Supplementary Material

Table S1. Field site background, including location, survey dates, and establishment and management history (Casey Bryan, Chris Evans, Scott Crist, Joe Nelson, personal communication, 2016). *Lespedeza cuneata* volunteered into these sites. Seeding of native species was from commercial seed.

Site Name	Ownership and Location	Survey Dates	History and Management
Headquarters Prairie	CONWR U.S. FWS Pigeon Creek Rd N 37°43.096' W -89°01.613'	5/23 7/25 7/26	-Established: 1971 -Prescribed burns: 1974, 1977, 1981, 1987, 1989, 1990, 1991, 1994, 1997, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2016 -Mowing: 2001 to control sumac in southern half -Herbicide: 2007-*L. cuneata* treatment with Plateau -Seeding: 1997-rootstock of forbs planted (1600 spp) -Current management: undergoing herbicide treatment before site replanting
Postage Stamp Prairie	CONWR U.S. FWS Stringtown Rd N 37°43.162' W -89°02.696'	5/24 7/26 7/27	-Established: unknown -Seeding: restoration was planted, records do not indicate date or seed mix -Current management: none
HC-6	CONWR U.S. FWS Hampton Cemetery Rd N 37°41.704' W -89°03.821'	5/31 7/27 8/2	-Established: 2014 -Prescribed burns: every two years -Mowing: 2014 -Seeding: grass/forb mix was seed drilled in 2014 -Former use: haying of cool season grasses and fescue -Current management: mowing, fire, pesticide application, additional planting
Bass Pond West	CONWR U.S. FWS N Wolf Creek Rd N 37°41.641' W -89°03.463'	6/3 7/28	-Established: ~1990, with additional acreage added in 1994, 2002, and 2004 -Prescribed burns: each half of the unit burned individually on two-year rotation (east unit last burned 2015) -Mowing: 2014 -Herbicide: 2007-*L. cuneata* treatment with Plataeu -Seeding: grass/forb mixture when established -Former use: haying and pasture -Current management: mowing, fire, haying, interseeding
Bass Pond East	CONWR U.S. FWS N Wolf Creek Rd N 37°41.530' W -89°03.043'	6/7 8/5 8/8	
North Prairie 1	CONWR U.S. FWS Spillway Rd N 37°42.258' W -89°07.911'	6/8 8/1	-Established: 1994, additional acreage converted in 1997 -Prescribed burns: 1990, 1995 1999, 2001, 2006, 2010, 2012 -Seeding: native warm season grasses and forbs -Former use: grazing and farming -Current management: fire, mechanical removal of autumn olive
North Prairie 2	CONWR U.S. FWS Spillway Rd N 37°42.473'	6/9 8/3	

	W -89°07.917'		
Galum Unit	Pyramid State Park IDNR Galum Church Rd N 38°02.314' W -89°22.617'	6/10 8/9	-Established: area reclaimed prior to PSP's purchase in 2001 -Former use: surface strip mine -Current management: unknown
Denmark Unit	Pyramid State Park IDNR Denmark Rd N 37°59.778' W -89°30.304'	6/13 8/9	
Faulkner-Franke Prairie	INPC US-51, south of Mine Rd N 37°51.230' W -89°13.846'	6/14 8/8 8/10	-Established: unknown -Prescribed burns: 2010, 2016 -Herbicide: treatment for 8 species in 2011 -Current management: fire
Cache River	IDNR US-37, northeast of Perks Rd N 37°18.708' W -89°01.196'	6/16 8/11	-Established: ~2001 -Prescribed burns: 2005, 2013, 2016 (prior to surveys) -Seeding: reseeded twice between 2006 and 2013 -Current management: prescribed burns
Cave Creek Glade	INPC US-45, north of Belknap Rd N 37°21.500' W -88°53.178'	6/17 8/10 8/12	-Established: self-established; unknown date -Prescribed burns: 1989, 2002, 2008, 2011, 2012, 2014, 2016 (prior to surveys) -Herbicide: *L. cuneata* treated in 2011, 2014, 2015 -Former use: unknown -Current management: prescribed burns and treatment for *L. cuneata*, *Dipsacus laciniatus*, and *Microstegium vimineum*
Dixon Springs	U of I Dixon Springs Agricultural Center US-145 N 37°25.408' W -88°40.342'	6/20 8/24	-Established: early 1980s -Prescribed burns: none -Mowing: at least once a year until 5-10 years ago -Seeding: planted into trees -Former use: unknown -Current management: none
Pennant Bar Openlands 1	Shawnee National Forest US-146, west of Hound Ridge Rd N 37°23.205' W -88°42.110'	6/23 8/12 8/24	-Established: unknown -Prescribed burns: 2001, 2003, 2004, 2005; alternate between units; each burned every 2 years -Current management: prescribed burns, treatment for *E. umbellate* invasion, disking, plowing, planting
Pennant Bar Openlands 2	Shawnee National Forest US-146, east of Franklin Ln N 37°23.469' W -88°42.681'	6/24 8/31	

