INVASIVE PLANT SPECIES

(Noxious weeds)

Introduction

Invasive plant species are non-native plants that can inhabit and negatively alter native plant communities. A number of invasive plant species are recognized as noxious, meaning laws have been developed to restrict their spread and effect on the environment. Dry vegetation types and areas affected by road development, grazing, logging, fire, or other disturbances are most susceptible to weed invasion. Typically, invasive species have the ability to spread rapidly and reproduce in high numbers, which enables them to effectively crowd out native plant populations. Some can pose serious threats to the composition, structure, and function of native plant communities.

Information Sources

The Flathead County noxious weed list was consulted, and invasive species of concern were identified (Pw-1) Montana State and Flathead County Noxious Weed List). In addition to county listed weeds, a recent weed risk assessment project in the Northern Region of the U.S. Forest Service (USDA Forest Service 2003) has identified additional species that pose a threat to native vegetation. After assessing the species recognized by Flathead County and the Forest Service, a list was compiled of species of greatest concern regarding impacts on ecosystem integrity for the West Side Reservoir project area. Weed risk was analyzed for a sample of these species using methods from a weed risk assessment developed for the Northern Region (USDA Forest Service 2003a).

Analysis Area

The analysis area used to examine the impacts of the proposed action and its alternatives on noxious weeds is the same as described for vegetation in the previous section.

Affected Environment

Noxious weeds and invasive plant species can pose serious threats to the composition, structure, and function of native plant communities (Olsen, 1999). As a disturbance process, fire has the potential to greatly exacerbate infestations of certain noxious weed species, depending on burn severity and habitat type (Fire Effects Information System 2002). Soil disturbance such as that resulting from low and moderate burn severities from a wildfire and fire suppression related disturbances (dozer lines, fire camps, drop spots, etc.) provide

optimum conditions for noxious weed invasion. Dry site vegetation types and road corridors are also extremely vulnerable, especially where recent ground disturbance has occurred.

In the West Side Reservoir Project area, there is a concern that invasive plants may spread into burned areas, especially where optimum conditions exist as above. Monitoring from historic fires on the FNF (e.g. Moose 2001, Little Wolf 1994) indicate that fire and related suppression efforts may favor weed invasions and population expansion. In addition, weed invasion and expansion has also been observed in areas of past timber management projects.

Invasive Species of Concern

The analysis area is entirely within Flathead County. Flathead County has adopted the Montana State Noxious Weed list with additional County invasive plants of concern. In addition, a weed risk assessment (WRA) identified additional species that pose a threat to native vegetation (USDA Forest Service 2003a). After assessing those species recognized by Flathead County and the WRA, a list was compiled of invasive plant species of concern with regards to impacts on ecosystem integrity for the analysis area (Table 3-19).

Table 3-19. Invasive plants considered in this analysis.

Scientific Name[a]	Common Name	WRA list	Known from the project area	Potential invader to the project area[c]
Category 1 – Widespread established[b]				
Acroptilon repens (Centaurea repens)	Russian knapweed	X		X
Cardaria draba	hoary cress	X		X
Centaurea biebersteinii (C. maculosa)	spotted knapweed	X	X	
Centaurea diffusa	diffuse knapweed	X		X
Cirsium arvense	Canada thistle	X	X	
Convolvulus arvensis	field bindweed	X		X
Cynoglossum officinale	hound's-tongue	X	X	
Euphorbia esula	leafy spurge	X		X
Hypericum perforatum	St. John's-wort	X	X	
Leucanthemum vulgare (Chrysanthemum leucanthemum)	ox-eye daisy	X	X	
Linaria dalmatica	Dalmatian toadflax	X	X	
Linaria vulgaris	yellow toadflax	X		X
Potentilla recta	sulphur cinquefoil	X	X	
Tanacetum vulgare	common tansy	X	X	
Category 2 – Recently established, rapidly spreading[b]				
Hieracium aurantiacum	orange hawkweed	X	X	
Hieracium caespitosum, H. floribundum, H. piloselloides, H. pratense	yellow hawkweed complex	X	X	
Lepidium latifolium	perennial pepperweed	X		X
Lythrum salicaria	purple loosestrife	X		X
Lythrum virgatum	wandlike loosestrife			X
Ranunculus acris	Tall buttercup	X		X
Senecio jacobaea	tansy ragwort	X		X
Tamarix spp.	salt cedar or tamarisk	X		X
Category 3 – Not yet detected or small occurrence				
Centaurea solstitialis	yellow starthistle	X		X

