

Invasive Non-Native Plants That Threaten Wildlands in Arizona

A categorized list developed by the Arizona
Wildlands Invasive Plant Working Group



August 2005

Supporting Organizations

Arizona Association of Environmental Professionals
Arizona Department of Agriculture
Arizona Department of Environmental Quality
Arizona Department of Transportation
Arizona Department of Water Resources
Arizona Game and Fish Department
Arizona Native Plant Society
Arizona-Sonora Desert Museum
Arizona State Land Department
Arizona State Parks
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
National Park Service
Sonoran Institute
Southwest Vegetation Management Association
The Nature Conservancy in Arizona
University of Arizona Cooperative Extension
US Army Corps of Engineers
US Department of Defense
US Environmental Protection Agency
US Fish and Wildlife Service
USDA Forest Service
US Geological Survey

The appearance of an organization's name above indicates that it: (1) recognizes that the list was developed in a transparent, unbiased, and scientific manner; (2) supports the conclusions reached during the Arizona Wildlands Invasive Plant Working Group's (AZ-WIPWG) listing and oversight process as reflected by the plants contained in the resultant list and their categorization; and (3) intends to use and internally promote the list to guide day-to-day management activities in accordance with its particular organizational mission and responsibilities.

Purpose

Invasive non-native plants, especially those that alter ecological processes such as fire and hydrologic regimes, are a significant threat to Arizona's wildlands. Federal and state noxious weed lists, however, are concerned primarily with agricultural pests that in some cases are not yet in the state. As a result, these regulatory lists do not provide land managers and other stakeholders with a complete picture of those non-native plants that can impact native species, plant and animal communities, and ecosystems. What is needed is objective information that identifies and distinguishes those non-native plants that can invade an area and cause adverse ecological impacts from those non-native plants that, at least based on current knowledge, are relatively innocuous.

Approach

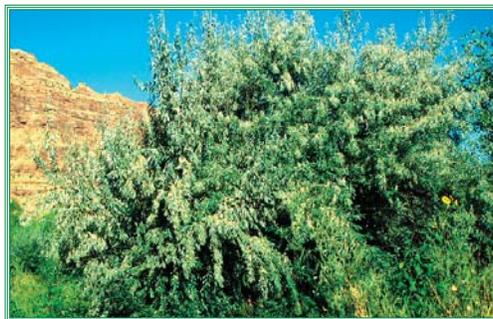
To address the above need, over 20 federal and state agencies, academic institutions, and private conservation, professional, and commercial interests from across Arizona joined together to form the Arizona Wildlands Invasive Plant Working Group (AZ-WIPWG). The AZ-WIPWG was truly an example of multiple organizations partnering and sharing resources to accomplish a mutual goal. Over a two and a half-year period, the AZ-WIPWG developed the enclosed categorized list of invasive non-native plants that threaten Arizona's wildlands. This non-regulatory list was constructed through the application of a regionally developed assessment protocol, *Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands*, released in February of 2003 (the *Criteria*). The AZ-WIPWG implemented a comprehensive review and oversight process that ensured a consistent and objective evaluation of each non-native plant considered. To be evaluated a non-native plant species had to be established in Arizona's wildlands (that is, outside of human cultivation and management).

Categorized List

High: These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetational structure; invasiveness attributes are conducive to moderate to high rates of dispersal and establishment; and species are usually widely distributed, both among and within ecosystems /communities. See page 9 for 🚩 annotations.

Plants Ranked High (19)

- *Acroptilon repens* (Russian knapweed)
- *Arundo donax* (Giant reed)
- *Bromus rubens* (Red brome)
- *Bromus tectorum* (Cheatgrass)
- *Centaurea solstitialis* (Yellow starthistle)
- *Eichhornia crassipes* (Water hyacinth) 🚩
- *Elaeagnus angustifolia* (Russian olive)
- *Eragrostis lehmanniana* (Lehmann lovegrass)
- *Euphorbia esula* (Leafy spurge)
- *Euryops multifidus* (Sweet resinbush) 🚩
- *Lepidium latifolium* (Perennial pepperweed) 🚩
- *Myriophyllum aquaticum* (Parrot's feather)
- *Myriophyllum spicatum* (Eurasian watermilfoil)
- *Pennisetum ciliare* (Buffelgrass) 🚩
- *Pennisetum setaceum* (Fountain grass) 🚩
- *Salvina molesta* (Giant salvinia)
- *Tamarix chinensis* (Fivestamen tamarisk) 🚩
- *Tamarix parviflora* (Smallflower tamarisk) 🚩
- *Tamarix ramosissima* (Saltcedar) 🚩



