CHAPTER 3 AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the existing condition of the physical, biological, and social resources within the Project Area that may be affected by the Proposed Action. The descriptions are based on the geographic scope of the project described in Chapter 1. The Analysis Methods section under each resource contains an explanation of the methods and sources of information used in the analysis. More detailed information on each resource can be found in the resource specialist's reports in the project file (PF).

This chapter also contains the regulatory requirements that must be met by management activities, primarily Forest Plan standards and other Federal and state laws and policies.

SOIL RESOURCES

REGULATORY FRAMEWORK

The Helena NF Plan has the objective of maintaining soil productivity and minimizing sedimentation by applying soil and water conservation practices.

The National Forest Management Act requires that lands be managed to ensure the maintenance of long-term soil productivity, soil hydrologic function, and ecosystem health. Soil resource management will be consistent with these goals.

The Forest Service Manual (FSM) 2550 - Soil Management has a goal to optimize sustained yields of goods and services without impairing the productivity of the land, and it is the policy of the Forest Service to manage forest and rangelands in a manner that will improve soil productivity.

Other laws and guidance include the Soil Conservation and Domestic Allotment Act (16 U.S.C. 590) that states soil erosion is a menace to national welfare and provides for the prevention of erosion on lands owned or controlled by the United States through a variety of means including the establishment of vegetative cover. In addition, Congress declares that unsatisfactory conditions on public lands present a high risk of soil loss, subsequent loss of productivity, and unacceptable levels of siltation that can be mediated by increased rangeland management (43 C.F.R. § 1901).

The Montana legislature encourages the use of best management practices in order to prevent soil erosion on forest lands (MCA 76-13-101). Standards for Forest Practices in Streamside Management Zones (MCA 77-5-303) prohibit the application of any hazardous material in a manner that may damage or cause injury to the land within a streamside management zone as defined in MCA 77-5-302.

ANALYSIS AREA

The analysis area for soil resources is the proximity of the proposed treatment areas.

ANALYSIS METHODS

Impacts on soil quality resulting from weed infestation and weed control measures associated with treatment alternatives are discussed below. Effects were determined through a review of scientific literature (PF-*Soils*). Many of the effects discussed are common for all herbicides on all soils within the Project Area.

AFFECTED ENVIRONMENT

The Helena NF soil survey (USDA 1988) describes soil characteristics in association with specific, detailed map units or land types located on the Helena NF. Locations and acres of weed infestations included in the following landscape area discussions are based on information provided by the Helena NF.

- **Belts/Dry Range Landscape Area** - Weed infestations occur on 529 sites on approximately 9,900 acres. Affected soil occurs in a variety of topographic positions ranging from floodplains and terraces in lower elevations to higher elevation mountain ridges. Soil ranges from fine-textured clays to medium-textured sandy loams. Approximately 1,340 acres have surfaces subject to moderate erosion hazard while approximately 1,515 acres are subject to severe erosion hazard. Approximately 915 acres include areas such as wet meadows, floodplains, and draws where the water table fluctuates and can be at or within 30 inches of the soil surface, especially in the spring or early summer.

- **Blackfoot Landscape Area** - Weed infestations occur on 213 sites covering approximately 5,324 acres. Affected soil occurs in a variety of topographic positions ranging from floodplains and terraces in lower elevations to higher elevation mountain ridges. Soil ranges from moderately fine-textured silty clays to moderately coarse-textured sands. Approximately 3,215 acres have surfaces subject to moderate erosion hazard while approximately 790 acres are subject to severe erosion hazard. Approximately 135 acres include floodplains where the water table fluctuates and can be at or within 30 inches of the soil surface during spring months.

- **Continental Divide Landscape Area** - Weed infestations occur on 336 sites covering approximately 5,631 acres. Affected soil occurs in a variety of topographic positions ranging from floodplains and terraces in lower elevations to higher elevation mountain ridges. Soil ranges from medium-textured clay loams to moderately coarse-textured sandy loams. Approximately 2,000 acres have surfaces subject to moderate erosion hazard while approximately 1,100 acres are subject to severe erosion hazard. Approximately 225 acres include areas such as wet meadows, floodplains, and draws where the water table fluctuates and can be at or within 30 inches of the soil surface, especially in the spring or early summer.

- **Elkhorn Landscape Area** - Weed infestations occur on 213 sites covering approximately 1,792 acres. Affected soil occurs in a variety of topographic positions ranging from floodplains and terraces in lower elevations to higher elevation mountain ridges. Soil ranges from medium-textured clay loams to moderately coarse-textured sandy loams. Approximately 780 acres have surfaces subject to moderate erosion hazard while approximately 610 acres are subject to severe erosion hazard. Approximately 35 acres include areas such as wet meadows, floodplains, and draws where the water table fluctuates and can be at or within 30 inches of the soil surface, especially in the spring or early summer.

Noxious weed infestations affect soil quality by out-competing native species for water and nutrient resources in the soil (Olson 1999a). Broadleaved weeds often produce deeper taproot systems and less canopy cover compared to the native species that they displace (DiTomaso 1999). Due to these physiologic and morphologic differences, weed infestations can have direct and indirect effects on soil properties resulting in negative changes in overall soil quality. The following information is related to weed species that occur on the Helena NF and can be assumed to be occurring where weed infestations are dense.

- Soil Organic Matter Content - Organic matter may be reduced or redistributed in weed-infested soil. Noxious weeds may decay more slowly than native species (Olson 1999a; Olson and Kelsey 1997). Slower decay rates result in less annual input of organic matter to the soil. Since noxious weeds also tend to have deeper roots and less foliage than native species, decay of these plants will contribute less

litter and organic matter near the soil surface.

- Soil Water Interactions - Water infiltration can be reduced on weed-infested sites due to reduced cover (DiTomaso 1999; Olson 1999a). Lacey *et al.* (1989) measured significantly greater surface water runoff, indicating less infiltration, from spotted knapweed dominated sites compared to adjacent native grass dominated sites. Decreased soil organic matter can reduce the amount of water held in the soil (especially near the surface) (Brady and Weil 1999; Tisdall and Oades 1982).

- Reduced cover on weed infested sites can result in higher evaporation from the exposed soil surface (Lauenroth *et al.* 1994, Olson 1999a). On sites where weeds are dense, the high transpiration rate may deplete soil water stored deeper in the profile (Olson 1999a).

- Soil Erodibility - Weed infested soil has been shown to be more erodible than soil supporting native grass species (Lacey *et al.* 1989). With less cover than native species, weeds are less able to dissipate the kinetic energy of rainfall, overland flow, and wind that cause soil erosion (Torri and Borselli 2000; Fryrear 2000).

- Soil Biota - Since abundance of soil microbial biomass is generally related to the organic matter content of soils (Brady and Weil 1999), it is possible that weed infested soils may support smaller populations of microorganisms than non-infested soils. Considering the deeper root distribution and reduced litter production of weeds compared to native grasses it is possible that infestation would result in a change of the size and/or distribution of the soil microbial population.

- Soil Nutrient Availability - Noxious weeds directly limit nutrient availability through their ability to out compete native species for limited soil resources. Weeds have high nutrient uptake rates and can deplete soil nutrients to very low levels (Olson 1999a). Potassium, nitrogen, and phosphorous levels were 44 percent, 62 percent, and 88 percent lower in spotted knapweed infested soil than in adjacent grass covered soil (Olson 1999a). In addition, some weed species germinate prior to native species and exploit nutrient (and water) resources before native species are actively growing (Olson 1999a). In instances where weed decomposition occurs slowly, nutrients remain immobilized in the plant tissue and unavailable for uptake by other species.

- Weeds indirectly limit nutrient availability due to increased soil erosion that can occur in infested areas. Erosion selectively removes organic matter and the finer sized soil particles that store nutrients for plant use, leaving behind soil with a reduced capacity to supply nutrients (Brady and Weil 1999).

WATER RESOURCES

REGULATORY FRAMEWORK

The Helena NF Plan (Forest Plan) includes management objectives for water resources, some of which are applicable to the proposed weed treatment project (USFS 1986). According to the Forest Plan, "The water currently meeting water quality standards would be maintained, by applying soil and water conservation practices that have been developed cooperatively by the State Water Quality agency and the Forest Service, and displayed in the Watershed Conservation Handbook (FSH 2509.25). To help identify the minimum requirements for projects that could degrade water quality, the effectiveness of state and local BMPs (best management practices) will be identified." In addition, "Soil productivity will be maintained and sediment will be minimized by applying soil and water conservation practices." A statement regarding herbicide in the Forest Plan is, "Use of

chemicals within the riparian area will be minimized to the extent feasible, and will be coordinated with wildlife, watershed, and fisheries personnel, and a certified pesticide applicator."

Surface water is classified by the Montana Department of Environmental Quality (DEQ) (Administrative Rules of Montana [ARM] 17.30.607 & 610).

The beneficial uses of surface water in the Helena NF (except McClellan, Tenmile, and Prickly Pear Creeks) are drinking; culinary and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, furbearers; and agricultural and industrial water supply (ARM 17.30.623). Water in McClellan Creek (Elkhorn Landscape) and Tenmile Creek (Upper Missouri River Landscape) is to be maintained suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities (ARM 17.30.622). Water in Prickly Pear Creek (Upper Missouri River Landscape), which is impaired, has a goal of fully supporting beneficial uses after implementation of measures to improve water quality (ARM 17.30.628). Ephemeral streams and seasonal lakes/ponds are to be maintained suitable for agricultural purposes, secondary contact recreation, and wildlife (ARM 17.30.652 & 654).

Applicable standards for streams and rivers (except McClellan, Tenmile, and Prickly Pear Creeks) include: maximum allowable increase above naturally occurring turbidity of five nephelometric turbidity units (NTU), and no increases are allowed above naturally occurring concentrations of sediment or suspended sediment, settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife (ARM 17.30.623).

Specific prohibitions for pesticide use in Montana are described in ARM 17.30.637(8): Application of pesticides in or adjacent to state surface waters must be in compliance with the labeled direction, and in accordance with provisions of the Montana Pesticides Act (Title 80, chapter 8, Montana Code Annotated) and the Federal Environmental Pesticides Control Act (7 USC 136, et seq., [Supp. 1973] as amended). Excess pesticides and pesticide containers must not be disposed of in a manner or in a location where they are likely to pollute state waters.

In Montana, numeric water quality standards are specified in Circular WQB-7, Montana Numeric Water Quality Standards (Montana DEQ 2002a) as human health and/or aquatic life criteria (also refer to ARM 17.30. subchapter 6). **Table 3-1** shows Montana's human health water quality standards for herbicides that are proposed for use on the Forest. No aquatic life standards have been established for these herbicides. Montana also has a "nondegradation" policy with associated rules (ARM 17.30.701-717; Montana Code Annotated [MCA] 75-5-301,303,306) that are intended to protect pristine surface water and groundwater.

Portions of the Federal Clean Water Act (CWA) also direct watershed management activities. Section 303(d) of the CWA directs states to list water quality impaired streams and develop total maximum daily loads (TMDLs) for the affected stream segments. Several streams and rivers in the Helena NF are on one or more of Montana's 303(d) lists of impaired water bodies. Section 319 of the CWA directs states to develop programs to control non-point source pollution. There are Section 319 projects currently underway in the Helena NF for the Blackfoot River headwaters area and for Deep Creek.

TABLE 3-1
Montana's Water Quality Standards for Herbicides

Herbicide	Category	Human Health Standard micrograms per liter (µg/l)	
		Groundwater	Surface Water
Chlorsulfuron	Toxin	1,750	1,750
Clopyralid	Toxin	3,500	3,500
Dicamba	Toxin	210	210
2,4-Dichlorophenoxyacetic Acid (2,4-D)	Toxin	70	70
Glyphosate	Toxin	700	700
Hexazinone	Toxin	400	400
Imazapyr	Carcinogen	21,000	21,000
Imazapic*	NA	NA	NA
Metsulfuron Methyl	Toxin	1,750	1,750
Picloram	Toxin	500	500
Sulfometuron Methyl	Toxin	1,750	1,750
Triclopyr	Toxin	350	350

* No standard included.

Source: Montana DEQ 2002a.

ANALYSIS AREA

Watershed characteristics are described within hydrologic unit code (HUC) locations. The Project area is divided into four landscapes (**Figure 1-1**) that generally coincide with separate mountain regions: Belts/Dry Range, Elkhorn, Continental Divide, and Blackfoot. The four landscape areas are located within the following major watersheds at the 4th HUC level: Upper Missouri River, Smith River, Upper Clark Fork River, Boulder River, and Blackfoot River. Watersheds are generally discussed at the 6th HUC level, which is a further division of the 4th HUC level into smaller watersheds. A hydrologic unit is defined as an area of land upstream from a specific point on a stream (i.e., mouth) that defines a hydrologic boundary and includes all of the source areas that could contribute surface water runoff directly and indirectly to the designated outlet point (Natural Resources Conservation Service 1995).

All 149 6th HUC watersheds for the Helena NF are considered. The four Landscape Areas have the following number of 6th HUC watersheds: Belts/Dry Range Landscape = 59 watersheds; Elkhorns Landscape = 17 watersheds; Continental Divide Landscape = 32 watersheds; and Blackfoot Landscape = 41 watersheds.

For purposes of describing general watershed characteristics, nine of the 149 6th HUC watersheds in the project area will be used to represent the various geo-climatic conditions throughout the potential treatment areas. Proposed weed treatments would occur in 105 watersheds (**Figures 3-1** through **3-4**), including the nine representative drainages. The nine 6th HUC watersheds selected by the Helena NF as representative of project area conditions are listed below. The physical settings within these nine watersheds are displayed in **Table 3-2**.

- **Belts/Dry Range Landscape**

  Avalanche Creek – Upper Missouri River Basin

  Magpie Creek – Upper Missouri River Basin

  White Gulch – Upper Missouri River Basin

- **Elkhorn Landscape**

  McClellan Creek – Upper Missouri River Basin

- **Blackfoot Landscape**

  Copper Creek – Blackfoot River Basin

  Nevada Creek – Blackfoot River Basin

- **Continental Divide Landscape**

  Ophir Creek – Upper Clark Fork Basin

Spotted Dog Creek – Upper Clark Fork Basin

Telegraph Creek – Upper Clark Fork Basin

ANALYSIS METHODS

Information for watersheds on the Helena NF was obtained from state and Federal agencies, including Montana Department of Environmental Quality (DEQ), Montana Natural Resource Information System (NRIS), Helena NF, U.S. Environmental Protection Agency (USEPA), and U.S. Geological Survey (USGS).

Drainage areas were determined using geographic information systems (GIS) methods. Flow characteristics of streams were obtained from a database maintained by the Helena NF. A few streams have actual flow measurements however, most flow information, including mean monthly flow and peak runoff values for storm events, were calculated using regression equations developed by USGS for ungaged sites.

The analysis uses stream flow rates for two time periods – spring high flow (June) and fall low flow (September) – to provide realistic dilution factors for herbicide runoff in the primary stream channels of each watershed. These two time periods approximate each end of the general season of herbicide application in the Helena NF. For June, the flood magnitude for a two-year recurrence interval (Q_2) was used to simulate dilution of herbicide in each stream during that time of year. For September, the mean monthly streamflow exceeded 20 percent of the years ($Q_{.20}$) was used to simulate lower flow conditions during that time of year. These flows were then used as input values to model resultant herbicide concentrations after mixing and diluting in the streams for each watershed (see Aquatic Resources Report in the project file for results of these calculations).

