# Practicing Applied Urban Ecology in Massachusetts



2023-05-16 Erica Holm



# What brings me here today?





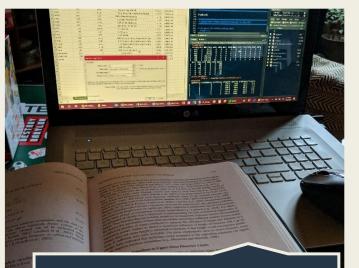
UNH (BSc 2012-2016)



Plum Creek Timber (Weyerhauser)



#### UNH (MSc\* 2016-2019)



Spatial Informatics Group



Emerald Necklace Conservancy



Mass Audubon



### Mass Audubon

- Mission: to protect the nature of Massachusetts for people and wildlife
- Founded in 1896
- 160,000 members
- 14,000 volunteers
- Over 40,000 acres protected

### Action Agenda Go Wild! Goals

Goal 1

Goal 2

Goal 3







Protect and Steward Resilient Landscapes Advance Inclusive and Equitable Access to Nature Mobilize to Fight Climate Change

2021 - 2026

#### Joppa Flats Rough Meadows North Shore Straitsmouth West High Ledges Lake Wampanoag Flat Rock **Rocky Hill** Eastern Ipswich River Point West Mountain Lincoln Woods Endicott Kettle Island Poor Farm Hill Central Conway Hills Nashoba Sanctuaries with Nature Centers Rutland Brook Brook Tracy Brook Brewster's Marblehead Road's and/or Programming Neck Graves Farm Nahant Pleasant\_ Meadows Canoe Wachusett Valley ( Habitat Meadow Cook's Canvon Drumlin Farm Boston Boston Eagle Lake Nature Lynes Woods Center Metro South **Blue Hills** Burncoat Pond Trailside Waseeka Arcadia Museum, Broadmoor Old Baldy Broad Museum of North Meadow American River Brook Lime Kiln Farm **Bird Art** Richardson Brook Moose Daniel Webster Stony Brook Laughing Brook Pierpont Meadow Hill North Hill Metro West Marsh Attleboro Springs South East Tidmarsh Oak Wellflee Knoll **Mass Audubon** Cape Barnstable Cod Great Marsh Long Pasture Skunknett **Sanctuary Map** mpsons Island Allens Pond - Islands Felix Neck Sesachacha Heathlands

Lost Farm

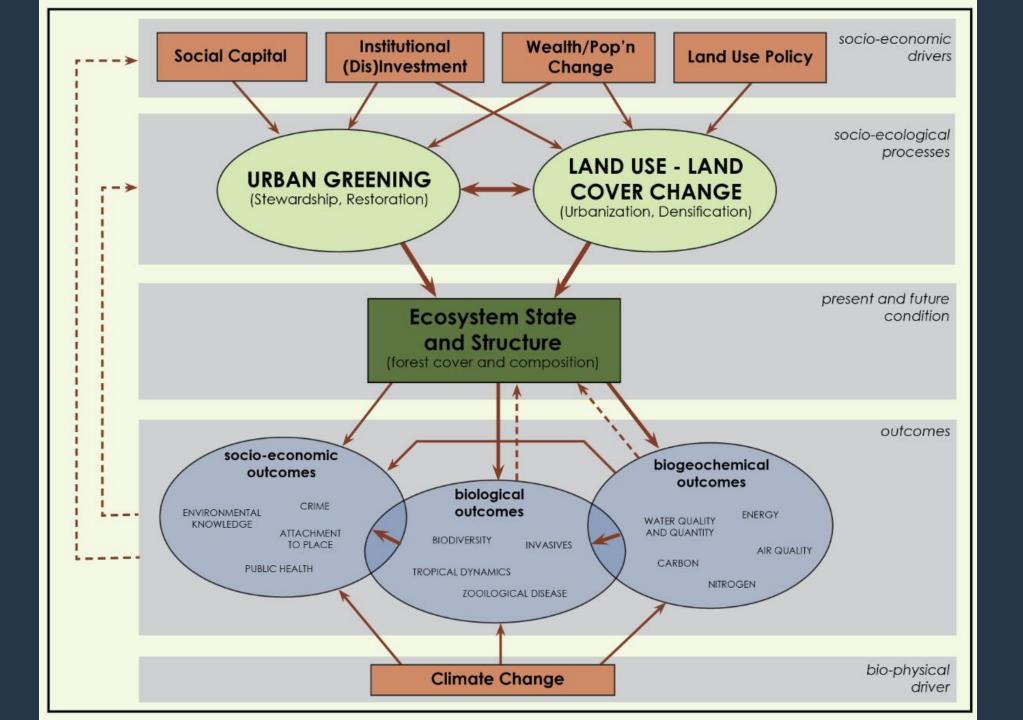
### What is urban ecology?



