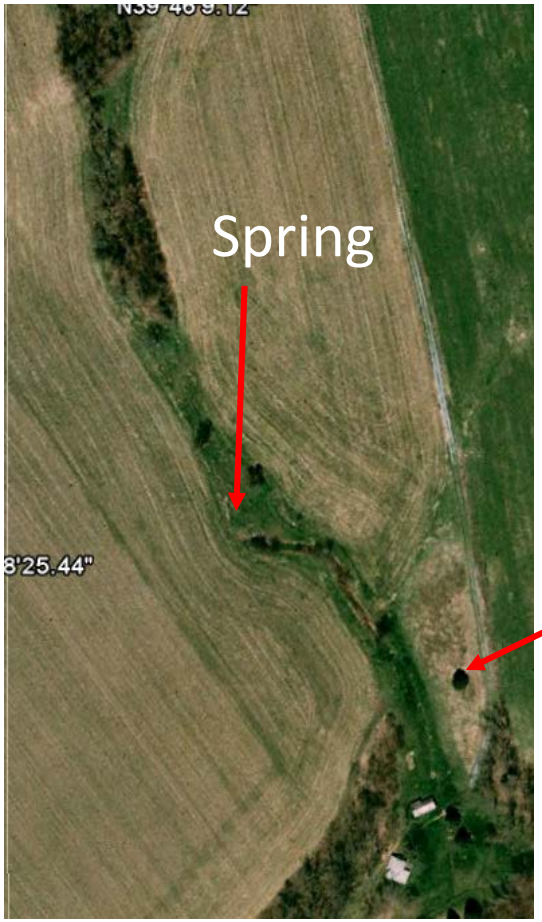
March , 2017

Designing a Forest Buffer for Multiple Benefits

Don and Ann English
Happy Hollow Farm
Stewartstown, PA

Baseline condition

- 45 Acre farm; 27 tillable
- Corn-Corn-Soybeans for >50 years; No-till since 2001
- Headwaters for Deer Creek



