Invasive Plant Species on Pasturelands

November 17, 2016

Contents

Overview

Information about the condition of the land and related natural resources is needed at many different scales to inform decision makers. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) gathers pastureland on-site data as part of the National Resources Inventory (NRI). There are nearly 121 million acres of pastureland in the contiguous 48 states, making up 6 percent of the non-Federal surface area (Figures 1-2, USDA-NRCS, 2015).

NRI pastureland on-site data are collected at a scientifically selected subset of NRI sample points, allowing the NRI pastureland on-site data to be linked to broader estimates of surface area and land cover use provided in the NRI. Pastureland area estimates were developed based on 2012 NRI estimates of pastureland in these states. The findings in this report focus on invasive plant species on non-Federal pasturelands.

Figure 2- Dominant Land Uses, 2012

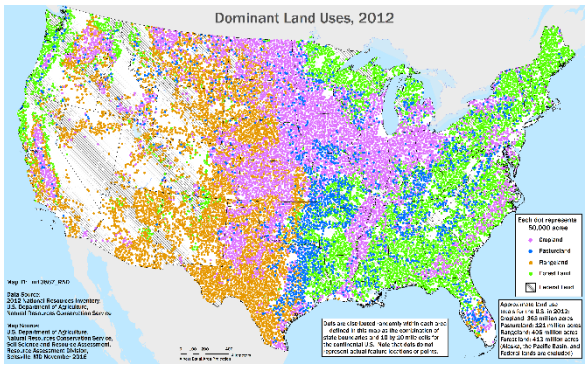
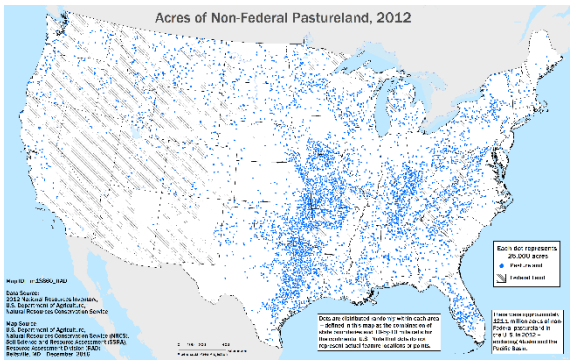


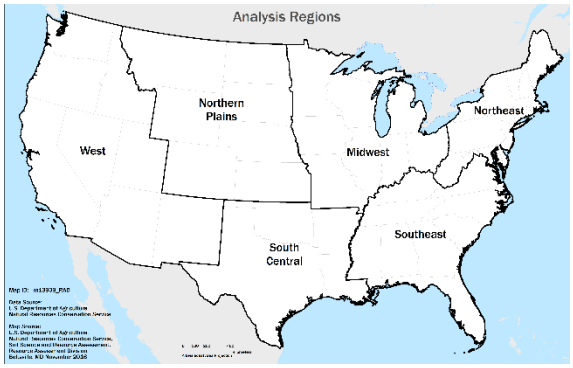
Figure 1 - Acres of Non-Federal Pastureland, 2012



Background

NRI data have been collected on over a thousand non-Federal pastureland sites during 2013-2015. Data from the three years were aggregated by six regions to conduct analysis (Figure 3).

Figure 3 - Analysis Regions



NRI census data are examined to determine the presence of invasive plant species groups listed in Table 1. Census data are collected in the 150-foot diameter (0.4 acre) plot at each field site. Data collectors record plant species observed through reconnaissance of the plot as well as those species observed with other collection methods at the site (See chapter 16 of the NRI Grazing Land On-site Data Collection Handbook of Instructions: http://www.nrisurvey.org/nrcs/Grazingland/2016/instructions/instruction.htm).

Invasive Plants

Invasive plant species have the ability to spread aggressively and outcompete many native or cultivated plant species. Many invasive plants such as annual brome grasses and multiflora rose are non-native. Some native species such as junipers can become invasive in certain areas, especially following disturbances. Others, such as reed canarygrass (*Phalaris arundinacea*), have both native and nonnative strains in the United States.

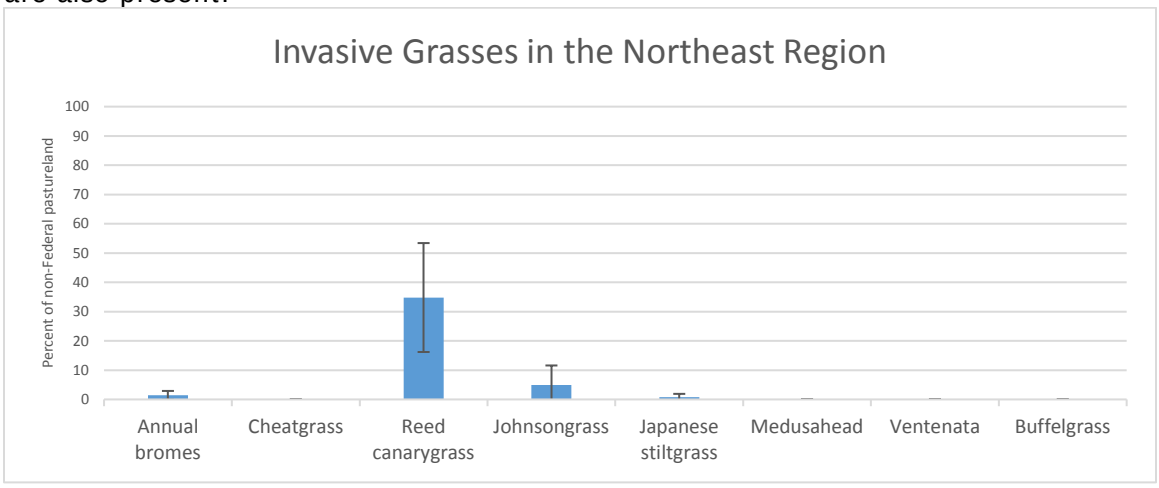
Species included in the groups of invasive plants are listed in Table 1. Presence of invasive species groups on Non-Federal pastureland is provided by region in Table 2.

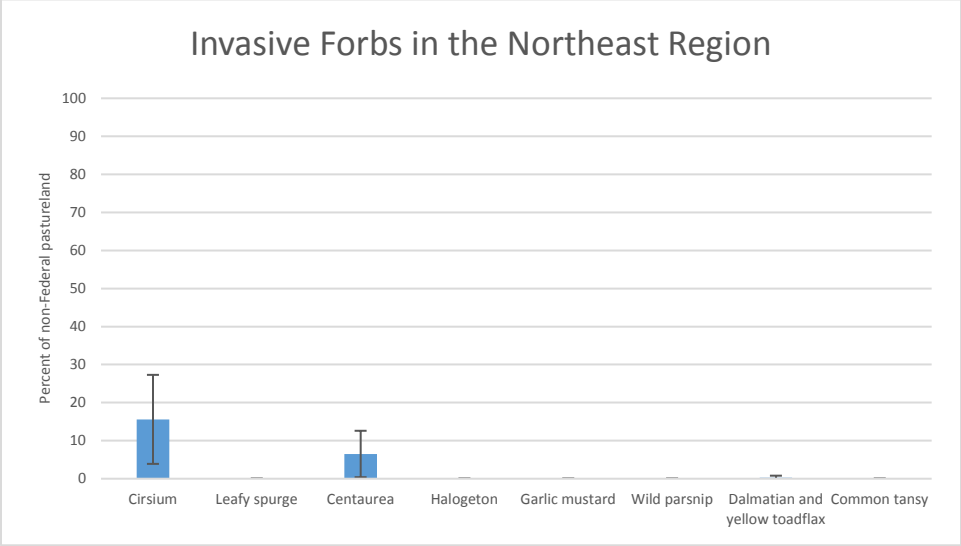
Regional Summaries

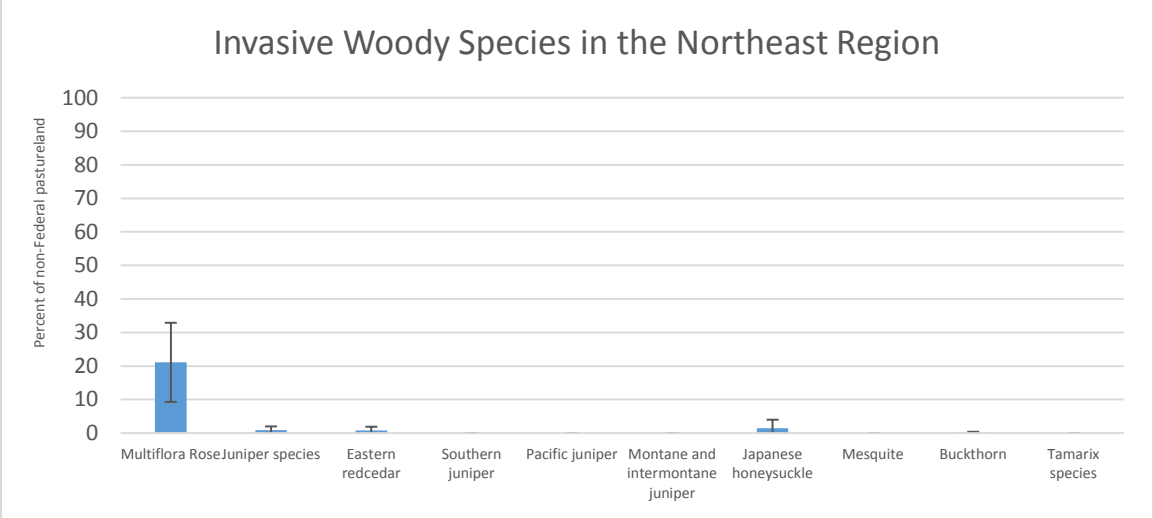
Northeast Region

In the Northeast region, the herbaceous invasive species groups that are present on the greatest proportions of non-Federal pastureland are reed canarygrass (34.8 ± 18.6 percent), *Cirsium* (15.6 ± 11.7 percent) and *Centaurea* (6.6 ± 6.1 percent). Trace amounts of other herbaceous species groups including annual bromes other than cheatgrass, Dalmatian and yellow toadflax, Japanese stiltgrass, and Johnsongrass are also present.