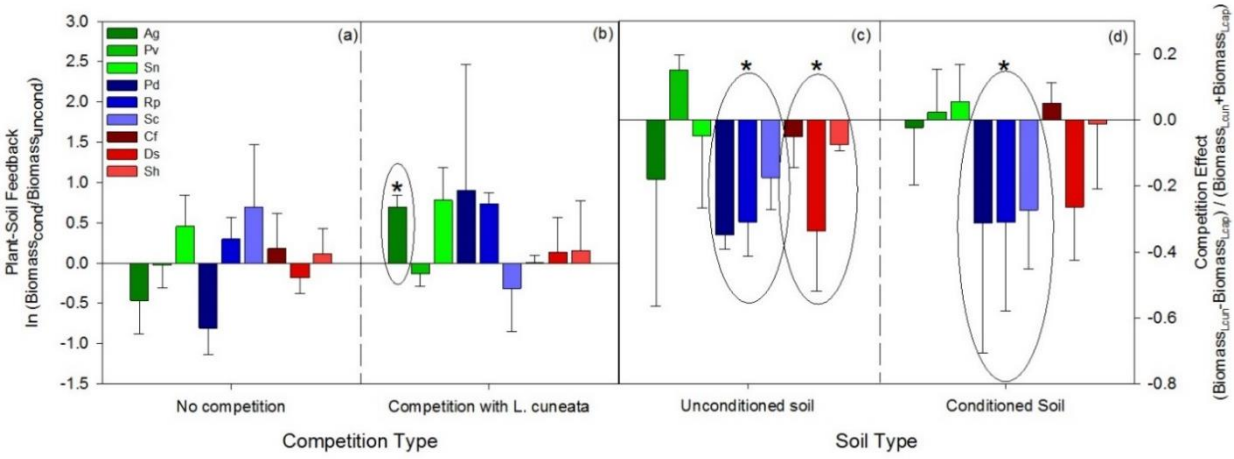
Table S2. Fifty most abundant species observed during the two field survey periods across all 15 sites. * Two letter genus/species are used for target species codes in Fig S1 (and Ds = *Desmodium* spp., and Sh = *Senna hebecarpa*).

Species	2 Letter Code
Agrimonia parviflora	
Ambrosia artemisiifolia	
Ambrosia bidentata	
*Andropogon gerardii**	Ag
Apocynum cannabinum	
Asclepias syriaca	
Bidens aristosa	
Bromus inermis	
Campsis radicans	
Carex bicknelli	
Carex bushii	
*Chamaecrista fasciculata**	Cf
Cirsium discolor	
Coronilla varia	
Desmodium canadense	
Desmodium paniculatum	
Dichanthelium clandestinum	
Dioscorea villosa	
Elymus virginicus	
Festuca arundinacea	
Galactia regularis	
Helianthus divaricatus	
Juncus interior	
Lespedeza cuneata	
Lonicera japonica	
Melilotus alba	
Microstegium vimineum	
Monarda fistulosa	
Muhlenbergia asperifolia	
*Panicum virgatum**	Pv
*Penstemon digitalis**	Pd
Persicaria hydropiperoides	
Poa pratensis	
Pycnanthemum tenuifolium	
*Ratibida pinnata**	Rp
Rosa carolina	
Rosa multiflora	
Rubus sp.	
Schizachyrium scoparium	
Setaria faberi	
Silphium integrifolium	
Silphium terebinthinaceum	
*Solidago Canadensis**	Sc