GoogleEarth, 2010

No stream buffer

Getting to Yes was a 5 year process

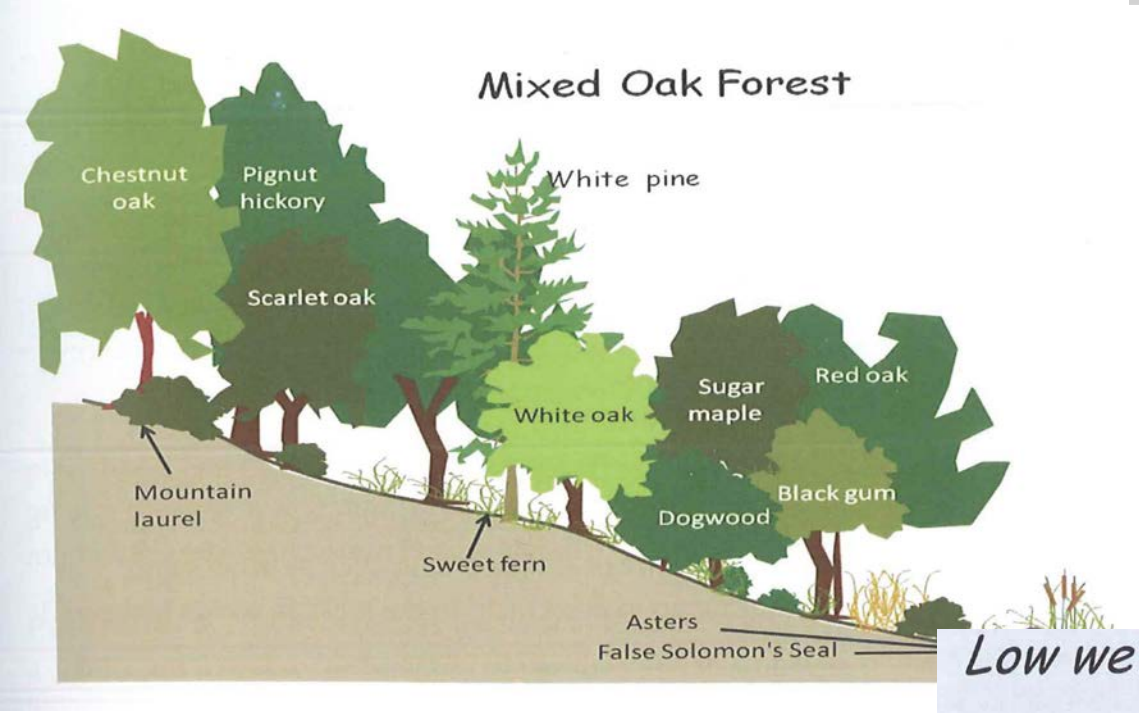
LANDOWNER CONCERNS

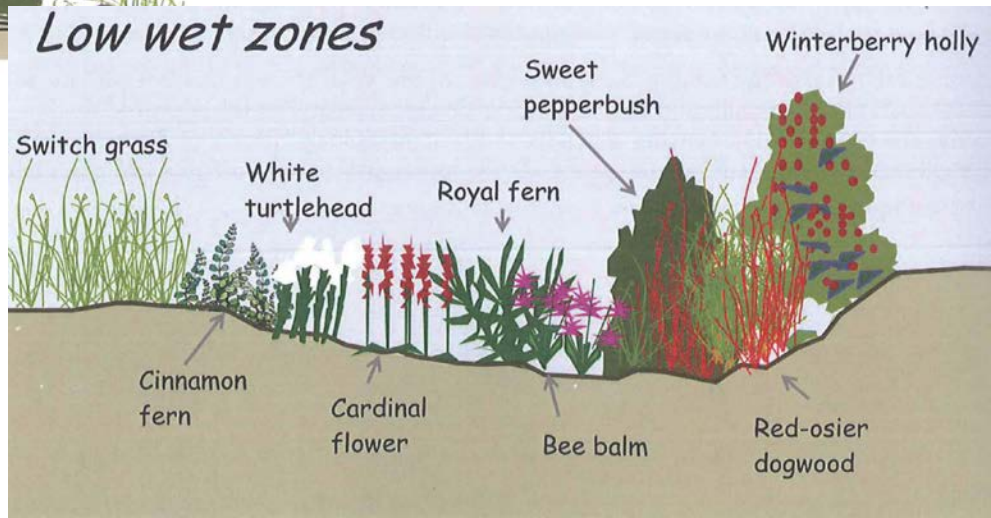
- No additional workload
- No change to ‘look’
- No ‘untidy’ views
- No loss of income
- Don’t chase the farmer away

Goals: Water quality and more

- Reduce pollution--especially sediment
- Create pollinator and bird habitat
- Increase species diversity
- Establish a food forest
- Rebuild soil

