Plant Assessment Form

For use with the "Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands" by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association (Warner et al. 2003)

Printable version, February 28, 2003
(Modified for use in Arizona, 07/02/04)

Table 1. Species and Evaluator Information

Species name (Latin binomial)**:**	*Avena fatua* L. (USDA 2005)
Synonyms:	*Avena fatua* L. var. *glabrata* Peterm., *Avena fatua* L. var. *vilis* (Wallr.) Hausskn., *Avena hybrida* Peterm. ex Reichenb. p.p.(USDA 2005)
Common names:	Wild oat
Evaluation date (mm/dd/yy)**:**	07/08/04
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Committee review date:	07/16/04 and 11/19/04
List date:	11/19/04
Re-evaluation date(s):	

Table 2. Scores, Designations, and Documentation Levels

Question		Score	Documentation Level	Section Scores	Overall Score & Designations
1.1	Impact on abiotic ecosystem processes	**U**	Observational	**"Impact"** **Section 1 Score:** **C**	**"Plant Score"** **Overall Score:** **Medium** **Alert Status:** **None**
1.2	Impact on plant community	**C**	Other published material		
1.3	Impact on higher trophic levels	**U**	No information		
1.4	Impact on genetic integrity	**D**	Other published material		
2.1	Role of anthropogenic and natural disturbance	**B**	Other published material	**"Invasiveness"** *For questions at left, an A gets 3 points, a B gets 2, a C gets 1, and a D or U gets=0. Sum total of all points for Q2.1-2.7:* **14 pts** **Section 2 Score:** **B**	
2.2	Local rate of spread with no management	**B**	Observational		
2.3	Recent trend in total area infested within state	**C**	Observational		
2.4	Innate reproductive potential	**A**	Other published material		
2.5	Potential for human-caused dispersal	**A**	Other published material		
2.6	Potential for natural long-distance dispersal	**B**	Other published material		
2.7	Other regions invaded	**C**	Observational		RED FLAG **NO** Something you should know.
3.1	Ecological amplitude	**A**	Observational	**"Distribution"** **Section 3 Score:** **A**	
3.2	Distribution	**B**	Observational		

Table 3. Documentation

Note: Most all of the research literature conducted on *Avena fatua* is based in agriculture settings and as it relates to crops.

Question 1.1 Impact on abiotic ecosystem processes *Score:* **U** *Doc'n Level:* **Obs.**
Identify ecosystem processes impacted: Possibly depletes soil resources, alters fire frequencies
Rationale: The following information is paraphrased from Guertin and Halvorson (2003). In an agricultural setting, *Avena fatua* is a common weed, reducing yields and quality of harvested crops (Sharma and Vanden Born 1978). It was found to effectively compete for light by producing greater height than the crop, subsequently reducing growth of the crop (Cudney et al. 1991 in Radosevich et al. 1997). Competition gets more rigorous even before *Avena fatua* reaches the 2 to 3 leaf stage (Chancellor and Peters 1976 and Sharma and Hunter 1975, both cited in Sharma and Vanden Born 1978). In a study focusing on root growth, *Avena fatua* plant grown free from competition had 54 miles of root system tissue after 80 days of growth and another study showed that when in competition with crop species, *Avena fatua* produced 90 times less root matter (Pavlychenko 1937 in Radosevich et al. 1997). Resource allocation for roots infers an apparent ability to harvest soil environment resources, which seemingly would improve a plant's competitive ability (Radosevich et al. 1997). Based on the above information, the extensive root system may lead to a depletion of soil resources (inference). Observational increase in fire frequency due to senescent plant litter, especially during dry hot months of June through August (personal communications with F. Northam and B. Munda, 2004). B. Munda has observed this over the past twenty years at a site near I-17 and south of Cordes Jct. These observations are predominately along right-of-ways and road sides where there tends to be: a) higher densities of *A. fatua*, likely due to increases in available water, and b) increased potential for ignitions. Most all of the research literature conducted on *A. fatua* is based in agriculture settings and as it relates to crops. There are no known studies of *A. fatua* impacts on natural areas. The Working Group did not feel comfortable inferring any of the above information to wildlands.
Sources of information: See cited literature. Additional information based on Working Group discussions and observations by F. Northam (Weed Biologist [former Arizona Department of Agriculture Noxious Weed Coordinator], Tempe, Arizona, 2004) and B. Munda (Plant Resource Specialist, Plant Materials Center. U.S. Department of Agriculture, Natural Resources Conservation Service, Tucson, Arizona, 2004).