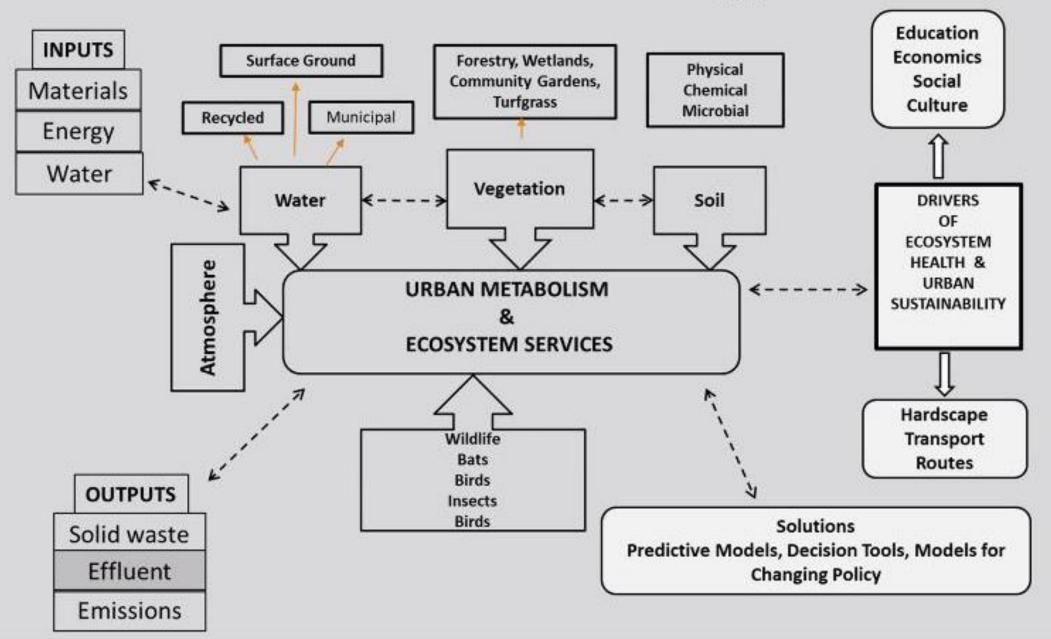
# Urban Ecology

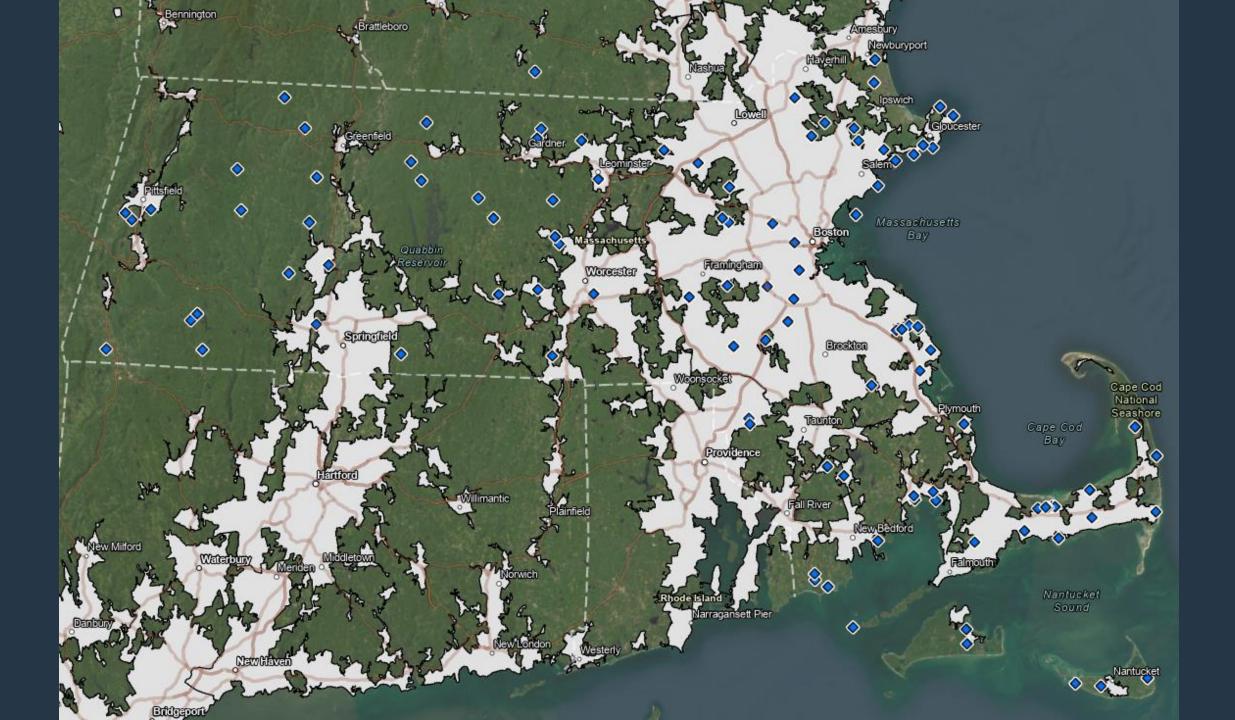
Urban ecology integrates both basic (i.e. fundamental) and applied (i.e. problem oriented), natural and social science research to explore and elucidate the multiple dimensions of urban ecosystems.