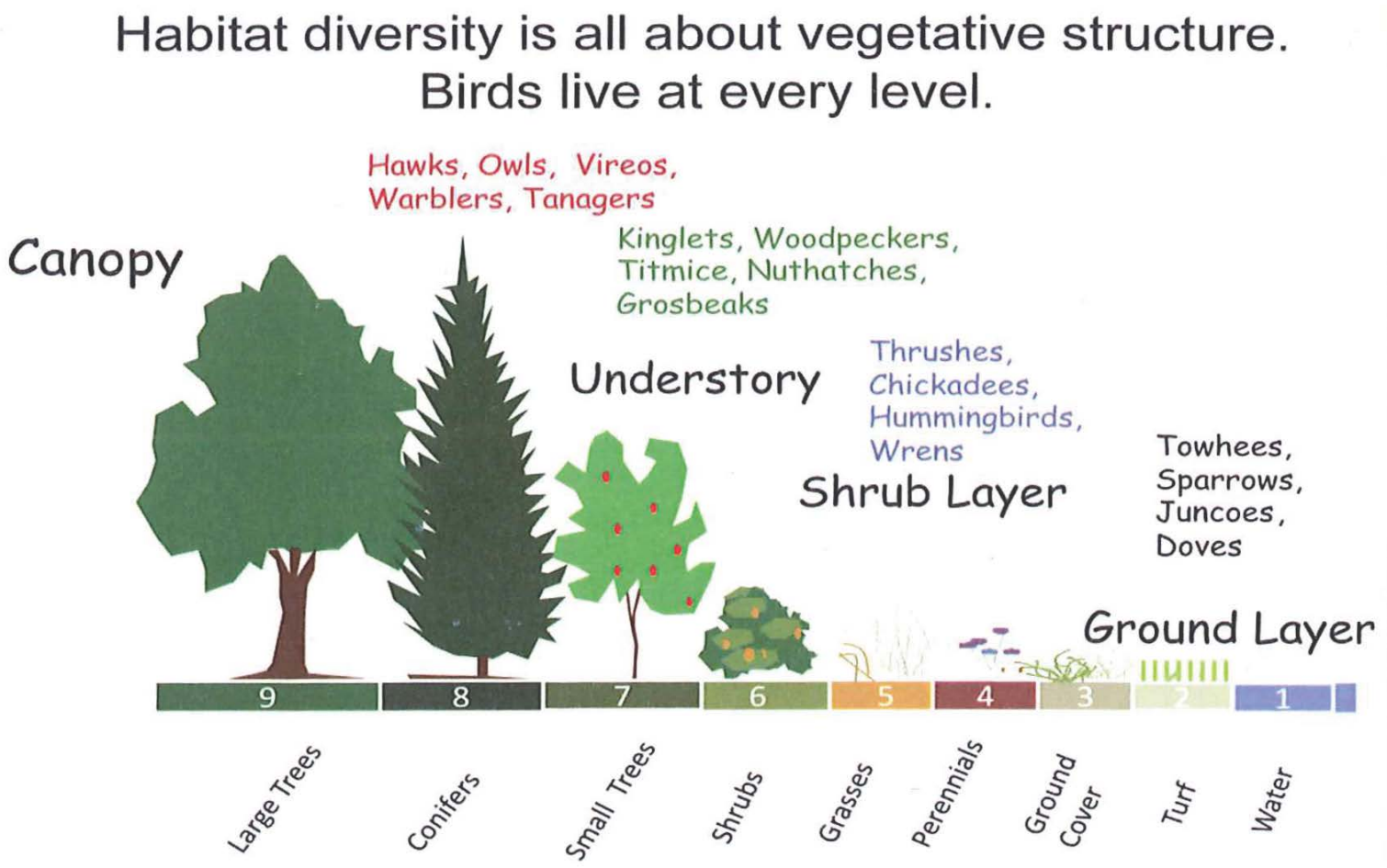
Assessing the site – determining possibilities





