TIPPC Plant Assessment Form

For use with "Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands"
by the California Invasive Plant Council and the Southwest Vegetation Management Association

Version February 2003, modified July 2009 for the Texas Invasive Plant & Pest Council – www.texasinvasives.org

Table 1. Species and Evaluator Information

Species name (Latin binomial)**:**	Arundo donax
Synonyms:	
Common names:	Giant Reed
Evaluation date (mm/dd/yy)**:**	10/27/2009
Evaluator #1 Name/Title:	Amanda Turley, Justin Adams, Shiho Yamamoto, Anastasia Jones, Crayle, Chris Lester
Affiliation:	University of North Texas
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Evaluator #2 Name/Title:	enter text here
Affiliation:	enter text here
Phone numbers:	enter text here
Email address:	enter text here
Address:	enter text here

Section below for list committee use—please leave blank

List committee members:	enter text here
Committee review date:	enter text here
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

Table 2. Criteria, Section, and Overall Scores

Species: enter text here

Region: enter text here

1.1	Impact on abiotic ecosystem processes	**A**	**4**
1.2	Impact on plant community	**A**	**4**
1.3	Impact on higher trophic levels	**B**	**4**
1.4	Impact on genetic integrity	**D**	**4**

Impact

Enter four characters from Q1.1-1.4 below:

AABD

Using matrix, determine score and enter below:

A

2.1	Role of anthropogenic and natural disturbance	**B**	**4**
2.2	Local rate of spread with no management	**A**	**4**
2.3	Recent trend in total area infested within state	**U**	**4**
2.4	Innate reproductive potential Wksht A	**B**	**4**
2.5	Potential for human-caused dispersal	**B**	**4**
2.6	Potential for natural long-distance dispersal	**A**	**4**
2.7	Other regions invaded	**C**	**4**

Invasiveness

Enter the sum total of all points for Q2.1-2.7 below:

15

Use matrix to determine score and enter below:

B

3.1	Ecological amplitude/Range	**A**	**3**
3.2	Distribution/Peak frequency Wksht C	**A**	**3**

Distribution

Using matrix, determine score and enter below:

A

Plant Score

Using matrix, determine Overall Score and Alert Status from the three section scores and enter below:

High

No Alert

Documentation

Average of all questions

3.84

Table 3. Documentation (List all references at end of PAF. Short citations may be used in Table 3.)

Impacts

Question 1.1 Impact on abiotic ecosystem processes A Rev'd Sci. Pub'n back

Identify ecosystem processes impacted: Arundo donax forms thick massive stands that increase the risk of wildfire occurrence. The stands change the morphology of the water channel by hindering flow, and increasing sediment deposition (Everitt, Yang, Alaniz, Davis, Nigling and Deloach, 2004). Mechanical removal and use of herbicides compromise water conservation efforts, and affect flood control (Boose & Holt, 1999)

Sources of information:

Boose, A.B and Holt, J.S.1998. Environmental effects on asexual reproduction in Arundo donax. Weed Research. 39:117-127.

Everitt, J.H.,Yang, C., Alaniz, M.A., Davis, M.R., Nigling, F.L., and Deloach, C.J. 2004. Canopy spectra of giant reed and associated vegetation. Journal of Range Management. 57

Question 1.2 Impact on plant community composition, structure, and interactions A Rev'd Sci. Pub'n back

Identify type of impact or alteration:

Stands of Arundo donax form thick dense fibrous root systems that penetrate deep into the soil (Perdue, 1958). They displace native riparian stands of cottonwood, willows, and others due to the thickness of the stands and their root systems (Dudley, 2000; Everitt, Yang, Alaniz, Davis, Nigling and Deloach, 2004).

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Sources of information: enter text here

Dudley, T.L. 2000. Arundo donax. In: Bossard C.C., Randall, J.M. and Hoshovsky M.C. (eds), Invasive Plants of California's Wildlands, 53:58. University of California Press, Berkeley.

Everitt, J.H.,Yang, C., Alaniz, M.A., Davis, M.R., Nigling, F.L., and Deloach, C.J. 2004. Canopy spectra of giant reed and associated vegetation. Journal of Range Management. 57 (5):561-56.

Perdue, R. E. Jr. 1958. Arundo donax- A source of musical reeds and industrial cellulose. Economic Botany. 12:368-404.