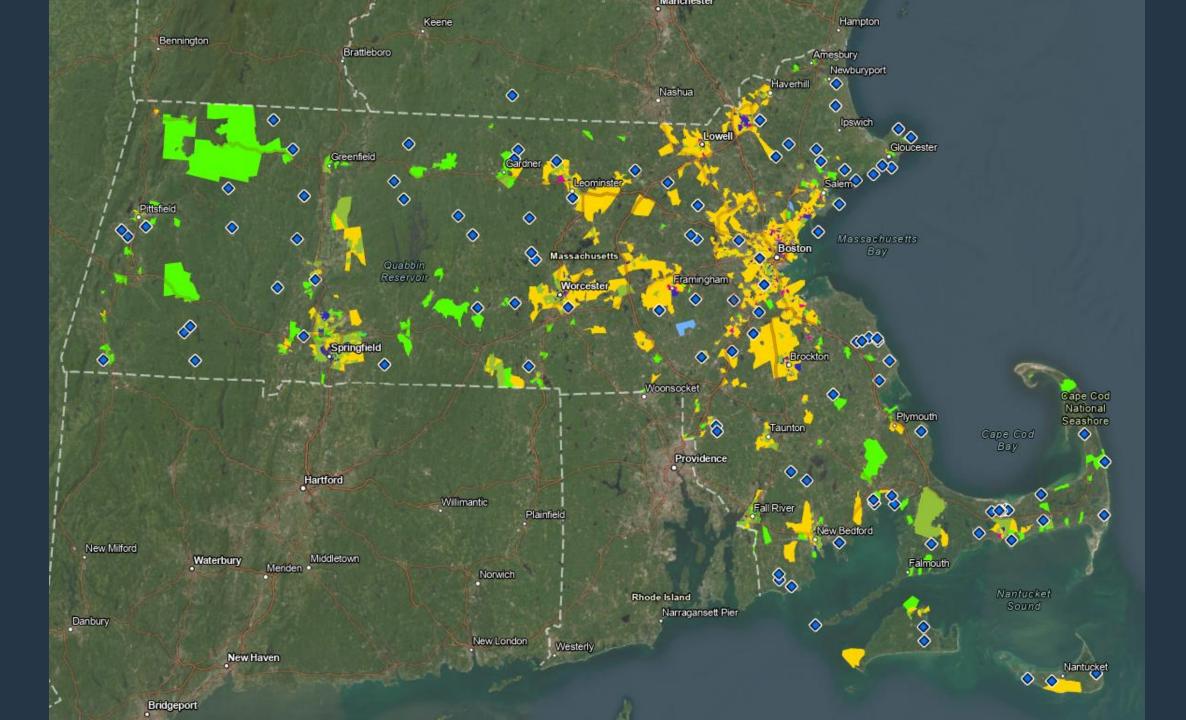
McDonnell, M. J. 2011. The history of urban ecology: an ecologist's perspective. Pages 5– 13 *in* J. Niemelä, J. H. Breuste, T. Elmqvist, G. Guntenspergen, P. James, and N. E. McIntyre, editors. Urban Ecology: Patterns, Processes, and Applications. Oxford University Press, Oxford, UK. <<u>https://doi.org/10.1093/acprof:oso/9780199563562.003.0002</u>>. Accessed 31 Aug 2022.



# What is Urban Ecology?







# Urban Ecology

- Is it really:
  - emerging?
  - different from natural?
  - possible to define in just one way or another?
- What is a city? What is science? What is urban?
- How does one practice this science, or come to consider oneself an urban ecologist?

MacGregor-Fors, I. 2011. Misconceptions or misunderstandings? On the standardization of basic terms and definitions in urban ecology. Landscape and Urban Planning 100:347–349.

The word urban is not synonymous with environmental justice.

Both concepts should be explored and increasingly understood by urban ecologists and the communities they live and work in.



