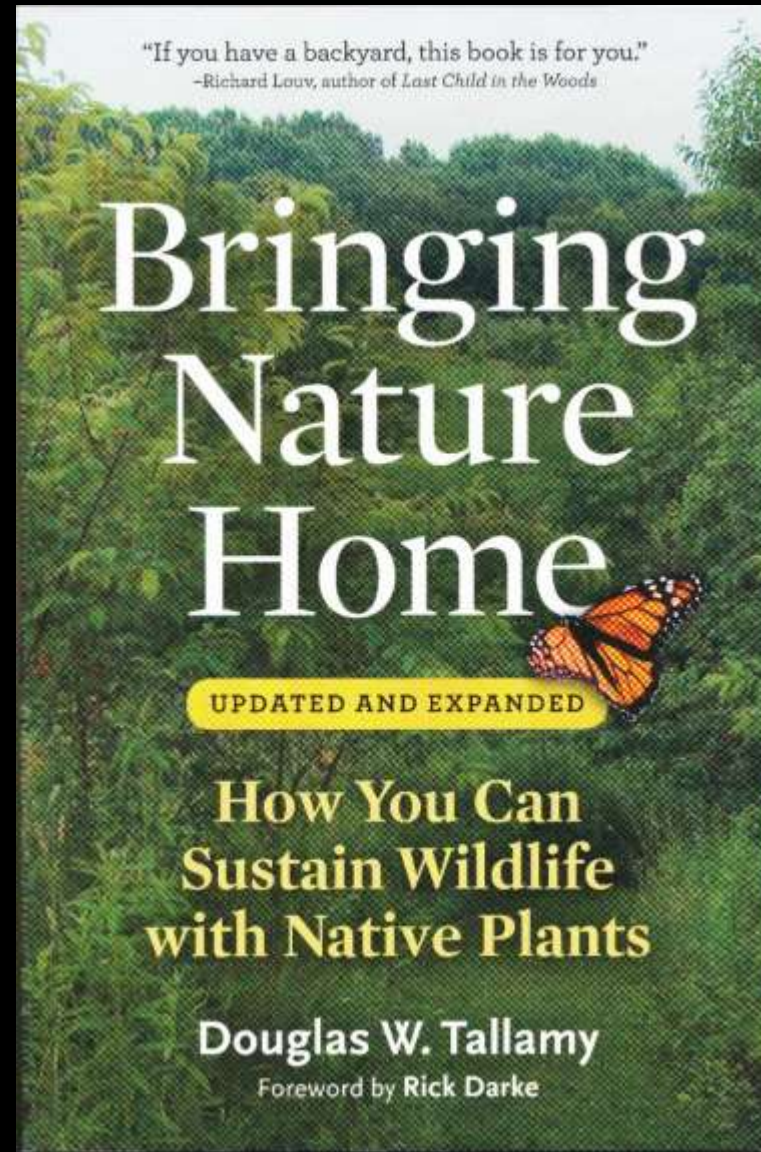
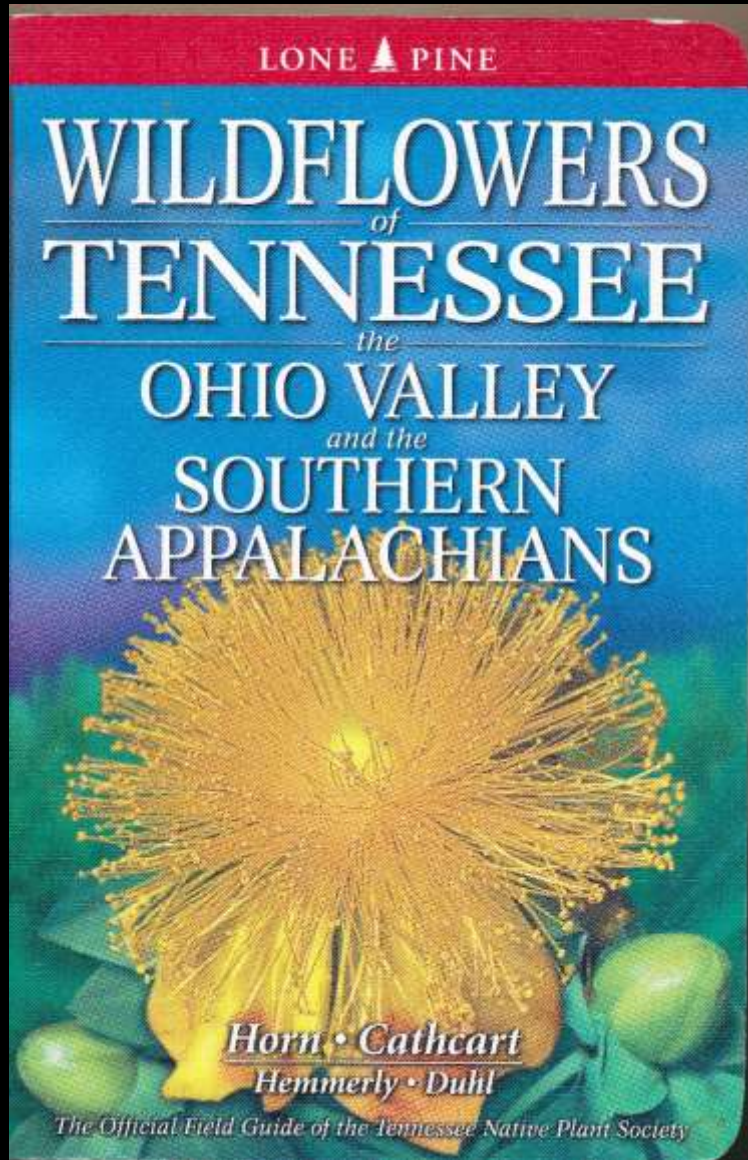


