Integrated Vegetation Management IVM Partners

Managing Ecosystems Together!

Pollinator Habitat Improvements using IVM

- IVM Partners, a 501-C-3 non-profit, was incorporated August 4, 2003

  Richard A. Johnstone, President

  - act as liaison between industry, agencies, conservation and academia
  - conduct research on IVM and Ecosystem Management best practices
  - inform and educate land managers and public officials on IVM best practices
  - develop partnerships between industry and government so that best IVM practices are used
  - improve wildlife and endangered specie habitat while lowering invasive weeds

IVM Documented Case Studies
Electric, Natural Gas & Highway ROW
and Partnerships with USFWS and Tribal Nations

Alabama Arizona Arkansas California Colorado Delaware Florida Idaho
Illinois Louisiana Maryland Michigan Missouri

United States Army
Corps of Engineers

Ohio Oklahoma New Jersey New Mexico New York North Carolina Oregon
Pennsylvania South Carolina Tennessee Virginia West Virginia

Canaan Valley National Wildlife Refuge, WV
Detroit River International Wildlife Refuge, MI
Eastern Neck National Wildlife Refuge, MD
Patuxent National Research Refuge, MD
Great Meadows National Wildlife refuge, MA
Forsythe National Wildlife Refuge, NJ
Chincoteague National Wildlife Refuge, VA
Cibola National Wildlife Refuge, AZ

Navajo Nation
Santa Ana Pueblo

Infrastructure Improvements can Restore 60 million acres of Pollinator Habitat with Integrated Vegetation Management

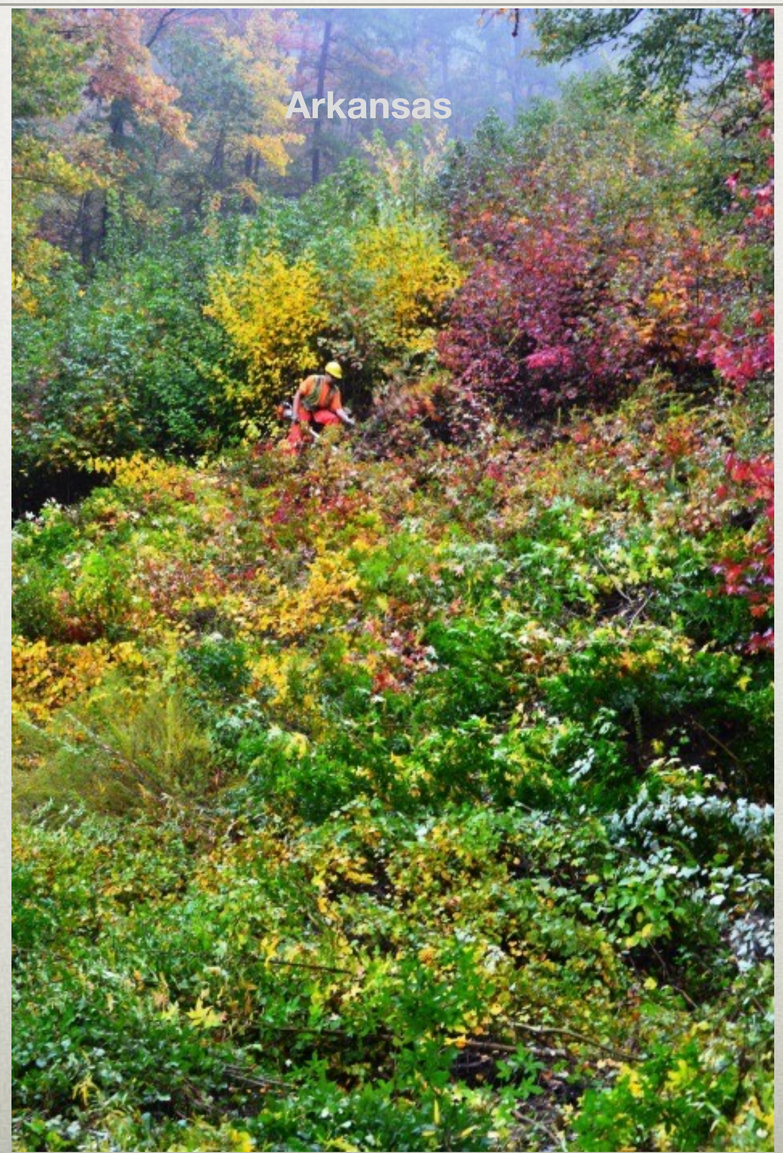
- Electric transmission system - **450,000 miles**
- Natural gas transmission system - **300,000 miles**
- Interstate highway system - **33,000 miles**
- Rural highway system - **3 million miles**
- Railroad system - **170,000 miles**

Mowing is an accepted maintenance practice

Removing vegetation along slopes is a Potential Erosion Problem

Mowers pollute greenhouse gases and increase carbon footprint at a rate exceeding 175 lbs carbon/acre

Mountain Slopes must be Hand-cut



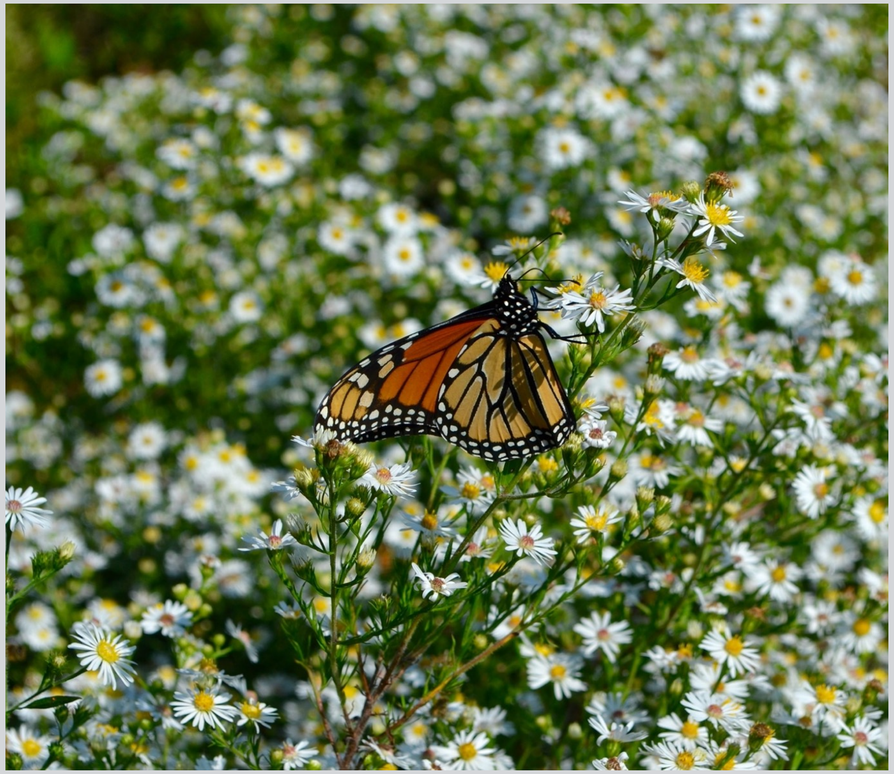
Cutting encourages multiple sprouts, increased density of brush, and continued root growth

Cutting invasive plants along water acts as a vector for spreading their seeds downstream

Late Summer ROW Mowing removes Forbs needed for pollinator nectar

Mowing resumes in September
Should wait until dormant season (November-March)

Monarch CCAA Advice:
Milkweed is important for larvae
nectar and pollen are necessary for migration



Selective spraying protects late blooming Asters to feed migrating Monarchs

September Selective Spraying

ROW Managers must consider Pollinators due to U.S. Federal Strategy and T&E Listing of Species

Rusty Patched
Bumble bee
Several bees petitioned

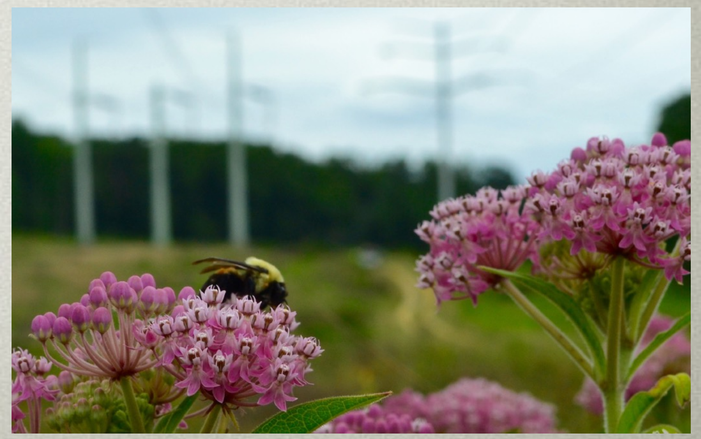
IVM benefits pollinators

Monarch
Butterfly
Warranted

Bombus
Pollinator Site Value Index (PSVI)

Target Focus	Rating
1. Plant species found in case study site	% Cover
2. Pollen quality rating * of each specie	1-5
3. Nectar quality rating * of each specie	1-5
4. Plant specie regional flowering months	1-12
5. Overwintering/Breeding habitat (dead vegetation, leaf litter, bare soil)	% cover (10% max)