Graphics from Designing with Natives by JRogers

Evaluate the site for reaching goals – set a priority list

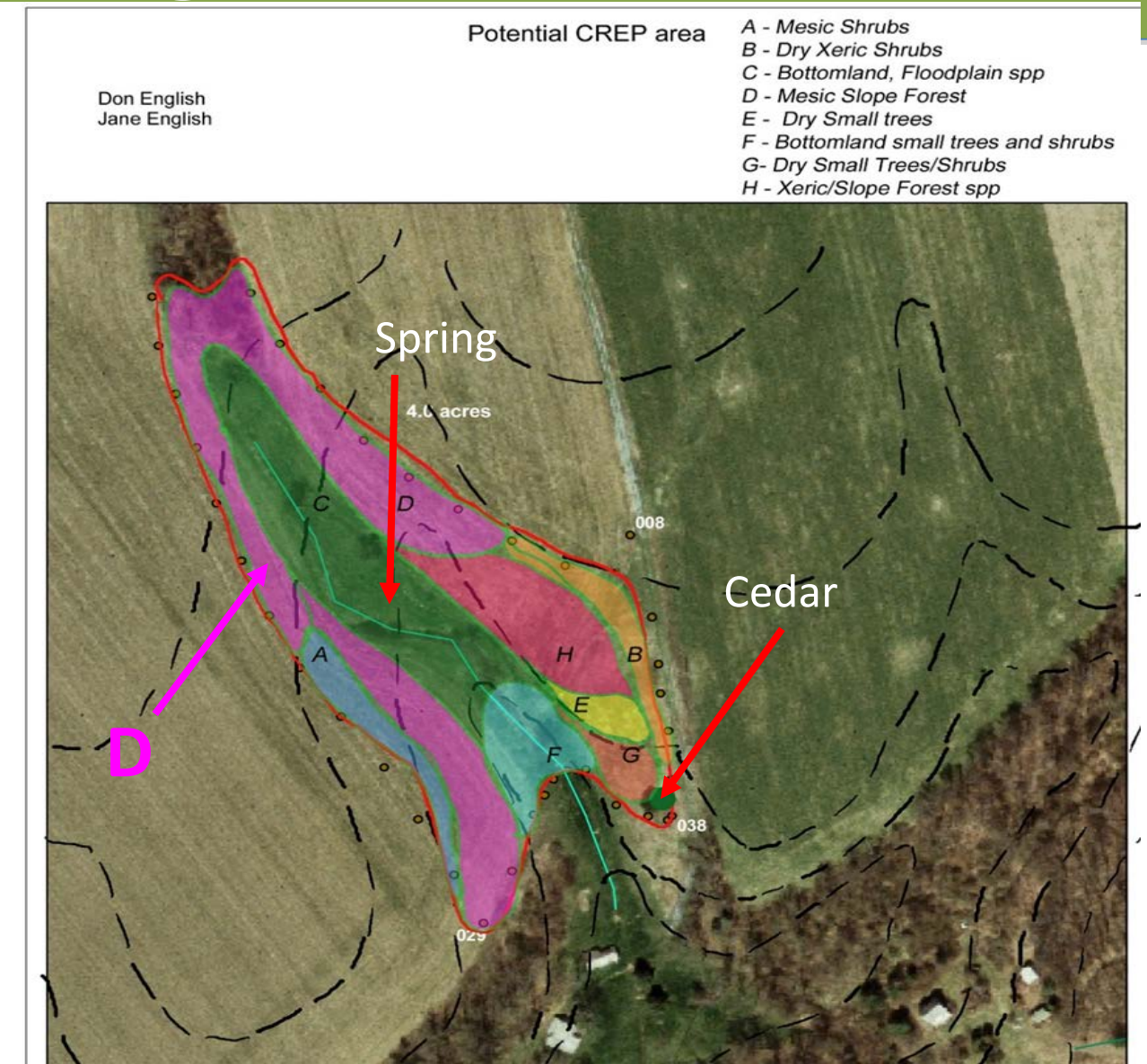


Graphic from Designing with Natives by JRogers

Plant communities and plant selection

- What plant communities should do well on the site?
- What communities are nearby?
- What are key community species?

4 Acre Buffer
8 Planting zones



D-Mesic Slope Forest – 194 plants

Canopy Trees

12	Acer saccharum
5	Carya laciniosa
6	Carya ovata
6	Castanea dentata
9	Diospyros virginiana
9	Gleditsia triacanthos
7	Nyssa sylvatica
5	Quercus alba
6	Quercus coccinea
9	Quercus rubra

Understory/ Shrubs

6	Acer pennsylvanicum
12	Amelanchier canadensis
3	Carpinus caroliniana
9	Cercis canadensis
9	Hamamelis virginiana
9	Ilex opaca
11	Prunus americana
9	Styrax americana
3	Aesculus parviflora
3	Calycanthus florida
6	Gaylussacia baccata
3	Hydrangea arborescens
6	Kalmia latifolia
5	Rhodendron maximum
3	Rhodendron periclymenoides
3	Rhodendron prinophyllum
3	Sambucus nigra
3	Viburnum prunifolium
5	Viburnum trilobum