Elaeagnus angustifolia (Russian olive). Photo by John M. Randall, The Nature Conservancy

Medium: These species have substantial and apparent ecological impacts on ecosystems, plant and animal communities, and vegetational structure; invasiveness attributes are conducive to moderate to high rates of dispersal, often enhanced by disturbance; and ecological amplitude (diversity of ecosystems/communities) and distribution (within an ecosystem/community) range from limited to widespread.

Plants Ranked Medium (40)

- *Alhagi maurorum* (Camelthorn)
- *Avena fatua* (Wild oat)
- *Brassica tournefortii* (Sahara mustard) 
- *Bromus diandrus* (Ripgut brome)
- *Bromus inermis* (Smooth brome) 
- *Cardaria chalapensis* (Lenspod whitetop)
- *Cardaria draba* (Whitetop)
- *Cardaria pubescens* (Hairy whitetop)
- *Carduus nutans* (Musk thistle)
- *Centaurea biebersteinii* (Spotted knapweed) 
- *Centaurea diffusa* (Diffuse knapweed)
- *Centaurea melitensis* (Malta starthistle)
- *Chondrilla juncea* (Rush skeletonweed)
- *Cirsium arvense* (Canada thistle) 
- *Conium maculatum* (Poison hemlock)
- *Convolvulus arvensis* (Field bindweed)
- *Cortaderia selloana* (Pampas grass) 
- *Cynodon dactylon* (Bermudagrass)
- *Erodium cicutarium* (Redstem filaree)
- *Hordeum murinum* (Mouse barley) 
- *Linaria dalmatica* (Dalmatian toadflax) 
- *Linaria vulgaris* (Yellow toadflax)
- *Lolium perenne* (Perennial ryegrass)
- *Melilotus alba* (White sweetclover) 
- *Melilotus officinalis* (Yellow sweetclover) 
- *Mesembryanthemum nodiflorum* (Slenderleaf iceplant)
- *Rhus lancea* (African sumac)
- *Rubus armeniacus* (Himalayan blackberry)
- *Rubus discolor* (Himalayan blackberry)
- *Saccharum ravennae* (Ravennagrass)

- *Salsola collina* (Slender Russian thistle)
- *Salsola paulsenii* (Barbwire Russian thistle)
- *Salsola tragus* (Prickly Russian thistle)
- *Schismus arabicus* (Arabian schismus)
- *Schismus barbatus* (Common Mediterranean grass)
- *Sonchus asper* (Spiny sowthistle)
- *Sonchus oleraceus* (Annual sowthistle)
- *Sorghum halepense* (Johnsongrass)
- *Ulmus pumila* (Siberian elm)
- *Vinca major* (Bigleaf periwinkle)



Cardaria draba (Whitetop). Photo by John M. Randall, The Nature Conservancy



Brassica tournefortii (Sahara mustard). Provided by U.S. Fish and Wildlife Service



Centaurea melitensis (Malta starthistle). Photo by John M. Randall, The Nature Conservancy

Low: These species have minor yet detectable ecological impacts; invasiveness attributes result in low to moderate rates of invasion; ecological amplitude and distribution are generally limited, but the species can be problematic locally.

Plants Ranked Low (12)

- *Aegilops cylindrica* (Jointed goatgrass) 🚩
- *Asphodelus fistulosus* (Onionweed)
- *Cirsium vulgare* (Bull thistle)
- *Cynoglossum officinale* (Houndstongue)
- *Echinochloa crus-galli* (Barnyardgrass)
- *Elymus repens* (Quackgrass)
- *Eragrostis curvula* (Weeping lovegrass) 🚩
- *Leucanthemum vulgare* (Oxeye daisy)
- *Mesembryanthemum crystallinum* (Common iceplant)
- *Onopordum acanthium* (Scotch thistle)
- *Panicum antidotale* (Blue panicum)
- *Tamarix aphylla* (Athel tamarisk) 🚩



Asphodelus fistulosus (Onionweed). Photo by John M. Randall, The Nature Conservancy

Evaluated but not listed: Designation when current information is inadequate to respond to the *Criteria* questions or sum effects of ecological impacts, invasiveness, and ecological amplitude and distribution are below the threshold for listing.