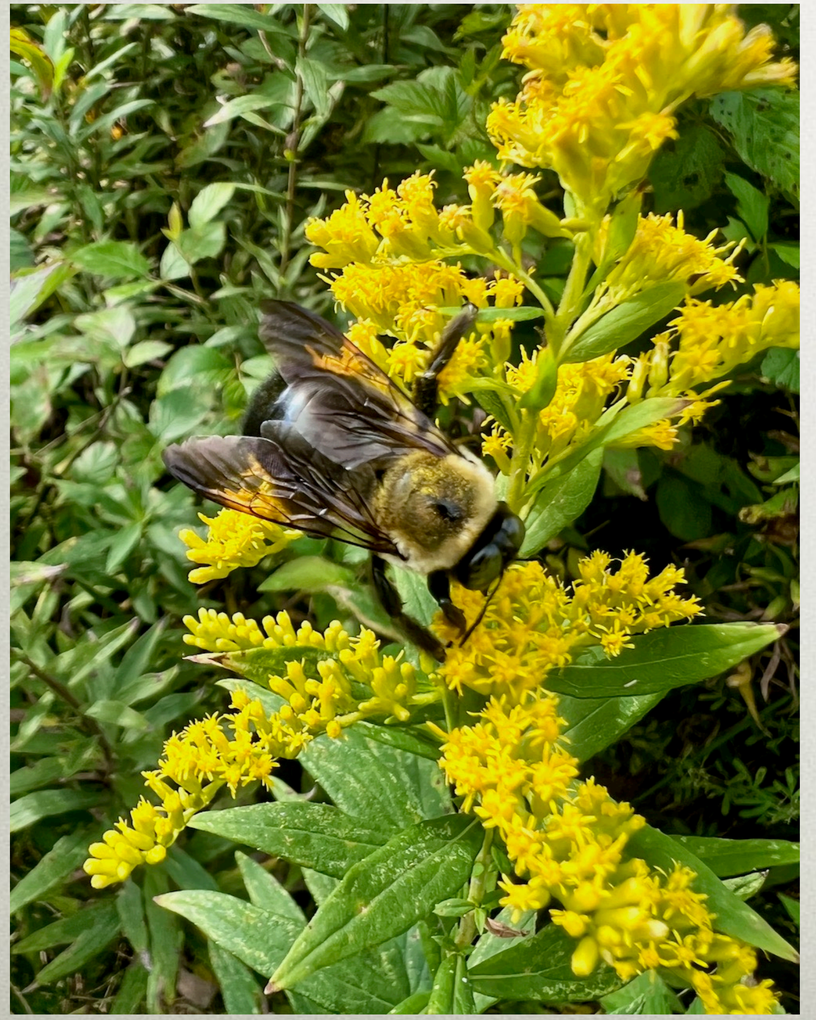
Lindtner, Peter. Garden Plants for Honey Bees. 2014. (ISBN: 978-1-878075-37-6) Wicwas Press, MI., USA. 396 pp.



Dead stems and Bare Soil provide Native Bee Nesting Habitat

BOMBUS 680+ Plants SEQUENCED BY PLANT ORDER	• www.ivmpartners.org					
Order	**Description**	**N Accumulative value**	***P* accumulative value**	**n #**	**Nectar**	**Pollen**
Alismatales/Arales	Arums/water plantains/pondweeds/ duckweeds	0	2	2	0.00	1.00
Apiales	Wild carrot/wild parley/Hedera	3	3	3	1.00	1.00
Aquifoliales/*Celastrales*	Ilex hollies	4	3	1	4.00	3.00
Asterales	Sunflowers/composites	121	112	59	2.05	1.90
Asterales - Helianthus only	Sunflowers	17	22	6	2.83	3.67
Asterales - Solidago only	Goldenrod	6	8	3	2.00	2.67
Asterales - Symphyotrichum only	Asters	12	12	6	2.00	2.00
Asterales - Verbesina only	Crownbeards	7	5	3	2.33	1.67
Asterales - Vernonia only	Ironweeds	5	4	2	2.50	2.00
Brassicales/Capparales	Mustards/pepperweed/yellow rocket/ Brassicas	1	1	1	1.00	1.00
Campanulales/*Asterales*	Bellflowers	1	2	1	1.00	2.00
Caryophyllales/*Polygonales*	Smartweeds/pinks/catchflies/cacti/ succulents	19	7	7	2.71	1.00
Caryophyllales - Polygonales alone	Smartweeds	15	6	6	2.50	1.00
Caryophyllales alone	Pinks, catchflies/cacti/succulents	1	1	1	1.00	1.00
Celastrales	Bittersweet/Euonymus	1	1	1	1.00	1.00
Commelinales	Day flowers/Pickerle weeds	8	8	3	2.67	2.67
Cornales	Dogwoods/hydrageas/Nyssas	2	3	3	0.67	1.00
Dipsacales	Honeysuckles/elder/viburnums	9	10	5	1.80	2.00
Ericales	Blueberries	22	16	12	1.83	1.33

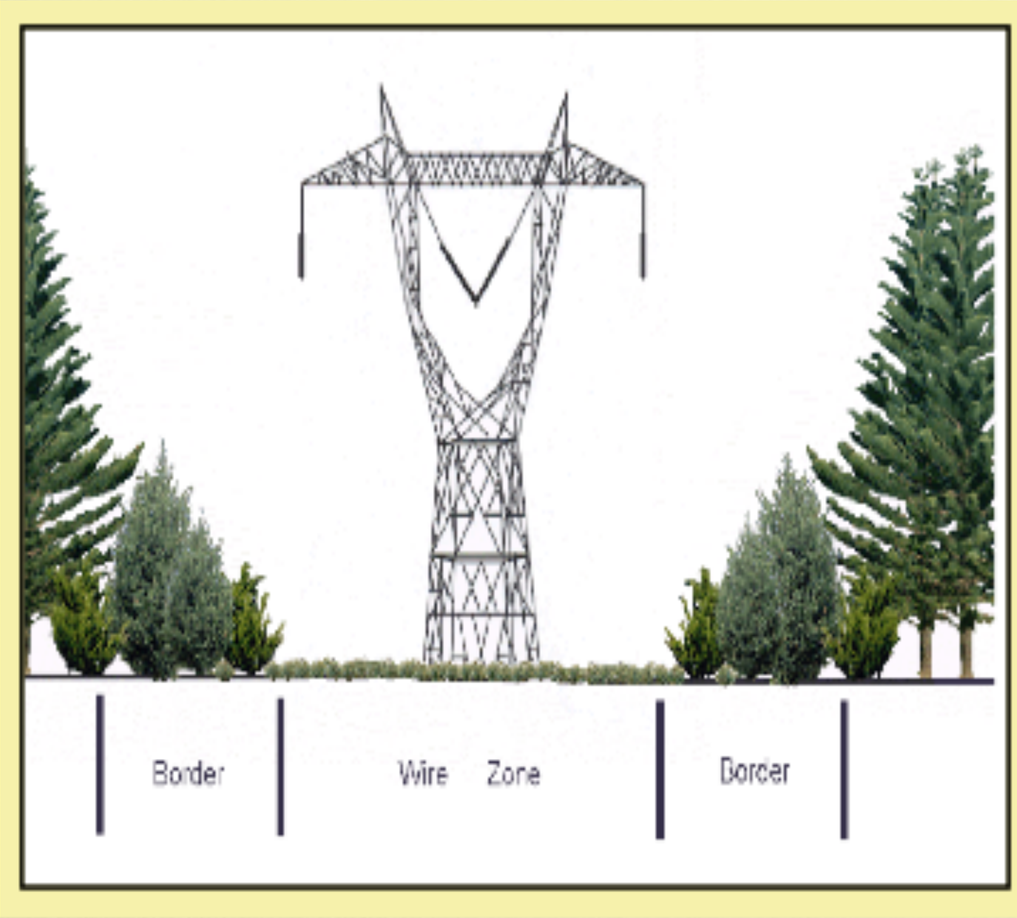
Pollinator Site Value Index (PSVI)



Plant Taxonomic Orders Important Nectar-Pollen for *Bombus*

- Asterales (Composites/Asters)
- Fabales (legumes)
- Lamiales (mints)
- Gentianales (milkweeds)
- Myrtales (Evening primroses)

ANSI-A300 Part 7 - IVM
Electric transmission Should be Managed to a Wire Zone - Border Zone



70 Years Research at Gamelands 33

Delmarva

Wire zone broadcast treated to favor grass
Border zone selective treated to favor forbs

Stoney Creek Metropark - ITC

Michigan Habitat Differences
Wire Zone - Border Zone

Management objectives determine method and chemistry which affects Pollinator Habitat

J. Percy Priest Lake
Nashville, TN
TCEnergy Pipeline Conversion

Army Corps of Engineers and Columbia Gas

Gas/Oil companies mow entire ROW for Maintenance & Testing but it removes pollinator habitat

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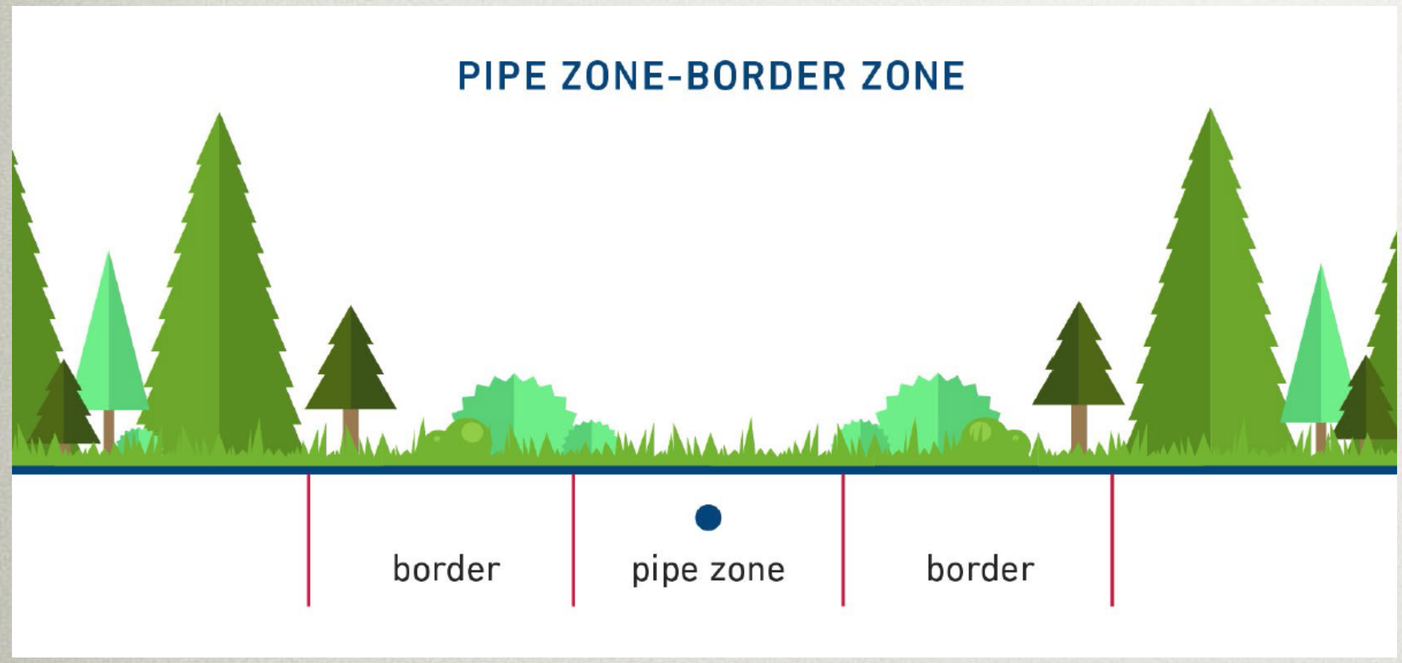
developed Spray from Behind Backpacks to treat Pipe zone