Sediment impacts are discussed qualitatively, as are point-source impacts from herbicide leaks and spills, and impacts on surface water and groundwater, because of attenuation and degradation mechanisms for herbicide in the

TABLE 3-2
Physical Setting of Representative Watersheds

Watershed/ Stream	Receiving Water for Stream	Geographic Area	Dominant Geology
Belts/Dry Range Landscape			
Avalanche Creek	Canyon Ferry Reservoir & Missouri River	S-facing basin on S-side of Big Belt Mountains	Metasedimentary rock with limestone; unburned
Magpie Creek	Canyon Ferry Reservoir & Missouri River	S-facing basin on S-side of Big Belt Mountains	Metasedimentary rock with limestone; burned
White Gulch	Canyon Ferry Reservoir & Missouri River	S-facing basin on S-side of Big Belt Mountains	Metasedimentary rock; thinly bedded; unburned
Elkhorn Landscape			
McClellan Creek	Prickly Pear Creek	N-facing basin on N-side of Elkhorn Mountains	Granitic rock
Continental Divide Landscape			
Ophir Creek	Little Blackfoot River	S-facing basin on W-side of Continental Divide	Limestone
Spotted Dog Creek	Little Blackfoot River	N-facing basin on W-side of Continental Divide	Volcanic rock; glaciated and non-glaciated
Telegraph Creek	Little Blackfoot River	N-facing basin on W-side of Continental Divide	Granitic & volcanic rock; glaciated
Blackfoot Landscape			
Copper Creek	Landers Fork of Blackfoot River	SE-facing basin south of Scapegoat Wilderness	Metasedimentary rock; glaciated
Nevada Creek	Blackfoot River	SW-facing basin on W-side of Continental Divide	Metasedimentary rock

environment, and the lack of water supply wells.

AFFECTED ENVIRONMENT

Watershed Characteristics

The Belts/Dry Range Landscape is located primarily within the Upper Missouri River drainage basin, with a small part in the Smith River drainage basin. The Elkhorn Landscape is also primarily located within the Upper Missouri River basin, with a minor portion in the Boulder River basin. The Continental Divide Landscape is located within the Upper Missouri River and Upper Clark Fork River drainage basins. The Blackfoot Landscape is located primarily in the upper Blackfoot River drainage basin, with a minor part in another part of the Upper Missouri River basin.

Physiography

Average annual precipitation at Helena, Townsend, and Lincoln are 11.3, 10.7, and 18.8 inches, respectively, for the period 1971-2000 (National Weather Service 2002); however, considerably more precipitation (30 to 60+ inches annually) occurs at higher elevations in the surrounding mountains. Highest monthly precipitation typically occurs in May/June, with some higher elevations also receiving high monthly totals in December and January due to snowfall. Information from seven snow monitoring stations (Snowtel) in the Helena NF (Copper Bottom, Nevada Ridge, Frohner Meadow, Rocker Peak, Tizer Basin, Boulder Mountain, and Pickfoot Creek) for a 30-year period shows that average maximum monthly snowpack ranges from 8 to 22 inches water equivalent, occurring in the months of April and May (MDNRC 2003). These stations range in elevation from 5,200 to 8,000 feet.

Drainage areas (total and Helena NF area) for the nine representative watersheds are presented in **Table 3-3**. Approximately 3,000 miles of streams are present in the Helena NF. The watersheds are snowmelt and rainstorm runoff dominated. Precipitation in the form of snow causes peak flows in the spring during snowmelt runoff. Streamflows increase as snowmelt occurs, usually beginning in April or May, and reach peak levels typically in May or June, depending on weather conditions and temperature fluctuations. After the peak, flows decrease through July and August. In September and October, when air temperatures decrease, streamflows increase slightly, after which they remain fairly consistent until spring runoff. Occasional brief intense storm events in spring/summer can cause sudden increases in runoff, sometimes causing flooding.

Many drainages are ephemeral or intermittent – flowing primarily in response to storms and/or snowmelt runoff. **Table 3-4** shows stream miles (intermittent and perennial) for the nine representative watersheds. Widespread forest

TABLE 3-3
Areas for Representative Watersheds

Watershed/ Stream	Total Drainage Acres	Helena NF Drainage Acres
Belts/Dry Range Landscape		
Avalanche Creek	25,018	22,456
Magpie Creek	16,249	15,600
White Gulch	20,450	12,436
Elkhorn Landscape		
McClellan Creek	23,144	14,096
Continental Divide Landscape		
Ophir Creek	16,786	5,748
Spotted Dog Creek	8,801	5,094
Telegraph Creek	12,205	10,254
Blackfoot Landscape		
Copper Creek	30,309	25,165
Nevada Creek	25,180	17,852

TABLE 3-4
Stream Distance for Representative Watersheds

Watershed	Total Stream Miles[1]	Intermittent Stream Miles[1]	Perennial Stream Miles[1]	Stream Density[2]
Belts/Dry Range Landscape				
Avalanche Creek	75.9	63.2	12.7	2.19
Magpie Creek	60.3	47.9	12.4	2.51
White Gulch	40.2	30.6	9.6	2.16
Elkhorn Landscape				
McClellan Creek	26.1	5.5	20.6	1.32
Continental Divide Landscape				
Ophir Creek	6.3	3.6	2.7	0.85
Spotted Dog Creek	8.6	0.0	8.6	1.26
Telegraph Creek	21.0	8.6	12.4	1.68
Blackfoot Landscape				
Copper Creek	68.8	32.2	36.6	1.77
Nevada Creek	40.7	22.3	18.4	1.83

Notes:

1 All distances are based on Helena NF land only.

2 Stream Density = Total Stream Miles divided by watershed area (in square miles).

Source: USFS 2002.

fires that occurred during the summer of 2000 have changed the natural flow pattern (i.e., greater runoff and sedimentation) in some areas that had significant burning (see "Effects from Fires" section below).

At lower elevations, where valley bottoms widen and gradients become less steep, the streams generally are less confined and have well-developed floodplains. Wider, valley bottom streams typically are stable because they can dissipate energy on the floodplain. These streams usually carry sediment during high flow and deposit it during lower flow periods. The finer-grained alluvial deposits on bed and banks of wider valley bottom streams can be easily eroded each year during high flow. In these stream systems, stream bank vegetation is important in maintenance of channel stability. Depending on condition of stream banks, bank erosion and channel migration may occur during periods of high flow.

Effects From Fires

The Cave Gulch fire in 2000 burned approximately 29,300 acres across portions of four watersheds in the central part of the Belts/Dry Range Landscape (USFS 2000a). The primary watershed affected was Magpie Creek. The Maudlow-Toston Fire in 2000 burned approximately 10,678 acres of National Forest System land across portions of several watersheds in the southern part of the Belts/Dry Range Landscape, including Sulphur Bar, Cedar Bar, Blacktail, Black Butte, Deep, and Dry Creeks (USFS 2001c). Fires burned with low to high severity over 10 to 90 percent of these watersheds.

Watershed and stream channel conditions are adjusting to changes in water and sediment yield resulting from the fires. Wildfire removes large amounts of forest canopy, resulting in increasing stream temperatures, runoff response to precipitation, and erosion. As an example, the Maudlow-Toston fire burned about 2,900 acres (37 percent) of the Sulphur Bar Creek watershed. Based on predictions of pre-fire sediment production, the fire increased sediment yield by over 1,000 percent, with a total sediment production rate of 1,650 tons/year (USFS 2001c). Estimated increase in water yield for this watershed after the 2000 fire is about seven percent (USFS 2001c).

Surface Water Quality

Generally, surface water quality is good. Sediment (suspended and bedload) is the water quality parameter that is often most affected by land management. Activities that disturb vegetation or soil surface have potential to produce sediment from increased erosion. Sediment in streams and rivers is naturally a highly variable parameter, with higher loads usually in the spring runoff period. Roads, logging, and grazing activities are sources of increased sediment and nutrients in streams. Some areas of historic mining disturbance have resulted in increased metal and sediment loads to streams.

Water samples were collected from several streams in the project area (USFS 2002a). Of the nine representative watersheds, water quality data are available for Avalanche Creek (1984-93), upper and lower McClellan Creek (1979-93), upper and lower Telegraph Creek (1989-95), and Copper Creek (1988-98). Parameters typically measured for the surface water samples include: water temperature, pH, specific conductance, suspended sediment, turbidity, bedload, alkalinity, and hardness. These data show the following general quality conditions: neutral pH (6.0 – 8.5); specific conductance less than 500 micromhos/ centimeter; alkalinity less than 250 milligrams/ liter; and hardness less than 300 milligrams/liter. Water temperature, suspended sediment, and turbidity vary considerably depending on the season and streamflow. A check of water quality records from state and federal agencies discovered no data exists for pesticides/ herbicides in surface water in the project area.

Table 3-5 lists representative water bodies or stream segments on one or more of Montana's 303(d) lists (water quality limited waterbodies). For the nine representative watersheds, six have been on the 303(d) lists:

TABLE 3-5
Impaired Water Bodies for Representative Watersheds

Stream Segment & Years on 303(d) List	Segment Length (miles)	Probable Impairment Causes[1]	Probable Impairment Sources[2]
Belts/Dry Range Landscape			
Avalanche Creek (1996, 1998, 2000, 2002)	16.5	1, 3	1, 9, 11, 17
Magpie Creek (1996, 1998)	12.7	1, 2	10, 11
White Gulch (1996, 1998)	12	1, 2	1, 19, 20
Elkhorn Landscape			
None			
Continental Divide Landscape			
Spotted Dog Creek (1996, 1998, 2000, 2002)	10	1	1, 6
Telegraph Creek (1996, 1998, 2000, 2002)	4.9	2, 8, 10, 12	12, 14, 18, 19
	2.4	9, 10, 11	18, 19
Blackfoot Landscape			
Nevada Creek (1996, 1998, 2000, 2002)	18.3	2, 6, 7, 10, 13	1, 6, 10, 19, 20
	24.9	1, 2, 7, 8	1, 4, 13

Notes:

[1] Causes: 1 = flow alteration; 2 = other habitat alterations; 3 = dewatering; 4 = thermal modifications; 5 = phosphorus; 6 = nitrogen; 7 = nutrients; 8 = siltation; 9 = mercury; 10 = metals; 11 = lead; 12 = riparian degradation; 13 = suspended solids.

[2] Sources: 1 = agriculture; 2 = construction; 3 = land development; 4 = habitat modification (other than hydromodification); 5 = removal of riparian vegetation; 6 = grazing-related; 7 = pasture grazing – riparian construction; 8 = highway/road/bridge construction; 9 = irrigated crop production; 10 = range grazing – riparian; 11 = crop-related; 12 = logging road construction & maintenance; 13 = bank or shoreline modification & destabilization; 14 = silviculture; 15 = intensive animal feeding operation; 16 = confined animal feeding operation (NPS); 17 = hydromodification; 18 = abandoned mining; 19 = resource extraction; 20 = placer mining; 21 = channelization.

Source: Montana DEQ 2002b.

- **Belts/Dry Range Landscape**

  Avalanche Creek – 16.5 miles impaired

  Magpie Creek – 12.7 miles impaired

  White Gulch – 12 miles impaired

- **Blackfoot Landscape**

  Nevada Creek – 18.3 + 24.9 miles impaired

- **Continental Divide Landscape**

  Spotted Dog Creek – 10 miles impaired

  Telegraph Creek – 4.9 + 2.4 miles impaired.

WILDLIFE

REGULATORY FRAMEWORK

Regulations on wildlife resources are outlined in 36 CFR 219.19 and 219.27. These regulations state that management indicator species (MIS) will be identified by each national forest in order to adequately maintain distributed habitat for these species and to evaluate the impacts of management activities on these species. Forest Service Manual (FSM) 2670.31 (6) directs "identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species."

Forest Service Manual (FSM) 2670 at 2670.22 - Sensitive Species, provides the following direction for sensitive wildlife:

- Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
- Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
- Develop and implement management objectives for populations and/or habitat of sensitive species.

The Endangered Species Act requires the conservation of threatened and endangered species, and prohibits carrying out or authorizing any action that may jeopardize a listed species or its critical habitat.

The National Forest Management Act (NFMA) provides for balanced consideration of all resources. It requires the Forest Service to plan for diversity of plant and animal communities. Under its regulations, the Forest Service is to maintain viable populations of existing and desired species, and to maintain and improve habitat of management indicator species.

The Helena National Forest Plan provides standards and guidelines for management of wildlife species and habitats on the Forest. The Forest Plan also identifies Management Indicator Species (MIS).

ANALYSIS AREA

The analysis area for wildlife includes species-specific habitats in proximity to proposed treatment areas. These habitats have the potential to be directly or indirectly impacted by herbicide application and disturbances associated with the proposed weed treatment methods.

ANALYSIS METHODS

Published reports in scientific journals were reviewed along with file data from the Helena National Forest, unpublished reports, and personal communications. A detailed discussion of the effects on wildlife of each herbicide proposed is included in the project file (PF-*Wildlife*).

A list of sensitive species that could potentially occur on the Forest was obtained from the list of species compiled by Region 1, Forest Service at http://www.fs.fed.us/r1/wildlife_senspecies.pdf. Information on ecology, distribution, and habitat

affinities for sensitive species was also obtained from the Montana Natural Heritage Database on the Internet at http://nhp.nris.state.mt.us/animal/index.html.

Species known to occur on the forest and species with the potential to occur are identified and discussed. Potential impacts were assessed based on animal habitat affinities and probability that a given habitat would be treated with herbicide to control noxious weed communities.

AFFECTED ENVIRONMENT

MANAGEMENT INDICATOR SPECIES

The Helena NF has identified and monitors populations of several wildlife species in its efforts to manage activities and habitats on the forest. These MIS are discussed below. While classified as a MIS on the Helena NF, goshawks are also listed as Sensitive species. Therefore, goshawks are discussed in the *Threatened, Endangered, Proposed, and Sensitive Species* section of the document.

Marten

Marten are a MIS for large continuous blocks of mature cover. Reviews by Buskirk and Rugerrio (1994) and Clark (1987) indicate that marten are closely associated with mesic late-successional conifer or mixed forests, particularly those with complex structure near the ground. Marten tend to prefer stands with well developed understory consisting of woody debris, abundant shrub and forb vegetation, low branches of living trees, talus fields and squirrel middens (Buskirk and Rugerrio 1994; Clark 1987, Strickland and Douglas 1987). Riparian areas provide important resting and foraging areas, and travel corridors (Clark 1987). Large open areas, clear-cuts, and burned areas tend to be avoided, although marten will use the edges of open areas (Buskirk and Rugerrio 1994; Clark 1987, Strickland and Douglas 1987). Avoidance of clear-cuts and burned areas may persist for as long as 23 years, until regenerated forests provided overhead cover (Clark 1987; Strickland and Douglas 1987). Thus, the likelihood of marten inhabiting burned areas, big game winter ranges, and recently harvested stands proposed for weed treatment is low. The diet of marten consists primarily of voles, mice, and squirrels. Snowshoe hare is the largest usual prey item. However, marten are opportunistic and will feed on a variety of birds and their eggs, reptiles, amphibians, invertebrates, and fruits (e.g., *Vaccinium* spp.) (Buskirk and Rugerrio 1994; Clark 1987).