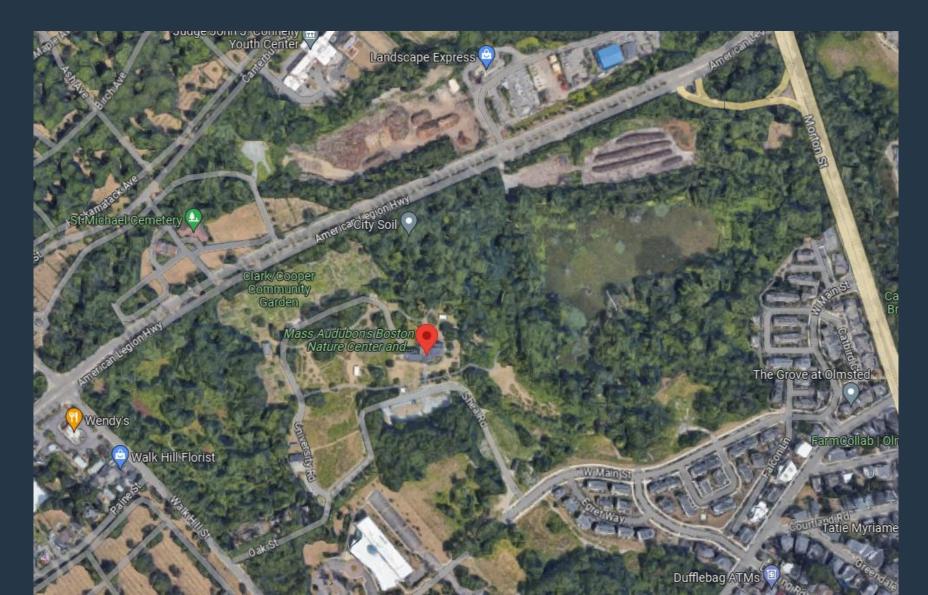


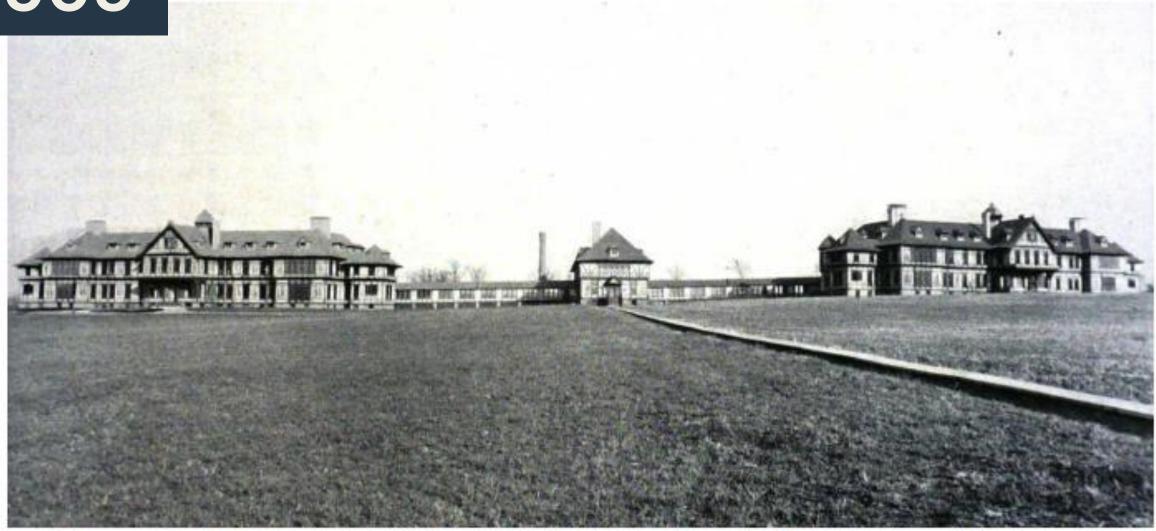
### **Urban Ecologist**

- Conservation Science Department
- Nature in the City and more
  - Listen + engage with urban residents
  - Conserve, restore + improve urban green spaces
  - Research + practice urban ecosystem science
  - Partner across sectors + disciplines
  - Support participatory and community science in urban areas



### **Boston Nature Center**





8.3. The hospital buildings at Pierce Farm as seen from the Walk Hill side, in a photograph from the 1909 Annual Report. *Courtesy of the City of Boston Archives*.













St Michael Cemetery

Clark/Cooper Community Garden

AmericarCity Soil •

Boston Food Forest Coalition - Food Forest... Mass Audubon's Boston Nature Center and...