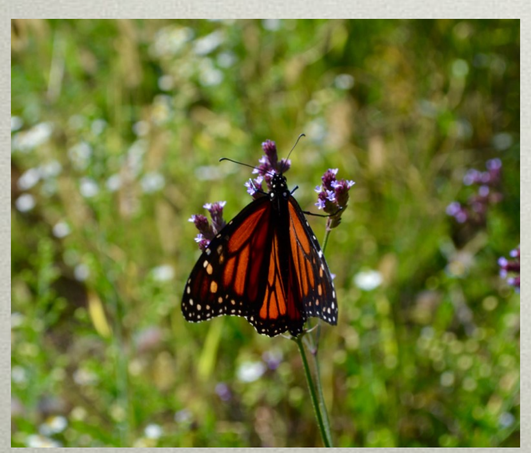
Progressive Solutions

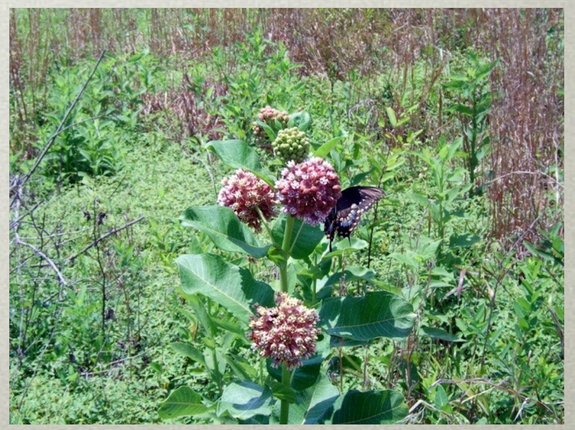
ANSI-A300 Part 7 - IVM
Latest Standard



Pipe Zone for
access & testing

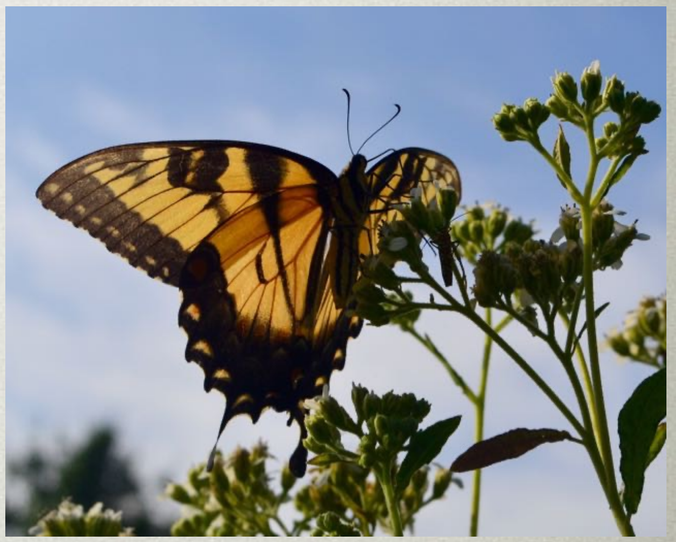
Border Zone for pollinator & Wildlife habitat





We use a Lepidopteran Metric Pollinator Site Value Index (PSVI)



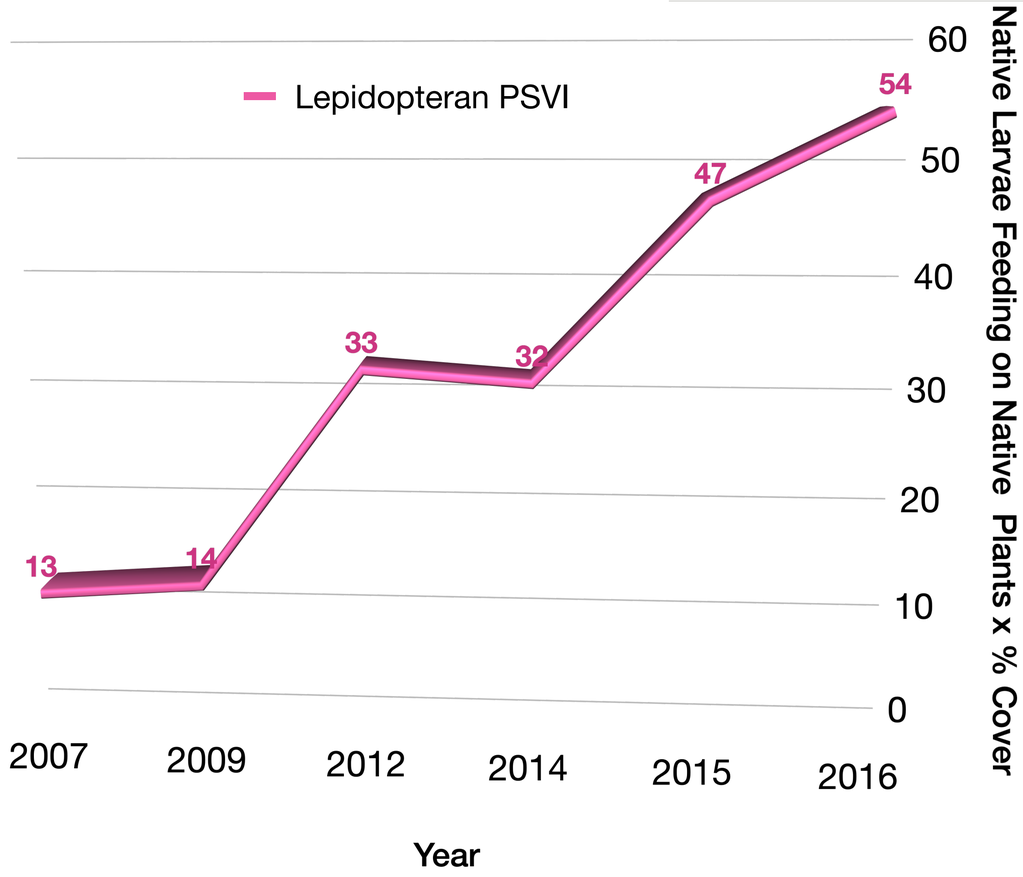



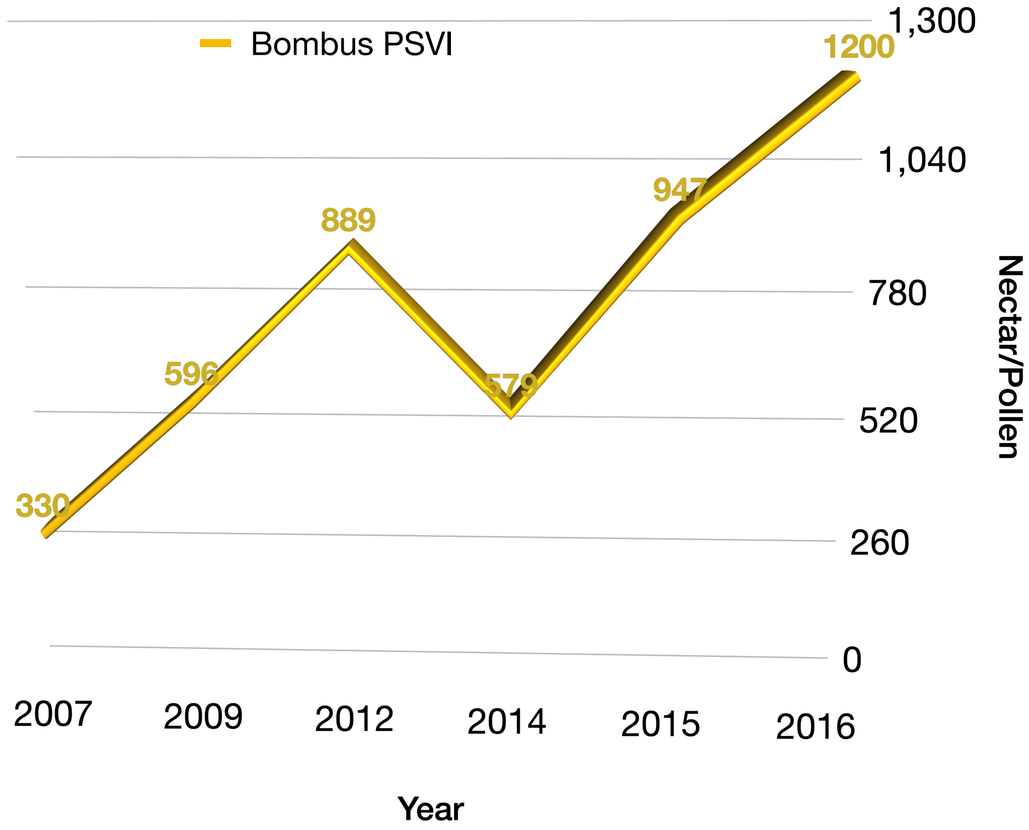
Number of native lepidopteran larvae species feeding on native plants x percent plant cover

- Ref: Tallamy, Douglas W., and Kimberley J. Shropshire. "Ranking lepidopteran use of native versus introduced plants." Conservation Biology 23, no. 4 (2009): 941-947.