Across the Forest, marten occur in areas of older, larger spruce and spruce/fir and lodgepole stands in (USFS 1999a; USFS 1995b). Based on habitat modeling conducted by the Helena NF, approximately 247,000 acres of pine marten habitat are estimated to exist on the Forest, with both primary and secondary marten habitat occurring in each of the four landscape areas. Within the Belt Landscape, 259 acres of weed infestation are located in either primary or secondary marten habitat, which represents less than one percent of the 39,646 acres of modeled marten habitat. Within the Divide Landscape, approximately 609 of these mapped weed infestations occur within primary or secondary marten habitat, representing 1.3 percent of modeled marten habitat. The Elkhorn Landscape contains 19 acres (less than one percent) of mapped weed infestation occurring in 22,966 acres of modeled marten habitat. In the Blackfoot Landscape, 839 acres occur within the 93,626 acres of modeled marten habitat, representing less than one percent of marten habitat (PF-*Wildlife)*.

Pileated Woodpecker

Pileated woodpeckers are a MIS for old growth habitat. They inhabit a wide range of habitats from river bottom cottonwood forests to the upper ranges of dry Douglas-fir stands where there is a food source, and dead trees large enough to accommodate a nest cavity. Pileated woodpeckers often feed on ants, other insects, and larvae in dead woody material lying on the ground. They tend to nest in snags greater than 21 inches in diameter with nest cavities usually more than 40 feet above the ground (Bull and Jackson 1995). On the Helena NF, pileated

woodpecker habitat occurs in mature ponderosa pine and Douglas-fir stands, containing large snags, decaying trees, and downed woody debris (USFS 1995b; USFS 1996a; USFS 2003).

Based on habitat modeling conducted by the Helena NF, approximately 68,700 acres of pileated woodpecker habitat are estimated to exist on the Forest, with habitat occurring in each of the four landscape areas. Within the Belt Landscape, 182 acres of weed infestation are located in pileated woodpecker habitat, which represents less than one percent of the 33,100 acres of modeled pileated habitat. Within the Divide Landscape, approximately 213 of these mapped weed infestations occur within pileated woodpecker habitat, representing one and one-half percent of the 14,000 acres of modeled habitat. The Elkhorn Landscape contains 35 acres (less than one percent) of mapped weed infestation occurring in 4,120 acres of modeled pileated habitat. In the Blackfoot Landscape, 400 acres of weed infestation occur within the 17,430 acres of modeled pileated habitat, representing approximately two percent of modeled pileated woodpecker habitat (PF-*Wildlife)*.

Hairy Woodpecker

Hairy Woodpeckers are a MIS for snag dependent species (USFS 2001d). Suitable habitat for this species includes old-growth mesic coniferous and deciduous stands of Douglas-fir, spruce, subalpine fir, ponderosa pine, lodgepole pine, aspen woodland, as well as riparian woodland, and subalpine marsh. Hairy woodpeckers primarily eat insects such as ants and beetles they retrieve from the bark of dead trees, although they also use fruits and seeds in the winter or in times of famine. In a study conducted by Hoffman (1997) in the Yellowstone area hairy woodpeckers were detected in most forest types, including aspen forests and associated wetlands, although they were found more frequently in cut or early post-fire forests than in uncut forests. According to Helena NF annual monitoring data, hairy woodpeckers were located on the Forest in "numerous" locations and in a variety of habitats during 2001(USFS 2002e).

Based on habitat modeling conducted by the Helena NF, approximately 205,500 acres of hairy woodpecker habitat are estimated to exist on the Forest, with habitat occurring in each of the four landscape areas. Within the Belt Landscape, 1,512 acres of weed infestations are located in hairy woodpecker habitat, which represents two and one-half percent of the 62,400 acres of modeled hairy woodpecker habitat. Within the Divide Landscape, 1,133 of mapped weed infestations occur within hairy woodpecker habitat, representing two and one-third percent of the 48,400 acres of modeled habitat. The Elkhorn Landscape contains 137 acres (less than one percent) of mapped weed infestation occurring in 22,140 acres of modeled hairy woodpecker habitat. In the Blackfoot Landscape, 885 acres of weed infestation occur within the 72,600 acres of modeled hairy woodpecker habitat. This represents one and one-fifth percent of modeled habitat (PF-*Wildlife)*.

Elk

Elk are a MIS for summer and winter range and thermal and hiding cover (USFS 1986). Early summer range is mid-to-high elevation grassland, old burns, and meadows interspersed within forests of lodgepole pine, spruce, Douglas-fir, and subalpine fir (USFS 1998a). As summer progresses, elk break into smaller groups and spend more time in higher elevation forested areas. Protection from human disturbance as well as succulent forage are major factors that lure elk to these summer ranges (USDA 2002). Winter ranges are found at lower elevations. Winter ranges typically contain relatively low elevation grasslands and shrublands, usually on south to southwest facing slopes. Adjacent north/northeast-facing slopes often contain forested stands, where they find security and thermal cover (USDA 2002). Adequate winter range is considered crucial for elk survival, and loss of winter range to development, grazing, agriculture, or other intensive land use potentially threatens elk populations in certain areas (USDA 2002). Elk

are found throughout the Helena NF in all landscape areas (USFS 1986; USFS 1995b; USFS 1996a; USFS 1997a; USFS 199a).

Weed infestations can and have decreased the total amount of quality forage available on winter ranges and on transitional ranges on and near the Forest during the past few decades. In comparing the distribution of winter range in all landscape areas with areas proposed for weed treatment, approximately 80 percent of mapped weed acres lie within mapped winter range in the Belt, Blackfoot, and Elkhorn landscapes; and approximately 50 percent lie within mapped winter range in the Divide Landscape (PF-*Wildlife*).

Mule Deer

Mule deer are a MIS for "secure" winter range. Mule deer are found in a variety of habitats, though they are generally associated with relatively open habitats. Dense stands of timber are used primarily for hiding and thermal cover. Mule deer are migratory, summering at higher elevations and wintering at low elevations, where there winter range often coincides with that of elk. Individual deer may spend all year at lower elevations. As with elk winter range, it is likely that some mule deer ranges are currently infested with noxious weeds.

Montana's mule deer populations are currently meeting or exceeding objectives in many areas just 4-5 years since the lows experienced during the period 1995-1997. Although populations are not at the highs recorded in the early 1990s, populations are rebounding toward previous levels rather rapidly. Winter weather, summer forage conditions, and hunting season harvest typically play a role in regulating the dynamic nature of mule deer populations in Montana, including on the Helena NF (Muledeernet 2003).

Bighorn Sheep

Bighorn sheep are a MIS for big game. Bighorn sheep habitat is open grasslands usually on steep terrain in mountainous country, often interspersed with or adjacent to cliffs or rocky outcrops. For the most part, bighorn sheep on the Helena NF are relatively sedentary. Though their summer range may expand somewhat, many bighorn sheep incorporate the winter range within their summer range. Lambing areas are usually rocky outcrops or cliffs found within or near the winter ranges. In some cases, summer ranges may be at high elevations and somewhat distant from the winter range, particularly for adult rams. Bighorn sheep winter ranges are often part of elk winter ranges, and based on the mapped distribution of proposed weed treatment areas associated with winter range, it is likely that some winter ranges used by bighorn sheep currently contain weed populations.

THREATENED, ENDANGERED, PROPOSED, AND SENSITIVE SPECIES

Several wildlife species that are listed as threatened, endangered, or are proposed for listing, are present on the Helena NF. In addition, several species listed by the Forest Service as sensitive are also present. Many of these “special status” species also serve as MIS. The U. S. Fish and Wildlife Service provided a list of federally listed wildlife species with potential to occur on the Helena NF (USFWS 2003). **Table 3-6** lists those special status wildlife species.

Grizzly Bear -Threatened

Grizzly bears are a MIS for habitat effectiveness and open road density. Grizzly bears are wide-ranging and can be found in a variety of habitats from dense forests to subalpine meadows and arctic tundra. Typically, they inhabit rugged mountains and forests with large river valleys undisturbed by human encroachment. Grizzlies require large blocks of lightly roaded country with a mix of productive habitats in order to establish viable populations (USFS 1998a). Across most of the Helena NF, grizzlies are considered to be transient due to fragmentation of suitable habitat by roads and human activity, although no formal research has been

TABLE 3-6
Helena National Forest Special Status Wildlife Species

Species	Scientific Name	Status on Forest	Potential for Occurrence on Treatment Areas[1]	Habitat
Grizzly Bear Threatened	*Ursus arctos horribilis*	Resident/ Transient	Potential within Blackfoot and Divide landscapes	Alpine/subalpine coniferous Forest
Gray Wolf Threatened[2]	*Canis lupus*	Resident/ Transient	Potential within Divide and Blackfoot landscapes	Variable
Bald Eagle	*Haliaeetus leucocephalus*	Resident / Migrant	Unlikely	Forest near major waterways
Canada Lynx	*Lynx canadensis*	Resident	Low potential in all landscape areas	
Black-backed Woodpecker	*Picoides arcticus*	Documented	Low potential in all landscape areas	Douglas-fir, lodgepole pine, & subalpine fir forests with lots of snags, Recent burns
Boreal Toad	*Bufo boreas*	Documented	Potential	Adults occur in a wide variety of uplands. Breed in shallow ponds, lakes or slow moving streams.
Fisher	*Martes pennanti*	Documented	Unlikely	Mesic forested habitats
Flammulated Owl	*Otus flammeolus*	Documented	Potential in low to moderate severity burns, edges of ponderosa pine shrub/grass stands.	Old-growth ponderosa pine, Douglas-fir
Leopard Frog	*Rana pipiens*	Documented Historically near Forest	Potential in low elevation wetland/riparian areas	Marshes, wet meadows, riparian areas, and moist open meadows
Northern Bog Lemming	*Synaptomys borealis*	Suspected	Unlikely	True bogs, wet alpine & sub-alpine meadows
Peregrine Falcon	*Falco peregrinus*	Documented	Unlikely	Open habitats near cliffs and mountains
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Documented	Unlikely	Caves, mines, snags for roosts
Wolverine	*Gulo gulo*	Documented	Unlikely	Far ranging omnivorous habitat generalist
Northern Goshawk	*Accipiter gentilis*	Documented	Low potential in all landscapes.	Mature to old-growth forest

Notes:

1. Potential for Occurrence on Treatment Areas based on habitat associations and general habitats proposed for treatments.
2. Gray wolves west of Interstate Highway 15 are listed as Threatened. East of Interstate Highway 15, they are listed as Non-Essential Experimental.

undertaken to determine the suitability of habitat outside of the grizzly recovery zone.

Across the Forest, approximately 200,000 acres of grizzly bear habitat are currently mapped, mostly north of Montana Highway 200 (USFS 1986). Grizzly bear use of the Forest is limited primarily to that portion north of Montana Highway 200, where bears make use of denning areas, spring habitat, and other isolated resource areas south of the Scapegoat Wilderness. The Scapegoat Wilderness is adjacent to the Bob Marshall Wilderness complex, which is an occupied core habitat block and part of the historic migration corridor connecting the Canadian Rocky Mountains to the greater Yellowstone ecosystem.

Grizzlies eat everything from grasses, sedges, roots, and berries to insects, fish, carrion, and small and large mammals. Grizzlies eat large

amounts in summer and fall to build up enough fat reserves to survive the denning period.

Gray Wolf -Threatened/Non-Essential Experimental Population

The gray wolf is currently listed as threatened in the Blackfoot and Continental Divide Landscape Areas and as a Non-essential Experimental Population in the Elkhorn and Belts/Dry Range Landscape Areas.

Gray wolves are nocturnal predatory carnivores. They tend to occupy coniferous forests as well as mixed grasslands, tundra, and shrublands. In general, gray wolves do not typically favor any one habitat more than another. Thus, as long as prey and secure denning and rendezvous sites are available, wolves are not habitat-limited (USFS 1998a).

In recent years, gray wolves have been increasingly observed throughout western Montana. The Bob Marshall Wilderness complex immediately north of the Scapegoat Wilderness is the core of a designated wolf recovery area that extends south into the Blackfoot LA. Based on the availability of prey and habitat on the Helena NF, and the numerous recorded sightings of wolves within the past five years, it is likely that wolves are dispersing southward through the Blackfoot and Continental Divide LAs along the Continental Divide corridor from the growing northern populations (USFS 1998a).

The predominant prey for gray wolves are ungulate populations including elk, deer, and moose. In times of famine, alternative prey, such as beaver, snowshoe hare, rodents, and carrion may be taken. Occasionally, gray wolves will kill mountain lions and sometimes seize ungulate prey killed by lions.

The Helena NF had three established packs up until February 2003, the Great Divide Pack, Castle Rock, and Halfway Pack ranging throughout the Continental Divide LA. In February 2003, the Castle and Halfway Packs were eliminated due to excessive depredation. Currently, the Great Divide Pack is the only known wolf pack on the Helena NF (USFWS 2003). No confirmed packs are known to range in the Belts/Dry Range or Elkhorns LAs (USFWS 2003).

Bald Eagle -Threatened

Bald eagles are a MIS for river and lake system suitability. Bald eagle nesting and roosting habitat typically includes mature and over-mature mixed conifer, ponderosa pine, and cottonwood stands near large rivers or lakes. Bald eagles are common winter residents in the Missouri River valley and also pass through the Helena NF during migration. There are two active nests near the Blackfoot and Continental Divide LAs, one west of Lincoln and one south of the Nevada Creek Reservoir; however, neither of these are on Forest System land (USFS 1998a). There are three known bald eagle nests on the Forest, all of which are in the Belts/Dry Range LA. The nests occur at Cochran Gulch, Fields Gulch, and downstream from Hauser Dam (PF-*Wildlife*).

The presence of nests indicates there is an adequate summer forage base to support nesting pairs and young. Eagle activity on most areas of the Forest is probably limited to overflights, rest stops at scattered perch sites, and foraging on carrion – particularly in spring and fall (USFS 1998a). In areas where substantial portions of the major rivers become frozen in winter, the bald eagles leave the area in search of more suitable habitat.

Canada Lynx -Threatened

Lynx often inhabit forested benches, plateaus, valleys, and gently rolling ridgetops in rugged mountain ranges. Primary lynx habitat in the Rocky Mountains includes lodgepole pine, subalpine fir, and Englemann spruce forests. Secondary vegetation interspersed throughout high elevation forests, including cool, moist Douglas-fir, grand fir, western larch, and aspen, may also contribute to lynx habitat. They prefer to forage in areas that support their primary prey, the snowshoe hare. Landscapes with varying age classes that support dense understory vegetation provide good foraging habitat. Moist Douglas-fir types are considered

secondary habitat that can provide red squirrels, an alternate prey species for lynx during periods when snowshoe hare densities are low. Dry forest types (ponderosa pine, Douglas-fir, and climax lodgepole pine) do not typically provide lynx habitat. Lynx are notoriously elusive and therefore are extremely hard to survey. The most recent report of a lynx comes from the Copper Creek drainage within the Blackfoot River Valley in November of 1998 (USFS 1998a).