Question 1.3 Impact on higher trophic levels B Rev'd Sci. Pub'n back

Identify type of impact or alteration: Arundo donax does not appear to provide significant food or habitat for native species. In fact, several species including the endangered southwestern willow flycatcher (Empidonax traillii extimus) and the arroyo toad (Bufo californicus) have lost habitat to Arundo. (Bell, 1997; Lawson,Giessow, and Giessow, 2005). A. Donax causes a significant reduction in abundance and diversity of invertebrate arthropod along the riparian zone in central California (Herrera & Dudley, 2003). A. donax creates uniform stands that disturb habitats of many riparian bird species, particularly Bell's vireo (Vireo bellii) (Yong and Finch, 1997).

Sources of information: Bell, G. 1997. Ecology and management of Arundo donax, and approaches to riparian habitat restoration in Southern California. In Brock, J. H., Wade, M., Pysek, P., and Green, D. (Eds.): Plant Invasions: Studies from North America and Europe. Blackhuys Publishers, Leiden, The Netherlands, pp. 103-113.

Herrera, A.M. and Dudley,T.L. 2003. Reduction of riparian arthropod abundance and diversity as a consequence of giant reed (Arundo donax) invasion. Biological Invasions 5: 167-177.

Lawson, D.M., Giessow,J.A, and Geissow, J.H. 2005. The Santa Margarita River Arundo donax Control Project: Development of Methods and Plant Community Response. USDA Forest Service Gen. Tech. Rep. 195: 229-244

Yong,W., and Finch, D.M. 1999. Population trends of migratory landbirds along the middle Rio Grande. The Southwestern Naturalist 42 (2): 137-147.

Question 1.4 Impact on genetic integrity D Rev'd Sci. Pub'n back

Identify impacts: In the United States, Arundo donax does not reproduce sexually and therefore has little to no effect on genetic integrity of native species (Decruyenaere and Holt, 2004; Cosentino, Copannie, V., D'Agosta, Sazone, and Mantineo, 2006; Everitt, Yang, Alaniz, Davis, Nigling and Deloach, 2004; Khudamrongsawat, Tayyar, and Holt, 200). No viable seeds have been found in the United States all reproduction as been asexual through spread of rhizomes and pieces of shoots or roots that sprout at the nodes (Everitt, Yang, Alaniz, Davis, Nigling and Deloach, 2004; Ahmad, Liow, Spencer, and Jasieniuk, 2007).

Sources of information: Ahmad, R. Liow, P.S., Spencer, D.F., and Jasieniuk, M. 2007. Molecular evidence for a single genetic clone of invasive Arundo donax in the United States. Aquatic Botany. 88:113-120.

Cosentino, S.L., Copannie, V., D'Agosta, G.M., Sazone, E., and Mantineo, M. 2005. First results on evaluation of Arundo donax L. clones collected in Southern Italy. Industrial Crops and Products. 23:212-222.

Decruyenaere, J.G. and Holt,J.S. 2004.Seasonality of clonal propagation in giant reed. Weed Science 49:760-767.

Everitt, J.H.,Yang, C., Alaniz, M.A., Davis, M.R., Nigling, F.L., and Deloach, C.J. 2004. Canopy spectra of giant reed and associated vegetation. Journal of Range Management. 57 (5):561-56.

Khudamrongsawat, J., Tayyar, R., and Holt, J.S., 2004. Genetic diversity of giant reed (Aundo donax) in the Santa Ana River, California. Weed Science 52: 395-405.

Invasiveness

Question 2.1 Role of anthropogenic and natural disturbance in establishment B Rev'd Sci. Pub'n back

Describe role of disturbance: Arundo donax often spreads through natural disturbances such as flooding and deposition which move pieces of rhizomes or stalks containing nodes into new areas where they rapidly sprout (Boose and Holt, 1998). Any disturbance that breaks up the shoots or rhizomes has potential to spread this plant to new areas. Bulldozers, plows and other mechanical breakup of rhizomes and shoots by humans may lead to its spread (Boland, 2006). Pieces of shoot containing a node have been shown to sprout new growth even 123 days after separation from parent plant, while rhizomes sprouted up to 132 days after separation. The nodes have also been shown to sprout after both extreme water logging and burial up to 25 cm deep in depth (Boose and Holt, 1998). Decruyenaere and Holt reported that Arundo donax spread faster and to a greater degree in nitrogen rich wetlands as compared to low nitrogen wetlands in which a winter dormancy period occurred (2004).