Lepidopteran Larvae Family 1360+ (as listed by USDA)	Family as per Robinson et al. 2002	Genus	common name	herb or woody	origin (for analysis)	origin	species counts (Mid-Atlantic numbers unless otherwise indicated)	total Lep spp	exotic Lep spp	Native Lep spp
Caprifoliaceae	Caprifoliaceae	***Abelia***	abelia	w	alien	alien	1 alien	1	0	1
Malvaceae	Malvaceae	***Abelmoschus***	okra	h	alien	alien	1 alien, perhaps another if cultivated	11	0	11
Pinaceae	Pinaceae	***Abies***	fir	w	native	both	3 natives, 1 alien perhaps others if cultivated	117	4	113
Malvaceae	Malvaceae	***Abutilon***	indian mallow, velvet leaf	h	alien	alien	1 alien, perhaps others if cultivated	5	1	4
Fabaceae	Leguminosae(M)	***Acacia***	acacia, wattle	w	native	native unless	1 natives, perhaps many aliens if cultivated	11	1	10
Euphorbiaceae	Euphorbiaceae	***Acalypha***	copperleaf	h	native	both	5 natives, 1 alien (NY&NJ)	3	0	3
Asteraceae	Asteraceae	***Acanthospermum***	starburr	h	native	both	1 native, 2 aliens	0	0	0
Aceraceae	Aceraceae	***Acer***	maple, boxelder	w	native	both	9 natives, 5 aliens perhaps others if cultivated	297	10	287
Asteraceae	Compositae	***Achillea***	yarrow, sneezeweed	h	native	both	1 native, 4 aliens perhaps others if cultivated	21	1	20
Amaranthaceae	Amaranthaceae	***Achyranthes***	chaff flower	h	alien	alien	1 aliens perhaps 2 others if cultivated	0	0	0
Calyceraceae	Calyceraceae	***Acicarpha***	acicarpha	h	alien	alien	1 alien	0	0	0
Lamiaceae	Lamiaceae	***Acinos***	basil thyme	h	alien	alien	1 alien	0	0	0
Asteraceae	Asteraceae	***Acmella***	spotflower	h	alien	alien	1 alien perhaps another if cultivated (native further south)	0	0	0
Ranunculaceae	Ranunculaceae	***Aconitum***	monkshood	h	native	both	3 natives, 1 alien perhaps others if cultivated	3	0	3
Acoraceae	Acoraceae	***Acorus***	sweetflag	h	native	native unless	2 natives, perhaps 1 alien if cultivated	0	0	0
Ranunculaceae	Ranunculaceae	***Actaea***	baneberry, bugbane	h	native	native unless	6 natives, perhaps 1 alien when cultivated	4	0	4
Actinidiaceae		***Actinidia***	kiwi, tara vine	w	alien	alien	Cultivated, 1 alien, perhaps 2 others.	0	**0**	0
Pteridaceae	Adiantaceae	***Adiantum***	maidenhair fern	h	native	native unless	3 natives perhaps aliens if cultivated	0	0	0
Fumariaceae	Fumariaceae	***Adlumia***	Allegheny vine	w	native	native	1 native	0	0	0

Army Corps of Engineers - TransCanada Tennessee Partnership
PSVI 10-year transition





US Forest Service uses National Environmental Policy Act (NEPA) to Hinder IVM Best Practices