Chondrilla juncea	rush skeletonweed	X		X
Crupina vulgaris	common crupina	X		X
Iris pseudacorus	yellowflag iris			
Isatis tinctoria	dyer's woad	X		X
Myriophyllum spicatum	Eurasian water milfoil	X		X
Additional Invasives of concern				
Achillea millefolium [d]	common yarrow			
Artemisia absinthium	wormwood	X	X	
Artemisia species [d]	wormwood			
Bromus tectorum	cheatgrass	X		X
Campanula rapunculoides [e]	creeping bellflower	X		X
Carduus nutans	musk thistle	X		
Chorispora tenella	purple mustard	X		
Cirsium vulgare	bull thistle	X	X	
Elymus repens	quackgrass	X		
Euphorbia species [d]	spurge (all)			
Melilotus officinalis	yellow sweetclover	X		X
Phalaris arundinacea	reed canarygrass	X		
Sonchus spp.	perennial sowthistle	X		X
Tripleurospermum perforata [e] *(Matricaria inodora, M. perforata)*	scentless chamomile			X
Veronica officinalis	common speedwell	X		X

[a] Nomenclature follows the USDA Plants Database: USDA, NRCS 1999. The PLANTS database (http://plants.usda.gov/plants). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

[b] **Montana Department of Agriculture Noxious weed categories**

- **Category 1** is defined as noxious weeds that are currently established in the State and generally widespread in many counties of the state. Management criteria include awareness and education, containment and suppression of existing infestations and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses.
- **Category 2** is defined as noxious weeds that have recently been introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and invasion of lands, rendering lands unfit for beneficial uses. Management criteria include awareness and education, monitoring and containment of known infestations and eradication where possible.
- **Category 3** is defined as noxious weeds that have not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria include awareness and education, early detection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

[c] Potential invasive plant species of concern with potential to impacts ecosystem integrity for the analysis area.
[d] Cautionary - Additional Invasive plants of concern from Flathead County Weed List
[e] Undesirable - Additional Invasive plants of concern from Flathead County Weed List

Inventory and Monitoring

The Flathead National Forest has completed an Environmental Assessment analyzing the effects of treating noxious and invasive plants (USDA Forest Service 2001 - FNF Noxious and Invasive Weed Control Environmental Assessment). A Forest-wide Weed Management Plan is currently under development to outline methodology in prioritizing treatment and inventory and monitoring protocols. In addition, this plan will outline a methodology for minimizing the establishment and spread of invaders in all projects and special use permits, such as grazing allotments and timber management areas. Currently, treatment and inventory is prioritized at quarterly meetings of the FNF Weed Advisory Group. Factors for prioritization include:

1) **Weed invasive category** as outlined in the FNF Noxious and Invasive Weed Control Environmental Assessment (Table 3-20).
2) **Level of invasive risk** to a potential vegetation group. The Western Montana Planning Zone Weed Risk Assessment is used as a tool to ascertain the level of invasiveness for weed species within potential vegetation groups (USDA Forest Service 2003a).
3) **Special areas** that are threatened by weed invasion. Particular areas of greater conservation concern need additional protection from weed invasion. Examples would be designated wilderness, sensitive plant habitat, and pristine native plant communities.
4) **Potential for increased off-site movement** of weeds that could increase the spread to new areas. Weed infestations that are located along roads, at trailheads, in grazing allotments, or at high use recreation sites are higher priority for treatment because of the increased vectors of spread in these areas.

