nana"
Primrose Jasmine	<i>Jasminum mesnyi</i>
Texas Sage	<i>Leucophyllum frutescens</i>
Dwarf Wax Myrtle	<i>Myrica cerifera</i>
Dwarf Purple Nandina	<i>Nandina domestica nana</i> "Purpurea"
Harbor Dwarf Nandina	<i>Nandina domestica nana</i> "Harbor Dwarf"
Dwarf Oleander	<i>Nerium oleander</i>
Turner's Dwarf Pittosporum	<i>Pittosporum tobia</i> "Turner's Dwarf"
Wheeler's Dwarf Pittosporum	<i>Pittosporum tobia</i> "Wheeler's Dwarf"
Fraser's Photinia	<i>Photinia x fraseri</i>
Red Elf Pyracantha	<i>Pyracantha</i> "Red Elf"
Indian Hawthorne	<i>Raphiolepis indica</i>
Red Spirea	<i>Spiraea x bumalda</i> "Anthony Waterer"
Spring Bouquet Vib	<i>Viburnum tinus</i> "Spring Bouquet"
Red Tip Photinia	<i>Photinia glabra</i>
Chinese Photinia	<i>Photinia serrulata</i>
Waxleaf Ligustrum	<i>Ligustrum japonicum</i>
Southern Wax Myrtle	<i>Myrica cerifera</i>

Natives Instead of Common Exotics

- Beautyberry
- Fragrant Sumac
- Buttonbush
- Turk's Cap
- Texas Lantana
- Carolina Cherry Laurel
- Elderberry
- Texas acacia
- Strawberry bush
- Carolina buckthorn
- Rusty blackshaw viburnum
- Arrow wood viburnum
- Flame leaf sumac
- Palmetto
- Black Willow

A NOTE ON STINGS

- Colonizing Insects with Venomous Stings
 - Bald-faced hornets
 - European honey bees
 - Paper wasps
 - Yellowjackets
- Colonizing Insects without Venom
 - Bumble bees
- 90% native bees are solitary
 - Males do not possess stingers, females tend to flee or hide



BUILDING A POLLINATOR FRAMEWORK

- Add pollinator habitat to existing corridors
- Connect two green spaces
- Underused land types
 - Vacant lots
 - Roadside strips and medians
 - Surface parking lots
 - Municipal properties