Multiflora rose is present on 21.1 ± 11.8 percent of non-Federal pastureland in this region. Trace amounts of Eastern redcedar, buckthorn, and Japanese honeysuckle are also present.



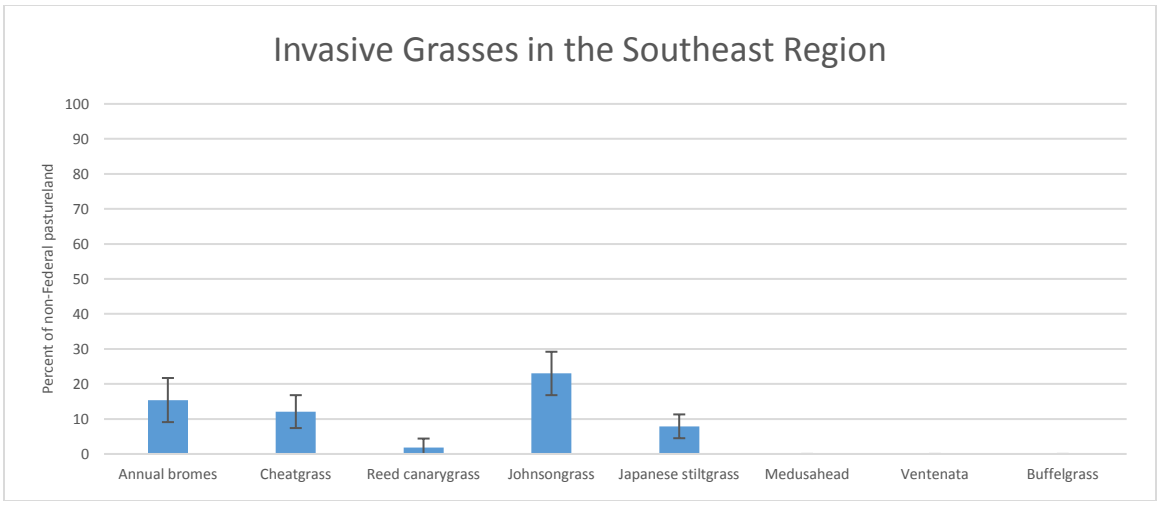


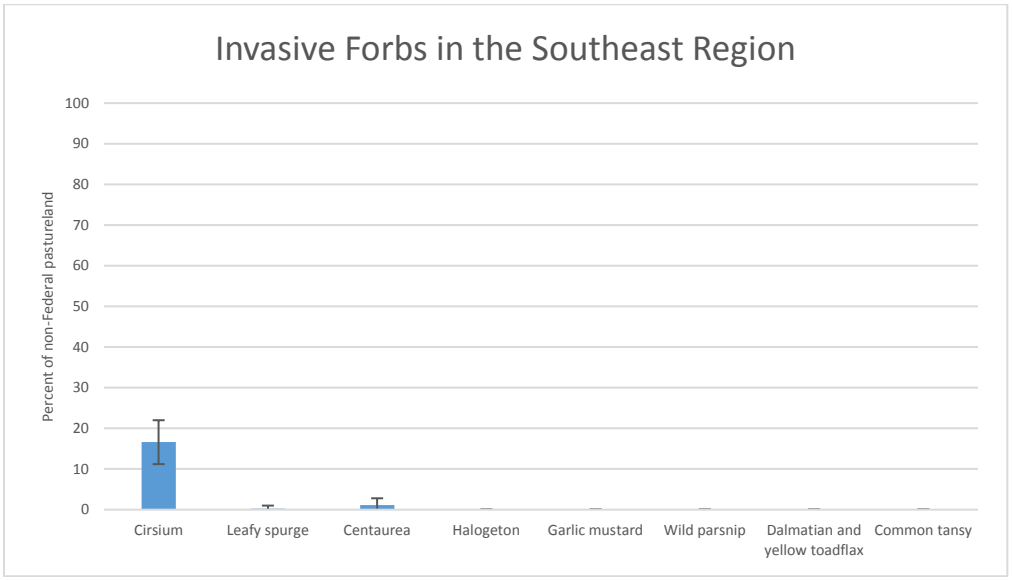


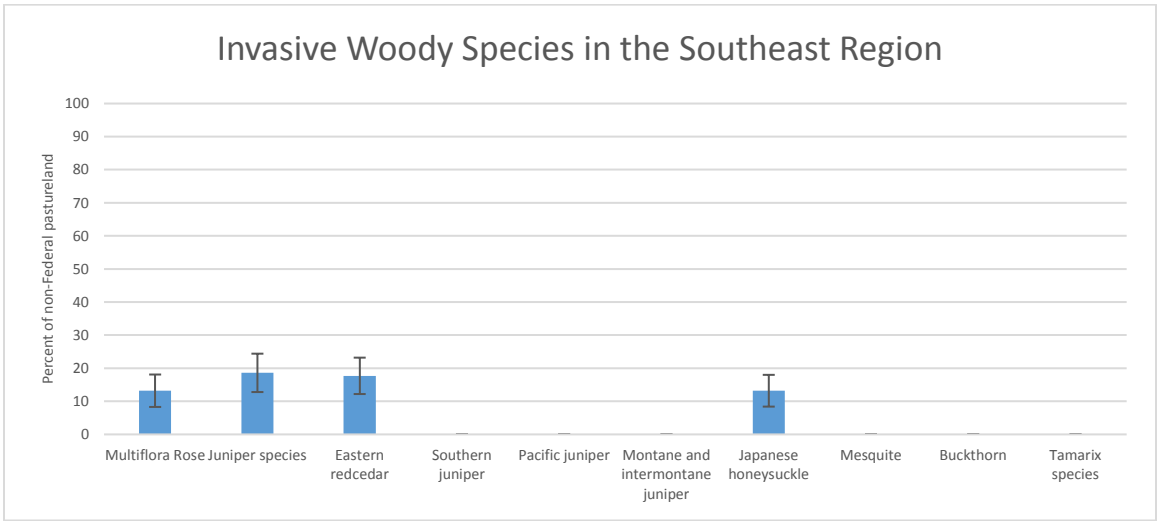
Southeast Region

In the Southeast region, the invasive herbaceous species groups that are present on the greatest proportions of non-Federal pastureland are Johnsongrass (23.0 ±6.2 percent), *Cirsium* (16.6 ±5.4 percent), annual bromes (15.4 ±6.3 percent) including cheatgrass (12.1 ±4.7 percent), and Japanese stiltgrass (7.9 ±3.4 percent). Trace amounts of leafy spruge, *Centaurea*, and reed canarygrass are also present.

Invasive woody species present on non-Federal pastureland in this region are junipers (18.6 ±5.8 percent) including Eastern redcedar (17.7 ±5.5 percent), Japanese honeysuckle (13.2 ±4.8 percent), and multiflora rose (13.2 ±4.9 percent).


Invasive Grasses in the Southeast Region
Percent of non-Federal pastureland
100
90
80
70
60
50
40
30
20
10
0
Annual bromes
Cheatgrass
Reed canarygrass
Johnsongrass
Japanese stiltgrass
Medusahead
Ventenata
Buffelgrass

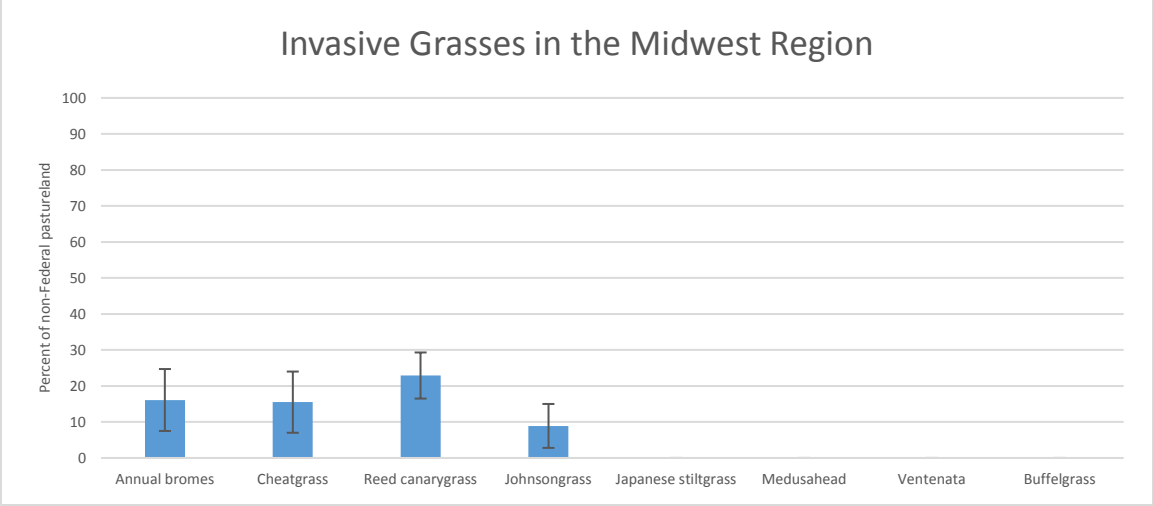

Invasive Forbs in the Southeast Region
Percent of non-Federal pastureland
100
90
80
70
60
50
40
30
20
10
0
Cirsium
Leafy spurge
Centaurea
Halogeton
Garlic mustard
Wild parsnip
Dalmatian and yellow toadflax
Common tansy