Question 1.2 Impact on plant community composition, structure, and interactions *Score:* **C** *Doc'n Level:* **Other pub.**
Identify type of impact or alteration: Minor alteration. Inhibits germination and seedling growth. More competitive (primarily in crop settings).
Rationale: Most of the competition studies have been conducted on crops and various agricultural weeds. From Sharma and Vanden Born (1978): The competitive success of wild oats depends on the plants with which they are competing. Pavlychenko and Harrington (1934) studied the competing abilities of certain weeds, including wild oats and crops. Based on the development of the root system, development of assimilation surface and stomatal number, the authors concluded that wild oats were the most vigorous competitors among weeds studied.

The following information is paraphrased from Guertin and Halvorson (2003). *Avena fatua* is far less competitive with its growth very restricted when growing in a crop versus growing alone (Chancellor 1976). *Avena fatua* has allelopathic phenolic compounds, which impact other plants, inhibiting germination and seedling growth (Sharma and Vanden Born 1978). In California annual grasslands *Avena fatua* in California has demonstrated strong allelopathic effects (Tinnin and Muller 1971a, b in Wilken and Hannah 1998). *Avena fatua* is suited to open, sunny sites, exhibiting reduced growth and diminished competitive ability when under shade (Maranon and Bartolome 1993 in Wilken and Hannah 1998).

A. fatua does not appear to be displacing native plants and usually responds only in wet years (P. Guertin, pers. comm., 2004). It is persistent in natural communities (F. Northam, personal communication, 2004). Coronado NF is using *Avena sativa* in revegetation sites post-burn at lower elevations. It has not been observed persisting more than 1 to 2 years post-planting because it seems to be out-competed (R. Lefever, personal communication, 2004).

Sources of information: See cited literature citations. Observations by F. Northam (Weed Biologist [former Arizona Department of Agriculture Noxious Weed Coordinator], Tempe, Arizona, 2004) and R. LeFever (Forester, USDA Forest Service, Coronado National Forest, Tucson, Arizona, 2004).

Question 1.3 Impact on higher trophic levels *Score:* **U** *Doc'n Level:* **No info**

Identify type of impact or alteration: Possibly competes with native plants that are used for forage.

Rationale: No known studies of impact on higher trophic levels in Arizona or elsewhere.

Sources of information: No information.

Question 1.4 Impact on genetic integrity *Score:* **D** *Doc'n Level:* **Other pub.**

Identify impacts: Hybridizes with other *Avena* species, but none that are native.

Rationale: Although natural hybridization occurs between *Avena fatua* and *A. sativa (*Sharma and Vanden Born 1978), *A. sativa* is not native to Arizona. *A. sativa* is readily used in post-fire revegetation seed mixes. Furthermore, there are no native congeners in Arizona (Kearney and Peebles 1960).

Sources of information: See cited literature; also see Rajhathy and Thomas (1974).

Question 2.1 Role of anthropogenic and natural disturbance in establishment *Score:* **B** *Doc'n Level:* **Other pub.**

Describe role of disturbance: *Avena fatua* establishes readily in disturbed areas, most common in cultivated fields (Sharma and Vanden Born 1978) and occasionally establishes in areas that are undisturbed (Working Group consensus and personal observations).

Rationale: The following is paraphrased from Guertin and Halvorson (2003). On the North American continent: *Avena fatua* is found in valleys and on open slopes of foothill ranges, on cultivated soils, disturbed soils in waste places, and along roadsides (Stubbendieck et al. 1992). *Avena fatua* is presently noted to be scattered and rare on disturbed sites along roads and washes at the Desert Laboratory in Tucson, Arizona (Burgess et al. 1991).