Solidago graminifolia	
Sorghastrum nutans[*]	Sn
Teucrium canadense	
Toxicodendron radicans	
Trifolium campestre	
Verbesina alternifolia	
Vernonia missurica	

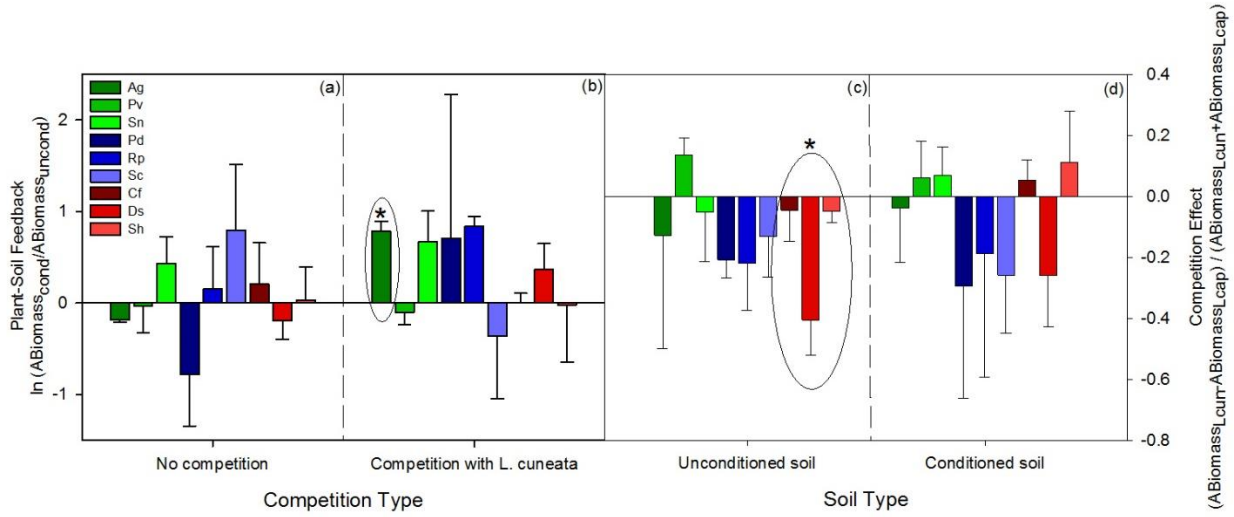
Table S3. Results of vector fitting for each of the 15 site ordinations. R and p-values are bold if significant at $\alpha < 0.05$.