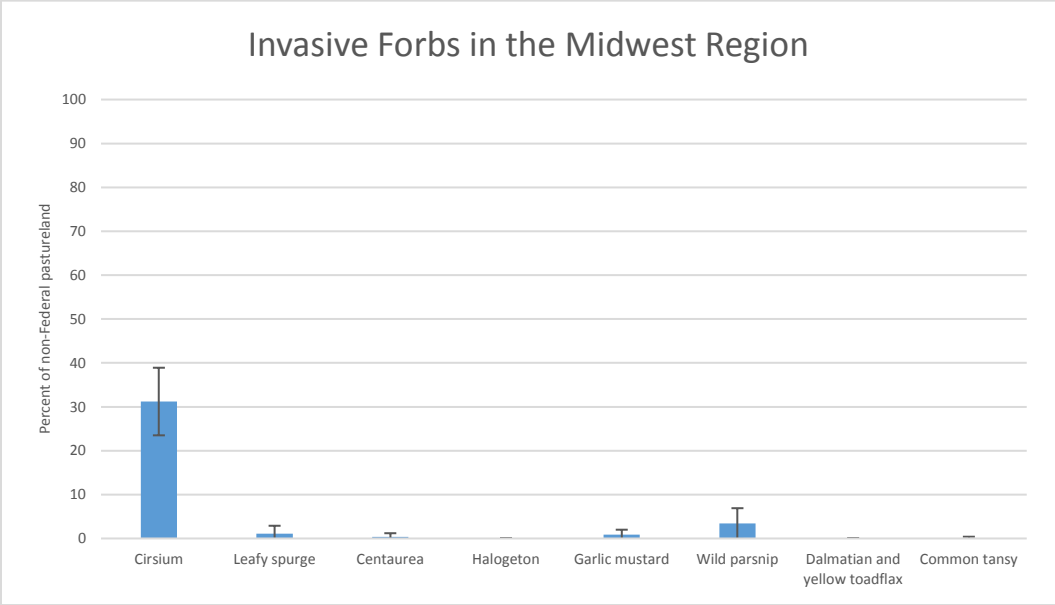

Invasive Woody Species in the Southeast Region
Percent of non-Federal pastureland
100
90
80
70
60
50
40
30
20
10
0
Multiflora Rose
Juniper species
Eastern redcedar
Southern juniper
Pacific juniper
Montane and intermontane juniper
Japanese honeysuckle
Mesquite
Buckthorn
Tamarix species

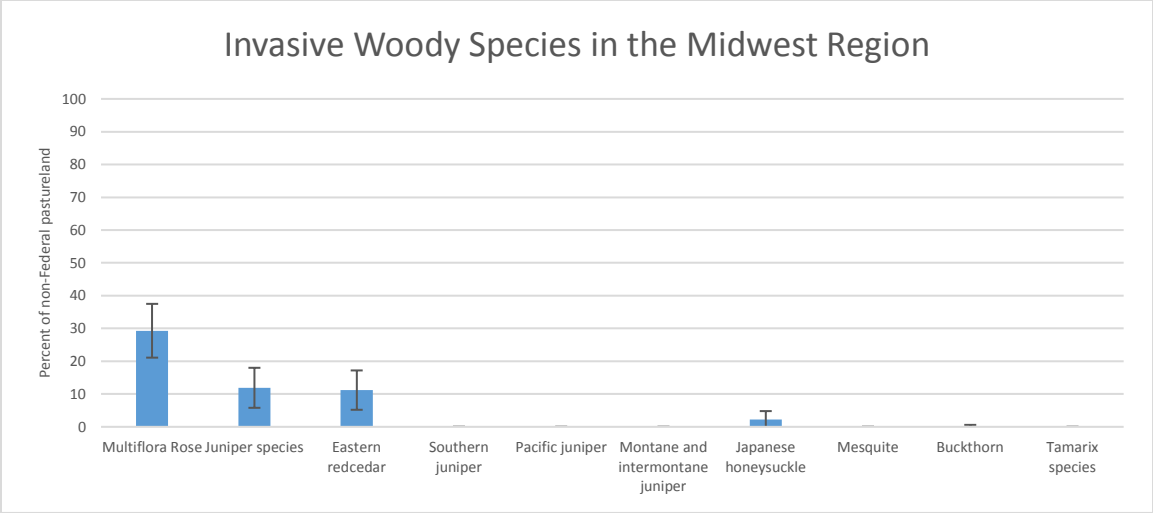
Midwest Region

Cirsium, reed canarygrass, annual bromes, including cheatgrass, and Johnsongrass are present on 31.2 ±7.7, 22.9 ±6.4, 16.1 ±8.6, 15.5 ±8.5, and 8.9 ±6.1 percent of non-Federal pastureland, respectively, in this region. Leafy spurge, *Centaurea*, garlic mustard, wild parsnip, and common tansy are also present in trace amounts.

The woody invasive species groups in this region include multiflora rose and junipers including Eastern redcedar, present on 29.3 ±8.2, 11.9 ± 6.1, and 11.2 ±6.0 percent of non-Federal pastureland. Trace amounts of buckthorn and Japanese honeysuckle are also present in this region.

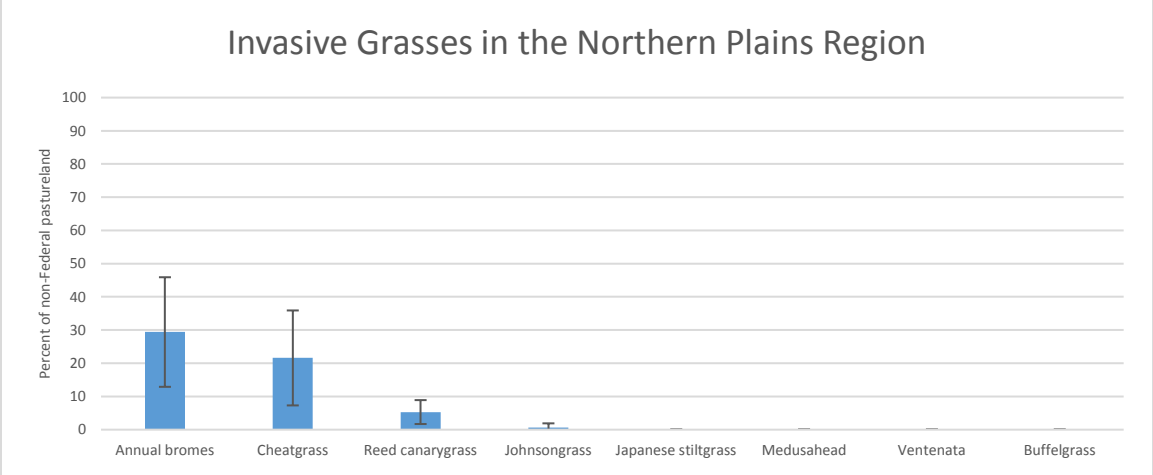


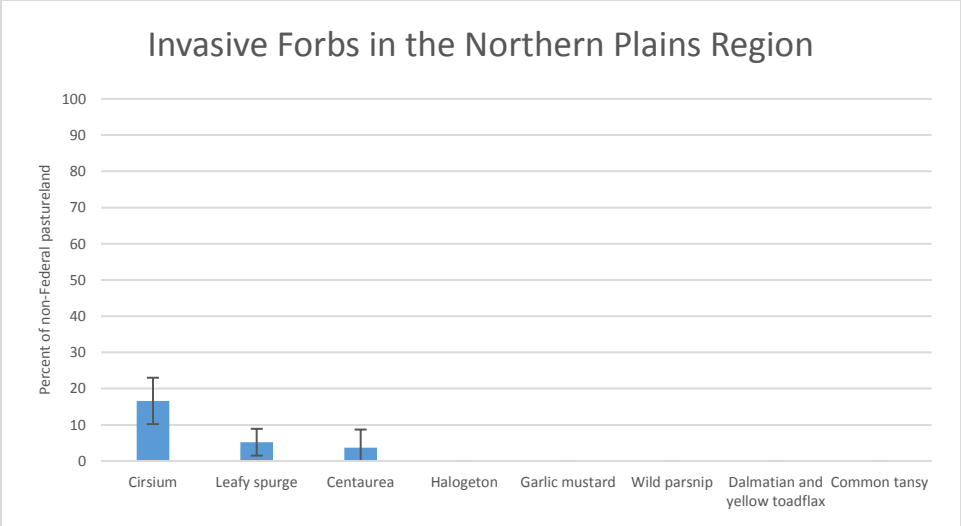


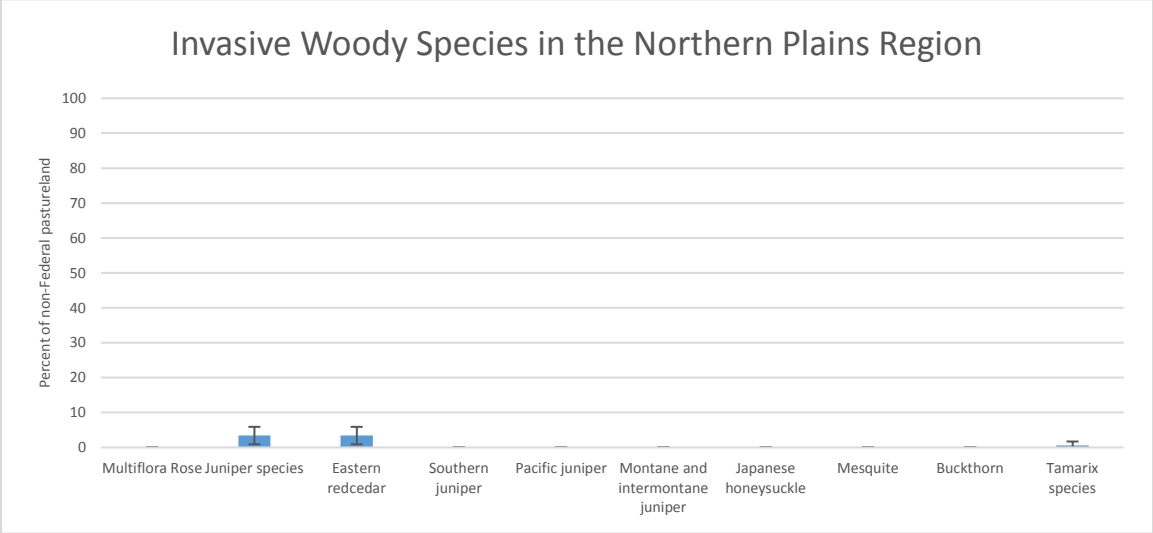


Northern Plains Region

Annual bromes, cheatgrass, and reed canarygrass are present on 29.4 ±16.5 and 21.6 ±14.3, 5.3 ±3.6 percent of these lands. Trace amounts of Johnsongrass is also present. Invasive forbs C*irsium* and leafy spurge are present on 16.6 ±6.4 and 5.2 ±3.7 percent, respectively, of non-Federal pasturelands in this region along with trace amounts of *Centaurea*. Woody invasives in this region include Eastern redcedar (3.4 ± 2.5 percent) and trace amounts of *Tamarix* species.