Observed numerous areas where *Avena fatua* populations have moved from disturbed areas are mainly highway right-of-ways into semidesert grasslands and interior chaparral (F. Northam, personal communication, 2004)

Sources of information: See cited literature. Observations by F. Northam (Weed Biologist [former Arizona Department of Agriculture Noxious Weed Coordinator], Tempe, Arizona, 2004).

Question 2.2 Local rate of spread with no management	*Score:* **B** *Doc'n Level:* **Obs.**
Describe rate of spread: Increasing, but less rapidly.	
Rationale: Observations by plant ecologists (B. Munda, P. Guertin, and E. Northam) suggest *Avena fatua* is still spreading without management control. Where wild oat is found in natural areas it is spreading but not doubling (AZ-WIPWG, July 16, 2004 meeting).	
Sources of information: Observations by B. Munda (Plant Resource Specialist, Plant Materials Center. U.S. Department of Agriculture, Natural Resources Conservation Service, Tucson, Arizona, 2004), P. Guertin (Research Specialist, U.S. Geological Survey Sonoran Desert Research Station, Tucson, Arizona, 2004), and F. Northam (Weed Biologist [former Arizona Department of Agriculture Noxious Weed Coordinator], Tempe, Arizona, 2004).	

Question 2.3 Recent trend in total area infested within state	*Score:* **C** *Doc'n Level:* **Obs.**
Describe trend: Stable	
Rationale: *Avena fatua* is documented as being present in Arizona as of 1902 (Thornber; unnumbered collection in Burgess et al. 1991). Appears to be widespread throughout AZ and has reached the extent of its range (AZ-WIPWG, July 16, 2004 meeting).	
Sources of information: Inference based on observations and Working Group discussion.	

Question 2.4 Innate reproductive potential	*Score:* **A** *Doc'n Level:* **Other pub.**
Describe key reproductive characteristics: In dense infestations can produce seeds at densities >1000 per meter, which are viable for more than 3 years; self and cross pollination; reaches reproductive maturity in 2 years.	
Rationale: The following is summarized from Sharma and Vanden Born (1978). *Avena fatua* plants commonly produce between 100-150 seeds/plant. Dadd (1953) reports up to 500 seeds/plant. When under more intense competition in a crop, *Avena fatua* may only produce 1–2 inflorescence/panicles, having 20–30 seeds/plant (Chancellor and Peters 1976). Seeds will persist for 3 to 6 years in cultivated soil (Banting 1962). Seeds in undisturbed soil or under sod survive longer than in soil cultivated annually (Banting 1974). From Guertin and Halvorson (2003): In California, *Avena fatua* plants produce seeds from April through June (Elkhorn Slough National Estuarine Research Reserve 2000, University of California 1998). *Avena fatua* seeds can stay dormant in the soil for 7-8 years, and occasionally over 10 years, but 85-95% of the seeds germinate within 2 years (Manitoba Agriculture 2001, Ministry of Agriculture and Food 2001). Variability has been noted between plants from different geographic regions having different habitat; differences have been found in seed dormancy, germination, emergence, and growth (Sharma and Vanden Born 1978, Thurston and Phillipson 1976). The following is summarized from Holm et al. (1991). No generalizations can be made about the dormancy of the species of wild oats. There are many factors that lead to seed dormancy and the literature has many contradictions. The seed dormancy is perhaps the prime reason for the difficulties encountered in the cereal fields of the world. Most tests indicate seeds in farm soils do not survive beyond 4 to 7 years.	
Sources of information: See cited literature.	

Question 2.5 Potential for human-caused dispersal	*Score:* **A** *Doc'n Level:* **Other Pup.**
Identify dispersal mechanisms: Contaminant of hay, vehicles, and farm machinery.	
Rationale: *Avena fatua* is a common contaminant in seed, animal feed and silage, in or on farm machinery, and in manure (Thurston and Phillipson 1976 in Guertin and Halvorson 2003, Holm et al. 1991). Several authors noted that California cultivates wild oats for hay and as a range grass;	

approximately 16,000 ha are harvested annually (Sharma and Vanden Born 1978, Holms et al. 1991). It is not known if it is still cultivated in California. Seeds are commercially available via the internet and in the UK (http://www.scs.leeds.ac.uk/pfaf/Links_3.html).