Fire can modify lynx habitat in a variety of ways, depending on its location, size, and severity. Large, stand-replacing fires can result in habitat loss if they occur in key areas such as travel corridors or within denning habitat. Fire can also improve lynx habitat when large expanses of even-aged forest are broken up to create a mosaic of age classes, resulting in improved snowshoe hare habitat and improved lynx foraging habitat, as lynx are known to hunt along edges of mature forest within burned forest matrices (USFS 2000b). Based on modeled and mapped lynx habitat on the Helena NF and locations proposed for weed treatment, recent burned areas proposed for treatment (e.g., Cave Gulch) did not appreciably impact lynx habitat (PF-*Wildlife*).

Based on habitat modeling conducted by the Helena NF, approximately 433,770 acres of lynx habitat is estimated to exist on the Forest, with habitat occurring in each of the four landscape areas. Within the Belt Landscape, 322 acres (less than one percent) of mapped weed infestation occurs within approximately 62,000 acres of modeled lynx habitat. Within the Divide Landscape, 1,076 acres of mapped weed infestations occur within approximately 105,000 acres of modeled lynx habitat (one percent). The Elkhorn Landscape contains 221 acres of mapped weed infestations occurring within 23,000 acres of modeled lynx habitat (one percent). In the Blackfoot Landscape, 2,062 acres of mapped wed infestation lie within 220,500 acres of modeled lynx habitat (less than one percent) (PF-*Wildlife*).

Black-backed Woodpecker - Sensitive

Black-backed woodpeckers are associated with mid- to high-elevation coniferous forests in the northern Rocky Mountains, concentrated in areas of wood-boring beetle outbreaks associated with fires (USFS 2001d). Black-backed woodpeckers prefer fire-killed Douglas-fir, western larch, and ponderosa pine; lodgepole pine is a secondary species. For black-backed woodpeckers, the presence of dead and dying trees in open feeding areas (typically, recent burns) and forested communities is a prerequisite to higher population levels (USFS 1998a).

Black-backed woodpeckers excavate nest cavities in live or dead trees with deteriorating heartwood in close proximity to foraging areas. They nest 3 to 16 feet above the ground, in trees larger than 12 inches in diameter. Clusters of snags can provide both nesting and foraging habitat.

Based on habitat modeling conducted by the Helena NF, approximately 37,000 acres of black-backed woodpecker habitat are estimated to exist on the Forest, with modeled habitat only occurring in the Belt Landscape. Within the Belt Landscape, 1,430 acres of weed infestation are located in black-backed woodpecker habitat, which represents approximately four percent of the 37,000 acres of modeled habitat. The Divide, Elkhorn, and the Blackfoot landscapes contain no modeled black-backed woodpecker habitat, though based on the species' habitat needs, they likely occur throughout the Forest. This comparison of mapped habitat with known weed infestation areas for the Belt Landscape indicates that a relatively low percentage of black-backed woodpecker habitat has potential for weed treatment activities, with the majority of these areas being associated with recent burns.

Boreal Toad - Sensitive

Boreal toads are found in habitats from valley bottoms to high elevations. They breed in lakes, ponds, and slow streams with a preference for shallow areas with mud bottoms.

Tadpoles are seen in ponds during the day. During the breeding season, adults can also be found in water; however, movement to nearby upland habitats after the breeding season is quite common. While boreal toads are more common in Montana west of the Continental Divide, voucher specimens from Lewis and Clark County have been collected (Maxell *et al.* 2003) their occurrence on the Helena NF has been documented within the Divide Landscape Area, and their occurrence elsewhere, although likely scattered, is suspected (B. Costain pers. comm.).

Fisher - Sensitive

Characteristics of marten and fisher habitat are similar. Fisher habitat primarily consists of mature and old-growth grand fir, cedar, and hemlock stands below 6,300 feet in elevation. They usually inhabit forested habitat within 1,000 feet of riparian areas which they use extensively for foraging, resting, and as travel corridors. Moderate and high severity burn areas are not considered habitat for fishers while low severity burn areas may still offer suitable continuous cover. Typically, fishers prefer forests with continuous cover, although some use of shrubby clearings can occur during certain seasons. Secondary fisher habitat consists of lower elevation spruce, subalpine fir, and mesic Douglas-fir forest that meets the physical attributes of primary habitat (USFS 1998a). Because grand fir, hemlock, and cedar forest types have a low occurrence on the Helena NF, the majority of fisher habitat is probably secondary habitat. The quality of some of the secondary habitat approaches that of primary habitat, although the grand fir, hemlock, and cedar forest types generally are not present (USFS 1998a).

Flammulated Owl - Sensitive

Flammulated owls are dependent on mature to old-growth ponderosa pine/Douglas-fir forests at low elevations in the Rocky Mountains. They are found in mature, open, park-like stands with a well-developed understory of grasses, shrubs, and small trees. Flammulated owls prey primarily on night flying moths in the early spring and on crickets, grasshoppers, moths, beetles, and bugs in the summer.

Flammulated owls spend winters in Mexico and Central America, returning to breed in western Montana around the beginning of May when nights are warm enough to support the nocturnal flying insects.

Currently, most of the potential flammulated owl habitat on the Forest consist of mature to old-growth pine/fir stands which have a dense understory of seedling, sapling, pole, and mature conifers and little grass/shrub understory (USFS 1997a). The only flammulated owl observed on the Helena NF in recent years was found in an aspen stand east of the Continental Divide south of Helena. A flammulated owl was heard on a bird point-count transect in the Nevada Creek drainage near the Nevada/Dalton project area in 1998, but the precise location and character of its nesting stand is unknown (USFS 1998a).

Based on habitat modeling conducted by the Helena NF, approximately 30,150 acres of flammulated owl habitat are estimated to exist on the Forest, with habitat occurring in each of the four landscape areas. Within the Belt Landscape, no mapped weed infestation occurs within approximately 10,800 acres of modeled flammulated owl habitat. Within the Divide Landscape, no mapped weed infestations occur within approximately 6,800 acres of modeled lynx habitat (one percent). The Elkhorn Landscape contains no mapped weed infestations within 2,300 acres of modeled flammulated owl habitat. In the Blackfoot Landscape, no mapped weed infestations lie within the 10,180 acres of modeled flammulated owl habitat (PF-*Wildlife*).

Leopard Frog - Sensitive

Northern leopard frogs are found in or near non-forest habitats, inhabiting dense sedge, wet-meadow, or cattail marsh. Northern leopard frogs are known to occur primarily on low elevation marshes and wetlands on valley bottoms. Breeding takes place in lakes and ponds (temporary and permanent), springs, and

occasionally backwaters or beaver ponds in streams. Historically, the northern leopard frog was widespread in Montana, but it now appears to have been extirpated throughout much of the western part of the state (Reichel and Flath 1995). Bullfrogs are a primary predator of northern leopard frogs, and after introductions of bullfrogs were made, northern leopard frog populations began to decrease.

Ideal habitat on the Helena NF that could support leopard frogs would be any low elevation, un-forested marshes, wet meadows, dense sedge, or valley bottom wetlands. Ideally, these sites would not support populations of bullfrogs. One museum specimen, one pre-1990 observation, and one post-1990 observation all near Canyon Ferry Reservoir are the only documented occurrences of the species in the vicinity of the Helena NF (Maxell *et al*. 2003). Although not documented as occurring on the Helena NF, the species is suspected to occur there.

Northern Bog Lemming - Sensitive

Northern bog lemmings are found in highest abundance in sphagnum bogs or sedge mats. Bogs develop on un-drained or poorly drained sites where chemical conditions hinder decomposition of organic matter (Foresman 2001). These wetlands are characterized by standing water interspersed with vegetated ridges or floating mats of vegetation on organic soils. Many bog plants and their associated animals, e.g., bog lemmings, are sensitive and specialized for existence on these distinctive habitats. Some bog lemmings do occur in wet areas along streams. Bog Lemmings are found where the stream gradient is relatively gentle and wetlands extend laterally from the stream. Potential habitat exists only along streams, and then only if gradients are gentle and wetlands approximating bogs are present.

Across the Helena NF, only marginal fragments of suitable habitat for the bog lemming are present (USFS 1998a) and although not documented, they are suspected to occur (B. Costain Pers. Comm.).

Peregrine Falcon - Sensitive

Peregrine falcon eyries are found primarily on cliffs near water. They hunt for waterfowl and other birds, flying high above their intended prey, then swooping or diving to strike their prey in mid-air, killing it with a sharp blow.

Peregrine falcons have been reintroduced into several areas in southwest Montana since 1989. As of 2002, there are at least three known wild eyries on the Helena NF (PF-Wildlife). Although eyries are not established across the entire Forest, as breeding pairs become established and disperse into new areas, many locations have the potential to provide nesting and foraging habitat (USFS 1997a).

Townsend's Big-eared Bat - Sensitive

In western Montana, big-eared bats are most closely associated with caves, cliffs, and rock outcrops of sedimentary origin (often limestone). They also make use of abandoned mine adits, as well as hollowed trees and snags in old-growth forests. Typically, they roost in caves, rock outcrops, lava tubes, buildings or mine shafts. Townsend's big-eared bats are insectivorous, feeding primarily on small moths typically higher in the forest canopy than most bats, although they occasionally glean beetles, flies, and insects from leaves. Big-eared bats forage more often along forest edges. Other notable feeding sites are over wet meadows and other areas of water. These are areas that can supply suitable insect prey in some abundance (USFS 1998a; Foresman 2001). On the Helena NF, Townsend's big-eared bats are considered rare.

Wolverine - Sensitive

Wolverines are solitary animals, ranging widely over a variety of habitats. Within large roadless areas, wolverine use appears to be concentrated in medium to scattered mature timber and areas around natural openings such as cliffs, slides, basins, and meadows.

Wolverine home ranges can be as large 150 square miles in Montana. Wolverines feed primarily on rodents and carrion, although they

are opportunists, and will consume berries, insects, fish, birds, and eggs when available; however, they seldom eat vegetation. Large mammal carrion is important at all times of year, but it seems to be particularly important in the winter (USFS 1998a).

Wolverines have been observed along the Continental Divide, as well as in the Bob Marshall Wilderness complex to the north and the Elkhorns to the south (USFS 1998a; USFS 1997a). Suitable habitat is available across the Forest in the form of coniferous montane forest, ungulate winter range, and blocks of lightly roaded and unroaded country (USFS 1998a).

Wolverine habitat modeling has been conducted by the Helena NF, and indicates approximately 101,400 acres of wolverine habitat is estimated to exist on the Forest, with habitat occurring in each of the four landscape areas except the Divide Landscape. Within the Belt Landscape, 30 acres (less than one percent) of mapped weed infestations occur within approximately 50,000 acres of modeled wolverine habitat. The Elkhorn Landscape contains no mapped weed infestations occurring within 11,500 acres of modeled wolverine habitat. In the Blackfoot Landscape, 45 acres of mapped weed infestation lie within 39,890 acres of modeled wolverine habitat (less than one percent) (PF-*Wildlife*).

Northern Goshawk - Sensitive

Northern goshawks are MIS for old-growth forest. They are associated with old-growth mixed conifer and deciduous woodland, often in mountainous terrain. Northern goshawk nesting habitat is typified by a dense overstory of large trees and an open understory of grass and shrubs, often near clearings. Mature stands of single- and multi-storied trees with small open areas are preferred for nesting and foraging (USFS 1990).

Most of the lower to mid-elevations in all landscape areas contain potential habitat for goshawks. Based on surveying and monitoring data, nine active goshawk nests exist in the Big Belt and Elkhorn mountains (USFS 2002). As many as 11 probable active nests could occur across the Forest. However, the location and activity of these nests are only inferred based on goshawk sightings and aggressive behavior (USFS 2002c).

Goshawk habitat modeling has been conducted by the Helena NF, and indicates approximately 278,000 acres of goshawk habitat is estimated to exist on the Forest, with habitat occurring in each of the four landscape areas. Within the Belt Landscape, 650 acres (less than one percent) of mapped weed infestations occur within approximately 88,000 acres of modeled goshawk habitat. Within the Divide Landscape, approximately 748 acres of mapped weed infestations occur within approximately 56,700 acres of modeled goshawk habitat (one percent). The Elkhorn Landscape contains 140 acres of mapped weed infestations occurring within approximately 35,000 acres of modeled goshawk habitat (less than one percent). In the Blackfoot Landscape, 1,623 acres of mapped weed infestations lie within approximately 98,000 acres of modeled goshawk habitat (2 percent) (PF-*Wildlife*).

BIRDS

There are more than 100 species of land birds on the Forest. Neotropical migrant birds are a group of birds that live, breed, and nest in temperate forests of North America during spring and summer and migrate to Mexico, Central America, South America, and the Caribbean Islands during the fall and winter. Species that may be present on the Helena NF include the American redstart, common yellowthroat, Macgillivray's warbler, warbling vireo, willow flycatcher, olive-sided flycatcher, yellow warbler, flammulated owl, and Townsend's warbler. Each of these species has been known to breed in Montana and on the Helena NF. The species above are by no means an exhaustive list, though they do represent the types of Neotropical migrants that occur. The Northern Region Land Bird Monitoring Program monitors trends in land bird populations.

REPTILES AND AMPHIBIANS

Amphibians are aquatic breeders that require healthy riparian and aquatic environments to lay eggs and to develop as larvae. Generally, frogs are tied to aquatic systems throughout their lives, but other amphibians such as toads and salamanders can be found in upland habitats. These habitats include wet and dry coniferous forests of all seral stages, deciduous forests, grasslands, shrublands, talus, and caves (USFS 1998a).

Amphibians that have either been surveyed for or have potential habitat on the forest include the long-toed salamander, Rocky Mountain tailed frog, Pacific chorus frog, Columbia spotted frog, boreal toad, and the leopard frog. The boreal toad and leopard frog are both addressed earlier in this section of this report. The long-toed salamander, boreal toad, and Columbia spotted frog all live in ponds, wetlands, and lakes. The long-toed salamander and the Pacific chorus frog are associated with closed canopy forests.

Reptiles, unlike amphibians, are not directly tied to water resources and are known to inhabit a rather wide variety of habitat types. Several reptile species that have been identified or that have potential habitat on the Forest include the western skink, northern alligator lizard, common garter snake, western terrestrial garter snake, racer, rubber boa, western rattlesnake, and gopher snake. These species occur in a variety of habitats and are generally known to inhabit dry forests.

FISHERIES AND AQUATIC RESOURCES

REGULATORY FRAMEWORK

The Helena NF Plan includes management objectives for aquatic resources, some of which are applicable to the Proposed Action of weed treatment. The Forest Plan includes the following statement regarding herbicide use: "Use of chemicals within the riparian area will be minimized to the extent feasible, and will be coordinated with wildlife, watershed, and fisheries personnel, and a certified pesticide applicator." Forest-wide standards require that water quality and fish habitat be maintained by coordinating Forest activities and by direct habitat improvement.