Wendy's

Americantegronthat

🕘 Walk Hill Florist

W Main St

et Way

The Grove at Ol

### **NOW** George Robert White Environmental Conservation Center

First net-zero, carbon neutral City-owned building

Geothermal

Education space – preschool, camp, field trips

**Public trails** 



### **NOW** Lots of heterogeneity, competing uses, and work to do

Table 3. BNC Wildlife Sanctuary General Cover Types				
Cover Type	Area (Acres)			
Wetlands	16.5			
Cattail Marsh	5.7			
Wet Meadow	4.3			
Shallow Marsh Meadow or Fen	0.9			
Riparian (wetlands along stream)	3.0			
Shrub Swamp	2.6			
Uplands	31.0			
Shrubland	10			
Woodland	15.5			
Cultural Grassland	5.5			
Other Land Uses	13.2			
Buildings, Parking, Lawns	3.0			
Community Garden	5.5			
Compost Facility	4.7			



### NOW Lots of heterogeneity, competing uses, and work to do





### **Urban Ecologist**

- Urban Forest Plans
- Open Space and Recreation Plans
- Grants in urban ecology
- Networking and learning
  - Urban Ecology Collaborative
  - Community Coalitions
  - Researching special topics
    - Rodenticides
    - Urban wildlife conflict
    - Urban forestry
    - Community/participatory science



# Early Career Opportunities

#### Willow Tree Youth Leaders Program

- Based at Boston Nature Center
- 3-year, paid afterschool/weekends

### **Environmental Fellowship Program**

- 14-month, paid fellowship program (\$50-55k)
- 300+ applicants for 5 positions in 2022

#### **Massachusetts Climate Corp**

- 10-week, paid summer research (\$18-25/hr)
- 2 crew leaders, 8 crew members in 2023



What did you wish you had known when starting out? What strategies did you use or do you recommend to build a career? What can the next generation learn/do to most help you or the field overall?





# Boston urban forestry Alliance for tree canopy on private land



### Mass Audubon

January 2023



Response to City of Boston Tree Planting and Maintenance Program Request for Proposals

Stacey Beuttell Senior Director Nature in the City sbeuttell@massaudubon.org 781-259-2170 Erin Kelly Acting Director Boston Region ekelly@massaudubon.org 617-983-8500 x 6906 Erica Holm Urban Ecologist Conservation Science eholm@massaudubon.org 617-620-7683











#### **Spring Planting Pilot Kickoff Event**

#### Tree Planting Demo

- Two individual sugar maples, 7 gallon size
- Detailed demonstration of planting
- Demonstration of what homeowners would typically need to do to plant & maintain trees

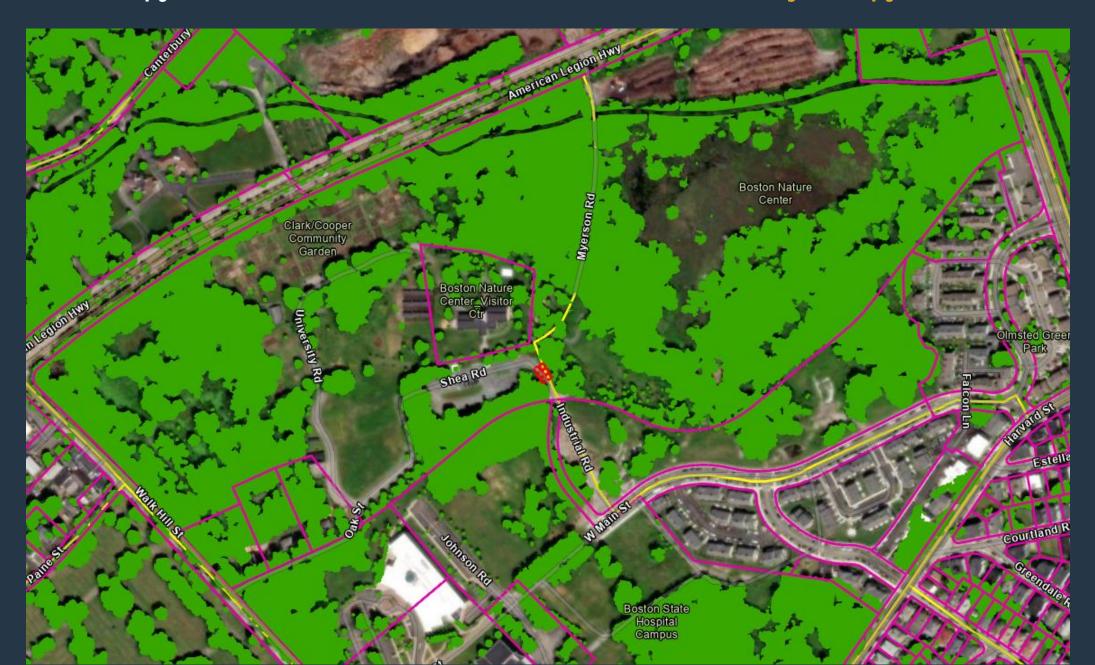
#### **Microforest Planting**

- 333 plants in total, of 33 native species
- PowerCorpsBOS, Mayor Wu help plant
- Small trees planted densely to grow canopy and reforest barren land rapidly

