

# APPENDIX D

## Weed Risk Assessment

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# Appendix D – Weed Risk Assessment

## Process

The weed risk assessment is based on the methodology developed by Maria Mantis of The Nature Conservancy of Montana and the Cohesive Strategy Team (Mantis 2003; available on the web at [http://www.fs.fed.us/r1/cohesive\\_strategy/datafr.htm](http://www.fs.fed.us/r1/cohesive_strategy/datafr.htm)). Mantis developed a weed risk assessment for each species studied. The weed risk assessment for the KIPZ is a composite value for all species. Table D-1 lists the weed species included in the risk assessment. The weed species included in this assessment were determined by the weeds covered within the assessment performed by Mantis and by their presence in the KIPZ.

**Table D-1 Weed Species and Codes for the Weed Risk Assessment**

Code	Species	Common Name
ACRREP	<i>Acroptilon repens</i>	Russian knapweed
CARDRA	<i>Cardaria draba</i>	hoary cress
CENMAC	<i>Centaurea maculosa</i>	spotted knapweed
CENDIF	<i>Centaurea diffusa</i>	diffuse knapweed
CENSOL	<i>Centaurea solstitialis</i>	yellow starthistle
CHOJUN	<i>Chondrilla juncea</i>	rush skeletonweed
CIRARV	<i>Cirsium arvense</i>	Canada thistle
CRUVUL	<i>Crupina vulgaris</i>	common crupina
CYNOFF	<i>Cynoglossum officinale</i>	hound's-tounge
EUPESU	<i>Euphorbia esula</i>	leafy spurge
HIEAUR	<i>Hieracium aurantiacum</i>	orange hawkweed
HIECAE	<i>Hieracium caespitosum</i>	meadow hawkweed
HYPPER	<i>Hypericum perforatum</i>	common St. John's-wort
ISATIN	<i>Isatis tinctoria</i>	dyer's woad
LINDAL	<i>Linaria dalmatica</i>	Dalmatian toadflax
LINVUL	<i>Linaria vulgaris</i>	common toadflax, yellow toadflax
POLCUS	<i>Polygonum cuspidatum</i>	Japanese knotweed
POTREC	<i>Potentilla recta</i>	sulphur cinquefoil
TANVUL	<i>Tanacetum vulgare</i>	common tansy
VEROFF	<i>Veronica officinalis</i>	Common speedwell, Paul's betony

The weed risk assessment is based on four items: disturbance, susceptibility, threat, and exposure. The following is a description of how each item was developed and then combined to produce a composite risk rating.

### Disturbance for Weeds

Disturbance was defined as any of the following:

**Past timber harvest** – Regeneration harvest in the past 30 years. Each Forest's Timber Stand Management Record System (TSMRS) database was used to identify these stands.

**Wildfire** – High- and mixed- (moderate) severity wildfires for the past 30 years on forested cover types.

**Additional seedling/sapling** – This item was used to identify other areas that have been disturbed but not previously identified in steps 1 or 2 (e.g., areas without harvest data such as private lands). The Vegetation Mapping Project (VMAP) coverage was used to identify size class of seed/sap and combined with forested Vegetation Response Units (VRUs).

**Grazing** – Areas on less than 40 percent slope in active grazing allotments in the warm/dry biophysical (VRUs 1-3) group.

**Wildlife** – Prescribed wildlife burn within the last 30 years on warm/dry biophysical (VRUs 1-3) group. TSMRS was the data source for the wildlife burns.

## Susceptibility of Weeds

Susceptibility refers to the vulnerability of a native plant community to colonization and establishment of an exotic species. Susceptibility was determined by species for each VRU, based on data from Maria Mantis. Mantis made a susceptibility determination for each species by potential natural vegetation type (PNV). Data, literature sources, and expert opinion were used to determine if a species could become established in each PNV. Expert opinion came from a panel of botanists and ecologists who were convened to review the findings from data and literature, and provide further input where needed. Susceptibility was rated using a categorical system where each combination of a species and PNV was coded with one of the following:

**U – Unknown:** Susceptibility of this PNV to the species is unknown

**C – Closed:** The species generally does not occur within this PNV under any condition

**I – Invasive:** The species is invasive in undisturbed conditions within this PNV. If a species was rated as “I”, the assumption is that it would also invade with disturbance.