Laying it Out
Restoration Planting Approach

Color coded flag system for layout

Installation

- **March 2011**
- Orchardgrass/ ladino clover
- Oats as nurse crop

- **April 2011**
- 534 plants
- 65 tree/shrub species

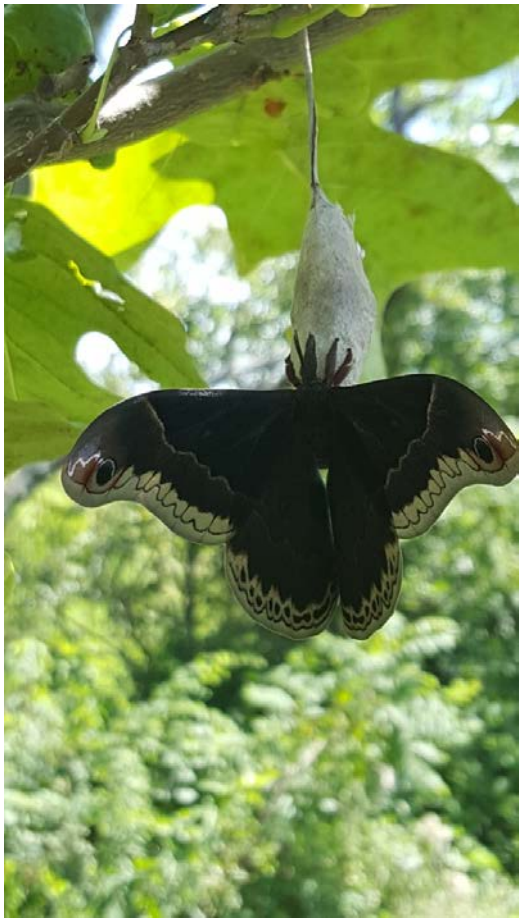
- **Nucleus of each community type**

Goal: Reduce TSS
First Summer: Sedimentation

Summer 2011

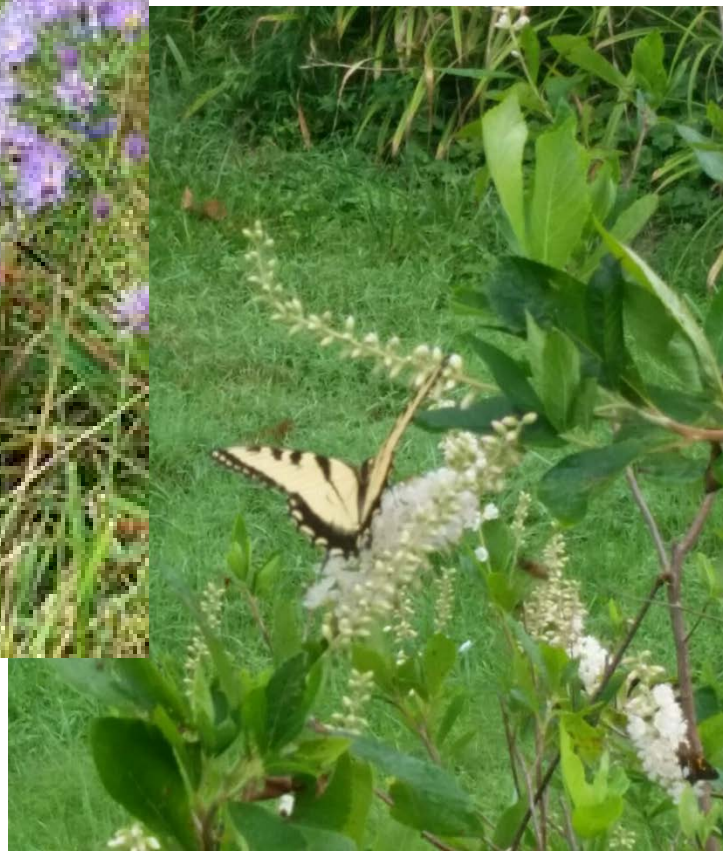
Goal: Birds and pollinators
2016: Nesting and cocoons

Goldfinch nest in black walnut



Cecropia moth in tulip poplar

Goal: Pollinators
2016: Big butterflies



Goal: Species Diversity
2016: Forbs replace orchardgrass

Goal: 2016: Food Forest Wildlife forage

Buttonbush - August 2016

Winterberry – ‘Winter Red’ - 2015

Goal: Food Forest
2016: Fruits and Nuts

Blackberry, Wineberry, Elderberry

American hazelnut

Goal: Soil Building
2014: Just beginning

Report prepared for:
Happy Hollow Farm
Don English
14421 Bauer Dr.
Rockville, MD 20853 USA
phillygent78@gmail.com