	Site														
Vector	**BPE**	BPW	**CR**	**CCG**	**DXSP**	**FFP**	HC6	**HQ**	**NP1**	NP2	PB1	PB2	POST	PSPD	**PSPG**
L. cuneata presence	R=0.37 p=0.06	R=0.23 p=0.36	**R=0.5 p=0.002**	**R=0.54 p=0.002**	R=0.23 p=0.56	R=0.27 p=0.42	R=0.09 p=0.96	**R=0.64 p<0.0001**	**R=0.42 p=0.03**	R=0.36 p=0.08	R=0.28 p=0.23	R=0.14 p=0.68	R=0.15 p=0.83	R=0.20 p=0.45	**R=0.53 p=0.0009**
Survey round	R=0.13 p=0.73	R-0.12 p=0.76	R=0.21 p=0.44	R=0.13 p=0.72	R=0.24 p=0.53	R=0.19 p=0.71	**R=0.87 p<0.0001**	R=0.18 p=0.74	R=0.05 p=0.96	R=0.26 p=0.28	R=0.02 p=0.98	R=0.07 p=0.93	R=0.31 p=0.29	R=0.16 p=0.61	R=0.37 p=0.06
L. cuneata abundance	**R=0.54 p=0.001**	R=0.20 p=0.46	**R=0.63 p=0.001**	R=0.29 p=0.18	R=0.37 p=0.14	**R=0.46 p=0.03**	R=0.32 p=0.25	**R=0.56 p=0.002**	R=0.27 p=0.24	**R=0.47 p=0.007**	R=0.31 p=0.15	R=0.33 p=0.12	R=0.37 p=0.14	R=0.31 p=0.16	**R=0.83 p<0.0001**
Forb abundance	**R=0.77 p<0.0001**	**R=0.84 p<0.0001**	**R=0.78 p<0.0001**	**R=0.56 p=0.0004**	**R=0.60 p=0.001**	R=0.22 p=0.59	**R=0.74 p<0.0001**	**R=0.67 p=0.0003**	**R=0.74 p<0.0001**	**R=0.71 p<0.0001**	**R=0.78 p<0.0001**	**R=0.57 p=0.0006**	**R=0.58 p=0.001**	**R=0.51 p=0.005**	R=0.35 p=0.08
Grass abundance	**R=0.68 p<0.0001**	**R=0.89 p<0.0001**	**R=0.51 p=0.005**	**R=0.90 p<0.0001**	**R=0.72 p<0.0001**	**R=0.54 p=0.006**	**R=0.80 p<0.0001**	**R=0.82 p<0.0001**	R=0.26 p=0.26	**R=0.85 p<0.0001**	**R=0.81 p<0.0001**	**R=0.51 p=0.004**	**R=0.44 p=0.05**	R=0.09 p=0.84	**R=0.86 p<0.0001**
Woody abundance	R=0.22 p=0.49	**R=0.47 p=0.02**	R=0.17 p=0.57	**R=0.44 p=0.02**	**R=0.53 p=0.005**	R=0.31 p=0.32	R=0.40 p=0.06	R=0.28 p=0.40	**R=0.48 p=0.009**	**R=0.56 p=0.001**	**R=0.35 p=0.04**	R=0.34 p=0.10	R=0.36 p=0.18	R=0.15 p=0.64	R=0.17 p=0.55
Vine abundance	R=0.31 p=0.15	R=0.37 p=0.09	**R=0.52 p=0.003**	R=0.27 p=0.22	**R=0.87 p<0.0001**	R=0.40 p=0.08	R=0.33 p=0.24	R=0.15 p=0.84	**R=0.92 p<0.0001**	R=0.36 p=0.07	R=0.10 p=0.85	R=0.22 p=0.43	R=0.30 p=0.37	**R=0.81 p<0.0001**	NA
Legume abundance	**R=0.71 p<0.0001**	R=0.25 p=0.29	**R=0.74 p<0.0001**	R=0.27 p=0.25	R=0.33 p=0.24	**R=0.63 p=0.0003**	R=0.38 p=0.13	R=0.40 p=0.10	**R=0.72 p<0.0001**	**R=0.56 p=0.0009**	R=0.18 p=0.55	R=0.08 p=0.90	R=0.19 p=0.77	**R=0.54 p=0.003**	R=0.11 p=0.72
Sedge/rush abundance	**R=0.39 p=0.04**	**R=0.5 p=0.004**	R=0.16 p=0.60	R=0.23 p=0.31	R=0.40 p=0.054	R=0.20 p=0.68	**R=0.87 p<0.0001**	**R=0.46 p=0.03**	R=0.14 p=0.70	**R=0.43 p=0.02**	R=0.26 p=0.26	R=0.31 p=0.14	**R=0.83 p<0.0001**	R=0.28 p=0.21	R=0.28 p=0.17
Shannon diversity	**R=0.55 p=0.0006**	**R=0.79 p<0.0001**	**R=0.81 p<0.0001**	**R=0.56 p=0.001**	**R=0.70 p<0.0001**	R=0.35 p=0.19	**R=0.75 p<0.0001**	**R=0.6 p<0.0001**	**R=0.83 p<0.0001**	**R=0.78 p<0.0001**	**R=0.51 p=0.003**	R=0.28 p=0.23	R=0.27 p=0.45	R=0.36 p=0.07	**R=0.71 p<0.0001**
Simpson diversity	**R=0.56 p=0.001**	**R=0.72 p<0.0001**	**R=0.71 p<0.0001**	**R=0.7 p<0.0001**	**R=0.71 p<0.0001**	R=0.40 p=0.10	**R=0.78 p<0.0001**	**R=0.58 p=0.002**	**R=0.81 p<0.0001**	**R=0.75 p<0.0001**	**R=0.47 p=0.009**	R=0.36 p=0.08	R=0.24 p=0.53	R=0.36 p=0.07	**R=0.57 p<0.0001**
Evenness	**R=0.52 p=0.004**	**R=0.67 p<0.0001**	**R=0.67 p<0.0001**	**R=0.63 p<0.0001**	**R=0.58 p=0.001**	R=0.35 p=0.20	**R=0.75 p<0.0001**	**R=0.46 p=0.03**	**R=0.75 p<0.0001**	**R=0.72 p<0.0001**	**R=0.39 p=0.05**	R=0.32 p=0.14	R=0.33 p=0.23	R=0.22 p=0.17	**R=0.53 p=0.001**
Richness	**R=0.52 p=0.003**	**R=0.63 p<0.0001**	**R=0.61 p<0.0001**	R=0.22 p=0.39	**R=0.62 p=0.001**	R=0.35 p=0.21	**R=0.54 p=0.004**	R=0.37 p=0.14	**R=0.65 p<0.0001**	**R=0.56 p=0.001**	**R=0.46 p=0.01**	R=0.20 p=0.47	R=0.33 p=0.25	**R=0.51 p=0.005**	**R=0.68 p<0.0001**
Native abundance	**R=0.43 p=0.02**	R=0.27 p=0.25	R=0.15 p=0.65	R=0.38 p=0.053	**R=0.67 p=0.0002**	**R=0.59 p=0.0007**	R=0.22 p=0.61	**R=0.53 p=0.008**	**R=0.87 p<0.0001**	**R=0.69 p<0.0001**	R=0.32 p=0.14	R=0.07 p=0.90	**R=0.47 p=0.03**	**R=0.55 p=0.0008**	R=0.17 p=0.61
Non-native abundance	R=0.10 p=0.85	R=0.32 p=0.13	R=0.22 p=0.27	R=0.23 p=0.34	**R=0.60 p=0.0002**	R=0.17 p=0.80	**R=0.48 p=0.02**	R=0.29 p=0.37	R=0.24 p=0.35	R=0.26 p=0.26	R=0.11 p=0.92	**R=0.46 p=0.007**	R=0.42 p=0.06	R=0.23 p=0.36	R=0.22 p=0.36
Invasive abundance	R=0.33 p=0.11	R=0.22 p=0.39	**R=0.59 p=0.003**	R=0.23 p=0.36	**R=0.76 p<0.0001**	**R=0.48 p=0.02**	R=0.26 p=0.48	R=0.24 p=0.55	**R=0.90 p<0.0001**	**R=0.65 p=0.0001**	R=0.26 p=0.26	**R=0.43 p=0.02**	R=0.37 p=0.15	**R=0.81 p<0.0001**	**R=0.76 p<0.0001**



