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Draft noxious
weed management
plan

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D R A F T NOXIOUS WEED MANAGEMENT PLAN

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1.0 INTRODUCTION

1.1 Noxious Weed Management Program Guidance and Objectives

The Montana Department of Fish, Wildlife and Parks (DFWP) recently adopted its Vision document which describes the direction in which the Department is heading and how the goals articulated within that document will be reached (DFWP 1992). The basic Mission of the agency is:

"to provide for the stewardship of the fish, wildlife, parks, and recreational resources of Montana, while contributing to the quality of life for present and future generations."

A key element of all Montana Department of Fish, Wildlife and Parks programs is to consider how policies and programs affect adjacent lands, and in turn, how adjacent lands affect DFWP properties. This perspective is rooted in a strong commitment to public involvement in management decisions. In 1983, the Department adopted a Noxious Weed Control Program for lands managed by the agency (DFWP 1983). The objective of the program is:

"to prevent, to the greatest extent possible, the reproduction, proliferation, and distribution of agriculturally undesirable plant species throughout department lands or from department lands onto adjacent lands."

Overall direction for regional implementation of the Noxious Weed Management Program is provided by the Vision document and statutory requirements based in state law and local ordinances. The purpose of DFWP Region 3's Noxious Weed Management Plan (Plan) is to describe the administrative and management framework to discourage the introduction of noxious weeds and to stabilize and reduce established noxious weed populations, thereby satisfying legal mandates and serving as stewards of the natural and recreational resources within southwest Montana. This Plan outlines an integrated approach to noxious weed management based on site conditions whereby a variety of methods and techniques, including manual, cultural, biological, and chemical treatments will be applied. More specifically, the objectives of the Plan are to:

- Meet legal requirements to manage plants declared as noxious weeds by the State, Gallatin, Park, Jefferson, Silver Bow, Deer Lodge, Beaverhead, and Madison counties in an ecologically responsible manner.
- Develop an integrated approach to noxious weed management and a strategy to prioritize treatment areas on DFWP administered properties.
- Work cooperatively with adjacent landowners and the County Weed Boards to enable consistent and sound weed treatment efforts.

- Attempt to contain or reduce noxious weed populations, depending on the location and density and to discourage the introduction of new noxious weed species.
- Conduct treatments in an ecologically responsible manner to protect and maintain fish, wildlife, vegetation, and recreation resources and to ensure human health and safety.

1.2 Existing Statutory Requirements

The State of Montana has recognized the damaging effects of noxious weeds in laws and regulations. The County Noxious Weed Control Act of 1979 (MCA 7-22-21-1 *et seq.*, as amended 1991, Appendix A) defines "noxious weeds" as "any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities..." Administered at the county level, this law requires counties to develop weed control districts to plan and implement a weed control program. County commissioners appoint a district weed board which is responsible for the administration and enforcement of the district's noxious weed control efforts. The law provides for the promulgation of rules to list statewide noxious weeds and, it allows for county-wide listing of additional species. In addition, this law also gives specific direction to counties for cooperation with state and federal-aid programs. Furthermore, the law states that "it is unlawful for any person to permit any noxious weed to propagate or go to seed on his [or her] land" (7-22-2115) and, it encourages landowners to file weed control plans (7-22-2116).

The weed species declared as noxious by the State of Montana (through the Department of Agriculture) and by the individual county weed boards within the administrative boundaries of DFWP Region 3 are listed in Appendix B. The treatment of noxious weeds, particularly through the use of herbicides, is also subject to other state and federal laws as well as the policies and programs of other agencies. These are summarized in Appendix C.

1.3 Overview and Setting

Exotic (non-native) "weedy" plants have been noted in Montana throughout this century. DFWP draws a distinction between "weedy" species and "noxious" species. DFWP recognizes the value of some weed species to wildlife as food and/or cover. For example, some "weedy" species in the composite family (e.g. dandelion, prickly lettuce, and goat's beard) are important components of upland game bird summer diets. As declared in law, "noxious" weeds are those non-native species which are very aggressive and successful competitors for nutrients, moisture, and space. In the past few decades, some noxious weed species have become significant components of local vegetation communities, actually dominating some sites. Noxious weeds may reduce vegetation biodiversity and may limit the diversity of wildlife. Native vegetation species are also more desirable for providing erosion control and visual aesthetics.

Noxious weeds occur on many sites currently administered by DFWP, although most invasions occurred prior to DFWP acquisition. The number of species and the total coverage vary considerably by site and the nature of land use. Important factors influencing noxious weed establishment include proximity to water, previous overgrazing practices, human activities, site disturbance and seed dispersal -- the latter two of which can be aggravated by road access.

This Plan considers the treatment and management of noxious weeds on the 148,302 acres owned by or leased to DFWP Region 3 within Gallatin, Park, Jefferson, Silver Bow, Deer Lodge, Beaverhead, and Madison counties (DFWP 1992). Figure 1 illustrates the location of these properties. Several land parcels owned by DFWP are leased to other individuals or municipalities. This Plan will note the location of such properties but not address noxious weed management as individual leases may specifically address the topic. Chapter 2.0 identifies strategies to prioritize treatment activities and reviews methods and techniques of noxious weed treatments. Chapter 3.0 outlines specific weed management programs for the groups of properties outlined below.

1.3.1 Property Groups

Lands administered by DFWP can be classified by the DFWP Division responsible for their management, by land use, by degree of site disturbance, and by the status of noxious weeds. The Wildlife Division oversees the Wildlife Management Areas (WMA's). These areas are set aside primarily to preserve wildlife habitat and secondarily to provide opportunities for both consumptive and non-consumptive outdoor recreation. Within Region 3, there are 12 WMA's, encompassing approximately 138,577 acres. The Fisheries Division administers the acquisition and management of Fishing Access Sites (FAS's), while site maintenance is the responsibility of the Parks Division. Fishing Access Sites provide the public with opportunities to access river corridors and lakes to fish, boat, hunt, picnic, watch wildlife, camp, etc... There are 72 access sites, totalling 5,604 acres in Region 3. In addition to maintaining the FAS's and the administrative Regional Headquarters complex, the Parks Division manages 7 State Parks (SP's) comprising 4,121 acres. State Parks are so designated because of unique historical, recreational, or geologic features which merit protection. Similar to FAS's, land use at State Parks is oriented toward human use. Three administrative sites, totalling 9 acres, are leased to DFWP.

Because of differences in land use, site disturbance, and the degree of noxious weed establishment, these lands have different opportunities and constraints for the management of noxious weeds. Therefore, this Management Plan will examine groups of properties where similarities merit and will direct appropriate management strategies accordingly. Site specific management strategies will be outlined for property groups, while recognizing that some deviations will occur. These differences will be highlighted and addressed more specifically in Part 3.0 of this document. The following discussion describes the groupings in general, whereas Tables 1,2, and 3 outline the property groups, list discrete properties by name, and report the findings of the most recent noxious weed inventory conducted on each property during summer, 1993.

Figure 1. Properties owned by or leased to Montana Department of Fish, Wildlife and Parks in Region 3. Key to the Fishing Access Sites appears on the facing page.

Key to the Fishing Access Sites

YELLOWSTONE RIVER

1. Queen of the Waters	6. Emigrant	11. Loch Leven	16. Mayor's Landing
2. Corwin Springs	7. Emigrant West	12. Mallard's Rest	17. Highway 89 Bridge
3. Slip N' Slide	8. Grey Owl	13. Pine Creek	18. Sheep Mountain
4. Dailey Lake	9. Chicory	14. Carter's Bridge	19. Springdale
5. Point of Rocks	10. Paradise	15. Free River	

GALLATIN RIVER

20. Kirk	24. Erwin Bridge	27. Cherry River (on the E. Gallatin River)
21. Axtell Bridge	25. Four Corners	28. Glen Lake (E. Gallatin Recreation Area)
22. Shed's Bridge	26. Gallatin Forks	29. Bozeman Ponds
23. Cameron Bridge		

MADISON RIVER

30. Raynold's Pass	34. Eight Mile Ford	38. Meadow Lake	42. Blackbird
31. Lyon's Bridge	35. Burnt Tree Hole	39. Black's Ford	43. Milwaukee
32. McAtee Bridge	36. Ennis	40. Greycliff	
33. Varney Bridge	37. Valley Garden	41. Cobblestone	

MISSOURI RIVER

44. Fairweather

JEFFERSON RIVER

45. Three Forks Ponds	48. Harrison Reservoir	51. Cardwell	54. Parrot Castle
46. Drouillard	49. Sappington Bridge	52. Mayflower Bridge	55. Silver Star
47. William's Bridge	50. Limespur	53. Kountz Bridge	

BEAVERHEAD RIVER

56. Poindexter Slough	57. Corrals	58. Henneberry	59. High Bridge

BIG HOLE RIVER

60. High Road	64. Browne's Lake	67. Salmon Fly	70. Greenwood Bottoms
61. Pennington Bridge	65. Kalsta Bridge	68. Maidenrock	71. Dewey
62. Notch Bottom	66. Browne's Bridge	69. Powerhouse	72. Fishtrap
63. Glen			

Table 1. Noxious weed species present and status on Department of Fish, Wildlife and Parks (DFWP) Wildlife Management Areas in Region 3.

DFWP PROPERTY NAME and ACREAGE	WEED SPECIES PRESENT	WEED STATUS		
		SIZE ¹	DENSITY ²	LOCATION
Dome Mountain (4,680.0)	spotted knapweed	80	MD	roadsides; scattered patches south of Dailey Lake, sections 2, 11
	Canada thistle	10	MD	roadsides; scattered patches south of Dailey Lake, section 1
	hound's tongue	20	HD	roadsides, southeast of Dailey Lake, sections 6, 7
	mullein	1	VLD	roadsides
	musk thistle	1/4	VLD	roadsides, southeast of Dailey Lake, sections 6, 7
Fleecer Mountain (10,488.0)	spotted knapweed	150	MD	roadsides; scattered patches throughout WMA, sections 29, 32, 33, 6, 7
	Canada thistle	5	LDA	roadsides
	yellow toadflax	2	LDA	roadsides
Gallatin (9857.3)	spotted knapweed	1/4	VLD	roadsides, mouth of Beaver Creek, section 17
	musk thistle	5	VLD	roadsides, mouth of Beaver Creek, section 17
	Canada thistle	5	VLD	roadsides, mouth of Beaver Creek, section 17
	hound's tongue	2	LDA	roadsides, mouth of Beaver Creek, section 17
Blacktail (17,500.0)	spotted knapweed	1/2	VLD	roadsides, isolated individual plants
	Canada thistle	40	LDA	East Fork Blacktail Creek
Bear Creek (3510.9)	spotted knapweed	5	LDB	roadsides, western boundary, sections 22, 35, 1
	Canada thistle	10	LDB	roadsides, western boundary, sections 22, 35, 1
	hound's tongue	5	LDB	roadsides, western boundary, sections 22, 35, 1
	whitetop	3	LDA	roadsides, western boundary, sections 22, 35, 1

DFWP PROPERTY NAME and ACREAGE	WEED SPECIES PRESENT	WEED STATUS		
		SIZE ¹	DENSITY ²	LOCATION
Wall Creek (7067.1)	spotted knapweed	10	LDB	roadsides, sections 15,12
	hound's tongue	2	LDA	roadsides, sections 22, 14
	Canada thistle	20	LDB	English George Creek, section 36
Mount Haggin (56,151.0)	spotted knapweed	4,000	HD	northern segment, Cabbage Gulch, East Fork Willow Creek; southeast segment, Whitepine Creek; scattered patches southwest segment
	leafy spurge	2,000	HD	northern segment, Cabbage Gulch, East Fork Willow Creek; scattered patches southeast segment, German Gulch; distribution overlaps spotted knapweed
	Canada thistle	40	LDA	Mule Ranch
Robb-Ledford Creek (28,077.7)	spotted knapweed	2	VLD	roadsides, sections 17, 20 in Ledford Creek drainage
	hound's tongue	2	VLD	scattered patches throughout WMA
	hound's tongue	50	MD	roadsides
	field scabiosa	2	LDB	roadside, section 33 in Ledford Creek drainage
	musk thistle	2	LDB	section 17, Ledford Creek drainage
	Canada thistle	2	LDB	section 23, head of Dry Hollow

¹ SIZE: total acres, including roadsides and scattered patches away from roads

² DENSITY: number of weed stems in the population

<i>VLD: very low density</i>	--	<i>one or a few individual plants, accounting for a very small proportion of the vegetative ground cover; native species well represented</i>
<i>LDA: low density - A</i>	--	<i>individual <u>plants clumped in small areas</u>, accounting for a small proportion of the vegetative ground cover; native species well represented</i>
<i>LDB: low density - B</i>	--	<i>individual <u>plants scattered throughout site</u>, accounting for a small proportion of the vegetative ground cover; native species well represented</i>
<i>MD: moderate density</i>	--	<i>individual <u>plants numerous</u>, accounting for a moderate proportion of the vegetative ground cover; native species present</i>
<i>HD: high density</i>	--	<i>individual <u>plants abundant</u>, accounting for a high proportion of the ground cover; native species present but not well represented</i>
<i>VHD: very high density</i>	--	<i>individual <u>plants very abundant</u>, accounting for almost all of the vegetative ground cover; native species almost absent</i>

Table 2. Noxious weed species present and status on Department of Fish, Wildlife and Parks (DFWP) Fishing Access Sites in Region 3, by drainage. Although the Department owns Mayor's Landing, Glen Lake, and Three Forks Ponds, they are leased to other entities and are omitted from this table.

DFWP PROPERTY NAME and ACREAGE	WEED SPECIES PRESENT ¹	WEED STATUS SIZE ² DENSITY ³	
YELLOWSTONE RIVER			
Carter's Bridge (2.8)	SK	10 ft²	VLD
Chicory (1.7)	SK, CT	1/16, 1.0	VLD, HD
Corwin Springs (0.9)	SK, OW	10 ft², 1/16	VLD, MD
Emigrant (2.3)	SK	2.3	MD
Emigrant West (70.7)	SK, CT, ST	5.0, 70.7, 40.0	LDB, MD, MD
Free River (13.4)	SK	13.4	MD
Grey Owl (36.0)	SK, SK, CT, MU, ST	20.0, 5.0, 4.0, 20.0, 1.0	VHD, MD, MD, HD, LDA
Highway 89 Bridge (2.0)	SK, CT, MU	5 ft², 1/16, 10ft²	VLD, LDA, VLD
Loch Leven (65.7)	SK, SK, SK, CT, CT, MT, MT, MT, MU, MU, BT, OW, OW	1/4, 12.0, 30.0, 28.0, 30.0, 1/64, 30.0, 2.0, 30.0, 5.0, 1/64, 5.0, 30.0	MD, VHD, LDB, HD, LDB, VLD, LDB, HD, VLD, LDB, VLD, HD, VLD
Mallard's Rest (18.1)	SK, CT, BT, DT, MU, MU, OW	13.0, 1/64, 1/64, 1/8, 1/32, 1.0, 1/16	MD, LDA, VLD, LDA, LDB, LDA, LDB
Paradise (2.6)	SK, CT	1/4, 1/8	VLD, HD
Pine Creek (2.3)	SK	1/32	LDA
Point of Rocks (15.0)	SK, MU	1/4, 10.0	MD, MD
Queen of the Waters (10.0)	SK	1/64	VLD
Sheep Mountain (7.5)	SK, CT	1/64, 5.0	VLD, LDB
Slip N' Slide (14.3)	NONE		
Springdale (15.5)	SK, CT, MU	1/16, 1/16, 10ft²	LDA, LDA, VLD
GALLATIN RIVER			
Axtell Bridge (4.3)	SK	1.5	LDA
Cameron Bridge (148.9)	SK, SK, CT	5.0, 5.0, 5.0	MD, LDA, LDA
Cherry River (72.0)	LS, CT, OW	1.0, 45.0, 45.0	MD, MD, MD
Erwin Bridge (71.7)	SK, SK, SK	10.0, 20.0, 5.0	LDB, MD, HD

DFWP PROPERTY NAME and ACREAGE	WEED SPECIES PRESENT ¹	WEED STATUS	
		SIZE ²	DENSITY ³
Four Corners (9.4)	SK, SK	2.5, 3.0	MD, LDA
Gallatin Forks (269.3)	SK, LS, CT	4.0, 5 ft ² , 1/4	LDB, VLD, VLD
Kirk (3.9)	SK, CT, OW	2.0, 1.0, 1.0	LDA, LDA, LDA
Shed's Bridge (8.7)	SK, SK	1.5, 1/8	LDA, MD
MADISON RIVER			
Black's Ford (2.0)	NONE		
Blackbird (29.3)	SK	5ft ²	VLD
Burnt Tree Hole (26.9)	SK, CT, OW	1/4, 1/32, 1/32	MD, LDB, LDB
Cobblestone (190.3)	LS, LS, CT, MU	5.0, 10.0, 5.0, 5.0	LDB, MD, LDA, LDA
Eight Mile Ford (30.0)	SK, CT, OW	1/16, 1/64, 1/32	MD, LDA, LDB
Ennis (76.7)	SK, CT, OW	a few plants of each	VLD
Greycliff (497.1)	SK, LS	1.0, 200.0	VLD, MD
Lyons' Bridge (2.0)	SK, CT, MT, OW	1/64, 1/32, 1/64, 1/16	LDA, LDA, LDA, LDA
McAtee Bridge (5.8)	SK, CT, OW	1/8, 1/64, 1/64	LDB, LDA, LDB
Meadow Lake (5.6)	SK, CT, OW	10ft ² , 1/64, 1/8	LDA, LDA, LDB
Milwaukee (7.0)	NONE		
Raynold's Pass (162.0)	SK, CT, OW	1/8, 1/64, 1/32	LDB, LDA, LDA
Valley Garden (147.2)	SK, CT, OW	1/64, 1/64, 1/32	LDA, LDA, LDA
Varney Bridge (7.5)	SK, CT, OW	1/4, 1/64, 1/64	MD, LDA, LDA
JEFFERSON RIVER			
Cardwell (5.5)	SK	2.0	LDA
Drouillard (40.5)	SK, SK	15.0, 5.0	HD, LDB
Kountz Bridge (38.3)	SK	3.0	VLD
Limespur (118.3)	SK	2.0	MD
Mayflower Bridge (20.0)	SK	a few plants	VLD
Parrot Castle (31.0)	SK	2.0	LDB
Sappington Bridge (7.0)	SK, LS	1/64, 3.0	VLD, HD
Silver Star (25.9)	SK, LS	1/16, 0.5	LDA, LDB

DFWP PROPERTY NAME and ACREAGE	WEED SPECIES PRESENT ¹	WEED STATUS	
		SIZE ²	DENSITY ³
William's Bridge (2.3)	SK	1.5	MD
MISSOURI RIVER			
Fairweather (625.0)	NONE		
BEAVERHEAD RIVER			
Corrals (2.5)	SK	0.5	VLD
Henneberry (600.4)	SK, CT	50.0, 100.0	VLD, VLD
High Bridge (13.0)	SK	2.0	LDB
Poindexter Slough (500.0)	MT	150.0	LDA
BIG HOLE RIVER			
Browne's Bridge (10.4)	SK, CT, OW	1/64, 0.5, 0.5	VLD, LDA, LDA
Dewey (4.4)	CT, OW	1/4, 1/4	LDA, LDA
Fishtrap (90.7)	SK, CT	5.0, 5.0	LDA, LDA
Glen (7.9)	SK, CT, OW	1/4, 1/4, 1/8	LDA, LDB, LDA
Greenwood Bottoms (6.1)	CT, OW	0.5, 0.5	LDA, LDA
High Road (3.0)	SK, CT	1/16, 1/16	LDB, LDB
Kalsta Bridge (5.9)	CT	0.5	LDB
Maidenrock (200.2)	SK, CT, OW	2.0, 3.0, 2.0	LDA, LDA, LDA
Notch Bottom (12.3)	CT	0.5	LDA
Pennington Bridge (2.0)	LS, CT, OW	10ft ² , 1/8, 1/8	VLD, LDA, LDA
Powerhouse (35.2)	SK, SK	4.0, 11.0	MD, LDA
Salmon Fly (12.3)	CT, OW	1.0, 2.0	LDA, LDA
PONDS or LAKES			
Bozeman Ponds (23.9)	SK, SK, SK	0.5, 1.0, 0.5	VLD, LDA, MD
Dailey Lake (382.2)	SK, SK, CT, MU, MU, MU, ST, BT, BT	11.0, 1/8, 11.0, 10.0, 2.0, 1/8, 10.0, 10.0, 1/4	LDB, MD, VLD, VLD; LDA, LDB, MD, VLD, LDA
Browne's Lake (73.8)	CT, MT, OW	1.0, 1.0, 2.0	LDA, LDB, LDA
Harrison Reservoir (40.0)	SK, MT, CT	3.0, 1.0, 10.0	VLD, VLD, LDA

¹ Weed species abbreviations:

SK = spotted knapweed	LS = leafy spurge	ST = sow thistle
CT = Canada thistle	MT = musk thistle	BT = bull thistle
MU = mullein	DT = dalmatian toadflax	OW = other weed-like vegetation

² SIZE: total acres or partial acres for each species, respectively:

1 acre = 43,560 ft ² (200' x 200')	1/16 acre = 2,722 ft ² (50' x 50')
1/2 acre = 21,780 ft ²	1/32 acre = 1,361 ft ²
1/4 acre = 10,890 ft ² (100' x 100')	1/64 acre = 680 ft ² (25' x 25')
1/8 acre = 5,445 ft ²	< 1/64 acre estimation in square feet

³ DENSITY: number of weed stems in the population, respectively:

VLD:	<i>very low density</i>	--	<i>one or a few <u>individual plants</u>, accounting for a very small proportion of the vegetative ground cover; native species well represented</i>
LDA:	<i>low density - A</i>	--	<i>individual <u>plants clumped in small areas</u>, accounting for a small proportion of the vegetative ground cover; native species well represented</i>
LDB:	<i>low density - B</i>	--	<i>individual <u>plants scattered throughout site</u>, accounting for a small proportion of the vegetative ground cover; native species well represented</i>
MD:	<i>moderate density</i>	--	<i>individual <u>plants numerous</u>, accounting for a moderate proportion of the vegetative ground cover; native species present</i>
HD:	<i>high density</i>	--	<i>individual <u>plants abundant</u>, accounting for a high proportion of the ground cover; native species present but not well represented</i>
VHD:	<i>very high density</i>	--	<i>individual <u>plants very abundant</u>, accounting for almost all of the vegetative ground cover; native species almost absent</i>

Table 3. Noxious weed species present and status on Department of Fish, Wildlife and Parks (DFWP) State Parks in Region 3.

DFWP PROPERTY NAME and ACREAGE	WEED SPECIES PRESENT ¹	WEED SPECIES	
		SIZE ²	DENSITY ³
Bannack (196.6)	SK	2.0, 1.0	LDB, HD
	OW	6.0	LDB
Beaverhead Rock (71.0)	CT	5.0	LDA
	OW	6.0	VLD
Clark's Lookout (7.2)	SK	1/16	VLD
Lewis and Clark Caverns (2696.1)	SK	1/16, 1/2, 4.0, 37.0, 20.0	VLD, LDA, LDB, MD, HD
	CT	1/4, 1/4, 1/32	VLD, LDA, LDB
	MU	1/8, 1/4, 1.0, 51.0, 1.3, 1.0	VLD, LDA, LDB, MD, HD, VHD
	MT	1/64, 40.0, 10ft ²	VLD, MD, HD
Madison Buffalo Jump (617.5)	CT	1/8	MD
	DT	1/8, 1/64	VLD, VLD
Missouri Headwaters (531.1)	LS	1/4	LDB
	SK	12.0, 3.0, 5.0, 1.3	VLD, MD, HD, VHD
	CT	2.0, 1.0, 3.0	MD, HD, VHD
Parker Homestead (1.7)	OW	1/64	VLD

¹ Weed species abbreviations

SK = spotted knapweed	LS = leafy spurge	CT = Canada thistle
MU = mullein	DT = dalmatian toadflax	OW = other weed-like vegetation

² SIZE: total acres or partial acres for each species, respectively:

1 acre = 43,560 ft ² (200' x 200')	1/16 acre = 2,722 ft ² (50' x 50')
1/2 acre = 21,780 ft ²	1/32 acre = 1,361 ft ²
1/4 acre = 10,890 ft ² (100' x 100')	1/64 acre = 680 ft ² (25' x 25')
1/8 acre = 5,445 ft ²	< 1/64 acre estimation in square feet

³ DENSITY: number of weed stems in the population

VLD: very low density	--	<i>one or a few <u>individual plants</u>, accounting for a very small proportion of the vegetative ground cover; native species well represented</i>
LDA: low density - A	--	<i>individual <u>plants clumped in small areas</u>, accounting for a small proportion of the vegetative ground cover; native species well represented</i>
LDB: low density - B	--	<i>individual <u>plants scattered throughout site</u>, accounting for a small proportion of the vegetative ground cover; native species well represented</i>
MD: moderate density	--	<i>individual <u>plants numerous</u>, accounting for a moderate proportion of the vegetative ground cover; native species present</i>
HD: high density	--	<i>individual <u>plants abundant</u>, accounting for a high proportion of the ground cover; native species present but not well represented</i>
VHD: very high density	--	<i>individual <u>plants very abundant</u>, accounting for almost all of the vegetative ground cover; native species almost absent</i>

Wildlife Management Areas

DFWP manages the Wildlife Management Areas with the needs of wildlife and the maintenance of habitat as primary objectives. Secondary objectives include providing recreational opportunities for the public. Each WMA is a unique portrait of landscape features, vegetation communities, and the environmental forces which shape them. With varying elevations, habitat types, precipitation zones, and management programs, the WMA's will be reviewed individually. These include: Dome Mountain, Fleecer Mountain, Gallatin, Blacktail, Bear Creek, Wall Creek, Mount Haggin, and Robb-Ledford. Part 3.0 of this Plan will highlight these differences and propose weed treatments which suit each property. Smaller WMA's without an active management program include Silver Gate, Bridger Mountain, Red Rock Lake, and Kirk. Bridger Mountain and Red Rock Lake are leased to other parties and will not be discussed further.

