

Integrated Vegetation Management to Restore and Manage Landscapes & Improve Pollinator Habitat

RICK JOHNSTONE, IVM PARTNERS



IVM to Restore and Manage Landscapes and Improve Pollinator Habitat

- IVM Partners, a 501-C-3 non-profit, was incorporated August 4, 2003
Richard A. Johnstone, President
- liaison between industry, agencies, conservation and academia
- research 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

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,	% cover
<p>Lindtner, Peter. Garden Plants for Honey Bees. 2014. (ISBN: 978-1-878075-37-6) Wicwas Press, MI., USA. 396 pp.</p>	
	max)



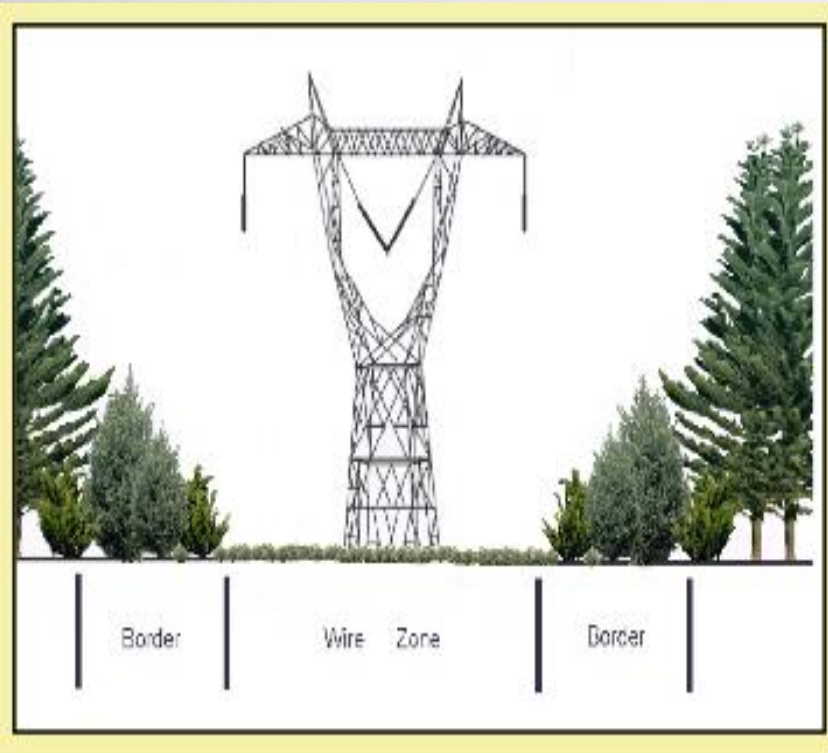
Dead stems and Bare Soil provide Native Bee Nesting Habitat



BOMBUS 680+ Plants						
SEQUENCED BY PLANT ORDER						
Order	Description	Bombus N Accumulative	Bombus 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/Pickertle 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
Euphorbiales see ME (APG II)	Spurges					
Fabales/Polygalales	Legumes/milkworts	62	50	30	2.07	1.67
Fabales - Desmodium only	Ticktrefoils	3	2	2	1.50	1.00
Fabales - Lespedeza only	Lespedeza	21	17	7	3.00	2.43
Fagales/Myricales	Bayberries/beechnut/birch	3	6	6	0.50	1.00
Gentianales	Milkweeds/dogbanes	11	9	6	1.83	1.50
Gentianales - Asclepiadaceae only	Milkweeds	7	3	3	2.33	1.00
Gentianales - Apocynaceae only	Milkweeds	2	3	2	1.00	1.50
Geraniales	Geraniums/crane's bills/woodsorrels	5	4	3	1.67	1.33
Hamamelidales	Witch hazels/plane trees	1	2	2	0.50	1.00
Juglandales/Fabales	Walnuts	0	1	1	0.00	1.00
Lamiales/Scrophulariales/Boraginales	Mints/figworts/bugloss	32	31	20	1.60	1.55
Lamiales alone	Mints/vervains	15	11	9	1.67	1.22
Lamiales - Lamiaceae - only	Mints	12	8	6	2.00	1.33
Lamiales - Scrophulariaceae - only	Penstemon/mullein, veronica	6	8	5	1.20	1.60
Laurales	Spicebush/sassafras	1	2	1	1.00	2.00
Liliales	Greenbriers/lilies	7	6	5	1.40	1.20
Magnoliales	Magnolia/tulip poplar	5	3	1	5.00	3.00
Malpighiales/Theales/Euphorbiales/	St. Johnswort/violets/willows	23	26	16	1.44	1.63
Malpighiales/Euphorbiales	Spurge/croton	6	3	3	2.00	1.00
Malpighiales/Theales	St. Johnswort	5	5	5	1.00	1.00
Malpighiales/Violales only	Violets, passionflower	3	3	3	1.00	1.00
Malvales	Mallows	6	6	3	2.00	2.00
Myrtales	Evening primrose/myrtles/loosestrifes	7	7	3	2.33	2.33
Myrtales - Onagraceae only	Evening primrose	5	5	1	3.00	3.00
Papaverales	Poppies	5	7	4	1.25	1.75
Ranunculales	Ranunculus	1	1	1	1.00	1.00

ANSI-A300 Part 7

Recommendation that Electric Transmission be managed to a Wire Zone - Border Zone