#### Tree Giveaway

- Speak for the Trees to administer giveaway
- Folks taking a tree agreed to follow-up visits and check-ins from the Alliance
- European hornbeams

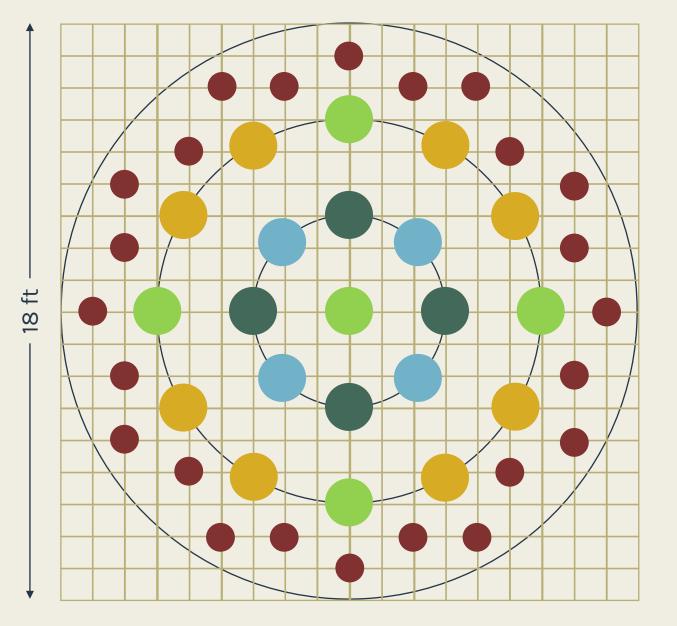
#### 2019 Tree Canopy at the Boston Nature Center – southern boundary canopy lost in 2023



# **Microforest:** Initial Design







### **MIYAWAKI SUPERCLUMPS**

Adapted from <a href="https://www.plantnovatrees.org/create-a-mini-forest">https://www.plantnovatrees.org/create-a-mini-forest</a>

native perennial (n=24)

native shrub (n=8)

native fast-growing tree species (n=5)

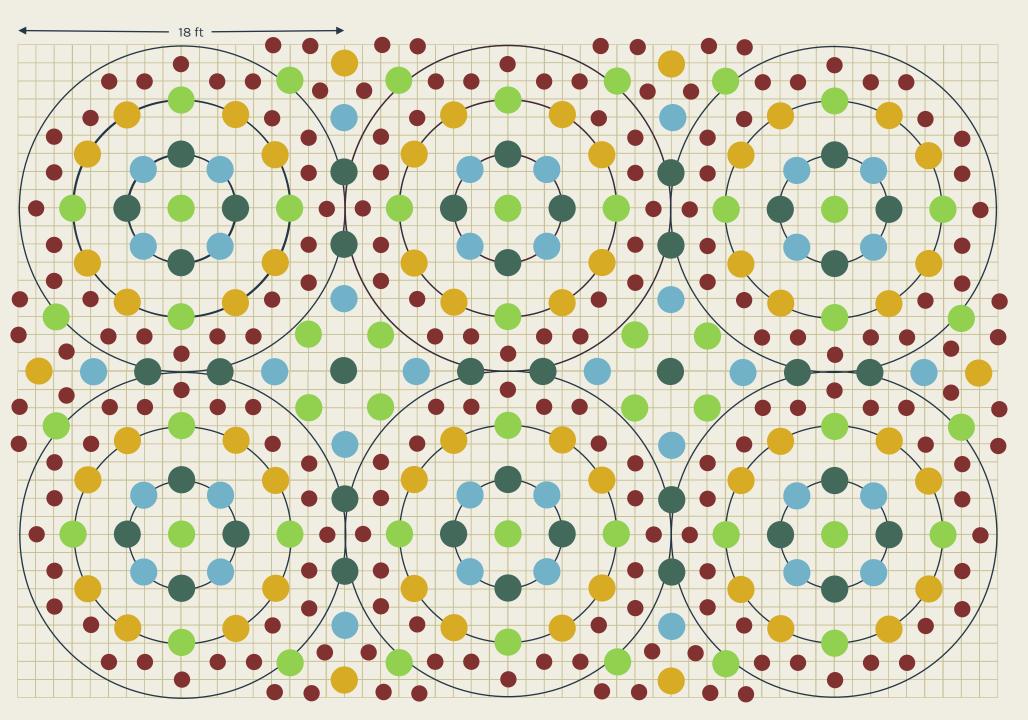
native understory tree species (n=4)

native climax canopy tree species (n=4)