Sources of information:

Boland, J.M., 2006. The importance of layering in the rapid spread of Arundo donax (Giant Reed). Madrono. 53(4):301-312.

Boose, A.B. and Holt, J.S.1998. Environmental effects on asexual reproduction in Arundo donax. Weed Research. 39:117-127.

Decruyenaere, J.G., and Holt, J.S., 2004.Seasonality of clonal propagation in giant reed. Weed Science 49:760-767.

Question 2.2 Local rate of spread with no management A Rev'd Sci. Pub'n back

Describe rate of spread: Under favorable conditions, A. donax may grow at rates of 0.3 to 0.7 meters per week (Perdue, 1958). It grows successfully in broad soil preferences ranging from clay, loamy to sandy soils up to depths of 25 cm below ground (Boose and Holt, 1998). Due to its rhizomes being protected below ground, A. donax can resprout when cut or burned. This allows it to take over areas before native vegetation can recuperate (Boland, 2006). Flooding is the major dispersal agent of this species (Dudley, 2000).

Sources of information:

Boland, J.M. 2006. The importance of layering in the rapid spread of Arundo donax (Giant Reed). Madrono. 53(4):301-312.

Boose, A.B. and Holt, J.S. 1998. Environmental effects on asexual reproduction in Arundo donax. Weed Research. 39:117-127.

Dudley, T.L. 2000. Arundo donax. In: Bossard C.C., Randall, J.M. and Hoshovsky M.C. (eds), Invasive Plants of California's Wildlands, 53:58. University of California Press, Berkeley.

Perdue, R. E. Jr. 1958. Arundo donax- A source of musical reeds and industrial cellulose. Economic Botany. 12:368-404.

Question 2.3 Recent trend in total area infested within state U Rev'd Sci. Pub'n back

Describe trend: Found along riparian zone of the Rio Grande in southwest and west Texas (Everitt, Yang, Alaniz, Davis, Nigling and Deloach, 2004).

Sources of information: Everitt, J.H.,Yang, C., Alaniz, M.A., Davis, M.R., Nigling, F.L., and Deloach, C.J.. 2004. Canopy spectra of giant reed and associated vegetation. Journal of Range Management. 57 (5):561-56

Question 2.4 Innate reproductive potential B Rev'd Sci. Pub'n back

Describe key reproductive characteristics: A.donax does not produce viable seeds in North America; rather it spreads vegetatively (Dudley, 2000; Everitt, Yang, Alaniz, Davis, Nigling and Deloach, 2004; Ahmad, Liow, Spencer, and Jasieniuk, 2007). It can spread through fragmentation, rhizomes and layers (a mixture of asexual reproduction and growth) (Boland, 2006; Boose and Holt, 1998; Everitt, Yang, Alaniz, Davis, Nigling and Deloach, 2004; Ahmad, Liow, Spencer, and Jasieniuk, 2007). The plant can grow at a rate of 0.3-0.7 meters per week in optimal conditions (Purdue, 1958). Rhizomes can grow in clay, loamy and sandy soils which accounts for the wide range of habitats this species invades (Boose and Holt, 1998).

Sources of information:

Ahmad, R., Liow, P.S., Spencer, D.F., and Jasieniuk, M. 2007. Molecular evidence for a single genetic clone of invasive Arundo donax in the United States. Aquatic Botany. 88:113-120.

Boland, J.M. 2006. The importance of layering in the rapid spread of Arundo donax (Giant Reed). Madrono. 53(4):301-312.

Boose, A.B. and Holt, J.S. 1998. Environmental effects on asexual reproduction in Arundo donax. Weed Research. 39:117-127.

Dudley, T.L. 2000. Arundo donax. In: Bossard C.C., Randall, J.M. and Hoshovsky M.C. (eds), Invasive Plants of California's Wildlands, 53:58. University of California Press, Berkeley.

Everitt, J.H.,Yang, C., Alaniz, M.A., Davis, M.R., Nigling, F.L., and Deloach, C.J.. 2004. Canopy spectra of giant reed and associated vegetation. Journal of Range Management. 57 (5):561-56.