Fishing Access Sites

DFWP manages Fishing Access Sites to provide public access to river corridors or lakes as well as to provide reasonable accommodations for vehicle parking, boat launching, and general recreation. As noted earlier, proximity to water and seed dispersal influence the degree and success of noxious weed establishment. Water courses disperse and transport seeds quite effectively. A small, localized weed population will be a seed source for downstream lands if seeds are introduced into a waterway. For that reason, all FAS's for a particular drainage will constitute a property group. For example, leafy spurge is a problem common to most access sites on the lower Madison River; therefore, management strategies should address those sites comprehensively if long-term reduction and/or eradication is to be successful.

In Region 3, several FAS's grant access to ponds or lakes. Two of these sites are leased to municipalities: the East Gallatin Recreation Area (Glen Lake) to the City of Bozeman and the Three Forks Ponds to the City of Three Forks. Neither site will be discussed further in this Plan. However, Bozeman Ponds, Dailey Lake, Harrison Reservoir, and Browne's Lake remain the responsibility of DFWP and will be treated as a property group.

State Parks and Administrative Sites

State Parks attract visitors because of the natural, cultural, recreational, and historical resources. Picnicking and overnight camping opportunities also attract many visitors. Although there are similar opportunities and constraints for the treatment and management of noxious weeds in State Parks, each Park is unique. Thus, groups, where possible, are based on broad cultural, historical, or natural resource similarities.

Because they occur in arid, shrub/grassland steppe, Parker Homestead, Clark's Lookout, and Beaverhead Rock will be considered together. Lewis and Clark Caverns, Bannack, Missouri Headwaters, and Madison Buffalo Jump will each be discussed individually due to the uniqueness of the settings and the resources involved. Differences in facility development and human use will be discussed in greater detail in Part 3.0.

Administrative properties will be grouped and considered with State Parks. They include the Regional Headquarters Complex, the Gallatin Check Station Site, and an administrative use site in West Yellowstone.

2.0 NOXIOUS WEED MANAGEMENT STRATEGIES

2.1 General Approach

It is the goal of DFWP to be in compliance with state laws and county ordinances concerning noxious weeds where they are established. Furthermore, DFWP hopes to discourage the establishment of noxious weeds through the application of good land management principles and to reduce noxious weed populations over time with as few negative impacts to the State's resources as possible. To achieve these goals, DFWP crafted this Noxious Weed Management Plan based on the concept of Integrated Noxious Weed Management (INWM). INWM is a multifaceted approach which tailors weed management activities to the treatment needs and site characteristics of a particular weed population. First, weed management priorities are established. Then, management methods and techniques are selected, including natural predators and parasites, environmental modifications, and chemical herbicides when necessary and appropriate. INWM allows for the most flexibility in managing noxious weeds as site conditions change, treatment methods improve, and funding opportunities arise. This approach is consistent with state law and the noxious weed plans developed by the counties. DFWP has been practicing some form of INWM informally since the early 1980's. This Plan formally adopts this approach.

2.2 Conceptual Framework to Prioritize Activities

Within the context of INWM, there are several ways to prioritize noxious weed management activities. These approaches include species-specific directives based in state law, treatment objectives based on location or size of weed populations, special management zones which require modification of general (area-wide) techniques, and property groups based on watershed or political boundaries. In using INWM, DFWP has adopted an approach which utilizes all of these concepts.

2.2.1 Species Specific Directives

As a state law, the County Noxious Weed Control Act mandates the management of certain species declared as "noxious." Thus, DFWP must attempt to treat and manage those species declared by the state as well as those species declared by the individual counties. On DFWP sites, spotted knapweed and leafy spurge are the most prevalent, but other species are treated as well. Thus, efforts which have primarily been focused on these species will continue, but additional species may need to be added as the state and county noxious weed lists are amended.

2.2.2 Location and Population Size

Noxious weed treatment priorities depend on the location and size of a weed population. Factors to consider are: the potential impact on site values in the absence of weed treatment, potential of weed spread, and the difficulty of satisfactory weed control. These same factors are considered by the state and counties during the process of listing weeds as "noxious." Priorities based on location and population size described below (Lolo National Forest 1989).

Prevention

Prevention describes the implementation of policies, programs, or activities that will minimize the possibility of introduction of noxious weeds or their seeds to DFWP sites from lands nearby. This approach will have a high priority for DFWP since the long term cost effectiveness is high. Attempts will be made to prevent the establishment of a new noxious weed species or new populations on Region 3 properties. Where newly discovered populations are small, the objective is immediate treatment to prevent any increase in size beyond manageable limits.

Preventative measures under consideration include but are not limited to the following:

- Regulate or limit the use of vehicles that could spread and carry noxious weed seeds into an area.
- Require or promote the use of weed seed free materials for livestock feed, landscaping, revegetation, and construction activities, including topsoil, gravel, hay mulch, and seed mixes.
- Require the thorough cleaning of all heavy equipment used on Region 3 lands, where feasible.
- Cooperate in education programming initiated by other organizations, where feasible, concerning the problems caused by noxious weeds, how weeds spread, and how the spread can be curtailed.

Eradication

Eradication is an attempt to totally eliminate a noxious weed species or a particular weed patch from Region 3 properties. Eradication is preferred where weed populations are small but have the potential to spread rapidly. However, this approach has limitations. Long term efforts may be required where the seed source is established; current technologies may not be adequate or practical; or total eradication efforts may result in unacceptable environmental consequences. When appropriate, eradication efforts would continue as long as detectable levels of the weed were present. For small populations, the cost effectiveness of eradication efforts is high.

Reduction or Suppression

Reduction or suppression is an attempt to prevent seed production and distribution throughout the treatment area and reduce the coverage of the weed. Reduction will prevent the weed from dominating the vegetation of the area but will require the public and land managers to accept noxious weed presence at low levels since complete elimination would not be feasible. Reduction is preferred in most instances when light to moderate noxious weed populations exist in accessible areas.

Containment

Containment is an attempt to prevent (through eradication or die off) the spread of the weed beyond the perimeter of a weed patch or treatment area. Managers and the public must tolerate weeds within established areas, but not beyond current boundaries. Containment is the preferred approach when weed populations have grown so large or dense that reduction is not practical or possible. In some situations, weeds may exist in settings where all methods of treatment are either unacceptable or ineffective so that containment is the only practical course of action.

Tolerance

Tolerance is to accept the continued presence of established weed populations and the probable spread to ecological limits for a particular species. Tolerance should only be applied in the context of containment. Tolerance is only acceptable if noxious weeds are contained within an area and not allowed to spread beyond the ecosystem. Like containment, tolerance situations usually exist where noxious weeds are beyond control or are in environments where all methods of treatment are either unacceptable or ineffective. The manager must identify these situations and try to discourage weed encroachment through preventive practices.

2.2.3 Special Management Zones

Although weed treatment needs may be similar from site to site or within the boundaries of one particular site, each site is a unique juxtaposition of environmental features, visitor facility development, and level of human use. For these reasons, individual sites or groups of sites may be distinguished into management zones based on the following: presence of surface water or shallow groundwater, threatened, endangered, or sensitive species, intensity of human use, weed treatment objectives, or other factors. The framework of management zones permits the identification of weed treatment methods and techniques amenable to a particular weed patch should it require the modification of general area-wide weed treatments. Three zones have been identified: surface and groundwater, sensitive species, and high human use. Because of the sensitive nature of these special management zones, herbicide use will be somewhat limited. A discussion of each zone and guidelines for their protection follow.

Surface and Groundwater Zone

Sensitive surface and groundwater zones constitute locations of aquatic vegetation, surface water, shallow groundwater, and groundwater recharge. Examples include wetlands or marshes, riparian areas, lakes or ponds, springs, rivers, flood plain, and pathways of overland runoff. Because of their high moisture content and abundant nutrients, these environments are highly productive, yielding valuable fishery and wildlife habitats, recreation areas, and livestock foraging areas. Such zones occur on a significant portion of DFWP properties in Region 3. Noxious weeds exist within many sensitive surface and groundwater areas. The weed management goal is to attempt to protect riparian areas and wetlands from encroachment by noxious weeds while preventing chemical contamination of surface and groundwater if weeds are treated in these zones.

Surface water zones can be determined by studying topographic features of a site. After surveying the presence and location of surface water, high water marks, and associated overland runoff contours, a chemical applicator can discover and avoid avenues of potential surface water contamination. In addition, a preliminary soil analysis will determine soil textures. Course, gravelly soils tend to have higher infiltration rates, which imply the potential to transport chemicals. The opposite is true of fine textured, clayey soils.

Sensitive groundwater zones could be identified on a soils map using a procedure developed for the Lewis & Clark County Conservation District (Lacey 1991). Risk of chemical contamination of water resources is determined for a site based on depth to the seasonal or permanent water table, soil permeability, soil organic matter content, flooding hazard, and percent slope. A risk index based on these variables was calculated on a scale of 1 to 100 and divided into 4 categories or classes of risk. Risk factors and classes were then indicated on a map of soil units (Table 4). The U.S. Department of Agriculture (USDA) Soil Conservation Service has completed the Madison County soil map, but is in the process of mapping soils in the other 6 counties in Region 3. Until detailed soil maps become available and some of the other variables are quantified, the following guidelines are suggested to protect surface and groundwater from chemical contamination:

- Target noxious weeds encroaching upon sensitive surface and groundwater environments (e.g. purple loosestrife) so weeds don't become well established.
- Avoid applying herbicides directly to standing or running water; maintain a 50 foot distance from surface waters when applying chemicals; when applying chemicals within 50 feet of a surface water, use a wick applicator; because manufacturer label restrictions are not always restrictive enough, more restrictive guidelines could be established as site conditions merit.
- Mix and load herbicides off-site as much as possible; mixing, if done on site, should be at least 500 feet from open water or shallow groundwater; water for tank mixing should be obtained off-site.

- Avoid applying picloram on the immediate banks of a water body, below the high water line, or in high groundwater risk class areas.
- Encourage manual, cultural, and biological methods; if chemical methods are used, design and schedule herbicide treatments to have the least impact on fish, wildlife, non-target vegetation, and water quality.
- Avoid using boom sprayers where noxious weed plants and seeds are mixed with desirable woody vegetation; biological, cultural, or manual methods which target individual plants (e.g. wick applicator) are preferred in these settings.
- Avoid broadscale applications with high herbicide rates on areas where fractured bedrock lies close to the soil surface.

Table 4. Soil index values, risk classes, and soil descriptions used to identify groundwater areas sensitive to chemical contamination (Lacey 1991).

Index	Class	Soils Descriptions
100+	1-Very High	Soils with water tables within 3 feet and moderately rapid to very rapid permeability; herbicide use not recommended on these sites.
80-99	2-High	Soils with water tables within 3-6 feet, moderate to rapid permeability, no flooding risk; <u>or</u> soils with water tables within 15 feet, moderately rapid to very rapid permeability, high flooding risk, and low organic matter; spot treatments with herbicides may be utilized in some areas; reduce herbicide rates and application frequency to decrease contamination risk; low leach potential and short residual herbicides recommended for any large scale applications.
60-79	3-Moderate	Soils with water tables within 6-10 feet and moderately slow to very slow permeability; <u>or</u> soils with water tables within 15 feet and rapid to very rapid permeability; these soils often occur in association with high water table soils; herbicides can be used for spot treatments on these sites; large broadscale applications with high herbicide rates not recommended; decrease application frequency to reduce risk.
40-59	4-Slight	Soils with water tables within 15-25 feet and moderate to moderately rapid permeability; soils occur where landscape features resemble those with high water table soils; may be located on benches and terraces adjacent to perennial or intermittent streams; few restrictions for herbicide use.

Sensitive Species Zone

Sensitive species zones possess physical and biological features essential to the conservation or survival of plants or animals. Typically, these zones support animal or plant populations which may be adversely affected by the presence of noxious weeds or efforts to treat them. More specifically, they might provide vital habitat for species designated threatened or endangered under the Endangered Species Act or as sensitive by the Montana Natural Heritage Program. Noxious weeds occur in many sensitive species zones. The weed management goal within this zone is to protect existing, diverse habitats from encroachment by weeds while ensuring that threatened, endangered, rare or unique species are not adversely affected by noxious weed treatments. The following guidelines are offered:

- Determine sensitive species zones or identify and locate sensitive species populations for each property or group of properties and establish treatment buffers if necessary.
- Direct management towards weed populations in the vicinity of sensitive species zones before weeds become established in the sensitive zone.
- Encourage manual treatments, although some cultural and spot herbicide treatments may be considered where appropriate.
- Design and schedule herbicide treatments to have the least impact on wildlife, fisheries, and non-target vegetation.
- Avoid using boom sprayers in sensitive species zones where weeds are closely mixed with desirable woody vegetation.
- Consider revegetation or rehabilitation of treated wildlife habitat areas as part of the treatment plan to ensure that desirable ground cover is established without affecting sensitive plant species.

High Human Use Zone

High human use zones are areas which have concentrated and frequent recreationist or DFWP employee use. Examples include picnic table areas, tent sites, restrooms, drinking water well sites, interpretive sites, and boat launch areas. Because of the high degree of ground disturbance and the intense activity level, these areas are very susceptible to the encroachment and rapid spread of noxious weeds. Once invaded, these areas require aggressive treatment actions. The weed management goal is to reduce noxious weed populations in areas which are continually or heavily used by people, while simultaneously ensuring public health and safety. In the majority of situations, a buffer zone of at least 50 feet is maintained from such zones during chemical application. Weed management guidelines for this zone follow:

- Emphasize prevention as the key component of management efforts, primarily by cooperating with educational programming initiated by other organizations to increase public awareness of noxious weeds.
- Encourage manual, cultural, or biological treatments; consider the plausibility of spot herbicide treatments on a site by site basis.
- Post signs in high human use zones prior to and for 24 hours after herbicide applications to notify the public that spraying activities will/have occurred.
- Wash and rinse residue from surfaces used by the public for food handling if herbicides are applied within 50 feet.
- Use only those chemicals with label designations specifying permission for use in human occupation areas (e.g. glyphosate, clopyralid, and 2,4-D).

2.3 Treatment Methods and Techniques

Within the framework of INWM, there are four general weed treatment methods, each with several specific techniques or agents. Manual, cultural, biological, and chemical methods for the treatment and management of noxious weeds are described below, with specific techniques or agents identified. Additional methods and techniques will be considered in the future as they become available.

2.3.1 Manual

Manual techniques involve grubbing with hand tools (shovel, hoe, pulaski etc...), topping (shears, clippers, and "weed-whackers"), and hand-pulling to treat noxious weeds. These techniques can effectively reduce small populations of annual or biennial noxious weed species, primarily by reducing seed production. Periodic re-treatment is required. Because these techniques are labor intensive, their application would be mostly limited to environmentally or culturally sensitive areas.

2.3.2 Cultural

Cultural techniques include burning, mowing, tilling, reseeding, and grazing. These techniques effectively reduce some noxious weed species, although implementation is often limited by topography and access. These techniques can also be costly and time consuming. Furthermore, some techniques disturb the soil which can contribute to noxious weed proliferation if revegetation does not occur rapidly.

Burning

As a treatment technique, burning alone is generally of limited effectiveness. It may be considered in the future in conjunction with other treatment techniques such as reseeding.

Mowing and Tilling

Mowing and tilling can prevent noxious weed plants from producing seeds when treated in the bud stage or earlier. Repeated efforts during a single growing season can deplete the underground food supply of some perennial species. These treatments would need to be repeated over at least a five-year period to attain satisfactory results since they do not eliminate weed plants themselves. These methods may also weaken non-target species. Mowing and tilling opportunities are often limited because of steep slopes and rugged terrain. Mowing would be considered on level or nearly level slopes, where suitable soils exist and where a small percentage of the vegetation consists of shrubs. Mowing is also an alternative in environmentally sensitive areas where other treatment methods are unsuitable. Tilling would be considered only for areas that had previously been or are currently under cultivation because ground disturbance may increase the likelihood of noxious weed establishment beyond the potential benefits of tilling. However, tilling combined with a reseeding program would be considered when economically feasible. Other treatment methods would also be considered in conjunction with tilling such as alternate cropping systems, grazing systems, or chemical applications.

Reseeding

Reseeding is required where plant communities are completely disturbed by facility construction. It may also be advisable where vegetation communities are dominated entirely by noxious weeds. Such revegetation projects require considerable effort to eliminate existing weeds, prepare a seedbed, and re-plant. In radically disturbed areas, it is imperative to reseed as soon as possible. Topsoil should be salvaged and replaced on the disturbed site immediately to encourage native species to sprout from seed, rhizomes, or other plant parts in the salvaged soil. Despite the significant expense, dramatic results can be achieved.

Grazing

Grazing by domestic sheep and goats have effectively controlled the spread of leafy spurge in certain situations in Gallatin County and other parts of Montana, as well as in North Dakota. Other weed species were often selected early in the growing season since they tend to green up earlier than native plants. Controlled livestock grazing incorporating adequate vegetative rest is utilized on several of the WMA's to maintain and/or improve range condition thereby discouraging weed proliferation. Many leafy spurge populations on Region 3 properties occur where careful herding and/or installation of temporary fences would be necessary. When considering this treatment technique, the effect of grazing on soils, water, and riparian areas will be considered.

2.3.3 Biological

Biological control methods are those which introduce natural enemies (insect pathogens) to a noxious weed population. Biological control agents stress noxious weeds, severely reducing seed production and/or plant viability. Biological agents will not eliminate the species, but can reduce the population to a tolerable level, particularly when used in combination with other treatment techniques. Biological control methods may be the only treatment possible in areas where manual, cultural, or chemical methods are not feasible.

Biocontrol agents are currently being developed and screened by universities and the USDA Animal, Plant and Health Inspection Service (APHIS). There are also commercial sources for a number of agents. Several biological agents have been released in the counties of Region 3. Release of biological control agents onto DFWP properties will be in cooperation with the counties, the Montana Agricultural and Experiment Station at Montana State University, and APHIS. DFWP personnel in Region 3 have been working with APHIS to establish insectaries on certain properties which meet selected criteria. Over the long term, biological control agents are cost effective because expenses are limited to the collection and release of new agents and periodic monitoring to insure spread and infection. However, it remains to be seen whether biocontrol agents can keep pace with the rate of spread of certain noxious weed species, whether on DFWP properties or elsewhere.

With any biocontrol program, it is necessary to maintain a viable host population for the biological control organism. Areas selected for release of these agents will be screened with respect to location and plant community. As such, these areas preclude weed eradication objectives and the use of herbicides. Appendix D summarizes biological control agents currently available in Montana, and those which have been released on DFWP properties in Region 3.

2.3.4 Chemical

Chemical methods involve the use of herbicides to kill weeds directly or the application of soil sterilants which prevent the germination of noxious weed seeds. Over the past half-century, chemical herbicides have been developed to treat a variety of weed species. While the benefits of chemical techniques include efficacy and low cost, there are valid concerns about any application of chemicals to the landscape. In addition to concerns about the effects of chemical exposure on human health and the environment, attention has also focused on chemical storage, handling, use, and disposal procedures. Herbicide manufacturers have responded to these issues with attempts to develop products that are: (a) more pest specific to reduce effects on non-target species, (b) less toxic to humans, birds, fish and other animals, and (c) less likely to impact the environment, particularly water quality. The following discussion highlights these points in greater detail.

Efficacy and Cost

Properly used chemical herbicides are usually effective against their targets. Variation in effectiveness is attributable to environmental conditions, skill of the applicator, condition of the equipment, application rates, and the target species. For example, leafy spurge is difficult to eradicate with chemicals whereas spotted knapweed can be successfully eradicated, in the short-term. Herbicides are relatively inexpensive to obtain and apply.

Human Health Effects

A definitive evaluation of human health risks from exposure to herbicides is beyond the scope of this Plan. The long-term health effects of chemical herbicides continue to be researched. Short-term health effects can be serious for sensitive individuals. Health effects are most commonly reported among herbicide applicators. Due to uncertainty over health and environmental effects, DFWP hopes to reduce the use of chemical herbicides over time.

Environmental Concerns

Environmental concerns over the storage, handling, use, and disposal of chemicals are based on four issues: persistence, potential for movement, contamination of surface and groundwater, and the potential for chemical spills.

Persistence refers to the longevity of a chemical's integrity. It is usually expressed as half-life or the length of time required for half of the substance to become inert. Herbicides are degraded by physical, chemical and biological processes. Many herbicides degrade to very low levels in soil after several weeks or months, whereas others persist for several months to years. Most herbicides are broken down and adsorbed in the uppermost 12 inches of the soil profile.

Potential for movement describes the transport of chemicals through the environment as solids, liquids, and gases. Once applied, herbicides are absorbed, adsorbed, accumulated, degraded, diluted, inactivated, and/or mobilized. Solubility in water gives a preliminary indication of chemical mobility. The ultimate fate is heavily influenced by the type of herbicide, the application rate, environmental conditions at the time of application, and site characteristics. Individual properties or characteristics of herbicides also affect persistence and potential for movement due to the interaction of active ingredients with soil organic matter and clay particles. Research has been conducted on most common herbicides to establish environmental pathways and final fate. Research findings are incorporated into herbicide label instructions distributed with chemicals at purchase. These instructions are an important component of herbicide use and safety and will be discussed later.

Contamination of surface and groundwater results from improper use and application of chemical herbicides. Sandy and gravelly soils, having high infiltration and hydraulic conductivity rates, may transport chemicals directly to surface or groundwater. Transport may also occur where fractured bedrock lies close to the surface. Drainage paths, whether natural or artificially

created, could also transport chemicals. These mechanisms of transport involve relatively low chemical concentrations, though some level of contamination may still result if appropriate applications guidelines are not followed.

In contrast, the potential for high chemical concentration levels exists in the event of a spill, with the extent of contamination depending of the nature of the spill. Many spills occur during transport, resulting from auto accidents. However, spills may also occur during application or storage. For these reasons, this Plan also outlines emergency response procedures in the event of an accidental spill. The Herbicide Emergency Response Plan is in Appendix E.

Because of the aforementioned concerns, DFWP intends to minimize the reliance on chemical methods as much as possible, while still meeting its legal responsibility to manage and treat noxious weeds on its properties. However, because the proliferation of noxious weeds does not appear to be decelerating, chemical methods remain a necessary component of this Plan. Therefore, it will be under the following guidelines that DFWP applies chemical herbicides to its properties:

- Consider the treatment objective, season of application, stage of plant growth, topography, species present, expected cost, equipment limitations, and potential environmental impacts during site specific planning.
- Determine rates of application from label instructions, taking into account target species, other vegetation in the area including desirable vegetation species, soil type, human occupation, wildlife, and the presence of surface waters or shallow groundwater.
- Conduct and supervise all applications with an applicator licensed by the State of Montana, whether that individual is a Department employee or contractor.
- Use vehicle-mounted spray applicators (hand-gun, boom, injector etc...) in open areas that are readily accessible and where vehicle operation will not damage soil or vegetation; the boom will only be used for concentrated weed patches.
- Use hand applicators (backpacks or wipers) on small, scattered patches in rough terrain or environmentally sensitive areas.
- Dismiss the possibility of aerial herbicide applications for the present time; reconsider in the future as warranted.
- Monitor weather conditions during application periods to ensure effectiveness of the application and to reduce drift; spraying would cease when rainfall is expected within 24 hours, air temperatures exceed 85° F, or wind speeds exceed 8 m.p.h.
- Design and adjust spray equipment to deliver a median drop diameter of 200-800 microns to reduce excessive drift.

- Conduct calibration checks at the beginning of the spraying season and periodically to ensure that equipment is functioning properly and that the desired applications rates are achieved, when feasible.
- Attempt to apply herbicides during the optimum stage of plant growth to achieve maximum effect using the least amount of herbicide; this is usually in the spring and/or fall when adequate soil moisture is available for plant growth and herbicide uptake.
- Mix a dye, when feasible, with the herbicide solution to aid in identifying where spraying has occurred in order to prevent "double-spraying" and to provide a means of checking coverage for monitoring purposes.
- Avoid applying picloram to dense stands of noxious weeds in sequential years to prevent overuse of a persistent chemical capable of leaching into groundwater.
- Follow all herbicide label instructions, observing restrictions; additional precautions may also be taken.

2.4 Inventory and Monitoring Procedures

Prior to the preparation of this Plan, inventories were conducted during summer, 1993 and during previous years. Inventories consisted of field reconnaissance by DFWP personnel or DFWP contractors who noted the weed species present, location, approximate acreage, and its density. See Tables 1, 2, and 3 for a summary. Based on these reports, weed treatment activities are prioritized using the conceptual framework presented previously. Subsequently, work plans for the following field season are outlined. Monitoring on a yearly basis will be conducted through similar informal field reconnaissance methods. Priorities and treatment methods can be adjusted as necessary, due to the dynamic nature of noxious weed seed germination and plant growth.

2.5 Other Subjects of Concern

2.5.1 Oversight of Plan Implementation

The ultimate responsibility for implementation of this Plan and compliance with its provisions rests with the Regional Supervisor. However, the most direct oversight of field personnel conducting weed treatments is the responsibility of the Regional Managers of the Division lands under their jurisdiction, respectively. For example, the Regional Wildlife Manager would directly oversee weed management activities on the Wildlife Management Areas whereas the Regional Parks Manager would oversee weed management activities in State Parks.

2.5.2 Threatened, Endangered, and Sensitive Species

One goal of this Plan is the preservation of fisheries, wildlife, and vegetation resources under the stewardship of DFWP in Region 3. Land management agencies and conservation organizations have developed lists of threatened, endangered, or sensitive plant and animal species. Those species listed in Montana are of concern due to relatively small population sizes and/or limited distributions. Appendix F summarizes reported occurrences of such species on or near DFWP sites in Region 3 (Montana Natural Heritage Program 1993). Properties in this Region include aquatic, moist forest types, dry forest types, and shrub grasslands -- some with similar environmental and site conditions as habitats supporting listed species. DFWP personnel involved in weed management activities should be aware of this list. In addition, they should periodically consult with the DFWP Plant Ecologist and the Endangered Species Program Coordinator.