Plants Evaluated but not listed (3)

- *Hydrilla verticillata* (Hydrilla) 
- *Tribulus terrestris* (Puncturevine)
- *Verbascum thapsus* (Common mullein)

Alert: Additional designation for some species in either the high or medium category, but whose current ecological amplitude and distribution are limited. This designation alerts site managers to species capable of invading unexploited natural communities, based on initial, localized observations or behavior in similar ecosystems/communities elsewhere.

Plants with an Alert Designation (19)

- *Bromus diandrus* (Ripgut brome)
- *Cardaria chalapensis* (Lenspod whitetop)
- *Cardaria draba* (Whitetop)
- *Cardaria pubescens* (Hairy whitetop)
- *Chondrilla juncea* (Rush skeletonweed)
- *Conium maculatum* (Poison hemlock)
- *Eichhornia crassipes* (Water hyacinth)
- *Euphorbia esula* (Leafy spurge)
- *Lepidum latifolium* (Perennial pepperweed)
- *Linaria vulgaris* (Yellow toadflax)
- *Mesembryanthemum nodiflorum* (Slenderleaf iceplant)
- *Myriophyllum aquaticum* (Parrot's feather)
- *Myriophyllum spicatum* (Eurasian watermilfoil)
- *Rhus lancea* (African sumac)
- *Rubus armeniacus* (Himalayan blackberry)
- *Rubus discolor* (Himalayan blackberry)
- *Saccharum ravennae* (Ravennagrass)
- *Salvina molesta* (Giant salvinia)
- *Vinca major* (Bigleaf periwinkle)

Red Flag  : Additional designation assigned by the AZWIPWG to identify and document a critical piece of information not evident in the overall ranking.

Red Flag Annotations (21)

Aegilops cylindrica—Above 1,220 meters (4,000 feet) elevation, *Aegilops cylindrica* can replace native herbaceous and shrub vegetation subsequent to its removal on highly disturbed soil surfaces. *Aegilops cylindrica* infestations alter natural fire regimes during the summer months when wildfires are most likely to occur by increasing fine-fuel loads relative to native vegetation. Roadside populations of *A. cylindrica* connect rights-of way that serve as fire corridors to wildlands and, as a result, increase the risk of wildfires in the wildland-urban interface. Because *A. cylindrica* can occur as a contaminant in revegetation seed lots, seed mixes should be checked for the presence of this species.

Brassica tournefortii—Abundant rainfall during the latter part of 2004 and early 2005 resulted in an undocumented response by *Brassica tournefortii* in terms of number of individuals and total biomass. These increases potentially contributed to the altered fire regimes (that is, increased number and areal extent of fires) that occurred in Arizona at lower elevations during 2005. Should these trends persist in future years, then the scores and rank reported here for *B. tournefortii* should be revisited.

Bromus inermis—*Bromus inermis* should not be used for reclamation purposes in wildlands because of its persistence and invasive potential.

Centaurea biebersteinii—*Centaurea biebersteinii* likely has not yet reached its full invasive potential in Arizona. Its ecological impacts and reproductive capacity are well documented in other states, especially in Montana. *Centaurea biebersteinii* has great potential to increase its abundance and areal extent in Arizona on sites that are subjected to fire suppression, mechanical fuel treatment (that is, thinning), or timber harvest activities on public lands.

Cirsium arvense—*Cirsium arvense* has been observed in a variety of ecosystems/plant communities across Arizona and in even more ecological types in other states, but it currently has few occurrences within any specific ecological type in Arizona. Above elevations of 1,525 meters (5,000 feet), *C. arvense* has a high potential to invade many ecological types. It may not have had, however, enough time or opportunity to exploit these types. Because this plant is extremely difficult to control, land managers currently without infestations may want to consider this plant as a priority for early detection and monitor accordingly.

Cortaderia selloana—*Cortaderia selloana* is widely sold as both a live plant or seed in Arizona and on the internet. It also is promoted as a low water-use plant in Arizona. As a relatively new plant to Arizona, *C. selloana* has only started to appear in wildlands. Based on the species' broad ecological amplitude, it potentially can become as problematic in Arizona as it now is in California and other places. At present *C. selloana* exists only in small patches in the state; however, plenty of unoccupied niches, such as riparian corridors, are available to this species to invade.