Perdue, R. E. Jr. 1958. Arundo donax- A source of musical reeds and industrial cellulose. Economic Botany. 12:368-404.

Question 2.5 Potential for human-caused dispersal B Rev'd Sci. Pub'n back

Identify dispersal mechanisms: Human dispersal generally occurs through mechanical breakup and spreading within the site or transportation to new sites (Boland, 2006). Mechanical breakup occurs through tilling, bulldozers and other human disturbances. Fires caused by humans may cause spread within a site as the rhizomes of A. donax sprout quickly after a fire which allows it to rapidly dominate a cleared area and thereby outcompete native species that take longer to recuperate from fires (Everitt, Yang, Alaniz, Davis, Nigling and Deloach. 2004). Dispersal by humans also occurs as A. donax is used in many areas for erosion control , stream bank stabilization, fodder, roofing material, and as an ornamental (Dudley, 2000; Perdue, 1958). Following World War I, A. donax was introduced into Texas as a reed supply for musical instruments (Ahmad, Liow, Spencer, and Jasieniuk, 2007).

Sources of information: enter text here

Ahmad, R., Liow, P.S., Spencer, D.F., and Jasieniuk, M. 2007. Molecular evidence for a single genetic clone of invasive Arundo donax in the United States. Aquatic Botany. 88:113-120.

Boland, J.M. 2006. The importance of layering in the rapid spread of Arundo donax (Giant Reed). Madrono. 53(4):301-312.

Dudley, T.L. 2000. Arundo donax. In: Bossard C.C., Randall, J.M. and Hoshovsky M.C. (eds), Invasive Plants of California's Wildlands, 53:58. University of California Press, Berkeley.

Everitt, J.H.,Yang, C., Alaniz, M.A., Davis, M.R., Nigling, F.L., and Deloach, C.J.. 2004. Canopy spectra of giant reed and associated vegetation. Journal of Range Management. 57 (5):561-56.

Question 2.6 Potential for natural long-distance dispersal A Rev'd Sci. Pub'n back

Identify dispersal mechanisms: Dispersal generally occurs through flood event dispersal of fragments and vegetative propagules (Bell, 1997). It can also occur through fire, and human mechanical disturbances (Everitt, Yang, Alaniz, Davis, Nigling and Deloach. 2004; Boland, 2006).

Sources of information: enter text here

Bell, G. 1997. Ecology and management of Arundo donax, and approaches to riparian habitat restoration in Southern California. In Brock, J. H., Wade, M., Pysek, P., and Green, D. (eds.): Plant Invasions: Studies from North America and Europe. Blackhuys Publishers, Leiden, The Netherlands, pp. 103-113.

Boland, J.M. 2006. The importance of layering in the rapid spread of Arundo donax (Giant Reed). Madrono. 53(4):301-312.

Everitt, J.H.,Yang, C., Alaniz, M.A., Davis, M.R., Nigling, F.L., and Deloach, C.J. 2004. Canopy spectra of giant reed and associated vegetation. Journal of Range Management. 57 (5):561-56.

Question 2.7 Other regions invaded D Rev'd Sci. Pub'n back

Identify other regions: Arundo donax has invaded all ecoregions of Texas.

Sources of information: USDA PLANTS Database. http://plants.usda.gov/java/county?state_name=Texas&statefips=48&symbol=ARDO4 Accessed October 25, 2009.

Distribution

Question 3.1 Ecological amplitude/Range A Other Pub. Mat'l back

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Refer to Worksheet B

Sources of information: enter text here

Invaders of Texas Citizen Science Program (Accessed 9 May 2011: http://texasinvasives.org/observations/search.php?satellite=&sn=ARDO4&cn=).

USDA PLANTS Database (Accessed 9 May 2011: http://plants.usda.gov/java/county?state_name=Texas&statefips=48&symbol=ARDO4).

Question 3.2 Distribution/Peak frequency A Other Pub. Mat'l back

Describe distribution: Worksheet B

Sources of information: enter text here

Invaders of Texas Citizen Science Program (Accessed 9 May 2011: http://texasinvasives.org/observations/search.php?satellite=&sn=ARDO4&cn=).

USDA PLANTS Database (Accessed 9 May 2011: http://plants.usda.gov/java/county?state_name=Texas&statefips=48&symbol=ARDO4).