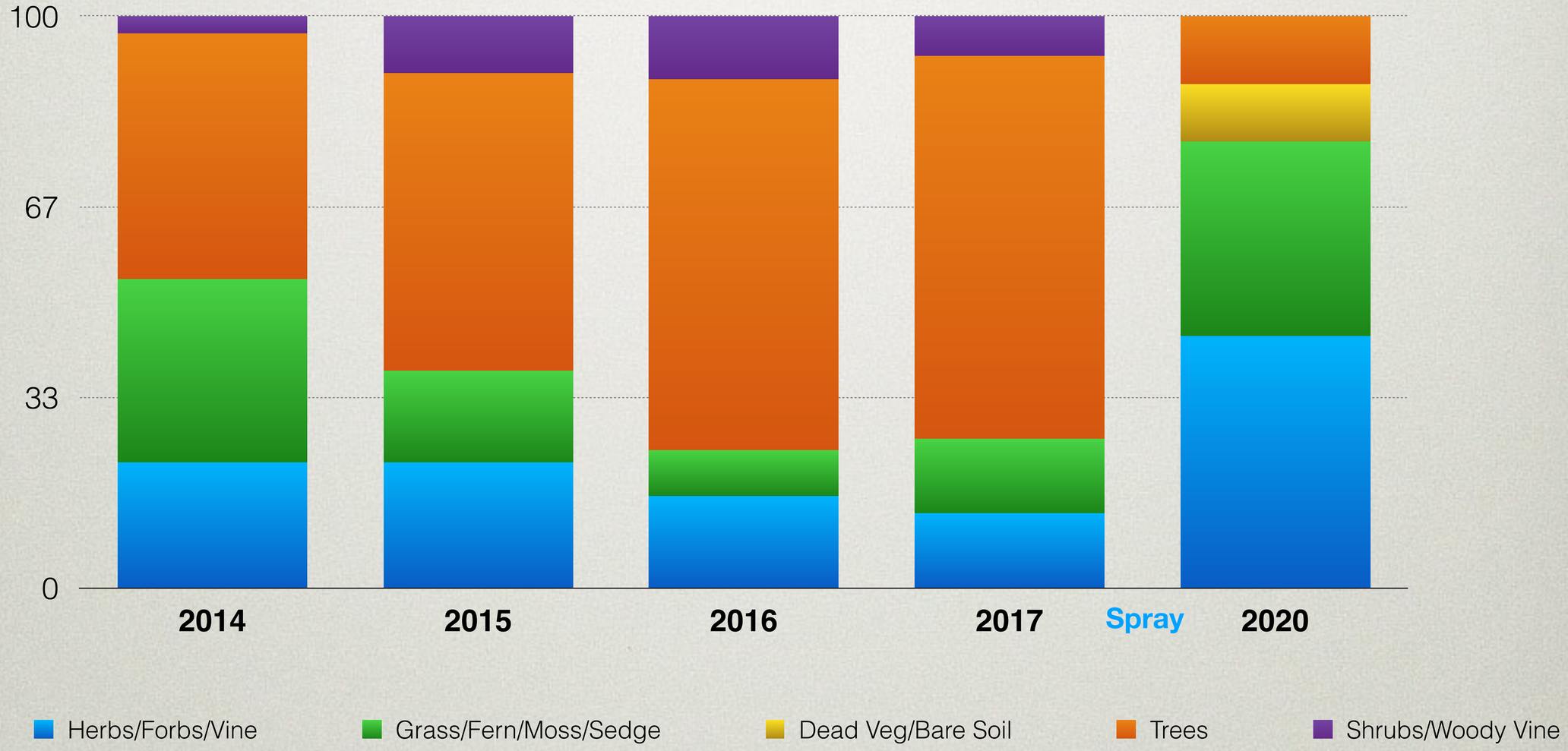
Ouachita National Forest
Arkansas

Mow
2013

Mow
2017

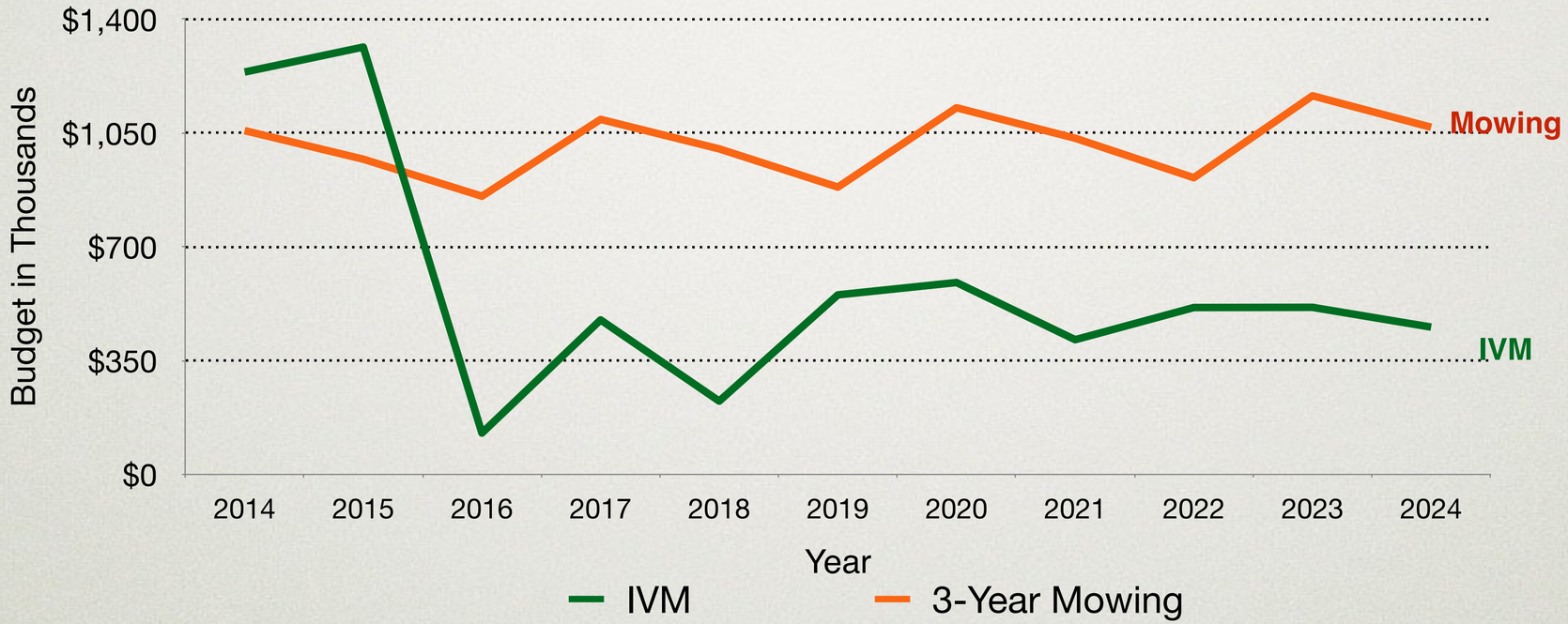
Spray
2019

One Herbicide Treatment changed Tree/Invasive Plant Dominance



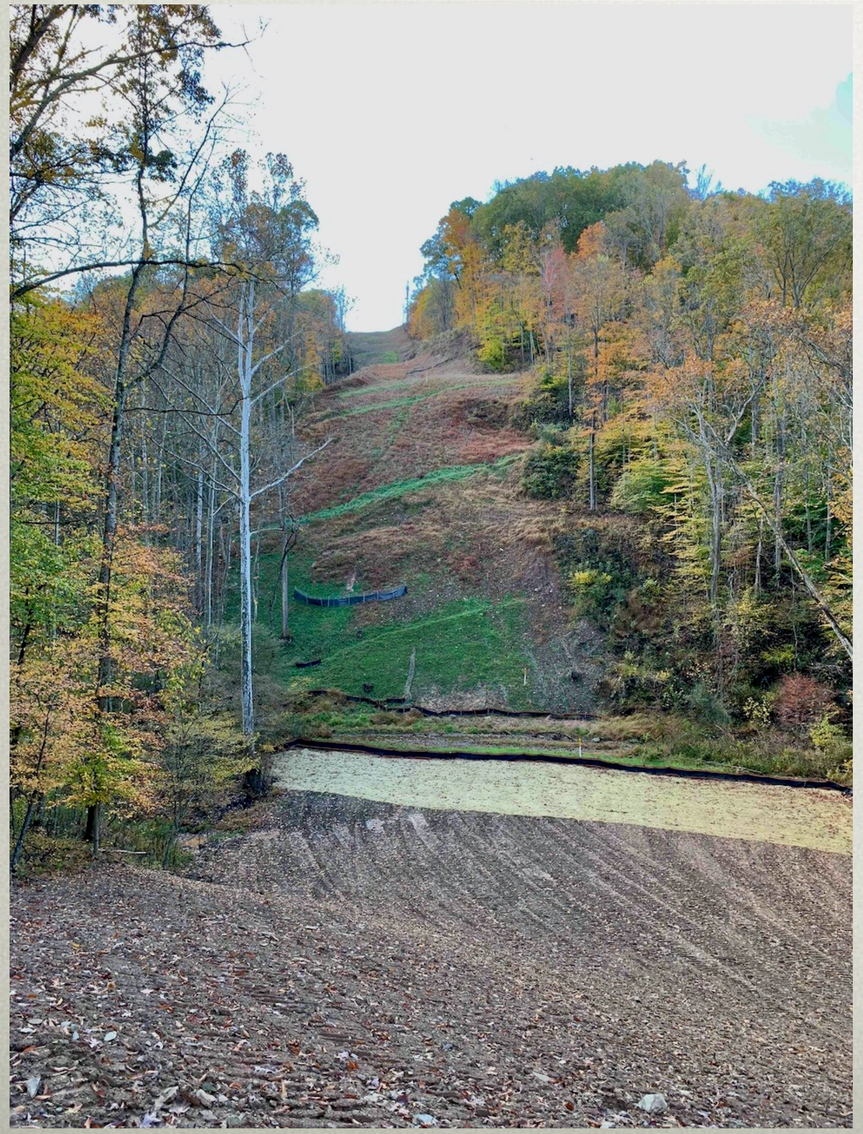
IVM saves $

Enable Midstream Partners



Economics

Costly Seeding is Routine for New Line Construction or Pollinator Plots



Planting Orchard Grass or Lespedeza on new ROW has no pollinator value

"Begin with the End in Mind"
Plant Grass in Pipe Zones - Native Forbs in Border Zones

Reclaim a Pipeline by Cutting the Brush, Treating the Trees and Invasives and Allowing Native Prairie to Germinate

Big & Little Bluestem, June, Deertongue, Brome, Panic Grasses

Black-eyed Susan, Golden Aster, Rose-Gentian, Sunflower, Laceflower,

Petunia, Indian Blanket, Orchid, Showy Spring, Milkweed

Roadside Tree PLanting Regulations to Then Mow around them does not make sense

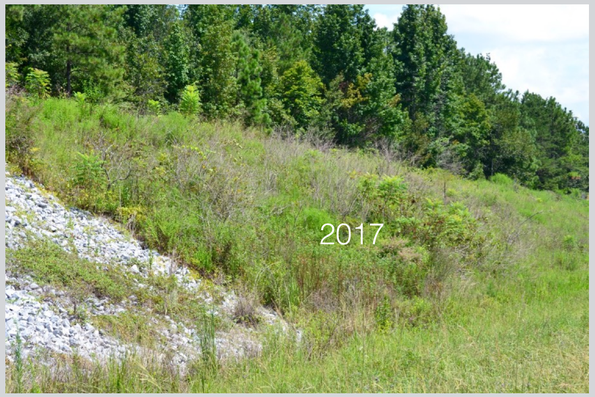
University Maryland - MDOT
Mow for sight distance and let dormant plants germinate

51 species sprouted

Train Crews in Plant Identification prior to Spraying

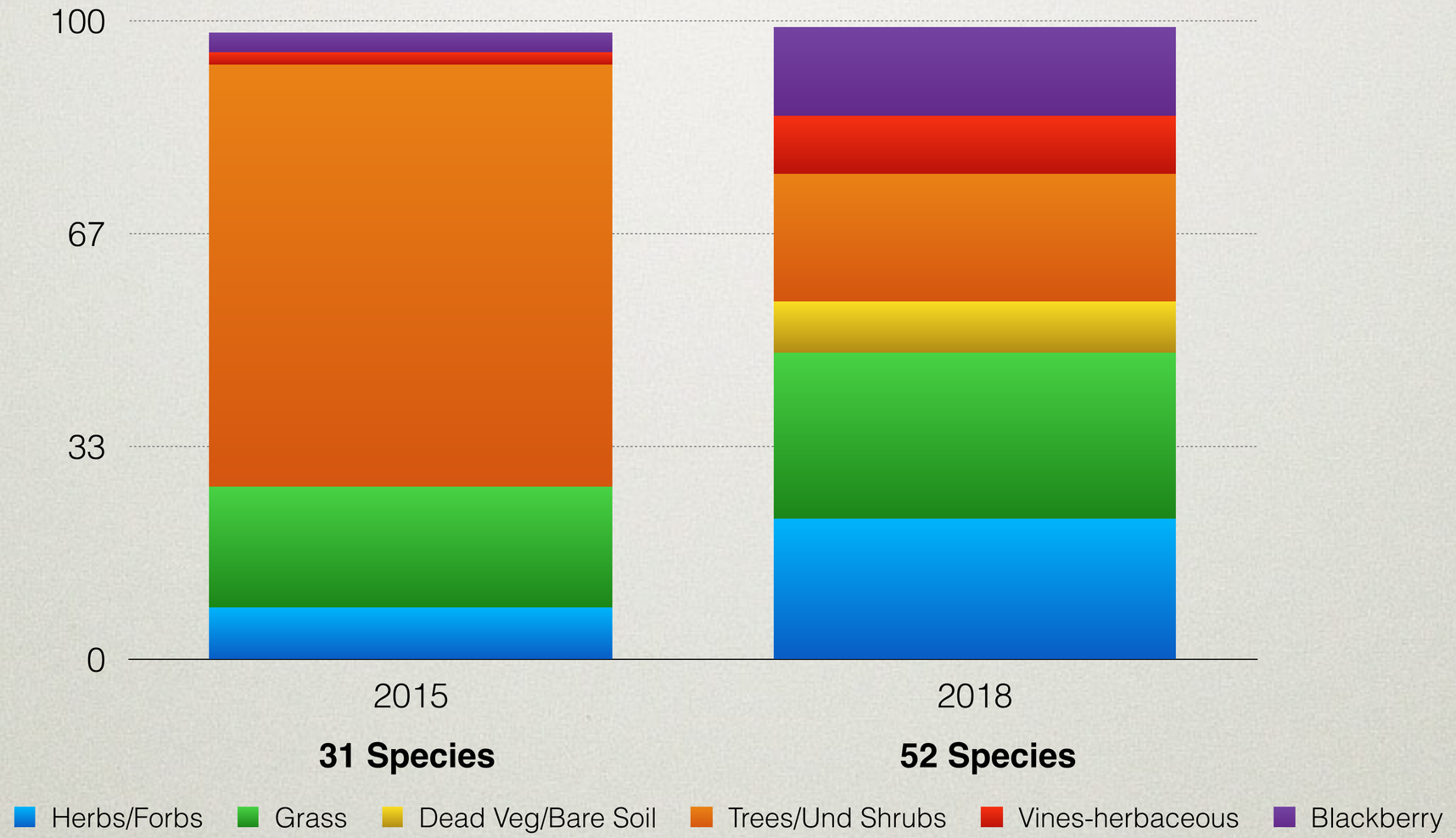
Selectively treat Incompatible Trees & Invasive Plants while keeping Pollinator Habitat