The Inland Native Fish Strategy (INFISH) amended the Forest Plan in 1995. The INFISH amendment to the Forest Plan established additional Forest-wide fisheries standards. As part of this strategy, a network of priority watersheds were designated that contain excellent habitat or assemblages of native fish, provide for metapopulation objectives, or have excellent potential for restoration. Priority watersheds in the project area are Copper Creek, Landers Fork, and the Little Blackfoot River (USFS 1995c).

Guidelines of INFISH specify that application of herbicide will only be allowed such that it does not retard attainment of riparian management objectives (RMOs) and avoids adverse effects on inland native fishes.

The Endangered Species Act requires the conservation of threatened and endangered species, and prohibits carrying out or authorizing any action that may jeopardize a listed species or its critical habitat.

Regulations on fish and wildlife resources are outlined in 36 Code of Federal Regulations (CFR) 219.19 and 219.27. These regulations state that MIS will be identified by each National Forest in order to maintain adequately distributed habitat for these species and to evaluate the impacts of management activities. Additional guidance is found in FSM, which states, identifies, and prescribes measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species (FSM 2670.31(6). MIS are identified in a planning process and used to monitor effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important. Aquatic MIS identified on the Helena NF are cutthroat trout, which

will be used as an indicator of fisheries habitat changes (USFS 1986).

Forest Service Manual (FSM) 2670 at 2670.22 - Sensitive Species, provides the following direction for sensitive fish:

- Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
- Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
- Develop and implement management objectives for populations and/or habitat of sensitive species.

ANALYSIS AREA

The fisheries analysis area consists of the 105 6th HUC watersheds where weed treatment activities may occur (**Figure 3-1** through **3-4**).

ANALYSIS METHODS

A variety of methods were used to collect information compiled for this document. An extensive search was conducted via the Internet on topics as they relate to aquatic resources including but not limited to, effects of the chemicals proposed for use on the aquatic environment, chronic and acute effects on aquatic organisms and ecological risk to the aquatic environment. Data, in the form of reports, existing NEPA documents, memoranda and other documents were provided by US Forest Service personnel, in particular, technical resource specialists on the Helena and other area National Forests. A model was used to predict chemical delivery to surface water via runoff and infiltration. Specific variables used for this model (acreage, flows from specific storm events, amount of chemical applied) were calculated from Helena NF data. For specific details on these model variables, please see analysis methods – Water Resources. A spreadsheet was developed that allowed for the determination of the acreage within specific watersheds that could be treated without risking impacts to the aquatic environment.

AFFECTED ENVIRONMENT

Of the 149 6th HUC watersheds in the Project Area, 105 (70 percent) have weed infestations. However, infested areas within each watershed are relatively small. Most areas are less than three percent of total watershed area. In some cases, a high percentage of acres occur within 300 feet of flowing water. Only six watersheds currently have infestations covering five percent or more of the total watershed area: Lower Trout Creek, Oregon Gulch, and Cave Gulch in the Belts/Dry Range LA; Middle Crow Creek tributary in the Elkhorn LA; and Grizzly-Orofino Gulch and Upper Little Blackfoot River in the Continental Divide LA. The watersheds with the highest infested acres (20 to 25 percent) are Lower Trout Creek, Oregon Gulch, and Cave Gulch. Oregon, Dry and Grizzly-Orofino Gulches do not support fish.

Aquatic Organisms

Table 3-7 identifies native and non-native fisheries species within the study area as well as their distribution and status. Three fish species are endangered, threatened, or sensitive (cutthroat trout, bull trout, and ling (burbot)). These species are discussed in the Special Status Species section.

SPECIAL STATUS SPECIES

Bull Trout - Threatened

In July 1998, bull trout was listed as "threatened" under the Endangered Species Act. Critical habitat has been proposed by the U.S. Fish and Wildlife Service (USFWS), but has not been finalized. On the Helena NF proposed critical habitat includes the Blackfoot River, Landers Fork to Silver King Falls, Copper Creek, and the Little Blackfoot River from the confluence with the Clark Fork upstream to Blackfoot Meadows.

Historically, bull trout were likely distributed throughout the Clark Fork Drainage portions of

TABLE 3-7
Fish Species Distribution on Helena NF

Common Name	Scientific Name	Native or Non-native	Probable Distribution	Status
Bull trout	*Salvelinus confluentus*	Native	Clark Fork Drainage	Threatened
Yellowstone cutthroat trout	*Oncorhynchus clarki bouvieri*	Native to Montana but not waters on the Helena NF	Forest-wide[1] (mountain lakes only)	Sensitive
Westslope cutthroat trout	*Oncorhynchus clarki lewisi*	Native	Forest-wide	Sensitive, Management Indicator Species
Burbot	*Lota lota*	Native	Missouri River Drainage	Sensitive
Mountain whitefish	*Prosopium williamsoni*	Native	Forest-wide	None
Northern pikeminnow	*Ptychocheilus oregonensis*	Native	Clark Fork Drainage	None
Longnose dace	*Rhinichthys cataractae*	Native	Missouri River Drainage	None
Arctic grayling	*Thymalus arcticis*	Native but no longer found in any streams on the Helena National Forest	Park Lake, Missouri Drainage and Heart Lake in the Clark Fork drainage	Sensitive
Longnose sucker	*Catostomus catostomus*	Native	Clark Fork Drainage	None
Largescale sucker	*Catostomus macocheilus*	Native	Clark Fork Drainage	None
Slimy sculpin	*Cottus cognatus*	Native	Clark Fork Drainage	None
Rainbow trout	*Oncorhynchus mykiss*	Non-native	Forest-wide	None
Brook trout	*Salvelinus fontinalus*	Non-native	Forest-wide	None
Brown trout	*Salmo trutta*	Non-native	Forest-wide	None
Kokanee salmon	*Onchornchus nerka*	Non-native	Missouri River Drainage	None
Walleye	*Sitzaostedion vitreum*	Non-native	Missouri River Drainage	None
Yellow perch	*Perca flavescens*	Non-native	Missouri River Drainage	None
White sucker	*Castostomus commersoni*	Native	Missouri River Drainage	None
Mountain sucker	*Castostomus platyrntnchus*	Native	Missouri River Drainage	None
Carp	*Cyprinus carpio*	Non-native	Missouri River Drainage	None
Utah chub	*Gila atraria*	Non-native	Missouri River Drainage	None
Flathead chub	*Platygobio gracilis*	Native	Missouri River Drainage	None
Mottled sculpin	*Cottus bairdi*	Native	Forest-wide	None

1 Forest-wide includes: Clark Fork Drainage and the Missouri River Drainage.

the Helena NF (Montana Bull Trout Scientific Group 1995). Currently, all fish-bearing waters within the Clark Fork drainage on the Helena NF are considered bull trout habitat (Walch and Stuart 2002). **Figure 3-5** through **Figure 3-8** display the streams that have habitat known to support bull trout.

Sediment from roads and run off due to vegetation conversions to less dense cover (e.g., pioneering/invasive species following a fire) has the potential to degrade habitat for resident and spawning bull trout.

Westslope Cutthroat Trout - Sensitive

Westslope cutthroat trout is a sub-species of cutthroat trout native to Montana. Its natural range is on both sides of the Continental Divide; excluding the Yellowstone River drainage. It can be difficult to visually distinguish westslope from other cutthroat trout sub-species and the only way to be certain is by genetic testing.

Westslope cutthroat trout were first described by Lewis and Clark and were once extremely abundant. Various studies have estimated that the species now occupies between 19 and 27 percent of its historical range in Montana and about 36 percent of its historical range in Idaho (Van Eimeren 1996). The most recent status review completed by Shepard *et al.* (2003) reports westslope cutthroat trout are now estimated to inhabit 59 percent of the 56,500 miles of stream they historically occupied. However, only 6 percent of the miles that were historically occupied are currently occupied by genetically pure westslope cutthroat trout (Shepard *et al.* 2003).

The westslope cutthroat trout is found in the Blackfoot, Little Blackfoot, and Missouri Rivers as well as many of their fish-bearing tributaries (PF-Fish Distribution Maps).

Burbot - Sensitive

Currently, the burbot is listed by Region 1 of the Forest Service as sensitive. The burbot is the only exclusively fresh water cod species. It occurs in deep cold waters of lakes and rivers in North America. It typically is not present in water that exceeds 69° F during the summer (Paulson and Hatch 2002). During the day, it remains at the bottom at low light intensity or in areas of aquatic vegetation, rock piles, submerged logs, or other underwater structures. At night, it preys on small fish, crayfish, clams, aquatic insects, or fish eggs. Species that might be included in its diet are sculpin, yellow perch, or walleye. Adult fish feed mainly on other fish during the summer, increasing the amount of invertebrates in their diet during the winter. The young feed mainly on mayfly nymphs and other aquatic insects, shifting to fish and crayfish as they mature.

The burbot is unique in that it spawns in winter, under the ice. It spawns at night in shallow bays and streams over sand and gravel, in water temperatures near 35° F (Rook 1999, Paulson and Hatch 2002). They spawn in large groups, thrashing about. A female can release up to a thousand eggs, where they are dispersed through the water to drift along the bottom. After spawning, the adults migrate in early spring from lakes to tributary rivers. The young grow rapidly in the first four years spending most of their time in vegetated and debris covered lake shallows and stream channels. As they grow, they seek out rocky riffles, then pools and under bank cuts. Young burbot are common prey for other fish such as yellow perch and lake trout.

On the Helena National Forest, burbot are only known from the Missouri River, Hauser Reservoir, and Holter Reservoir.

AQUATIC HABITAT

Watershed baseline conditions west of the Continental Divide have been completed. In many of the 6th code hydrologic units, various components of fish habitat are considered to be functioning at risk or functioning at unacceptable risk (USFS 2000a). Fish habitat conditions east of the Continental Divide have not been compiled in a watershed baseline as they have west of the Continental Divide. However, conditions in many 6th HUCs have been assessed to varying degrees with information available in the Helena NF fishery files. Generally speaking, habitat conditions have been affected negatively in many locations from a variety of human related activities (Walch and Stuart 2002).

VEGETATION

REGULATORY FRAMEWORK

The Forest-wide management goal of the Forest Plan (USFS 1986) is to "control noxious weeds to protect resource values and minimize adverse effects on adjacent private land." Forest management objectives for all Management Areas within the Forest state: "the primary means of preventing, containing, or controlling noxious weeds will be through vegetative management practices and by the use of biological agents such as insects, rusts, molds, and other parasites on host plants. However, herbicides may be used to provide short-term

protection on specific sites, after appropriate environmental analysis."

The Endangered Species Act requires the conservation of threatened and endangered species, and prohibits carrying out or authorizing any action that may jeopardize a listed species or its critical habitat.

Executive Order 13112 of February 3, 1999 on invasive species directs Federal agencies to prevent introduction of invasive species; provide for their control; and minimize economic, ecological, and human-health impacts. Under this executive order, Federal agencies cannot authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species, unless all reasonable measures to minimize risk of harm have been analyzed and considered.

Forest Service Manual (FSM) 2670 at 2670.22 - Sensitive Species, provides the following direction for sensitive plants:

- Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
- Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
- Develop and implement management objectives for populations and/or habitat of sensitive species.

The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) and National Forest Management Act of 1976 (NFMA) provide the broad legislative background for forest vegetation management, including management of sensitive species.

ANALYSIS AREA

The analysis area for vegetation includes vegetative communities in proximity to proposed treatment areas. These plant communities have the potential to be directly or indirectly impacted by herbicide and ground disturbances associated with the proposed weed treatment methods.

ANALYSIS METHODS

Information used came from data on file at the Helena NF, published reports in scientific journals, unpublished reports, and personal communications with resource specialists with knowledge of vegetation, weed control, and herbicide effects. Acreage values were derived from GIS. Information on ecology, distribution, and habitat affinities for sensitive species was obtained from the Montana Natural Heritage Database on the Internet. Only species known to occur are addressed in detail.

Effects of weed management practices on sensitive plants also were assessed based on studies sponsored by the Helena NF and conducted by the Montana Natural Heritage Program (Barton and Crispin 2001; 2002). **Appendix B** contains a list of scientific and common names used in this document.

AFFECTED ENVIRONMENT

The Helena NF includes a diversity of habitats ranging from wetlands and riparian areas to high-elevation alpine and subalpine ridges and plant communities. Broad vegetation types, most frequently invaded by noxious weeds, are grasslands, shrublands, and conifer forests with more open overstory canopies (**Table 3-8**).

Grasslands

Grasslands dominated by bluebunch wheatgrass, rough fescue, and Idaho fescue are the most common grasslands on the Forest. These communities have a sparse to moderately dense cover. Annual grasses, forbs, and shrubs are sparse. Litter, moss, and lichens are important components of grasslands. Habitat indicator species in addition to the dominants include western wheatgrass, Sandberg bluegrass, thread-leaf sedge, narrow-leaf sedge, American vetch, and fringed sage. Many grassland communities on the Forest are being invaded by

TABLE 3-8
Percent of Landscapes by Vegetation Cover Types

Vegetation Type	Belts/Dry Range	Continental Divide	Elkhorn	Blackfoot
Grassland	9.0	6.6	18.2	1.7
Shrubland	1.4	0.2	0.9	0.0
Ponderosa pine	2.4	1.1	0.8	0.0
Douglas-fir	61.6	39.8	28.8	24.1
Lodgepole pine	0.2	2.4	0.1	0.1
Spruce-fir	13.7	39.0	34.8	58.3
Other habitats	2.3	0.4	0.2	2.5
Non-vegetated areas	9.5	10.5	16.1	13.3

Note: Vegetation types represent habitat type grouped by dominant species.

ponderosa pine and Douglas-fir as a result of fire suppression over the last century.

Shrub Communities

Shrub communities dominated by low sagebrush, big sagebrush, shrubby cinquefoil, bitterbrush, mountain mahogany, and skunkbush sumac comprise less than three percent of the vegetation cover on the Forest. Shrub communities generally range from 3,000 to 8,000 feet elevation. Forbs are generally abundant. Common herbaceous species include bluebunch wheatgrass, rough fescue, Idaho fescue, timber oatgrass, and sticky geranium. Large amounts of bare ground and rock are usually present.

Conifer Forests

Generally, noxious weeds do not invade forest communities that have more than 10 percent canopy cover, except where overstory vegetation has been thinned or removed by logging, road construction, fire, or other activities. Forest habitat types that have the greatest area infested with noxious weeds are dry ponderosa pine and Douglas-fir stands with sparse overstory canopies. However, noxious weeds also have invaded the wetter Douglas-fir sites where the overstory has been removed or thinned by logging, road building, or other activities.

Ponderosa pine communities are a relatively minor component of the Forest. They occur mostly at lower elevations, adjacent to grasslands. Ponderosa pine forests have a sparse, open canopy with a grassy understory. Common species include skunkbush sumac, chokecherry, buffaloberry, common snowberry, Oregon grape, bitterbrush, bluebunch wheatgrass, Idaho fescue, and rough fescue.

Douglas-fir communities are the most common tree-dominated communities on the Forest. Douglas-fir is a shade-tolerant species that occupies a broad range of elevations, soils, and climatic conditions. Common species include ninebark, pinegrass, twinflower, huckleberry, kinnikinnik, beargrass, bluebunch wheatgrass, ponderosa pine, elk sedge, common juniper, spirea, heart-leaf arnica, rough fescue, and mountain snowberry.