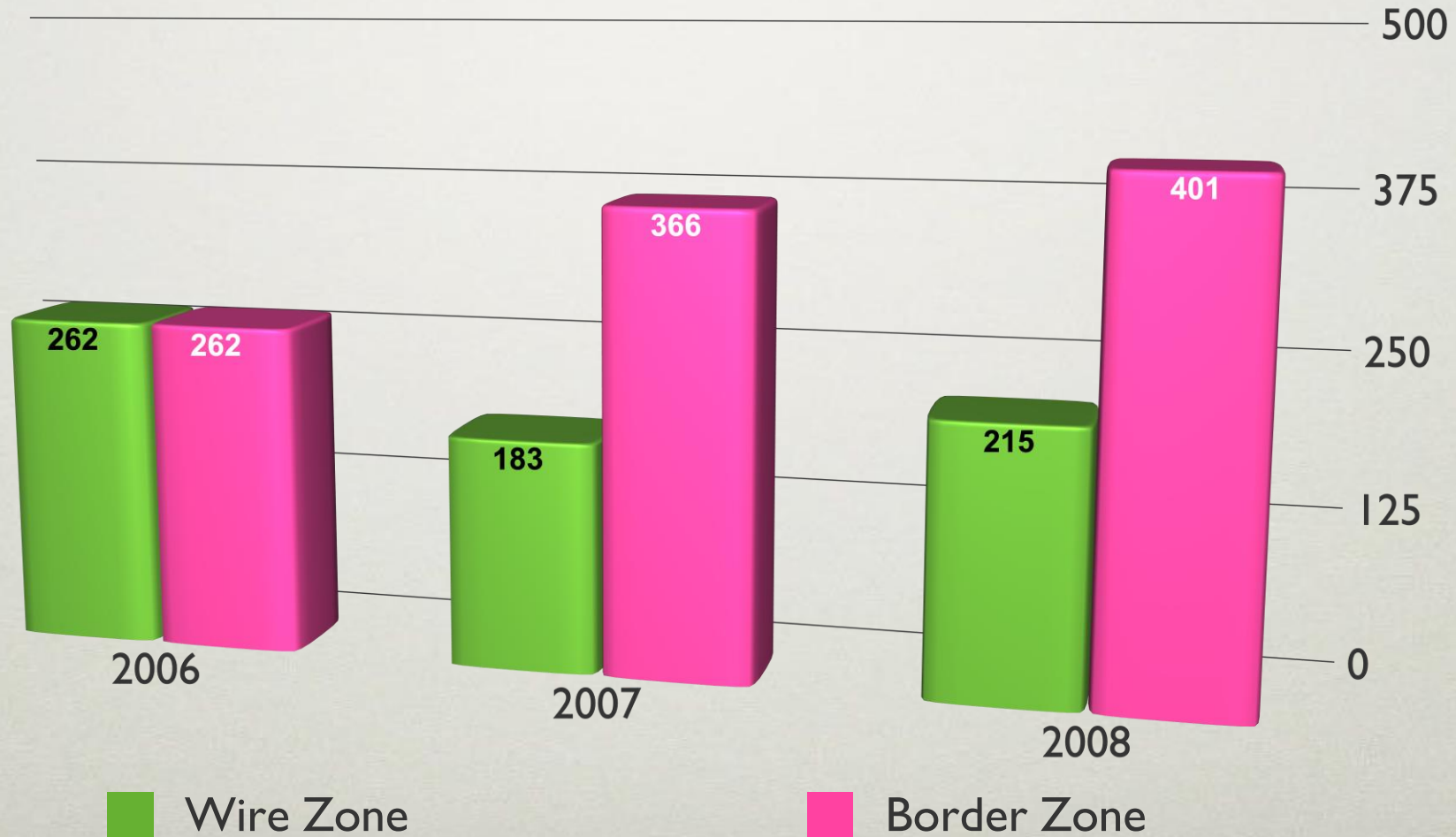
Michigan

Wire zone broadcast treated to favor grass

Border zone selective treated to favor forbs



Management objectives determine method and chemistry which affects Bee Pollinator Habitat



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

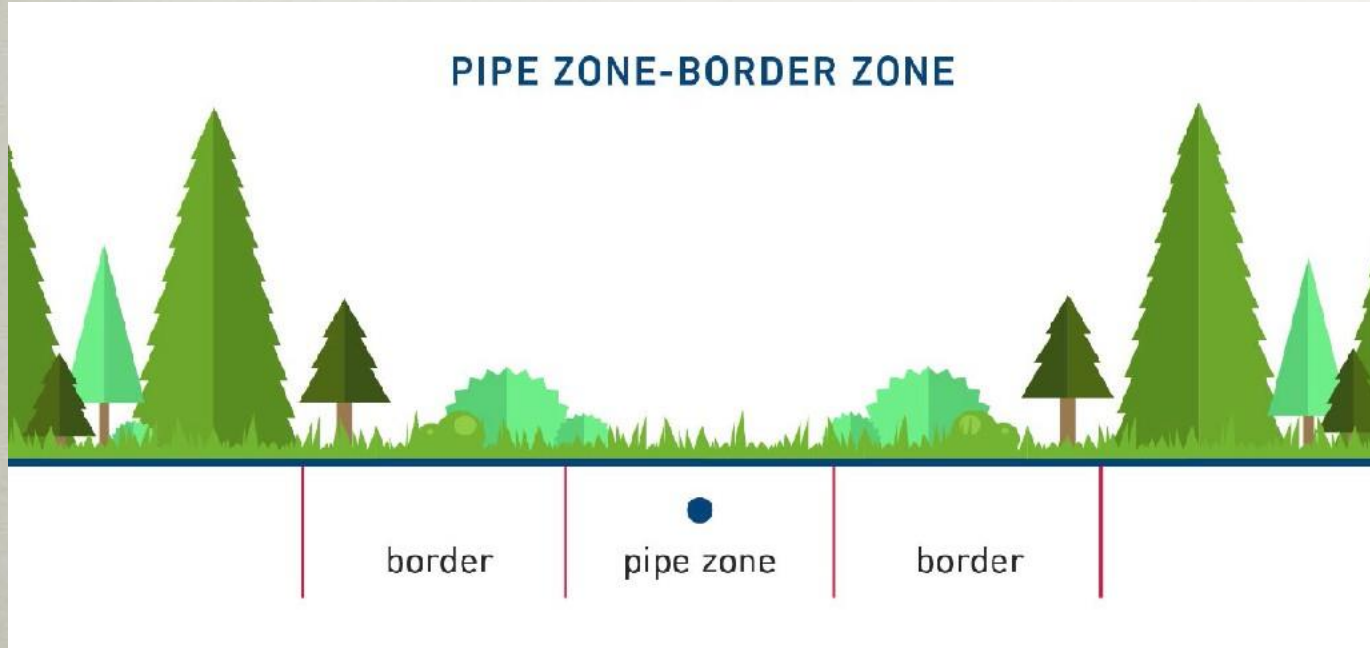


Mowers release 175 lbs carbon per acre cut!