DOWNTOWN HOUSTON

CURRENT Light Rail Corridor



DOWNTOWN HOUSTON

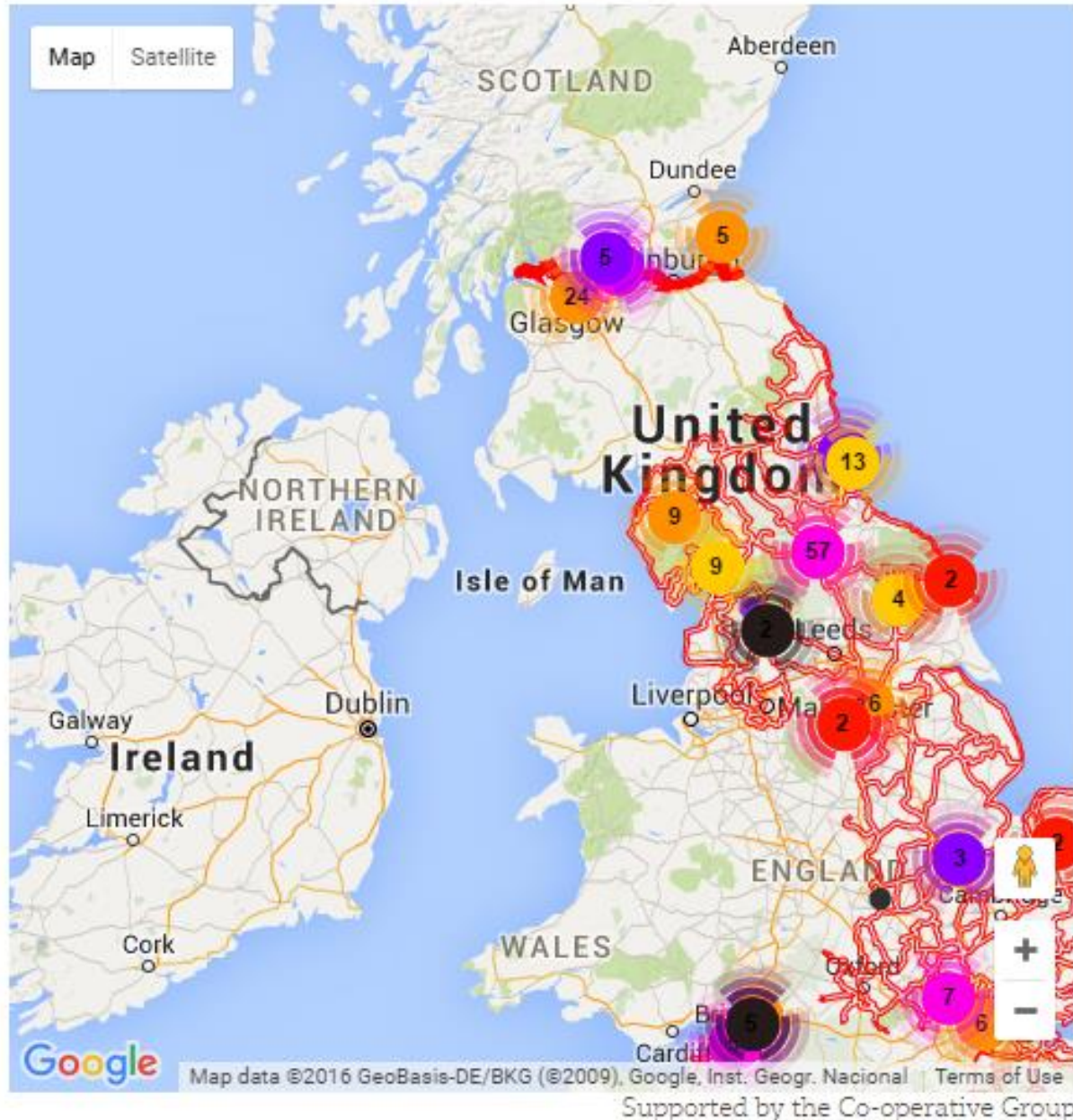
PROPOSED Light Rail Corridor



Danielle Bilot

THE HIGHLINE, NEW YORK, NY





Map Key

Type of work carried out

Wildflower meadow creation ●

Habitat restoration ●

Wildflower plug planting ●

Wildflower sowing ●

School activities ●

Urban Meadow ●

Bee hotels ●

Wildflower margins, pollen and nectar mixes ●

Green roof ●

B-lines ||

CITIES TAKING ACTION

- Madison, Wisconsin Pollinator Protection Task Force
- St Paul, Minnesota city council passed resolution 16-171
- Seattle, Washington's Pollinator Pathway
- United Kingdom B-Lines
- Oslo, Norway bee highway