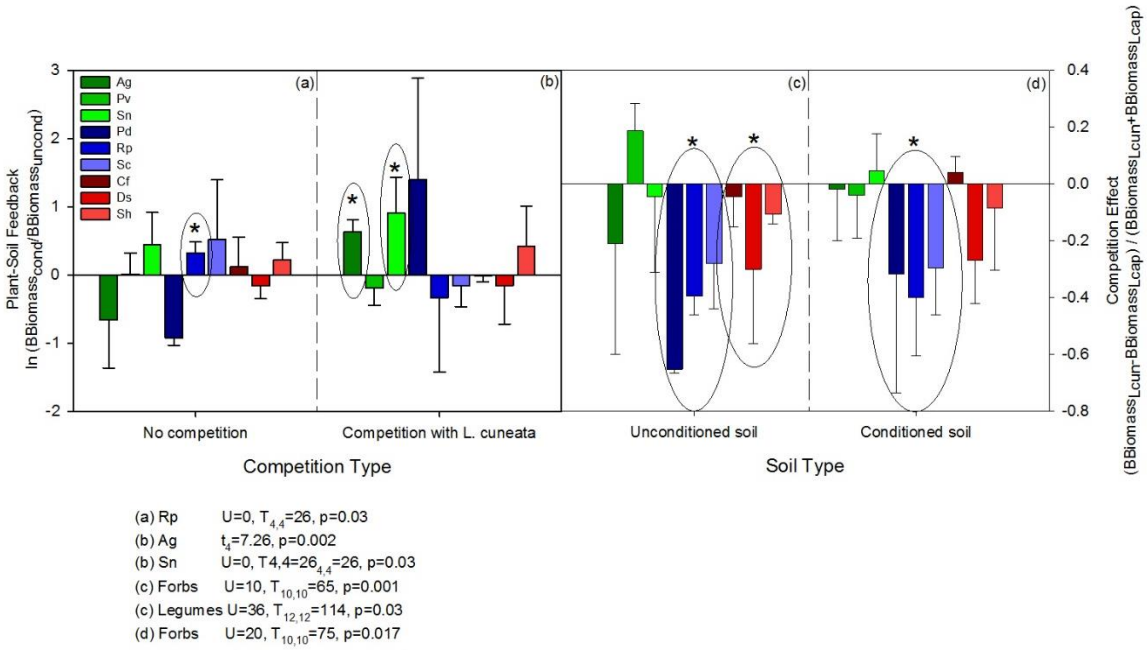
(b) Ag t_4=4.67, p=0.009
(c) Forbs U=10, $T_{10,10}$=65, p=0.001
(c) Legumes U=24, $T_{12,12}$=102, p=0.003
(d) Forbs U=20, $T_{10,10}$=75, p=0.017