Developed Spray from Behind Backpacks to treat Pipe Zone favoring Grass

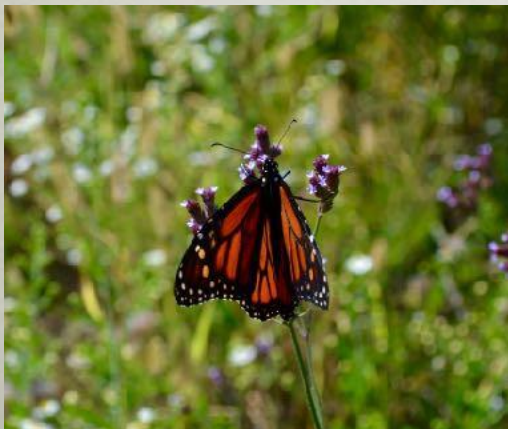


ANSI Latest IVM Standard



Pipe Zone for
access & testing

Border Zone for pollinator & Wildlife habitat



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

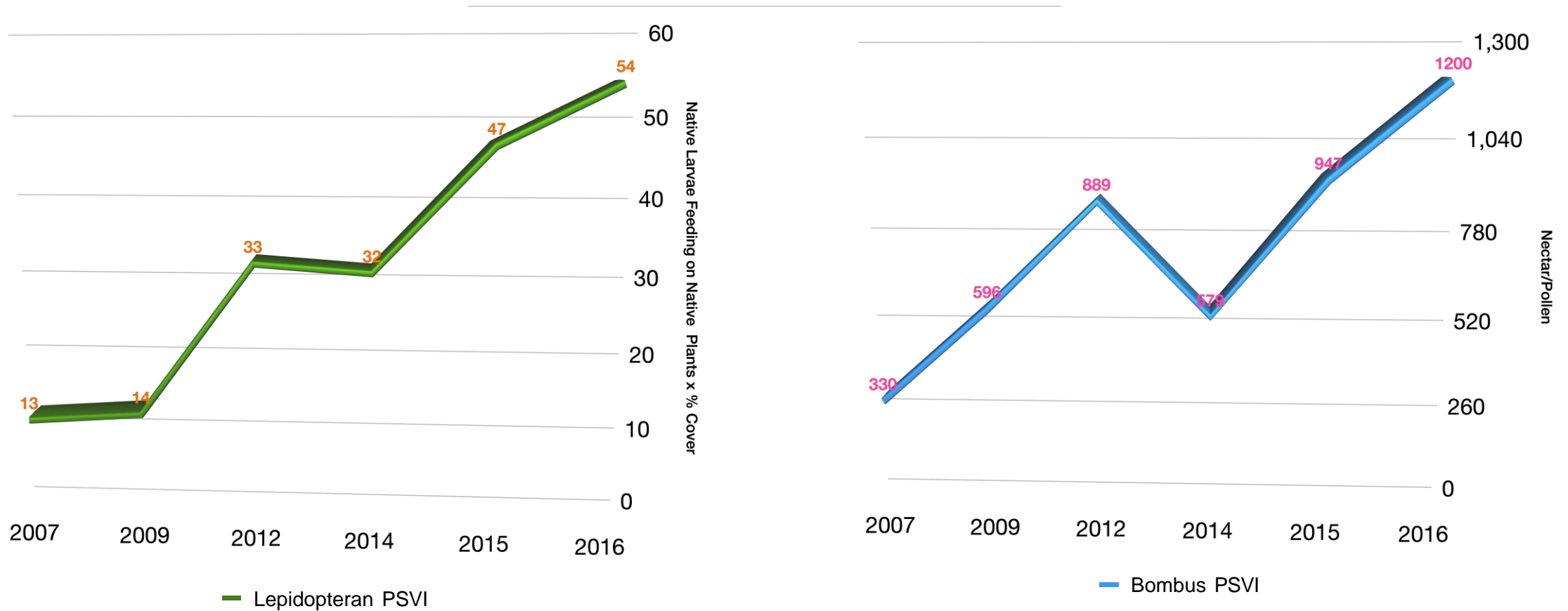


Number of native lepidopteran larvae species feeding on native plants x percent plant cover

- 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	her b or woo dy	origin (for analysi s)	origin	species counts (Mid-Atlantic numbers unless otherwise indicated)	tot al Le p spp	exotic Lep spp	Native Lep spp
Caprifoliaceae	Caprifoliaceae	<i>Abelia</i>	abelia	w	alien	alien	1 alien	1	0	1
Malvaceae	Malvaceae	<i>Abelmoschus</i>	okra	h	alien	alien	1 alien, perhaps another if cultivated	11	0	11
Pinaceae	Pinaceae	<i>Abies</i>	fir	w	native	both	3 natives, 1 alien perhaps others if cultivated	117	4	113
Malvaceae	Malvaceae	<i>Abutilon</i>	indian mallow, velvet leaf	h	alien	alien	1 alien, perhaps others if cultivated	5	1	4
Fabaceae	Leguminosae(M)	<i>Acacia</i>	acacia, wattle	w	native	native unless cultivated	1 natives, perhaps many aliens if cultivated	11	1	10
Euphorbiaceae	Euphorbiaceae	<i>Acalypha</i>	copperleaf	h	native	both	5 natives, 1 alien (NY&NJ)	3	0	3
Asteraceae	Asteraceae	<i>Acanthospermum</i>	starburr	h	native	both	1 native, 2 aliens	0	0	0
Aceraceae	Aceraceae	<i>Acer</i>	maple, boxelder	w	native	both	9 natives, 5 aliens perhaps others if cultivated	297	10	287
Asteraceae	Compositae	<i>Achillea</i>	yarrow, sneezeweed	h	native	both	1 native, 4 aliens perhaps others if cultivated	21	1	20
Amaranthaceae	Amaranthaceae	<i>Achyranthes</i>	chaff flower	h	alien	alien	1 aliens perhaps 2 others if cultivated	0	0	0
Calyceraceae	Calyceraceae	<i>Acicarpa</i>	acicarpa	h	alien	alien	1 alien	0	0	0
Lamiaceae	Lamiaceae	<i>Acinos</i>	basil thyme	h	alien	alien	1 alien	0	0	0
Asteraceae	Asteraceae	<i>Acmella</i>	spotflower	h	alien	alien	1 alien perhaps another if cultivated (native further south)	0	0	0
Ranunculaceae	Ranunculaceae	<i>Aconitum</i>	monkshood	h	native	both	3 natives, 1 alien perhaps others if cultivated	3	0	3
Acoraceae	Acoraceae	<i>Acorus</i>	sweetflag	h	native	native unless cultivated	2 natives, perhaps 1 alien if cultivated	0	0	0
Ranunculaceae	Ranunculaceae	<i>Actaea</i>	baneberry, bugbane	h	native	native unless cultivated	6 natives, perhaps 1 alien when cultivated	4	0	4
Actinidiaceae		<i>Actinidia</i>	kiwi, tara vine	w	alien	alien	Cultivated, 1 alien, perhaps 2 others.	0	0	0
Pteridaceae	Adiantaceae	<i>Adiantum</i>	maidenhair fern	h	native	native unless cultivated	3 natives perhaps aliens if cultivated	0	0	0
Fumariaceae	Fumariaceae	<i>Adumia</i>	Allegheny vine	w	native	native	1 native	0	0	0
Ranunculaceae	Ranunculaceae	<i>Adonis</i>	muskroot, pheasant's eye	h	alien	alien	2 aliens	0	0	0
Adoxaceae	Adoxaceae	<i>Adoxa</i>	adox	h	native	native	1 native	0	0	0
Poaceae	Poaceae	<i>Aegilops</i>	goatgrass	h	alien	alien	3 aliens perhaps others if cultivated	0	0	0
Apiaceae	Umbelliferae	<i>Aegopodium</i>	goutweed	h	alien	alien	1 alien	1	0	1
Fabaceae	Leguminosae(P)	<i>Aeschynomene</i>	shyleaf, jointvetch	h	native	native unless cultivated	3 natives, perhaps aliens if cultivated	1	0	1
Hippocastanaceae	Hippocastanaceae	<i>Aesculus</i>	horsechestnut, buckeye	w	native	both	6 natives, 2 aliens (1 must be cultivated)	32	0	32
Scrophulariaceae	Scrophulariaceae	<i>Agalinis</i>	false foxglove, gerardia	h	native	native	9 natives	4	0	4
Lamiaceae	Labiatae	<i>Agastache</i>	hyssop	h	native	native	2 natives	2	0	2
Asteraceae	Compositae	<i>Ageratina</i>	snakeroot	h	native	native	2 natives	5	1	4
Asteraceae	Compositae	<i>Ageratum</i>	white weed, ageratum	h	alien	alien	1 alien perhaps others if cultivated	7	0	7
Rosaceae	Rosaceae	<i>Agrimonia</i>	agrimony, churchsteeple	h	native	both	6 natives, 1 alien	1	0	1
Poaceae	Gramineae	<i>Agropyron</i>	wheat grass	h	alien	alien	2 aliens perhaps another if cultivated	8	0	8
Caryophyllaceae	Caryophyllaceae	<i>Agrostemma</i>	comcockle	h	alien	alien	1 alien	0	0	0
Poaceae	Gramineae	<i>Agrostis</i>	bent grass	h	native	both	6 natives, 2 aliens perhaps others if cultivated	5	1	4
Simaroubaceae	Simaroubaceae	<i>Ailanthus</i>	ailanthus, tree of heaven	w	alien	alien	1 alien	6	2	4
Poaceae	Poaceae	<i>Aira</i>	hairgrass	h	alien	alien	3 aliens	0	0	0
Lamiaceae	Lamiaceae	<i>Ajuga</i>	bugle	h	alien	alien	3 aliens	0	0	0
Lardizabalaceae		<i>Akebia</i>	chocolate vine	w	alien	alien	1 alien	0	0	0
Fabaceae	Leguminosae(M)	<i>Albizia</i>	albizia, silk tree	w	alien	alien	1 alien perhaps others if cultivated	5	2	3
Malvaceae	Malvaceae	<i>Alcea</i>	hollyhock	h	alien	alien	2 natives (1 must be cultivated)	22	3	19