SERVICES FOR CITIES

Provide wildlife habitat for pollination & pest control

Facilitate drainage, improve water quality, reduce soil erosion

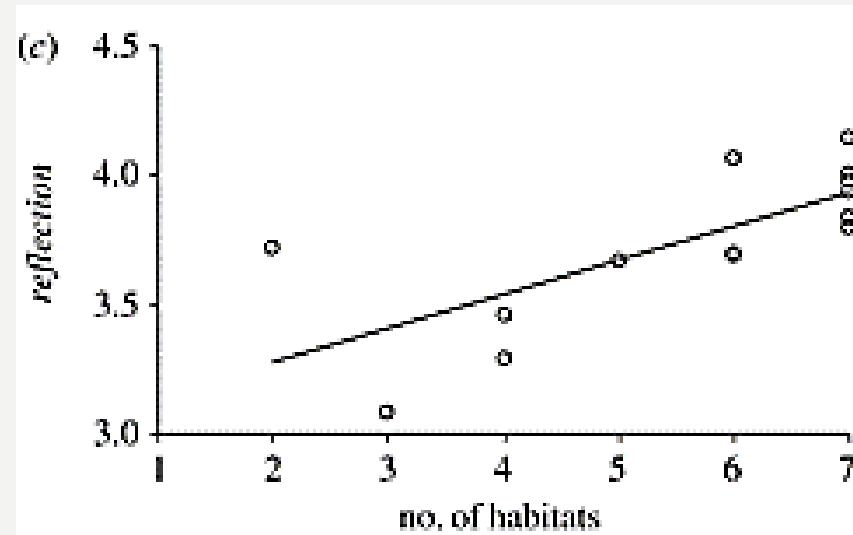
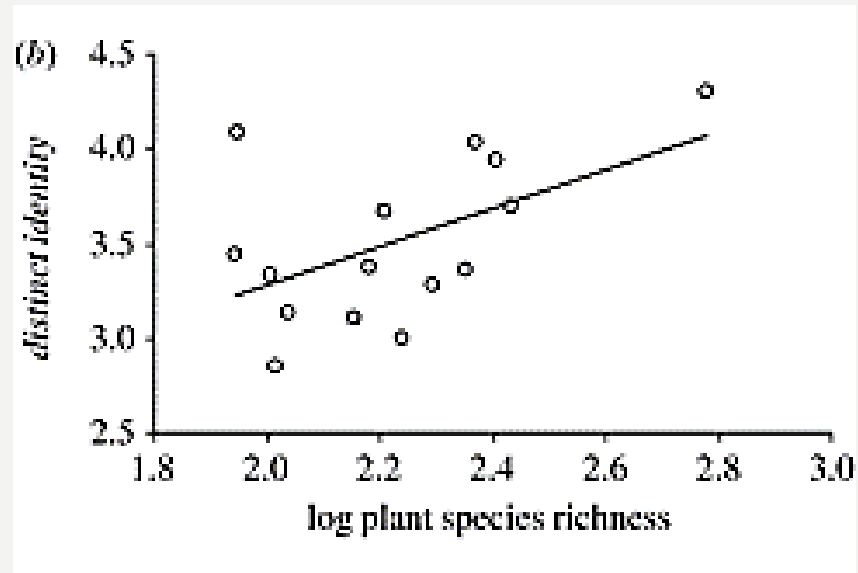
Reduce urban heat island effect