2.5.3 Applicator Licenses and Record Keeping

Applicators of restricted use herbicides must be licensed by the State of Montana. To obtain a license, the applicator must take training courses and pass an exam. To retain that license, the applicator must earn re-certification credits in government-approved courses. State law also requires that applicators record their use of restricted herbicides. Records must indicate the location's legal description, the chemical applied, rate of mixing, the applicators, the weather conditions at the time of application, and the number of acres treated. These records must be submitted to the State Department of Agriculture one out of every five years. In addition, the records must be made available to state investigative officers at any time following an herbicide application. All aspects of applicator licensing, re-certification training, and record keeping regulations administered by the State are supervised by the United States Environmental Protection Agency. Appendix G outlines herbicides used in Region 3.

In addition to the State reporting requirements, DFWP policy also requires the annual reporting of all measurable weed treatment activities conducted on any Department property, regardless of the methods and techniques employed. All cultural, manual, biological, and chemical treatments are recorded according to county and site name, type of action, species treated, number of acres treated, application rate, frequency of treatment, and total cost. Periodically, the Department produces summary reports of all noxious weed management activities statewide. Region 3 reports are filed at the Regional Headquarters Office in conjunction with yearly workplans.

2.5.4 Herbicide Labels

Herbicide labels are an important component of chemical use and safety. Manufacturer labels are in booklet format and supplied with each container of product. The booklet contains detailed information to meet four important goals of herbicide regulation, including: chemical identification, protection of human health and the environment, special practices, and legal

requirements. Herbicide labels have the force of law and should be an integral part of any chemical weed management program. Appendix H contains manufacturer labels for those herbicides proposed for use in Region 3.

2.5.5 Contracted Services

Some weed management activities in Region 3, especially herbicide applications, have and will continue to be contracted to private individuals. Contractors must be licensed by the State and knowledgeable concerning the specific weeds to be treated and chemicals to be used. Contractors must also sign and comply with a Personal Services Contract, in addition to carrying a liability insurance policy of \$750,000. Contractors should be familiar with all components of this Plan, especially those regarding safety and emergency response. Contractors must be provided with clear information and directions and be supervised to insure compliance with contract specifications and this Plan.

Contractors should keep detailed records concerning applications, including: time and date of applications, chemicals used, amounts and mixing notes, public contacts, weather, and other pertinent information. This record-keeping can be coordinated with other herbicide use and reporting programs.

Contractors utilizing non-chemical methods of weed treatment would also be provided with the necessary information and direction to meet the specifications of the contract and this Plan. Their activities will also be recorded and filed.

3.0 PROPERTY GROUP TREATMENT PLANS

In most cases, existing information is sufficient to define the conditions of DFWP Region 3 properties with respect to noxious weeds. Property group treatment plans were prepared based on these data. Plan preparation was also guided by the following factors, each of which stems from the conceptual framework to prioritize weed management activities discussed in Part 2.0 of this Plan:

- weed species present
- size and density of weed populations
- management objectives
- potential for successful treatment
- potential for spread on DFWP property
- potential for spread beyond DFWP property
- public concern over weeds or weed management efforts
- existing local weed management projects
- budget and personnel constraints

3.1 Wildlife Management Areas

3.1.1 Introduction

Wildlife Management Areas (WMA's) are managed to meet the needs of wildlife, preserve wildlife habitat, and provide recreational opportunities to hunt, fish, or view wildlife in their natural habitats. Site specific, integrated resource management plans are in various stages of development and/or revision and will be filed at the Regional Headquarters Office as they are finalized. These management plans describe overall management direction and specify certain activities to be undertaken to reach some desired future condition. Common to every WMA management plan is the application of proper land management practices to maintain or enhance healthy, vigorous vegetation communities. To the degree that vegetation communities are healthy and vigorous, they will be able to resist noxious weed encroachment. Furthermore, the quality of wildlife habitat is directly linked to the health and stability of vegetation communities. Thus, the prevention of noxious weed encroachment is inherent in the administration of these properties.

On WMA's, good land management begins with protecting the soil and vegetation resources. All WMA's have vehicle restrictions intended to prevent excessive soil disturbance and/or erosion. Motorized vehicles are restricted to established roads or trails and designated parking areas. Vegetation and soil resources are also protected by requiring the use of certified weed seed free hay to prevent the introduction of noxious weed seeds to WMA's.

WMA's are a small part of a larger landscape in which, unfortunately, noxious weeds occur, and noxious weeds have been documented on the WMA's in Region 3. DFWP is required by law to attempt to manage noxious weeds on its properties. As such, any noxious weed management should be approached on the landscape level, considering neighboring landowners, land use practices, and mechanisms of noxious weed seed dispersal. To that end, noxious weed management on the WMA's will center around maintaining healthy vegetation communities, deterring seed dispersal, and the detection and treatment of noxious weed outbreaks before they become well established.

Quick detection and treatment of small patches is the most efficient approach to managing noxious weed outbreaks. As populations increase, the number of potential treatment methods dwindles as other considerations come into play. For example, chemicals could be applied to a 1/10 acre patch with some risk to other vegetation, but they could not be applied broadscale to a 10 acre patch without potential impacts on non-target vegetation or other resource values. In addition, seed production influences the long term success of weed treatments. The volume of seeds produced on a 1/10 acre patch is much less than that of a 10 acre patch, thus making it easier to confine or eradicate the smaller one.

Budget and personnel constraints necessitate the implementation (when necessary) of treatment methods which maximize the ratio of expedient, successful noxious weed treatment to cost. Of the methods currently available, chemical treatments offer the most cost effective means of weed management. However, there are circumstances where chemical methods are not feasible, such as near surface waters or where weeds cover a wide area. Manual methods are not practical in most cases because of budget and personnel limitations. Cultural methods, though effective in certain situations, sometimes result in additional soil and vegetation disturbances, two factors contributing to the spread of noxious weeds. Biocontrol methods offer a cost effective alternative though they are not appropriate in all settings. Furthermore, biocontrol agents are not yet readily available. Only a few sources dispense agents commercially, at a premium price; otherwise, agents must be obtained from APHIS.

Each WMA is discussed individually with respect to the status of noxious weeds and management strategies. Recall that Table 1 summarizes the noxious weed species present and status for WMA's in Region 3. It should be pointed out that the estimated area (in acres) presented in Table 1 is cumulative for an entire site, since weeds are not continuously distributed throughout a WMA. That is, estimated acres of weeds along roadways are added to estimated acres in remote locations to obtain a total amount of acres. Figure 2 illustrates the location of the WMA's in Region 3.

Figure 2. Wildlife Management Areas (WMA's) administered by Montana Department of Fish, Wildlife and Parks in Region 3.

3.1.2 Bear Creek

Existing Environment

Bear Creek WMA was first purchased in 1954, with parcels added in 1956, 1957, 1959, 1960, and 1963. During these same years, DFWP sold some tracts. The net effect of these transactions was the consolidation of ownership into contiguous blocks. Bear Creek is located 17 miles south of Ennis and 4 miles east of Cameron in the Madison mountain range. It consists of 3,511 acres of deeded land in Madison County, with private land to the west and south and Gallatin National Forest land to the east. Bear Creek was originally purchased to provide and assure a source of winter forage and cover for elk which summer on the Gallatin National Forest and in Yellowstone National Park. In addition, its values for other game and nongame species, as well as outdoor recreation opportunities have long been recognized. Vegetation on the WMA is primarily lower elevation grasslands. Conifers predominate at higher elevations, roughly corresponding with the National Forest boundary. Public use facilities consist of four designated parking areas and two gravel access roads.

Weed Status

In total, approximately 23 acres of Canada thistle, spotted knapweed, hound's tongue, and whitetop occur on Bear Creek WMA (Table 1). All four species occur in relatively low densities. These weeds are associated with access roads located on the western perimeter of the property. At present, these populations are contained at their current levels through annual chemical treatments.

Site Constraints

Chemical treatment of noxious weeds on Bear Creek WMA is constrained by the presence of surface waters, namely the North and Middle Forks of Bear Creek, Burger Creek and a few springs. These surface waters are used by neighboring landowners to the west before draining into the Madison River.

Weed Management Strategies and Methods

By restricting vehicles to established roads and trails and by requiring certified weed seed free hay, DFWP hopes to curtail the spread of noxious weeds. However, due to the mobility of our society and to the fact that the public is welcome to (and does) use public resources like Bear Creek, noxious weeds will likely persist. Therefore, the weed management goals are to attempt contain weeds at their current levels and locations, to prevent weeds from spreading to or from adjacent lands, and to comply with county ordinances and state laws concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate, manual, cultural, or biological methods will be used. Where possible, weed treatment efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.3 Dome Mountain

Existing Environment

Dome Mountain WMA was purchased in 1986, but parcels were also added in 1987 and 1989. Dome Mountain was put into public ownership through a cooperative effort of the Rocky Mountain Elk Foundation and the U.S. Forest Service. Management of the property rests solely with DFWP. Dome Mountain WMA, located 14 miles north of Yellowstone National Park and 30 miles south of Livingston, consists of 4,680 acres of deeded land. National Forest land occurs to the east and southeast. Narrow strips of Bureau of Land Management ownership occur on the east and southwest boundaries. Private land adjoins the WMA immediately to the south, north, and west. In addition, there is a small private in-holding of 160 acres located on the upper slopes of the WMA. It is used as a recreational cabin site. The Montana Power Company leases a right-of-way for a utility line. Dailey Lake accounts for approximately 120 acres within the WMA.

Dome Mountain WMA provides winter range for local, resident elk and for migratory elk from the Northern Yellowstone Elk Herd. The values of the WMA for other species of game and nongame and for outdoor recreational opportunities are also recognized. Public use facilities include designated parking areas, limited gravel roads for travel, picnic areas, out houses, and a boat ramp. (The latter three are associated with Dailey Fishing Access Site and will be discussed in Part 3.2.9 below).

Dome Mountain WMA consists primarily of open bunchgrass communities at elevations of 5,200 - 7,600 feet, either as dryland bench or as mountain foothills. In addition, there are riparian aspen - shrub communities, irrigated agricultural hay meadows, and a wetland marsh. The hay meadow is leased to a nearby landowner, providing the lessee with hay and wildlife with a forage source.

Weed Status

In total, approximately 112 acres of spotted knapweed, hound's tongue, Canada thistle, mullein, and musk thistle occur on Dome Mountain WMA (Table 1). Spotted knapweed is the most common, accounting for about 80 acres of the total. Weeds are associated with access roads, primarily in the southwest corner of the property. Weeds also occur along the southbound road leading to the private inholding. The proximity of Dome Mountain WMA to a well-traveled state highway serving as a primary route to Yellowstone National Park increases the potential for noxious weed introductions to this WMA. This potential is heightened by the fact that a seed source already exists along the Sixmile Creek access road just north of the WMA. Visitors to the WMA must travel down this same road for a number of miles before reaching the WMA boundary. At present, weeds on the WMA are contained at their current levels through annual chemical treatments.

Site Constraints

Chemical treatments of weeds on the WMA are constrained by the presence of surface waters: Dailey Lake, irrigation ditches, Sheep Creek, and a wetland marsh. These surface waters eventually drain to the Yellowstone River. Public use, particularly during the summer season when weeds are treated, is quite high. Riparian, aspen, and marsh vegetation types contribute much to the vegetative and thus habitat diversity on the WMA. There is a peregrine falcon hawk site on the WMA.

Weed Management Strategies and Methods

By restricting vehicles to established roads and trails and by requiring certified weed seed free hay, DFWP hopes to curtail the spread of established species. However, due to the mobility of our society and to the fact that the public is welcome to (and does) use public resources like Dome Mountain, noxious weeds will likely persist. Therefore, the weed management goals are to attempt to contain weeds at their current levels and locations, to prevent weeds from spreading to or from adjacent lands, and to comply with county ordinances and state law concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate, manual, cultural, or biological methods will be used. Where possible, weed treatment efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.4 Fleecer Mountain

Existing Environment

The initial land acquisition for Fleecer Mountain WMA occurred in 1962. Since that time, numerous transactions have taken place such that presently DFWP administers 6,707 acres of deeded land and 4,077 acres of leased land. Fleecer Mountain WMA is located in Silver Bow County just 28 miles south of Butte. Private land neighbors the WMA to the east and federal land adjoins to the west. Like other WMA's, Fleecer was purchased initially to provide winter range for elk, but resource values for other game and nongame species are also acknowledged. Livestock grazing is accommodated on Fleecer WMA in three pastures which are part of a 12 pasture system in cooperation with a private landowner and the U.S. Forest Service. Public use facilities consist of designated parking areas and gravel access roads. An active railroad borders the property for approximately two miles along the southeast boundary.

Fleecer Mountain WMA straddles the Continental Divide between elevations of 5,200 and 7,000 feet. Topography is gentle to moderately rolling with mostly south and east exposures. Most of the land area consists of bunchgrass foothills, although about 15% of the vegetative cover is

timber, mostly on higher elevation, north-facing slopes. Soils are of granitic origin, typical of unglaciated foothills. Precipitation averages 14 to 18 inches per year, with the majority falling between April and August.

Weed Status

In total, approximately 157 acres of spotted knapweed, Canada thistle, and yellow toadflax occur on Fleecer Mountain WMA (Table 1). Spotted knapweed accounts for 150 acres of the total, occurring at moderate to high densities. Approximately 85% of the spotted knapweed is associated with roads throughout the WMA while the remaining 15% is found in more remote sites. Canada thistle and yellow toadflax are both found in low densities along roads. At present, these weeds are contained at their current levels through annual chemical treatments. A seed source for spotted knapweed already exists in the general vicinity of Fleecer Mountain WMA and an active railroad and major state highways (Interstate 15 and State Highway 43 which serve as routes to Idaho) border the WMA.

Site Constraints

Chemical treatments of weeds on the WMA are constrained by the presence of at least 5 miles of perennial streams and their associated riparian zones. These streams are tributaries to the Big Hole River.

Weed Management Strategies and Methods

By restricting vehicles to established roads and trails and by requiring certified weed seed free hay, DFWP hopes to curtail the spread of established weed species. However, due to the mobility of our society and to the fact that the public is welcome to (and does) use public resources like Fleecer Mountain WMA, noxious weeds will likely persist. Therefore, the weed management goals are to attempt to contain weeds at their current levels and locations, to prevent weeds from spreading to or from adjacent lands, and to comply with county ordinances and state law concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate, manual, cultural, or biological methods will be used. Where possible, weed management efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.5 Gallatin

Existing Environment

The Gallatin WMA was initially purchased in 1945, but many land transactions have occurred since. Presently, DFWP administers 7,319 acres of deeded land and 2,544 acres of leased land approximately 50 miles south of Bozeman in Gallatin County. Approximately 1,000 acres occur

along the Gallatin River and Porcupine Creek, with the remainder at higher elevations in scattered, non-contiguous blocks interspersed with Gallatin National Forest and private corporate timberlands. Yellowstone National Park borders the WMA to the southeast. A segment of the WMA is located to the north at the mouths of Porcupine and Beaver creeks, then extending north along the east side of the Gallatin River.

The Gallatin WMA was originally purchased as winter range for local, resident elk of the Gallatin Canyon and for migratory Yellowstone National Park elk which summer inside but winter outside the Park. However, due to the proximity of Yellowstone Park and other wildlands in the area, the Gallatin WMA is also valuable to other species of game and nongame, as well as to recreationists. In particular, the WMA provides key moose winter range and is within occupied grizzly bear habitat. Ramshorn Lake, a popular destination for anglers, is home to pure strain Yellowstone cutthroat trout. Also, there is a population of Wolf's willow (*Salix wolfii* var. *wolfii*) along the Gallatin River within the WMA boundary. This subspecies of wolf's willow is extremely rare in Montana and is listed as a sensitive species by the U.S. Forest Service. Slender paintbrush (*Castilleja gracillima*), another rare and sensitive plant, was once collected near Dailey Creek on the east side of the Gallatin River, opposite from a small parcel of the WMA at the mouth of Lodgepole Creek.

As DFWP properties are in a checkerboard pattern with the Gallatin National Forest, public use facilities are cooperatively maintained. The Forest Service maintains the trail heads, trails, parking areas, and livestock corrals. Forest Service trails which pass through the Gallatin WMA remain the responsibility of the Forest Service, however weed management responsibility along the trails within the WMA rests with DFWP.

Weed Status

In total, approximately 13 acres of musk thistle, Canada thistle, hound's tongue, and spotted knapweed occur on Gallatin WMA (Table 1). Hound's tongue is associated with the livestock corrals whereas the others are associated with roads. These weeds are located on the Porcupine - Beaver creeks unit. However, the Ramshorn Lake area is a very popular destination and is visited by the public during all seasons. High volumes of foot and/or livestock traffic may increase the potential for noxious weed introduction to the WMA. Increased potential may also stem from the proximity of State Highway 191, a primary route to Yellowstone National Park. Highway 191 also carries large volumes of commercial traffic, serving as a shortcut between Idaho and Interstate 90 in Bozeman. At present, weeds are contained at their current levels through annual chemical treatments.

Site Constraints

Chemical treatment of noxious weeds on the Gallatin WMA is constrained by the presence of surface waters. The WMA includes 2.5 miles of the Gallatin River, 5.0+ miles of Porcupine Creek, 6.0+ miles of Buffalo Horn Creek, 2.0+ miles of Tepee Creek, and 0.5 miles of Lodgepole Creek. The riparian zones associated with these waters and the population of Wolf's

willow (*Salix wolfii* var. *wolfii*) are also a consideration. Other surface waters include several lakes and marshy areas. Chemical treatments would not take place in any of these areas. Furthermore, the hiking/pack trails in the area sustain high levels of use by the public, particularly during the summer season. Additional considerations stem from the presence of pure Yellowstone cutthroat trout in Ramshorn Lake and the plethora of other wildlife species including grizzly bears known to inhabit the wildlands north of Yellowstone National Park.

Weed Management Strategies and Methods

By restricting vehicles to established roads and trails and by requiring certified weed seed free hay, DFWP hopes to curtail the spread of established species. However, due to the mobility of our society and to the fact that the public is welcome to (and does) use public resources like the Gallatin WMA, especially in conjunction with the Gallatin Canyon, noxious weeds will likely persist. Therefore, the weed management goals are to attempt to contain weeds at their current levels and locations, to prevent weeds from spreading to or from adjacent lands, and to comply with county ordinance and state law concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate, manual, cultural, or biological methods will be used. Where possible, weed management efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.6 Blacktail

Existing Environment

The Blacktail WMA was purchased in 1972 in three parcels. Subsequently, land was also leased from the Montana Department of State Lands. Presently, DFWP administers 11,300 acres of deeded land and 6,200 acres of leased land. The WMA is approximately 30 miles southeast of Dillon in Beaverhead County. Land ownership around the WMA is diverse: private to the north and south, Bureau of Land Management to the southeast, DFWP Robb-Ledford WMA to the east, and a mixture of private and state school trust land to the west. Public use facilities include designated parking areas and gravel access roads. The Blacktail WMA was purchased initially to provide winter range for elk which summer in the Gravelly and Snowcrest mountain ranges. However, the values and abundance of other game and nongame species have also been acknowledged. Ranging between 6,400 and 8,000 feet, approximately 95% of the total acreage consists of bunchgrass rangeland on rolling foothill slopes and valleys. That remaining is riparian willow bottom, abandoned hay meadows, aspen stands, and coniferous timber. Approximately 15 miles of the East Fork of Blacktail Creek run through the WMA. Soils in this 6-12 inch precipitation zone are generally fine-textured loams. Precipitation averages 20-30 inches per year, with much of it falling as snow.

Weed Status

In total, approximately 41 acres of Canada thistle and spotted knapweed occur on Blacktail WMA (Table 1). Canada thistle accounts for all but about one acre, occurring at moderate densities along the East Fork of Blacktail Creek. Spotted knapweed, mainly associated with roads, has recently been found and can be contained at its current level through annual chemical treatments. Canada thistle has not been treated because of its proximity to surface water.

Site Constraints

Chemical treatment of Canada thistle on the Blacktail WMA is constrained by its occurrence in the riparian zones of the East Fork of Blacktail Creek and its tributaries. The East Fork of Blacktail Creek is an excellent sport fishery.

Weed Management Strategies and Methods

By restricting vehicles to established roads and trails and by requiring certified weed seed free hay, DFWP hopes to curtail the spread of established weed species. However, due to the mobility of our society and to the fact that the public is welcome to (and does) use public resources like the Blacktail WMA, noxious weeds will likely persist. However the remoteness of this WMA will contribute to a slower rate of spread than for other, more accessible WMA's. The weed management goals are to attempt to contain weeds at their current levels and locations, to prevent weeds from spreading to or from adjacent lands, and to comply with county ordinances and state law concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate, manual, cultural, or biological methods will be used. Biological control agents are currently under consideration for the Canada thistle population along the East Fork of Blacktail Creek. Where possible, weed management efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.7 Mount Haggin

Existing Environment

The first parcels comprising Mount Haggin WMA were acquired in 1976. Additional parcels were bought and sold intermittently up until 1992. Today, Mount Haggin totals 56,151 deeded acres, the majority of which are in Silver Bow County. Lesser amounts occur in Deer Lodge County. The WMA, located approximately 10 miles southeast of Anaconda, is bordered by national forest lands to the south and west and by private land to the north and east. Public use of the WMA occurs during all seasons. Public use facilities consist of designated parking areas and gravel access roads. State Highway 274, running north - south from Anaconda to the Big Hole River, bisects the WMA.

As part of the purchase agreement, a timber sale contract with Louisiana Pacific was transferred to DFWP. DFWP also inherited a grazing lease. Both agreements were honored. The logging contract expired in 1991 and was not renewed. The original grazing lease expired in 1980. The final years of the lease were spent studying livestock habits and wildlife distributions. Resource managers then designed an experimental rest rotation grazing system for the WMA to meet the needs of wildlife. The grazing program will enhance plant vigor, allow seedling establishment, and improve range condition. Portions of Mount Haggin WMA are grazed by cattle between June 15 and October 15 in a three pasture rest rotation system.

Mount Haggin WMA is a diverse landscape consisting of high mountain peaks, high elevation timbered ridges interspersed with meadows, valleys, and grassland foothills. These habitats are important calving and fawning areas for a variety of big game species as well as year round habitat for numerous nongame species. Additionally, there is a population of yellow springbeauty (*Claytonia lanceolata*) in the French and California creek drainages. This plant is considered a sensitive species by the U.S. Forest Service. Furthermore, it is a candidate species for listing under the Endangered Species Act (Montana Natural Heritage Program 1993). However, in the winter of 1991/92, the Montana Natural Heritage Program recommended to the U.S. Fish and Wildlife Service that this taxa be dropped from the C2 candidate species category because of its abundance (> 30 records in Montana) and proposed taxonomic revisions which make this species more widely distributed (Heidel 1993). Wolf's willow (*Salix wolfii*) has been documented on Mount Haggin WMA, although it is unknown whether the plants examined belong to the variety *wolfii* which is also a Species of Special Concern. *Juncus hallii*, also considered a Species of Special Concern by the U.S. Forest Service, has been documented near Mount Haggin WMA. Although *Juncus hallii* has not actually been found on the WMA, it is likely that the habitat types supporting this species do exist on the WMA, as this species has a fairly wide ecological amplitude (Lessica 1993). The graminoid growth form of this plant makes it somewhat inconspicuous and easy to overlook during floristic surveys. Until more thorough botanical surveys are conducted, the existence of this species on Mount Haggin WMA is speculative.

The WMA also includes part or all of 28 named perennial streams and numerous unnamed tributaries. Most of these drain into the Big Hole River. However, the northern half of the WMA breaches the Continental Divide and two perennial streams drain west into the Columbia River basin. Pure-strain westslope cutthroat trout, also a Species of Special Concern, have been documented in German Gulch Creek which originates on the WMA.

The entire landscape in the upper Clark Fork drainage has a long history of disturbance, going back over 150 years to early years of mining and smelting in the Butte - Anaconda area. Mountains and creeks were mined while the hillsides were logged extensively for wood products to fire the smelters. The lowlands were heavily grazed by livestock. Overall, vegetation communities were significantly impacted by mining and smelting pollution. Thus the history of human-caused disturbance in this region predisposes Mount Haggin WMA to noxious weeds. The extent of human disturbance on this WMA is the greatest of any WMA in Region 3.

Weed Status

In total, approximately 5,000 acres of spotted knapweed, leafy spurge, and Canada thistle occur on Mount Haggin WMA (Table 1). Spotted knapweed accounts for 4,000 acres of the total, occurring at high densities in the northern portion of the WMA just south of Anaconda and in small isolated patches in the southeast corner. Leafy spurge, a recent invader, overlaps the spotted knapweed distribution. The overlap is approximately 2,000 acres. Canada thistle is found in low densities in the central and southwestern portions. Vehicular traffic from heavily infested areas west of Mount Haggin WMA are one agent of seed dispersal. A significant seed source for spotted knapweed already exists in the vicinity of the WMA. Thus, controlling or eradicating this noxious weed will likely be very difficult.

Site Constraints

Chemical treatment of noxious weeds on Mount Haggin WMA is constrained by the presence of surface waters, associated riparian zones, meadows, and the overlap of noxious weeds with desirable vegetation, particularly shrubs. In addition, Mount Haggin attracts recreationists during all seasons, particularly during the summer angling season. German Gulch supports a population of pure strain westslope cutthroat trout, considered a Species of Special Concern by the American Fisheries Society. Deep Creek, a tributary to the Big Hole River, supports a population of arctic grayling on a seasonal basis, or occasionally in a year round, non-contiguous distribution. The Big Hole River is the last stronghold of river-dwelling arctic grayling outside of Alaska. Furthermore, the presence of yellow springbeauty (*Claytonia lanceolata*) in the French and California creek drainages requires that a site those drainages be thoroughly investigated before the application of chemicals. It is unlikely that a population of *Juncus hallii* (if one occurs on Mount Haggin WMA) would be impacted by chemical application because graminoids generally are not affected by the broadleaf herbicides DFWP would use during weed management activities. However, *Juncus* could be affected by cultural treatment methods which disrupt plant communities such as tilling and reseeding. Manual and biological methods would not be expected to affect this species. Likewise manual and biological methods would not likely affect wolf's willow (*Salix wolfii*), regardless of whether the variety is indeed *wolfii*, the Species of Special Concern. Chemical or cultural treatments would not take place in the riparian habitat types where this willow species is found.