Eichhornia crassipes—At present no wildland aquatic ecosystems within Arizona are known to be infested with *Eichhornia crassipes*. Records at the Arizona Department of Agriculture, however, indicate several small (< 0.4 hectares [1 acre]) populations have been discovered and eradicated from Arizona wildland streams, park ponds, and irrigation tail-water pits during the past 20 years. *Eichhornia crassipes* is listed as a regulated and restricted noxious weed in Arizona.

Eragrostis curvula—This assessment does not pertain to *Eragrostis curvula* var. *conferta* (Boer lovegrass). This taxon has different moisture and temperature limits relative to the species as whole and likely behaves differently in regard to its ecological impacts, invasiveness, and ecological amplitude. *Eragrostis curvula* var. *conferta* as a valid taxon is ambiguous as the U.S. Department of Agriculture Plants Database regards it as a synonym of *E. curvula*. Because of the differences in environmental tolerances and ploidy between *E. c.* var. *con-*

ferta and the species as a whole, for the purposes of this list *E. c.* var. *conferta* is considered a separate taxon and is not evaluated as part of *E. curvula*.

Euryops multifidus—Only about 10 known populations of *Euryops multifidus* occur in Arizona. Those populations have been mapped and most locations have active control efforts. Vegetation survey projects should be aware that undocumented populations may exist on historic Civilian Conservation Corps project sites.

Hordeum murinum—Some authorities recognize *Hordeum glaucum*, *H. leporinum*, and *H. murinum* as separate species; however, based on the use of the U.S. Department of Agriculture Plants Database as the authority for reconciling taxonomic questions, *H. murinum* is recognized herein as the valid species taxon and *H. m. glaucum*, *H. m. leporinum*, and *H. m. murinum* are recognized as subspecies.

Hydrilla verticillata—Although based on its question and section scores related to Impact and Invasiveness *Hydrilla verticillata* potentially could have been ranked as a **High, Alert** taxon, it was assigned an Evaluated but not listed designation to reflect its current distribution status: present in the state but only in human-constructed water bodies. If inadvertently introduced into natural, low-elevation water bodies in Arizona, *H. verticillata* easily could establish and flourish in Arizona's wildlands.

Lepidium latifolium—*Lepidium latifolium* is not widely distributed in Arizona. Established populations occur mostly near the northern borders of the state. Land managers should be on the alert for isolated plants or small nascent populations that can be eradicated before they can spread. *Lepidium latifolium* is a difficult species to eradicate so addressing infestations while they are small is critical.

Linaria dalmatica—*Linaria dalmatica* occurs within a variety of ecosystems/plant communities that experience different natural fire regimes. *Linaria dalmatica*, however, established in these various ecological types after the onset of habitat

alteration and fire exclusion that characterizes these types today. Because *L. dalmatica* was not present when historic (natural) fire regimes were functioning, it is unclear how the presence of *L. dalmatica* might affect the ability to restore a natural fire regime. Little empirical evidence exists to enable anticipating these potential effects. The expanding wildland-urban interface and projected increases in the intensity of forest restoration/fuel treatments may provide new opportunities for *L. dalmatica* to spread into forested areas. Only a portion of *L. dalmatica* seeds may germinate in any given year. As a result, dormant seeds may germinate at sites following herbicide applications or other site disturbances that reduce native plant competition.

***Melilotus* spp.** (*M. alba*, *M. officinalis*)—*Melilotus* spp. is invasive in a number of ecosystems/plant communities in Arizona. *Melilotus* spp. also may be used, however, in semi-arid habitats in northern Arizona for reclamation purposes where it has been difficult to reestablish native species after disturbances such as fire. Once suitable native alternatives can be identified and successfully restored in these areas, use of *Melilotus* spp. for reclamation purposes should be discontinued.

Pennisetum ciliare—At present *Pennisetum ciliare* is only occasionally observed in semi-desert grasslands and Chihuahuan desertscrub and has not been observed in southwestern interior chaparral scrub, and Madrean evergreen woodland. Invasion into these “cooler” ecological types could increase or begin if the new cold-tolerant cultivar “Frio” is released into Arizona. Continued development of cold tolerance or drought tolerance in *P. ciliare* cultivars poses a significant ecological threat if such cultivars are released into Arizona wildlands.

