

Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Colorado’s Wildlands and Agriculture”
By the Colorado Noxious Weed Advisory Committee

Electronic version: December 4, 2008

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Carthamus lanatus L.
Synonyms:	Carthamus lanatus L. ssp. creticus (L.) Holmboe, Carthamus lanatus L. ssp. lanatus
Common names:	Woolly Distaff Thistle, Distaff Thistle, False Starthistle, Saffron Thistle, Wolly Safflower, Wolly Starthistle
Evaluation date (mm/dd/yy):	1-19-10
Evaluator #1 Name/Title:	Ryan Edwards/Graduate student
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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:

Woolly Distaff Thistle (*Carthamus lanatus* L.) (WDT) is a spiny, annual non-native plant which was introduced from the Mediterranean region. WDT has been reported as a major invasive pest in Australia, and has been found in Oklahoma, Texas, California and Oregon where it has been actively perused to decrease infestations. WDT is considered a very dangerous plant for livestock, due to the frequent injuries that can occur to their eyes and mouths if they feed upon the spiny tissues.

WDT is an erect herb, approximately 0.5-1m tall, featuring multiple branched stems that are armed with small spines which detract forages from feeding. The leaves are lobed and end in a terminal spine. Yellowish flower heads form on the ends of the branches, and are surrounded with spiny bracts. Seeds are surrounded with small bracts which aid in the dispersal of the seeds as they can easily be caught on clothing or wool from animals.

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	U	No Information	<p>Impact</p> <p><i>Enter four characters from Q1.1-1.4 below:</i></p> <p>UBBC</p> <p><i>Using matrix, determine score and enter below:</i></p> <p>B</p>	
1.2	Impact on plant community	B	Other Pub. Mat'l		
1.3	Impact on higher trophic levels	B	Other Pub. Mat'l		
1.4	Impact on genetic integrity	C	Other Pub. Mat'l		
2.1	Role of anthropogenic and natural disturbance	A (3 pts)	Other Pub. Mat'l	<p>Invasiveness</p> <p><i>Enter the sum total of all points for Q2.1-2.7 below:</i></p> <p>13</p> <p><i>Use matrix to determine score and enter below:</i></p> <p>B</p>	<p>Wildlands Plant Score</p> <p><i>Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:</i></p> <p>Moderate Red Alert</p>
2.2	Local rate of spread with no management	B (2 pts)	Other Pub. Mat'l		
2.3	Recent trend in total area infested within state	U (0 pts)	Observational		
2.4	Innate reproductive potential Wksht A	A (3 pts)	Other Pub. Mat'l		
2.5	Potential for human-caused dispersal	A (3 pts)	Other Pub. Mat'l		
2.6	Potential for natural long-distance dispersal	B (2 pts)	Other Pub. Mat'l		
2.7	Other regions invaded	U (0 pts)	No Information		
3.1	Ecological amplitude/Range	D	Observational	<p>Distribution</p> <p><i>Using matrix, determine score and enter below:</i></p> <p>D</p>	
3.2	Distribution/Peak frequency Wrksht B	U	Anecdotal		

<u>4.1</u>	Poisonous to livestock	B (2pts)	Other Pub. Mat'l
<u>4.2</u>	Detrimental to economic crops	A (3 pts)	Rev'd, Sci. Pub'n
<u>4.3</u>	Detrimental to management of agricultural system, rangeland and pasture	B (2 pts)	Anecdotal
<u>4.4</u>	Human impacts <u>Wrksht C</u>	A (3 pts)	Anecdotal

Agricultural / Human Impact

Enter the sum total of all points for Q4.1-4.4 below:

9

Use matrix to determine score and enter below:

A

Agricultural Plant Score

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

Moderate

No Alert

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>U No Information back</p>
<p>Identify ecosystem processes impacted: There is no information found in the literature which describes any ecological losses of function caused by WDT.</p>	
<p>Rationale: Further research is needed to determine the abiotic impacts of WDT.</p>	
<p>Sources of information: enter text here</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>B Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: When WDT does establish, it can alter the surrounding species composition by forming dense stands of thistles (1). Establishment can occur when disturbance due to anthropogenic influences decreases the competitive forces of surrounding species.</p>	
<p>Rationale: WDT infestations occur when there is a avenue for disturbance; without that disturbance, WDT stands are less frequent or do not occur.</p>	
<p>Sources of information: (1) Kessler, E. 1987. <i>Carthamus lanatus</i> L. (Asteraceae: Cynareae)- A potentially serious plant pest in Oklahoma. Proc. Okla. Acad. Sci. 67: 39-43.</p>	
<p>Question 1.3 Impact on higher trophic levels</p>	<p>B Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: WDT can lead to ulcerations of the mouth for grazing animals due to the spines. Spines of the plant can also penetrate the hooves of grazing animals and cause lameness (1). Plants can also damage the eyes of foraging animals (2).</p>	
<p>Rationale: Injury caused by WDT causes fairly minimal impacts to wildlife and livestock. However, it would be advised to keep livestock away from pastures with dense stands of WDT to prevent such injuries from occurring.</p>	
<p>Sources of information: (1) Kessler, E. 1987. <i>Carthamus lanatus</i> L. (Asteraceae: Cynareae)- A potentially serious plant pest in Oklahoma. Proc. Okla. Acad. Sci. 67: 39-43. (2) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197</p>	
<p>Question 1.4 Impact on genetic integrity</p>	<p>C Other Pub. Mat'l back</p>
<p>Identify impacts: WDT has been intentionally crossed in a laboratory with Safflower (<i>Carthamus tinctorius</i>) in an attempt to develop a cultivar that was resistant to wilts and root rot, while retaining qualities for Safflower oil production (1).</p>	