Weed Management Strategies and Methods

The long history of disturbance in this region has made noxious weed encroachment inevitable. The fact that the public is welcome to (and does) use public resources like the Mount Haggin WMA means that noxious weeds will likely persist. However, DFWP hopes to curtail the rate of spread of established weed species by restricting vehicles to established roads and trails and by requiring certified weed seed free hay.

In the past, weed management on Mount Haggin WMA has been by chemical means. However, early on it was recognized that spotted knapweed was spreading and that the potential for total eradication was slim. Approximately ten years ago, a biological control agent (*Urophora affinis*) specific for spotted knapweed was released on Mount Haggin WMA in cooperation with APHIS. The agent is established but is not expected to keep pace with the rate of spread of its host. Also recognized was the serious nature of the threat from leafy spurge. Two years ago, the biological control agent *Aphthona flava* was released on leafy spurge at two sites. Biological control techniques will be pursued more aggressively in the future as chemical treatments are impossible over the area where these noxious weed species occur.

The weed management goals are to attempt to contain weeds at their current levels and locations and to comply with county ordinances and state law concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate such as in a riparian area or where spotted knapweed occurs continuously with desirable native vegetation, biological control agents will be used. Where possible, weed management efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.8 Robb-Ledford

Existing Environment

The Robb-Ledford WMA (also known as Robb Creek WMA) is one of the most recent land acquisitions in Region 3. Located in Beaverhead and Madison counties, Robb-Ledford WMA is approximately 30 miles south of Sheridan and 30 miles southeast of Dillon. The WMA consists of 17,420 acres of deeded land and 19,657 acres of leased land in the Gravelly-Snowcrest mountains. Immediately adjacent landownership includes private, Bureau of Land Management, Beaverhead National Forest, and DFWP's Blacktail WMA. At the time of purchase, the Robb Creek Grazing Association retained three years of grazing rights on the properties. Those rights were honored. A nine pasture rest rotation grazing system was then established to accommodate the Association and meet the needs of wildlife. Its goal is to enhance plant vigor, promote seedling establishment, and improve range condition. Public use facilities consist of gravel access roads and designated parking areas. Robb-Ledford WMA also serves as a primary route accessing Beaverhead National Forest via the Robb Creek or Ledford Creek county roads.

Robb-Ledford WMA was purchased principally to provide winter range for elk. However, additional benefits to other game and nongame species are significant. Ferruginous hawks (*Buteo regalis*) are known to nest on the WMA. Vegetation types include open upland grasslands, mid- and lower elevation shrub communities, riparian zones, and isolated pockets of timber. There are six perennial streams and several springs. Altogether, surface waters flow more than 20 miles on the WMA, eventually draining into the Ruby and Beaverhead rivers. Robb Creek supports a population of pure strain westslope cutthroat trout, considered a Species

of Special Concern by the American Fisheries Society. Elevations range between 6,000 and 8,000 feet. Average annual precipitation varies from 12 to 30 inches depending on elevation, with most falling as snow. Soils are generally fine-textured loams.

Weed Status

As the Robb-Ledford WMA was acquired in 1988, noxious weed inventory is an ongoing project, as is upgrading fencing and marking the boundaries. Presently, we estimate a total of approximately 60 acres of hound's tongue, field scabiosa, spotted knapweed, and musk thistle on the WMA (Table 1). Hound's tongue occurs in moderate densities along the roadways, but at low densities in remote patches away from roads. The other species occur in low densities.

Site Constraints

Chemical treatment of noxious weeds on Robb-Ledford WMA is constrained by the presence of surface waters and the associated riparian zones.

Weed Management Strategies and Methods

By restricting vehicles to established roads and trails and by requiring certified weed seed free hay, DFWP hopes to curtail the spread of established weed species. However, due to the mobility of our society and to the fact that the public is welcome to (and does) use public resources like Robb-Ledford WMA, noxious weeds will likely persist. Therefore, the weed management goals are to attempt to contain weeds at their current levels and locations, to prevent weeds from spreading to or from adjacent lands, and to comply with county ordinances and state law concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate, manual, cultural, or biological methods will be used. Where possible, weed management efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.9 Wall Creek

Existing Environment

Wall Creek WMA, located in Madison County about 25 miles south of Ennis, was first purchased in 1960. Although several transactions have taken place since then, today the WMA consists of 6,148 acres of deeded land and 918 acres of leased land. Beaverhead National Forest adjoins the WMA to the west while private land borders to the north and south. The Bureau of Land Management manages the riparian zone between the WMA boundary and the Madison River. A campground along the entrance road to Wall Creek WMA headquarters is heavily used by the public during spring, summer, and fall.

Wall Creek was purchased primarily for elk winter range, though values for other game and nongame species are significant. The Wall Creek landscape is mostly open, bunchgrass foothills. Timbered ridges occur at higher elevations, roughly corresponding with the National Forest boundary. Annual precipitation averages 12-14 inches. Visitor use facilities consist of graveled access roads and designated parking areas.

Weed Status

In total, approximately 32 acres of hound's tongue, Canada thistle, and spotted knapweed occur on Wall Creek WMA (Table 1). Hound's tongue occurs at moderate densities in isolated patches in the southwestern corner whereas Canada thistle and spotted knapweed occur at low densities in the southeastern corner and northeastern corner, respectively. Most weeds are associated with roads and can be contained at current levels through annual chemical treatments.

Proximity to a major state highway which serves both as a route to Yellowstone National Park and as the first highway east of Interstate 15 to enter Idaho increases the potential for introduction of noxious weeds to the WMA. Additionally, there are many "ranchettes" carved out of the Madison River Valley. Those "ranchettes" lacking adequate noxious weed management serve as sources of noxious weed seeds. Spotted knapweed is established in the Valley upstream from Wall Creek. Seed dispersal via the Madison River exposes all downstream landowners to potential encroachment of this species.

Site Constraints

Chemical treatment of weeds on the WMA is constrained by the presence of five perennial streams and their associated riparian zones. These streams are tributaries to the Madison River. Public visitation to Wall Creek WMA during the summer season is significant, particularly along the river corridor.

Weed Management Strategies and Methods

By restricting vehicles to established roads and trails and by requiring certified weed seed free hay, DFWP hopes to curtail the spread of established species. However, due to the mobility of our society and to the fact that the public is welcome to (and does) use public resources like Wall Creek WMA, noxious weeds will likely persist. Therefore, the weed management goals are to attempt to contain weeds at their current levels and locations, to prevent weeds from spreading to or from adjacent lands, and to comply with county ordinances and state law concerning noxious weeds. The primary treatment method will be chemical, subject to the guidelines outlined previously in Part 2.0 of this Plan. Where use of chemicals is inappropriate, manual, cultural, or biological methods will be used. Where possible, weed management efforts will be coordinated with adjacent landowners in recognition of the landscape aspect of noxious weeds and seed dispersal.

3.1.10 Bridger Mountain, Red Rock Lake, Silver Gate and Kirk

Existing Environment

Bridger Mountain WMA totals 440 acres, of which 120 acres are deeded and 320 acres are leased. DFWP acquired the initial 120 acres in 1950, but the parcel is now leased to Bridger Bowl ski area. Since Bridger Bowl is responsible for maintaining the property, it will not be discussed further. The 320 leased acres are located on the east side of the Bridger Mountains in the Cottonwood Creek drainage. It is also known as the Armstrong Winter Range. The 27 acre Red Rock Lake WMA was the first WMA ever purchased by DFWP. The year was 1926. Today, that tract is leased to the U.S. Fish and Wildlife Service and is incorporated into Red Rocks Lakes National Wildlife Refuge operations. Silver Gate WMA consists of approximately 3 acres in the Soda Butte Creek drainage. Kirk was gifted to DFWP in 1981, consisting of 13 acres near the mouth of the Gallatin Canyon. Of these three WMA's, Silver Gate, Armstrong, and Kirk are the only ones for which DFWP holds maintenance responsibilities. There are no active management programs for these properties at this time.

3.2 Fishing Access Sites

3.2.1 Introduction

Twenty eight percent of the statewide total hours of fishing per year (angling pressure) is spent in DFWP Region 3. Furthermore, Region 3 contains 3,390 miles of fishing streams, 278 miles of which are designated Blue Ribbon. That represents 41% of the total Blue Ribbon fishing streams in Montana. In fact, the salmonid streams in Region 3 sustain almost twice as much angling pressure as the salmonid streams in any other DFWP Region. Public enjoyment of such resources would not be possible without access to river corridors.

Fishing Access Sites (FAS's) are properties owned by or leased to DFWP along surface watercourses or lakes. Through this ownership, FAS's provide access to river corridors for the general public to fish, float, watch wildlife, picnic, hunt, camp, etc... Watercourses with their associated vegetation communities (riparian zones) are some of the most diverse, productive habitats available to wildlife. For example, riparian woodlands in the west support the greatest diversity and abundance of neotropical migrant songbirds both during the breeding season and during migration (Dobkin 1992). These species are particularly dependent on the complexity and density of vegetation structure, especially in the shrub and herbaceous layers. Furthermore, riparian zones add tremendous diversity to the surrounding landscape. In addition to their significant value to wildlife, FAS's are also valued by outdoor recreationists. Public use occurs during all seasons, although it is more concentrated during the angling season. The setting and visitor use facilities at a typical FAS include the following: access roads, parking areas, surface water body (stream or lake), outhouse, and a boat ramp or launch. Additional facilities may include picnic tables, cooking grills, a designated group use area, and camp sites.

Several rivers in southwest Montana have noteworthy historical significance beyond their present day recreational values. The Lewis and Clark Expeditions of 1805 and 1806 navigated their way up and down many of the major rivers in Region 3. Journals of the Lewis and Clark Expedition were the first recorded natural histories of many of these rivers and their environs. Occasionally, an enthusiast will retrace the path of Lewis and Clark. Although much in the drainages has changed since then, access to the river corridor is guaranteed at DFWP access sites. In addition, many rivers and their tributaries in southwest Montana were instrumental during the fur trapping era and subsequent settling of Europeans in present day Montana.

The aim of DFWP is to administer FAS's by enacting good land management policies which protect vegetative and soil sources. To the degree that vegetation communities are healthy and vigorous, they will resist noxious weed encroachment. However, FAS's are a small part of a larger landscape in which, unfortunately, noxious weeds occur, and noxious weeds have been documented on FAS's in Region 3. Furthermore, river corridors are increasingly becoming subdivided into "ranchettes." This contributes to noxious weed problems for everyone if those landowners are not sensitive to the topic and attempt to manage weeds on their properties. Therefore, any noxious weed management should be approached on the landscape level, considering neighboring landowners, land use practices, and mechanisms of noxious weed seed dispersal. As well, noxious weed management strategies must take into account the natural resource and human use values of these sites.

To that end, noxious weed management on FAS's will center around maintaining healthy vegetation communities, deterring seed dispersal, and the detection and treatment of noxious weed outbreaks before they become well established. Healthy vegetation communities can be promoted by limiting excessive soil disturbance which facilitates weed establishment. Soil disturbance can be prevented by confining the use of motorized vehicles to established roads and trails and by not disturbing vegetation unnecessarily during the development of visitor use facilities. After the development of visitor use facilities, the site will be reseeded. By restricting vehicular traffic to established routes, seed dispersal is also confined to areas where weeds can be easily detected and treated. Quick detection and treatment of small patches is the most efficient approach to manage noxious weed outbreaks. As populations increase, potential treatment methods and techniques dwindle as other considerations come into play. Given the number of FAS's in Region 3, budget and personnel constraints require the implementation of methods which maximize the ratio of successful weed management to cost. Therefore, the management of noxious weeds on FAS's will be accomplished using the concept of Integrated Noxious Weed Management (INWM). Manual, cultural, chemical, and biological methods will all be used. Specific techniques will vary as individual circumstances require.

FAS treatment plans, organized by major river drainage, follow. All access sites in that particular drainage will be discussed in common. Unique circumstances will be pointed out as necessary. Access sites are located on the following rivers: Yellowstone, Gallatin, Madison, Jefferson, Missouri, Beaverhead, and the Big Hole. Additionally, standing water bodies with access sites will be discussed in common. These are Harrison Reservoir, Dailey Lake, Bozeman Ponds, and Browne's Lake. Figure 3 illustrates the locations of FAS's in Region 3.

Figure 3. Fishing Access Sites administered by Montana Department of Fish, Wildlife and Parks in Region 3. Key to the Fishing Access Sites appears on the facing page.

Key to the Fishing Access Sites

YELLOWSTONE RIVER

1. Queen of the Waters	6. Emigrant	11. Loch Leven	16. Mayor's Landing
2. Corwin Springs	7. Emigrant West	12. Mallard's Rest	17. Highway 89 Bridge
3. Slip N' Slide	8. Grey Owl	13. Pine Creek	18. Sheep Mountain
4. Dailey Lake	9. Chicory	14. Carter's Bridge	19. Springdale
5. Point of Rocks	10. Paradise	15. Free River	

GALLATIN RIVER

20. Kirk	24. Erwin Bridge	27. Cherry River (on the E. Gallatin River)
21. Axtell Bridge	25. Four Corners	28. Glen Lake (E. Gallatin Recreation Area)
22. Shed's Bridge	26. Gallatin Forks	29. Bozeman Ponds
23. Cameron Bridge		

MADISON RIVER

30. Raynold's Pass	34. Eight Mile Ford	38. Meadow Lake	42. Blackbird
31. Lyon's Bridge	35. Burnt Tree Hole	39. Black's Ford	43. Milwaukee
32. McAtee Bridge	36. Ennis	40. Greycliff	
33. Varney Bridge	37. Valley Garden	41. Cobblestone	

MISSOURI RIVER

44. Fairweather

JEFFERSON RIVER

45. Three Forks Ponds	48. Harrison Reservoir	51. Cardwell	54. Parrot Castle
46. Drouillard	49. Sappington Bridge	52. Mayflower Bridge	55. Silver Star
47. William's Bridge	50. Limespur	53. Kountz Bridge	

BEAVERHEAD RIVER

56. Poindexter Slough	57. Corrals	58. Henneberry	59. High Bridge

BIG HOLE RIVER

60. High Road	64. Browne's Lake	67. Salmon Fly	70. Greenwood Bottoms
61. Pennington Bridge	65. Kalsta Bridge	68. Maidenrock	71. Dewey
62. Notch Bottom	66. Browne's Bridge	69. Powerhouse	72. Fishtrap
63. Glen			

3.2.2 Yellowstone River Drainage

Existing Environment

Draining Yellowstone National Park and the Gallatin and the Absaroka mountain ranges, the Yellowstone River flows approximately 103 miles from its entrance into Montana near Gardiner, through Paradise Valley, and easterly past Livingston to the Regional boundary. Land ownership along the river corridor is mostly private, where agriculture is the predominant land use. Federal lands also occur in proximity to the river at certain points within this reach. The Yellowstone River is nationally recognized for its natural resource values, whether for the angling, the vistas, or the unaltered river course. This portion of the Yellowstone is the longest continuous stretch of Blue Ribbon trout water in Montana, accounting for nearly one quarter of all the Blue Ribbon waters statewide. Native Yellowstone cutthroat trout occupy waters in the upper reaches of the river. This particular stretch of the Yellowstone River logged approximately 48,792 angler-days during the 1991 angling season from March 1991 to February 1992 (where 1 angler-day is 1 angler fishing for approximately 4 hours). This figure is the fourth highest of all the salmonid streams in Region 3.

The Yellowstone River corridor is seasonal or year-round habitat for an abundance of wildlife. Game and nongame species alike depend on its cottonwood riparian bottoms. All varieties of waterfowl use the Yellowstone during the breeding season and annual migrations. There is an occupied bald eagle nesting territory in the vicinity of the Grey Owl FAS near Emigrant. Emigrant West FAS supports a unique vegetation community of basin wild rye - alkali saltgrass (*Elymus cinereus* - *Distichlis stricta*). Although described in the State of Washington, this habitat type is not yet described in Montana.

With such high resource values and such notoriety, it's only fitting that DFWP maintains the greatest number of FAS's on the Yellowstone than any other river in the Region. They are:

Carter's Bridge	Chicory	Corwin Springs
Emigrant	Emigrant West	Free River
Grey Owl	Highway 89 Bridge	Loch Leven
Mallard's Rest	Paradise	Queen of the Waters
Pine Creek	Point of Rocks	Springdale
Sheep Mountain	Slip n' Slide	

Weed Status

The most common noxious weed species on these FAS's are spotted knapweed and Canada thistle, although other species do occur in small numbers (Table 2). The largest populations occur on Loch Leven, Mallard's Rest, and Grey Owl; however, these are three out of the four largest FAS's on the upper Yellowstone River. The proximity of Yellowstone River FAS's to a well-travelled state highway serving as a primary route to Yellowstone National Park increases the potential for noxious weed introduction to these FAS's.

Site Constraints

Chemical treatment of noxious weeds at these FAS's is constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Furthermore, high levels of human use, particularly during the summer months, limit the use of chemicals even in those areas where they can be safely applied without risk to water resources. Riparian vegetation consisting of cottonwood/willow bottoms with a shrub and herbaceous understory component may also preclude certain chemical treatments. The undescribed habitat type at Emigrant West FAS would require special consideration when applying chemicals so as to avoid impacting non-target vegetation species.

Weed Management Strategies and Methods

Manual and cultural methods have been applied on roughly half of the FAS's. Hand-pulling and cutting treatments were usually administered at least once during any one growing season. Many of these access sites receive annual treatments of this nature. Target weed species are spotted knapweed, thistle, and whitetop.

A biological control agent (*Urophora affinis*) was released on Grey Owl and Free River FAS's in an attempt to treat spotted knapweed. Initial releases were made in 1988, though subsequent releases have also occurred. These sites also received additional releases of *Agapeta zoegana* and *Terellia virens* in 1993. Sites are inspected for agent survival, distribution, and effectiveness at least annually. Periodically, agents will be redistributed to new or different weed patches once they've been introduced to a site. This redistribution sustains the life cycles of host-specific agents and provides weed treatment benefits to a broader area. Thus far, these agents have survived and appear to be expanding their territories. Biocontrol techniques will be relied upon more in the future as they become more readily available.

Some weed management on Yellowstone River FAS's has been by chemical means, although DFWP has begun to move away from a total reliance on chemical treatment methods on its FAS's. Chemical methods will be reserved for those sites (or weed patches on a site) where application will not impair site values and resources. Manual (hand pulling), cultural (cutting or mowing), and biological methods will be emphasized.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during development will be reseeded.

3.2.3 Gallatin River Drainage

Existing Environment

The Gallatin River originates in Yellowstone National Park as the outflow of Gallatin Lake, flowing 115 miles from its origin to its mouth. From the Park boundary, the Gallatin flows 44 miles through the narrow Gallatin Canyon. DFWP does not maintain any FAS's in the southern end of this reach. Lands in the Canyon are privately owned and intermixed with federal ownership. Principal land uses include homesites, recreation, and timber production. Upon leaving the Canyon, the Gallatin River flows through the Gallatin Valley to its confluence with the Madison and Jefferson rivers near Three Forks. Land ownership in this reach is mostly private, with agricultural land uses and homesites predominating. All seven DFWP FAS's are downstream from the Spanish Creek - Gallatin River confluence. They are:

Axtell Bridge
Four Corners
Shed's Bridge

Cameron Bridge
Gallatin Forks

Erwin Bridge
Kirk

The East Gallatin River joins the main Gallatin near Manhattan. The only FAS on the East Gallatin is Cherry River, located just north the City of Bozeman and Interstate 90.

One of the many natural resource values associated with the Gallatin River is its Blue Ribbon trout fishery. Of the major rivers in the upper Missouri River drainage, the Gallatin ranks second behind the Madison River in total fishing pressure. During the 1991 angling year (March 1991 to February 1992), 55,931 angler-days were logged on the Gallatin River. Anglers logged approximately 9,274 days on the East Gallatin during that same time period. This is the seventh highest number of angler days spent on any a salmonid stream in Region 3. An experimental reintroduction of fluvial arctic grayling has recently added a new dimension to the angling opportunities in both the East and main Gallatin. Other recreational opportunities include scenic recreational floating (primarily in the Gallatin Canyon) and wildlife viewing.

Weed Status

Spotted knapweed is the most frequent noxious weed species encountered on FAS's along the Gallatin River (Table 2). The largest populations occur on the Erwin Bridge and Cameron Bridge sites. The proximity of the Gallatin FAS's to the well-travelled State Highway 191 increases the potential for noxious weed introduction to the FAS's in this drainage. Not only is Highway 191 a primary route to Yellowstone National Park, it also serves as a shortcut between Idaho and Interstate 90 in Bozeman. Commercial traffic along this highway is heavy.

Site Constraints

Chemical treatment of noxious weeds on Gallatin River FAS's is constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Furthermore, high levels of human use, particularly during the summer months, limit the use of chemicals even in those areas where they can be safely applied without risk to water resources. Riparian vegetation consisting of cottonwood/willow bottoms with a shrub and herbaceous understory component may also preclude certain chemical treatments.

Weed Management Strategies and Methods

Manual and cultural methods have been applied on these sites intermittently in the past. Hand-pulling and cutting treatments were usually administered at least once during any one growing season. Many of these access sites receive annual treatments of this nature. Target weed species are spotted knapweed, thistle, leafy spurge, and whitetop.

Several biological control agents have been released on the following FAS's: Erwin Bridge, Gallatin Forks, Cameron Bridge, Axtell Bridge, and Cherry River. Agents targeting leafy spurge are: *Aphthona nigriscutis*, *Aphthona cyparissiae*, and *Aphthona flava*. Agents targeting spotted knapweed are: *Agapeta zoegana*, *Larinus minutus*, *Metzneria paucipunctella*, and *Urophora affinis*. Initial releases were made in 1988, though subsequent releases have also occurred. In 1993, *Ceutorhynchus litura* was released on Canada thistle and *Terellia virens* was released on spotted knapweed. Sites are inspected for agent survival, distribution, and effectiveness at least annually. Periodically, agents will be redistributed to new or different weed patches once they've been introduced to a site. This redistribution sustains the life cycles of host-specific agents and provides weed treatment benefits to a broader area. Thus far, these agents have survived and appear to be healthy and expanding their range. Biocontrol techniques will be relied upon more in the future as they become more readily available.

Some weed management on Gallatin River FAS's has been by chemical means, although DFWP has begun to move away from a total reliance on chemical treatment methods on its FAS's. Chemical methods will be reserved for those sites (or weed patches on a site) where application will not impair site values and resources. Manual (hand pulling), cultural (mowing or cutting), and biological control methods will be emphasized.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.2.4 Madison River Drainage

The Madison River, originating at the junction of the Firehole and Gibbon rivers in Yellowstone National Park, flows for 149 miles to its union with the Gallatin and Jefferson rivers near Three Forks. From its source, the Madison crosses a high, forested plateau to Hebgen Reservoir which is 1.5 miles inside the State of Montana. From there, it flows through a narrow canyon to Earthquake (Quake) Lake. Below Quake Lake, the Madison flows through the upper Madison valley for 57 miles before entering Ennis Reservoir. The upper river valley bottomland is mostly private, with land devoted to agriculture. However, subdivision of agricultural land into "ranchette" homesites has accelerated in recent years. Below Ennis Reservoir, the Madison enters Bear Trap Canyon, a Bureau of Land Management Primitive Area. Downstream of Bear Trap, the Madison flows through the lower Madison River valley to its mouth. The lower river valley bottomland is also mostly private, again where agriculture and "ranchette" homesites are the primary land uses.

The Madison River is one of Montana's premier wild trout fisheries and was the birthplace of "wild trout management." It is recognized nationally for its Blue Ribbon fishery and scenic vistas. In addition to the traditional trout species, anglers may also catch arctic grayling in the Madison River and Ennis Reservoir. Float fishing and recreational floating are popular on the Madison, and boat pressure is high compared to other rivers within the state. Of all the salmonid streams in Region 3, the Madison River received the greatest total fishing pressure during the 1991 angling season (March 1991 to February 1992). Approximately 113,969 angler-days were spent on the Madison that year. Fourteen DFWP access sites are located throughout the length of the Madison from just below Quake Lake to its mouth. They are:

Black's Ford	Blackbird	Burnt Tree Hole
Cobblestone	Eight Mile Ford	Ennis
Greycliff	Lyon's Bridge	McAtee Bridge
Meadow Lake	Milwaukee	Raynold's Pass
Valley Garden	Varney Bridge	

In addition to its fishery values, the Madison River corridor is home to an abundance of game and nongame species. Riparian zones are vegetated with willow, alder, cottonwood, with occasional conifers in the upper drainage. There are many islands between Ennis and Ennis Reservoir and in the lower reaches just upstream from Three Forks. There is an active bald eagle nesting territory on the Madison River just upstream of Ennis Reservoir. Many species of waterfowl, including Canada geese and sandhill cranes nest in the river corridor. In addition, trumpeter swans stop over at Ennis Reservoir during their annual migration.

Weed Status

Many Madison River FAS's are accessible via a well-travelled state highway serving both as a route to Yellowstone National Park and the first route east of Interstate 15 connecting Montana with Idaho. This proximity increases the potential of noxious weed introduction to these FAS's. Also, those subdivided "ranchettes" lacking adequate noxious weed management efforts serve as potential sources of noxious weed seeds for the entire drainage downstream. In the upper Madison River valley (upstream from the town of Ennis), spotted knapweed is a problem for many landowners, not just DFWP. Likewise, all DFWP access sites along the lower Madison are vulnerable to the encroachment of leafy spurge since the river can act as a dispersal agent. This noxious weed species is present on many access sites along the lower Madison, immediately upstream from Three Forks. Most FAS's on the Madison River also have a few Canada thistle plants (Table 2).