a



(b) Ag t_4=7.26, p=0.002
(c) Legumes U=24, $T_{12,12}$=102, p=0.003

b



(a) Rp U=0, $T_{4,4}$=26, p=0.03
(b) Ag t_4=7.26, p=0.002
(b) Sn U=0, T4,4=26$_{4,4}$=26, p=0.03
(c) Forbs U=10, $T_{10,10}$=65, p=0.001
(c) Legumes U=36, $T_{12,12}$=114, p=0.03
(d) Forbs U=20, $T_{10,10}$=75, p=0.017

c

Figure S1. The plant-soil feedback responses (on total (a), above- (b), and belowground (c) biomass) of the nine target species (codes refer to the first letter of the genus and specific epithet, respectively [Table S2]) to soil conditioning without competition (panel a) and in the presence of competition with *L. cuneata* (panel b) and the competition effect responses (on total (a), above- (b), and belowground (c) biomass) on the nine target species comparing competition with *L. capitata* to competition with *L. cuneata* in unconditioned (panel c) and conditioned soil (panel d). The PSF was calculated as ln(Biomass$_{cond}$/Biomass$_{uncond}$) within each replicate and averaged per target species (mean ± se). Positive responses indicate that the target species produced greater biomass in conditioned soil while negative responses indicate that they produced less biomass in conditioned soil. The competition effect was calculated as (Biomass$_{Lcun}$-Biomass$_{Lcap}$) / (Biomass$_{Lcun}$+Biomass$_{Lcap}$) within each replicate and averaged per target species (mean ± se). Positive responses indicate that the target species produced greater biomass under competition with *L. cuneata* than competition with *L. capitata* while negative responses indicate that they produced less biomass in competition with *L. cuneata* than competition with *L. capitata*. Significant PSFs and competition effects (compared to 0) are denoted with *. All calculations are averages of 3-4 replicates excluding *A. gerardii* and *P. digitalis* no competition PSFs, which are averages of only 2 replicates due to misidentified and dead plants.