Pennisetum setaceum—Although *Pennisetum setaceum* is established in a number of ecosystems/plant communities, it is not yet present in many individual occurrences of these types. Large areas of suitable wildland habitat still remain for this species to colonize. The misnamed *Pennisetum setaceum* “Rubrum” (with dark purplish foliage and purplish crimson

spikes) or *P. setaceum* purple-type is actually a distinct species, *P. advena*. *Pennisetum advena* is sold commercially in Arizona as an ornamental but reportedly does not reproduce reliably from seed and, as a result, was not evaluated.

Tamarix aphylla—*Tamarix aphylla* currently has a limited distribution within Arizona wildlands even though many thousands of populations are present in agricultural and urban areas of southwestern Arizona. The species was introduced to provide windbreaks for homesteads. Until recently seeds were thought to be sterile and the only means of spread into wildlands was via vegetative reproduction. It is now known that *T. aphylla* can hybridize with other *Tamarix* spp. One documented occurrence of this is along the Gila River in western Maricopa County. It is unclear at this point what the morphology, physiology, reproduction by seed, and invasiveness of the hybrids will be, as well as the attributes of any subsequent backcross progeny.

***Tamarix* spp.** (*T. chinensis*, *T. parviflora*, *T. ramosissima*)—The ecological impacts associated with invasion by *Tamarix* spp. should be considered within the context of the specific riparian community invaded. In addition, such impacts may be mediated by previous changes to a variety of ecological processes associated with the particular riparian community. Land managers planning riparian restoration projects involving the control of *Tamarix* spp. should consider and address, as appropriate, other factors, such as existing hydrologic regimes, fluvial processes, and whether *Tamarix* spp. stands are providing habitat for southwestern willow flycatchers (*Empidonax traillii extimus*) before proceeding with such projects.

Applications

Some of the intended uses of the list are to: (1) be a tool for land managers to assist in setting priorities, allocating resources, and developing and justifying management strategies; (2) educate a variety of stakeholders about the ecological impacts and distribution of specific non-native plants; and (3) modify public and industry behavior regarding particular plants that adversely impact wildlands and may be sold commercially. The AZ-WIPWG recognizes that the list should be updated periodically as new information is acquired about a currently listed species' behavior in wildlands or as additional non-native plants become established in Arizona's wildlands.

Usage

Based on the use of the *Criteria* as currently conceived, the ranking categories are designed to reflect the degree of ecological impact a particular plant species is having on a state-wide basis. Some species, however, potentially threaten wildlands in only a portion of Arizona. In other geographic locales, they may not be able to establish and survive outside human cultivation. The answers to the *Criteria* question regarding ecological amplitude indicate those ecosystems/plant communities occurring within Arizona within which a species likely will have an ecological impact based on current information. These ecosystems/plant communities often have a close correspondence with geographic location. Although a lack of information on impacts does not rule out that a particular plant may be problematic in other locales in the state, it might suggest geographic areas where such a plant may not be of ecological concern.

Plants sold commercially and on the list may behave in the manner described above. Two approaches are possible relative to the use of the list in these situations. First, plant taxa presumed to be non-invasive in particular geographic areas of Arizona might still be used. Because, however, the *Criteria* and its application for Arizona were not designed to provide positive recommendations on where (or within which ecosystems/plant communities) particular plants might be non-invasive, each commercially sold plant should be assessed on a

case-by-case basis and used with caution. Future modifications to the *Criteria* that enable plant assessments on a bioregional basis may improve the above determination. Second, ecosystems/plant communities within which invasion does not occur by a particular plant may occur in close proximity to ecosystems/plant communities that are invaded and impacted by the same plant. Moreover, plant materials sold in one location may be used in another inappropriate location. It would be difficult to manage all the potential pathways for moving a plant within the state to inappropriate locations. As a result, a conservative approach to this situation would be to err on the side of caution and not sell the plant within Arizona. Because the categorized list of *Invasive Non-Native Plants that Threaten Wildlands in Arizona* is a non-regulatory list, the AZ-WIPWG cannot dictate which of the two preceding approaches should be followed. To the extent that non-invasive plant alternatives can be identified and promoted for any of the commercially sold plants on the list that may fit under this situation, the ideal situation is that industry itself will eventually have sufficient incentive and motive not to sell listed plants anywhere within the state.