Site Constraints

Chemical treatment of noxious weeds on Madison River FAS's is constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Furthermore, high levels of human use, particularly during the summer months, limit the use of chemicals even in those areas where they can be safely applied without risk to water resources. Riparian vegetation consisting of cottonwood/willow bottoms with a shrub and herbaceous understory component may also preclude certain chemical treatments.

Weed Management Strategies and Methods

Manual and cultural methods have been applied on some of these sites intermittently in the past. Hand-pulling and cutting treatments were usually administered at least once during any one growing season. Many of these access sites received annual treatments of this nature. Target weed species were spotted knapweed, thistle, and whitetop. Cobblestone FAS is currently under a management plan which utilizes grazing by domestic sheep as a treatment for leafy spurge containment.

Biological control agents (*Spurgia esulae*, *Aphthona flava*, and *Aphthona nigricutis*) were released on Greycliff FAS to treat leafy spurge. Initial releases were made in 1988, although subsequent releases have also occurred. In 1993, *Ceutorhynchus litura* organisms were released on Canada thistle. Sites are inspected for agent survival, distribution, and effectiveness at least annually. Periodically, agents will be redistributed to new or different weed patches within a site once they've been introduced. This redistribution sustains the life cycles of host-specific agents and provides weed treatment benefits to a broader area. Thus far, these agents have survived and appear to be healthy and expanding their range. Biocontrol techniques will be relied upon more so in the future as they become more readily available.

Some past weed management on Madison River FAS's was by chemical means, although DFWP has begun to move away from a total reliance on chemical treatment methods on its FAS's. Chemical methods will be reserved for those sites (or weed patches on a site) where application will not impair site values and resources. Manual (hand pulling), cultural (mowing or cutting), and biological methods will be emphasized.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.2.5 Jefferson River Drainage

Existing Environment

The Jefferson River originates at the junction of the Big Hole and Beaverhead rivers near Twin Bridges. It flows 84 miles before reaching Three Forks where it joins the Gallatin and Madison rivers, forming the Missouri River. For most of its length, the Jefferson flows through private land. Primary land uses are agricultural. The channel is braided in some reaches, particularly in the Whitehall and Three Forks areas. DFWP maintains nine FAS's on the Jefferson River, and they are:

Cardwell	Drouillard	Kountz Bridge
Limespur	Mayflower Bridge	Parrot Castle
Sappington Bridge	Silver Star	Williams Bridge

Of all the salmonid streams in Region 3, the Jefferson ranks fifth in total angler-days. The Jefferson logged 20,309 angler-days during the 1991 angling season from March 1991 to February 1992. The river offers reasonably uncongested float fishing and recreational floating opportunities; it is easily navigable by inexperienced rowers. Angling is the most popular during the spring and fall seasons, with brown trout being the most abundant game fish. Summer angling is not as popular because irrigation withdrawal, particularly in below average water years, affects water availability, thus fish abundance and distribution. Cottonwood riparian zones are well developed in some reaches of the Jefferson, making other recreational opportunities such as waterfowl hunting, trapping, asparagus picking, and wildlife viewing more enjoyable. Waterfowl, Neotropical migrant songbirds, as well as other species of game and nongame use the river corridor whether year-round, seasonally, or during annual migrations.

Weed Status

Many Jefferson River FAS's are accessible via well-travelled state highways serving both as a route to Yellowstone National Park and as a cutoff route from Interstate 15 in Dillon to Interstate 90 in Whitehall. This cutoff route is used by commercial traffic. The proximity to major highways increases the potential for noxious weed introductions to these FAS's. There is an established population of leafy spurge along irrigation ditches south of Whitehall which may serve as a seed source to all downstream property, particularly if water from that ditch returns to the main river. Leafy spurge and spotted knapweed are the most commonly encountered noxious weed species on Jefferson River FAS's, particularly on Sappington Bridge and Drouillard (Table 2).

Site Constraints

Chemical treatment of noxious weeds on the Jefferson River FAS's is constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Furthermore, in those areas where they can be safely applied without risk to water resources, even a moderate level of human use during the summer months may limit the use of chemicals. Riparian vegetation consisting of cottonwood/willow bottoms with a shrub and herbaceous understory component may also preclude certain chemical treatments.

Weed Management Strategies and Methods

Manual and cultural methods have been applied on some of these sites intermittently in the past. Hand-pulling and cutting treatments were usually administered at least once during any one growing season. Many of these access sites receive annual treatments. Target weed species were leafy spurge, spotted knapweed, thistle, and whitetop.

Biological control agents were released on Drouillard, Williams Bridge, and Sappington Bridge access sites. To treat leafy spurge on Sappington Bridge, *Aphthona nigriscutis* was introduced. Spotted knapweed occurs on the Drouillard and Williams Bridge sites. Three biocontrol agents were released on Drouillard: *Agapeta zoegana*, *Metzneria paucipunctella*, and *Urophora affinis*. Only the latter was introduced onto Williams Bridge FAS. Initial releases onto Drouillard were made in 1989 and subsequent releases have also occurred. In 1993, a new biocontrol agent, *Larinus minutus*, was introduced onto Drouillard. Sites are inspected for agent survival, distribution, and effectiveness at least annually. Periodically, agents will be redistributed to new or different weed patches within a site once they have been introduced. This redistribution sustains the life cycles of host-specific agents and provides weed treatment benefits to a broader area. Thus far, these agents have survived and appear to be establishing themselves. Biocontrol techniques will be relied upon more in the future as they become more readily available.

Some past weed management on Jefferson River FAS's was by chemical means, although DFWP has begun to move away from a total reliance on chemical treatment methods on its FAS's. Chemical methods will be reserved for those sites (or weed patches on a site) where application will not impair site values and resources. Manual (hand pulling), cultural (mowing or cutting), and biological methods will be emphasized.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility maintenance and development will be minimized. Sites disturbed during facility development will be reseeded.

3.2.6 Missouri River Drainage

Existing Environment

The Missouri River is formed by the union of the Gallatin, Madison, and Jefferson rivers near Three Forks. The Missouri flows for almost 10 miles through a semi-canyon before reaching Fairweather, the only FAS on the Missouri River within Region 3. Missouri Headwaters State Park is the only other public access to the Missouri between Three Forks and Toston Dam. (Headwaters SP will be discussed in Part 3.3 along with the other State Parks.) Land ownership along this remote stretch of the Missouri is mostly private, with agriculture being the principal land use. A county road parallels the river through the canyon.

Because of the canyon-like characteristics of this reach, development of the riparian zone is restricted to a narrow ribbon of vegetation along the river, though islands in the river channel also support a riparian vegetation community. Outdoor recreational values include fishing, hunting, wildlife viewing, and floating. Angling opportunities are primarily for brown trout, with lesser numbers of rainbow trout. Between March 1991 and February 1992, anglers logged 7,839 angler-days along this stretch of the Missouri.

Weed Status

Access to Fairweather is obtained from a county road. This road serves as a potential agent of noxious weed introduction. However, due to the remoteness of the area, the volume of traffic is low. No noxious weeds were detected during an inventory of this site during summer 1993. Because established noxious weed populations upstream function as a seed source for areas downstream, Fairweather is vulnerable to both spotted knapweed and leafy spurge encroachment.

Site Constraints

If noxious weeds show up during future site inventories, manual methods will be attempted first, since the population is likely to be small. If chemicals are applied in the future, that use would be constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Furthermore, human use during the summer months limits the use of chemicals even in those areas where they can be safely applied without risk to water resources. Riparian vegetation consisting of cottonwood/willow bottoms with a shrub and herbaceous understory component may also preclude certain chemical treatments.

Weed Management Strategies and Methods

Since there currently are no noxious weeds growing on the FAS, the strategy will be to prevent their establishment. DFWP will attempt to prevent the establishment of noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded. Manual methods will be applied first should noxious weed seeds germinate and grow. However, if the rate of weed spread exceeds the ability of manual treatments to keep pace, chemical treatments would be considered.

3.2.7 Beaverhead River Drainage

Existing Environment

The Beaverhead River originates at the outlet of Clark Canyon Reservoir, an irrigation storage facility, and flows 80 miles to its confluence with the Big Hole River near Twin Bridges. For much of its course, the Beaverhead meanders through private lands which are devoted to agricultural purposes. However, a substantial portion of the drainage consists of rugged mountains ranging from 9,000 to 11,000 feet. DFWP maintains the following 4 access sites:

Corrals

Henneberry

High Bridge

Poindexter Slough

Although anglers can access the Beaverhead River from Poindexter Slough, many never arrive at their destination without stopping first. Poindexter Slough is actually a spring creek, with a wild trout fishery of its own. The associated willow communities and meadows have tremendous value for waterfowl, white-tailed deer, bald eagles, and countless other species of both game and nongame. Trumpeter swans have even been observed resting on a backwater there.

Float fishing is extremely popular on the Beaverhead, in part because the river's meandering course and well-developed riparian vegetation communities make it difficult to fish from shore. The Beaverhead River logged 15,093 angler-days during the 1991 angling season from March 1991 to February 1992. This ranks the Beaverhead as the sixth most heavily fished salmonid stream in Region 3. Recreational floating is also popular. Other outdoor recreation opportunities include wildlife viewing, hunting, and photography. The Beaverhead River is particularly well-known for its white-tailed deer and waterfowl populations.

Weed Status

Many Beaverhead River FAS's are accessible via well-travelled state highways serving both as a route to Yellowstone National Park and as a cutoff route from Interstate 15 in Dillon to Interstate 90 in Whitehall. This cutoff route is used by commercial traffic. Many Beaverhead FAS's are also accessible from Interstate 15 south of Dillon. The proximity to major highways increases the potential for noxious weed introductions to the FAS's in this drainage. This potential is heightened by the extent of noxious weed establishment in nearby drainages, most notably the Bitterroot River drainage just over the Continental Divide. Thistle species (Canada and musk) are the most common noxious weed species on these sites (Table 2). Spotted knapweed was recorded, but in low densities.

Site Constraints

Chemical treatment of noxious weeds on Beaverhead River FAS's is constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Poindexter Slough and Henneberry are both sub-irrigated in part, limiting the feasibility of chemical treatments. Furthermore, high levels of human use during the summer months limit the use of chemicals even in those areas where they can be safely applied without risk to water resources. Riparian vegetation consisting of cottonwood/willow bottoms with a shrub and herbaceous understory component may also preclude certain chemical treatments.

Weed Management Strategies and Methods

Manual and cultural methods have been applied on some of these sites intermittently in the past. Hand-pulling and cutting treatments were usually administered at least once during any one growing season. Many of these access sites receive annual treatments. Target weed species were leafy spurge, spotted knapweed, thistle, and whitetop.

The biocontrol agents *Ceutorhynchus litura* and *Urophora cardui* were released on Poindexter Slough to treat Canada thistle. Initial releases were made in 1989. Sites are inspected for agent survival, distribution, and effectiveness at least annually. Periodically, agents will be redistributed to new or different weed patches within a site once they have been introduced. This redistribution sustains the life cycles of host-specific agents and provides weed treatment

benefits to a broader area. Thus far, these agents have survived and appear to be healthy and expanding their range. Biocontrol techniques will be relied upon more so in the future as they become more readily available.

Some past weed management on Beaverhead River FAS's was by chemical means, although DFWP has begun to move away from a total reliance on chemical treatment methods on its FAS's. Chemical methods will be reserved for those sites (or weed patches on a site) where application will not impair site values and resources. Manual (hand pulling), cultural (mowing or cutting), and biological methods will be emphasized. In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.2.8 Big Hole River Drainage

Existing Environment

The Big Hole River begins in the Bitterroot Mountains with the confluence of Warm Springs Creek and the South Fork of the Big Hole River. It flows 139 miles before joining the Beaverhead River near Twin Bridges. The upper reaches of the Big Hole flow through a high elevation valley of meadows and willow. Land ownership is mostly private, with hay and livestock production its primary uses. The lower reaches are characterized by well-developed cottonwood bottoms. Land ownership and uses are similar to the upper reaches. DFWP maintains 12 access sites, which are skewed towards the lower reaches. They are:

Browne's Bridge	Dewey	Fishtrap
Glen	Greenwood Bottoms	High Road
Kalsta Bridge	Maidenrock	Notch Bottom
Pennington Bridge	Powerhouse	Salmon Fly

Free-flowing for its entirety, the Big Hole is one of the most scenic rivers in southwest Montana. This river has long been acclaimed for its wild trout fishery. In 1959, a 56-mile stretch from the town of Divide to the river's mouth was designated Blue Ribbon in recognition of its fishery, recreational, and aesthetic values. In fact, during the 1991 angling season (March 1991 to February 1992), the Big Hole River logged 51,203 angler-days. This ranks the Big Hole as the third most heavily fished salmonid stream in Region 3. Anglers have a rare opportunity to catch an arctic grayling from its waters. Until recently, the Big Hole was home to the last remaining truly fluvial arctic grayling population in the lower 48 states. (An adfluvial population exists in the Madison River - Ennis Reservoir system.) Grayling derived from Big Hole parentage have been experimentally reintroduced into the Gallatin and East Gallatin rivers where they once were native. Nonetheless, the Big Hole River remains the last stronghold of this unique salmonid species.

The Big Hole River corridor is seasonal or year-round habitat for an abundance of wildlife. Game and nongame species alike depend on the riparian zones, vegetated with willow, alder, and cottonwood. A historic bald eagle nesting territory occurs on the lower reaches in the vicinity of Notch Bottom FAS. Many species of waterfowl use the Big Hole during the breeding season and during seasonal migrations.

Weed Status

Big Hole River FAS's are accessible via gravel county roads, a well-travelled state highway which eventually leaves Montana for Idaho, and a frontage road along Interstate 15. This proximity to major highways increases the potential for noxious weed introductions to these FAS's. This potential is heightened by the extent and severity of noxious weed infestations in nearby drainages, most notably the Bitterroot River just over the Continental Divide. Spotted knapweed and Canada thistle are the most frequently encountered noxious weed species on these sites (Table 2).

Site Constraints

Chemical treatment of noxious weeds on the Big Hole River FAS's is constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Furthermore, high levels of human use during the summer months limit the use of chemicals even in those areas where they can be safely applied without risk to water resources. Riparian vegetation consisting of cottonwood/willow bottoms with a shrub and herbaceous understory component may also preclude certain chemical treatments.

Weed Management Strategies and Methods

Manual and cultural methods have been applied on some of these sites intermittently in the past. Hand-pulling and cutting treatments were usually administered at least once during any one growing season. Many of these access sites receive annual treatments. Target weed species were spotted knapweed, thistle, whitetop, toadflax, and leafy spurge.

Some past weed management on Big Hole River FAS's was by chemical means, although DFWP has begun to move away from the use of chemical treatment methods on its FAS's. Chemical methods will be reserved for those sites (or weed patches on a site) where application will not impair site values and resources. Treatment methods used in this drainage will include manual (hand pulling), cultural (mowing or cutting), chemical, and biological control agents. Biocontrol techniques will be relied upon more so in the future as they become more readily available. With heavy infestations in nearby drainages, aggressive, cost efficient action will be required to prevent a similar scenario in the Big Hole.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.2.9 Ponds and Lakes

Existing Environment

Harrison Reservoir, an irrigation storage facility constructed on Willow Creek near the town of Harrison, supports a popular, self-sustaining rainbow trout fishery. DFWP administers a 40 acre access site with several improvements. They include an access road, parking areas, a boat ramp, latrines, and picnic tables. Outdoor recreation opportunities associated with the Reservoir include angling, waterfowl hunting, boating, water skiing, wildlife viewing, sailboarding, and outdoor photography.

Dailey Lake is located on the Dome Mountain WMA at the base of the foothills. Angling opportunities include rainbow trout, perch, and walleye. Other outdoor opportunities include waterfowl hunting, boating, sailboarding, outdoor photography, and wildlife viewing. Administered independent from the WMA, Dailey Lake FAS consists of 382 acres with several improvements. They include an access road, parking areas, outhouses, a boat launch, and picnic areas.

Browne's Lake is located in the Rock Creek drainage, a tributary to the Big Hole River. The lake itself and the DFWP FAS are located on the Beaverhead National Forest. Outdoor opportunities available at this site include fishing, boating, picnicking, and camping. Improvements at this site include latrines and picnic tables.

Bozeman Ponds are located at the west edge of Bozeman, near the Main Mall. The site consists of three ponds on 24 acres. Angling opportunities are sporadic because natural fish reproduction takes place on a limited basis. They are primarily a "put and take" fishery derived from excess hatchery production or brood stock. However, due to its proximity to Bozeman and its flat terrain, it is a popular site used by novice anglers when learning to cast. In addition, the site is used by the public for picnicking etc... Improvements which are maintained by DFWP include an access road, parking areas, and picnic tables.

Weed Status

Spotted knapweed was recorded on all four sites, though in mostly low densities. Thistle species (Canada, bull, and sow) also occur on these sites. All occurrences are low or moderate in density.

Site Constraints

On all four sites, chemical treatment of noxious weeds is constrained by the presence of surface waters and by gravelly soil types which easily transport chemicals to shallow groundwater tables or to surface waters. Furthermore, high levels of human use limit the use of chemicals even in those areas where they can be safely applied without risk to water resources.

Weed Management Strategies

Manual and cultural methods have been applied on some of these sites intermittently in the past. Hand-pulling and cutting treatments were usually administered at least once during any one growing season. Many of these access sites receive annual treatments. Target weed species were spotted knapweed, thistle, whitetop, toadflax, and leafy spurge.

Some weed management on these sites was by chemical means, although DFWP has begun to move away from the use of chemical treatment methods on its FAS's. Chemical methods will be reserved for those sites (or weed patches on a site) where application will not impair site values and resources. Manual (hand pulling), cultural (mowing or cutting), biological, and chemical methods will all be used, although the first three will be emphasized.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.3 State Parks and Administrative Sites

3.3.1 Introduction

Preserved for their cultural, historical, recreational, and natural features, Montana's State Parks (SP's) add a new dimension to recreational opportunities in Montana. As a complement to the natural resources of Montana, State Parks offer visitors a glimpse into Montana's past, the discovery of unique natural landscape features, and the enjoyment of leisure time spent outdoors.

In Region 3, there are 7 State Parks, encompassing 4,121 acres. They are: Bannack, Lewis and Clark Caverns, Missouri Headwaters, Parker Homestead, Clark's Lookout, Madison Buffalo Jump, and Beaverhead Rock. These properties provide natural settings to camp, hike, boat, picnic, view wildlife, take pictures, etc... However, all the parks in Region 3 have a historical significance beyond their present day recreational values. For example, Madison Buffalo Jump was used by indigenous peoples prior to European settlement of this region. Missouri Headwaters, Clark's Lookout, and Beaverhead Rock preserve landmarks used by Lewis and Clark and the Corps of Discovery during their epic journey through present day Montana. Bannack, as the first Territorial Capital, exemplifies early mining settlements of Montana while Parker Homestead exemplifies early homesteads. Finally, Lewis and Clark Caverns, Montana's first State Park, was developed by a New Deal, Civilian Conservation Corps crew during the late 1930's.

The setting and visitor use facilities at a typical state park include the following: access roads, parking areas, restrooms, camp grounds, and picnic areas. Additional facilities may include cooking grills, a designated group use area, hiking trails, a surface water body, drinking water, and a visitor's center.

The goal of DFWP is to administer SP's by enacting good land management policies which protect vegetation and soil resources. To the degree that vegetation communities are healthy and vigorous, they will resist noxious weed encroachment. However, SP's are a small part of a larger landscape in which, unfortunately, noxious weeds occur, and noxious weeds have been documented on most SP's in Region 3. DFWP is required by law to treat noxious weeds. As such, any noxious weed management program undertaken should be approached at the landscape level, considering neighboring landowners, land use practices, and mechanisms of seed dispersal. As well, noxious weed management strategies must take into account the high natural resource and human use values of these sites. To that end, weed management in SP's will center around maintaining healthy vegetation communities, deterring seed dispersal, and the detection and treatment of noxious weed outbreaks before they become well established.

Healthy vegetation communities can be promoted by limiting excessive soil disturbance which facilitates noxious weed establishment. Soil disturbance can be prevented by confining the use of motorized vehicles to established roads and trails and by not disturbing vegetation

unnecessarily during the development or maintenance of visitor use facilities. By restricting vehicular traffic to established routes, seed dispersal is also confined to areas where weeds can be easily detected and treated.

Preventing noxious weed dispersal is the ultimate goal. However, the mobility of our society makes that a difficult goal to attain. Quick detection and treatment of noxious weed outbreaks is the most efficient approach to manage weeds, keeping their dispersal rate at a manageable level. As weed patches increase in size, potential treatment methods and techniques dwindle as other considerations come into play. Given the amount of acreage contained within State Parks in Region 3, budget and personnel constraints require the implementation of methods which maximize ratio of successful weed management to cost. Therefore, the management of noxious weeds in SP's will be accomplished using the concept of Integrated Noxious Weed Management (INWM). Where appropriate, chemicals will be applied. However, other methods and techniques such as hand-pulling, mowing, and biological control agents will be emphasized.

Noxious weed treatment plans for SP's follow. Bannack, Missouri Headwaters, Lewis and Clark Caverns, and Madison Buffalo Jump will be discussed individually whereas Parker Homestead, Clark's Lookout, and Beaverhead Rock will be discussed concurrently. Figure 4 illustrates the locations of these parks in Region 3.

This section also discusses these administrative sites: Regional Headquarters, the Gallatin Check Station, and a residential homesite in West Yellowstone.

Figure 4. State Parks administered by Montana Department of Fish, Wildlife and Parks in Region 3.

3.3.2 Bannack

Existing Environment

Bannack State Park, located 30 miles southwest of Dillon, was first added to the park system in 1954 when it was acquired from the Beaverhead County Museum Association. Subsequent acquisitions now place the park at 197 acres. As one of Montana's best preserved ghost towns, Bannack is also listed as a National Historic Landmark.

In 1862, Grasshopper Creek yielded the first gold discovered in what later became Montana Territory and eventually the State of Montana. Bannack was born. As the first gold camp in Montana Territory, Bannack attracted hordes of hopeful miners, swelling to a population over 3,000. The first territorial legislature convened there in 1864. However, by 1865, gold strikes in Alder and Last Chance gulches lured many miners as well as the territorial government seat away from Bannack. By the 1880 federal census, Bannack only recorded 232 residents within the city limits. Mining activity persisted over the years until the 1960's, but Bannack was no longer the booming metropolis it once was. When DFWP acquired the site in 1954, many of the buildings were in disrepair. The Parks Division has since stabilized and restored about 40 of the original buildings and developed the site into a State Park. Over 100 structures remain intact, allowing visitors to imagine history in a setting where many of Montana's formative events took place.

Between May 15 and September 30, 1992, approximately 40,000 people visited Bannack SP. Visitor use facilities at Bannack SP consist of access roads, parking areas, picnic areas, a campground, drinking water, a boardwalk down Bannack's Main Street, hiking trails, and a visitor's center.

Weed Status

Noxious weeds occurring at Bannack include: thistle, spotted knapweed, whitetop, mullein, leafy spurge, and hound's tongue. At present, weeds appear to be kept in check through annual treatments.

Bannack is somewhat removed from major State Highways, so the potential for noxious weed introduction from such a source is somewhat lessened. However, Bannack can only be reached via graveled county roads which have been treated for noxious weeds in the past by the Beaverhead County Weed District. Bannack Days, a celebration of the history and lifestyle of Montana's early pioneers, increases the volume of traffic, bringing visitors to the park from all over Montana and points beyond. The increased volume of traffic increases the potential for noxious weed introduction to Bannack.

Site Constraints

Chemical treatment of noxious weeds in Bannack is constrained by many factors. Grasshopper Creek flows through the park and thus must be avoided. In addition, high levels of human use preclude the use of chemicals in many of the facility developments.

Furthermore, Bannack SP is home to the pygmy rabbit (*Brachylagus idahoensis*) which is being considered for listing under the federal Endangered Species Act. Weed management activities should not adversely affect this rare mammal.

Weed Management Strategies and Methods

In the past, most weed management at Bannack was by chemical means, although DFWP has begun to move away from a total reliance on chemical treatment methods on its SP's. Chemical methods will be reserved for those weed patches where application of chemicals will not impair site values and resources. Should weeds spread to areas where chemical methods are no longer appropriate, cultural, manual, and biocontrol methods will be used.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.3.3 Missouri Headwaters

Existing Environment

The resource values in the vicinity of the headwaters of the Missouri River were first recognized by local residents in the nearby town of Three Forks during the 1940's. They were concerned that industrial development (railroads, utility lines, Interstate Highways etc...) would destroy the natural resource attributes of the area. In 1957, the State of Montana established Missouri Headwaters State Park and the majority of land acquisitions occurred during the 1960's. With a legislative appropriation and a matching federal grant, Missouri Headwaters State Park was developed during the late 1960's and early 1970's. In 1976, the park was dedicated as Montana's Bicentennial Park, commemorating the United State's Bicentennial. Today, 530 acres of riverbottom are preserved.

It's only fitting that Missouri Headwaters SP was selected as Montana's Bicentennial Park, since the headwaters of the Missouri River figured so prominently in western expansion. In 1805, the Lewis and Clark Expedition reached the headwaters as the first whites to see what they described as an "essential point in the geography of this west part of the Continent." Little did they realize the significance of this geographic landmark. Indigenous peoples valued the headwaters as a place to trade, visit, hunt, and fish. Though traditional enemies in other settings, many Native

American tribes used this area in peace. Trappers arrived in this area after Lewis and Clark reported "vast numbers of beaver." Years later, the headwaters served as a gateway to the mining camps of the 1860's. Thus the Missouri headwaters area figured significantly in Montana history.

Between May 1 and September 25 1992, approximately 23,200 people visited Missouri Headwaters SP. Visitor use facilities include: drinking water, restrooms, a campground, picnic sites, a designated group use site, a boat ramp, hiking trails, and interpretive displays.

Weed Status

The proximity to Highway 286, which transports commercial traffic increases the potential for noxious weed introduction to Missouri Headwaters SP. In addition, since weed seeds disperse via watercourses, all upstream weed populations are potential sources of noxious weed seeds to Missouri Headwaters SP.