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



DOT Mowing can be Reduced: Don't Mow to Fence simply because the State owns the Land



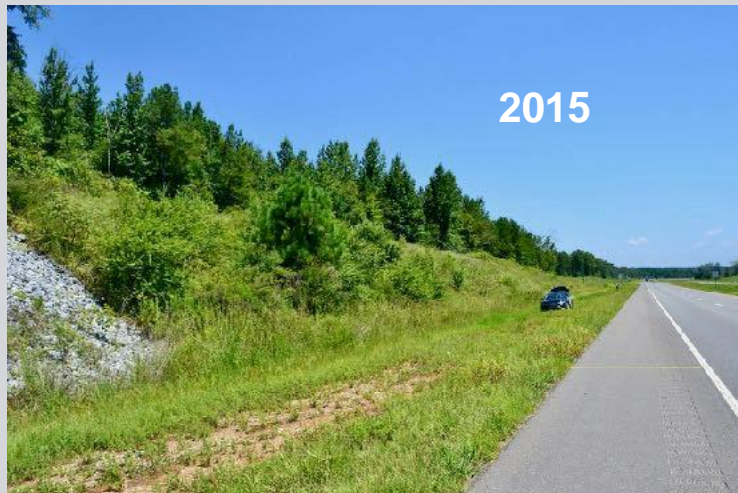
Alabama



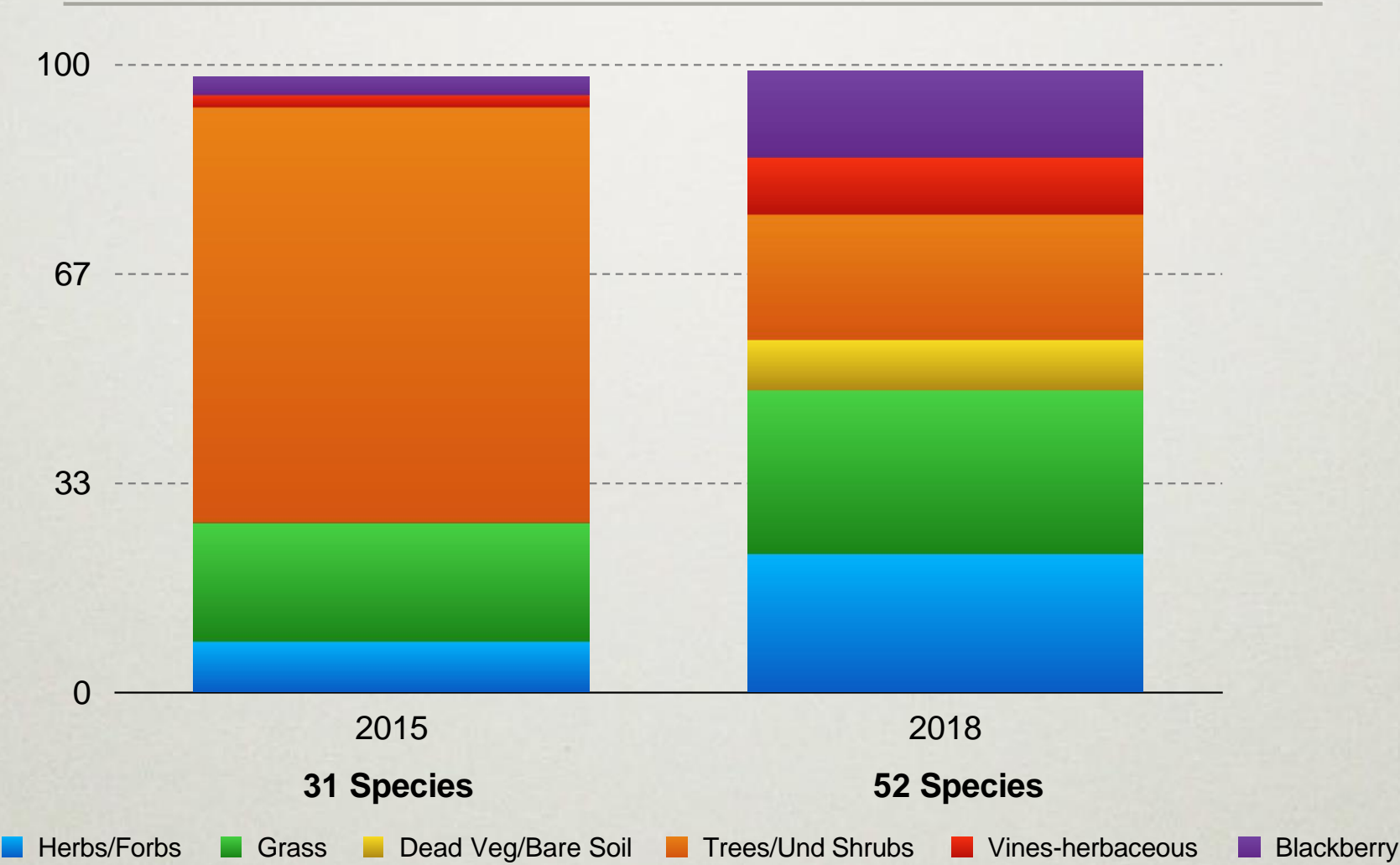
Oklahoma

Alabama DOT

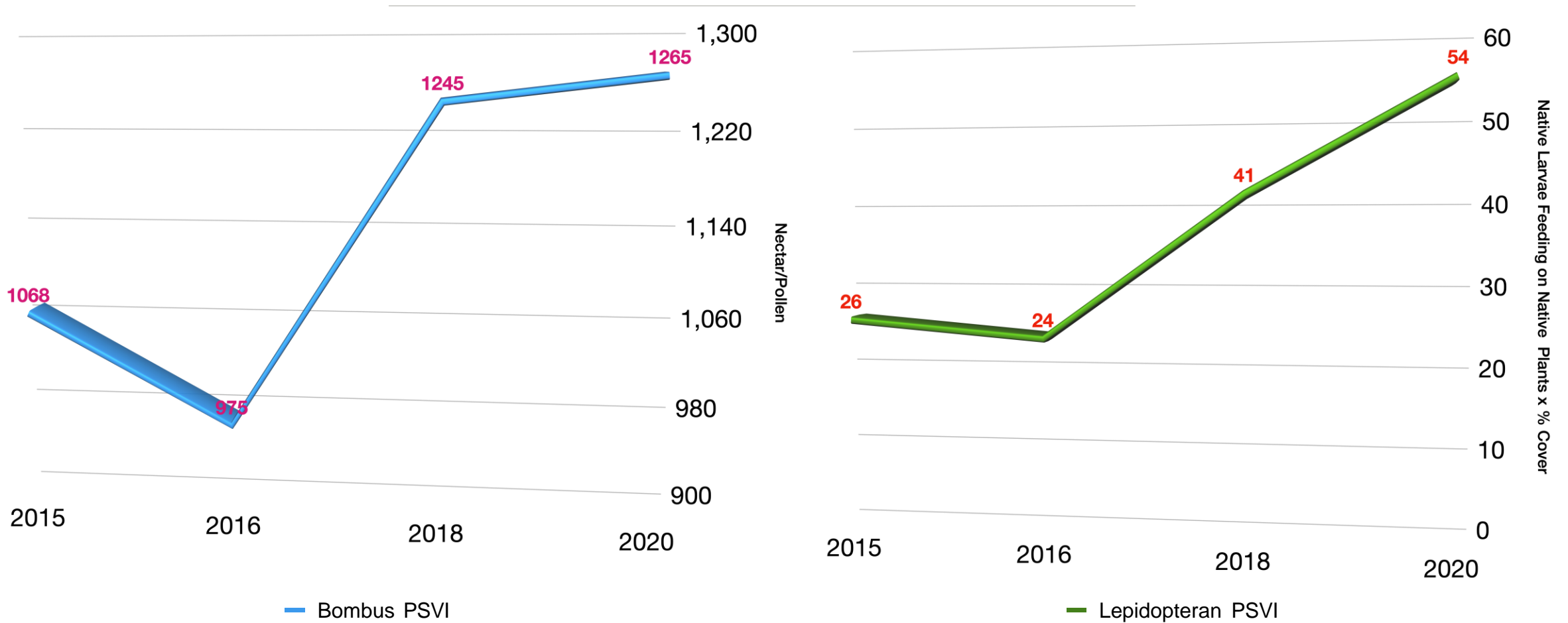
Mow zone 1 and selectively treat
Zones 2-3 swale and backslope where
pollinator plants can thrive