Air pollution removal

Noise and environmental buffers along corridors

Carbon storage and sequestration

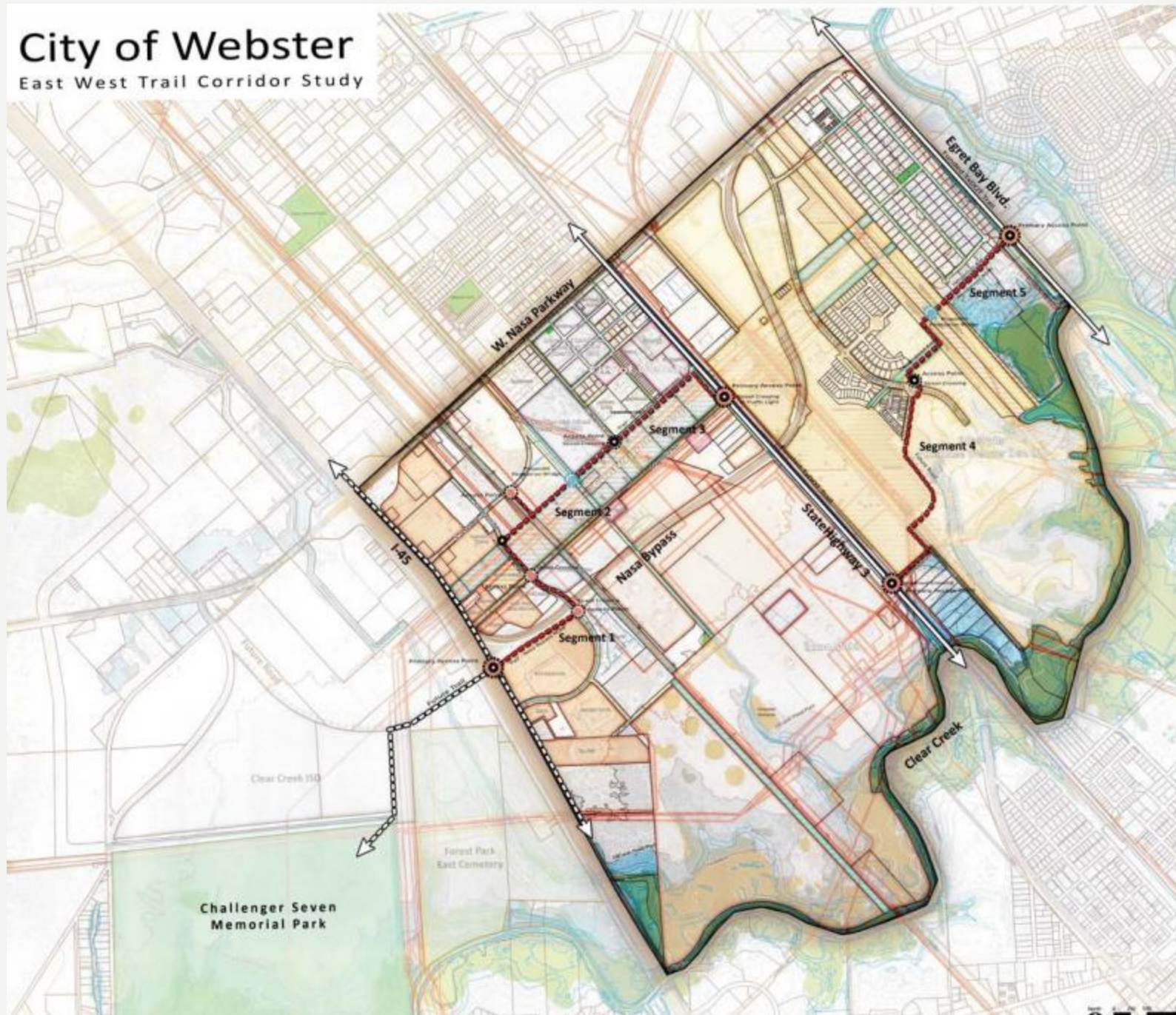
PSYCHOLOGICAL BENEFITS



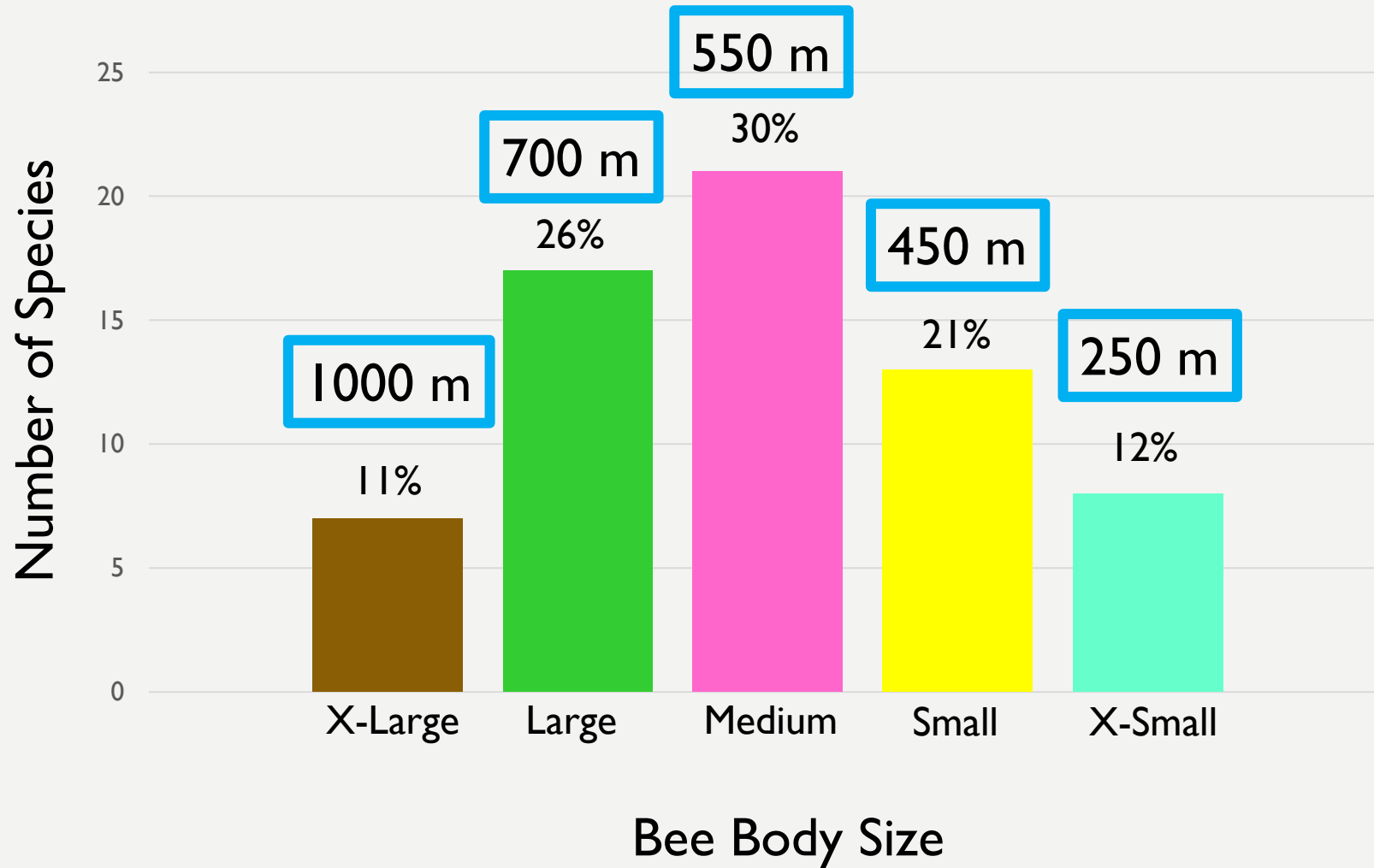
(Fuller et al, 2007)