<p>Rationale: There are no reports in the literature in which WDT has naturally crossed with any other species. However, the possibility exists, even though unlikely.</p>	
<p>Sources of information:</p> <p>(1) Kessler, E. 1987. <i>Carthamus lanatus</i> L. (Asteraceae: Cynareae)- A potentially serious plant pest in Oklahoma. Proc. Okla. Acad. Sci. 67: 39-43.</p>	
<p>Question 2.1 Role of anthropogenic and natural disturbance in establishment</p>	<p>A Other Pub. Mat'l back</p>
<p>Describe role of disturbance: WDT can spread into new habitats from grazing and disturbance (2). Sheep and goats are known to collect seeds on their wool after brushing up against the plants, and in their cloven hooves (1). Seeds are also suspected of being distributed by mud imbedded upon heavy machinery used in oil drilling (1).</p>	
<p>Rationale: WDT, however, does not readily invade established perennial pastures nor withstand competition well from annual pastures (2). Dense monotypic stands of WDT can establish only when competitive forces are reduced by overgrazing, or poor cultural management.</p> <p>If WDT is found in the future, cultural management of areas to prevent overgrazing and disturbance must be practiced.</p>	
<p>Sources of information:</p> <p>(1) Kessler, E. 1987. <i>Carthamus lanatus</i> L. (Asteraceae: Cynareae)- A potentially serious plant pest in Oklahoma. Proc. Okla. Acad. Sci. 67: 39-43.</p> <p>(2) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197.</p>	
<p>Question 2.2 Local rate of spread with no management</p>	<p>B Other Pub. Mat'l back</p>
<p>Describe rate of spread: WDT infestations can spread rapidly if the conditions are conducive (e.g. heavily grazed pastures with little competition from surrounding plants) (2). WDT can also spread into agronomic crops, where it can reduce yields.</p>	
<p>Rationale: As stated before, cultural practices and grazing must be employed to prevent an avenue for WDT infestations to establish.</p>	
<p>Sources of information:</p> <p>(2) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197.</p>	
<p>Question 2.3 Recent trend in total area infested within state</p>	<p>U Observational back</p>
<p>Describe trend: Review of the literature provided no information on WDT entering Colorado at this time. The USDA PLANTS database does not list Colorado as having WDT at this time (4). Surrounding states with infestations of WDT include Oklahoma, Arizona, Texas, Oregon, and California. However, Oklahoma reports an infestation of WDT no longer occur in their state (5). The CSU herbarium contains no specimens of WDT.</p>	
<p>Rationale: Oklahoma cooperative extension has published extension reports claiming that infestations of WDT</p>	

have been contained in their state. Similarly, Arizona has also reported that populations of WDT have been contained. However, sources of infestation (e.g. transport of seeds by accident from states that are infested) poses the single greatest chance for infestation. These sources include grazing animals, such as sheep and goats which cross state lines, people who have come in contact with WDT, and heavy machinery that has been moved from states where WDT populations are dense.

Sources of information:

(4) USDA PLANTS database. *Carthamus lanatus* L. <http://plants.usda.gov/java/profile?symbol=CALA20>.

(5) Medlin, C., and Tyrl, R.J. Thistles in Oklahoma and Their Identification. Oklahoma Cooperative Extension Service PSS-2776. <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-3341/PSS-2776web.pdf>.

Question 2.4 Innate reproductive potential

A Other Pub. Mat'l [back](#)

Describe key reproductive characteristics: Dispersal is only by seed (2). WDT overwinters in the rosette stage during year one of its life cycle, and then bolts the following spring. In Oklahoma, it has been reported that WDT flowers in the late spring (late May to early June) and concludes by July (1). Like many thistles, WDT produces many small seeds along its multiple flower heads.

Rationale: Much of the literature focuses on seedbank studies, and information from Australia. There is very little on the growth patterns, life history, and physiology of WDT. However, from what is in the literature, it appears that WDT behaves very similar to other invasive thistles.