One Herbicide Treatment Removed Trees and Invasives Releasing 21 New Species



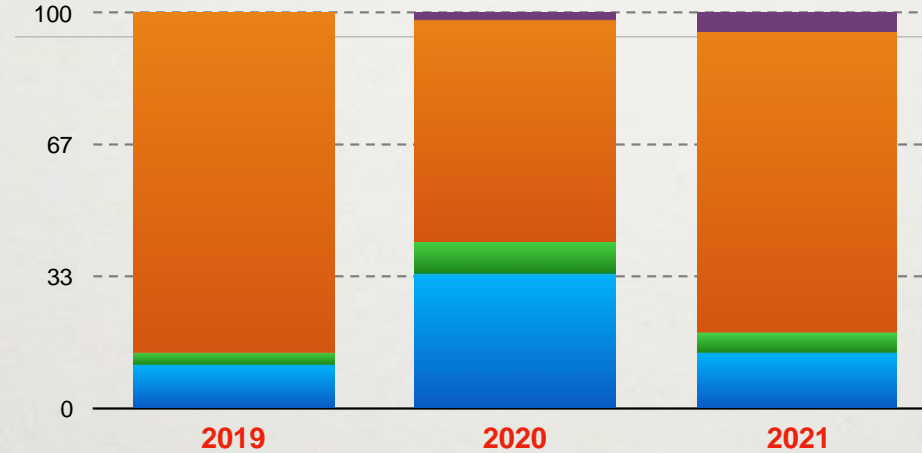
Alabama Highway IVM 5-Year PSVI



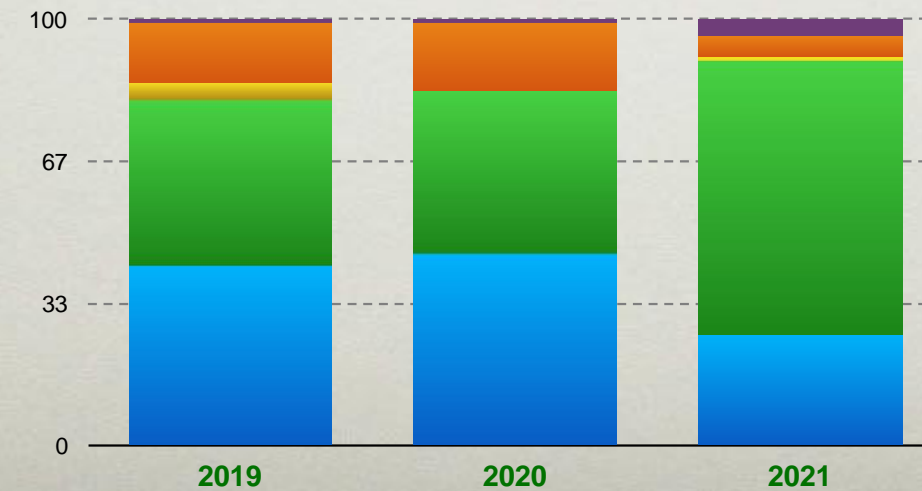
Mowing v IVM

Mark Twain National Forest v Poplar Bluff, MO

Plant Community Percent % Coverage



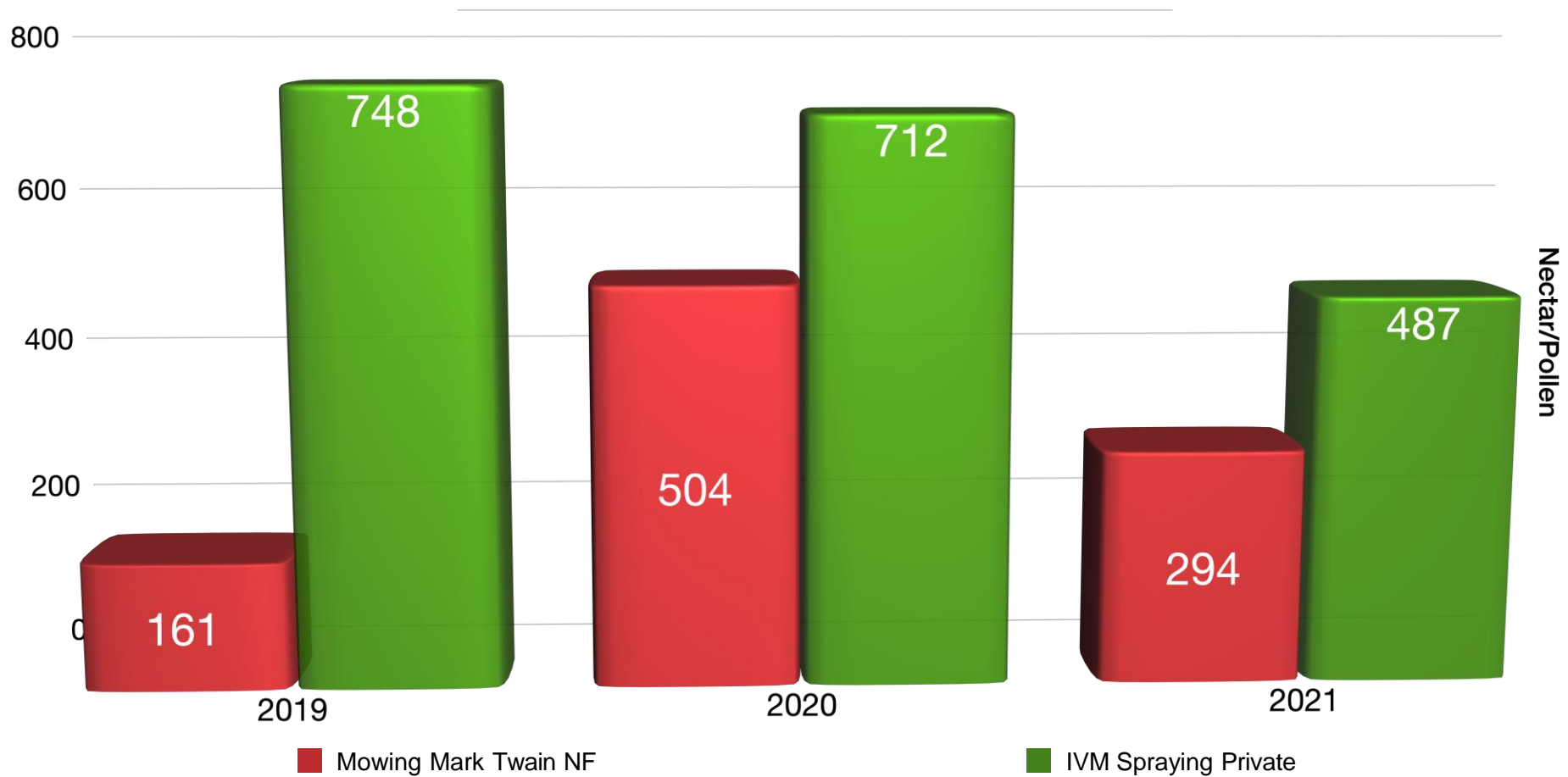
■ Herbs/Forbs/Vines
 ■ Grass/Fern/Moss/Sedge
 ■ Dead Veg/Bare Soil
 ■ Trees/Shrubs
 ■ Blackberry