Noxious weeds occurring at Missouri Headwaters SP include: Canada thistle, spotted knapweed, whitetop, and leafy spurge. Spotted knapweed is the most serious of the noxious weed species documented on this site. Canada thistle is near riparian areas and is difficult to treat. Leafy spurge is not a problem at this site currently. However, as discussed previously, seed sources exist upstream, particularly along the banks of the lower Madison River and seeds are dispersed via waterways.

Site Constraints

Chemical methods of noxious weed treatment on Missouri Headwaters SP is constrained by the presence of surface water sources and by high levels of human use, particularly during the spring and summer seasons.

Weed Management Strategies and Methods

In the past, weed management on Missouri Headwaters SP was by a combination of pulling, mowing, and chemical means. The biological control agent, *Ceutorhynchus litura*, was introduced to treat Canada thistle in 1990 and 1991. As DFWP has begun to move away from a total reliance on chemical treatment methods on its SP's, chemical methods will be reserved for those weed patches where application of chemicals will not impair site values and resources. Should weeds spread to areas where chemical methods are not appropriate, cultural, manual, and biocontrol methods will be used.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.3.4 Lewis and Clark Caverns

Existing Environment

Although possibly known to Native Americans in the region, Lewis and Clark Caverns were first discovered by white settlers from Whitehall in 1882. For the next 50 years, the caves were intermittently explored and developed. Commercial development early in the 1900's was thwarted because of ownership disputes between the Northern Pacific Railroad and the enterprising owner of a mining company seeking to develop a tourist attraction. After the Railroad deeded the site to the U.S. Government in 1908, it was designated as a National Monument though no funds were appropriated for its development or maintenance, and it was closed to the public. Encouraged by Montana's Governor, the U.S. Congress relinquished responsibility for the Monument to the State of Montana in 1937 so it could develop its first State Park. The Great Depression prevented Montana from accomplishing its goal. However, Roosevelt's New Deal brought new hope for developing the caverns. A Civilian Conservation Corps crew was assigned to the site. The crew is credited with constructing the entrance road and visitor center, making additional discoveries within the caverns, establishing the trail system, and installing a lighting system between 1935 and 1940. In 1941, Lewis and Clark Caverns unveiled its geologic wonders to the public. Today, the Park not only protects the underground cavern, but also preserves 2,696 acres of rugged hills atop the caves overlooking the Jefferson River.

It took at least 300 million years to create what visitors now see during a tour of the caverns. The caverns are still evolving through the geologic processes which formed them. Principally, water is the main agent of erosion which causes the formation of calcite deposits into elaborate stalactites, stalagmites, helictites, and columns. Lewis and Clark Caverns are some of the largest and most remarkable caves in the northern Rockies. These caverns are home to one of four known maternity colonies of Townsend's big-eared bat (*Plecotus townsendii*) in Montana. Listed as a sensitive species by the U.S. Forest Service, this mammal is imperiled in Montana because of its rarity. The hills atop the caverns are quite scenic, harboring wildlife and an association of curl-leaf mountain mahogany - bluebunch wheatgrass (*Cercocarpus ledifolius* - *Agropyron spicatum*). This undisturbed vegetation association is a potential ecological natural landmark within the northern Rockies (Johnson and Pfister 1981). Between May 1 and September 30 1992, Lewis and Clark Caverns SP accommodated 71,000 visitors. Visitor use facilities include camping, picnic areas, restrooms, drinking water, interpretive trails, a visitor's center, and a private concessionaire.

Weed Status

Proximity to Highway 2, a route to Yellowstone National Park, increases the potential for noxious weed introduction to Lewis and Clark Caverns SP. Noxious weeds occurring at Lewis and Clark Caverns SP include: Canada thistle, spotted knapweed, and mullein. Spotted knapweed is the most commonly encountered species. Currently, its distribution is associated with road ways, but it is expanding up drainage from an established road, despite previous treatment efforts.

Site Constraints

Chemical treatment of noxious weeds on this site is constrained by the high levels of human use. Lewis and Clark Caverns is one of the most visited sites in the State Parks system. In addition, the vegetation association of curl-leaf mahogany and bluebunch wheatgrass is somewhat rare in Montana and noteworthy. Chemical applications should not occur in the vicinity of these vegetation communities.

Weed Management Strategies and Methods

In the past, weed management on Lewis and Clark Caverns SP was by a combination of pulling, mowing, and chemical means. As DFWP has begun to move away from a total reliance on chemical treatments on its SP's, chemical methods will be reserved for those weed patches occurring in open areas where application of chemicals will not impair other site values and resources. Other methods such as cultural, manual, and biocontrol will be applied elsewhere.

In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during facility development will be reseeded.

3.3.5 Madison Buffalo Jump

Existing Environments

Many aspects of Montana's history enchant an imaginative reader. However, a stroll into the era of the Plains Indian and roaming buffalo herds can be experienced at the Madison Buffalo Jump SP. For nearly 2,000 years, the indigenous peoples of this region stampeded herds of bison to their death at the base of a 30 foot, semicircular cliff. The Shoshoni, Blackfeet, and Flathead tribes depended on bison for food, clothing, shelter, and tools -- all of which were necessary for survival, particularly during long, cold winters. The Madison Buffalo Jump is one of the most complete pictures of a pishkun in Montana. Five elements comprise a pishkun complex, all of which are preserved at this site: a grazing area for bison on the broad rolling plain to the east, drive lanes which funnelled stampeding bison to the cliff, the rimrock forming

the jump, a steep slope at the base of the jump where dead and injured bison came to rest and were butchered, and a nearby village site to process meat and hides. The visitor to Madison Buffalo Jump SP can envision the whole scenario of the chase, the butchering, and the feast and celebration afterwards.

Located 23 miles west of Bozeman overlooking the Madison River, the 618 acre Madison Buffalo Jump joined the State Parks system in 1967. It is also listed in the National Register of Historic Places. Approximately 16,000 visitors were counted between May 1 and September 25, 1992. Recreational opportunities include picnicking, hiking, and outdoor photography. Visitor use facilities include access roads, parking areas, a picnic area, a designated group use area, interpretive displays, and restrooms.

Weed Status

The proximity to Interstate 90 and leafy spurge populations in the lower Madison River valley increases the potential for noxious weed introduction to Madison Buffalo Jump SP. Thus far, leafy spurge has not appeared at this site. However, there are small patches of Canada thistle, dalmatian toadflax, and whitetop.

Site Constraints

Chemical treatment of noxious weeds on Madison Buffalo Jump SP is constrained in developed areas by high levels of human use, particularly during the summer season.

Weed Management Strategies and Methods

Past weed management on Madison Buffalo Jump SP was by pulling and cutting. Thus far, annual treatments appear to be effective. In addition to treating established weeds, DFWP will attempt to curtail noxious weed spread by restricting vehicles to established roads through traffic control devices such as rock barriers. Disturbance to soil and vegetation communities during facility development and maintenance will be minimized. Sites disturbed during development will be reseeded.

3.3.6 Parker Homestead, Beaverhead Rock, and Clark's Lookout

Existing Environment

Parker Homestead, Beaverhead Rock, and Clark's Lookout are undeveloped, primitive parks. Of significant historical value, each preserves a piece of Montana's heritage. Parker Homestead preserves a sod-roofed cabin typical of early homestead dwellings. Beaverhead Rock and Clark's Lookout are both internationally recognized landmarks of the Lewis and Clark Expedition. Sacajawea, in recognizing Beaverhead Rock, was able to guide the Expedition to a rendezvous with the Shoshone tribe at their summer encampment on the Beaverhead River.

Clark's Lookout signifies one of the few locations during the Expedition's entire journey which was definitively described in the journals and charted on a map. Clark's Lookout afforded a vantage point from which to scout the route ahead.

Because these sites are undeveloped, they lack separately allocated budgets. Thus no visitor use facilities exist on these sites. Parker Homestead consists of the cabin site and 1.7 acres of land. Beaverhead Rock is 71 acres while Clark's Lookout is 7.2 acres.

Weed Status

Due to budgetary constraints, no formal surveys or weed management efforts occur at these sites. However, these sites are visited periodically by DFWP contractors, who are sensitive to noxious weed occurrence. Parker Homestead is not harboring any noxious weeds at this time while Clark's Lookout has a small patch of spotted knapweed and Beaverhead Rock has a small patch of Canada thistle.

Weed Management Strategies and Methods

There is no weed management program at these sites at the present time. However, noxious weeds may become a problem sometime in the future. DFWP will continue informal inspections at these sites to monitor weed status. Should weed management be necessary in the future, any of the four treatment methods (manual, cultural, chemical, or biological) may be used, depending on the circumstances. Any weed management actions will be conducted subject to the guidelines presented in this Plan.

3.3.7 Administrative Sites: Headquarters Complex, Gallatin Check Station, and West Yellowstone Spawning Station

Existing Environment

Administrative sites are those reserved for use by DFWP. The Regional Headquarters complex is located in Bozeman, totalling 6.6 acres. This complex serves as the public office of DFWP and as a parking/storage facility for vehicles, trailers, and heavy equipment. The 2-acre Gallatin Check Station site is located at the mouth of the Gallatin Canyon and consists of a paved pull out on State Highway 191. This site is only used by DFWP during the general and late big game hunting seasons, roughly from the third week in October through the end of January. The West Yellowstone Spawning Station is leased from the U.S. Forest Service and serves as the residence of the local Game Warden. It is approximately 4 acres.

Weed Status

Because vehicles are one agent of weed seed dispersal, occasionally a noxious weed will root in the parking lot or storage compound of the Regional Headquarters. Spotted knapweed has been found. No weeds have been detected at the Gallatin Check Station site. The West Yellowstone site does not have any noxious weeds.

Weed Management Strategies and Methods

Any noxious weeds discovered in the Headquarters complex, are pulled immediately. There is no need for weed treatments at the other two sites. However, noxious weeds may appear sometime in the future. Should weed treatment become necessary, any of the four treatment methods (manual, cultural, chemical, or biological) may be used, depending on the circumstances. Any weed management actions will be conducted subject to the guidelines presented in this Plan.

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APPENDIX A

COUNTY NOXIOUS WEED CONTROL ACT OF 1979

**COUNTY NOXIOUS WEED
CONTROL ACT
AND
ADMINISTRATIVE RULES**

**STATE OF MONTANA
DEPARTMENT OF AGRICULTURE
HELENA, MONTANA**

JULY, 1991

COUNTY NOXIOUS WEED CONTROL ACT

Title 7, Chapter 22

Sections

7-22-2101 through 7-22-2153

M C A

Amended 1991

AND RULES

Rules 4.5.201 through 4.5.203

State of Montana
Department of Agriculture
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COUNTY NOXIOUS WEED CONTROL ACT

7-22-2101. Definitions. As used in this part, unless the context indicates otherwise, the following definitions apply:

- (1) "Board" means a district weed board created under 7-22-2103.
- (2) "Commissioners" means the board of county commissioners.
- (3) "Department" means the department of agriculture provided for in 2-15-3001.
- (4) "District" means a weed management district organized under 7-22-2102.
- (5) "Native plant" means a plant endemic to the state of Montana.
- (6) "Native plant community" means an assemblage of native plants occurring in a natural habitat.
- (7) (a) "Noxious weeds" or "weeds" means any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities and that is designated:
 - (i) as a statewide noxious weed by rule of the department; or
 - (ii) as a district noxious weed by a board, following public notice of intent and a public hearing.(b) A weed designated by rule of the department as a statewide noxious weed must be considered noxious in every district of the state.
- (8) "Person" means an individual, partnership, corporation, association, or state or local government agency or subdivision owning, occupying, or controlling any land, easement, or right-of-way, including any county, state, or federally owned and controlled highway, drainage or irrigation ditch, spoil bank, borrow pit, or right-of-way for a canal or lateral.
- (9) "Supervisor" means the person employed by the board to conduct the district noxious weed management program and supervise other district employees.
- (10) "Weed management" or "control" means the planning and implementation of a coordinated program for the containment, suppression, and, where possible, eradication of noxious weeds.

7-22-2102. Weed Management Districts Established. A weed management district shall be formed in every county of this state and shall include all the land within the boundaries of the county, except that a weed management district may include more than one county through agreement of the commissioners of the affected counties.

7-22-2103. District Weed Board -- Appointment and Term. (1) The commissioners shall appoint a district weed board.

(2) The commissioners shall, at a public meeting, pass a resolution establishing the number of members of the district weed board and the terms of the appointments. The board must consist of at least three members and no more than nine members, and the members of the board must be residents of the district. A majority of the board members must be rural agricultural land owners.

(3) The county extension agent in each county and other interested individuals may be appointed to serve as nonvoting members of that district's weed board.

(4) The board members are public officers.

(5) The board may call upon the county attorney for legal advice and services as it may require.

7-22-2104. Term of Office. (1) Except as provided in subsection (2), a member of a district weed board serves a term of 3 years and until the qualification of his successor. The term of office begins January 1.

(2) When a three-member weed board is established, the initial board members serve terms of 1, 2, and 3 years, respectively, as designated by the commissioners. When a five-member weed board is established, two of the initial members serve terms of 1 year, two serve terms of 2 years, and one serves a term of 3 years. After expiration of an initial term of office, the successor serves a 3-year term as provided in subsection (1).

7-22-2105. Organization of District Weed Board and Compensation.

(1) The board shall organize by choosing a chairman and a secretary. The secretary may or may not be a member of the board.

(2) Salary, per diem, and mileage of such board members shall be set by resolution of the commissioners.

(3) A majority of the board constitutes a quorum for the conduct of business.

7-22-2106. Renumbered 7-22-2115 by Code Commissioner, 1985.

7-22-2107. Renumbered 7-22-2116 by Code Commissioner, 1985.

7-22-2108. Renumbered 7-22-2117 by Code Commissioner, 1985.

7-22-2109. Powers and Duties of Board. (1) The board may:

(a) employ a supervisor and other employees as necessary and provide for their compensation;

(b) purchase such chemicals, materials, and equipment and pay other operational costs as it determines necessary for implementing an effective weed management program. Such costs must be paid from the noxious weed fund.

(c) determine what chemicals, materials, or equipment may be made available to persons controlling weeds on their own land. The cost for such chemicals, materials, or equipment must be paid by such person and collected as provided in this part.

(d) enter into agreements with the department for the control and eradication of any new exotic plant species not previously established in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial use if such plant species spreads or threatens to spread into the state; and

(e) perform other activities relating to weed management.

(2) The board shall:

(a) administer the district's noxious weed program;

(b) establish management criteria for noxious weeds on all land within the district;

(c) make all reasonable efforts to develop and implement a noxious weed program covering all land within the district owned or administered by a federal agency.

7-22-2110. Administrative Hearing -- Appeals. (1) A person adversely affected by any notice, action, or order of the board may request an administrative hearing before the board. The board shall hold a hearing within 30 days of the request. Participants may be represented by legal counsel. The board shall make a record of the proceeding and enter its order and findings within 7 days after the hearing.

(2) An order of the board may be appealed to the commissioners within 30 days from the time the order is entered.

The commissioners shall hear such appeal within 30 days after the notice of appeal and shall render their order and findings within 7 days after such hearing. Participants may be represented by legal counsel.

(3) Within 30 days after the commissioners render their order and findings, the person adversely affected may file a petition in district court requesting that the order and findings of the commissioners be set aside or modified. The court may affirm, modify, or set aside the order complained of, in whole or in part.

7-22-2111. (Temporary) Liability Restrictions. A district, as defined in 7-22-2101, is liable for damages caused by its use of herbicides only for an act or omission that constitutes gross negligence. The provisions of 2-9-305 apply to board members, supervisors, and employees of a district. (Terminates July 1, 1995 -- sec. 7, Ch. 530, L. 1991.)

7-22-2112. (Temporary) Information on Herbicide Use. The district must provide information on protective clothing, health hazards, and proper application techniques to mixers, loaders, and applicators of herbicides and make information available for review by the public at the district office. (Terminates July 1, 1995 -- sec. 7, Ch. 530, L. 1991.)

7-22-2113 and 7-22-2114 reserved.

7-22-2115. Noxious Weeds and Seeds Declared Nuisance. Noxious weeds and the seed of any noxious weed are hereby declared a common nuisance.

7-22-2116. Unlawful to Permit Noxious Weeds to Propagate. It is unlawful for any person to permit any noxious weed to propagate or go to seed on his land, except that any person who adheres to the noxious weed management program of his district or who has entered into and is in compliance with a noxious weed management agreement is considered to be in compliance with this section.

7-22-2117. Violations. (1) Any person who in any manner interferes with the board or its authorized agent in carrying out the provisions of this part or who refuses to obey an order or notice of the board is guilty of a misdemeanor, and upon conviction thereof, he shall be fined not to exceed \$100 for the first offense and not less than \$100 or more than \$200 for each subsequent offense.

(2) All fines, bonds, and penalties collected under the provisions of this part, except those collected by a justice's court, shall be paid to the county treasurer of each county and placed by him to the credit of a fund to be known as the noxious weed fund.

7-22-2118 through 7-22-2120 reserved.

7-22-2121. Weed Management Program. (1) The noxious weed management program must be based on a plan approved by the board.

(2) The noxious weed management plan must:

(a) specify the goals and priorities of the program;

(b) review the distribution and abundance of each noxious weed species known to occur within the district and specify the locations of new infestations and areas particularly susceptible to new infestations;

(c) specify pesticide management goals and procedures, including but not limited to water quality protection, public and worker safety, equipment selection and maintenance, and pesticide selection, application, mixing, loading, storage, and disposal; and

(d) estimate the personnel, operations, and equipment costs of the proposed program.

(3) The board shall provide for the management of noxious weeds on all land or rights-of-way owned or controlled by a county or municipality within the confines of the district. It shall take particular precautions while managing the noxious weeds to preserve beneficial vegetation and wildlife habitat. Where at all possible, methods for such control shall include cultural, chemical, and biological methods.

(4) The board may establish special management zones within the district. The management criteria in such zones may be more or less stringent than the general management criteria for the district.

7-22-2122. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2123. Procedure in a Case of Noncompliance. (1) Where complaint has been made or the board has reason to believe that noxious weeds described in this part are present upon a person's land within the district in violation of the law, that person must be notified by mail or telephone of the complaint and the board may request inspection of such land. The board or its authorized agent and the landowner or his representative shall inspect the land at an agreeable time, within 10 days of notification of the landowner. If after reasonable effort the board is unable to gain cooperation of the person, the board or its authorized agent may enter and inspect the land to determine if the complaint is valid.

(2) If noxious weeds are found, the board or supervisor shall notify the person or his representative and seek voluntary compliance with the district weed control program. If voluntary compliance is not possible, notice of noncompliance must be sent to the person by certified mail.

(3) The notice must specify:

(a) the basis for the determination of noncompliance;

(b) the geographic location of the area of noncompliance, by legal description or other reasonably identifiable description;

(c) measures to be undertaken in order to comply with the district's management criteria;

(d) a reasonable period of time, not less than 10 days, in which compliance measures must be initiated; and

(e) the right of the person to request, within the time specified in subsection (3) (d), an administrative hearing as provided by 7-22-2110.

(4) A person is considered in compliance if he submits and the board accepts a proposal to undertake specified control measures and is in compliance for so long as he performs according to the terms of the proposal. If the measures proposed to be taken extend beyond the current growing season, the proposal and acceptance must be in writing.

(5) In accepting or rejecting a proposal, the board shall consider the economic impact on the person and his neighbors, practical biological and environmental limitations, and alternative control methods to be used.

7-22-2124. Destruction of Weeds by Board. (1) If corrective action is not taken and no proposal is made and accepted or no request for an administrative hearing is made within the time specified in the notice, the board may forthwith enter upon the person's land and institute appropriate control measures.

In such case the board shall submit a bill to the person, itemizing man-hours of labor, material, and equipment time, together with a penalty not exceeding 10% of the total cost incurred. Labor and equipment must be valued at the current rate paid for commercial management operations in the district. The bill must specify and order a payment due date of 30 days from the date the bill is sent.

(2) A copy of the bill must also be submitted by the board to the county clerk and recorder.

(3) If a person receiving an order to take corrective action requests an administrative hearing, the board may not institute control measures until the matter is finally resolved, except in case of an emergency. In such a case, the person is liable for costs as provided in subsection (1) only to the extent determined appropriate by the board, commissioners, or court that finally resolves the matter.

7-22-2125. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2126. Embargo. The board may establish voluntary embargo programs to reduce the spread of noxious weeds within the district or the introduction of noxious weeds into the district.

7-22-2127. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2128 and 7-22-2129 reserved.

7-22-2130. Weed District Supervisor Training. Within the limitations of available funds, the board shall ensure that the weed district supervisor obtains training to properly implement the noxious weed management program described in 7-22-2121. The department shall specify through rulemaking the level and type of training necessary to fulfill this requirement.

7-22-2131 through 7-22-2140 reserved.

7-22-2141. Noxious Weed Fund Authorized. (1) The commissioners of each county in this state shall create a noxious weed management fund, to be designated the "noxious weed fund".

(2) This fund shall be kept separate and distinct by the county treasurer.

7-22-2142. Sources of Money For Noxious Weed Fund. (1) The commissioners may create the noxious weed fund and provide sufficient money in the fund for the board to fulfill its duties, as specified in 7-22-2109, by:

(a) appropriating money from the general fund of the county;

(b) at any time fixed by law for levy and assessment of taxes, levying a tax not exceeding 2 mills on the dollar of total taxable valuation in the county. The tax levied under this subsection must be identified on the assessment as the tax that will be used for noxious weed control; and

(c) levying a tax in excess of 2 mills if authorized by a majority of the qualified electors voting in an election held for this purpose pursuant to 7-6-2531 through 7-6-2536.

(2) The proceeds of the noxious weed control tax must be used solely for the purpose of managing noxious weeds in the county and must be designated to the noxious weed fund.

(3) Any proceeds from work or chemical sales must revert to the noxious weed fund and must be available for reuse within that fiscal year or any subsequent year.

(4) The commissioners may accept any private, state, or federal gifts, grants, contracts, or other funds to aid in the management of noxious weeds within the district. These funds must be placed in the noxious weed fund.

7-22-2143. Determination of Cost of Weed Control Program. Based on the board's recommendations, the commissioners shall determine and fix the cost of the control of noxious weeds in the district, whether the same be performed by the individual landowners or by the board.

7-22-2144. Payment of Cost of Weed Control Program. The total cost of such control shall be paid from the noxious weed fund. The cost of controlling such weeds growing along the right-of-way of a state or federal highway shall, upon the presentation by the board of a verified account of the expenses incurred, be paid from the state highway fund in compliance with 7-14-2132 and any agreement between the board and the department of highways. Costs attributed to other lands within the district shall be assessed to and collected from the responsible person as set forth in 7-22-2116.

7-22-2145. Expenditures From Noxious Weed Fund. (1) The noxious weed fund must be expended by the commissioners at the time and in the manner as is recommended by the board to secure the control of noxious weeds.

(2) Warrants upon the fund must be drawn by the board. Warrants may not be drawn except upon claims duly itemized by the claimant, except payroll claims that must be itemized and certified by the board, and each claim must be presented to the commissioners for approval before the warrant is countersigned by the commissioners.

7-22-2146. Financial Assistance to Persons Responsible For Weed Control. (1) The commissioners, upon recommendation of the board, may establish cost-share programs with any person, specifying costs that may be paid from the noxious weed fund and costs that must be paid by the person. Cost-share programs may be established for special projects and for established management zones.

(2) (a) When under the terms of any voluntary agreement, whether entered into pursuant to 7-22-2123 or otherwise, or under

any cost-share program entered pursuant to this section a person incurs any obligation for materials or services provided by the board, the board shall submit a bill to the person, itemizing man-hours of labor, material, and equipment time. The bill must specify and order a payment due date not less than 30 days from the date the bill is sent.

(b) A copy of the bill must be submitted by the board to the county clerk and recorder. If the sum to be repaid by the person billed is not repaid on or before the date due, the county clerk and recorder shall certify the amount thereof, with the description of the land to be charged, and shall enter the sum on the assessment list as a special tax on the land, to be collected in the manner provided in 7-22-2148.

7-22-2147. Repealed. Sec. 32, Ch. 607, L. 1985.

7-22-2148. Tax Liability For Payment of Weed Control Expenses.

(1) The expenses referred to in 7-22-2124 shall be paid by the county out of the noxious weed fund, and unless the sum to be repaid by the person billed under 7-22-2124 is repaid on or before the date due, the county clerk shall certify the amount thereof, with the description of the land to be charged, and shall enter the same on the assessment list of the county as a special tax on the land. If the land for any reason is exempt from general taxation, the amount of such charge may be recovered by direct claim against the lessee and collected in the same manner as personal taxes. When such charges are collected, they shall be credited to the noxious weed fund.

(2) In determining what lands are included as land covered by the special tax and are described in the certificate of the county clerk, it is presumed that all work done upon any of the land of any one landowner is for the benefit of all of the land within the district belonging to the owner, together with the parcel upon which the work was done, and the amount certified becomes a tax upon the whole thereof.

7-22-2149. Responsibility For Assessments And Taxes For Weed Control Levied on Leased State Lands. The lessee of agricultural state land is responsible for assessments and taxes levied by the board of county commissioners for the district as provided in 77-6-114.

7-22-2150. Cooperation With State And Federal-Aid Programs. The board is empowered to cooperate with any state or federal-aid program that becomes available. Under such a plan of cooperation, the direction of the program shall be under the direct supervision of the board of the district in which the program operates.

7-22-2151. Cooperative Agreements. (1) Any state agency controlling land within a district, including the department of highways; the department of state lands; the department of fish, wildlife, and parks; the department of institutions; the department of natural resources and conservation; and the university system, shall enter into a written agreement with the board. The agreement must specify mutual responsibilities for noxious weed management on state-owned or state-controlled land within the district.

(2) The board and the governing body of each incorporated municipality within the district shall enter into a written agreement and shall cooperatively plan for the management of noxious weeds within the boundaries of the municipality. The board may implement management procedures described in the plan within the boundaries of the municipality for noxious weeds only. Control of nuisance weeds within the municipality remains the responsibility of the governing body of the municipality, as specified in 7-22-4101.