Lodgepole pine climax communities are uncommon. Lodgepole pine is a seral species in Douglas-fir and spruce/fir forests. Common species include sweet-scented bedstraw, baneberry, bluejoint reedgrass, dwarf bilberry, twinflower, beargrass, globe huckleberry, pinegrass, and elk sedge. Weed infestations in lodgepole pine forest are infrequent.

Spruce/fir communities consist of Englemann spruce and subalpine fir with a well-developed component of shrubs and herbaceous species. Spruce most commonly occurs in soil with high moisture content, such as riparian areas and higher elevation sites fed by snow melt. Subalpine fir is found most frequently at higher elevations. Common understory species include common horsetail, ground dogwood, sweet-scented bedstraw, dwarf bilberry, meadowrue, smooth woodrush, mountain gooseberry, arrow-leaf groundsel, menziesia,

beargrass, twinflower, starry Solomon's seal, Labrador tea, grouse whortleberry, round-leaved violet, and Sitka valerian.

Other Habitats

Other habitats on the Forest include whitebark pine communities, alpine areas, wetlands, and aspen communities. These habitats occupy small acreages but have high ecological values because they often harbor rare species, have high value as wildlife habitat, and have desirable aesthetic qualities.

Whitebark pine communities occupy drier mountaintops, above the cold limits of Douglas-fir. These forests are open with tree islands and dry meadows and rarely have noxious weed infestations. Alpine meadows and timberline shrub communities reflect the effects of wind abrasion, blowing snow, winter desiccation, intense solar radiation, cold, wet and shallow soils, cold temperature and deep snow. Perennial forbs and low prostrate shrubs are typical life forms. Noxious weeds are rare.

Wetlands dominated by sedges and willows are associated with high water tables that are within six inches of the soil surface for at least one third of the growing season. They occur along streams and rivers and in association with springs, seeps, and depressions. Typically, sedges dominate in areas with perennial standing water and willows occupy the transition between flowing water and upland. Typical species are black cottonwood, paper birch, ponderosa pine, willow species, and water birch. Weed infestations can occur where the overstory canopy of trees and shrubs have been removed.

Some wetlands (i.e., fens) produce more biomass than decomposes; consequently, they develop substrates composed of organic muck or peat. These wetlands typically receive their moisture from groundwater seepage and are cold microenvironments that support a diversity of mosses, sedges, and shrubs such as willow, bog birch, and Labrador tea. Peatlands are rare wetlands that have a high probability of harboring sensitive species (e.g., pale sedge, English sundew, linear-leaved sundew, and water bulrush). There are no known weed infestations in fens on the Helena NF.

Aspen communities, perpetuated by periodic fires, occupy small acreages on the Forest, usually intermixed or adjacent to conifer communities (Pfister *et al.* 1977). Fire suppression and intense wildlife grazing eventually lead to invasion by conifer species. These communities occur in moist upland sites, stream terraces, and slumps. Associated species are serviceberry, pinegrass, elk sedge, Oregon grape, and sweet mountain-cicely. No weeds have been identified in aspen communities.

Noxious Weeds

Generally, noxious weeds infest sites that have less than 10 percent overstory canopy cover of trees and sites that have been disturbed by grazing, road construction, logging, or fires. Approximately 8 million acres (9 percent of the total land area) in Montana is infested with noxious weeds, including approximately 2.4 percent of the Helena NF (**Table 3-9**). Weeds are the single most serious threat to natural habitats in the western US (Duncan 2001).

Noxious weed infestations are causing adverse impacts on native plant communities, hydrological cycles, wildlife habitat, soil and watershed resources, recreation, and aesthetic values. A shift from timber, shrub, and bunchgrass vegetation to noxious weeds decreases wildlife forage and species diversity and increases soil erosion. Noxious weeds present on the Forest are described in detail in the project file (PF-Vegetation).

Effects of fire and fire-suppression activities on the spread of noxious weeds and the introduction of new noxious weeds are concerns on the Forest. Forest canopy cover has been lost in many areas that were formerly shaded. Prior to the fires of 2000, shading by conifers inhibited noxious weeds from spreading into areas with unburned overstories.

TABLE 3-9
Predominant Weed* Infestations Acres in Landscape Areas

Species	Belts/Dry Range LA	Continental Divide LA	Elkhorn LA	Blackfoot LA	Total Acres
Spotted knapweed	2,409	2,294	638	5,104	10,445
St. Johnswort	--	--	--	11	11
Oxeye daisy		23	--	1	24
Canada thistle	1,107	1,580	667	191	3,545
Musk thistle	76	--	--	--	76
Houndstongue	--	--	--	1	1
Sulfur cinquefoil	2	330	14		346
Leafy spurge	725	117	8	1	851
Dalmatian toadflax	5,573	1,301	465	19	7,358
Common tansy	11	--	--	--	11
Total	9,903	5,645	1,792	5,328	22,668

* Many locations have more than one species of weeds present. To avoid counting acres twice, only the predominant weed is displayed in the table. The result is that some of the less common weeds, such as houndstongue, are under-represented in the table because often it occurs where spotted knapweed predominates.

Source: Helena NF Weed Database

Post-fire monitoring data collected by the Helena NF (Winfield 2003) suggests that there is an increase in the number of weedy forbs, and noxious, invasive, weed species (especially Dalmatian toadflax) following fire, mostly in the ponderosa pine and Douglas-fir habitats in the Belts/Dry Range LA.

The proliferation of noxious weeds such as Dalmatian toadflax may alter post-fire succession. Studies have found that Dalmatian toadflax, spotted knapweed, and cheatgrass increase in biomass and cover following fire (Brown *et al.* 2002). Management prescriptions for invasive plants following wildfires are needed to reduce or prevent their establishment and spread on burned sites.

There has been limited research on effects of fire on the spread of noxious weeds. The Forest Service (USFS 2001c) reported that underburning on a site with spotted knapweed caused it to increase. Studies of shelterwood timber harvests indicated that timber harvest with understory burning caused spotted knapweed to increase the second year following these activities (USFS 2001c). Low-severity burns usually do not kill knapweed, because of their deep taproots, and insufficient heat to kill seeds buried in soil. High severity burns create favorable conditions for knapweed to colonize from off site, suggesting that spotted knapweed will thrive in low-severity burn areas and spread into high-severity burned areas.

Information collected for the Lolo National Forest (USFS 2001a), following the 2000 fires, indicated that reductions in crown closure due to burning rendered 7,650 acres high risk for noxious weed infestation. High-risk areas were those where:

- Most of the tree canopy was killed and most ground-level native plants were either killed or severely damaged;
- Burn severity was low, moderate, or high;
- Duff and organic soil was consumed, exposing mineral soil;
- Invasive weeds were present in or adjacent to the area prior to wildfires in 2000;

TABLE 3-10
Habitat of Sensitive Plants Documented or Potentially Present

Habitat	Common Name[1]
Ponds	Water bulrush
Wet meadows, riparian areas, marshes, and fens	English sundew, giant helleborine, linear-leaved sundew, pale sedge, poor sedge, wavy moonwort, wolf willow, and round-leaved orchid
Forest- meadow ecotones	California false-hellebore, heart-leaved violet, short-styled columbine, small-yellow ladies slipper, sparrow's egg lady's slipper
Grasslands	Alpine meadowrue, Hall's rush, Howell's gumweed, long-styled thistle, Missoula phlox, peculiar moonwort, wavy moonwort
Cliff crevices	Austin's knotweed, Lackschewitz' milkvetch
Douglas-fir forest	Northern rattlesnake plantain
Alpine	Gray's point-vetch, storm saxifrage

- Sites were dry to moderately dry; and
- Unwashed fire-fighting equipment was used which could introduce invasive weed seeds.

SPECIAL STATUS SPECIES

Three Federally listed threatened plant species (water howellia, Ute's ladies' tresses, and Spaulding's catchfly) occur in Montana though none are found on the Helena NF and suitable habitat is not present.

Twenty-five species of sensitive vascular plants are known or have the potential to occur on the Forest (**Table 3-10**). Of these 25 species, 10 have been documented to be present (**Table 3-11**).

An evaluation of threatened, endangered, proposed, and sensitive species was conducted to determine species that are most likely to be present in or near proposed weed treatment areas (Barton and Crispin 2001; 2002). Weed treatments pose the greatest risk to long-style thistle and Austin's knotweed in the Belts/Dry Range LA and Missoula phlox in the Continental Divide LA, near MacDonald Pass (Barton and Crispin 2001; 2002). Populations of these species are often intermixed with noxious weeds.

WILDERNESS AND INVENTORIED ROADLESS AREAS

Wilderness Areas are areas of Federally owned land that have been designated by Congress as wilderness, in accordance with the Wilderness Act of 1964. These areas are protected and managed so as to preserve their natural

TABLE 3-11
Sensitive Plants Documented for the Helena National Forest

Species	Number of Occurrences	Landscape Area
English sundew	2	Blackfoot
Hall's rush	3	Continental Divide
Linear-leaved sundew	2	Blackfoot
Long-styled thistle	23	Belt
Missoula phlox	3	Continental Divide
Pale sedge	2	Blackfoot
Peculiar moonwort	2	Continental Divide
Small, yellow lady's-slipper	1	Continental Divide
Water bulrush	1	Blackfoot

Note:

1 Scientific names are included in Appendix B.

Sources: Montana Natural Heritage Program; Barton and Crispin 2001.

conditions which (1) generally appear to have been affected primarily by forces of nature with the imprint of man's activity substantially unnoticeable; (2) have outstanding opportunities for solitude or a primitive and confined type of recreation; (3) have at least 5,000 acres or is of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and (4) may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest. A Wilderness Study analysis is conducted on candidate areas to determine an area's appropriateness, cost, and benefits for addition to the National Wilderness Preservation System (NWPS).

Inventoried Roadless Areas (IRAs)are areas identified in a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000, which are held at the National headquarters office of the Forest Service, or any subsequent update or revision of those maps.

REGULATORY FRAMEWORK

Wilderness areas are managed as directed by the Wilderness Act of 1964. Generally, management activities do not occur, yet there are many exceptions. Some of them include trail construction and maintenance, fire suppression, removal of existing structures, dams, and noxious weed treatment.

FSM 2323.26b – Wilderness Management allows plant control for "noxious farm weeds by grubbing or with chemicals when they threaten lands outside wilderness or when they are spreading within the wilderness, provided that it is possible to effectively control the weeds without causing serious adverse impacts on wilderness values."

FSM 2109.14 (13.4), the Pesticide-Use Management and Coordination Handbook, requires Regional Forester approval of pesticide use in designated wilderness areas.

The Helena National Forest Plan sets management goals and standards for Scapegoat Wilderness (Management Area P-1 – Helena NF portion of Scapegoat Wilderness) that states the following:

- Management Goals – Maintain plants and animals indigenous to the area by protecting the natural dynamic equilibrium associated with natural, complete ecosystems (FP pg III/56).
- Managers will concentrate on improving conditions at campsites with unacceptable impacts such as the abundance of non-native plant species (FP pg III/58).
- Natural processes such as fire, wind, and insect and disease activity will be the only agents permitted to influence vegetation and its associated wildlife in the wilderness (FP pg III/59).
- Before a decision is made to control noxious weeds with chemicals, an environmental document must be prepared discussing the need for control, risk to human health, and the method to be used (FP pg III/62).
- All project proposals will be analyzed and evaluated to determine the potential water quantity and quality impacts. Mitigation measures will be developed to minimize adverse effects. If the unacceptable effects cannot be adequately mitigated, the project will be redesigned or abandoned (FP pg III/65).

Stated management goals for the Gates of the Mountains Wilderness (Management Area P-2 Helena NF portion of Gates-of-the-Mountain Wilderness) include:

- Maintain plants and animals indigenous to the area by protecting the natural dynamic equilibrium associated with natural, complete ecosystems (FP pg III/66).

Current Forest Service policy is that no development of Inventoried Roadless Areas (IRAs) will occur without Regional Forester

approval. Noxious weed treatments would not be considered development.

Forest Plan direction for Management Area P-3 (Recommended for wilderness designation) is to maintain natural vegetative composition.

ANALYSIS AREA

The analysis area for wilderness and inventoried roadless areas is the extent of the individual wilderness area and/or roadless area.

ANALYSIS METHODS

The source of information for the Affected Environment was the Forest Plan and its associated EIS. The analysis is based on the potential for the proposed weed treatment activities to impact those values inherent to designated wilderness and traits associated with inventoried roadless areas (e.g., roadless nature).

AFFECTED ENVIRONMENT

Wilderness

Congress designated the 28,600-acre Gates of the Mountains Wilderness in 1964. The wilderness is currently being managed in compliance with existing wilderness regulations. An additional 9,600 acres of IRA (Big Log - see below) are adjacent to the wilderness boundary.

Although no weed infestations within Gates of the Mountains Wilderness are mapped, there are noxious weeds just inside the wilderness boundary along several trails, including, Missouri River Canyon Trail # 257, Big Log Gulch Trail #252, and Porcupine Creek Trail # 263. Sections of these trails leading to the wilderness are more heavily infested. It is estimated that less than five acres total are infested within the Gates of the Mountains.

The Scapegoat Wilderness is 239,000 acres and was designated in August 1972. It is located in the Blackfoot Landscape Area. Approximately 60 acres burned in 2001. These burned areas are at high risk for noxious weed infestation.

There are currently about 68 acres of weed infestation identified in the Scapegoat Wilderness. The majority (72 percent) is spotted knapweed, followed by Canada thistle (21 percent), Dalmatian toadflax (four percent), and houndstongue and ox-eye daisy (both two percent). Infestations occur in 24 locations.

Inventoried Roadless Areas and Recommended Wilderness

Three IRAs are designated by the Forest Plan as Management Area P-3, Recommended Wilderness. The three areas include Big Log, which is adjacent to the Gates of the Mountains Wilderness, the Mount Baldy IRA in the Belts/Dry Range LA, and the Electric Peak IRA located in the Continental Divide LA. Weed infestation in IRAs is shown in **Table 3-12**.

There are 23 IRAs in the Helena NF (**Table 3-13**). Currently, approximately one half of a percent of the total acres of IRA is known to be infested with noxious weeds.