Sources of information:

(2) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197

Question 2.5 Potential for human-caused dispersal

A Other Pub. Mat'l [back](#)

Identify dispersal mechanisms: WDT has a stiff pappus consisting of many bristles which easily stick to clothing, bags, fur and wool (2). Kessler (1) reported three possible ways in which the seeds could be spread; 1) accidental human contact and transport 2) transport from machinery used on sites infested with WDT and 3) to deposit the seeds to new areas from their machinery.

Rationale: The ease at which WDT can be transported provides the plant with an opportunity to quickly establish into disturbed areas, such as heavily grazed pastures or worksites.

Sources of information:

(1) Kessler, E. 1987. *Carthamus lanatus* L. (Asteraceae: Cynareae)- A potentially serious plant pest in Oklahoma. Proc. Okla. Acad. Sci. 67: 39-43.

(2) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197.

Question 2.6 Potential for natural long-distance dispersal

B Other Pub. Mat'l [back](#)

Identify dispersal mechanisms: WDT seeds have a stiff pappus, or bristles, surrounding the seed (2). The pappus coating is used by seeds for wind dispersal; however, due to the large size of WDT seeds, travel by air is limited. Seeds tend to fall from the parent plant onto the ground and germinate in close proximity. In combination with a

<p>long period of seed banking (e.g. 8-10 years), WDT can become a reoccurring pest relatively easy. It has been reported that sheep and goats can feed upon WDT and pass seeds through their guts; however, there was no information of viability of seeds after passage. In Australia, the plant has been reported to act similar to a tumble weed, in which seeds are spread when the plant dries and travels with the wind (3).</p>	
<p>Rationale: The extent to which WDT can naturally spread is relatively limited, so it is apparent that it depends upon transport by animals either by clinging to their fur or passage through the digestive tracts to spread to new environments.</p>	
<p>Sources of information:</p> <p>(2) Parsons, W.T., and Cuthburton, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197</p> <p>(3) Price, J.R. 1990. Morphological and phenological variation in three populations of saffron thistle (<i>Cardthamus lanatus</i> L.) from western Australia. Australian Journal of Agricultural Research 41: 1193-1201.</p>	
<p>Question 2.7 Other regions invaded</p>	<p>U No Information back</p>
<p>Identify other regions: There is no information in the literature describing alternative infestation sites.</p>	
<p>Rationale: The literature is lacking information on habitats which WDT can naturally invade.</p>	
<p>Sources of information: enter text here</p>	
<p>Question 3.1 Ecological amplitude/Range</p>	<p>D Anecdotal back</p>
<p>Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: There are no reports of WDT entering Colorado from the literature. Information from the PLANTS database, Oklahoma Cooperative Extension and Arizona Cooperative Extension services all indicate that surrounding infestations have been controlled.</p>	
<p>Rationale: If infestations occur, they will occur in habitats such as pastures, rangeland, and disturbed areas where heavy machinery can transport seeds.</p>	
<p>Sources of information:</p> <p>(4) USDA PLANTS database. <i>Carthamus lanatus</i> L. http://plants.usda.gov/java/profile?symbol=CALA20.</p> <p>(5) Medlin, C., and Tyrl, R.J. Thistles in Oklahoma and Their Identification. Oklahoma Cooperative Extension Service PSS-2776. http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-3341/PSS-2776web.pdf. enter text here</p>	
<p>Question 3.2 Distribution/Peak frequency</p>	<p>U Anecdotal back</p>
<p>Describe distribution: As stated above, there is no current information on the distribution of WDT in Colorado.</p>	
<p>Rationale: enter text here</p>	