(3) A board may develop and carry out its noxious weed management program in cooperation with boards of other districts, with state and federal governments and their agencies, or with any person within the district. The board may enter into cooperative agreements with any of these parties.

7-22-2152. Revegetation of Rights-Of-Way And Disturbed Areas.

(1) Any state agency or local government unit approving a mine, major facility, transmission line, solid waste facility, highway, subdivision, or any other development resulting in significant disturbance of land within a district shall notify the board.

(2) Whenever any person or agency disturbs vegetation on an easement or right-of-way within a district by construction of a road, irrigation or drainage ditch, pipeline, transmission line, or other development, the board shall require that the disturbed areas be seeded, planted, or otherwise managed to reestablish a cover of beneficial plants.

(3) (a) The person or agency disturbing the land shall submit to the board a written plan specifying the methods to be used to accomplish revegetation. The plan must describe the time and method of seeding, fertilization practices, recommended plant species, use of weed-free seed, and the weed management procedures to be used.

(b) The plan is subject to approval by the board, which may require revisions to bring the revegetation plan into compliance with the district weed management plan. Upon approval by the board, the revegetation plan must be signed by the chairman of the board and the person or agency responsible for the disturbance and constitutes a binding agreement between the

board and such person or agency.

7-22-2153. Voluntary Agreements For Control of Noxious Weeds Along Roads. (1) Any person may voluntarily seek to enter into an agreement for the management of noxious weeds along a state or county highway or road bordering or running through his land. The supervisor may draft such an agreement upon the request of and in cooperation with the person; however, the agreement must, in the board's judgment, provide for effective weed management. The weed management agreement must be signed by the person and, upon approval of the board, by the chairman. An agreement involving a state highway right-of-way must also be signed by a representative of the department of highways.

(2) The agreement must contain a statement disclaiming any liability of the board and, if applicable, the department of highways for any injuries or losses suffered by the person in managing noxious weeds on the state or county highway right-of-way. The signed agreement transfers responsibility for managing noxious weeds on the specified section of right-of-way from the board to the person signing the agreement. If the board later finds that the person has failed to adhere to the agreement, the board shall issue an order informing the person that the agreement will be void and that responsibility for the management of noxious weeds on the right-of-way will revert to the board unless the person complies with the provisions of the agreement within a specified time period.

RULES
COUNTY NOXIOUS WEED LIST
Sub-Chapter 2
Designation of Noxious Weeds

4.5.201. Designation of Noxious Weeds. (1) The department designates certain exotic plants listed in these rules as statewide noxious weeds under the County Weed Control Act 7-22-2101 (5), MCA. All counties must implement management standards for these noxious weeds consistent with weed management criteria developed under 7-22-2109 (2)(b) of the Act. The department established three categories of the noxious weeds. (History: Sec. 7-22-2101 MCA; IMP, Sec. 7-22-2101 MCA; NEW 1986, p. 337, Eff. 3/14/86; AND, 1991 MAR p. 511, Eff. 4/26/91.)

4.5.202. Category 1. (1) Category 1 noxious weeds are weeds that are currently established and generally widespread in many counties of the state. Management criteria includes awareness and education, containment and suppression of existing infestations and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses.

(2) The following are designated as category 1 noxious weeds:

- (a) Canada Thistle (Cirsium arvense)
- (b) Field Bindweed (Convolvulus arvensis)
- (c) Whitetop or Hoary Cress (Cardaria draba)
- (d) Leafy Spurge (Euphorbia esula)
- (e) Russian Knapweed (Centaurea repens)
- (f) Spotted Knapweed (Centaurea maculosa)
- (g) Diffuse Knapweed (Centaurea diffusa)
- (h) Dalmatian Toadflax (Linaria dalmatica)
- (i) St. Johnswort (Hypericum perforatum).

(History: Sec. 7-22-2101 MCA; IMP, Sec. 7-22-2101 MCA; NEW 1986 MAR p. 337, Eff. 3/14/86; AND, 1991 MAR p. 511, Eff. 4/26/91.)

4.5.203. Category 2. (1) Category 2 noxious weeds have recently been introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and invasion of lands, rendering lands unfit for beneficial uses. Management criteria includes awareness and education, monitoring and containment of known infestations and eradication where possible.

(2) The following are designated as category 2 noxious weeds:

(a) Dyers Woad (Isatis tinctoria)

(b) Purple Loosestrife or Lythrum (Lythrum salicaria, L. virgatum, and any hybrid crosses thereof).

(c) Sulfur (Erect) Cinquefoil (Potentilla recta)

(History: Sec. 7-22-2101 and 80-7-802 MCA; MP Sec. 7-22-2101 MCA: EW 1986 MAR p. 337, Eff. 3/14/86; AND, 1989 MAR p. 899, Eff. 7/14/89; AND 1991 MAR p. 511, Eff. 4/26/91.)

4.5.204 Category 3. (1) Category 3 noxious weeds have not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria includes awareness and education, early detection and immediate action to eradicate infestations. These weeds are know pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

(2) The following are designated as category 3 noxious weeds:

(a) Yellow Starthistle (Centaurea solstitialis)

(b) Common Crupina (Crupina vulgaris)

(c) Rush Skeletonweed (Chondrilla juncea)

(History: Sec. 80-7-802 MCA; IMP, Sec. 7-22-2102 MCA; NEW 1991 MAR p.511, Eff. 4/26/91.)

Part Cross References:

Weed Control - Department of Agriculture, Title 80, Chapter 7, Part 7.
Municipal Weed Control, 7-22-4101.
Noxious Weed Management Funding, Title 80, Chapter 7, Part 8.
Embargo against introduction of noxious weed seed from other state, 80-7-701.
General authority of county commissioners, 7-5-2101.
County officers - term of office, 7-4-2205.
Nuisance, Title 27, Chapter 30.
Classification of offenses, 45-1-201.
Department of State Lands, general powers and duties, Title 77, Chapter 1, Part 3.
Mining on State Lands, Title 77, Chapter 3.
Department of Fish, Wildlife and Parks, general powers and duties, Title 87, Chapter 1, Part 2.
Department of Highways, general powers and duties, Title 60, Chapter 2, Part 7.
Highways, acquisition and disposition of property, Title 60, Chapter 4.
Highway maintenance agreements with local government, 60-2-204.
Montana Environmental Protection Act, Title 75, Chapter 1.
Montana Solid Waste Management Act, Title 75, Chapter 10, Part 2.
County Taxation, Title 7, Chapter 6, Part 25.
Department of Institutions, general powers and duties, Title 53, Chapter 1, Part 2.
University system, Title 20, Chapter 5.
Department of Natural Resources and Conservation established 2-15-3301.
Major Facility Siting Act, Title 75, Chapter 20.
Subdivisions, Title 76, Chapter 2 and 3.
Coal mining, Title 82, Chapter 3.
Oil and gas conservation, Title 82, Chapter 11.
Hard rock mining impact, Title 90, Chapter 6, Part 3.
Role and duties of county clerk, 7-4-2611.
Employment of personnel by county commissioners. 7-5-2107.

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APPENDIX B

SYNOPSIS OF NOXIOUS WEED SPECIES

State Declared Noxious Weed Species

CATEGORY 1 noxious weeds are weeds that are currently established in many counties of the state. Management criteria for control of these weeds is necessary in all counties to contain or suppress existing infestations or to prevent, through eradication or other appropriate measures, new infestations of these weeds. All of these weeds render land unfit or greatly limit the beneficial uses (rule 4.5.202).

Canada thistle (*Cirsium arvense*)

Canada thistle is a perennial forb that reproduces by horizontal roots and seed. The stems are hollow and branch near the top. The wavy leaves are deeply cut with spiny to smooth margins. The flower heads are numerous, small, compact, and vary from light lavender to rose-purple. Canada thistle grows in cultivated fields, meadows, pastures, and waste areas.

Dalmatian toadflax (*Linaria dalmatica*)

Dalmatian toadflax is a perennial forb that spreads by creeping rootstalk and seed. The plants are pale green and have very showy yellow flowers. The "spurred" flowers are tinged with orange and are about 1 inch long. The leaves are broad, heart-shaped, and clasp the stem. Dalmatian toadflax is an escaped ornamental that invades rangeland, and is difficult to control.

Field bindweed (*Convolvulus arvensis*)

Field bindweed, a perennial forb, has an extensive, deep root system. Stems are prostrate, 1-4 feet long with numerous arrowhead-shaped stem leaves which form dense tangled mats. The white to pinkish flowers are trumpet-shaped and bloom from late June to frost. The plant propagates by seed and rhizome. Seeds remain viable for up to 50 years making this persistent weed very difficult to control. It is largely a problem in cultivated fields and waste areas.

Leafy spurge (*Euphorbia esula*)

Leafy spurge is a perennial forb which reproduces by vigorous rootstalk and seeds. The small flowers are enclosed by a pair of yellowish-green, heart shaped bracts which have the appearance of flowers. Stems, leaves and flowers contain a milky sap called latex, which may cause severe rashes in humans. The weed forms dense patches and may be the most persistent noxious weed in Montana. It has wide habitat suitability, prolific reproductive capabilities, strong competitive ability and is difficult to control, especially along water bodies. Although it is unpalatable to cattle, leafy spurge will be grazed by sheep and goats when they are confined to an infested area.

Russian knapweed (*Centaurea repens*)

Russian knapweed is a perennial forb that spreads by creeping rootstalk and seed. The plant has numerous branches that are tipped with a single, lavender thistle-like flower. The leaves are small and narrow with broken edges. The roots are dark brown and have a scaly appearance. Once, established, it will completely crowd out other vegetation. Livestock tend to avoid the weed because of its bitter, quinine-like taste. Horses, if forced to graze Russian knapweed, will develop nervous disorders.

Spotted knapweed (*Centaurea maculosa*)

Spotted knapweed is a short-lived perennial forb that reproduces by seed. The seeds germinate in the spring and fall, whenever growing conditions are favorable. The showy, purple flowers are held in spotted bracts. The alternate leaves have deep, narrow divisions and a rough, hairy appearance. It is very nutrient competitive, accelerating the decline of native vegetation.

Diffuse knapweed (*Centaurea diffusa*)

Diffuse knapweed is a biennial or short lived perennial forb. The tip of each branch has a single flower head. The flowers are usually white or sometimes pinkish. Bracts are yellowish green with a light brown margin. The upper part of each bract narrows into a stiff spine. It is an excellent competitor on dry sites.

St. Johnswort (*Hypericum perforatum*)

St. Johnswort is most commonly known as "goatweed". A perennial forb, it reproduces by seed and rootstock. The stems are smooth, branched and woody at the base. The opposite leaves have small glandular dots. Flowers are orange-yellow with 5 petals. Goatweed is found in meadows, dry pastures, rangelands, neglected fields, and along the roadside. Goatweed causes photo-sensitive reactions in livestock and should be regarded as a poisonous plant.

Whitetop (*Cardaria draba*)

Whitetop, also known as "hoary cress", is a perennial forb which reproduces by seeds and creeping roots. The dense flowers give the plant a white, flat-topped appearance. The leaves are grayish-green. The upper leaves clasp the stem.

CATEGORY 2 noxious weeds are weeds that have not been detected in or have recently been introduced into the State of Montana. These weeds have the potential for rapid spread and invasion of lands, thereby rendering them unfit for beneficial uses. County planning to prevent the spread or introduction of these weeds is necessary. Management criteria for detection and immediate action to eradicate or contain these weeds is necessary in all counties (rule 4.5.203).

Dyers woad (*Isatis tinctoria*)

Dyers woad is a perennial, biennial or annual forb reproducing by seeds and from roots. The plants have a smooth, bluish-green color. The lower leaves clasp the stem with ear-like projections. The yellow flowers are very small and form a flat-topped inflorescence. The seed pods are winged like a maple seed and turn black when mature. The purplish-black seed pods have been used for their dye extract, thus the name dyers woad.

Purple loosestrife (*Lythrum salicaria*)

Purple loosestrife is an aggressive perennial plant that is capable of invading our wetlands and replacing valuable wetland plants. Its dense root mats choke waterways, eliminating food and shelter for wildlife. It grows from underground roots, sprouts from broken off plant parts, and is a prolific seed producer. The flowers have a purple-magenta color. The leaves are linear shaped with smooth edges and are attached directly to a four-sided stem. Purple loosestrife is often confused with Blazing Star, Fireweed, or Blue Vervain.

Sulfur cinquefoil (*Potentilla recta*)

Sulfur cinquefoil is also referred to as "upright" or "rough fruited" cinquefoil. It is a perennial forb and reproduces by seed. The stems are hairy and rigid. The leaves are alternate and palmately divided with 5 to 7 coarsely toothed leaflets. The clustered flowers are a sulfur yellow. Sulfur cinquefoil is difficult to distinguish from several other native cinquefoils.

CATEGORY 3 noxious weeds have not been detected in the state or may be found only in small, scattered localized infestations. Management criteria includes awareness and education, early detection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

Common crupina (*Crupina vulgaris*)

Common crupina is a annual that reproduces by seed. It is closely related to the knapweed species. The leaves are large, thick, and dark green with stiff hairs that feel sticky. The plant produces 5 to 100 flower heads with a lavender to purple color, which

from a distance could be confused with spotted knapweed. It is generally found on well-drained, rocky to silt loam soils in pastures or rangeland. Cattle will not feed on common crupina plants. The species is competitive and forms solid stands reducing forage production and range carrying capacity. Infestations start in disturbed sites with sparse vegetation. Common crupina is not believed to be in Montana at this time.

Rush skeletonweed (*Chondrilla juncea*)

Rush skeletonweed, a member of the sunflower family, is a perennial 1-4 feet tall with a deep, extensive root system. It branches off of several main stems which have downward bent, coarse hairs on the lower 4-6 inches. Leaves occur at the base and resemble those of dandelions. Yellow flowering heads are small and scattered on branches. Flowering and seed production occurs from late summer through frost. This species generally inhabits well-drained, light-textured soils along roadsides, in rangelands, grain fields and pastures. Rush skeletonweed occupies large acreage in Oregon, Washington, Idaho and California. This species should not be confused with the rangeland native, skeletonweed, (*Lygodesmia juncea*) which has pink flowers.

Yellow star-thistle (*Centaurea solstitialis*)

Yellow star-thistle is an annual or, occasionally, biennial that reproduces by seed. The leaves are alternate and have slender, pointed lobes. The upper leaves are smaller and narrow with sharp, spiny tips. Leaf bases extend down the plant stem giving a winged effect. The flowers heads have sharp stiff spines on either side with one flower per branch. The flowers are yellow, long and tubular. It is toxic to horses and when eaten in quantity, results in a neurological disorder which over time causes death. The chewing disease associated with it comes from the spikes on the flower.

Other Watch Species

Eurasian watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil is an aggressive aquatic weed which is flourishing in Washington and Idaho. It resembles native milfoils with its lacy leaves and reproduces by seed and vegetative propagation. Water-milfoil roots in shallow streams and lakes in up to 15 feet of water forming extremely dense mats. It chokes waterways and irrigation ditches and depletes oxygen and therefore is a serious problem for recreationists, fisheries and landowners. The species appears to have a wide tolerance to severe environmental conditions and can resprout from seemingly dried out stems and roots. Thus it is easily spread by boats and trailers that carry fragments from infested waters to clean waters.

County Declared Noxious Weed Species

In addition to the state-declared noxious weed species specified in the County Noxious Weed Control Act, individual counties may also declare additional species as noxious and mandate control actions through their County Noxious Weed Control Management Plans. The following list summarizes these additional species for the counties within the administrative boundaries of DFWP Region 3.

Weed Species	Scientific Name	County (-ies)
Alyssum	<i>Alyssum spp.</i>	Gallatin
Arkansas rose	<i>Rosa arkansana</i>	Deer Lodge
Baby's Breath	<i>Gypsophila paniculata</i>	Beaverhead; Deer Lodge; Silver Bow
Brown Knapweed	<i>Centaurea jacea</i>	Gallatin
Bull Thistle	<i>Cirsium vulgare</i>	Beaverhead
Burdock	<i>Arctium minus</i>	Beaverhead; Gallatin; Park
Caraway	<i>Carum carvi</i>	Beaverhead; Silver Bow
Cocklebur	<i>Xanthium pensylvanicum</i>	Park
Common Tansy	<i>Tanacetum vulgare</i>	Beaverhead; Gallatin; Silver Bow
Common Toadflax	<i>Linaria vulgaris</i>	Beaverhead; Gallatin
Curly dock	<i>Rumex crispus</i>	Deer Lodge
Field Scabious	<i>Knautia arvensis</i>	Gallatin; Madison
Halogeton	<i>Halogeton glomeratus</i>	Beaverhead
Henbane	<i>Hyoscyamus niger</i>	Gallatin; Beaverhead
Hound's Tongue	<i>Cynoglossum officinale</i>	Beaverhead; Gallatin; Madison; Park; Silver Bow
Matrimony Vine	<i>Lycium halimifolium</i>	Silver Bow
Mullein	<i>Verbascum thapsus</i>	Gallatin; Deer Lodge; Park
Musk Thistle	<i>Carduus nutans</i>	Beaverhead; Deer Lodge; Gallatin; Madison; Park
Oxeye Daisy	<i>Heliopsis helianthoides</i>	Gallatin
Poison Hemlock	<i>Conium maculatum</i>	Gallatin; Park
Puncture Vine	<i>Tribulus terrestris</i>	Beaverhead
Showy Milkweed	<i>Asclepias speciosa</i>	Beaverhead
Sow Thistle	<i>Sunchus arvensis</i>	Beaverhead; Park
Sunflower	<i>Helianthus spp.</i>	Deer Lodge
Tansy (Ragwort)	<i>Senecio jacobaea</i>	Deer Lodge; Park
Yellow Bedstraw	<i>Galium verum</i>	Gallatin

APPENDIX C

LAWS AND POLICIES RELATING TO THE MANAGEMENT OF NOXIOUS WEEDS

Laws and Policies Relating to the Management of Noxious Weeds

State and federal laws, policies, and programs that affect DFWP Region 3's activities include:

- Creating a VISION for the Future of Montana's Department of Fish, Wildlife & Parks (1992)
- Weed Control Program for Lands Managed by the Montana Department of Fish, Wildlife and Parks (1983)
- Montana Pesticides Act (80-8-801 *et seq.*, MCA)
- Montana Weed Control Act (80-7-701 *et seq.*, MCA)
- Montana Noxious Weed Trust Fund Act of 1985 (80-7-801 *et seq.*, MCA) as amended 1991 and Rules
- Montana Water Quality Act (75-5-101 *et seq.*, MCA)
- Montana Agricultural Chemical Ground Water Protection Act of 1989 (80-15-100 *et seq.*, MCA)
- Montana Environmental Policy Act (MEPA, 75-1-101 *et seq.*, MCA)
- County Weed Boards for Beaverhead, Deer Lodge, Gallatin, Jefferson, Madison, Park, and Silver Bow counties; 5-Year Plans
- Montana Department of Agriculture Chemical Use Reporting Procedures
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) P.L. 92-516; CFR 40-171
- USDA Forest Service - Beaverhead, Deer Lodge, and Gallatin National Forests
- USDI Bureau of Land Management - Butte Division
- US Environmental Protection Agency

APPENDIX D

BIOLOGICAL CONTROL AGENTS AVAILABLE IN MONTANA

Biological Control Agents Available in Montana

Host	Control Agent	Action
Knapweeds	<i>Agapeta zoegana</i>	root mining moth
	<i>Chaetorellia acrolophi</i>	seed head fly
	<i>Cyphocleonus achates</i>	root weevil
	<i>Larinus minutus</i>	seed head weevil
	<i>Larinus obtusus</i>	seed head beetle
	<i>Metzneria paucipunctella</i>	flowerette and seed moth
	<i>Pelochrista medullana</i>	root mining moth
	<i>Pterolonche inspersa</i>	root moth
	<i>Sclerotinia spp.</i>	fungus
	<i>Sphenoptera jugoslavica</i>	root mining beetle
	<i>Subanguinia picridis</i>	leaf gall nematode
	<i>Terellia virens</i>	seed head fly
	<i>Urophora affinis</i>	seed head gallfly larvae
	<i>Urophora quadrifasciata</i>	seed head fly
Leafy Spurge	<i>Aphthona nigricutis</i>	root and leaf flea beetle
	<i>Aphthona cyparissiae</i>	root and leaf flea beetle
	<i>Aphthona flava</i>	root and leaf flea beetle
	<i>Aphthona czwalinae</i>	root and leaf flea beetle
	<i>Bayeria spp.</i>	shoot tip gall midge
	<i>Hyles euphorbiae</i>	defoliating hawk moth larvae
	<i>Oberea erythrocephala</i>	stem and root beetle larvae/adults
	<i>Spurgia esulae</i>	shoot tip gall midge
St. Johnswort	<i>Chrysolina quadrigemini</i>	defoliating beetle
Musk Thistle	<i>Rhinocyllus conicus</i>	seed head weevil
	<i>Trichosiracalus horridus</i>	rosette weevil
Canada Thistle	<i>Ceutorhynchus litura</i>	stem mining weevil
	<i>Urophora cardui</i>	stem and shoot gallfly
	<i>Larinus planus</i>	seedhead weevil
Dalmatian Toadflax	<i>Calophasia lunula</i>	defoliating larvae/moth

Biological Control Agents Released on Department of Fish, Wildlife and Parks Properties in Region 3

All biological control agents were released on Fishing Access Sites unless otherwise noted.

Host	Control Agent	Release Site
Knapweeds	<i>Agapeta zoegana</i>	Drouillard; Erwin Bridge; Free River
	<i>Larinus minutus</i>	Gallatin Forks; Drouillard; Erwin Bridge
	<i>Metzneria paucipunctella</i>	Drouillard; Cameron Bridge
	<i>Terellia virens</i>	Free River; Erwin Bridge
	<i>Urophora affinis</i>	Grey Owl; Free River; Shed's Bridge; William's Bridge; Drouillard; Erwin Bridge; Cameron Bridge; Axtell Bridge; Mount Haggin ¹
Leafy Spurge	<i>Aphthona nigriscutis</i>	Sappington Bridge; Greycliff; Cherry River
	<i>Aphthona cyparissiae</i>	Cherry River
	<i>Aphthona flava</i>	Greycliff; Cherry River; Mount Haggin ¹
	<i>Spurgia esulae</i>	Greycliff
Canada Thistle	<i>Ceutorhynchus litura</i>	Missouri Headwaters ² ; Poindexter Slough; Greycliff
	<i>Urophora cardui</i>	Poindexter Slough; Loch Leven
	<i>Larinus planus</i>	Chicory

¹ Mount Haggin Wildlife Management Area

² Missouri Headwaters State Park

APPENDIX E

HERBICIDE EMERGENCY RESPONSE PLAN

Herbicide Emergency Response Plan

The improper use or accidental release of an herbicide may pose serious health or environmental hazards. Accidental spills and releases must be managed quickly and efficiently to protect human health and the environment. Additional information on the handling and use of herbicides can be found in the Montana Pesticide Act (80.8.101 MCA) and its Administrative Rules (ARM 4.10.101).

During herbicide emergencies, the first priority is the safety of personnel involved in the accident. The next priority is spill containment and clean-up to minimize environmental contamination. This plan outlines field response and reporting procedures to follow in the event of an herbicide spill. This plan applies to all DFWP personnel and contractors when an accident occurs involving the transport, application, use or handling of an herbicide.

IN THE EVENT OF A SPILL:

- 1. Administer First Aid to Injured or Contaminated Persons**
- 2. Identify Type of Pesticide Released**
- 3. Notify the Appropriate Authorities**
- 4. Quarantine the Area**
- 5. Contain the Spill if Possible**
- 6. Complete Pesticide Emergency Response Record**
- 7. Develop a Clean-Up Plan Where Appropriate**

1. Administer First Aid to Injured Persons

Of greatest importance is the immediate threat to human health and the aid of someone injured during an herbicide spill. Any injured parties should be removed from the contaminated area immediately. Contaminated clothing should be removed. All persons should avoid direct contact with the spilled material until it is positively identified.

If the released chemical is known, labels and Material Safety Data Sheets can be consulted for the appropriate procedures for decontamination and administering first aid. For most herbicides, washing with water and detergent is the best method. Initial first aid for eye contact usually includes rinsing with eye-safe solutions (e.g. contact lens saline solution) or water. Injured parties, should be transported to medical facilities as soon as possible, with the name of the released material, label, and material safety data sheet accompanying the injured person.

2. Identify Spilled Material

To administer the most appropriate emergency response, the spilled herbicide must be accurately identified. Herbicide label information and Material Safety Data Sheets (MSDS) should accompany all DFWP personnel and their contractors if an herbicide is handled, transported, or applied. In addition, MSDS's should also be kept on file at any location where herbicides are stored. MSDS's describe appropriate response procedures for administering emergency aid to affected parties and appropriate protective clothing for containing a spill. The transporter and applicator of the herbicide must carry records describing mixtures of all herbicides applied.

3. Notify the Authorities

Herbicides can pose serious threats to human health and the environment and should be handled with extreme care. All accidental herbicide releases must be reported to the Montana Department of Agriculture within 48 hours. The written report must include the time of the incident, its location, herbicide name, type of formulation, method of application, and the DFWP contact for the project. The report should also name all parties involved in the incident, including the names and addresses of individuals who may be affected by the spill. If the spilled herbicide is classified as either extremely toxic or highly toxic, the Department of Agriculture must be notified immediately. The following authorities may be contacted:

DFWP: Regional Parks Maintenance Supervisor	994-4042
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Local Emergency Response:	911
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County Sheriff's Office:	Beaverhead	683-2383
	Deer Lodge	846-2711
	Gallatin	585-1475
	Jefferson	222-2281
	Madison	843-5301
	Park	222-2281
	Silver Bow	782-4224

Montana Disaster & Emergency Services:	(406) 444-6911
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National Response Center:	(800) 424-8802
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Montana Department of Agriculture:	(406) 444-3144
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Montana Poison Control Center:	(800) 525-5042
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The Chemical Manufacturer's Association maintains this 24 hour hotline to provide information about chemicals and their related health and environmental hazards for fire and police crews responding to chemical accidents and spills.