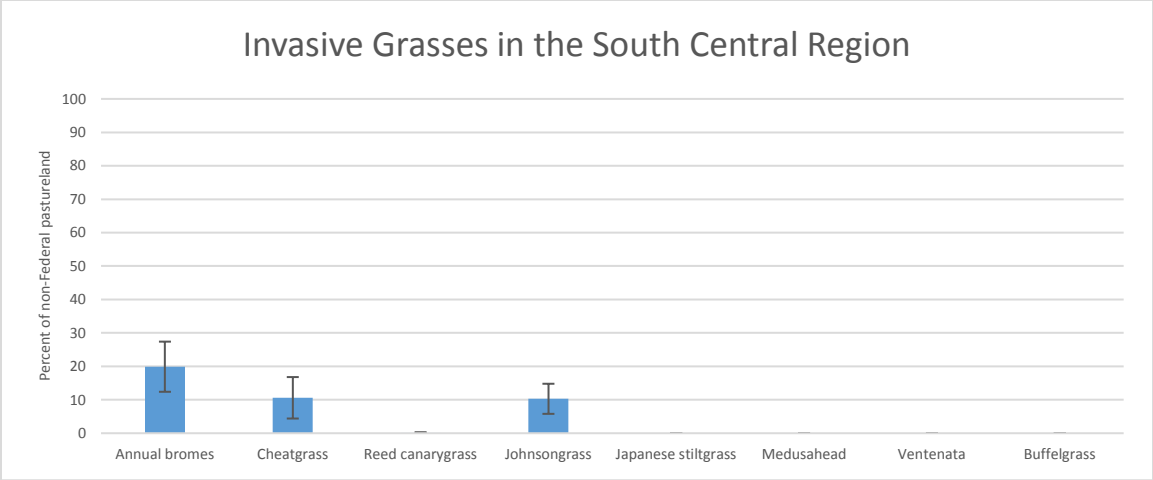


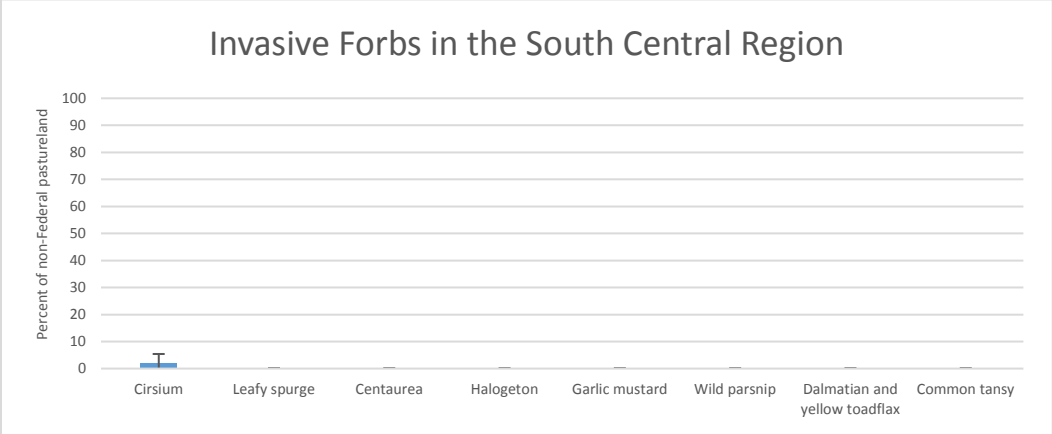


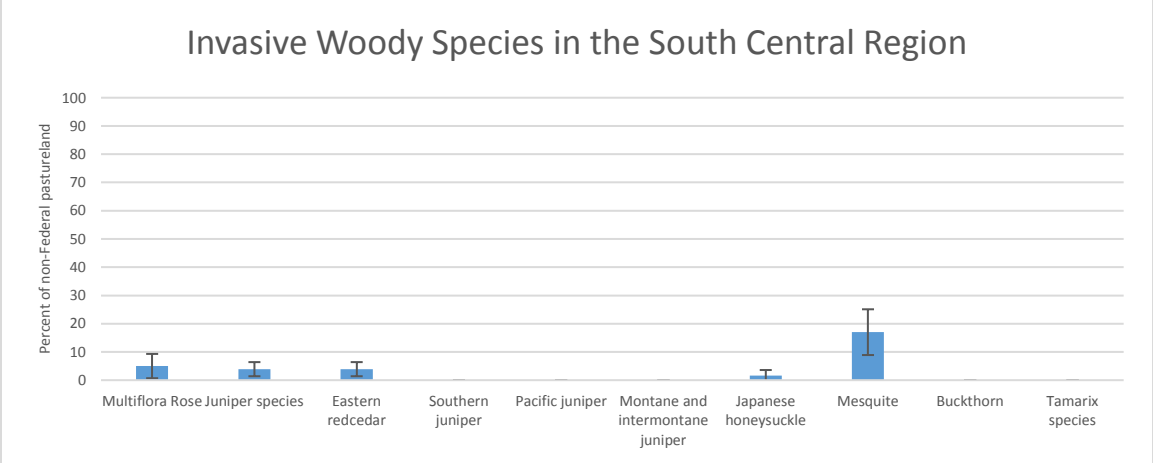


South Central Region

Among the annual bromes present on 19.9 ±7.5 percent of non-Federal pastureland in the South Central region, cheatgrass is present on 10.6 ±6.2 percent of this region. Johnsongrass is present on 10.3 ±4.5 percent of non-Federal pastureland. Mesquite, multiflora rose, and Eastern redcedar are present on 17.0 ±8.1, 5.0 ±4.3, and 3.9 ±2.5 percent, respectively. Trace amounts of *Cirsium*, reed canarygrass, and Japanese honeysuckle are also present on non-Federal pasturelands in this region.



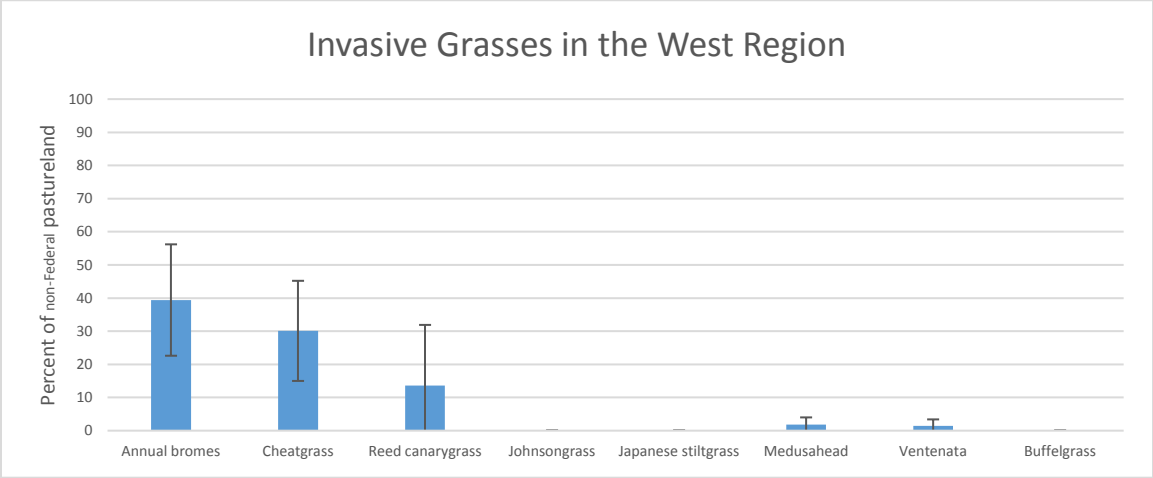


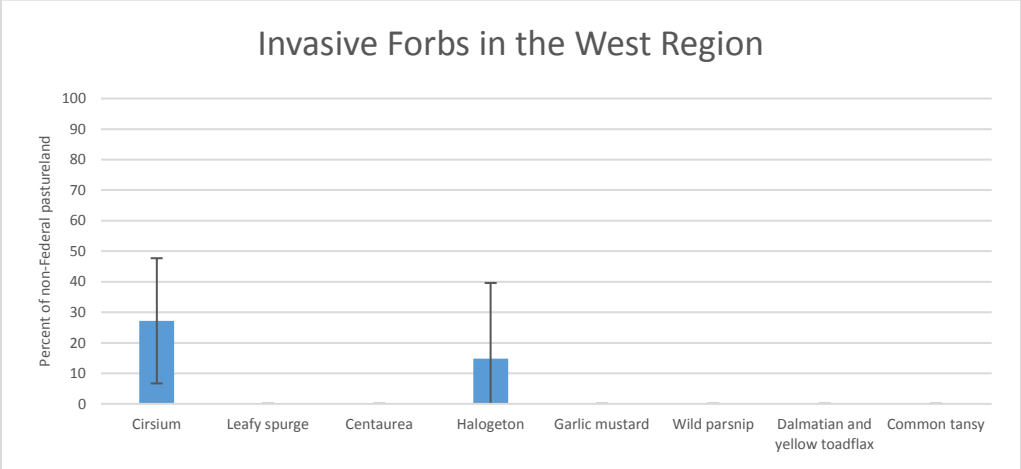


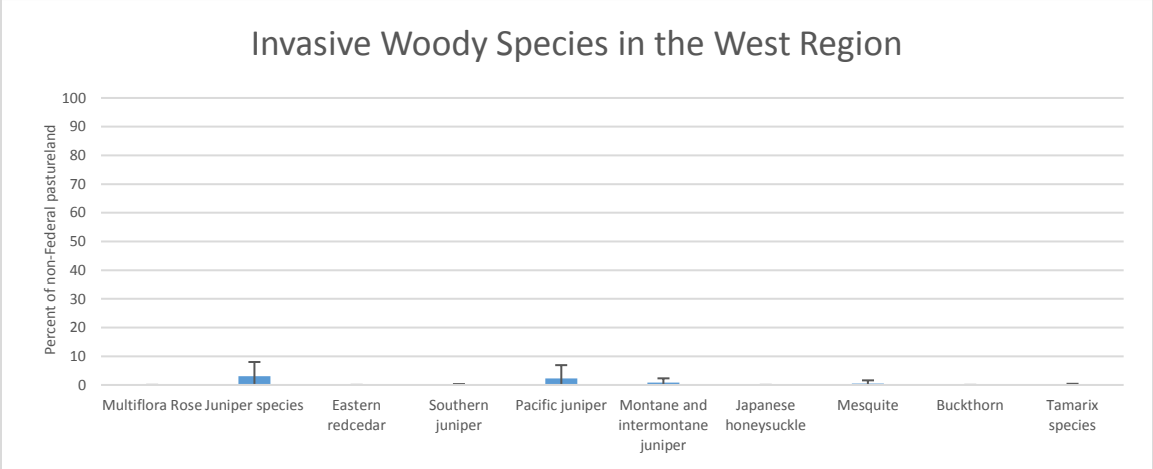
West Region

Annual bromes are present on 39.4 ±16.8 percent of these lands while cheatgrass is present on 30.1 ±15.1 percent of this region. *Cirsium* is found on 27.2 ±20.5 percent of non-Federal pastureland. Trace amounts of halogeton, medusahead, *Ventenata*, reed canarygrass are present, as well as trace amounts of junipers

(including southern, Pacific, montane and intermontane junipers), mesquite, and *Tamarix* species.