Table 3-20. Weed Treatment Prioritization on the Flathead National Forest.[a]

Priority	Category	Objectives	Prioritization Factors
1	3 (Potential Invaders)	Currently absent on FNF; goal is prevention, then eradication, if possible	▪ detection ▪ available funds
2	2 (New Invaders)	Localized containment and strong emphasis on overall population reduction	▪ available funds ▪ relative invasive nature of the species and its potential to displace native vegetation ▪ potential for off-site movement of seeds ▪ relative ecological importance of rarity of the site that could be damaged by the presence of the invader species
3	1 (Widespread Invaders)	Containment and localized reduction of populations	▪ available funds ▪ relative invasive nature of the species and its potential to displace native vegetation ▪ potential for off-site movement of seeds ▪ relative ecological importance of rarity of the site that could be damaged by the presence of the invader

[a] USDA Forest Service, 2001.

Pre-burn Condition

Inventories for various projects (e.g., timber stand exams, grizzly bear habitat mapping, sensitive plant surveys, and post-fire Burned Area Emergency Response assessments) within the project area have occurred through the years. These inventories provide us with the following observations regarding weed distribution in the analysis area.

The most abundant and widely distributed noxious weed species in the analysis area are spotted knapweed and St. John's wort. These species occur along most of the road systems, in gravel pits, roadsides, and in other disturbed sites. Canada thistle is also common in riparian areas and wet meadows. Orange and meadow (yellow) hawkweed are of greatest concern and have spread rapidly within the last few years throughout the FNF, including the South Fork drainage. These two species are a problem along the main road corridor along the South Fork (Forest Road 895). In addition, populations also occur along several adjacent road arteries on both year-long open roads and on seasonally and permanently closed roads (USDA Forest Service 2003b -Blackfoot Lake Complex BAER Report).

Some areas within the analysis area have received treatments to control noxious weed infestations (Table 3-21).

Table 3-21. Weed species of concern treated in the South Fork drainage.

Species Targeted	Common Name	First Year Treated
Artemisia absinthium	Wormwood	1993
Centaurea biebersteinii	spotted knapweed	1993
Cynoglossum officinale	hound's tongue	1993
Euphorbia esula	leafy spurge	1999
Hieracium aurantiacum	orange hawkweed	2002
Hypericum perforatum	St. John's wort	1993
Leucanthemum vulgare	ox-eye daisy	1993
Linaria dalmatica	dalmatian toadflax	2002
Linaria vulgaris	yellow toad flax	1993
Tanacetum vulgare	common tansy	1993

Post-burn Condition

For most noxious weed species identified in the analysis area, disturbed sites, dry potential vegetation types, and riparian areas are the most at risk from invasion and spread. Disturbed areas include roads, gravel pits, and areas where ground disturbing fire suppression actions occurred (dozer lines, hand lines, helispots, safety zones, and drop points). Some cutting units where intensive ground treatments were used (jammer roads, terracing, and dozer scarification) also display a high degree of soil disturbance. These sites are especially vulnerable to weed invasion. Severely burned sites can have altered soil structure and reduced organic matter content, creating a favorable germination substrate for weed seeds. Finally, undisturbed areas in drier vegetation types are also at risk. This is because many of our noxious weed species have evolved in dry Mediterranean climates and are highly competitive under these similar site conditions (USDA Forest Service 2003a).

Approximately 59 miles of roads were modified during suppression activities with several of these roads containing known occurrences of orange and yellow hawkweed and other noxious weeds listed in Table 3-19.

Plant response to fire depends on many factors. Each species must be assessed individually due to the great degree of variation in life history, morphology, phenology, ecology, and

reproductive biology. Another key factor in assessing the weed response to fire is the severity of the burn, (i.e. intensity of heat in the soil gets during the fire) which influences plant root mortality of pre-existing plants and how well seeds sprout.

Following are some summarized notes on response to fire for the key species (widespread invaders) in the burned area taken from the USDA Forest Service's Fire Effects Information Database (2002) and from The Nature Conservancy's Stewardship abstracts database.