**D – Disturbance:** The species occurs in this PNV where there has been evidence of recent disturbance.

These ratings by PNV were cross-walked to a rating by VRU in the KNF and the IPNF and some adjustments made, based on local knowledge. Tables D-2 and D-3 summarize the susceptibility rating by VRU for each Forest.

## Threat of Weeds

Threat refers to the degree of change to the structure, composition, or function of a native community from an exotic species. Threat was determined by species for each VRU, based on data from Maria Mantis. Mantis made a determination on threat for each species by potential natural vegetation type (PNV). Threat is displayed using a qualitative ranking of three classes: low, high, and none. The following factors were considering during threat classification:

**L – Low Threat:** Species can become established; however, they cannot compete well with native vegetation, even in disturbed settings. Species with low threat never increase substantially in cover without the aid of severe site disturbance. Even in cases of moderate to mild disturbance events (e.g., low intensity fires and moderate grazing) native plants still are able to compete successfully.

**H – High Threat:** Species were rated as having high threat if once established they can compete successfully with native vegetation. These changes would have to be significant enough to where the function of the plant community is substantially altered. These changes would include alteration in natural pathways of succession, a change in the natural fire regime, and/or significant changes to the composition and canopy cover of native plant species.

**N – No Threat:** A species can only be assigned no threat to a PNV if it is closed (C) to that PNV.

**? – Threat Unknown**

These ratings by PNV were cross-walked to ratings by VRU in the KNF and the IPNF and some adjustments made, based on local knowledge. Tables D-4 and D-5 summarize the susceptibility rating by VRU for each Forest.

**Table D- 2 Weed Susceptibility by Species and VRU for the IPNF**

IPNF VRU	ACRREP	CARDRA	CENMAC	CENDIF	CENSOL	CHOJUN	CIRARV	CRUVUL	CYNOFF	EUPESU	HIEAUR	HIECAE	HYPPER	ISATIN	LINDAL	LINVUL	POLCUS	POTREC	TANVUL	VEROFF
2	D	U	I	D	D	D	D	D	D	I	D	D	I	I	I	D	C	I	D	D
3	D	U	D	D	D	D	D	C	D	D	D	D	D	U	D	D	C	D	D	I
4	D	U	D	D	D	D	D	U	D	D	D	D	D	U	D	D	D	D	D	D
5 and 5/6	D	U	D	D	D	D	D	U	D	D	D	D	D	U	D	D	C	D	D	D
6, 6/8_Valley_Bottom 6_Valley_Bottom	D	U	D	D	U	D	D	U	I	I	D	D	D	D	D	D	I	D	D	D
7/8	C	U	D	U	U	D	D	C	D	D	D	D	D	C	U	D	I	D	D	D
8_Valley_Bottom	U	U	D	U	U	D	D	C	D	I	D	U	D	D	U	D	C	D	D	U
9	C	C	D	U	U	D	D	C	D	C	D	D	D	C	U	D	C	D	D	C
10/11	C	C	D	U	U	D	D	C	C	C	D	D	D	D	D	I	C	D	D	C
nonforest	D	I	I	I	I	D	D	D	D	I	C	I	I	I	I	D	C	I	U	C

**U – Unknown:** Susceptibility of this PNV to the species is unknown  
**C – Closed:** The species generally does not occur within this PNV under any condition  
**I – Invasive:** The species is invasive in undisturbed conditions within this PNV. If a species was rated as “I”, the assumption is that it would also invade with disturbance.  
**D – Disturbance:** The species occurs in this PNV where there has been evidence of recent disturbance.

**Table D-3 Weed Susceptibility by Species and VRU for the KNF**

KNF VRU	ACRREP	CARDRA	CENMAC	CENDIF	CENSOL	CHOJUN	CIRARV	CRUVUL	CYNOFF	EUPESU	HIEAUR	HIECAE	HYPPER	ISATIN	LINDAL	LINVUL	POLCUS	POTREC	TANVUL	VEROFF
1	D	U	I	D	D	D	D	D	D	I	D	D	I	I	I	D	C	I	D	D
2	D	U	D	D	D	D	D	U	D	I	D	D	D	U	D	D	C	D	C	D
3	D	U	D	D	D	D	D	U	D	D	D	D	D	U	D	D	C	D	D	I
4	D	U	D	D	D	D	D	U	D	D	D	D	D	U	D	D	D	D	D	D
5	D	U	D	D	D	D	D	U	D	D	D	D	D	U	D	D	D	D	D	D