Mow only Zone 1
Treat zones 2-3
Swale and back-slope

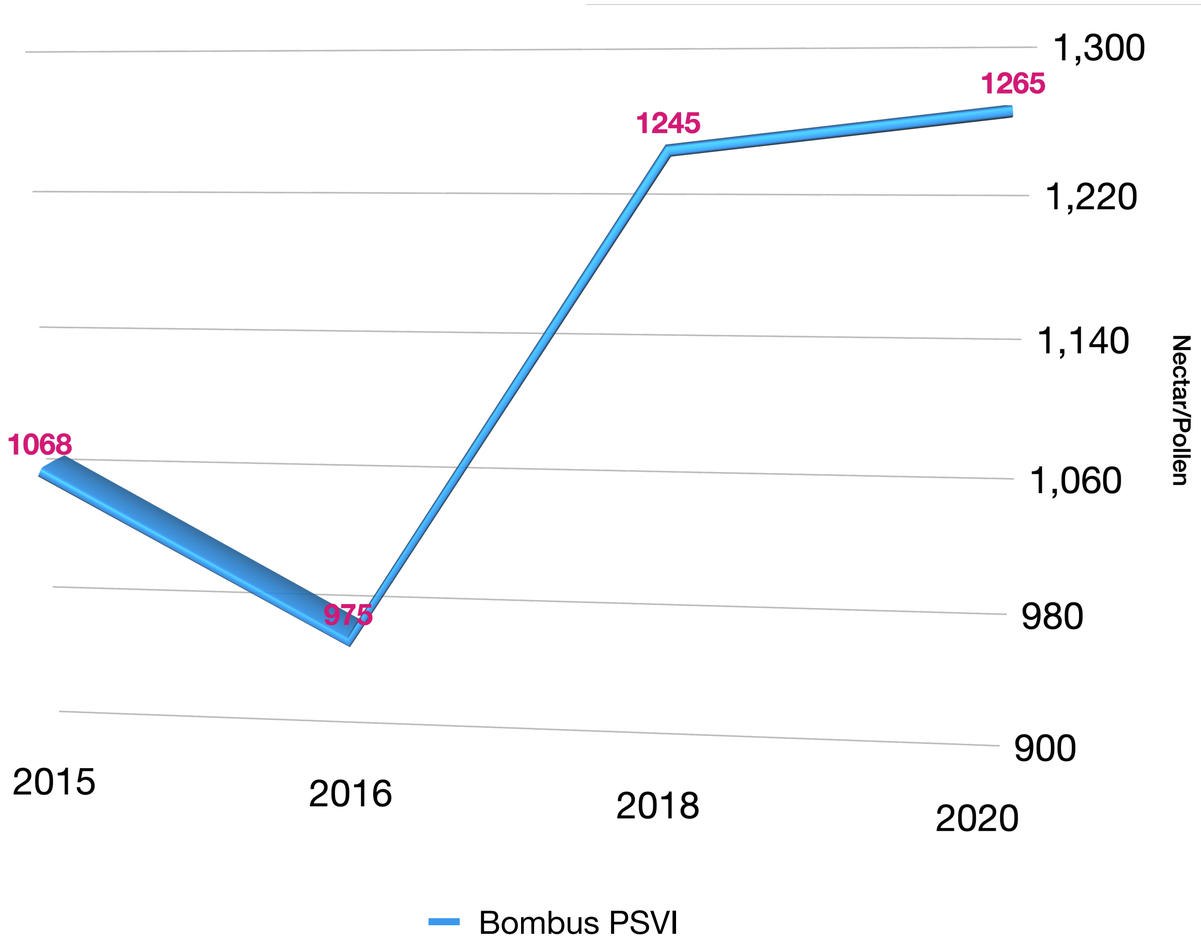


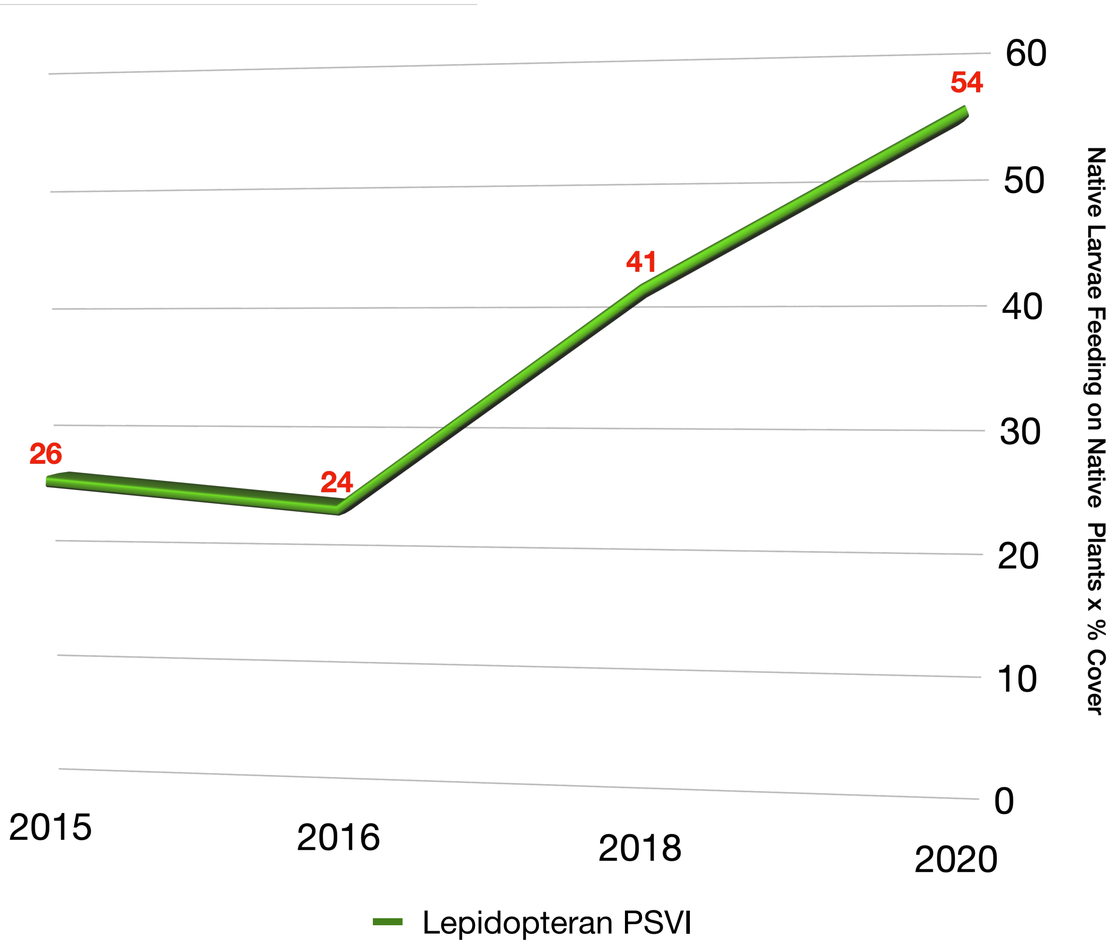
Alabama DOT

One herbicide treatment removed trees and privet releasing 21 new species



Alabama DOT
5-Year PSVI





Florida DOT

Saving $200/acre/year by NOT Mowing

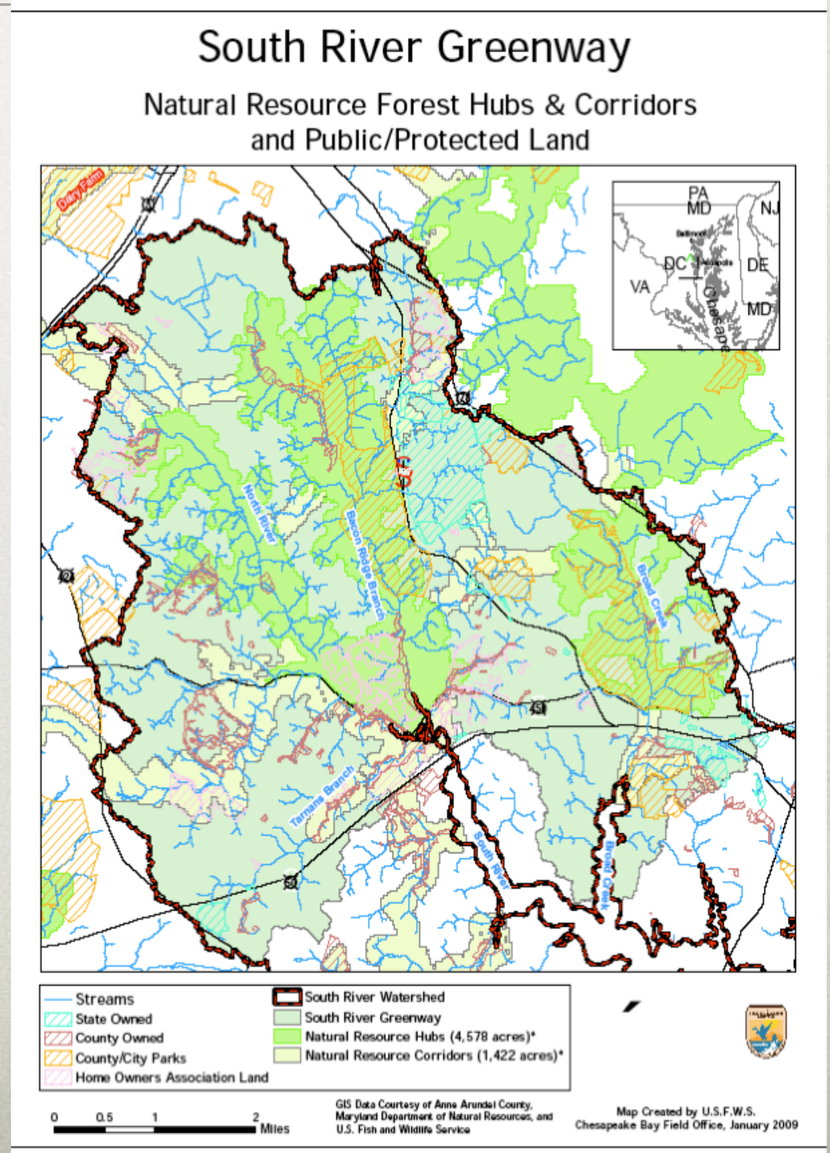
Utility and DOT should Partner for Pollinators

Only Mow Zone 1

Manage for Pollinators

Liaison for BGE to join South River Greenway Partnership

- US Fish & Wildlife Service
- MD/DC Audubon
- MD Environmental Trust
- MD DNR
- Scenic Rivers Land Trust
- South River Federation
- National Fish & Wildlife Foundation
- Biophilia Foundation
- Anne Arundel County
- Trust for Public Land
- Environmental Finance Center



Herbicides are the 'medicine' to fix sick ecosystems

- Adjust chemistry & technique to affect only target plants
- Goal is to stop root growth of weeds
- Method depends on height and density of plants and site sensitivity
- Herbicide mix is adjusted for wetland or upland sites and target species
- A mixture of chemistry provides synergy and improved efficacy
- Weed removal allows germination of suppressed grasses and wildflowers
- Desirable plants compete for growing space and improve habitat for pollinators
- Plants and wildlife provide biological controls that minimize future treatments & cost

IVM can manage meadow & shrub habitats in appropriate zones

Mowed

Maryland

IVM

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Partner to treat invasive plants like phragmites