Linaria vulgaris (Yellow toadflax). Photo by John M. Randall, The Nature Conservancy

INVASIVE NON-NATIVE PLANTS THAT THREATEN WILDLANDS IN ARIZONA						
Scientific Name/Authority (Common Name)	Ecological Impacts	Invasiveness	Distribution	Overall Score	Alert	Red Flag
01. <i>Acroptilon repens</i> (L.) DC. (Russian knapweed)	A	A	B	High		
02. <i>Aegilops cylindrica</i> Host (Jointed goatgrass)	C	B	B	Low		X
03. <i>Alhagi maurorum</i> Medik. (Camelthorn)	B	A	A	Medium		
04. <i>Arundo donax</i> L. (Giant reed)	A	B	B	High		
05. <i>Asphodelus fistulosus</i> L. (Onionweed)	C	B	D	Low		
06. <i>Avena fatua</i> L. (Wild oat)	C	B	A	Medium		
07. <i>Brassica tournefortii</i> Gouan (Sahara mustard)	B	B	A	Medium		X
08. <i>Bromus diandrus</i> Roth (Ripgut brome)	B	B	C	Medium	X	
09. <i>Bromus inermis</i> Leyss. (Smooth brome)	B	B	B	Medium		X
10. <i>Bromus rubens</i> L. (Red brome)	A	B	A	High		
11. <i>Bromus tectorum</i> L. (Cheatgrass)	A	A	A	High		
12. <i>Cardaria chalapensis</i> (L.) Hand.-Maz. (Lenspod whitetop)	B	B	C	Medium	X	
13. <i>Cardaria draba</i> (L.) Desv. (Whitetop)	B	B	C	Medium	X	

INVASIVE NON-NATIVE PLANTS THAT THREATEN WILDLANDS IN ARIZONA							
Scientific Name/Authority (Common Name)	Ecological Impacts	Invasiveness	Distribution	Overall Score	Alert	Red Flag	
14. <i>Cardaria pubescens</i> (C.A. Mey.) Jamolenko (Hairy whitetop)	B	B	C	Medium	X		
15. <i>Carduus nutans</i> L. (Musk thistle)	B	B	B	Medium			
16. <i>Centaurea biebersteinii</i> DC. (Spotted knapweed)	B	B	B	Medium		X	
17. <i>Centaurea diffusa</i> Lam. (Diffuse knapweed)	B	A	B	Medium			
18. <i>Centaurea melitensis</i> L. (Malta starthistle)	B	B	B	Medium			
19. <i>Centaurea solstitialis</i> L. (Yellow starthistle)	A	B	B	High			
20. <i>Chondrilla juncea</i> L. (Rush skeletonweed)	B	A	C	Medium	X		
21. <i>Cirsium arvense</i> (L.) Scop. (Canada thistle)	B	B	B	Medium		X	
22. <i>Cirsium vulgare</i> (Savi) Ten. (Bull thistle)	C	B	B	Low			
23. <i>Conium maculatum</i> L. (Poison hemlock)	B	B	C	Medium	X		
24. <i>Convolvulus arvensis</i> L. (Field bindweed)	B	B	A	Medium			
25. <i>Cortaderia selloana</i> (J.A. & J.H. Schultes) (Pampas grass) Aschers. & Graebn.	B	B	B	Medium		X	
26. <i>Cynodon dactylon</i> (L.) Pers. (Bermudagrass)	B	B	A	Medium			