# Native Plant Plot – Plateau Discovery Garden – Class 2012



summer 2014





**biodiversity**

Professor & Chair, Dept. of Entomology  
and Wildlife Ecology, Univ. Delaware



*Healing the Earth,  
One Yard at a Time*

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BEES



BUTTERFLIES



MOTHS



# POLLINATORS OF NATIVE PLANTS

Attract, Observe and Identify  
Pollinators and Beneficial Insects  
with Native Plants



WASPS



FLIES



BEETLES

Heather Holm

Winner of Four  
Book Awards

Includes Tree, Shrub, and Perennial  
Plant Profiles for the Midwest,  
Great Lakes, and Northeast Regions



# BEEES

An Identification and Native Plant Forage Guide

HEATHER HOLM *Author of Pollinators of Native Plants*

# Native Plants?

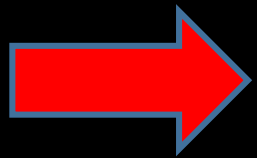
- indigenous to region
  - long before first human inhabitants

# Why important?

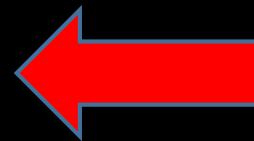
- Part of rich natural beauty of region
  - Part of natural heritage – *Plateau one of most biodiverse plant populations in world*

# Why important?

- Adapted to local conditions
  - hardy – local environment
  - less expensive
  - environmentally friendly
- Year round aesthetics – **maple leaf viburnum as example**
- Food source and natural habitat



● **Key to biodiversity**



# Relevance to Biodiversity

- **Plants don't like to be eaten**
  - **Insects like to eat plants**



**Why all the concern about insects??**

# Vast Majority of Insects are Beneficial

- pollinators – 4X attracted to native plants
- predators on pest species
- return nutrients to soil
- food source – native species
- aesthetic - beautiful

# Pollinator Decline – Threat - World Food Supply

John Schwartz, New York Times, 2/27/2016

Each year - loss of hundreds of billions of dollars' worth of pollinator-driven food sources

**In 27 years > 75 percent decline in total flying insect biomass in protected areas**

Hallmann et al. *PLOS ONE* 10/18/2017



# Food sources - pollinators

**35% of agricultural land worldwide**

kiwi, cashew, Brazil nuts, **watermelon**, **cantaloupe**, cucumber, **squash**,  
buckwheat, **apples**, mango, avocado, allspice, **apricot**, cherries,  
plum, almond,  
**peach**, pear, **raspberry**, blackberry, blueberry

**chocolate**, **coffee**, vanilla ice cream

# Not just honey bees

## Native bees

- Important pollinators of native plants
  - 3800 species – US
    - 350 species - Tennessee

**Butterflies – overall not great pollinators**

# **Native Bees**

**90% solitary**

**Don't sting – bumble bee exception**

**Short lived – 2 – 6 months**

**70% nest in ground**

**Don't produce honey**



# Native Plant Gardens Important!

- > 40% - agriculture
  - > 55% - cities
    - only 3 – 5% of forested land in lower 48 undisturbed

**Motto of Wild Ones - Healing the Earth, One Yard at a Time**

# Non-Native (Alien) Plants

- Native insects and insect larvae don't like to eat alien plants

Common	Scientific	Native Predators	U.S. Predators
Common Reed (Europe)	<i>Phragmites australis</i>	170	5 *
Bottlebush (Australia)	<i>Melaleuca quinquenervia</i>	409	8
Black Sally (Australia)	<i>Eucalyptus stellulata</i>	48	1

- Great right???? If you don't like butterflies or birds!!