KNF VRU	ACRREP	CARDRA	CENMAC	CENDIF	CENSOL	CHOJUN	CIRARV	CRUVUL	CYNOFF	EUESU	HIEAUR	HIECAE	HYPPER	ISATIN	LINDAL	LINVUL	POLCUS	POTREC	TANVUL	VEROFF
6	D	U	D	D	U	D	D	U	I	I	D	D	D	D	D	D	I	D	D	D
7	C	C	D	U	U	D	D	C	D	C	D	D	D	C	U	D	C	D	D	D
8	C	U	D	U	U	D	D	C	D	I	D	D	D	D	U	D	I	D	D	I
9	C	U	D	U	U	D	D	C	D	C	D	D	D	D	D	I	C	D	D	D
10	C	C	D	U	U	D	D	C	C	C	D	D	D	D	D	I	C	D	D	U
11	C	C	C	U	U	C	D	C	C	C	U	C	C	C	U	D	C	C	C	C
NF1, NF4, XX1, XX2, XX3	D	I	I	I	I	D	D	D	D	I	C	I	I	I	I	D	C	I	U	C

**U – Unknown:** Susceptibility of this PNV to the species is unknown  
**C – Closed:** The species generally does not occur within this PNV under any condition  
**I – Invasive:** The species is invasive in undisturbed conditions within this PNV. If a species was rated as “I”, the assumption is that it would also invade with disturbance.  
**D – Disturbance:** The species occurs in this PNV where there has been evidence of recent disturbance.

Table D-4 Weed Threat by Species and VRU for the IPNF

IPNF VRU	ACRREP	CARDRA	CENMAC	CENDIF	CENSOL	CHOJUN	CIRARV	CRUVUL	CYNOFF	EUESU	HIEAUR	HIECAE	HYPPER	ISATIN	LINDAL	LINVUL	POLCUS	POTREC	TANVUL	VEROFF
2	H	?	H	H	H	H	L	H	L	H	H	H	H	H	H	H	N	H	L	L
3	L	?	L	L	L	L	L	N	?	L	H	H	L	?	L	L	N	L	L	H
4	L	?	L	L	L	L	L	?	L	L	H	H	L	?	L	L	H	L	L	?
5 and 5/6	L	?	L	L	L	L	L	?	L	L	H	H	L	?	L	L	N	L	H	L
6, 6/8_Valley_Bottom, 6_Valley_Bottom	H	?	H	L	?	L	H	?	L	H	H	H	L	?	L	L	H	L	H	?
7/8	N	?	L	L	?	L	L	N	L	L	H	H	L	N	?	L	H	L	L	L
8_Valley_Bottom	?	?	H	H	?	?	H	N	L	H	H	?	L	?	?	L	N	L	L	?
9	N	N	L	L	?	L	L	N	?	N	H	H	L	N	?	L	N	L	L	N
10/11	N	N	L	L	?	L	L	N	N	N	H	H	L	?	L	L	N	H	L	N
nonforest	H	H	H	H	H	H	L	L	L	H	N	L	H	H	H	L	N	H	?	N

Table D-5 Weed Threat by Species and VRU for the KNF

KNF VRU	ACRREP	CARDRA	CENMAC	CENDIF	CENSOL	CHOJUN	CIRARV	CRUVUL	CYNOFF	EUPESU	HIEAUR	HIECAE	HYPPER	ISATIN	LINDAL	LINVUL	POLCUS	POTREC	TANVUL	VEROFF
1	H	?	H	H	H	H	L	H	L	H	L	H	H	H	H	H	N	H	L	L
2	L	?	H	H	L	L	L	?	L	L	H	H	L	?	L	L	N	L	L	L
3	L	?	L	H	L	L	L	?	L	L	H	H	L	?	L	L	N	L	L	H
4	L	?	L	L	L	L	L	?	L	L	H	H	L	?	L	L	H	L	L	?
5	L	?	L	L	L	L	L	?	L	L	H	H	L	?	L	L	H	L	H	L
6	H	?	H	L	?	L	H	?	L	H	H	H	L	?	L	L	H	L	H	?
7	N	N	L	?	?	L	L	N	L	N	H	H	L	N	?	L	N	L	L	L
8	N	?	H	?	?	L	H	N	L	H	H	H	L	N	?	L	H	L	L	L
9	N	?	L	?	?	L	L	N	L	N	H	H	L	N	L	H	N	H	L	L
10	N	N	L	?	?	L	L	N	N	N	H	H	L	N	L	H	N	H	L	?
11	N	N	N	?	?	N	L	N	N	N	?	N	N	N	?	L	N	N	N	N
NF1, NF4, XX1, XX2, XX3	H	H	H	H	H	H	L	L	L	H	N	L	H	H	H	L	N	H	N	N