Sources of information: enter text here	
Question 4.1 Poisonous to Livestock	B Other Pub. Mat'l back
Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: WDT can lead to ulcerations of the mouth for grazing animals due to the spines. Spines of the plant can also penetrate the hooves of grazing animals and cause lameness (1). Plants can also damage the eyes of foraging animals (2).	
Rationale: Impacts to wildlife and livestock are relatively limited and restricted to grazing injuries.	
Sources of information: (1) Kessler, E. 1987. <i>Carthamus lanatus</i> L. (Asteraceae: Cynareae)- A potentially serious plant pest in Oklahoma. Proc. Okla. Acad. Sci. 67: 39-43. (2) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197	
Question 4.2 Detrimental to Economic Crops	A Rev'd, Sci. Pub'n back
Describe impacts to all aspects of cropping systems (see guidelines): In grain crops, WDT can increase difficulties in harvesting and can reduce yield (1). WDT is a aggressive competitor; estimated cereal yield losses can be as high as 40% when the plant is not controlled (3).	
Rationale: WDT infestations of agrinomic crops are relatively limited from the reports in the literature, and deserves further review for a more conclusive findings.	
Sources of information: (1) Kessler, E. 1987. <i>Carthamus lanatus</i> L. (Asteraceae: Cynareae)- A potentially serious plant pest in Oklahoma. Proc. Okla. Acad. Sci. 67: 39-43. (3) Price, J.R. 1990. Morphological and phenological variation in three populations of saffron thistle (<i>Cardthamus lanatus</i> L.) from western Australia. Australian Journal of Agricultural Research 41: 1193-1201.	
Question 4.3 Detrimental to Mgmt of Agricultural System, Rangeland and Pasture	B Anecdotal back
Describe impacts to water diversion systems, increased water use, reduced forage for livestock: Due to the threat to livestock feeding on WDT (e.g. potential for lameness or for injury from the spines), there would be reduced foraging from animals. In fields where rosettes were prominent, some animals would selectively choose surrounding plants, decreasing the competition between WDT and increasing the infestation (2). It has been reported that sheep and goats can feed upon WDT and pass seeds through their guts.	
Rationale: The palatability of mature WDT is relatively low due to its thick coating of spines. Grazing animals will graze on any available vegetation before WDT, thus decreasing the competiive abilities of those species.	

Sources of information: (2) Parsons, W.T., and Cuthbertson, E.G. 2001. Noxious Weeds of Australia: Saffron Thistle. 194-197	
Question 4.4 Human Health Impacts	A Anecdotal back
Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: WDT posses spines which could cause injury to people, pets and livestock. Dense stands of WDT can impede pastures, prairies, and natural areas leading to economic losses of decreased foraging and management considerations.	
Rationale: Accidental contact with WDT could possibly cause injury similar to many other thistles. economic losses could possible exist as land managers expend resources on controlling WDT through herbicides or cultural practices, which can cost increased money from limited budgets.	
Sources of information: enter text here	

Worksheet A

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Reaches reproductive maturity in 2 years or less	Yes: 1 pt
Dense infestations produce >1,000 viable seed per square meter	Yes: 2 pts
Populations of this species produce seeds every year.	Yes: 1 pt
Seed production sustained over 3 or more months within a population annually	Yes: 1 pt
Seeds remain viable in soil for three or more years	Yes: 2 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	Unknown: 0 pts
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	No: 0 pt
Fragments easily and fragments can become established elsewhere	No: 0 pts
Resprouts readily when cut, grazed, or burned	Yes: 1 pt
	8 pts 1 unknown
	A (6+ pts)
Note any related traits: Plants reach maturity during the second year, after spending first as a rosette. Seed can remain viable in the soil for upwards of eight years (2). In Australia, the plant has been reported to act similar to a tumble weed, in which seeds are spread when the plant dries and travels with the wind (3).	

Worksheet B - Colorado Ecological Types and Land Use

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Major Ecological and Land Use Types	Minor Ecological and Land Use Types	Code*
Freshwater and Aquatic Systems	lakes, ponds, reservoirs	Unknown
	rivers, streams, canals	Unknown
Riparian and wetlands	Riparian forest	Unknown
	Riparian shrublands	Unknown
	Wet meadows	Unknown
Grasslands	Shortgrass prairie	Unknown
	Tallgrass prairie	Unknown
	Sandsage prairie	Unknown
	Montane meadows	Unknown
Irrigated Agriculture	Hay meadows	Unknown
	Irrigated crops (alfalfa, corn, sugar beets)	Unknown
Dryland Agriculture	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	Unknown
Developed Lands	Urban, exurban, industrial	Unknown
Arid Shrublands	Sagebrush shrublands	Unknown
	Foothills shrublands	Unknown
	Gambel oak shrublands	Unknown
Woodlands	Pinyon - juniper	Unknown
	Ponderosa pine	Unknown
	Limber pine	Unknown
Forest	Lodgepole pine	Unknown
	Spruce-fir	Unknown
Alpine	Boulder and rock fields	Unknown
	Dwarf shrublands	Unknown
	Tundra	Unknown
Barrens (lower elevation)	Dunes	Unknown
	Rock outcrops	Unknown
	Canyonlands	Unknown

* 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).

Worksheet C – Human Impacts

Human health impacts; irritants (sap), spines, poisonous, and/or smoke impacts	Yes: 1 pt
Property values are decreased due to increased risk of fire	Unknown: 0 pts
Decreased property value due to moderate to heavy infestations	Yes: 2 pts
Decreased land value for recreational use; boating, fishing, camping, etc.	Unknown: 0 pts
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	Yes: 2 pt
	5 pts 2 unknowns
	A (4+ pts)
Note any related traits: Plant features spines similar to many thistles. Infestations of WDT can become large, and are easily spread by brushing into the plant. WDT can decrease the productivity of surrounding plants.	