Restore native wetland ecosystems

Federal Agencies assisted in Training at Field Workshop

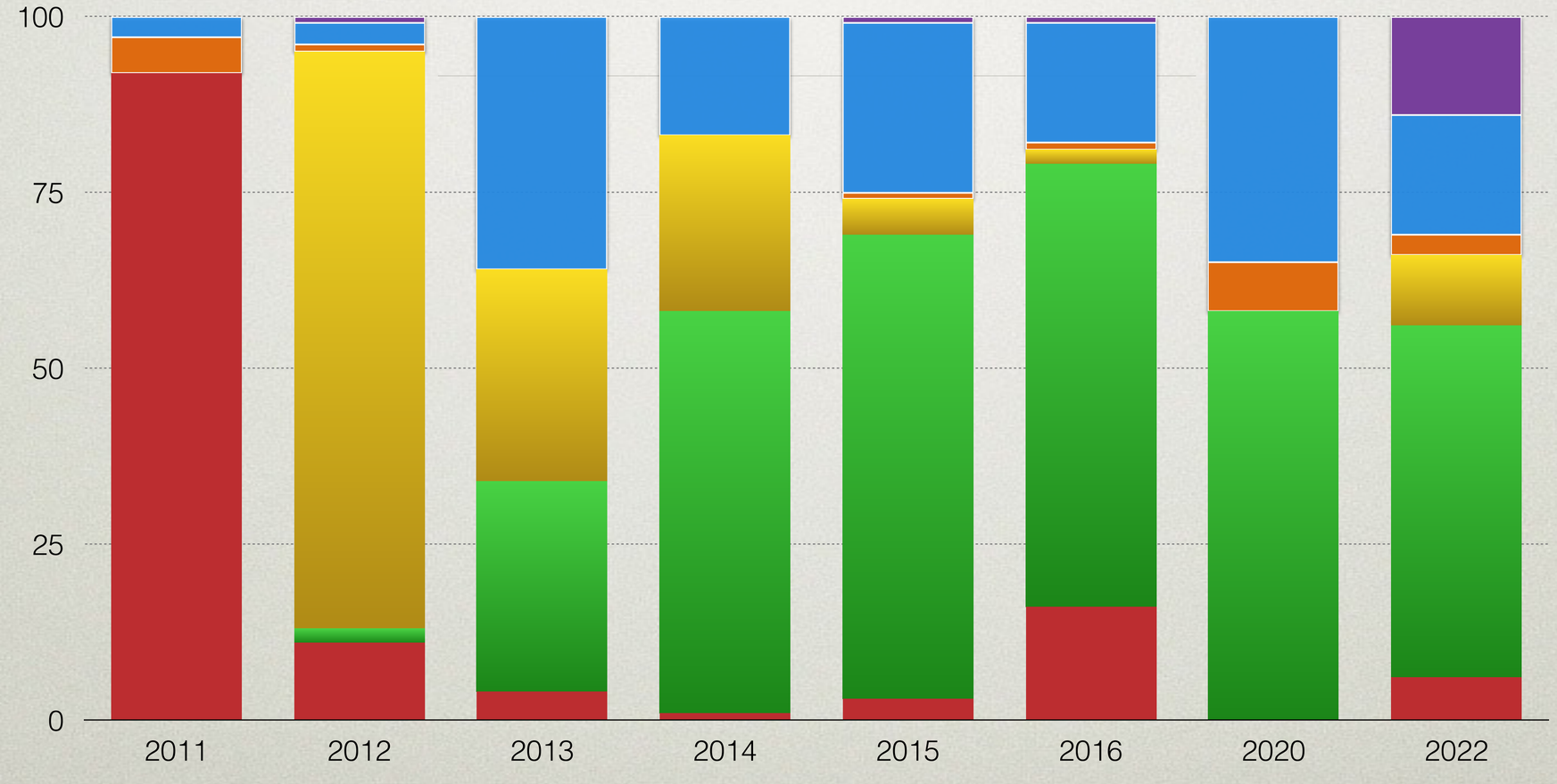
Rich Mason, USFWS
Praised Bird Habitat

Sam Droege, USGS
"Best Pollinator Habitat in Mid-Atlantic States"

2-year Maryland transition

Led to partnership at Patuxent National Research Refuge

Patuxent Research Center
Invasive Autumn Olive & Callery Pear
IVM conversion to native habitat



Maryland PSC now Mandates that IVM be used on New Projects

Pennsylvania to Maryland
Wind Turbine Generation Line

IVM Adoption by EverPower across the United States

New York

California

Western wildfire concerns demand that ladder fuels and Flammable Invasive Grasses be removed

Reclaimed ROW in the Santa Fe National Forest, New Mexico

Lupine and wildflowers germinate

But trees sprout back

Gambel Oak

Pinyon Pine

Oak Sprouts and cut Slash

Wildfire Hazard

Gambel Oak
Slash and Sprouts

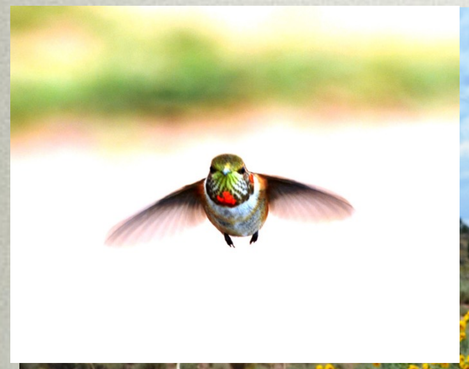
Juniper Slash

Arizona Mowing - IVM Comparison

Herbicides released grasses and Forbs

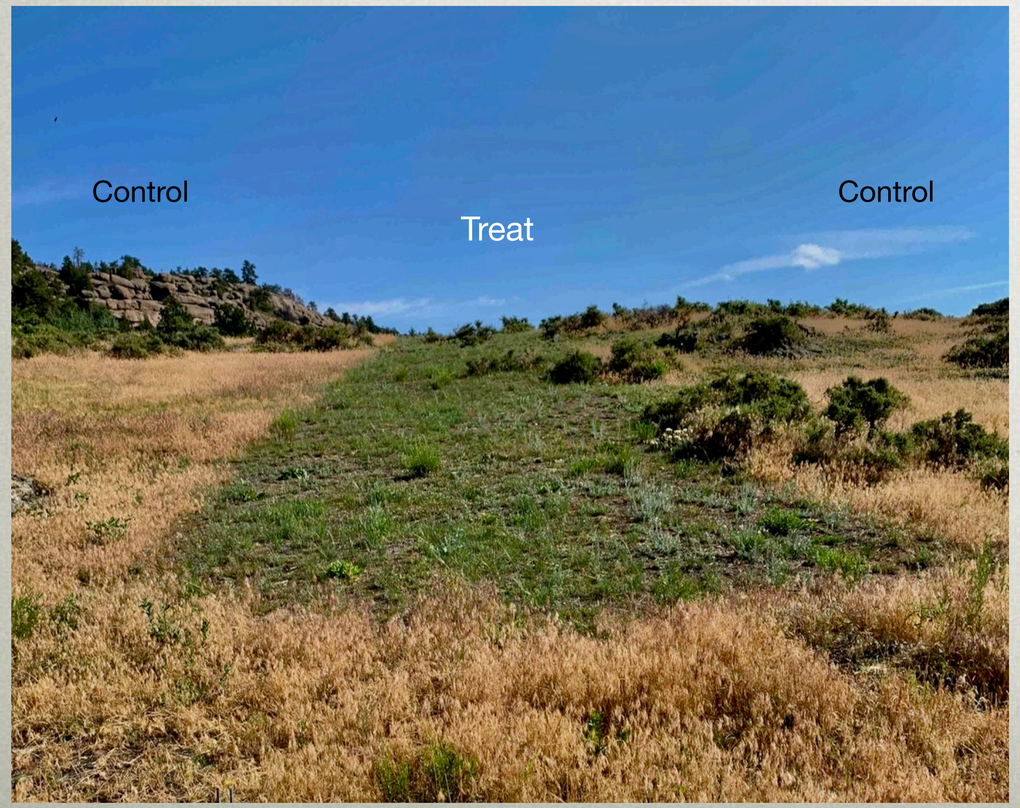
IVM partnership
APS - The Navajo Nation

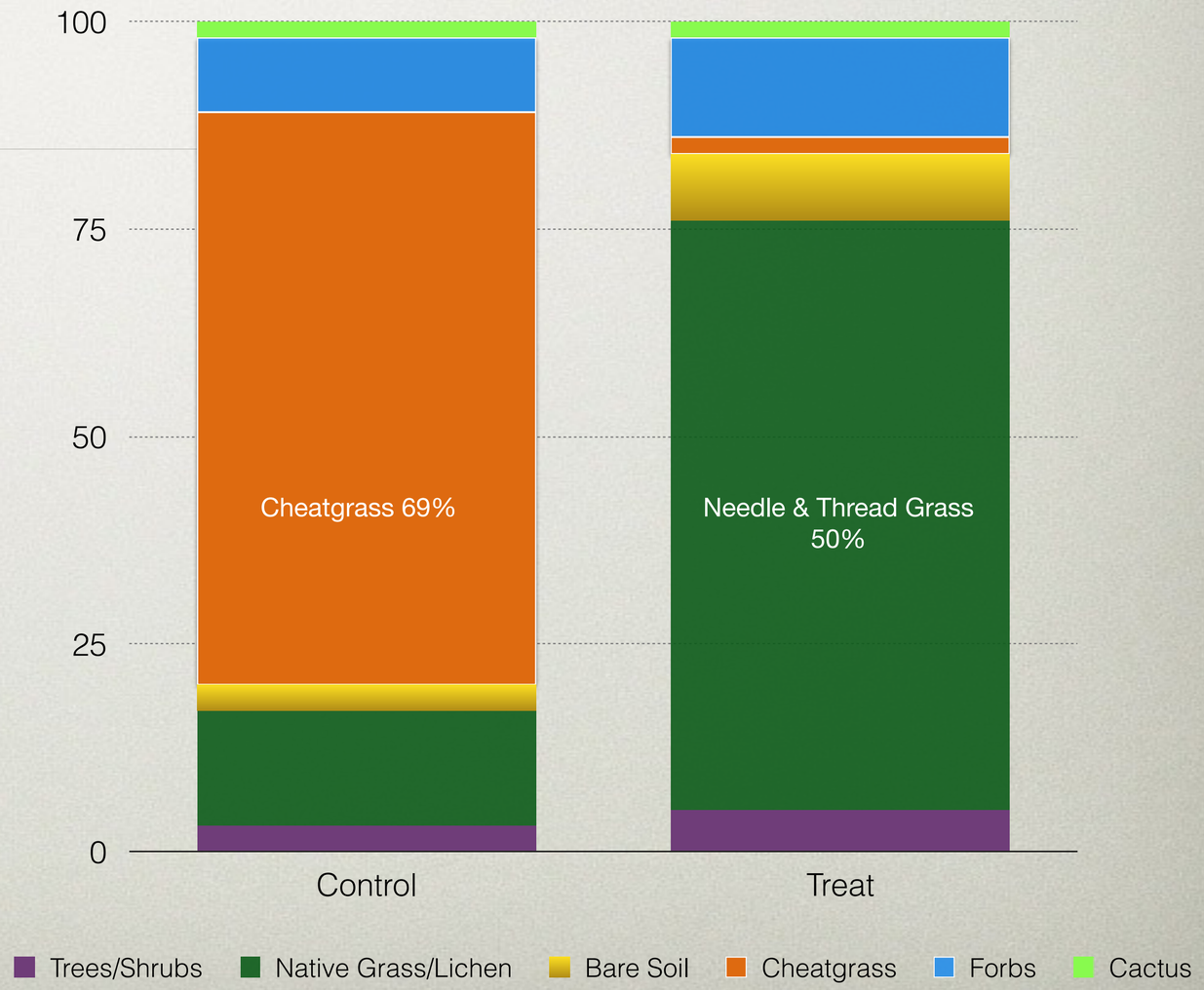
Manage ROW Rangeland for Tribal and Utility Needs