WILD AND SCENIC RIVERS

REGULATORY FRAMEWORK

The Wild and Scenic Rivers Act (16 US 1271) and Interagency Guidelines provide the

TABLE 3-12
Recommended Wilderness Areas and Weed Infestation

IRA	Acres	Acres of Weed Infestation	Known Weed Species
Big Log	9,651	110	Spotted knapweed, Canada thistle, Dalmatian toadflax, leafy spurge
Mount Baldy	17,459	6	Musk thistle, spotted knapweed
Electric Peak Total	27,753	79	Spotted knapweed, Canada thistle
Total	**54,863**	**195**	

TABLE 3-13
IRAs and Weed Infestation by Landscape Area

IRA	Acres	Acres of Weed Infestation	Known Weed Species
Belts/Dry Range LA			
Holter	2,334	26	Spotted knapweed
Grassy Mountain	6,845	13	Spotted knapweed
Devils Tower	7,149	154	Spotted knapweed, Canada thistle, leafy spurge
Irish Gulch	7,739	66	Leafy spurge
Ellis Canyon	15,415	2	Musk thistle
Hellgate Gulch	17,959	178	Spotted knapweed, Canada thistle, leafy spurge, Dalmatian toadflax
Cayuse Mtn	20,648	168	Spotted knapweed, musk thistle, Canada thistle, Dalmatian toadflax
Camas Creek	31,751	15	Spotted knapweed
Middleman Mtn-Hedges Mtn	35,212	1028	Leafy spurge, Spotted knapweed, musk thistle, Canada thistle, Dalmatian toadflax
Total	**145,052**	**1650**	
Blackfoot LA			
Anaconda Hill	19,594	35	Spotted knapweed
Bear-Marshall-Scapegoat-Swan	53,806	125	Spotted knapweed, Dalmatian toadflax, Canada thistle, houndstongue
Crater Mountain	9,882	88	Spotted knapweed, Canada thistle
Lincoln Gulch	7,820	0	
Nevada Mountain	50,827	95	Spotted knapweed, Canada thistle
Ogden Mountain	11,939	100	Spotted knapweed
Silver King/Falls Creek	7,119	0	
Spectmen Creek	13,357	16	Canada thistle
Total	**174,344**	**459**	
Continental Divide LA			
Nevada Mountain Total	50,827	11	Spotted knapweed
Jericho Mountain Total	9,043	.2	Spotted knapweed
Lazyman Mountain Total	12,209	85	Spotted knapweed, Canada thistle, sulfur cinquefoil, Dalmatian toadflax, leafy spurge
Total	**72,079**	**96**	
Grand Total*	**446,338**	**2,399**	

*Includes IRA designated as recommended wilderness from **Table 3- 12**.

following direction for establishing preliminary classifications for eligible Wild and Scenic Rivers (WSR). These classifications along with applicable Forest standards are discussed below.

Wild - Rivers or sections of rivers are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America. Agricultural use is restricted to the amount of domestic livestock grazing currently practiced. Motorized travel on land or water may be permitted, but is generally not compatible with this classification.

Scenic - Rivers or sections of rivers are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads. A wider range of agricultural uses is permitted to the extent currently practiced. Row crops are not considered as an intrusion of the "largely primitive" nature of scenic corridors as long as there is not a substantial adverse effect on the natural-like appearance of the river area. Motorized travel on land or water may be permitted, prohibited, or restricted to protect the river values.

Recreational - Rivers or sections of rivers are readily accessible by road or railroad, may have some development along their shorelines, and may have undergone some impoundment or diversion in the past. Adjacent lands may be managed for a full range of agricultural uses, to the extent currently practiced. Motorized travel on land or water may be permitted, prohibited, or restricted. Controls will usually be similar to surrounding lands and waters.

Streams determined to be eligible for protection under the Wild and Scenic Rivers Act will be protected to maintain their potential classification pending suitability studies.

Wild, Scenic and Recreational Management Standards were adopted from Forest Service Handbook 1909.12 - Chapter 8. Section 8.21c says "For a river to be eligible for designation to the National System, one or more of the following values within the river area must be outstandingly remarkable: 1) scenic, 2) recreational, 3) geological, 4) fish and wildlife, 5) historical, 6) cultural, 7) other values, including ecological values."

Forest-wide standards in the Forest Plan (Amendment No. 2) for Wild and Scenic Rivers that apply to this project give direction on management of range and motorized travel and to protect the outstandingly remarkable resource values of fisheries.

ANALYSIS AREA

The analysis area for Wild and Scenic Rivers are those streams and adjacent lands within the Helena NF that are potentially eligible for protection under the Wild and Scenic Rivers Act.

ANALYSIS METHODS

The source of information for the Affected Environment was the Forest Plan and its associated EIS. The analysis is based on the potential for the proposed weed treatment activities to impact those values inherent to rivers or streams on the Helena NF that are eligible for Wild and Scenic Rivers designation.

AFFECTED ENVIRONMENT

Amendment 2 to the Forest Plan (April 1989) identified segments of four streams on the Helena NF as eligible for protection under the Wild and Scenic Rivers Act. They include portions of Copper Creek, Little Blackfoot River, Beaver Creek, and the Missouri River (from Hauser Dam to Cochran Gulch). These stream segments will be further studied to determine their suitability for inclusion into the Wild and Scenic Rivers System.

Copper Creek is eligible as a recreational river. The outstandingly remarkable values are fish and wildlife. It provides critical spawning and rearing habitat for bull trout (fluvial strain) and cutthroat trout. Riparian zones offer unique habitat for threatened grizzly bear.

Little Blackfoot River has two eligible segments. The upper segment above Kading Cabin is eligible as a wild river, the segment below that is eligible as a recreational river. The outstandingly remarkable value is fish. The river provides high quality habitat for westslope cutthroat trout. Portions of these reaches are inhabited by fluvial bull trout populations.

Beaver Creek is eligible as a recreational river. The outstandingly remarkable value is fish. It is the only spawning tributary for the "Blue Ribbon" stretch of the Missouri River between Hauser Dam and Holter Reservoir.

Missouri River is eligible as a scenic river from Hauser Dam to Cochran Gulch. The outstandingly remarkable values are scenery, recreation, geology, fish, and wildlife. It provides nationally renowned fishing for trophy-sized brown trout, represents the Eldorado thrust fault, has outstanding cliffs and seeps and was one of main travel routes for the Lewis and Clark expedition.

Table 3-14 describes the extent of the known current weed infestation within the WSR corridors on National Forest System lands. In most cases, the weed infestations follow the rivers and roads within the corridors, indicating how they became infested.

RECREATION

REGULATORY FRAMEWORK

The goal of the Helena Forest Plan (1986) relative to recreation is to provide a range of motorized and non-motorized recreation opportunities and experiences, with the emphasis on dispersed recreation.

The Forest Service Manual, FSM 2300, describes the Forest Service Authority, Objectives, Policy, and Responsibility for recreation management.

TABLE 3-14
Current Weed Infestation In WSR Corridor

Landscape Area/Segment	Weed Species	Acres Infested on NFS lands[1]
Belts/Dry Range	**Total**	**297**
Beaver Creek	Spotted knapweed	137
	Leafy spurge	101
	Canada thistle	3
	Total	241
Missouri River	Spotted knapweed	45
	Leafy spurge	11
	Total	56
Continental Divide	**Total**	**65**
Little Blackfoot	Canada thistle	65
Blackfoot	**Total**	**30**
Copper Creek	Spotted knapweed	30
Total of Weeds in WSR		**392**

[1] Within the eligible Wild and Scenic River corridors (1/4 mile on either side of the river).

Pertinent Federal laws are the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act, and the Wilderness Act of 1964.

ANALYSIS AREA

Recreation opportunities on the Helena NF were analyzed by landscape area: the Belts/Dry Range LA, the Blackfoot LA, Continental Divide LA, and the Elkhorn LA.

ANALYSIS METHODS

The source of information for the Affected Environment was the Forest Plan and its associated EIS. The analysis is based on the potential for the proliferation of noxious weeds if left untreated, and proposed weed treatment activities to impact recreational opportunities on the Helena NF.

AFFECTED ENVIRONMENT

Noxious weeds can affect the recreation experience. Invading weeds such as spotted knapweed, tansy, Scotch thistle, and yellow starthistle detract from the desirability of using recreation sites and enjoyment of the forest environment. These species diminish the usefulness of sites because the stiff plant stalks, thorns, or sharp bristles can discourage or prevent walking, sitting, or setting up a camp. Noxious weeds also detract from the recreation experiences by reducing the variety and amount of native flora to observe or study and reducing forage availability for wildlife and recreational livestock.

Noxious weeds are frequently spread through recreational activities, particularly along roads, trails and dispersed recreation sites. As stated in Chapter 1, about 198 miles of roads are known to be infested on the Helena NF.

The Helena NF provides a variety of recreational experiences including dispersed camping, hiking, hunting, fishing, mountain biking, snowmobiling, horseback riding, cross-country skiing, and driving for pleasure. Passenger vehicle roads (levels 3, 4, and 5) provide the primary transportation routes into and through the Helena NF. While these roads provide access for a variety of purposes (commercial, residential, administrative), the primary public benefit may be recreational (USDA 2001). Level 3, 4, and 5 roads are designed and maintained for use by passenger vehicles. Level 1 and 2 roads are closed for more than 1 year or are for use by high-

clearance vehicles. There are 678 miles of Level 3-5, and 2,703 miles of Level 1 and 2 roads on the Helena NF (USDA 2001).

Belts/Dry Range Landscape Area

The Belts/Dry Range LA is managed for a diversity of recreation opportunities, including hiking, hunting, camping, fishing, off-highway vehicle trail riding, auto-touring, horseback riding, snowmobiling, picnicking, and cross-country skiing. The scenic beauty, wildlife diversity, landscape, air and water quality, history and social feelings of non-crowded recreation are sustained and protected.

Existing developed recreation sites include Meriwether, Coulter, Vigilante, Skidway, Deep Creek, and Gipsy Lake. Four rental cabins (Indian Flats, Bar Gulch, Thompson, and Flynn Memorial) and seven special use cabins are available within the landscape area. Four to six authorized outfitter/guide services operate under Special Use Permits in the Big Belt Mountains.

Approximately 42 percent of the dispersed, permitted use, special use, rental cabin and special use cabin sites in this Landscape Area have known weed infestations.

Dispersed recreation use occurs primarily in the Deep Creek, East Fork Deep Creek, Birch Creek Basin, Duck Creek Pass, Avalanche, Magpie Creek, and Beaver Creek drainages. There are 21 heavily used dispersed recreation areas. The 28,600-acre Gates of the Mountains Wilderness Area is accessed from trailheads along Beaver Creek and from the Gates of the Mountains recreation area on the Missouri River between Upper and Lower Holter Lake.

Approximately 320 miles of level 3-5 roads provide access to the Belt LA (USDA 2001f). In addition, about 125 miles of trail are available for non-roaded and OHV use.

Blackfoot Landscape Area

The Blackfoot LA is accessed primarily from Montana Highway 200 and features 244 miles of trails, 492 miles of roads, with most use occurring during the big game hunting season and on holiday and winter weekends. Some of the most popular activities include driving for pleasure, hunting, fishing, snowmobiling, hiking, camping, picnicking, off-highway vehicle use, cross-country skiing, firewood cutting, mountain biking, horseback riding, and berry picking. There are seven heavily used dispersed recreation areas. Other uses more unique to the area include the annual Race to the Sky Sled Dog Race, hiking the Continental Divide National Scenic Trail, and enjoying the two cabins available for short-term rental. The Rogers Pass watchable wildlife site (administered by the Lincoln District) is a renowned raptor flyway located just east of the Forest boundary (USFS 1995b).

Within the 80,700-acre Forest portion of the Scapegoat Wilderness, the types of allowable activities are defined by the Wilderness Act. Several Forest Service authorized outfitter and guide services provide big game hunting and summer horseback camping and fishing opportunities in the area under Special Use Permits.

Approximately 78 percent of the dispersed, permitted use, special use, rental cabin and special use cabin sites in this Landscape Area have known weed infestations.

Continental Divide Landscape Area

The Continental Divide LA is easily accessible from major travel routes and surrounding communities. Subdivision and heavy seasonal recreation use characterize the area. The area has 323 miles of trails, 770 miles of roads, four developed campgrounds, one picnic area, and one rental cabin. A variety of motorized and non-motorized recreation trail opportunities occur in the Continental Divide LA. Of the 323 miles of "system" trails within the Continental Divide LA, 219 miles are snowmobile routes located on public roads.

Currently there are no designated motorized trails in the area for use during summer and fall, however, legal ATV use occurs on non-designated trails. The Little Blackfoot River

area is one of the most popular recreation corridors. The area offers summer and winter dispersed and developed recreation opportunities including auto-touring, picnicking, camping, fishing, hiking, horseback riding, hunting, cross-country skiing, and snowmobiling. Numerous mountain biking routes have been "user" established in the mountains south of Helena. The Mount Helena National Recreation Trail is located adjacent to the city of Helena and extends approximately 5.7 miles from the Mount Helena City Park south to the residential area of Park City. A cross-country skiing site is located on private and NFS land near the former Frontier Town on MacDonald Pass near Helena. Several cultural and historic sites are features of attraction to visitors. Gulches south of Helena (Grizzly, Dry, Orofino), as well as the Little Blackfoot Corridor and Ten-Mile Creek (Rimini Road), are rich in mining history and scenery (USFS 1996a, 2002d).

Only one Forest Service-authorized outfitter-guide regularly uses the LA (Blackfoot Meadows). Other Special Use Permit-authorized activities occurring in Continental Divide LA include sled dog races, snowmobile events, and mountain bike trips. The Charter Oak Mine is the only Forest interpretation/ educational site in the LA. Kading Cabin has increasingly been used for various Helena NF community outreach and education programs such as Artists-in-Residence, Forest-Community Concerts, and Passports in Time. There are six heavily used dispersed recreation areas. Approximately 56 percent of the dispersed, permitted use, special use, rental cabin and special use cabin sites in this Landscape Area have known weed infestations.

Elkhorn Landscape Area

The Elkhorn LA is accessed from Interstate Highway 15, U.S. Highway 287, and Montana Highway 69. The area is popular for camping, picnicking, hiking, upland bird and big game hunting, mountain biking, cross-country skiing, driving for pleasure, sightseeing, snowmobiling, horseback riding, and target shooting. Public access to and recreational use of the area is somewhat constrained due to the many large private in-holdings and private property adjacent to the Forest boundary. There are several areas where NFS land is not accessible to the public due to the lack of recorded easements. These areas are suitable for various types of recreation, but due to limited access are primarily used by adjoining landowners. There are nine heavily used dispersed recreation areas.

The Elkhorn Mountains Travel Management Plan (USFS 1997d) restricted motorized travel to designated routes on Federal land throughout the Elkhorn Mountains. Most of the designated routes offer access to non-motorized trailhead facilities. Under the Travel Plan portions of Forest Road #258 (Iron Mine), #8578 (Queen's Gulch), and #8580 (East Fork Dry Creek) are available for use by off-highway vehicles and full-size vehicles under a "motorized trail" designation (USFS 1997d).

A developed site in the Elkhorn Mountains is located near the town of Elkhorn. The site consists of day-use picnic tables, some interpretive activities, and outhouses. The historic mining town of Elkhorn and the associated cemetery are visitor destinations in southwest Montana. The cabins at Eagle Guard Station and the Strawberry Lookout are included in the cabin rental program.

Approximately 64 percent of the dispersed, permitted use, special use, rental cabin and special use cabin sites in this Landscape Area have known weed infestations.

Hunting is one of the most popular recreation activities in the Elkhorn LA. Dispersed recreation (camping) use occurs mostly in Crow Creek and South Fork Crow Creek drainages. While hunting occurs on both private and public land, the majority of hunting takes place on public land. This use primarily occurs during the archery and rifle big game seasons, although mountain lion and upland bird hunting are also popular in the area. One authorized outfitter/guide service operates in the Elkhorn Mountains under a Special Use Permit.