Spotted knapweed – Often dense stands of knapweed have little surrounding vegetation, possibly because they release chemicals that inhibit the growth of competing plants, and they are less susceptible to fire. Litter from the previous year's stems often decays or scatters during the current season, but it may accumulate in very dense stands and create more favorable burning conditions. Spotted knapweed probably resists low-severity fire because of its stout taproot. It also most likely colonizes after fire from seeds buried in soil or from off-site sources. Within the West-Side Post-Fire project area knapweed often grows in disturbed areas of high bare soil component and low fuel loading, most often on roadsides. As a result, many plants were not killed by the fire.

Canada thistle - Response to fire varies from positive to negative, depending on season of burn, soil moisture, and location. Dormant season burning stimulates growth of native herbaceous species that compete with Canada thistle. Fire during the growing season damages native species as well as Canada thistle. After top-kill, plants resume growth from buds located on the roots. Canada thistle grows in moist areas. Those areas that did not burn intensely in the analysis area can expect vigorous resprouting of thistle in known infestations.

Orange and yellow hawkweed - Exotic hawkweeds (*Hieracium spp*.) are creeping perennial, stoloniferous and rhizomatous herbs with shallow fibrous roots. Exotic hawkweeds can rapidly colonize and dominate a site because they possess a wide range of highly successful reproductive strategies. Those reproductive strategies include seeds, rhizomes, stolons and adventitious buds. Most new infestations are established from seed, while expansion of established populations is primarily through vegetative spread. Once established, hawkweeds quickly develop into a solid mat of rosettes that rapidly expand until they dominate the site.

Within the analysis area, hawkweeds had already set seed prior to the ignition of the West-Side fires. Dormant seeds will establish in moist, well-drained, acidic, coarse-textured soils that are low in organic materials, at an elevation between 2100 and 5400 feet. They are usually found in small, isolated pockets with highest densities found in disturbed areas. Hawkweeds can grow in open woodlands, but does not tolerate heavy shade. Rapid colonization after fire was observed in the Little Wolf Fire, where orange hawkweed is currently one of the most dominant plants in this landscape (personal observation).

St. John's wort - This species can survive prolonged drought and fire. Plants reproduce from numerous seeds and rhizomatous, often re-sprouting from root crowns. Population explosions are common after fires due to the release of dormant seeds in soil or reduced competition in the burned areas. St. John's wort will rapidly recover from root crown sprouting following a spring burn and are able to out-compete other natives that may not germinate until fall. In fall burns, natives are able to germinate quickly and with establishment can compete with St.

John's wort. The majority of St. John's wort within the analysis area had most likely set seed before the burns occurred. In addition, root crowns are expected to survive the fires.

These references indicate that for at least a few of the more common invader species in the burn perimeter, fire often stimulates growth and reproduction for pre-existing invasive plant occurrences under certain conditions. This is true even in lower severity burns due to decreased likelihood of root mortality. Nearly 76% of the soils in the analysis area burned at this low severity (Table 3-22).

Table 3-22. Soil burn severity acres for the fires associated with the West-Side Post-Fire Project area. [a]

Soil Burn Severity	Acres	Percent of burn perimeter
High	421	1
Moderate	6688	22
Low	2600	9
Low (70-30%) / Unburned Mosaic	20,009	67
Unburned	296	1

[a] USDA Forest Service 2003b.

Surveys

Surveys for noxious/invasive plant species will be conducted in summer 2004.

Environmental Consequences

Direct and Indirect Effects

Alternative A – No Action

Alternative A provides the least opportunity for creating new weed habitat. However, this alternative does retain the greatest miles of existing open roads (139 miles total of yearlong and seasonally open roads) and closes (via berm, gates, revegetation, or decommissioning) the least miles of roads (198 miles, Table 3-24).

Open roads may serve as corridors for weed spread. Invasive species considered in the analysis area (Table 3-19) will have potential for expansion in to the burned areas and open roads. As a disturbance process, fire has the potential to greatly exacerbate infestations of certain noxious weed species, depending on burn severity and habitat type (Fire Effects Information System 2004). Soil disturbance such as that resulting from low and moderate burn severities from a wildfire and fire suppression related disturbances (dozer lines, fire camps, drop spots, etc.) provide optimum conditions for noxious weed invasion. In addition, new invaders may also establish in the burned areas as a result of increased vehicle and

personnel presence potentially depositing new invasive species from other regions during fire suppression efforts. Dry site vegetation types and road corridors are also extremely vulnerable. In the West-Side Post-Fire Project area, the existing condition of a post-burned environment creates a high level of risk of invasive plants spreading into burned areas, especially where optimum conditions exist.