1 base pattern = 45 plants total, 13 trees, 21 if including shrubs

18 ft diameter circle = 254 sq ft or 24 m<sup>2</sup>

A little under 2 plants per square meter in this adapted design



#### 54 ft x 36 ft 1,944 sq ft

6 SUPERCLUMPS					
	perennials	180			
	shrubs	54			
	fast-growing	50			
	understory	38			
	canopy	40			
	TOTAL	362			

128 true trees 182 trees if including shrubs

family _1	species	common name	function 🖓	form 💵	sizelater 🗠	grows 🗠	lifespan 🗠
Aceraceae	Acer saccharum	sugar maple	climax canopy tree	tree	60'-100'	slow	long
Juglandaceae	Carya ovata	shagbark hickory	climax canopy tree	tree	60-90'	slow	long
Fagaceae	Castanea dentata	American chestnut	climax canopy tree	tree	35'-115'	fast	long
Fagaceae	Quercus bicolor	swamp white oak	climax canopy tree	tree	50'-100'	fast	long
Aceraceae	Acer rubrum	red maple	fast-growing tree	tree	60'-75'	fast	short
Betulaceae	Betula populifolia	gray birch	fast-growing tree	tree	20'-40'	fast	short
Pinaceae	Larix laricina	tamarack	fast-growing tree	tree	40'-80'	fast	moderate
Salicaceae	Populus grandidentata	bigtooth aspen	fast-growing tree	tree	50'-75'	fast	short
Rosaceae	Prunus serotina	black cherry	fast-growing tree	tree	40'-80'	fast	moderate
Rosaceae	Prunus virginiana	chokecherry	fast-growing tree	tree	15'-30'	fast	short
Annonaceae	Asimina triloba	paw paw	understory tree	tree	10'-40'	slow	short
Oleaceae	Chionanthus virginicus	fringe tree	understory tree	tree	12'-25'	slow	short
Cornaceae	Cornus florida	flowering dogwood	understory tree	tree	20'-30'	moderate	short
Magnoliaceae	Magnolia virginiana	sweetbay magnolia	understory tree	tree	40'-60'	moderate	moderate
Lauraceae	Sassafras albidum	sassafras	understory tree	tree	24'-75'	moderate	moderate
Rosaceae	Aronia melanocarpa	black chokeberry	shrub	shrub	6'-15'	moderate	short
Rhamnaceae	Ceanothus americanus	New Jersey tea	shrub	shrub	3'	slow	moderate
Clethraceae	Clethra alnifolia	sweet pepperbush	shrub	shrub	16'	moderate	moderate
Myricaceae	Comptonia peregrina	sweet fern	shrub	shrub	2'-5'	slow	moderate
Betulaceae	Corylus americana	American hazelnut	shrub	shrub	6'-12'	moderate	short
Ericaceae	Gaylussacia baccata	black huckleberry	shrub	shrub	30'-60'	slow	long
Pteridaceae	Adiantum pedatum	northern maidenhair f	perennial	fern	8"-30"	moderate	moderate
Aristolochiaceae	Asarum canadense	wild ginger	perennial	wildflower	4"-8"		
Campanulaceae	Campanula rotundifolia	harebell	perennial	wildflower	4"-15"		
Cyperaceae	Carex pensylvanica	Pennsylvania sedge	perennial	grass	6"-12"		
Primulaceae	Dodecatheon meadia	eastern shooting-star	perennial	wildflower	6"-20"	moderate	short
Papaveraceae	Sanguinaria canadensis	bloodroot	perennial	wildflower	6"-24"		
Saxifragaceae	Tiarella cordifolia	foamflower	perennial	wildflower	6"-16"		