Mow winter 2017 & 2021

Spray summer 2017 & 2020

Enable Midstream Natural Gas ROW
Mark Twain NF Mowing v Private IVM Spraying
Bombus PSVI

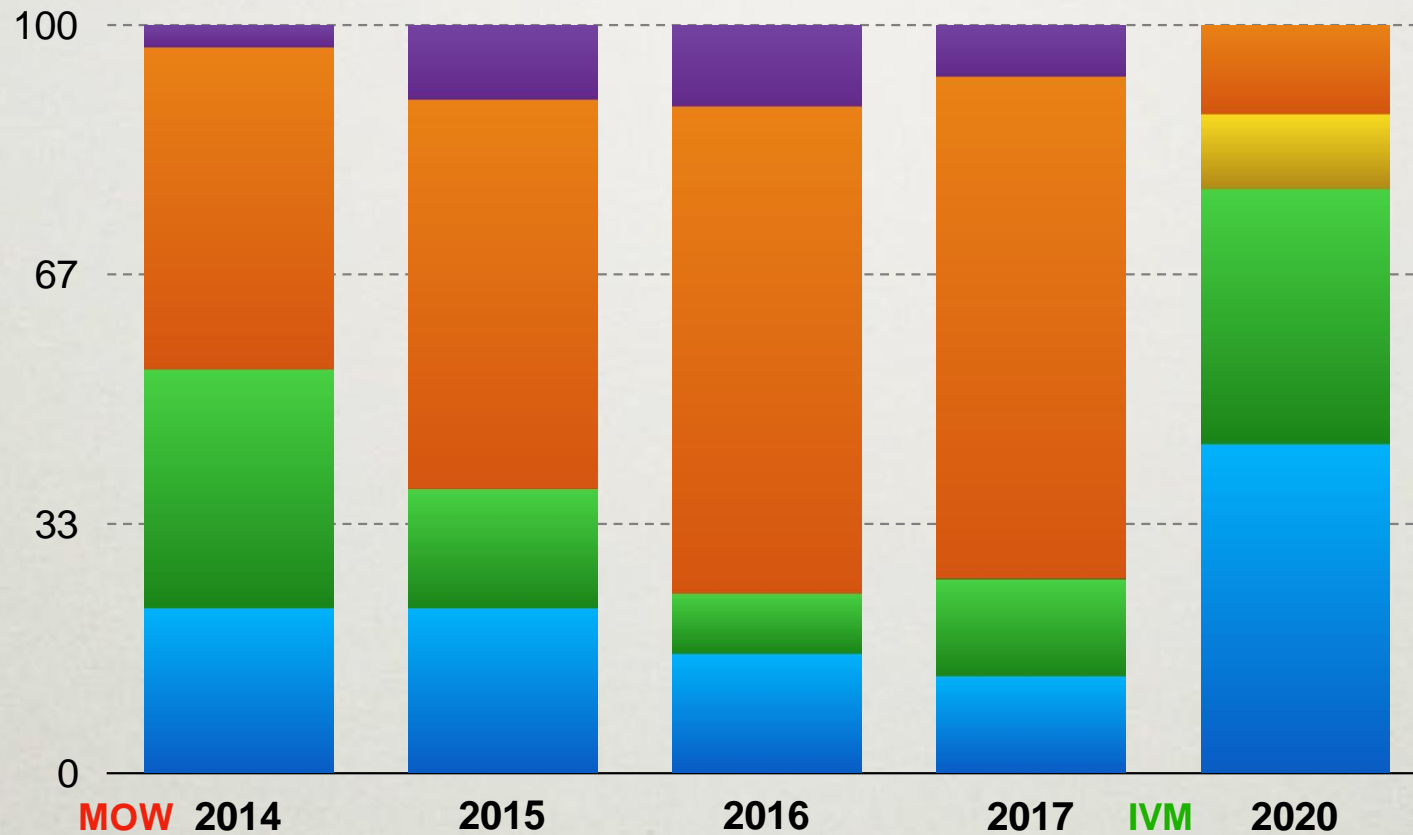


Ouachita National Forest, Arkansas Pipeline Mowed 2013, 2017 & 2019 Backpack Treated 2019



Arkansas Pipeline Plant % Cover

Mowing to IVM



■ Herbs/Forbs/Vine
 ■ Grass/Fern/Moss/Sedge
 ■ Dead Veg/Bare Soil
 ■ Trees
 ■ Shrubs/Woody Vine

Arkansas Natural Heritage Request to Herbicide Treat initially Rejected

Stateline Sand Ponds Natural Area



- Foot traffic only
- See current AGFC Guidebook for hunting and fishing regulations
- Removing or disturbing plants is prohibited

In cooperation with



For more information, please contact the Arkansas Natural Heritage Commission at 501.324.9619 or visit our website at www.naturalheritage.com.