INVASIVE NON-NATIVE PLANTS THAT THREATEN WILDLANDS IN ARIZONA							
Scientific Name/Authority (Common Name)	Ecological Impacts	Invasiveness	Distribution	Overall Score	Alert	Red Flag	
27. <i>Cynoglossum officinale</i> L. (Houndstongue)	C	B	D	Low			
28. <i>Echinochloa crus-galli</i> (L.) Beauv. (Barnyardgrass)	C	C	B	Low			
29. <i>Eichhornia crassipes</i> (Mart.) Solms (Water hyacinth)	A	B	D	High	X	X	
30. <i>Elaeagnus angustifolia</i> L. (Russian olive)	A	A	B	High			
31. <i>Elymus repens</i> (L.) Gould (Quackgrass)	C	C	C	Low			
32. <i>Eragrostis curvula</i> (Schrad.) Nees (Weeping lovegrass)	C	B	B	Low		X	
33. <i>Eragrostis lehmanniana</i> Nees (Lehmann lovegrass)	A	B	A	High			
34. <i>Erodium cicutarium</i> (L.) L'Her. ex Ait. (Redstem filaree)	C	B	A	Medium			
35. <i>Euphorbia esula</i> L. (Leafy spurge)	A	A	C	High	X		
36. <i>Euryops multifidus</i> (Thunb.) DC. (Sweet resinbush)	A	B	B	High		X	
37. <i>Hordeum murinum</i> L. (Mouse barley)	B	B	A	Medium		X	
38. <i>Hydrilla verticillata</i> (L.f.) Royle (Hydrilla)	A	B	U	Evaluated but not listed		X	
39. <i>Lepidium latifolium</i> L. (Perennial pepperweed)	A	B	C	High	X	X	

INVASIVE NON-NATIVE PLANTS THAT THREATEN WILDLANDS IN ARIZONA							
Scientific Name/Authority (Common Name)	Ecological Impacts	Invasiveness	Distribution	Overall Score	Alert	Red Flag	
40. <i>Leucanthemum vulgare</i> Lam. (Oxeye daisy)	C	B	B	Low			
41. <i>Linaria dalmatica</i> (L.) P. Mill. (Dalmatian toadflax)	B	B	A	Medium		X	
42. <i>Linaria vulgaris</i> P. Mill. (Yellow toadflax)	B	B	C	Medium	X		
43. <i>Lolium perenne</i> L. (Perennial ryegrass)	B	B	B	Medium			
44. <i>Melilotus alba</i> Medikus (White sweetclover)	C	B	A	Medium		X	
45. <i>Melilotus officinalis</i> (L.) Lam. (Yellow sweetclover)	C	B	A	Medium		X	
46. <i>Mesembryanthemum crystallinum</i> L. (Common iceplant)	C	B	D	Low			
47. <i>Mesembryanthemum nodiflorum</i> L. (Slenderleaf iceplant)	B	B	C	Medium	X		
48. <i>Myriophyllum aquaticum</i> (Vell.) Verdc. (Parrot's feather)	A	B	C	High	X		
49. <i>Myriophyllum spicatum</i> L. (Eurasian watermilfoil)	A	B	C	High	X		
50. <i>Onopordium acanthium</i> L. (Scotch thistle)	C	B	B	Low			
51. <i>Panicum antidotale</i> Retz. (Blue panicum)	C	C	C	Low			
52. <i>Pennisetum ciliare</i> (L.) Link (Buffelgrass)	A	A	A	High		X	

INVASIVE NON-NATIVE PLANTS THAT THREATEN WILDLANDS IN ARIZONA						
Scientific Name/Authority (Common Name)	Ecological Impacts	Invasiveness	Distribution	Overall Score	Alert	Red Flag
53. <i>Pennisetum setaceum</i> (Forsk.) Chiov. (Fountain grass)	A	B	B	High		X
54. <i>Rhus lancea</i> L. f. (African sumac)	B	B	C	Medium	X	
55. <i>Rubus armeniacus</i> Focke (Himalayan blackberry)	B	B	C	Medium	X	
56. <i>Rubus discolor</i> Weihe & Nees (Himalayan blackberry)	B	B	C	Medium	X	
57. <i>Saccharum ravennae</i> (L.) L. (Ravennagrass)	B	B	D	Medium	X	
58. <i>Salsola collina</i> Pallas (Slender Russian thistle)	B	B	A	Medium		
59. <i>Salsola paulsenii</i> Litv. (Barbwire Russian thistle)	B	B	A	Medium		
60. <i>Salsola tragus</i> L. (Prickly Russian thistle)	B	B	A	Medium		
61. <i>Salvina molesta</i> Mitchell (Giant salvinia)	A	B	C	High	X	
62. <i>Schismus arabicus</i> Nees (Arabian schismus)	B	B	A	Medium		
63. <i>Schismus barbatus</i> (Loefl. ex L.) Thellung (Common Mediterranean grass)	B	B	A	Medium		
64. <i>Sonchus asper</i> (L.) Hill (Spiny sowthistle)	C	B	A	Medium		
65. <i>Sonchus oleraceus</i> L. (Annual sowthistle)	C	B	A	Medium		