# Alien Plants Disease Vectors

1. Chestnut blight – Asian origin – 1876 – Japanese Chestnut
2. Dogwood anthracnose – Asian origin probably *Cornus kousa*
3. Oak sudden death disease (*Phytophthora ramorum*) (1995) – California – Oregon – shipped unknowingly to many other states



*Cornus kousa*



# Conduits - Destructive Insects

1. Japanese beetles – *Popillia japonica* – Japanese iris eat over 400 plant species – **larvae on grass roots**
2. Woolly adelgid - (eastern Asia) - Virginia in 1950s - eastern hemlocks (imidaclopid)
3. Emerald ash borer – China – larvae feed on cambrium, xyleum, phloem

# Alien Plants Can Be Invasive

1. Norway Maple – Europe – Asia – **invasive** – out competes Sugar Maple
2. **Burning Bush** – China - **invasive** – sale prohibited some states
3. **English Ivy** – Europe and Asia - **invasive**
4. Wisteria – China, Korea, Japan – **invasive particularly southeast U.S.**
5. Golden Rain Tree – Asia – China – Korea – **invasive eastern U.S., Florida**
6. **European Privet** (*Ligustrum*)– Europe – northern Africa - **invasive**
7. Multiflora Rose – Japan – Korea – eastern China - **invasive**
8. **Kudzu** – Japan – **invasive** – **plant that ate the South**
9. Tree of Heaven –China - **invasive** – out competes natives
10. **Nandina** - Japan – China - **considered invasive** – North Carolina, Tennessee, Georgia, Florida, Texas
11. **Butterfly Bush** – China – **invasive** – nectar only



## Butterfly Weed

*Asclepias tuberosa*



- full sun
  - one of last emerge
  - doesn't transplant well





16-46b

**Great Spangled Fritillary**  
*Speyeria cybele*

**Eastern Tiger Swallowtail**  
*Papilio glaucus*



15-185b



Monarch butterfly larvae –  
milkweed specialists. **No**  
**milkweeds no Monarchs!** 96% loss  
Since 1976





43-15b



43-023b



# Swamp Milkweed - Rose Milkweed

## *Asclepias incarnata*



- moist soils
- late spring
- bloom mid-summer
- one of best to attract Monarchs





16-163b

**Spicebush Swallowtail**

*Papilio troilus*



16-172b





34-131b



34-71b

## Common Milkweed

### *Asclepias syriaca*

- pollinators
  - more attractive for Monarchs vs Butterfly Weed



34-122b



# Milkweed Tussock Moth

*Euchaetes egle*



# Need more than milkweeds

- **Aesthetics – blooms all summer**
  - **Other major nectar sources**

# Food sources for other butterfly caterpillars



**Spice Bush Swallowtail**

**Spice Bush  
Sassafras**



**Great Spangled Fritillary**

**Violets**



**Eastern Tiger Swallowtail**

**Wild cherry  
Tulip tree  
Basswood  
Willow**



**Zebra Swallowtail**

**Pawpaw**





**Eastern Red Columbine –  
Wild Red Columbine**

***Aquilegia canadensis***

- woodland – shade to partial shade
- sandy – not too rich soils
  - moist – well drained soils – drought tolerant
  - long-tongued insects - hummingbirds







- full sun
- beautiful flower, blooms in May for short time



Wild Indigo  
False Indigo

*Baptisia australis*





**False Indigo Bush – False Indigo –  
Indigo Bush**

***Amorpha fruticosa***

- full sun – light shade
- medium wet – well-drained soils
- tolerant to occasional flooding
- late spring – early summer







**Wild Bergamot**  
*Monarda fistulosa*

**Red Bee Balm** – *Monarda didyma*  
**good nectar source**







## Black-eyed Susan

*Rubbeckia hirta*

- full sun
- bloom all summer
  - good food source – native insects







16-127b



34-115b



243-21

## White Cone Flower

*Echinacea purpurea*

**Good nectar source!**

- blooms all summer
- many colors









16-106b



16-102b



16-123b

## Joe Pye Weed

*Eupatorium maculatum*  
*Eutrochium purpureum*

- moist conditions
- can get tall
- good soil – multiple stalks
- late July – early August
- food and nectar source