Sources of information: See cited literature.

Question 2.6 Potential for natural long-distance dispersal *Score:* **B** *Doc'n Level:* **Other pub.**

Identify dispersal mechanisms: Wind, birds, and animals.

Rationale: Seeds usually fall to the ground in the immediate vicinity of the parent plant upon maturity (Sharma and Vanden Born 1978). Also dispersed by wind, birds and animals (forage or attachment to fur) (Thurston and Phillipson 1976 in Guertin and Halvorson 2003).

Sources of information: See cited literature.

Question 2.7 Other regions invaded *Score:* **C** *Doc'n Level:* **Obs**.

Identify other regions: No other ecological types in other regions that do not already occur in Arizona.

Rationale: Based on presence in nearly every U.S. state (USDA PLANTS database [USDA 2005] and Grass Manual on the Web [Barkworth et al. 2003]), primarily as an agriculture weed. On the North American continent *Avena fatua* is found in valleys and on open slopes of foothill ranges, on cultivated soils, disturbed soils in waste places, and along roadsides (Stubbendieck et al. 1992 in Guertin and Halvorson 2003).

From Holm et al. (1991): *A. fatua* is found as a weed in Iceland and Alaska and at higher elevations at the equator. Species is troublesome wherever cereals are grown at 375 to 750 mm annual precipitation. Cold temperatures do not hinder plant growth. On a world basis, it is one of the 12 most successful colonizers among the noncultivated plants (Allard 1965).

Sources of information: Inference based on cited literature and databases.

Question 3.1 Ecological amplitude *Score:* **A** *Doc'n Level:* **Obs.**

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: *Avena fatua* is native to Africa (Algeria, Egypt, Ethiopia), temperate Asia (Middle East, to China), tropical Asia (India, Nepal, Pakistan), and Europe (GRIN 2005). *Avena fatua* was introduced into North America as a contaminant in crop seed and feed by the early European settlers (Sharma and Vanden Born 1978). Records indicate that *Avena fatua* has been present in Canada for more than three centuries (Baum 1968 in Sharma and Vanden Born 1978). *Avena fatua* was established in California by 1824 (Frenkel 1977 in Burgess et al. 1991). It was present in Arizona by 1902 (Thornber unnumbered collection in Burgess et al. 1991). *Avena fatua* was first collected at the Desert Laboratory in Tucson, Arizona in 1983 by Bowers and Turner (Burgess et al. 1991). *Avena fatua* occurs at elevations up to 8250 feet (2515 m) in Arizona (Parker 1972).

Environmental and site preferences summarized by Guertin and Halvorson (2003): *Avena fatua* prefers temperate climates, cool weather and moist soil (Manitoba Agriculture 2001, Sharma and Vanden Born 1978); these conditions promote the highest emergence (Sharma and Vanden Born 1978). In crop fields, it can often be found on the lower, moister areas of the fields (Uva et al. 1997)….*Avena fatua* is suited to open, sunny sites, exhibiting reduced growth and diminished competitive ability when under shade (Maranon and Bartolome 1993 in Wilken and Hannah 1998)….*Avena fatua* can adapt to many different soil types (Elkhorn Slough National Estuarine Research Reserve 2000) and can typically be found on heavy clay and clay-loam soils (Uva et al. 1997).

Rationale: Present in four major ecological types.

Sources of information: See cited literature. Score based on observations of Working Group members and information from SEINet (Southwest Environmental Information Network), Arizona herbaria specimen database (available online at: http://seinet.asu.edu/collections; accessed July 16 2004).

Question 3.2 Distribution *Score:* **B** *Doc'n Level:* **Obs.**

Describe distribution: Arizona by county (from Guertin and Halvorson 2003): Coconino County (Kearney and Peebles 1960, McDougall 1973), Apache, Mohave counties (Gould 1951, Kearney and Peebles 1960, McDougall 1973), Navajo (Barkworth et al. 2003), and Yavapai County (Kearney and Peebles 1960, McDougall 1973), south (Kearney and Peebles 1960) to Gila, Pinal, Cochise, and Pima counties (Gould 1951, Kearney and Peebles 1960), and Santa Cruz county (Barkworth et al. 2003).