Action Alternatives B, C, D, and E

Direct and Indirect Effects

Vegetation treatments, road closures, road decommissioning, temporary road construction, beetle funnel trap treatments and weed control actions are proposed for this project. These general effects on weed risk and spread are discussed below by activity. Areas with more acres of ground disturbance or open roads are expected to have greater vulnerability to weed colonization.

Salvage Logging and other Vegetation Treatments

The effects of salvage logging are variable depending on the amount of ground disturbed during the activity; the more bare soil exposed, the more germination substrate is available for colonizing weed seeds. Ground-based systems with wheeled machinery usually disturb more ground than do skyline cable systems. Helicopter extraction of logs is even less disturbing to the ground within the actual units; however, areas used for landings can be impacted.

Another consideration is time of year vegetation treatments will occur. Harvest and skidding logs on snow-free ground would disturb more soil than if activity occurred over frozen ground or compacted snow. For all alternatives, all ground based logging systems are proposed for winter operations. This will reduce soil disturbance and opportunity for weed establishment and dispersal. The differences in these logging systems by alternative are displayed in Table 3-23. For all action alternatives approximately 17 to 19 percent of logging treatments will occur during winter months when snow compaction will reduce ground disturbance and risk of weed establishment and expansion.

Machinery can spread weed seeds if not washed prior to use; therefore design features include cleaning all off-road equipment prior to entering the area. Use of dedicated skid trails will also minimize spread across units. Other features designed to minimize soil impacts (see Chapter 2) will also aid in reducing noxious weed spread.

Road decommissioning, road closures, and temporary road construction

These activities will expose bare soil and parent material, creating suitable substrates for weed germination. Proposed weed control actions, revegetation, and closing these roads to vehicular use will lessen the impacts from weeds (see Chapter 2).

Table 3-23. Yarding system and required winter logging acres (% of total)

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Ground based **WINTER**	no action	623 (13%)	399 (10%)	663 (13%)	663 (12%)
Ground based NON-winter	no action	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Helicopter NON-winter	no action	3498 (71%)	2844 (72%)	3762 (71%)	3804 (71%)
Skyline **WINTER**	no action	295 (6%)	251 (6%)	328 (6%)	328 (6%)
Skyline NON-winter	no action	490 (10%)	439 (11%)	547 (10%)	543 (10%)
Total	**0**	**4906**	**3933**	**5300**	**5338**

Use of roads facilitates weed establishment because roads serve as travel routes for the main vectors of weed spread, specifically, cars and trucks, along with mountain bikes and horses. Closing roads reduces the ability for weed seeds to spread.

For all alternatives, 3.4 miles of old historic roads will be accessed during winter operations (3.2 miles of Road 9676 in Beta Fire and 0.2 miles of Road 547 in Ball Fire). These roads have an existing road template and have been naturally revegetating for several years. Vegetation will be cleared from Road 9676 using heavy equipment before logging operations begin in the winter months. Ground disturbance to these roads during snow-free periods may result in the potential for weed establishment and expansion into these areas. During fire suppression efforts in 2003, Road 547 was cleared of vegetation and used for suppression efforts. Minimal to no potential for weed establishment and expansion will result from use of these roads during winter months.

Alternative D would provide the least potential for weed spread, as it proposes closing the greatest miles of roads (via, berms, gates, revegetation, or decommissioning; 249 miles) and retains the least miles of open roads (yearlong and seasonal; 89 miles) (Table 3-24). Alternative E would provide the greatest potential for weed expansion and dispersal with the least miles of closed roads and greatest miles of open roads (not including no action, Alternative A).

Beetle funnel traps

There would be no ground disturbance associated with this activity; therefore no effects on weeds would result.

Table 3-24. Total estimated miles after implementation of each alternative.