Venable, R. 2014, Butterflies of Tennessee

*Spicebush Swallowtail*

*Papilio troilus*





18-62b

**Iron Weed**

***Vernonia altissima***

***Vernonia noveboracensis***

**New York Iron Weed**

- late July – early August
- can get really tall – 7-8 feet



18-141b



**good nectar  
source**



266—026b





251-13b

# Rough-stemmed Golden Rod Fireworks Golden Rod

*Solidago rugosa*



251-22b



251-170b





251-165b

**Rough-stemmed Golden Rod**





blooms mid to late summer



**Cardinal Flower**

*Lobelia cardinalis*





## Nine Bark

*Physocarpus opulifolius*

- full sun – partial shade
- 6 – 10 feet
- low maintenance
  - golden orange Fall foliage
  - blooms May - June





**Black Cohosh**

*Actaea racemosa*

flowers late spring – early summer  
dependent on moist, heavy  
nutrient-rich soil  
shade to partial shade  
hardy but mulch to retain moisture  
**very attractive to pollinators**







41-133b

**White Turtlehead**

*Chelone glabra*



41-137b



Plant	May	June	July	August	September
Columbine	Yellow				
Butterfly Weed		Yellow	Yellow		
Rose Milkweed			Yellow		
Joe Pye Weed			Yellow	Yellow	
Ironweed			Yellow	Yellow	
Golden Rod				Yellow	Yellow
Black-Eyed Susan		Yellow	Yellow	Yellow	Yellow
Wild Bergamot			Yellow	Yellow	
Cardinal Flower			Yellow	Yellow	Yellow
Nine Bark	Yellow	Yellow	Yellow		
Black Cohosh			Yellow	Yellow	Yellow



**Maple Leaf Viburnum**

*Viburnum acerifolium*



# Sources

- reputable nurseries – specialize in Tennessee natives
- know the scientific name
  - do your homework – be sure plant is native to state and Plateau