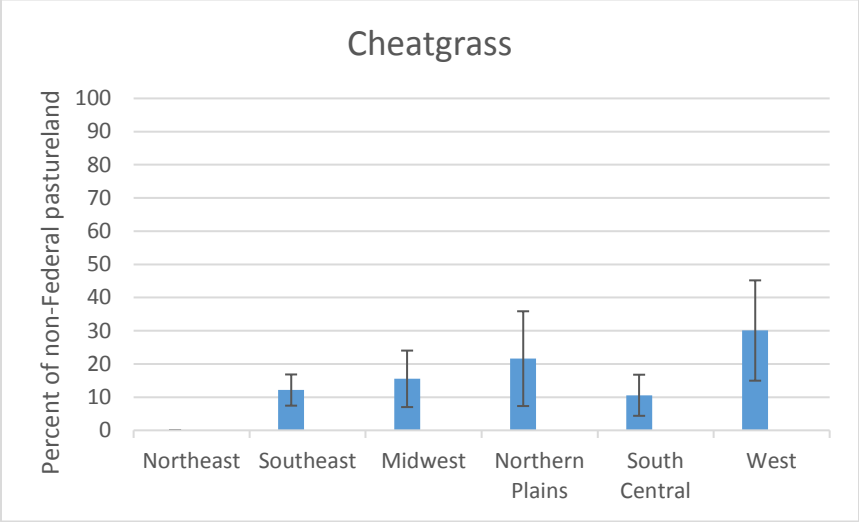


Invasive Species Group Summaries

Grasses

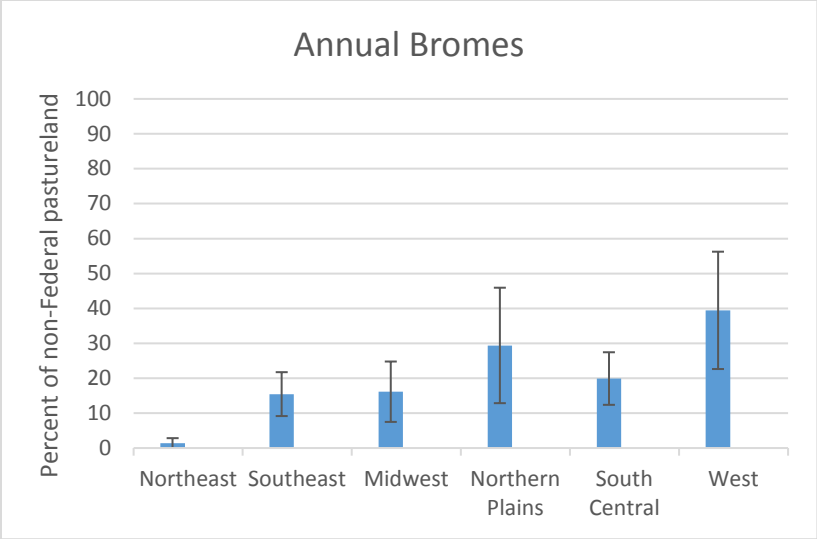
Cheatgrass (*Bromus tectorum*) is one of the more prevalent types of annual brome grasses. It has the potential to dramatically alter the ecosystems it invades, and can completely replace native vegetation and can change fire regimes (DiTomaso 2000, Skinner 2003).

Although nationally cheatgrass is present on 14.0 ± 3.6 percent of non-Federal pasturelands, in the West and Northern Plains it is present on 30.1 ± 15.1 percent and 21.6 ± 14.3 percent, respectively. In the Midwest, Southeast, and South Central regions cheatgrass is present on 15.5 ± 8.5 percent, 12.1 ± 4.7 percent, and 10.6 ± 6.2 percent, respectively, of non-Federal pasturelands.



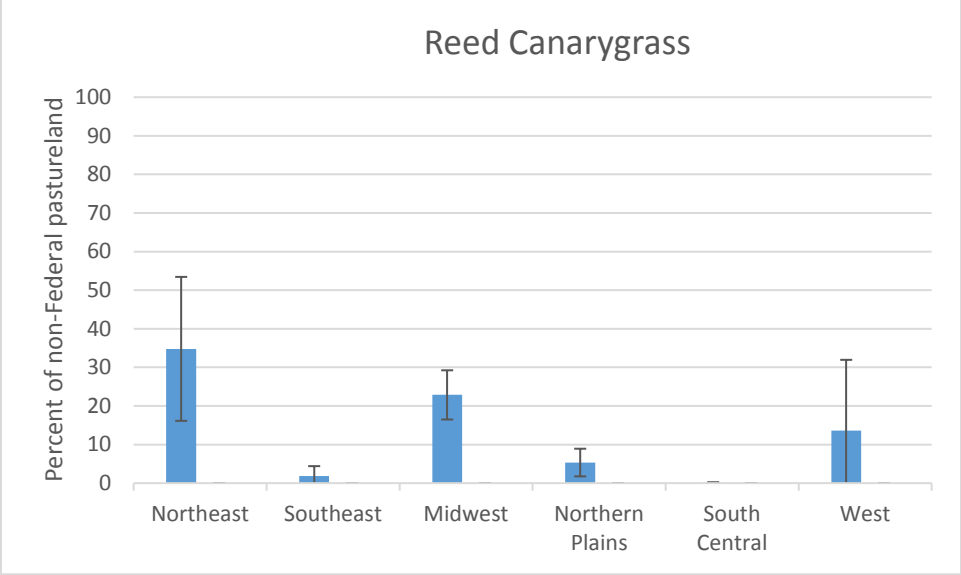
Annual bromes (*Bromus spp.*) – Annual brome grasses included in this group (including cheatgrass) are highly invasive in shrub communities including sagebrush, and pinyon-juniper and often completely out-compete native grasses and forbs. Communities of annual bromes can be highly flammable in the late spring through early fall (Brooks 2016).

Annual bromes are present on 39.4 ± 16.8 percent of non-Federal pasturelands in the West and 29.4 ± 16.5 percent in the Northern Plains region. In the South Central, Midwest, and Southeast regions annual bromes are present on 19.9 ± 7.5 percent, 16.1 ±8.6 percent, and 15.4 ± 6.3 percent, respectively, of non-Federal pasturelands.



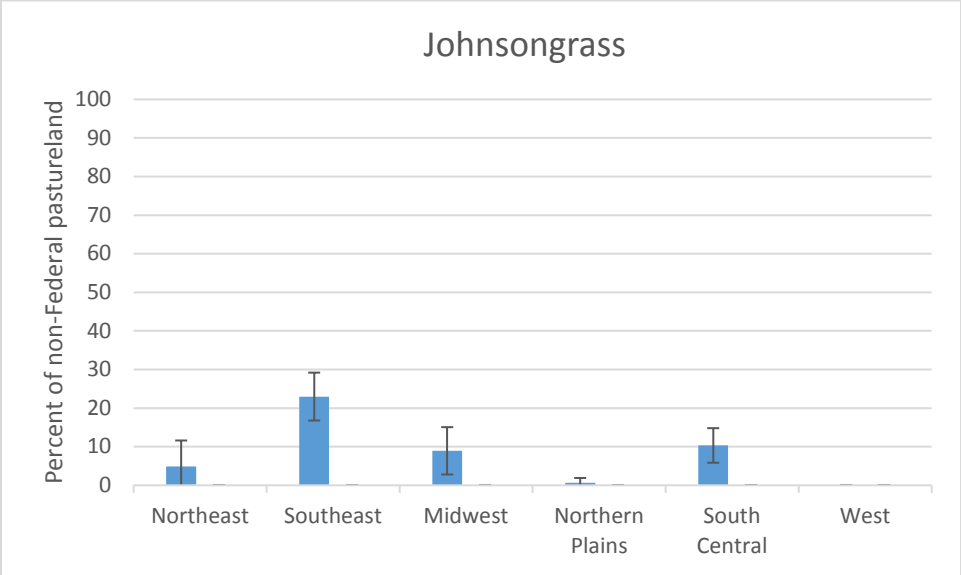
Reed canarygrass (*Phalaris arundinacea*) has both native and nonnative strains in the United States. European and Asian varieties have been introduced and cultivated for livestock forage and wastewater pollution control. The nonnative varieties and hybrids of nonnative and native varieties are aggressive in many environments and have the capacity to shade out and displace desirable vegetation. Once established, reed canarygrass is very competitive and will frequently develop a solid monoculture (Stannard 2002, Hall 2008).

Reed canarygrass is present on 34.8 ± 18.6 percent of non-Federal pasturelands in the Northeast and 22.9 ±6.4 percent in the Midwest. Nationally, this species is present on 9.5 ± 1.9 percent of non-Federal pasturelands.