Report Sent:
Sample#: 03-010161 | Submission:03-004549
Unique ID: 1
Plant: Corn
Invoice Number: 0
Sample Received: 5/13/2014

Organism Biomass Data	Dry Weight	Active Bacterial (µg/g)	Total Bacterial (µg/g)	Active Fungal (µg/g)	Total Fungal (µg/g)	Hyphal Diameter (µm)
Results	0.780	20.1	296	**4.04**	124	2.75
Comments	In Good Range	Good	Good	Low	Good	
Expected Range Low	0.45	15	100	15	100	
Expected Range High	0.85	25	300	25	300	

	Protozoa Numbers/g Flagellates	Protozoa Numbers/g Amoebae	Protozoa Numbers/g Ciliates	Total Nematodes #/g	Percent Mycorrhizal Colonization ENDO	Percent Mycorrhizal Colonization ECTO
Results	**5452**	**1772**	58	**2.35**	**0%**	**0%**
Comments	Low	Low	Good	Low	Low	Low
Expected Range Low	10000	10000	50	20	40%	40%
Expected Range High			100	30	80%	80%

Organism Biomass Ratios	Total Fungal to Total Bacterial	Active to Total Fungal	Active to Total Bacterial	Active Fungal to Active Bacterial	Plant Available N Supply (lbs/acre)
Results	**0.42**	**0.03**	**0.07**	**0.20**	50-75
Comments	Low	Low	Low	Low	
Expected Range Low	0.8	0.25	0.25	0.75	
Expected Range High	1.5	0.95	0.95	1.5	

Report prepared for:
Happy Hollow Farm
Don English
14421 Bauer Dr.
Rockville, MD 20853 USA
phillygent78@gmail.com

Report Sent:
Sample#: 03-010162 | Submission:03-004549
Unique ID: 2
Plant: tree
Invoice Number: 0
Sample Received: 5/13/2014

Organism Biomass Data	Dry Weight	Active Bacterial (µg/g)	Total Bacterial (µg/g)	Active Fungal (µg/g)	Total Fungal (µg/g)	Hyphal Diameter (µm)
Results	0.740	12.0	613	**7.08**	**94.9**	2.5
Comments	In Good Range	Good	Excellent	Low	Low	
Expected Range Low	0.45	10	50	25	500	
Expected Range High	0.85	15	200	50	2000	

	Protozoa Numbers/g Flagellates	Protozoa Numbers/g Amoebae	Protozoa Numbers/g Ciliates	Total Nematodes #/g	Percent Mycorrhizal Colonization ENDO	Percent Mycorrhizal Colonization ECTO
Results	37628	**18814**	2905	**2.04**	**14%**	**0%**
Comments	High	Low	High	Low	Low	Low
Expected Range Low	20000	20000	50	50	40%	40%
Expected Range High			100	100	80%	80%

Organism Biomass Ratios	Total Fungal to Total Bacterial	Active to Total Fungal	Active to Total Bacterial	Active Fungal to Active Bacterial	Plant Available N Supply (lbs/acre)
Results	**0.15**	**0.07**	**0.02**	**0.59**	100-150
Comments	Low	Low	Low	Low	
Expected Range Low	5	0.25	0.25	2	
Expected Range High	10	0.95	0.95	5	

Challenges

- Deer rubs
- Groundhogs, voles, rabbits, mice
- Dirt, not soil
- Herbicide drift
- Invasives
- Maintenance
  - Mowing
  - Minimal herbicide

Maintenance efforts: Adding trees / affordability

- HS Horticulture program
- Natural recruitment
- Transplants
- Collected seeds

Lessons learned

- No Herbicide => More mowing should be done
  - Mowing term 5 years; 3 is insufficient
- Grid layout simplifies mowing and protects small plants
- Plant community approach is essential
- Solid tubes neither durable nor effective

Lessons learned

- Plant species diversity => animal species diversity, especially pollinators;
  - but increases planting costs
- Maximize shrub percentage
- Forbs provide fall nectar source
- Trees and understory species struggle in initial planting
  - wood debris or chips helps

Facebook page and blog:

https://www.facebook.com/happyhollowfarmpa/

Questions and Discussion