## Exposure for Weeds

The probability of exposure for weeds is a function of road density, high traffic areas, and range allotments. The probability of exposure to weeds was calculated as follows (Mantis, 2003):

**Road Density:** Density was calculated for all roads in the analysis area that are not decommissioned or restricted year-round. Based on the amount of roads within ½ mile of a site, the following ratings were given:

- 0 to 0 = rating 1 (meaning 0 miles of roads within 0.5 miles of a site).
- 0 to 1.0 = rating 2 (meaning 0.1 to 1.0 miles of road within 0.5 miles of a site).
- 1.0 to 2.5 = rating 3 (meaning 1.1 to 2.5 miles of road within 0.5 miles of a site).
- Greater than 2.5 = rating 4 (meaning >2.5 miles of roads within 0.5 mile of a site).

**High Traffic:** High traffic areas were developed based on primary and secondary highways. Density of these highways was calculated and sites rated as follows:

- 0 to 0 = rating 1 (meaning 0 miles of highway within 0.5 miles of a site).
- 0 to 0.5 = rating 2 (meaning 0.1 to 0.5 miles of highway within 0.5 miles of a site).
- Greater than 0.5 = rating 3 (meaning > 0.5 miles of highway within 0.5 miles of a site).

**Active Grazing Allotments:** Active or recently inactive grazing allotments were considered as part of the rating for exposure and assigned a value of 3.

**Rating for Exposure:** Road density, high traffic areas, and active range allotments were combined to create a weed exposure rating. Weed exposure ratings were assigned as follows:

**In the KNF:**

- If exposure rating total = 0, then total exposure rate = ‘low’
- If exposure rating total = 1 – 7, then total exposure rate = ‘mod’
- If exposure rating total = 8– 14, then total exposure rate = ‘high’

**In the IPNF:**

- If exposure rating total = 0, then total exposure rate = ‘low’
- If exposure rating total = 1 – 6, then total exposure rate = ‘mod’
- If exposure rating total = 7– 14, then total exposure rate = ‘high’

## Weed Risk Rating

Disturbance, exposure, and VRUs (the land unit for susceptibility and threat) were combined and a weed risk rating calculated. A final susceptibility rating was determined by combining disturbance with species susceptibility, as shown in Table D-6. Risk for each species was then determined based on the combination of susceptibility, threat, and exposure and displayed in Table D-7.

**Table D-6 Final Susceptibility Rating**

Species Susceptibility	Final Susceptibility Rating
C	N
U	U
I	S
D with disturbance	S
D without disturbance	E

**Table D-7 Risk Rating**

Final Susceptibility	Threat	Exposure	Risk	Risk Number
N	Any	Any	None	0
S	L	Any	Low	1
S	?	Any	Unknown	0
S	H	L	Moderate	2
S	H	M	High	3
S	H	H	High	3
U	Any	Any	Unknown	0
E	Any	H or M	Moderate	2
E	Any	L	Low	1

A composite weed risk rating was calculated, based on the total (sum) of the risk for each species and on individual species rating of high or moderate. See Table D-8 for a summary of the composite rating.

**Table D-8 Final Composite Weed Risk Rating**

Composite (Total) Weed Risk Number or Rating of Species	Composite Weed Risk Rating
0	No Rating
1-12	Low
13-18	Moderate
19+ (but <99)	High
Any species with “High”	High
Any species with “Moderate”, but not already composite rating of “High”	Moderate

## Literature Cited

Mantis, Maria. 2003. *Evaluating Risk to Native Plant Communities from Selected Exotic Species*. The Nature Conservancy of Montana and U.S. Forest Service Cohesive Strategy Team, Kalispell, Montana. Available on the web at [http://www.fs.fed.us/r1/cohesive\\_strategy/datafr.htm](http://www.fs.fed.us/r1/cohesive_strategy/datafr.htm)