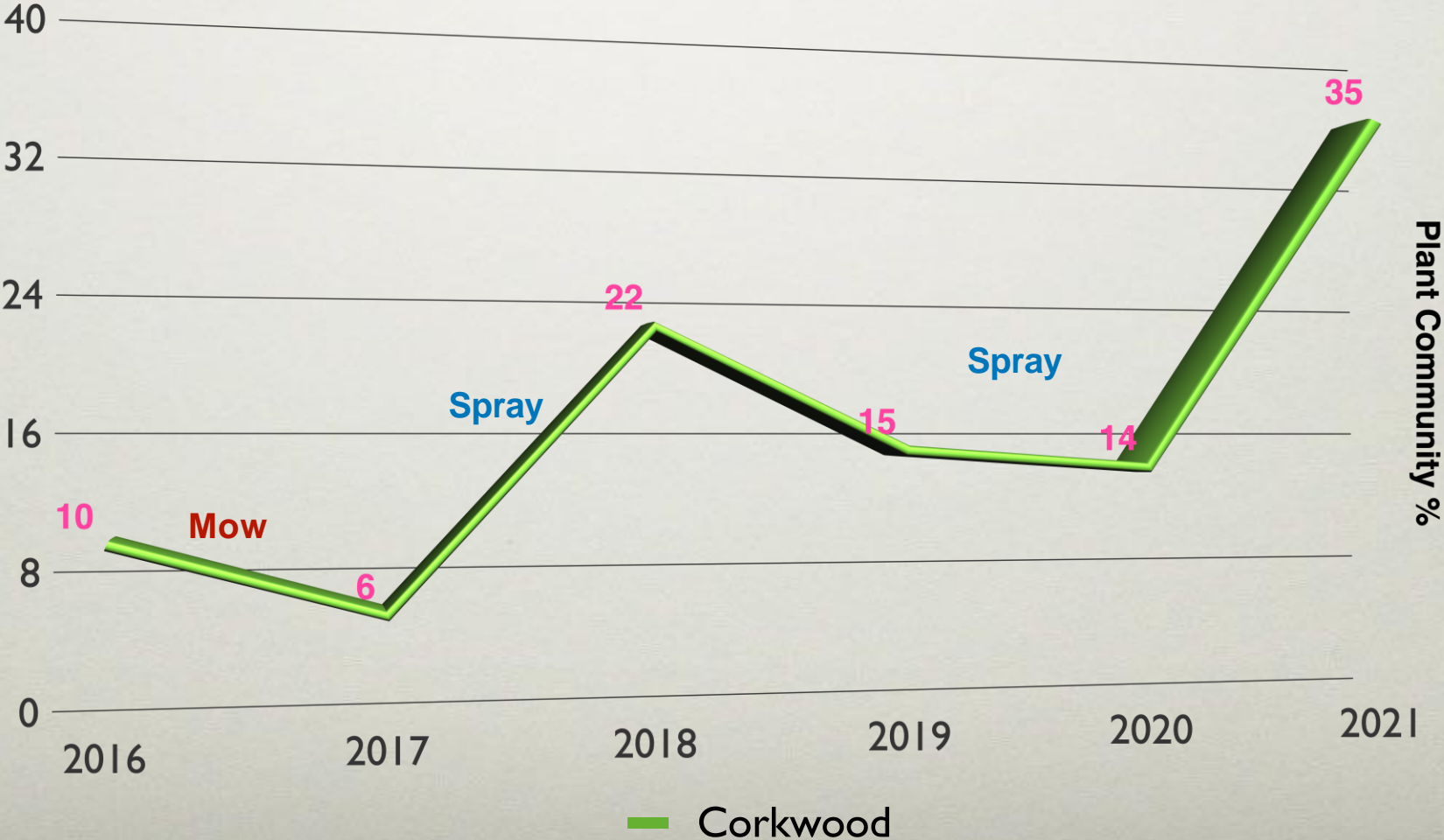
Corkwood
(*Leitneria pilosa*)



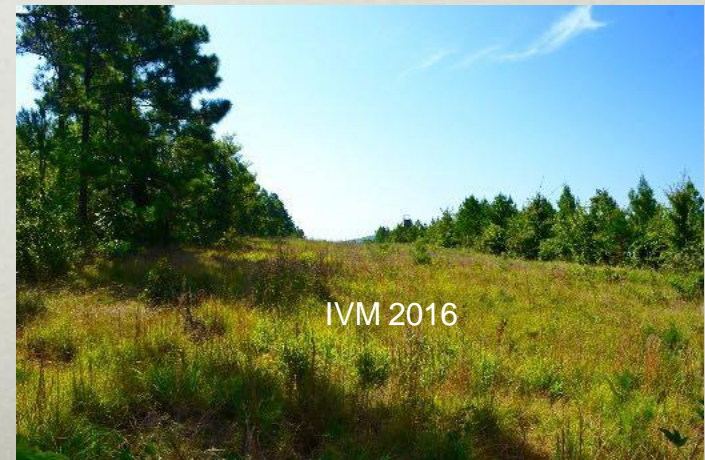
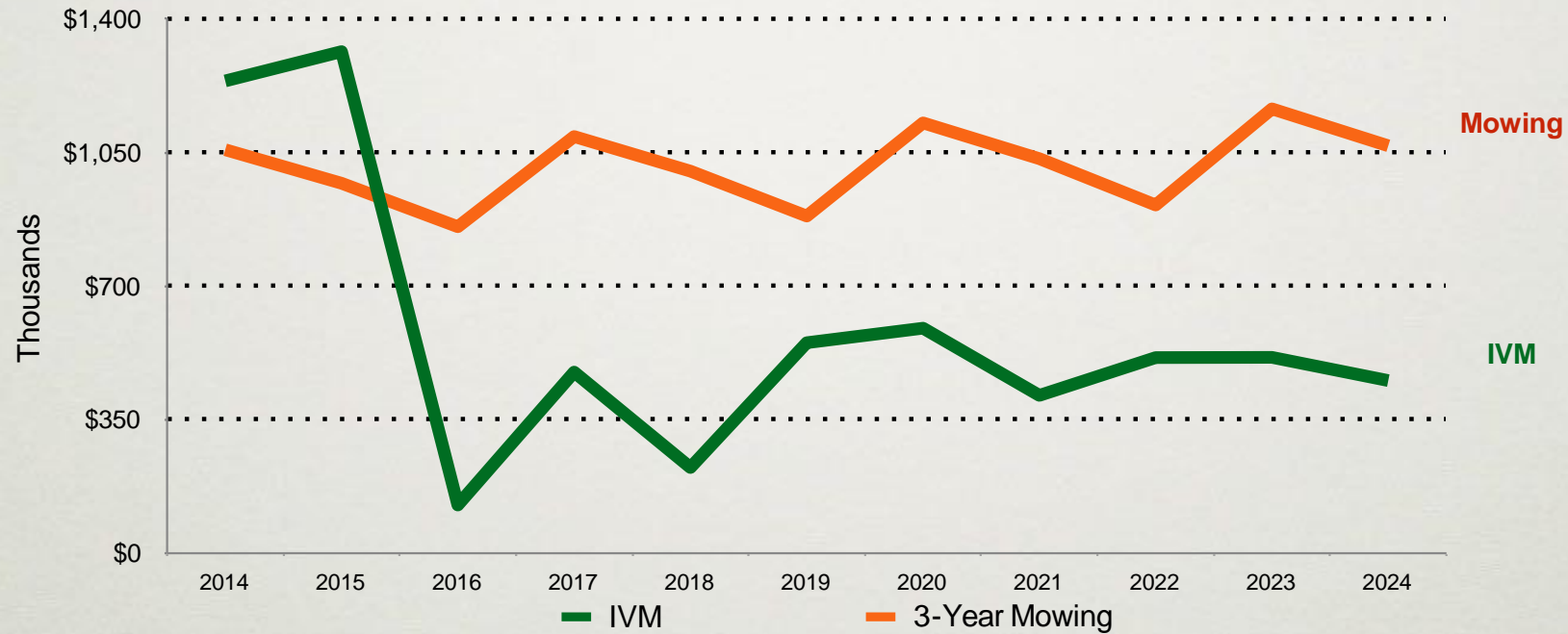
Corkwood % change 2016 - 2021