Travel Management Status	Alternative A*		Alternative B		Alternative C		Alternative D		Alternative E	
Open Yearlong	126	**139**	97	**120**	90	**101**	84	**89**	88	**121**
Open Seasonally	13		23		11		5		33	
Closed Yearlong/Bridgeout	15	**198**	14	**219**	14	**238**	14	**249**	14	**217**
Closed Yearlong/Berm	49		85		78		82		85	
Closed Yearlong/Gate	106		48		54		60		46	
Closed Yearlong/Revegetated	28		23		23		23		23	
To be decommissioned	0		49		69		69		49	
Motorized Trails	105	**162**	65	**165**	33	**150**	60	**166**	78	**159**
Non-motorized Trails	57		100		117		106		81	
New non-motorized Trails	0		1		1		1		1	

* with Spotted Beetle Resource Management Decision Notice implemented.

Cumulative Effects

Alternative A (No Action)

Past ground disturbing activities such as timber harvest, road construction, trail construction, road maintenance, and fire suppression activities (e.g. fireline, dozerline, and safety zone construction) have contributed to the establishment and spread of noxious and invasive plants in the area. Recreational and economic land uses (hunting, hiking, fishing, logging, mushroom harvesting, firewood gathering, etc.) have also promoted the spread of weed seeds as users and their vehicles serve as vectors for weed seed spread. All these activities are likely to continue into the future; however, the degree of effects from construction type activities, such as road and trail building, will be far less because of recent decreases in these actions which are expected to continue into the foreseeable future. Wildlife have also likely contributed to weed spread in the past by transporting weed seeds across the landscape.

The West-Side Fires itself has had a great impact on the susceptibility of the area to weed invasion for a few select species (i.e. orange and meadow hawkweeds). Ongoing activities that may contribute to weed spread are the road maintenance work as part of the Burned Areas Road Maintenance Project and commercial mushroom harvesting in the burned areas.

Other past, present, and future actions have and will reduce the potential for weed spread. Extensive noxious weed treatments has occurred in the past along the South Fork Flathead since 1993 (Table 3-21). Weed treatments are likely to increase in the area as surveys have detected new and growing infestations resulting from fire or proposed and ongoing actions. Road closures have likely decreased the spread of weeds. Planned revegetation efforts in areas affected by fire suppression activities and a few other areas seriously affected by the fire will help to reduce opportunities for weed spread, as planted and seeded native and non-invasive exotic species are established and compete with weeds.

Common to All Action Alternatives

In addition to the cumulative effects described for the no action Alternative above, the action alternatives will also contribute to cumulative effects to the degree described in the direct effects section above for each proposed activity (salvage, roads, beetle traps).

In summary, many past, present, and foreseeable actions have and will contribute to weed risk and spread in the West-Side Post-Fire Project area. Additional acres, outside and adjacent to the treatment units will become more susceptible to weed invasion from a number of weed species as a result of this action. Areas with greater miles of open roads will increase facilitation of weed spread. This contribution to cumulative effects will be greatly reduced, however, by design features that will lessen the impact of weed spread; specifically aggressive weed treatments, soil stabilization measures, revegetation of disturbed sites, and road closures.

REGULATORY FRAMEWORK AND CONSISTENCY

Management direction for noxious and invasive weed control on the FNF is set at the national and forest levels. Forest Service policies were developed in response to federal laws guiding implementation of noxious weed control actions. These policies are set forth in Amendment 2000-95-5 of the Forest Service Manual, Chapter 2080, Noxious Weed Management, and have been incorporated into the FNF Forest Plan. Treatment and monitoring of known weed populations in the West Side Post-Fire Project area will be implemented under the authority and guidance of the Flathead National Forest Noxious and Invasive Weed Control Decision Notice (May 2001) and EA (March 2001). The FNF Noxious and Invasive Weed Control EA (March 2001) and Decision Notice (May 2001) were designed to meet legal requirements and Forest Service policies for noxious weed control. The West-Side Post-Fire Project incorporates and is consistent with the FNF Weed Control Decision. Design features and management requirements for actions proposed under the this project follow requirements documented in the Forest Service Manual Amendment for Noxious Weed Management, specifically for road decommissioning and timber management projects

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