Fishing occurs in several streams within the area. Muskrat Creek, which contains both cutthroat and brook trout, is often fished at a popular dispersed site near the Forest boundary. The East Fork of Dry Creek, Queen's Gulch, and Crow, Elkhorn, McCarty, and Rawhide creeks all have fishable populations of brook trout; however, this use is believed to be limited. Leslie, Hidden, and Tizer lakes have Yellowstone cutthroat trout and are popular fishing/camping/hiking destinations.

Cross-country skiing occurs mostly from the town of Elkhorn toward Elkhorn or Crow Peaks on Forest Road #258 and #8578. The popularity of these roads may be in part due to the good snow conditions and the ability to drive the county road (which is plowed during winter months) to Elkhorn. Snowmobiling is popular on the designated open routes from the town of Elkhorn. Snowmobile use is concentrated primarily in areas also used by cross-country skiers (USFS 1997d).

RESEARCH NATURAL AREAS

Research Natural Areas (RNAs) are designated areas representing as many as possible of the major, natural timber types or other plant communities in an unmodified condition.

REGULATORY FRAMEWORK

At the time the Forest Plan was signed, there were no areas formally designated as RNAs, although three areas were identified as potentially displaying the qualities desired. The Forest Plan was amended in 1997, formally designating Cabin Gulch, Indian Meadows, and Red Mountain as RNAs and continuing management of Granite Butte as a candidate RNA.

The Forest Service Manual 4063 - Research Natural Areas directs that if practicable, exotic plant or animal life should be removed from RNAs.

The establishment records for all of the RNAs say "Pest management and noxious weed control will be as specific as possible against target organisms and induce minimal impact on other components of the area. If invasive exotics are discovered within the RNA, measures will be taken to control or eradicate these populations."

The Decision Notice establishing the RNAs (PF-RNAs) selected an alternative that included this direction: "Procedures permitted for control of noxious weeds and use of herbicides are described in FSM 4063. The need for, and type of, noxious weed control would be reviewed on a case-specific basis and covered by an appropriate review under the National Environmental Policy Act (NEPA)." This analysis serves as the NEPA review.

ANALYSIS AREA

The analysis areas for RNAs are the RNAs themselves.

ANALYSIS METHOD

Information for the Affected Environment came from the Establishment Records for the individual RNAs, which were completed in 1997, current GIS layers and weed inventory. The analysis is based on the effect the activities in each alternative would have on the establishing criteria for each RNA, and potential for affecting ecological integrity.

AFFECTED ENVIRONMENT

There are three RNAs designated within the project area (see **Figure 3-9**). They include Cabin Gulch (2,408 acres) in the Belts/Dry Range LA, and Indian Meadows (855 acres) and Red Mountain (1901 acres) in the Blackfoot LA. One area, Granite Butte (500 acres), also in the Blackfoot LA is proposed for designation.

Cabin Gulch RNA

The current database does not indicate a weed infestation in this location (PF-Weed Database),

however, a 5-acre patch of Canada thistle has been treated and is currently monitored.

The Cabin Gulch RNA is located in the Middleman Mountain/Hedges Inventoried Roadless Area.

Indian Mountain RNA

About 10 percent (106 acres) of the northwest corner of the RNA is in the Scapegoat Wilderness. The RNA borders private land in the southeast corner for about 130 feet. There are no known weed infestations in this RNA.

Red Mountain RNA

This RNA is adjacent to the southwest boundary of the Scapegoat Wilderness Area. There are no known weed infestations in this RNA.

CULTURAL RESOURCES

REGULATORY FRAMEWORK

The primary legislation governing modern heritage management is the National Historic Preservation Act (NHPA) of 1966 (amended in 1976, 1980, and 1992). All other heritage resource management laws and regulations support, clarify, or expand on the National Historic Preservation Act. Federal Regulations 36 CFR 800 (Protection of Historic Properties), 36 CFR 63 (Determination of Eligibility to the National Register of Historic Places, 36 CFR 296 (Protection of Archaeological Resources), and Forest Service Manual 2360 (FSM 2360) provide the basis of specific Forest Service heritage resource management practices. These laws and regulations guide the Forest in identifying, evaluating, and protecting heritage resources.

The Forest Plan is consistent with the laws discussed above. Additional Forest-wide management standards that apply to the alternatives considered include:

- Significant evaluated cultural resource sites would be preserved in place wherever possible.
- A survey for cultural resources would be made prior to ground-disturbing activities.
- The Forest would consult with Native American traditional religious leaders to identify sites to be protected in accordance with the American Indian Religious Freedom Act of 1978.

The Forest Service is required to consider effects of agency actions on heritage resources that are determined eligible for the National Register of Historic Places (NRHP) or on heritage resources not yet evaluated for eligibility. Eligible heritage resources are termed "historic properties." The Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation are also an important element of management of cultural resources on public land.

Several other laws address various aspects of heritage resource management, including the National Environmental Policy of Act of 1969 (NEPA), National Forest Management Act of 1976 (NFMA), Antiquities Act of 1906, Historic Sites Act of 1935, and the Archaeological Resource Protection Act of 1979 as amended in 1988 (ARPA). ARPA and two other regulatory acts describe the role of tribes in the federal decision-making process, including heritage management. ARPA requires Tribal notification and consultation regarding permitted removal of artifacts from federal land. The Native American Graves Protection and Repatriation Act of 1990 recognizes tribal control of human remains and certain cultural objects on public land and requires consultation prior to their removal. The American Indian Religious Freedom Act of 1978 requires federal agencies to consider impacts on traditional tribal cultural sites. The National Historic Preservation Act (NHPA) specifically calls for tribal participation in the consultation process (Section 106).

ANALYSIS AREA

The area analyzed in this section includes all NFS land that may be affected by the Project. Research on known heritage properties included an area approximately one-quarter

mile beyond proposed treatment boundaries. The extended area of analysis provides contingencies for potential over-spray from aerial application of herbicides, or poorly defined site boundaries.

ANALYSIS METHODS

The Heritage Resource Atlas (USFS no date) was compared to potential treatment acres to determine if any cultural resources have been recorded within treatment areas. Due to the various scales of the treatment area maps, it was not always possible to positively ascertain if a resource was located within a proposed treatment area. All resources within treatment areas and any cultural resources that could not be precisely located due to the differing scale of maps were noted.

Review of records at the Helena NF Supervisor's Office also included a search of recent cultural resource reports that have not yet been added to the heritage atlas. These reports were searched for any cultural resources within the four Landscape Analysis Areas. The records review located 109 previously recorded cultural resources. Each site form was reviewed to confirm site location compared to treatment areas for each alternative. The cultural resources that were not located within treatment areas were excluded from further analysis.

AFFECTED ENVIRONMENT

The Cultural Resources Investigation (PF – Heritage) contains all sites located during the records search within proposed treatment areas, including site number and name, a brief site description, and eligibility recommendation.

There are 83 previously recorded cultural resources located in the areas currently infested with weeds (**Table 3-15**).

The previously recorded resources include prehistoric and historic resources. The historic resources include cabins, placer and hard rock mining sites, earthen dams, and historic roads and trails. The prehistoric resources include rock art sites, rock shelters with rock art, lithic scatters, occupation sites, and quarries.

In addition to previously recorded cultural resources, there are weed infested areas that contain historic mining resources not yet recorded. A cursory review of the USGS quadrangles indicates several areas in the Belts/Dry Range and Continental Divide LA that are rich in historic mining resources.

SOCIO-ECONOMICS AND ENVIRONMENTAL JUSTICE

REGULATORY FRAMEWORK

Forest-wide goal #16: Manage the Forest in a manner that is sensitive to economic efficiency.

The Environmental Justice Executive Order 12898, released by the White House in February 1994, places attention on any adverse human health and environmental effects of agency actions that may disproportionately impact minority and low-income populations. Low-income populations are households that live below the subsistence or poverty level as defined by local, states, or national government.

TABLE 3-15
Previously Recorded Cultural Resources Within Weed Infestation Areas

Treatment area	Belts/Dry Range	Elkhorn	Blackfoot	Continental Divide	Total
Sites Eligible	17	1	7	5	30
Sites Ineligible	24	5	3	4	36
Sites with Unknown Eligibility	8	0	2	7	17
Total Number of Cultural Resources	49	6	12	16	83

The Order simultaneously directs Federal agencies to avoid making decisions that discriminate against these communities.

Environmental justice means that, to the greatest extent practicable and permitted by law, populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from and are not affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment.

ANALYSIS AREA

The analysis area is the five counties where weed treatment activities would occur.

ANALYSIS METHOD

Employment and demographic information was gathered from the US Census Bureau and the Montana Department of Commerce. Information on treatment costs was gathered from personal contacts with weed managers in various federal agencies and private weed treatment companies.

AFFECTED ENVIRONMENT

POPULATION AND DEMOGRAPHICS

According to the 2000 US Census, the combined population in the five counties containing affected landscape units was 79,262 (**Table 3-16)**

Federal, state, county, and municipal governments are the primary employers in the five-county region, followed by services and retail trade. Manufacturing accounts for the majority of the employment in Broadwater County. **Table 3-16** and **Table 3-17** present the average annual number of employees by industry, in 2000 for the five counties.

TABLE 3-16
Population by County, 2000

County	Number of Residents	Percent Growth 1990-2002
Jefferson	10,049	26.6
Broadwater	4,385	32.2
Powell	7,180	8.5
Meagher	1,932	6.2
State of Montana	902,195	12.9

Source: US Census Bureau 2002.

Powell and Meagher Counties did not grow at the state level and are not expected to experience any significant growth because, in addition to the lack of employment, there is little privately-owned land available for development.

TABLE 3-17
Industry Employees – Lewis and Clark, Jefferson and Broadwater Counties, 2000

Industry	Lewis and Clark	Jefferson	Broad-water
Agriculture/ forestry/fish	281	28	29
Mining	17	311	72
Construction	1,258	150	48
Manufacturing	1,023	119	325
Trans, comm., utilities	1,216	68	29
Wholesale trade	797	54	40
Retail trade	5,081	263	155
Finance, insurance, real estate	1,841	43	32
Services	7,987	261	160
Government	8,359	863	241

Source: MT Department of Commerce 2001.

Meagher and Powell Counties have a small business base making employment statistics hard to obtain. If there are fewer than five businesses in a category, the Census does not publish employment numbers in order to protect the confidentiality of employers, accounting for the Not Available (na) listing in many categories (**Table 3-18**).

Median household income and the unemployment rate also reflect the difference between the growing counties and those that showed stagnate growth during the census period (**Table 3-19**).

TABLE 3-18
Industry Employees – Meagher and Powell Counties, 2000

Industry	Meagher	Powell
Total, all industry	292	1,143
Agri, Forestry, fish	18	48
Information	na	40
Construction	21	42
Manufacturing	na	na
Trans. and\warehousing	na	40
Wholesale trade	na	20
Retail trade	58	137
Finance, insurance, real estate	na	41
Services	64	378
Health care services	80	288

Source: US Census Bureau 2002.

Helena, the state capital, continues to attract new residents because of government and government-related jobs in the retail trade and services industries. In fact, approximately 60 percent of the five-county population is located in the greater Helena area.

WEED TREATMENT COSTS

A range of costs for each treatment method was developed from four different sources and each was evaluated for relative effectiveness (**Table 3-20**). More information is available in the project file (PF-Social/Economic).

The Helena NF employs 4.4 permanent employees to manage noxious weeds. In fiscal year 2002, 22 seasonal employees were hired (5.5 full time equivalents [FTE]) to assist and implement the control strategies of the noxious weed program. Approximately $340,000 was spent on salaries to implement the program out of a budget of $1.75 million. Fire restoration funds contributed $1.4 million, and the remainder came from Regional allocations and grants. Approximately 5,500 acres were treated in fiscal year 2002 at an average cost of $61.82 per acre (PF-Social/Economic).

TABLE 3-19
Household Income (1999) and Unemployment (2002)

County	1999 Median Household Income	2002 Unemployment Rate
Lewis and Clark	$37,360	4.3%
Jefferson	$41,506	5.1%
Broadwater	$32,689	4.6%
Powell	$29,595	4.8%
Meagher	$22,471	7.2%
State of Montana	$33,024	4.9%

Source: US Census Bureau 2002, MT Department of Commerce 2000.

TABLE 3-20
Weed Control Methods and Costs

Method	General Effectiveness	Cost/ Acre
Ground application of herbicide – vehicle access	High	$24 – 115
Ground application – primarily vehicle access-some backpacking (current method)	High	$62
Ground application of herbicide – backpack access	High	$125-350
Aerial application of herbicide	High	$18 – 24
Biologicals ($1 per insect, 40 insects per acre)	Low - High	$40
Grazing	Low	$20-48
Handpulling	High for small infestations of tap-rooted weeds; low for high density infestation > 1 acres or rhizomatous.	$8,800

HUMAN HEALTH AND SAFETY

REGULATORY FRAMEWORK

Safety standards for herbicide use are set by the Environmental Protection Agency, Occupational Health and Safety Administration (OSHA), Code of Federal Regulations (40 CFR part 170), and individual states. In addition, several sections of the Forest Service Manual (FSM; 1994) provide guidance to the safe handling and application of herbicides. These include:

- Preparation of a safety plan for all pesticide use projects (FSM 2150).

- Consultation of pesticide handling requirements set forth in the Forest Service Health and Safety Code Handbook (FSH) 6709.11, before handling pesticides (FSM 2156).
- Pesticide-Use Management and Coordination Handbook that requires the Forest to review pesticide use proposals in terms of human health (FSM 2109.13.2).
- Recommendation to complete risk assessments prior to pesticide use to ensure public safety (FSM 2109.14).
- Completion of project work plans prior to implementation, including a description of personal protective clothing and equipment required (FSM 2109.14.3).
- Safety Planning that requires development of a safety plan to protect the public and employees from unsafe work conditions when pesticides are involved (FSM 2109.16, FSM 2153.3).
- Safety and Health Hazard Analysis that requires completion of a Job Hazard Analysis (Form FS-6700-7) to determine hazards on the project and identify ways to eliminate them (FSM 2109.16.2, FSM 6700, FSH 6709.11).

Finally, FSM 2109.16.3 states the requirement for, and defines *Pesticide Risk Assessment:* *"Pesticide Risk Assessment. Another method of helping to ensure safety in pesticide use is to conduct risk assessments. Analyses estimate the possible pesticide doses to workers and the public who may be affected by a pesticide application; and the potential effects on fish, wildlife, and other non-target organisms. These estimated doses are then compared with levels of no observed effects based on tests of laboratory animals.*

These analyses are usually incorporated into the decision making documents prepared in compliance with the National Environmental Policy Act (FSM 1950). A pesticide risk assessment does not, in itself, ensure safety in pesticide use. The analysis must be tied to an action plan which provides mitigation measures to avoid potential risks identified by the risk assessment."

ANALYSIS METHODS

The effects analysis compares the application rates, location and timing, and Environmental Protection Measures specified in Chapter 2 with scientific literature on toxicity and risks. The review of the effects of herbicide application in this document includes possible pesticide doses workers and the public may receive, and are compared to levels of no observed effects.

AFFECTED ENVIRONMENT

There is no affected environment for this issue.