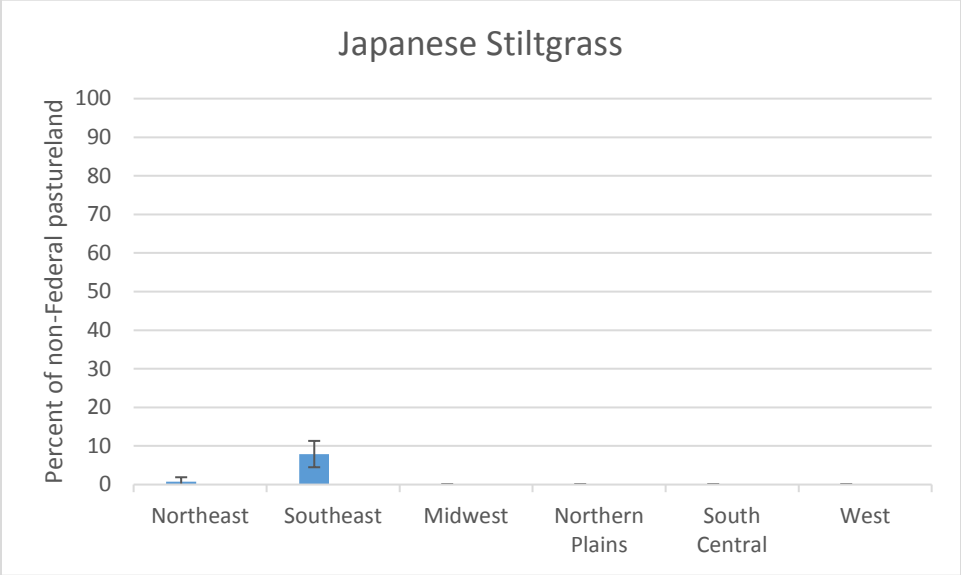


Johnsongrass (*Sorghum halepense*) is a tall, coarse, perennial grass that spreads aggressively via stout rhizomes. It grows in dense clumps or nearly solid stands that prevents growth of desirable vegetation. If Johnsongrass is stressed by cutting or frost, it can cause cyanide poisoning in livestock feeding (Byrd 2009).

In the Southeast, South Central, and Midwest regions Johnsongrass is present on 23.0 ± 6.2 percent, 10.3 ± 4.5 percent, and 8.9 ± 6.1 percent, respectively, of non-Federal pasturelands. Nationally, Johnsongrass is present on 10.8 ± 2.7 percent of non-Federal pasturelands.



Japanese stiltgrass (*Microstegium vimineum*) grows well in a wide range of ecosystems including pasturelands and can expand into dense stands that prevent desirable vegetation from growing. It grows well under a variety of light conditions and prefers damp locations (MDC 2010). Japanese stiltgrass is present on 7.9 ±3.4 percent of non-Federal pasturelands in the Southeast region.



Medusahead (*Taeniatherum caput-medusae*) typically invades established plant communities, displacing desirable vegetation. Medusahead has a high silica content making it generally unpalatable to livestock and wildlife. Its seeds are avoided by most seed eating birds. Dense communities present risk of wildfire and alteration of the hydrologic cycle (Kyser 2014). Trace amounts of medusahead were observed on non-Federal pasturelands in the West region.

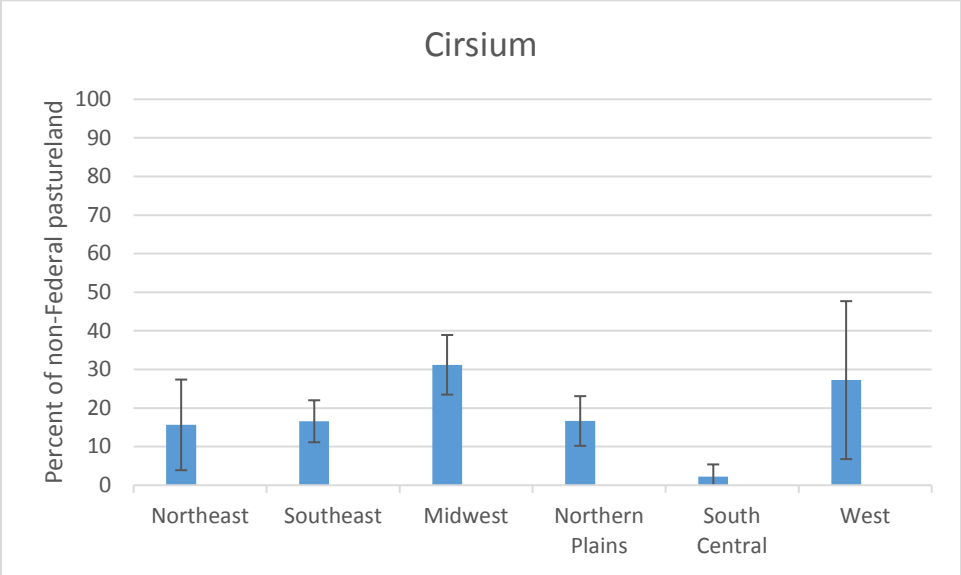
Ventenata (*Ventenata dubia*) is a winter annual grass that is beginning to replace perennial grasses and forbs along roadsides and in hay, pasture, range and CRP fields in the western U.S. It has minimal forage value for livestock and its shallow root system may cause soil to be more susceptible to erosion (Scheinost 2008). Trace amounts of this species were observed in the data collected on non-Federal pasturelands in the West region.

Buffelgrass (*Pennisetum ciliare*) is an invasive perennial grass that is highly resistant to drought events and can choke out native grasses. When dry, this tall grass burns rapidly if ignited, making it especially dangerous during wildfire season (NPS 2011). No presence of this species was observed in the data collected on non-Federal pasturelands.

Forbs

Canada and Bull thistles (*Cirsium arvense* and *C. vulgare*) – Canada thistle and bull thistle are in this group and can form dense stands that can shade out native vegetation. These species are unpalatable to many livestock and wildlife (Curran 2009).

Cirsium species were observed in all regions and present on 16.6 ± 3.0 percent of non-Federal pasturelands nationally. They are most common in the Midwest region where they are present on 31.2 ± 7.7 percent of non-Federal pastureland. In the West, Southeast, Northern Plains, and Northeast regions *Cirsium* species are present on 27.2 ± 20.5 percent, 16.6 ± 5.4 percent, 16.6 ± 6.4 percent, and 15.6 ± 11.7 percent, respectively, of non-Federal pasturelands.



Leafy spurge (*Euphorbia esula*) is a deep-rooted invasive plant that is highly competitive with native species causing degradation of grazing land and wildlife habitat. The plant produces milky latex that causes irritation to the skin and is poisonous to some animals (DiTomaso 2000, St. John 2014). Leafy spurge is present on 5.2 ± 3.7 percent of non-Federal pasturelands in the Northern Plains, while trace amounts are observed in the Southeast and Midwest regions.

Centaurea spp. - The roots of species in this group produce toxins that stunt the growth of many native plant species allowing them a competitive advantage. These *Centaurea* species are inedible to most livestock and poisonous to some (DiTomaso 2000). Introduced species in this genus are present on 6.5 ± 6.1 percent of non-Fedearl pastureland in the Northeast and trace amounts were observed in the Norther Plains, Midwest, and Southeast regions.

Halogeton (*Halogeton glomeratus*) was introduced from Eurasia to the United States early in the 20th century. It is highly toxic to both sheep and cattle. Salt from the soil accumulates in plant tissues and is also leached from the plant back onto the soil surface increasing salinity and favoring establishment of Halogeton over other species (Pavek 1992). Trace amounts of Halogeton were observed on non-Federal pasturelands in the West region.

Garlic mustard (*Alliaria petiolata*) is an invasive forb species found in the forest understory, at the edges of wooded areas, near trails, along roadsides and in areas where trees have been removed. It is difficult to control once it has reached a site and can quickly outcompete other plant species (Pratt 2004). Trace amounts of garlic mustard are observed on non-Federal pasturelands in the Midwest region.

Wild parsnip (*Pastinaca sativa*) is commonly found along roadsides, but is also found invading pastures, natural areas, forest harvest areas, idle lands and disturbed lands. Once established, it can spread into adjacent areas and form dense stands. The plant produces a compound in its leaves, stems, flowers and fruits that causes intense rash or blistering on contact with skin on sunny days (Averill 2007). Trace amounts of wild parsnip are observed on non-Federal pasturelands in the Midwest region.

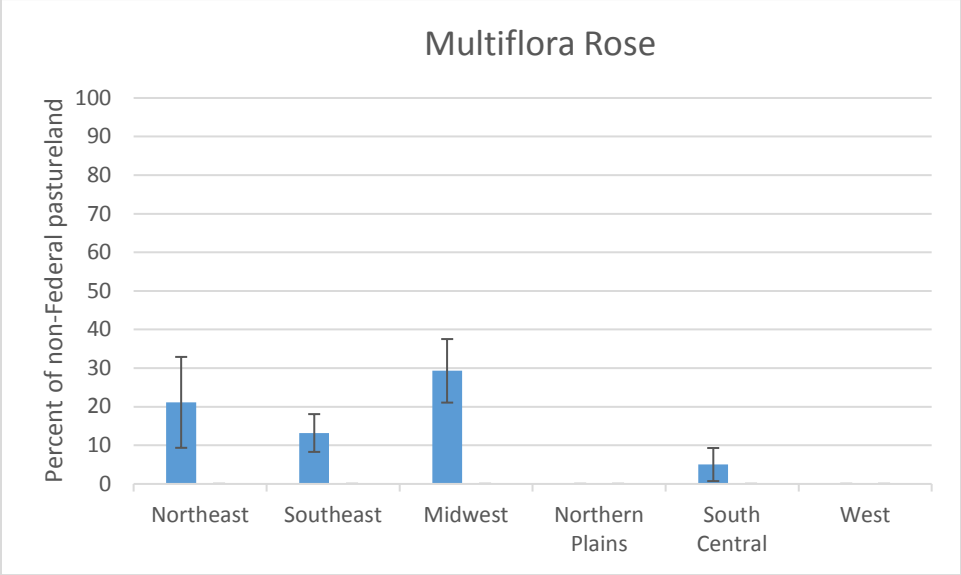
Dalmatian and yellow toadflax (*Linaria genistifolia* spp. *dalmatica* and *Linaria vulgaris)* Dalmatian toadflax can become extremely invasive, especially on dryland sites, disturbed areas, and roadsides. Yellow toadflax is found in pastures, meadows, and ditches on more moist sites than Dalmatian toadflax. Once an area becomes infested, both species can dramatically reduce forage production and decrease native plants and wildlife habitat (Lym 2002). Trace amounts of Dalmatian and yellow toadflax are observed on non-Federal pasturelands in the Northeast region.