Rationale: Observed in localized heavy infestations in Sonoran Uplands, desert scrub (desert having saguaro, with many shrubs), and even though it covers whole hillsides (seeming to prefer a south aspect unless in a riparian setting), it seems very dependent each year on sufficient rains in this type of vegetation. Observed several years without any new green plants in an infested area; germination dependent on enough rain at the right times to support it (its remnants stand for years as senesced biomass; P. Guertin, personal communication, 2004).

From Arizona State University Vascular Plant Herbarium, University of Arizona Herbarium, and Northern Arizona University Vascular Plant Herbarium via SEINet (2004):

Cochise County: San Pedro Riparian National Conservation Area, Upper San Pedro River floodplain, near Lewis Springs ~1/2 mile north of Highway 90
Maricopa County: Tonto National Forest, Seven Springs campground, about 0 to 0.5 upstream from road.
Graham County: Bureau of Land Management lands, Black Rock Wash. Near Forest boundary. Below Fisher Canyon junction. Also on National Forest lands.
Maricopa County: Tonto National Forest, Barpit Tank, about 1.1 miles down from summit of Humboldt Mountain.
Maricopa County: South Mountain Park, Alta Trail
Maricopa County: Southeastern Crater Range, 2.2 km ENE of Crater Mountains, about 4.2 km NW of Deadman Gap.
Maricopa County: White Tank Mountains Regional Park, East side of White Tank Mountains. Rocky wash rising from desert floor south of peak 2094 into high walled canyon between peaks 2995 and 3032 up to ridgeline East of Beacon at peak 4083.
Pinal County: Tonto National Forest. Superstition Wilderness Area. Heiroglyphic Spring and Miles Ranch Trailhead.
Coconino County, Grand Canyon National Monument, Grand Canyon National Park, along North Kaibab Trail.
Gila County: Tonto National Forest, Tonto National Forest; Sierra Ancha Wilderness Area
Yuma County: Theba, Arizona.
Coconino County: Grand Canyon, Tapeats Creek,
Pima County: Saguaro National Park; Rincon Mountains
Pima County: rare on mid-slopes of Pontatoc Ridge, Santa Catalina Mountains
Pima County: lower Bear Canyon
Pima County: Buenos Aires National Wildlife Refuge
Pinal County: Antelope Peak area (Table Top Mountains)

Sources of information: Based on cited literature, observations by P. Guertin (Research Specialist, U.S. Geological Survey Sonoran Desert Research Station, Tucson, Arizona, 2004), and information from SEINet (Southwest Environmental Information Network), Arizona herbaria specimen database (available online at: http://seinet.asu.edu/collections; accessed July 16 2004).

Worksheet A. Reproductive Characteristics

Complete this worksheet to answer Question 2.4.

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

Total pts: 8 Total unknowns: 1

Score : A

Note any related traits:

Worksheet B. Arizona Ecological Types

(*sensu* Brown 1994 and Brown et al. 1998)

Major Ecological Types	Minor Ecological Types	Code*
Dunes	dunes	
Scrublands	Great Basin montane scrub	
	southwestern interior chaparral scrub	**B**
Desertlands	Great Basin desertscrub	**D**
	Mohave desertscrub	**D**
	Chihuahuan desertscrub	
	Sonoran desertscrub	**D**
Grasslands	alpine and subalpine grassland	
	plains and Great Basin shrub-grassland	**D**
	semi-desert grassland	**C**
Freshwater Systems	lakes, ponds, reservoirs	
	rivers, streams	
Non-Riparian Wetlands	Sonoran wetlands	
	southwestern interior wetlands	
	montane wetlands	
	playas	
Riparian	Sonoran riparian	**D**
	southwestern interior riparian	**D**
	montane riparian	
Woodlands	Great Basin conifer woodland	
	Madrean evergreen woodland	
Forests	Rocky Mountain and Great Basin subalpine conifer forest	
	montane conifer forest	
Tundra (alpine)	tundra (alpine)	

*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 (unable to estimate percentage of occurrences invaded).

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