Partnership Meeting



IVM v Mowing Economics Gas Pipeline



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



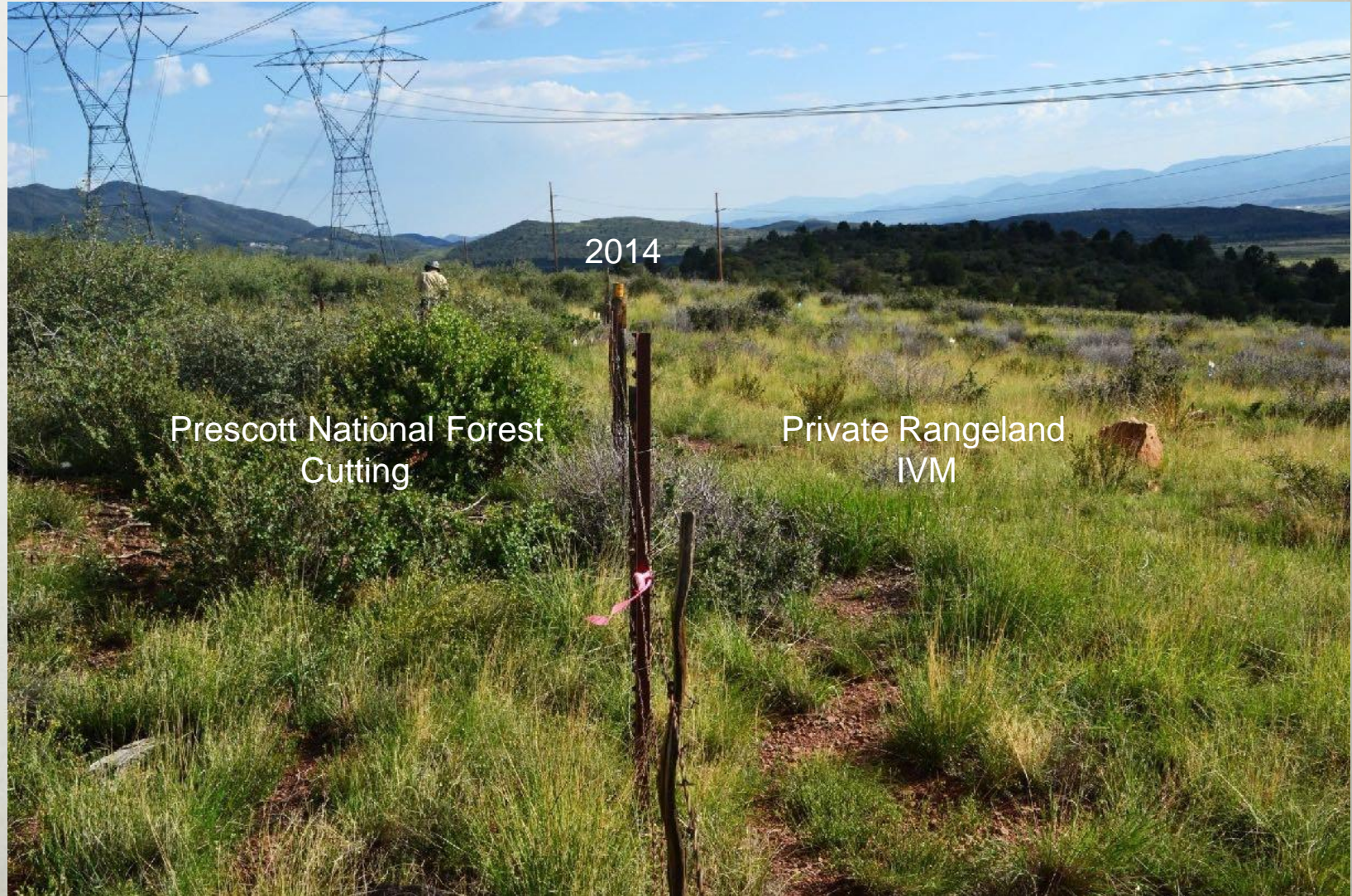
Arizona Mowing - IVM Comparison



Post mowing 2009



2013 IVM treatment



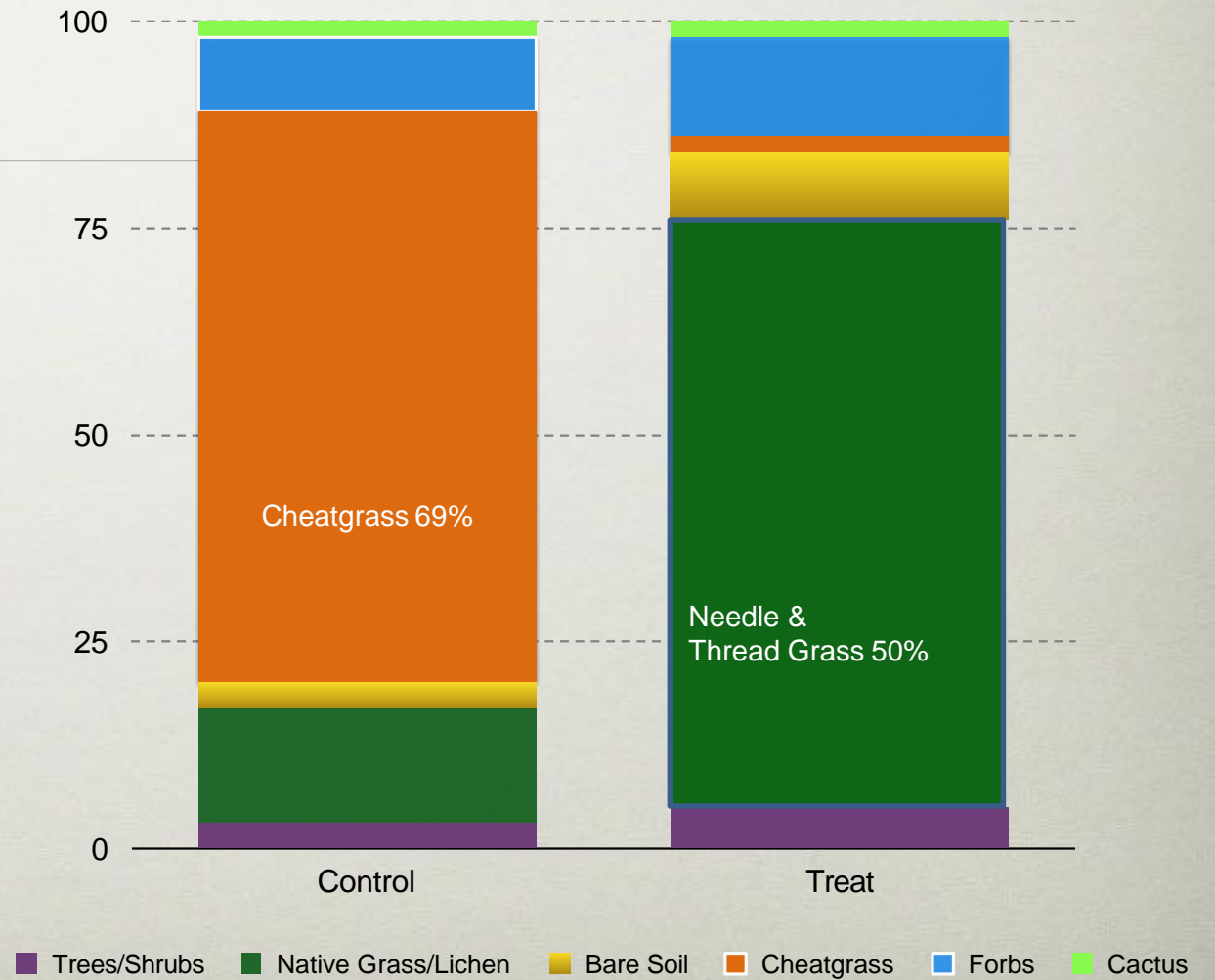
2014

Prescott National Forest
Cutting

Private Rangeland
IVM

Colorado Cheatgrass Control Rangeland Restoration

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



IVM can Manage ROW as Fire-Break Low Growing, Cool Burning Plants Provide Defensible Space





- 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