Common tansy (*Tanacetum vulgare*) often invades disturbed areas, roadsides, and fence lines, but once established is considered highly invasive. This species can severely reduce desirable forage in pastures and degrade wildlife habitat. Tansy spreads both from seed and rhizomes that form dense stands (Gucker 2009). Trace amounts of common tansy are observed on non-Federal pastureland in the Midwest region.

Woody species

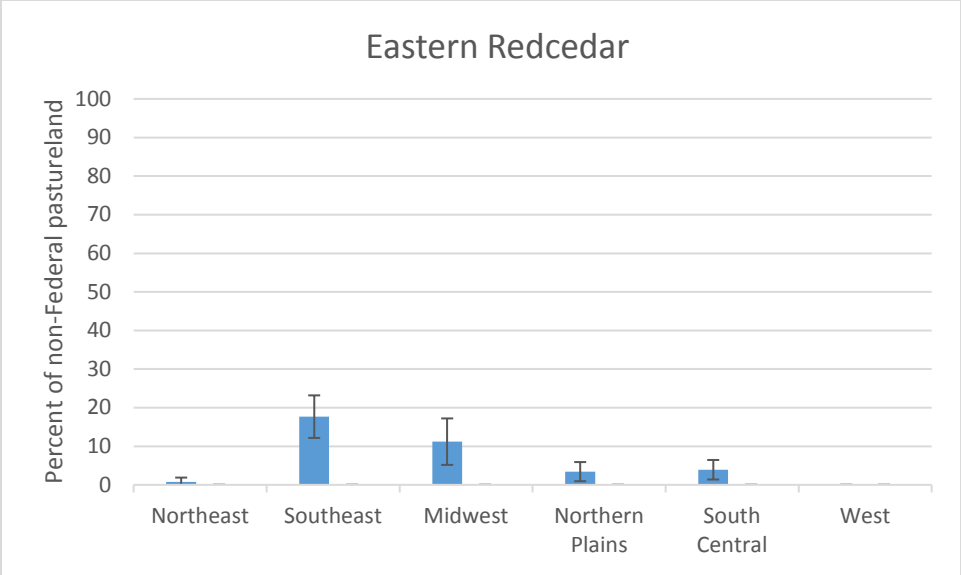
Multiflora rose (*Rosa multiflora*) is a subshrub or vine introduced from Japan to cultivate rose rootstock, but later was used for erosion control and as a component of living fences. Multiflora rose rapidly outcompetes surrounding vegetation, takes over pastures, and lowers crop yields (Johnson 2007, Wenning 2012).

Multiflora rose is present on non-Federal pastureland in the Midwest (29.3 ± 8.2 percent), Northeast (21.1 ± 11.8 percent), Southeast (13.2 ± 4.9 percent), and South Central (5.0 ± 4.3 percent). Nationally multiflora rose is present on 12.8± 3.1 percent of non-Federal pastureland.



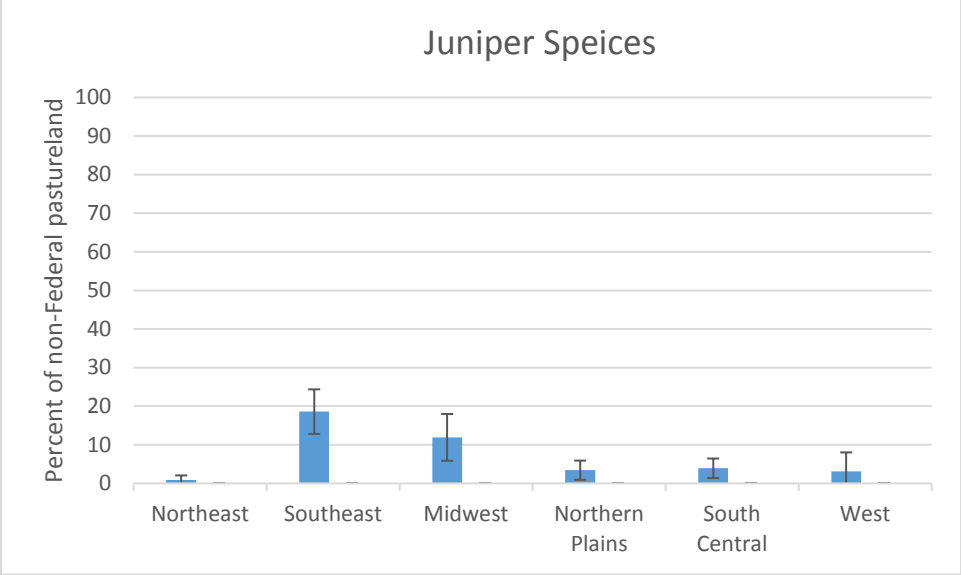
Eastern redcedar (*Juniperus virginiana)* has invaded many areas because of fire suppression and use in windbreaks and visibility screens. As eastern redcedar encroaches into grassland areas, it changes the composition and structure of the plant community. Eastern redcedar can compete with grasses for water, nutrients, and light and reduce forage production (DiTomaso 2000).

Eastern redcedar is the most common juniper species observed on non-Federal pasturelands and is present in the Southeast (17.7 ± 5.5 percent), Midwest (11.2 ± 6.0 percent), South Central (3.9 ± 2.5 percent), and Northern Plains (3.4 ± 2.5 percent). Trace amounts are also present in the Northeast.

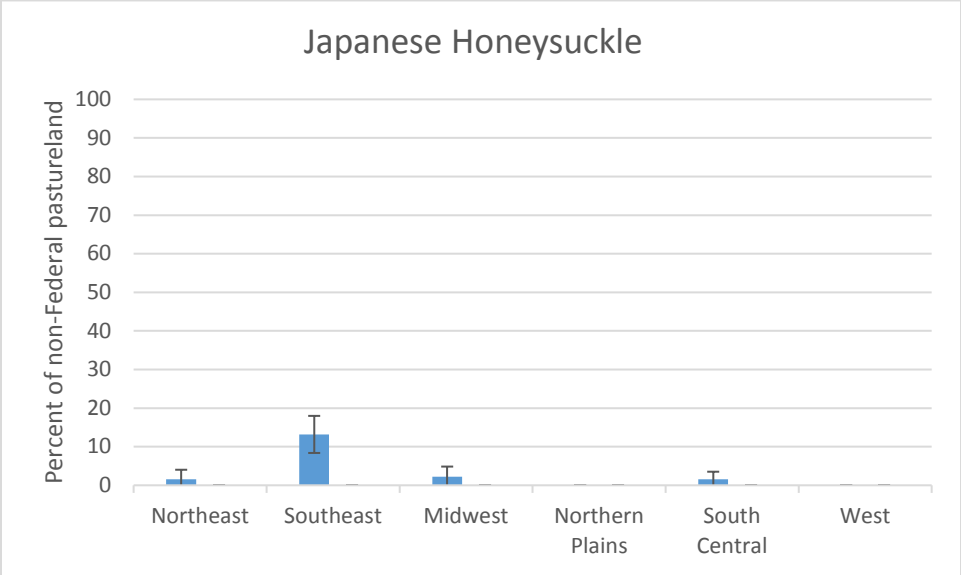


Junipers (*Juniperus* spp.) Some native invasive woody plant species such as junipers can invade areas replacing native shrubs, grasses, and forbs. Dense stands can alter nutrient and water cycles, and energy flow through the ecosystem, affect hydrology, and reduce wildlife habitat and forage for domestic animals and wildlife (DiTomaso 2000, Archer 1995).

Juniper species (including Eastern redcedar, southern junipers, Pacific junipers, and montane and intermotane junipers) are present on non-Federal pastureland in the Southeast (18.6 ± 5.8 percent), Midwest (11.9 ± 6.1 percent), South Central (3.9 ± 2.5 percent), and Northern Plains (3.4 ± 2.5 percent). Trace amounts of juniper species were also observed on non-Federal pasturelands in the West and Northeast. Although southern junipers, Pacific junipers, and montane and intermotane junipers are common on rangelands (USDA-NRCS 2014), they area only present in trace amounts on non-Federal pasturelands in the West.



Japanese honeysuckle (*Lonicera japonica)* is an aggressive vine that seriously alters or destroys the understory and herbaceous layers of plant communities it invades. The shade tolerant vine often occurs along field edges, rights-of-way or in forested areas (Bravo 2005). Japanese honeysuckle is present on 13.2 ± 4.8 percent of non-Federal pastureland in the Southeast and trace amounts are present in the Northeast, Midwest, and South Central regions.



Mesquite (*Prosopis* spp.) typically has a deep root system that enables it to withstand droughts and severe competition from grasses. Replacement of grasses by mesquite over time modifies the soils and microclimate, facilitating establishment of additional woody species (Archer 1995). Honey mesquite (*P. glandulosa*) and velvet mesquite (*P. velutina*) are the two most common species found in the southwestern U.S. (Ansley 1997). Mesquite is present on 17.0 ±8.1 percent of non-Federal pastureland in the South Central region and trace amounts are present in the West.

Buckthorn *(Rhamnus cathartica)* outcompetes other plants for nutrients, light and moisture and serves as host to pests including crown rust fungus and soybean aphid. It contributes to erosion by shading out other plants (Archibold 1997, PCA 2005, Klionsky 2011). Trace amounts of buckthorn were observed on non-Federal pasturelands in the Northeast and Midwest regions.

Tamarix (*Tamarix* spp.) is a fast-growing, deep-rooted invasive shrub-tree that can colonize riparian wetlands and floodplains. It absorbs large amounts of water and secretes salt which is deposited on the soil surface increasing its advantage over other plants (DiTomaso, Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. 1998). Trace amounts of Tamarix were observed on non-Federal pasturelands in the Northern Plains and West regions.