References

List full citations for all references used in the PAF (short citations such as DiTomaso and Healy 2007 may be used in table above). **Websites** should include the name of the organization and the date accessed. **Personal communications** should include the affiliation of the person providing the observation. Enter each reference on a separate line; the table will expand as needed.

Examples:

Mitich, L. W. 1995. Intriguing world of weeds: Tansy ragwort. Weed Technology. 9: 402-404.

HEAR. Date unknown. Emex spinosa. Hawaiian Ecosystems at Risk. www.hear.org/pier/species/emex_spinosa.htm. Accessed March 17, 2009

DiTomaso, J. M. Personal communication from Dr. Joe DiTomaso, Dept. of Plant Science, UC Davis. Email received 3/17/09.

enter text here

Worksheet A

Reaches reproductive maturity in 2 years or less	**No: 1 pts**
Dense infestations produce >1,000 viable seed per square meter	**Yes: 0 pts**
Populations of this species produce seeds every year.	**Yes: 0 pts**
Seed production sustained over 3 or more months within a population annually	**No: 0 pts**
Seeds remain viable in soil for three or more years	**No: 0 pts**
Viable seed produced with *both* self-pollination and cross-pollination	**No: 0 pts**
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	**Yes: 1 pts**
Fragments easily and fragments can become established elsewhere	**No: 2 pts**
Resprouts readily when cut, grazed, or burned	**Yes: 1 pts**
	5 0
	B

Note any related traits:
Resprouts vigorously when cut, burned or grazed

Worksheet B - Texas Ecoregions (Griffen et al, 2004).

* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown

Code	Level III	Level IV	Score
ER01	**Arizona/New Mexico Mountains**	Chihuahuan Desert Slopes	
		Montane Woodlands	
ER02	**Chihuahuan Deserts**	Chihuahuan Basins and Playas	B
		Chihuahuan Desert Grasslands	D
		Low Mountains and Bajadas	C
		Chihuahuan Montane Woodlands	
		Stockton Plateau	
ER03	**High Plains**	Rolling Sand Plains	
		Canadian/Cimarron High Plains	
		Llano Estacado	
		Shinnery Sands	
		Arid Llano Estacado	
ER04	**Southwestern Tablelands**	Canadian/Cimarron Breaks	
		Flat Tablelands and Valleys	
		Caprock Canyons, Badlands, and Breaks	
		Semiarid Canadian Breaks	
ER05	**Central Great Plains**	Red Prairie	A
		Broken Red Plains	
		Limestone Plains	
ER06	**Cross Timbers**	Eastern Crosstimbers	A
		Western Crosstimbers	A
		Grand Prairie	A
		Limestone Cut Plain	A
		Carbonate Cross Timbers	A
ER07	**Edwards Plateau**	Edwards Plateau Woodland	A
		Llano Uplift	A
		Balcones Canyonlands	A
		Semiarid Edwards Plateau	A
ER08	**Southern Texas Plains**	Northern Nueces Alluvial Plains	
		Semiarid Edwards Bajadas	
		Texas-Tamaulipan Thornscrub	
		Rio Grande Floodplain and Terraces	
ER09	**Texas Blackland Prairies**	Northern Blackland Prairies	A
		Southern Blackland/Fayette Prairie	
		Floodplains and Low Terraces	
ER10	**East Central Texas Plains**	Northern Post Oak Savanna	A
		Southern Post Oak Savanna	A
		San Antonio Prairie	
		Northern Prairie Outliers	
		Bastrop Lost Pines	
		Floodplains and Low Terraces	
ER11	**Western Gulf Coastal Plain**	Northern Humid Gulf Coastal Prairies	A
		Southern Subhumid Gulf Coastal Prairies	A
		Floodplains and Low Terraces	
		Coastal Sand Plain	
		Lower Rio Grande Valley	A
		Lower Rio Grande Alluvial Floodplain	A
		Texas-Louisiana Coastal Marshes	
		Mid-Coast Barrier Islands and Coastal Marshes	
		Laguna Madre Barrier Islands and Coastal Marshes	B
ER12	**South Central Plains**	Tertiary Uplands	A
		Floodplains and Low Terraces	
		Pleistocene Fluvial Terraces	
		Southern Tertiary Uplands	A
		Flatwoods	
		Red River Bottomland	