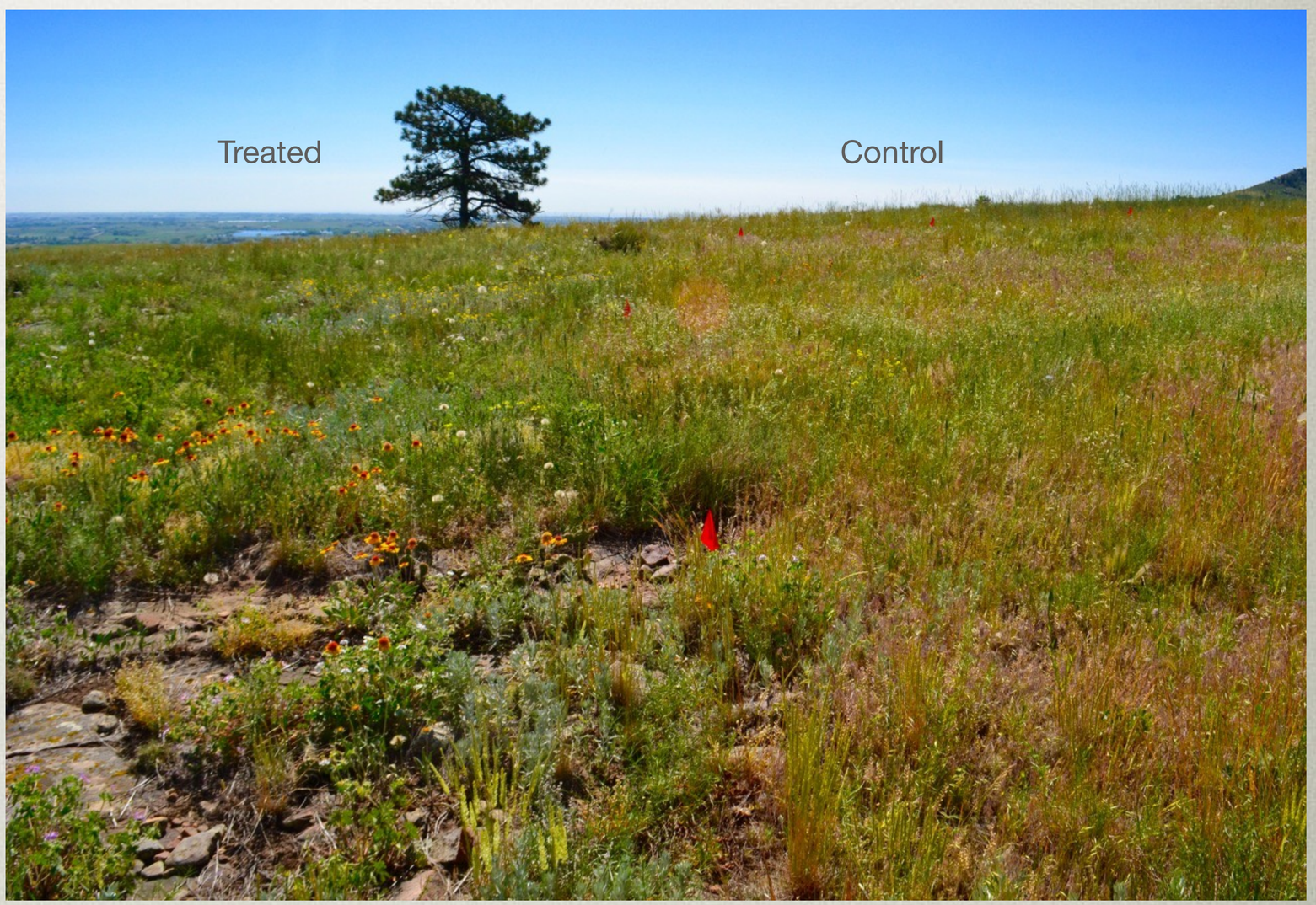
Colorado Cheatgrass Control
Rangeland Restoration

Rejuvra™ (Indaziflam) @ 5 oz/acre
Applied ATV @ 15 gals/ac July 2019
Botanical Documentation July 2021





IVM can Restore Native Forbs and Grass



Manage ROW as Fire-Breaks

Revised ANSI A300 - Part 7 IVM
2019 STANDARD

IVM is not only a best practice for electric ROW…

…but for ALL land management

- IVM is used to create, promote, and conserve sustainable plant communities that are compatible with the intended use of the site, and manage incompatible plants that may conflict with the intended use

- Chemical methods should be used to transition plant community to sustainable, compatible species by facilitating biological controls

IVM uses a combination of control methods to manage for low-growing compatible vegetation

- Improve
  - Safe & reliable access and utility service
  - Homeland Security
  - Wildlife Habitat
  - Ecosystem Management
  - Sight Distance
- Promote
  - Environmental stewardship
- Control
  - Invasive vegetation
  - Wildfire

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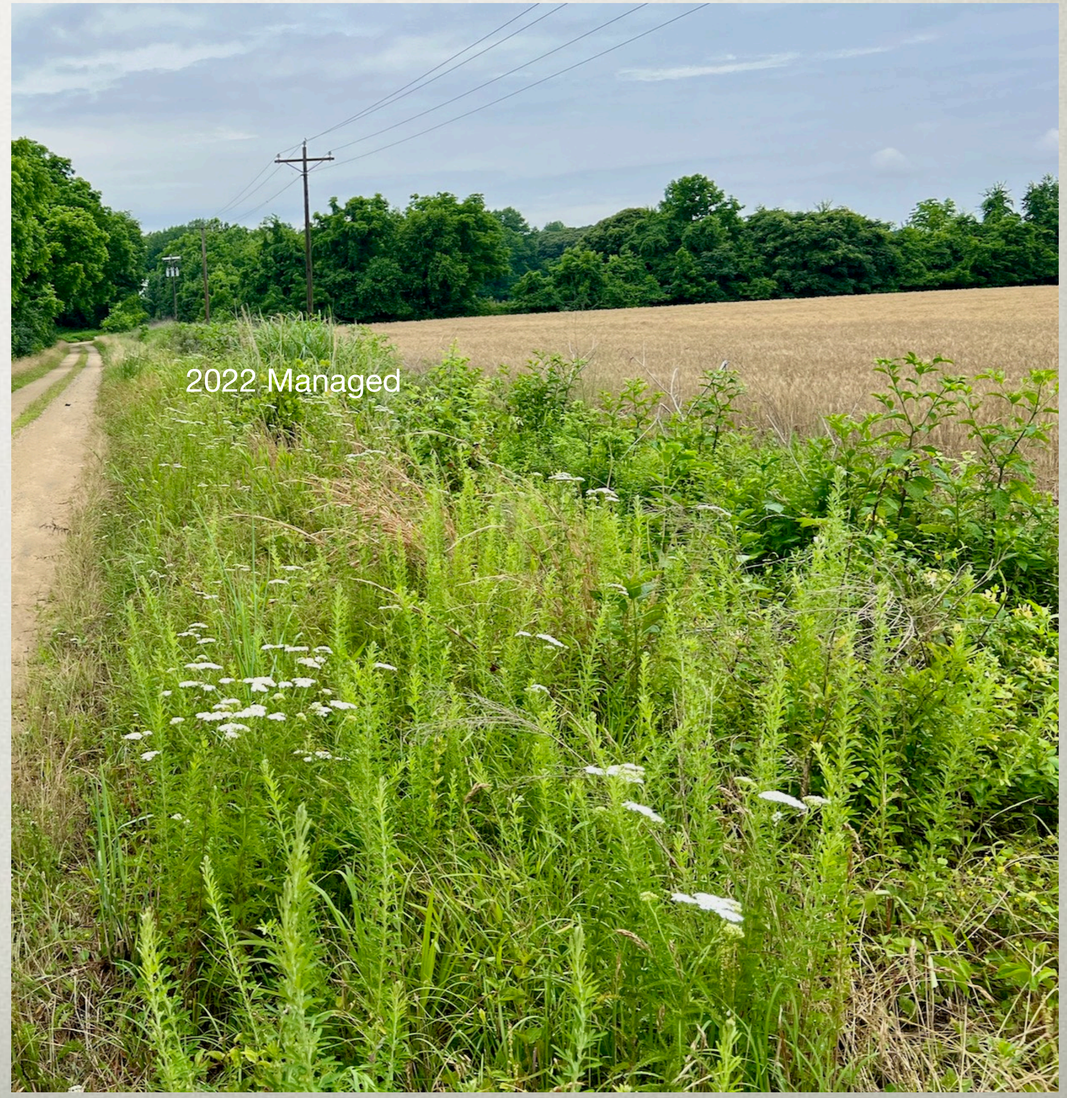
Selective Treatment at Landfill turned Nature Center

Manage Golf Course Rough for Pollinators

Stop annual mowing
and restore pollinator habitat

Manage Distribution Utility ROW for Pollinator Habitat Adjacent to Crops



Manage Agricultural Drainage Ditches & Solar Arrays

Stop annual mowing
and restore pollinator habitat

Instead of Mowed Utility ROW on Greenways

Manage them for Pollinators

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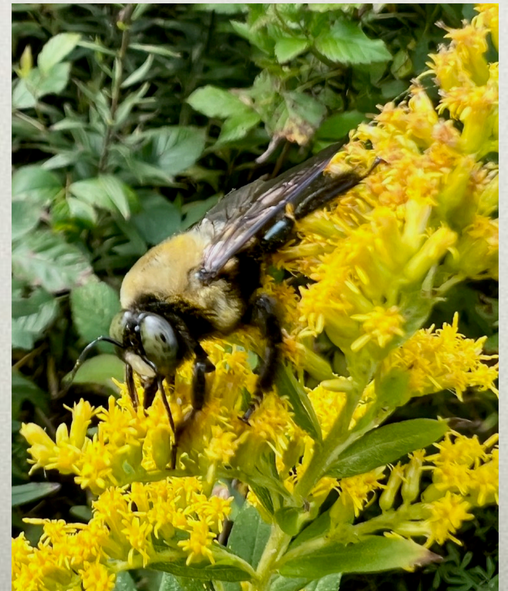
Habitat restoration is the reward



Waive City Grass Height Mowing ordinances

Bring Nature and Pollinators to Inner City Kids

IVM Case Study Conclusions

Cutting cannot manage but only maintains existing vegetation

Cutting spreads invasive plants and decreases biodiversity

Mowing should be restricted to the dormant season (November - March)

Selective Herbicides restore habitat and manage

Planting is usually not needed as suppressed native plants germinate

Native forbs provide nectar and pollen for pollinators

Plants and animals provide biological controls to lower costs

Selective treatments applicable for all land management

Integrated Vegetation Management IVM Partners

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- Case studies on electric - gas - highway ROW, farms, rangeland
- Document plant diversity based on techniques used and relative benefit to bees, butterflies, moths, birds
- Collaborate with utilities, agencies, companies, conservationists, and universities
- Publish findings at workshops, conferences, journals, website
- Develop college curriculum to educate the next generation
- Information available on web: **www.ivmpartners.org**
- **Contact: 302-299-5919 ivmpartners@gmail.com**