Table 1. Invasive Species Groups

Invasive Grass Species Groups

Annual bromes

- BRTE - *Bromus tectorum L.,* cheatgrass
- BRJA - *Bromus japonicus Thunb. ex Murr*., Bromus arvensis
- BRAR5 new symbol for BRJA
- BRST2 - *Bromus sterilis L.,* poverty brome
- BRRU2 - *Bromus rubens*, red brome
- BRDI3 - *Bromus diandrus ssp. diandrus*, ripgut brome
- BRDIR - *Bromus diandrus ssp. rigidus,* ripgut brome
- BRRI8 2004 symbol for BRDI3
- BRHO2 - *Bromus hordeaceus,* soft brome
- BRSE - *Bromus secalius,* rye brome

Cheatgrass

- BRTE - *Bromus tectorum L.,* cheatgrass

Reed canarygrass

- PHAR3 – *Phalaris arundinacea* L., reed canarygrass
- PHARP – *Phalaris arundinacea* L. var. *picta* L., reed canarygrass
- PHAR15 – *Phalaroides arundinacea* (L.) Raeusch.
- PHARP3 – *Phalaroides arundinacea* (L.) Raeusch. var. *picta* (L.) Tzvelev

Johnsongrass

- SOHA - Sorghum halepense (L.) Pers., Johnsongrass

Japanese stiltgrass

- MIVI - Microstegium vimineum (Trin.) A. Camus, Napalese browntop (aka Japanese stiltgrass)

Medusahead

- TACA8 - *Taeniatherum caput-medusae (L.) Nevski*, medusahead
- TAENI2 - *Taeniatherum Nevski*, medusahead

Ventenata

- VENTE, *Ventenata* Koeler, North Africa grass
- VEDU, *Ventenata dubia* (Leers) Coss., North Africa grass

Buffelgrass

- PECI *Pennisetum ciliare* (L.), buffelgrass
- CECI *Cenchrus ciliaris* (L.), buffelgrass

Invasive Forb Species

Cirsium

- CIAR4 - *Cirsium arvense* (L.) Scop., Canada thistle
- CIVU - *Cirsium vulgare* (Savi) Ten., bull thistle

Leafy spurge

- EUES - *Euphorbia esula L.*, leafy spurge

Centaurea

* CENTA not included from AZ, KS, NM, OK, TX since in those states the genus *Centaurea* may include both native and introduced species.

- CENTA - *Centaurea L.*, knapweed*
- CESO3 - *Centaurea solstitialis L.*, yellow star-thistle
- CEDI3 - *Centaurea diffusa Lam.*, diffuse knapweed
- CEME2 - *Centaurea melitensis L.*, Maltese star-thistle
- ACRE3 – *Acroptilon repens* (L.) DC., hardheads
- CEBI2 – *Centaurea biebersteinii* DC.
- CEST8 new symbol for CEBI2

Halogeton

- HALOG - *Halogeton* C.A. Mey, saltlover
- HAGL - *Halogeton glomeratus* (M. Bieb.) C.A. Mey., saltlover

Garlic mustard

- ALPE4 - *Alliaria petiolata* (M. Bieb.) Cavara & Grande, garlic mustard

Wild parsnip

- PASA2 - *Pastinaca sativa* L., wild parsnip

Yellow and Dalmation toadflax (*Linaria* sp.)

- LIVU2 - *Linaria vulgaris*, Mill., butter and eggs (aka yellow toadflax)
- LIDA - *Linaria dalmatica* (L.) Mill., Dalmatian toadflax
- LIDAD - *Linaria dalmatica* (L.) Mill. ssp. *Dalmatica*

Common tansy

- TAVU - *Tanacetum vulgare* L., common tansy

Woody Invasive Species Groups

Multiflora rose

- ROMU - *Rosa multiflora* Thunb.

Juniper

- JUCO6 - *Juniperus communis* L., common juniper
- JUHO2 - *Juniperus horizontalis* Moench, creeping juniper
- JUNIP - *Juniperus* L., juniper
- JUOC - *Juniperus occidentalis* Hook., western juniper
- JUCA7 - *Juniperus californica* Carrière, California juniper
- JUOS - *Juniperus osteosperma* (Torr.) Little, Utah juniper
- JUSC2 - *Juniperus scopulorum* Sarg., Rocky Mountain juniper
- JUAS - *Juniperus ashei* J. Buchholz, Ashe's juniper

- JUCO11 - *Juniperus coahuilensis* (Martiñez) Gaussen ex R.P. Adams, redberry juniper
- JUDE2 - *Juniperus deppeana* Steud., alligator juniper
- JUMO - *Juniperus monosperma* (Engelm.) Sarg., oneseed juniper
- JUPI - *Juniperus pinchotii* Sudw., Pinchot's juniper
- JUVI - *Juniperus virginiana* L., Eastern redcedar

Eastern juniper
- JUVI - *Juniperus virginiana* L., Eastern redcedar

Pacific junipers
- JUOC - *Juniperus occidentalis* Hook., western juniper
- JUCA7 - *Juniperus californica* Carrière, California juniper

Montane/intermontane junipers
- JUOS - *Juniperus osteosperma* (Torr.) Little, Utah juniper
- JUSC2 - *Juniperus scopulorum* Sarg., Rocky Mountain juniper

Southern junipers
- JUAS - *Juniperus ashei* J. Buchholz, Ashe's juniper
- JUCO11 - *Juniperus coahuilensis* (Martiñez) Gaussen ex R.P. Adams, redberry juniper
- JUDE2 - *Juniperus deppeana* Steud., alligator juniper
- JUMO - *Juniperus monosperma* (Engelm.) Sarg., oneseed juniper
- JUPI - *Juniperus pinchotii* Sudw., Pinchot's juniper

Japanese honeysuckle
- LOJA - *Lonicera japonica* Thunb.

Mesquite
- PROSO - *Prosopis* L., mesquite
- PRGL2 - *Prosopis glandulosa* Torr., honey mesquite
- PRJU3 - *Prosopis juliflora* (Sw.) DC., mesquite
- PRVE - *Prosopis velutina* Woot., velvet mesquite

Common buckthorn
- RHCA3 - *Rhamnus cathartica* L., common buckthorn

Tamarix
- TAGA - *Tamarix gallica* L., French tamarisk
- TAMAR2 - *Tamarix* L. , tamarisk
- TARA - *Tamarix ramosissima* Ledeb., saltcedar

Table 2. Non-Federal pastureland where invasive species are present. Estimates based on plant census data collected on pastureland (2013-2015). Margins of error are in parentheses.

	Northeast	Southeast	Midwest	Northern Plains	South Central	West	Nation
Invasive Grasses	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Annual bromes	1.4	15.4	16.1	29.4	19.9	39.4	19.2
	(1.5)	(6.3)	(8.6)	(16.5)	(7.5)	(16.8)	(4.0)
Cheatgrass	0	12.1	15.5	21.6	10.6	30.1	14.0
	(.)	(4.7)	(8.5)	(14.3)	(6.2)	(15.1)	(3.6)
Reed canarygrass	34.8	1.8	22.9	5.3	0.1	13.6	9.5
	(18.6)	(2.6)	(6.4)	(3.6)	(0.2)	(18.3)	(1.9)
Johnsongrass	4.9	23.0	8.9	0.6	10.3	0	10.8
	(6.7)	(6.2)	(6.1)	(1.3)	(4.5)	(.)	(2.7)
Japanese stiltgrass	0.8	7.9	0	0	0	0	1.9
	(1.1)	(3.4)	(.)	(.)	(.)	(.)	(0.8)
Medusahead	0	0	0	0	0	1.8	0.1
	(.)	(.)	(.)	(.)	(.)	(2.2)	(0.1)
Ventenata	0	0	0	0	0	1.4	0.1
	(.)	(.)	(.)	(.)	(.)	(2.0)	(0.1)
Buffelgrass	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Invasive Forbs							
Cirsium	15.6	16.6	31.2	16.6	2.2	27.2	16.6
	(11.7)	(5.4)	(7.7)	(6.4)	(3.2)	(20.5)	(3.0)
Leafy spurge	0	0.3	1.1	5.2	0	0	1.0
	(.)	(0.7)	(1.8)	(3.7)	(.)	(.)	(0.6)
Centaurea	6.5	1.1	0.4	3.7	0	0	1.2
	(6.1)	(1.7)	(0.8)	(5.0)	(.)	(.)	(0.8)
Halogeton	0	0	0	0	0	14.8	0.9
	(.)	(.)	(.)	(.)	(.)	(24.8)	(1.4)
Garlic mustard	0	0	0.9	0	0	0	0.2
	(.)	(.)	(1.1)	(.)	(.)	(.)	(.3)

Wild parsnip	0	0	3.4	0	0	0	0.8
	(.)	(.)	(3.5)	(.)	(.)	(.)	(0.8)
Dalmatian and yellow toadflax	0.3	0	0	0	0	0	0.0
	(0.5)	(.)	(.)	(.)	(.)	(.)	(.)
Common tansy	0	0	0.1	0	0	0	0.0
	(.)	(.)	(0.3)	(.)	(.)	(.)	(0.1)
Woody Species							
Multiflora Rose	21.1	13.2	29.3	0	5.0	0	12.8
	(11.8)	(4.9)	(8.2)	(.)	(4.3)	(.)	(3.1)
Juniper species	0.9	18.6	11.9	3.4	3.9	3.1	9.0
	(1.1)	(5.8)	(6.1)	(2.5)	(2.5)	(4.9)	2.1
Eastern redcedar	0.8	17.7	11.2	3.4	3.9	0	8.4
	(1.1)	(5.5)	(6.)	(2.5)	(2.5)	(.)	(2.0)
Southern juniper	0	0	0	0	0	0.1	0.0
	(.)	(.)	(.)	(.)	(.)	(.2)	(.)
Pacific juniper	0	0	0	0	0	2.3	0.1
	(.)	(.)	(.)	(.)	(.)	(4.6)	(.3)
Montane and intermontane juniper	0	0	0	0	0	0.8	0.0
	(.)	(.)	(.)	(.)	(.)	(1.5)	(.1)
Japanese honeysuckle	1.5	13.2	2.2	0	1.6	0	4.2
	(2.5)	(4.8)	(2.6)	(.)	(2.)	(.)	(1.3)
Mesquite	0	0	0	0	17.0	0.5	4.9
	(.)	(.)	(.)	(.)	(8.1)	(1.1)	(2.3)
Buckthorn	0.1	0	0.2	0	0	0	0.1

	(0.3)	(.)	(0.4)	(.)	(.)	(.)	(.1)
Tamarix species	0	0	0	0.6	0	0.1	0.1
	(.)	(.)	(.)	(1.1)	(.)	(0.3)	(0.1)

• When there are no observations for a plant in the region, the estimate is 0, margins of error are not applicable and shown as a period (.).

• Estimates in red = STOP, these estimates are not reliable. The margin of error is equal to or greater than the estimate so the confidence interval includes zero.

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