City of Webster

East West Trail Corridor Study

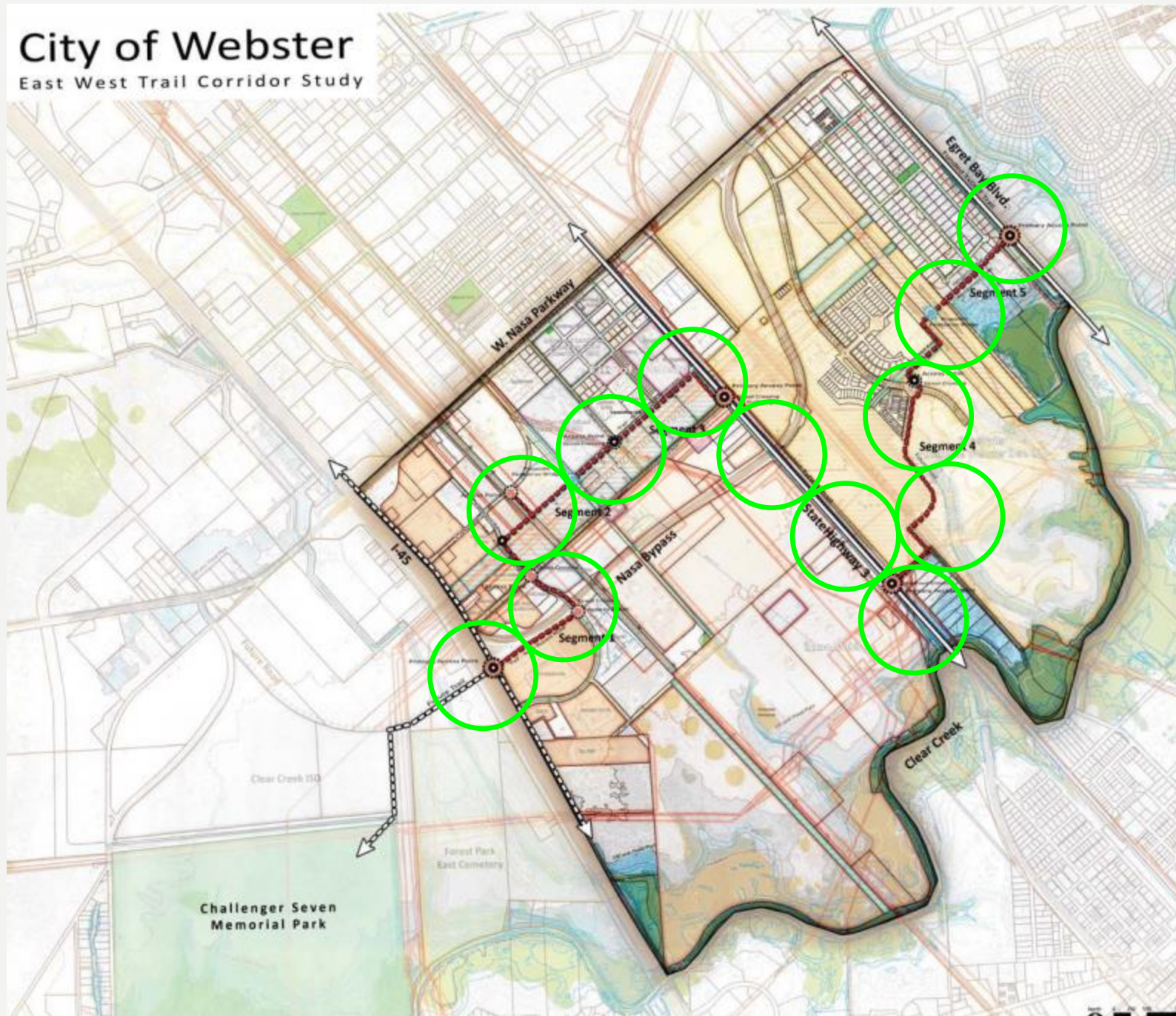


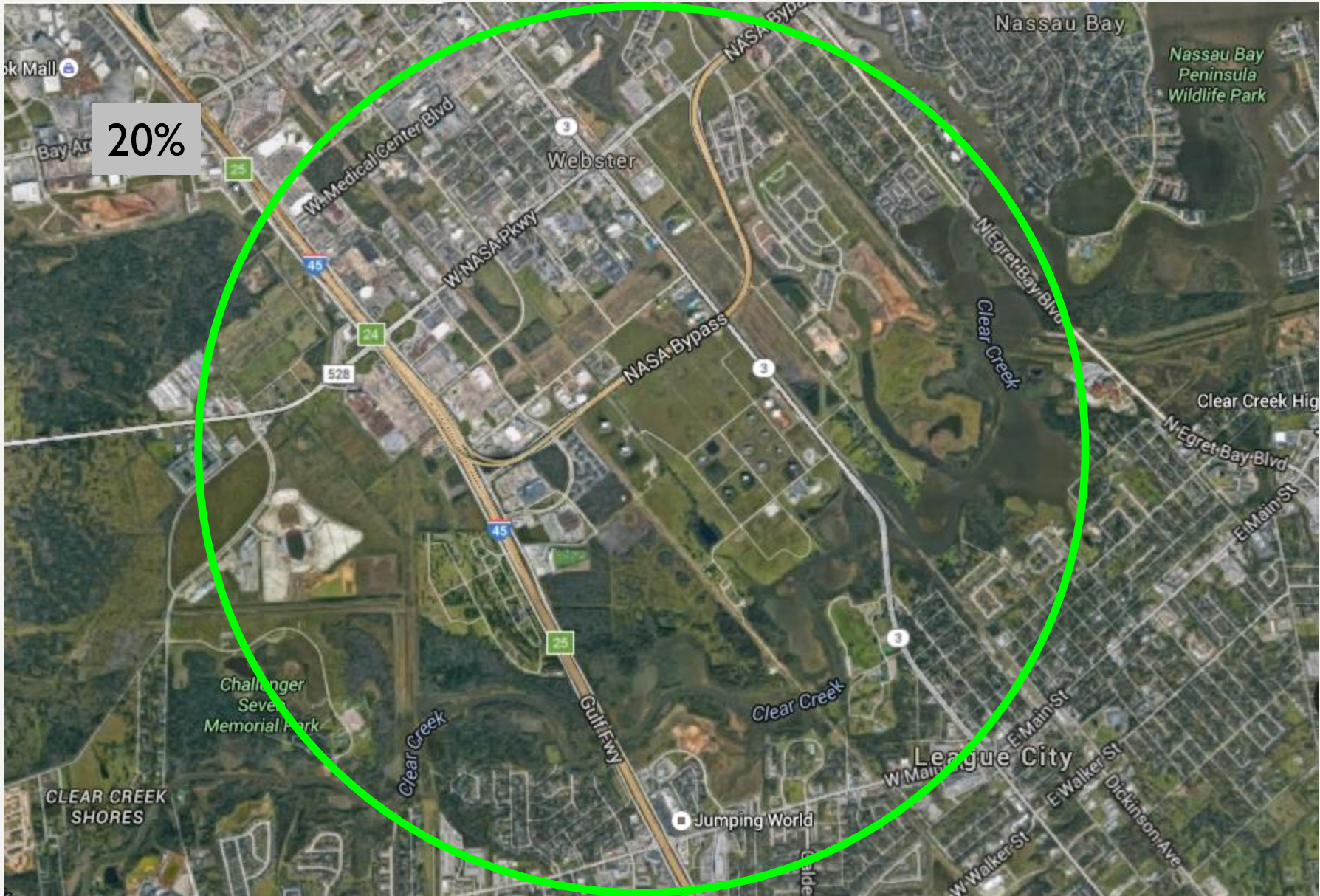
Houston Bees



City of Webster

East West Trail Corridor Study





Total Score for Habitat Assessment

The figures entered into this summary table will be calculated during completion of the assessment.

	BEFORE	AFTER
Section 1: Landscape Features (<i>max score 20</i>)	10	
Section 2: Site Features (<i>max score 35</i>)	24	
Section 3: Foraging Habitat (<i>max score 40</i>)	29	
Section 4: Native Bee Nesting Habitat (<i>max score 35</i>)	16	
Section 5: Management Practices (<i>max score 70</i>)	30	
OVERALL SCORE	109	

Pollinator Abundance
Native Bees: 57 species
Butterfly: 23 species

OPPORTUNITIES FOR PUBLIC COMMUNICATION AND EDUCATION

- Enhance community connections while supporting pollinator habitat
- Encourages volunteer partnerships between neighbors and neighborhoods
- “Bee Safe Neighborhood”
- Partner with local garden clubs, Native Plant Society – Houston Chapter
- City Council resolution declaring the city a pollinator-friendly community and encouraging residents and businesses to adopt pollinator-friendly practices
- Review department practices and incorporate training
- Bee City USA