## **Microforest:** Implementation



family 🚽	genus 🖃	species 🚽	common name	function 👻	size 💌	grows 💌	lifespan 🔽	light 🔹	moisture 💌	total 👻
Aceraceae	Acer	saccharum	sugar maple	climax canopy tree	60' - 100'	slow	long	sun to shade	dry to moist	10
Juglandaceae	Carya	ovata	shagbark hickory	climax canopy tree	60' - 90'	slow	long	sun to shade	dry to moist	16
Cupressaceae	Juniperus	virginiana	eastern redcedar	climax canopy tree	20' - 90'	slow	moderate	sun to shade	dry	4
Fagaceae	Quercus	bicolor	swamp white oak	climax canopy tree	50' - 100'	fast	long	part shade	moist	10
Fagaceae	Quercus	coccinnea	scarlet oak	climax canopy tree	75' - 150'	fast	long	sun	moist	3
Fagaceae	Quercus	rubra	northern red oak	climax canopy tree	75' - 100'	moderate	long	sun to part shade	dry to moist	6
Betulaceae	Betula	lenta	black birch	fast-growing tree	50' - 75'	moderate	moderate	part shade to shade	dry to moist	3
Betulaceae	Betula	papyrifera	white birch	fast-growing tree	50' - 75'	fast	moderate	sun to shade	moist	3
Betulaceae	Betula	populifolia	gray birch	fast-growing tree	20' - 40'	fast	short	sun to shade	dry to wet	3
Rosaceae	Prunus	serotina	black cherry	fast-growing tree	40' - 80'	fast	moderate	sun to shade	dry to moist	5
Annonaceae	Asimina	triloba	paw paw	understory tree	10' - 40'	slow	short	sun to shade	moist	7
Oleaceae	Chionanthus	virginicus	fringe tree	understory tree	12' - 25'	slow	short	part shade	moist	2
Cornaceae	Cornus	florida	flowering dogwood	understory tree	20' - 30'	moderate	short	part shade to shade	dry to moist	14
Magnoliaceae	Magnolia	virginiana	sweetbay magnolia	understory tree	40' - 60'	moderate	moderate	part shade	moist	8
Rosaceae	Aronia	melanocarpa	black chokeberry	shrub	6' - 15'	moderate	short	part shade	moist	9
Rhamnaceae	Ceanothus	americanus	New Jersey tea	shrub	3'	slow	moderate	sun to part shade	dry to moist	5
Rubiaceae	Cephalanthus	occidentalis	common buttonbush	shrub	10' - 15'	moderate	short	part shade to shade	moist to wet	2
Clethraceae	Clethra	alnifolia	sweet pepperbush	shrub	16'	moderate	moderate	sun to shade	moist to wet	9
Myricaceae	Comptonia	peregrina	sweet fern	shrub	2' - 5'	slow	moderate	part shade	dry	9
Betulaceae	Corylus	americana	American hazelnut	shrub	6' - 12'	moderate	short	part shade to shade	dry to moist	7
Ericaceae	Gaylussacia	baccata	black huckleberry	shrub	30' - 60'	slow	long	sun to shade	dry to wet	9
Ericaceae	Lyonia	ligustrina	maleberry	shrub	3' - 15'		short	part shade	wet	2
Pteridaceae	Adiantum	pedatum	northern maidenhair fern	perennial	8" - 30"	moderate	moderate	part shade to shade	moist	40
Ranunculaceae	Anemone	virginiana	tall thimbleweed	perennial	3'			sun to part shade	dry to moist	12
Cyperaceae	Carex	pensylvanica	Pennsylvania sedge	perennial	6" - 12"			sun to shade	dry to moist	21
Cyperaceae	Carex	scoparia	pointed broom sedge	perennial	3'			part shade	moist to wet	10
Scrophulariaceae	Chelone	glabra	white turtlehead	perennial				sun to shade	moist to wet	6
Primulaceae	Dodecatheon	meadia	eastern shooting-star	perennial	6" - 20"	moderate	short	part shade	moist	20
Rosaceae	Fragaria	virginiana	wild strawberry	perennial	4"			sun to part shade	dry	16
Asteraceae	Liatris	scariosa var. novae-angliae	New England blazing star	perennial	3'			sun	moist	6
Asteraceae	Pseudognaphalium	obtusifolium	sweet everlasting	perennial	3'			part shade	moist	16
Papaveraceae	Sanguinaria	canadensis	bloodroot	perennial	6" - 24"			part shade to shade	moist to wet	20
Saxifragaceae	Tiarella	cordifolia	heartleaf foamflower	perennial	6" - 16"			shade	moist	20
										333

#### Oct 12







2023 May 08















2023 May 12







### Where can you learn more?





# Follow-Up Resources Boston Nature Center



Boston Nature Center & Wildlife Sanctuary

A Healing Landscape

City of Boston PowerCorps Program

Pollinator-Friendly Solar Meadow Visual Timeline

2023 Greater Boston Area City Nature Challenge

Massachusetts Climate Corps





Urban Ecology Collaborative on YouTube

Urban Waters Learning Network

Urban Wildlife Information Network

Urban Bird Treaty Cities Program

Boston Biodiversity Consortium

BostonTreeAlliance@massaudubon.org

#### **Thank You!**



eholm@massaudubon.org