**Hey !  
Don't dig native plants from  
the wild!**

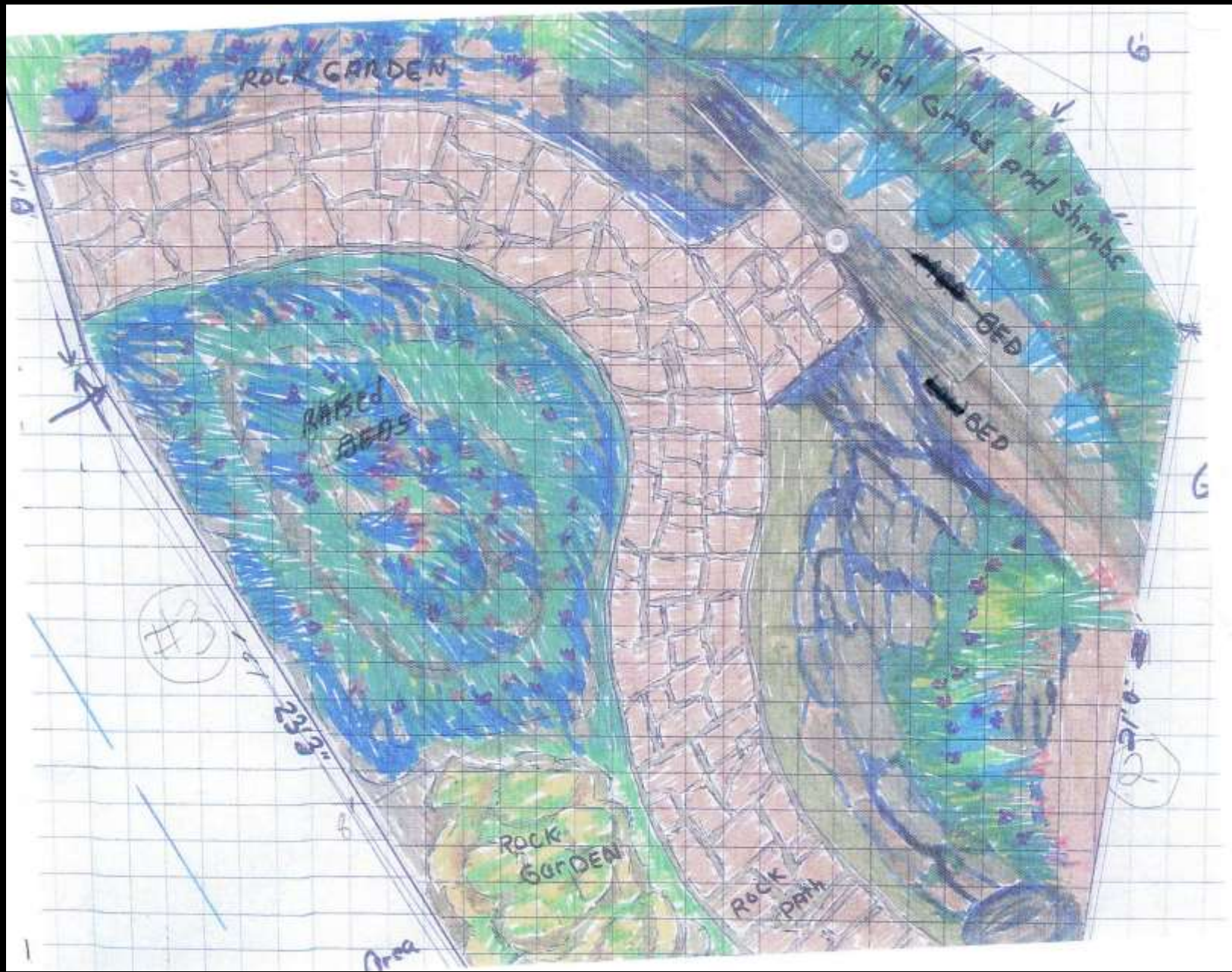
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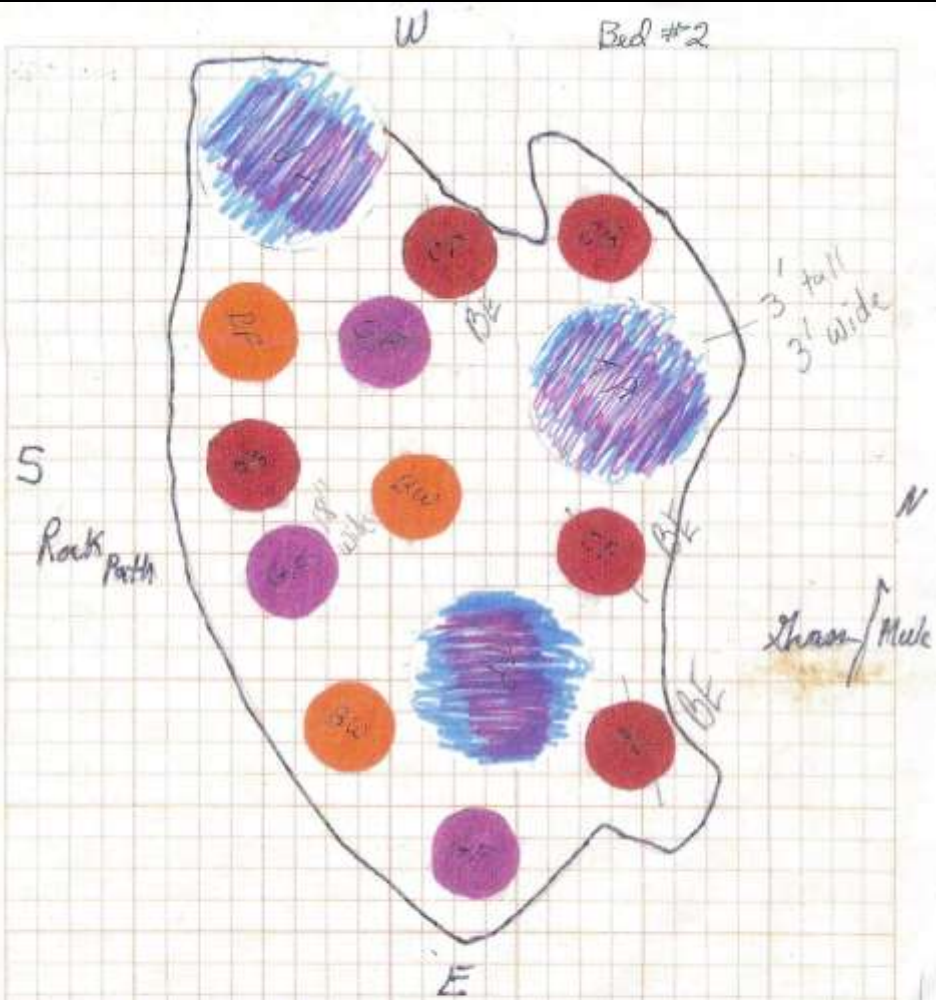


243-73d

summer 2014







Abbrev.	Plant	Height	Number
BF	Butterfly Weed	2.5'	3
GF	Gay-Feather	3'	3
TA	TN Aster	4'	3
CF	Cardinal Flower	4'	2
BB	Bea Balm	2'	2

Notes:  
 BF - 11" wide  
 GF - 3' wide  
 CF - Catnip - red/yellow  
 BB -



**The End**