INVASIVE NON-NATIVE PLANTS THAT THREATEN WILDLANDS IN ARIZONA							
Scientific Name/Authority (Common Name)	Ecological Impacts	Invasiveness	Distribution	Overall Score	Alert	Red Flag	
66. <i>Sorghum halepense</i> (L.) Pers. (Johnsongrass)	B	B	A	Medium			
67. <i>Tamarix aphylla</i> (L.) Karst. (Athel tamarisk)	B	C	D	Low		X	
68. <i>Tamarix chinensis</i> Lour. (Fivestamen tamarisk)	A	A	A	High		X	
69. <i>Tamarix parviflora</i> DC. (Smallflower tamarisk)	A	A	A	High		X	
70. <i>Tamarix ramosissima</i> Ledeb. (Saltcedar)	A	A	A	High		X	
71. <i>Tribulus terrestris</i> L. (Puncturevine)	D	C	U	Evaluated but not listed			
72. <i>Ulmus pumila</i> L. (Siberian elm)	B	B	B	Medium			
73. <i>Verbascum thapsus</i> L. (Common mullein)	D	C	A	Evaluated but not listed			
74. <i>Vinca major</i> L. (Bigleaf periwinkle)	B	B	C	Medium	X		

Definitions

Section Scores (Ecological Impacts, Invasiveness, Distribution)

Section scores can range from **A** to **D**. In some cases **U** or Unknown is used when insufficient information is available to assign a score. Section scores are based on scores (**A** to **D**, or **U**) assigned to individual questions within each section. For Ecological Impacts, the scores represent a range of severity with **A** assigned for the most severe impacts and **D** assigned for a negligible impact. For Invasiveness, **A** represents the greatest potential to invade an ecosystem/community, whereas **D** would indicate a low potential. For Distribution, **A** indicates that the species has a wide ecological amplitude, is widespread within particular ecosystems/communities, or both. A **D** score would indicate the converse.

Other Useful Definitions

Invasive non-native plants that threaten wildlands: Plants that: (1) are not native to, yet can spread into, the wildland ecosystems under consideration; and that also (2) do any of the following within wildland ecosystems—displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes.

Non-native plants: Species introduced to the ecosystems under consideration [here in reference to Arizona] after European contact and as a direct or indirect result of human activity.

Wildlands: Public and private lands [and waters] that support native ecosystems, including national, state, and local parks and forests, ecological reserves, wildlife areas, Bureau of Land Management lands, and so on. Working landscapes—such as grazed rangeland and active timberlands—that support native ecosystems are included in the definition.

Acknowledgments

Over 20 stakeholder organizations contributed staff time and other logistical support to make this project possible. The Southwest Vegetation Management Association sponsored the project, and The Nature Conservancy in Arizona secured funding to support and coordinate the efforts of the Arizona Wildlands Invasive Plant Working Group through both private—including Packard Foundation, Fear Not Foundation, and the Conservancy’s Invasive Species Initiative—and public—Department of Defense Legacy Resource Management Program—sources. The U.S. Geological Survey provided website services and hosts all project materials. The Bureau of Reclamation provided graphics support, and U.S. Fish and Wildlife Service covered initial printing costs for this brochure.

For More Information

Additional pdf copies of this booklet are available at the Southwest Vegetation Management Association website (<http://www.swvma.org/>) and U.S. Geological Survey’s Southwest Exotic Plant Information Clearinghouse (SWEPIC) website (<http://www.usgs.nau.edu/swepic>). Go to the “AZ-WIP” link. Individual plant assessment information, as well as additional information about the AZ-WIPWG and the *Criteria*, also are posted at the SWEPIC website.

Cover Photos: *Sorghum halepense* (Johnsongrass) by John M. Randall, The Nature Conservancy.

Pennisetum ciliare (Buffelgrass) by John M. Randall, The Nature Conservancy.

Salvinia molesta + *Tamarix* spp. by Theresa Olson, Bureau of Reclamation.

Mesembryanthemum nodiflorum (Slenderleaf ice plant) by Barry A. Rice, The Nature Conservancy.