4. Quarantine the Area

In the event of a spill, restrict access to the site, using physical barriers such as emergency tape, flagging, or signs. The area should be secured to prevent entry of unauthorized personnel into the spill area. Only authorized persons wearing the appropriate protective clothing should be permitted into the area.

5. Contain the Spill

Once the spilled material is positively identified, it must be contained as soon as possible. Technical labels and MSDS's provide information on protective clothing requirements for clean-up personnel. Generally, it will be clothing similar to the protective clothing required for application.

Put on all necessary protective clothing, including respirators, before approaching the spill from an upwind direction. Avoid inhaling fumes, vapors, and dust from the spill. Smoking is not allowed in a spill area. Examine the area and determine an effective method to contain the spill. Any person attempting to contain a spilled herbicide should also follow these guidelines:

- minimize human contact with the spill, using mechanized equipment if possible
- avoid raising dust
- avoid diluting material with water (except for misting dry substances)
- treat all absorbent material used during containment as a hazardous waste
- remove and dispose of all contaminated soil as a hazardous waste
- wash and properly decontaminate hands and face prior to consuming any food

Potential spill containment methods include:

Liquid Spills

- create small collection pools for runoff
- create dikes to impound runoff
- cover spill material with approximately double its volume in absorbent material (hydrated lime, saw dust, kitty litter)
- transfer absorbent material onto an impermeable barrier (e.g. tarp)
- divert spilled material away from open waters
- monitor and plug leaks in containment structures

Dry Spills

- cover with a plastic tarp and secure edges of the tarp
- spray fine mist to minimize dust
- shovel material into clearly marked plastic bags or drums and seal

6. Record Herbicide Spill

An herbicide spill or accident can have long lasting effects beyond immediate health and environmental threats. It is important to document all circumstances and events pertaining to the accident and/or spill. Important information includes the name and type of herbicide (include MSDS sheets), the names of any injured or contaminated persons, amount spilled or released, spill location, and whether chemicals were discharged into a water body. Below is a form to record all appropriate information.

HERBICIDE SPILL EMERGENCY RESPONSE FORM

Complete all appropriate items and add additional notes to document special conditions or unusual circumstances. Take photos when possible to supplement notes.

1. Immediately contact the appropriate response agencies.
2. Were there injuries related to the spill? ☐ yes ☐ no
Were any individuals contaminated with herbicide? ☐ yes ☐ no
Was aid provided to affected individuals? ☐ yes ☐ no
Was transportation to a medical facility required? ☐ yes ☐ no
3. Was a vehicle accident involved? ☐ yes ☐ no

4. What materials/herbicides were involved? (include MSDS)

5. Estimate amount of herbicide or herbicide mixture spilled in gallons.
Herbicide: _____ gals Mixture: _____ gals
Herbicide: _____ gals Mixture: _____ gals
Herbicide: _____ gals Mixture: _____ gals

6. Location of Incident (name of site): _____
____ 1/4 ____ 1/4 ____ Sec ____ T ____ R Highway/Road: _____
Time of Incident: _____ Date: _____

Provide a description of the site (water bodies, vegetation, landmarks)

Distance to picnic/play campground area: _____
nearest well: _____
surface water: _____

7. Is there a danger of surface water contamination? ☐ yes ☐ no
Has an herbicide already entered the water body? ☐ yes ☐ no
Name of Stream/Lake _____
8. Is there a danger of ground water contamination? ☐ yes ☐ no
Depth to groundwater: _____
Elevation above nearest surface water: _____

HERBICIDE SPILL EMERGENCY RESPONSE FORM, page 2

9. General Soil Description (check one for surface and subsurface soil)

Surface	☐ Dark Colored, Organic, Rock Free
	☐ Medium Textured
	☐ Light Colored, Rocky
Subsoil	☐ Dark Colored, Organic, Rock Free
	☐ Medium Textured
	☐ Light Colored, Rocky

10. List Agencies Notified

FWP Authority _____	When _____
Local Authority _____	When _____
State Authority _____	When _____
Federal Authority _____	When _____
Other Authority _____	When _____

11. Site Sketch

12. Describe Incident: _____

13. Public Contact/Comment During Incident: _____

14. Name: _____ **Date:** _____

CHEMICAL EMERGENCY SPILL KIT

All FWP personnel and contractors applying or transporting herbicides must carry the following safety items in the vehicle.

- at least one pair of neoprene or plastic gloves for each crew member present
- at least one pair of rubber, neoprene, or plastic material boots
- at least one pair of unvented goggles for each crew member present
- at least one approved respirator for applied pesticide
- at least one pair of coveralls or disposable coveralls (Tyvek) for each crew member
- absorbent material (kitty litter, floor dry)
- heavy duty plastic garbage sacks
- plastic tarp
- shovel
- dustpan and shop brush
- one pint liquid detergent
- portable eye wash kit
- five-pound ABC-type fire extinguisher
- first aid kit
- safety tape/flagging
- Material Safety Data Sheets and technical label information for each herbicide handled and used
- Herbicide Spill Response Plan

APPENDIX F

SENSITIVE SPECIES OCCURRING IN THE VICINITY OF MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS PROPERTIES IN REGION 3

Sensitive Species Occurring in the Vicinity of Department of Fish, Wildlife and Parks Region 3 Properties¹

Site Name	Species Occurrence and Status
Gallatin WMA ²	Grizzly Bear (<i>Ursus arctos</i>); site is within occupied habitat in the Yellowstone ecosystem; listed as threatened under the Endangered Species Act
Gallatin WMA	Subspecies of Wolf's Willow (<i>Salix wolfii</i> var. <i>wolfii</i>); critically imperiled in Montana because of its rarity; vulnerable to extinction ³
Gallatin WMA	Yellowstone Cutthroat Trout (<i>Oncorhynchus clarki bouvieri</i>); imperiled in Montana due to its rarity; vulnerable to extinction throughout its range
Gallatin WMA	Slender Paintbrush (<i>Castilleja gracillima</i>); critically imperiled in Montana because of its rarity; vulnerable to extinction
Mount Haggin WMA	Yellow Spring Beauty (<i>Claytonia lanceolata</i>); rare and local throughout its range
Red Rocks WMA	Great Basin Downingia (<i>Downingia laeta</i>); critically imperiled in Montana because of its rarity; vulnerable to extinction
Lewis & Clark Caverns ⁴	Curl-Leaf Mountain Mahogany/Bluebunch Wheatgrass Association (<i>Cercocarpus ledifolius</i> / <i>Agropyron spicatum</i>); this species association has a restricted range or distribution; it is undisturbed at this site
Lewis & Clark Caverns	Townsend's Big-Eared Bat (<i>Plecotus townsendii</i>); imperiled because of its rarity; this site supports a maternity colony
Bannack ⁴	Pygmy Rabbit (<i>Brachylagus idahoensis</i>); restricted range or rare throughout its range
Grey Owl FAS ⁵	Bald Eagle (<i>Haliaeetus leucocephalus</i>); nesting site and territory; listed as endangered under the Endangered Species Act
Emigrant North FAS	Basin Wild Rye - Alkali Saltgrass (<i>Elymus cinereus</i> - <i>Distichlis stricta</i>); habitat type not yet described in Montana

¹ Information provided by the Montana Natural Heritage Program, August 1993.

² Wildlife Management Area.

³ *Salix wolfii* has also been documented on Mount Haggin WMA; presently, it is unknown whether the variety is *wolfii*.

⁴ State Park.

⁵ Fishing Access Site.

APPENDIX G

HERBICIDES PROPOSED FOR USE ON DEPARTMENT OF FISH, WILDLIFE AND PARKS REGION 3 PROPERTIES

Herbicides Proposed for Use on Department of Fish, Wildlife and Parks

Region 3 Properties

The following herbicides have been applied on properties within DFWP Region 3. Individual chemicals have different properties and thus different circumstances for their proper application. This list also represents chemicals from which DFWP will select in the future, so as to use the appropriate herbicide in any given setting. All chemical applications are subject to the guidelines presented in this Plan. Herbicide label instructions will follow in APPENDIX H.

Trade Name	Chemical Ingredient
Tordon	piclorum
Roundup/Ruler	glyphosate
Stinger	clopyralid
Transline	clopyralid
Curtail	clopyralid + 2,4-D
Weedar 64	2,4-D Amine
Hi-Dep	2,4-D Ester

APPENDIX H

HERBICIDE LABEL INSTRUCTIONS AND SAFETY PRECAUTIONS

Specimen Label

Restricted Use Pesticide

May Injure (Phytotoxic) Susceptible, Non-Target Plants. For retail sale to and use only by Certified Applicators or person under their direct supervision and only for those uses covered by the Certified Applicator's certification. Commercial certified applicators must also ensure that all persons involved in these activities are informed of the precautionary statements.

For use in areas west of the Mississippi River for the control of susceptible broadleaf weeds and woody plants on rangeland and permanent grass pastures, fallow cropland, wheat, barley and oats not underseeded with a legume on grainland (which is not flood or sub-irrigated and not rotated to broadleaf crops), non-cropland, and on Conservation Reserve Program (CRP) acres and wildlife openings in forest and non-crop areas

Active Ingredient:

picloram: 4-amino-3,5,6-trichloropicolinic acid,
potassium salt 24.4%

Inert Ingredients 75.6%

Acid Equivalent

picloram: 4-amino-3,5,6-trichloropicolinic acid -
21.1% - 2 lb per gal

EPA Reg. No. 62719-6

EPA Est. 464-MI-1

Net Contents 2.5 gal

Precautionary Statements

Hazards to Humans and Domestic
Animals

Keep Out Of Reach Of Children

WARNING AVISO:

Precaucion al usuario: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

Causes Substantial But Temporary Eye Injury •
Harmful If Inhaled Or Absorbed Through Skin

Do not get in eyes or on clothing. Wear goggles, face shield or safety glasses when handling. Avoid contact with skin. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse. Avoid breathing spray mist.

First Aid

If in eyes: Flush with plenty of water for at least 15 minutes. Get medical attention.

Environmental Hazards

Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water when disposing of equipment washwaters. Do not contaminate water used for irrigation or domestic purposes by cleaning of equipment or disposal of wastes. Do not allow run-off or spray to contaminate wells, irrigation ditches or any body of water used for irrigation or domestic purposes. Do not make application when circumstances favor movement from treatment site.

Picloram is a chemical which can travel (seep or leach) through soil and under certain conditions has the potential to contaminate groundwater which may be used for irrigation and drinking purposes. Users are advised not to apply picloram where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into an aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

An aquifer is defined as "an underground, saturated, permeable, geologic formation capable of producing significant quantities of water to a well or spring. It is the ability of the saturated zone, or portion of that zone, to yield water which makes it an aquifer" (American Chemical Society, 1983).

Note: Use In Hawaii limited exclusively to Supplemental Labelling. See "General Use Precautions" for details.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read "Warranty Disclaimer" and "Limitation of Remedies" sections elsewhere on this label.

In case of emergency endangering health or the environment involving this product, call collect 517-636-4400.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Tordon* 22K

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Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all Directions for Use carefully before applying.

STORAGE AND DISPOSAL

Do not contaminate water, food, feed or fertilizer by storage or disposal. Open dumping is prohibited.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Metal Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Plastic Container Disposal: Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Sprayer Clean-Out: To avoid injury to desirable plants, equipment used to apply Tordon 22K should be thoroughly cleaned before reusing to apply any other chemicals.

1. Rinse and flush application equipment thoroughly after use. Dispose of rinse water in non-cropland area away from water supplies.
2. Rinse a second time, adding 1 quart of household ammonia for every 25 gallons of water. Circulate the solution through the entire system so that all internal surfaces are contacted (15 to 20 minutes). Let the solution stand for several hours, preferably overnight.
3. Flush the solution out the spray tank through the boom.
4. Rinse the system twice with clean water, recirculating and draining each time.
5. Nozzles and screens should be removed and cleaned separately.

General: Consult federal, state or local disposal authorities for approved alternative procedures.

GENERAL INFORMATION

In areas west of the Mississippi River use Tordon 22K herbicide to control susceptible broadleaf weeds and woody plants on rangeland and permanent grass pastures, fallow cropland, wheat, barley and oats not underseeded with a legume on grainland (which is not flood or sub-irrigated and not rotated to broadleaf crops), non-cropland, and on Conservation Reserve Program (CRP) acres, and wildlife openings in forest and non-crop areas. **This product is NOT for sale or use in the San Luis Valley of Colorado.**

General Use Precautions

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

To prevent damage to crops and other desirable plants, read and follow all directions and precautions on this label and container before using.

Do not use for manufacturing or formulating.

Do Not Mix With Dry Fertilizer.

Chemigation: Do not apply this product through any type of irrigation system.

In Hawaii, approved uses of Tordon 22K are limited to those described in Supplemental Labeling. This Supplemental Labeling may be obtained from your DowElanco representative or chemical dealer. Refer to this Supplemental Labeling for specific use directions and precautions.

Do not make application when circumstances favor movement from treatment site.

Do not apply or otherwise permit Tordon 22K or sprays containing Tordon 22K to contact crops or other desirable broadleaf plants, including but not limited to alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes, and other vegetable crops, flowers, fruit plants, ornamentals or shade trees or the soil containing roots of nearby valuable plants.

Precautions for Avoiding Injurious Spray Drift

Applications should be made to avoid spray drift since very small quantities of spray, which may not be visible, may seriously injure susceptible crops during both growing and dormant periods. To minimize spray drift, use low nozzle pressure; apply as a coarse spray; and use nozzles designed for herbicide application that do not produce a fine droplet spray. To aid in further reducing spray drift, a drift control and deposition aid such as Nalco-Trol may be used with this product. If such a drift control aid is used, follow all use recommendations and precautions on the product label.

Ground Equipment: With ground equipment spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the manufacturers recommended minimum pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); by spraying when the wind velocity is low (follow state regulations). Avoid calm conditions which may be conducive to air inversions. In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist).

Aerial Application: With aerial applications, drift may be lessened by using a coarse spray; by using a drift control system; or by using Nalco-Trol drift control additive or equivalent. Adjust spray pressure to provide coarse spray droplets and by using nozzles which do not create fine droplets. Spray boom should be no longer than 3/4 of the wingspan or rotor length. Do not use a thickening agent with the Microfoil or the Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid calm conditions which may be conducive to air inversions.

Determine Air Movement and Direction Before Foliar Application. Do not spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movements, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Do not contaminate water intended for irrigation or domestic purposes. To avoid injury to crops or other desirable plants, do not treat or allow spray drift or run-off to fall onto banks or bottoms of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation or domestic purposes.

Do not use on flood or sub-irrigated land.

Do not spray if the loss of forage legumes cannot be tolerated. Tordon 22K may injure or kill legumes. New legume seedlings may not grow for several years following application of this herbicide.

Do not use manure from animals grazing treated areas on land used for growing broadleaf crops, ornamentals, orchards or other susceptible, desirable plants. Manure may contain enough picloram to cause injury to susceptible plants.

Do not use grass or hay from treated areas for composting or mulching of susceptible broadleaf crops.

Do not transfer livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not apply to snow or frozen ground. Application during very cold (near freezing) weather is not advisable.

Tordon 22K should not be applied on residential or commercial lawns or near ornamental trees and shrubs. Untreated trees can occasionally be affected by root uptake of herbicide through movement into the top soil or by excretion of the product from the roots of nearby treated trees. Do not apply Tordon 22K within the root zone of desirable trees unless such injury can be tolerated.

Do not rotate food or feed crops on treated land if they are not registered for use with picloram until an adequately sensitive bioassay or chemical test shows that no detectable picloram is present in the soil.

Do not move treated soil to areas other than those treatment sites for which Tordon 22K is registered for use. Also, do not use treated soil to grow plants for which use of Tordon 22K is not registered until an adequately sensitive bioassay or chemical test shows that no detectable residue of picloram is present in the soil.

Woody Plants and Broadleaf Weeds Controlled by Tordon 22K

Woody Plants:

absinth wormwood
aspen
blackberries
catclaw acacia
chaparral sp.
fringed sagebrush
gorse

junipers/cedars
locust
multiflora rose
pinyon pine
rabbitbrush
Scotch broom

Annual and Perennial Broadleaf Weeds:

brackenfern	larkspurs	starthistles
buckwheat, wild	geyer	Iberian
buffalobur	plains	purple
bursage	tall	yellow
burweed	lambquarters	St. Johnswort
camelthorn	leafy spurge	sulfur cinquefoil
clover	licorice, wild	sunflower
crupina, common	locoweeds	tansy ragwort
dock	lupines	tasajillo
field bindweed	milkweed	toadflaxes
goldenrod	ox-eye daisy	thistles
henbane, black	pigweed	artichoke
horsetail	pricklypear cactus	beaumont
Carolina	ragweeds	bull
white	common	Canada
horseweed	bur	distaff
ironweed	lanceleaf	golden
knapweed	western	Italian
diffuse	rush skeletonweed	musk
Russian	Russian thistle	plumeless
spotted	snakeweeds	Scotch
squarrose	sowthistle	wavy leaf

Mixing and Application Methods

Mix the required amount of Tordon 22K in water and apply as a coarse low pressure spray using ground equipment or aircraft. Use enough spray volume to provide uniform coverage of the weeds. For best results treat when the weeds are growing actively in the spring before full bloom or late summer into fall. Treatments during full bloom or seed stage of some weeds may not give good control.

To prepare the spray, add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of Tordon 22K and other registered tank mix herbicides. Finally, with continued agitation, add the rest of the water and additives such as surfactants or drift control and deposition aids.

Use with surfactants

Addition of wetting or penetration agents is not usually necessary when using Tordon 22K. Under extreme conditions, such as drought, addi-

tion of a surfactant may improve efficacy. However, if foliar burn occurs too rapidly, translocation of Tordon 22K will not occur and control of perennial weeds, such as field bindweed, may be reduced.

Use With Sprayable Liquid Fertilizer Solutions

Tordon 22K is compatible with most non-pressurized liquid fertilizer solutions; however, if these solutions are to be sprayed with Tordon 22K, a compatibility test (jar test) should be made prior to mixing. Jar tests are particularly important when a new batch of fertilizer or pesticide is used, when water sources change, or when tank mixture ingredients or concentrations are changed. Compatibility may be determined by mixing the spray components in the desired order and proportions in a clear glass jar before large scale mixing of spray components in the spray tank. Use of a compatibility aid such as Unite or Compex may help obtain and maintain a uniform spray solution during mixing and application. Agitation in the spray tank must be vigorous to be comparable with jar test agitation. For best results, liquid fertilizer rates should not exceed 50% of the total spray volume. Premix Tordon 22K with water and add to the liquid fertilizer/water mixture while agitating contents of the spray tank. Apply the spray the same day it is prepared while maintaining continuous agitation. Rinse spray tank thoroughly after use.

Note: Foliar applied liquid fertilizers can cause yellowing or leaf burn of crop foliage.

Local conditions may affect the use of herbicides. State agricultural experiment stations or extension service weed specialists in many states issue recommendations to fit local conditions. Be sure that use of this product conforms to all applicable regulations.

Spot Treatment

Use application rates as suggested in the "Approved Uses" section of this label or recommended by your area weed control specialist. Apply in a total spray volume of 20 to 100 gallons per acre. Make sure equipment is properly calibrated and that the amount of Tordon 22K added to the spray mixture corresponds to the desired rate and spray volume.

To Calibrate:

1. Measure an area 18.5 ft by 18.5 ft in the target application area.
2. Spray the measured area uniformly with water only and record the number of seconds required to cover the area.
3. Measure the amount of water delivered to the test area by spraying into a container for this amount of time.
4. The amount of water collected in fl oz equals spray volume in gallons per acre.
5. Refer to the chart below for the amount of Tordon 22K to mix at the spray volume indicated by the calibration procedure. This chart contains the amount of Tordon 22K to mix when the application rate is 1 quart per acre. For a rate of 1/2 quart per acre (1 pint), divide the amount in the table by 2. For an application rate of 2 quarts per acre, multiply the table value by 2.

To Apply the Equivalent of 1 Quart of Tordon 22K per Acre at the Spray Volume Indicated, Mix the Following:

Spray Volume (gallons per acre)	Amount of Tordon 22K per 1 gallon of water	Amount of Tordon 22K per 100 gallons of water
20	10 tsp	5 quarts
40	4 3/4 tsp	2 quarts
60	3 1/4 tsp	1 2/3 quarts
80	2 1/3 tsp	1 1/4 quarts
100	2 tsp	1 quart

Note: tsp = teaspoon
6 tsp = 1 fluid ounce

Do not exceed 4 quarts per acre in any one year as a spot treatment.

Tank Mixture for Spot or Broadcast Treatment of Susceptible Weeds

Tordon 22K may also be tank mixed with 2,4-D products or other registered herbicides for use on areas having mixed species including those which respond well to 2,4-D. Read and follow all directions and use precautions on other product labels.

Wick Application

Mix 1 part of Tordon 22K with 2 parts of water to prepare a 33% solution. Apply when weeds are actively growing and are above most desirable plants. For ironweed and goldenrod, best results are obtained with applications made prior to early bud stage. Wick applicator should be drained and cleaned after each use. Ropes should be changed when flow is reduced from wear, extended use, poor cleaning or intermittent use.

APPROVED USES

NON-CROPLAND AREAS

Use Tordon 22K to control susceptible broadleaf weeds and woody plants on non-cropland areas such as on roadsides or other rights-of-way, along fence rows, and around farm buildings. Use up to 2 quarts of Tordon 22K per acre as a broadcast treatment and up to 4 quarts per acre as a spot treatment. Wick Application may be used on non-cropland. See "Wick Application" in "Mixing and Application Methods" section for directions.

RANGELAND AND PERMANENT GRASS PASTURES

Use Tordon 22K on rangeland and permanent grass pastures to control susceptible broadleaf weeds and woody plants such as (but not limited to) those shown in the table.

Grazing Restrictions: When applying more than 1 quart of Tordon 22K per acre, do not cut grass for feed within two weeks after treatment. Meat animals grazing for up to two weeks after treatment should be removed from treated areas three days prior to slaughter. Do not graze lactating dairy animals on treated areas within two weeks after treatment.

Broadcast Treatment (Ground and Aerial Applications)

Tordon 22K can be applied as a broadcast treatment by ground or aerially to control several broadleaf weeds and woody plants. Apply Tordon 22K at the suggested rates in 2 or more gallons of water per acre by air or in 10 or more gallons of water per acre by ground. Re-treat as necessary but do not exceed 1 quart of Tordon 22K per acre per season. For control of actively growing susceptible annual broadleaf weeds, including Russian thistle, apply 1/4 to 1/2 pint per acre of Tordon 22K. Tordon 22K can also be tank mixed with 1/2 to 1 pound per acre 2,4-D where species present are sensitive to 2,4-D.

Tordon 22K at rates over 1 quart may suppress certain established grasses, such as brome grass, blue gramma, and buffalograss. However, subsequent grass growth should be improved by release from weed competition.

Weed Control Guidelines for Tordon 22K in Non-cropland, Rangeland and Pasture*

Weed Species**	Rate per Acre	Comments
biennial thistles bull musk plumeless Scotch	Fall: 1/2 pint Spring: 6 - 8 fl oz with 1.0 lb ae 2,4-D	Apply when thistles are in the rosette stage before bolting in the spring or in the fall prior to soil freeze up.
bolting musk thistle	1/2 - 1 pint + 1 lb ae 2,4-D per acre	Apply before flowering.
broom snakeweed geyer larkspur locoweeds multiflora rose plains larkspur prickly pear cactus sulfur cinquefoil	1 pint	For prickly pear cactus, use of a diesel oil-water emulsion spray mixture may improve control.
black henbane crupina diffuse knapweed spotted knapweed yellow starthistle	1 - 2 pints	
absinth wormwood bursage Douglas rabbitbrush goldenrod ox-eye daisy	1 - 2 pints	Tank mix the lower rate with 1.0 lb ae per acre 2,4-D. Lower rates may require annual spot treatments.
wild licorice	1 quart	
Canada thistle field bindweed gorse lupines rush skeletonweed St. Johnswort tansy ragwort	1 - 2 quarts	Tank mix the lower rate with 1.0 lb ae per acre 2,4-D. Lower rates may require annual spot treatments.
dalmation toadflax juniper perennial sowthistle Russian knapweed	2 - 3 quarts	For Russian knapweed, apply at bud stage or in the fall
tall larkspur yellow toadflax	3 - 4 quarts	
leafy spurge	1 - 4 quarts	Lower rates will require annual retreatment for several years. Retreat when control drops below 80%

* For additional species or more specific rates consult your area's current Weed Control Guide and/or your local DowElanco representative.

**Many seedling annual weeds can be controlled using 1 pt per acre.

For rates exceeding 1 quart per acre, apply only as a spot treatment and the total area treated in a single season should not exceed 25% of a landowner's acreage found in any particular watershed.

Spot Treatment

See "Spot Treatment" in "Mixing and Application Methods" section for directions for calibration, spray volume determination and mixing.

Spot Concentrate Application

Eastern red cedar can be controlled with spot concentrate applications of Tordon 22K in either the spring (April-May) or fall (September-October). For best results, use 3 ml to 4 ml of Tordon 22K (undiluted) per 3 feet of plant height. Application should precede periods of expected rainfall. Apply directly to soil within the dripline and on the upslope side of the tree. Application to trees taller than 15 feet is not recommended. Do not use more than 2 pints of Tordon 22K per acre in any one year.

Wick Application

See "Wick Application" in "Mixing and Application Methods" section for directions. Apply when weeds are actively growing and are above most desirable plants. For ironweed and goldenrod, best results are obtained with applications made prior to early bud stage.

Barley, Oats, and Wheat Not Underseeded With a Legume (Which is Not Flood or Sub-Irrigated and Not Rotated to Broadleaf Crops)

Use Tordon 22K for the control of susceptible annual broadleaf weeds such as (but not limited to) volunteer sunflower, wild buckwheat, lamb-quarters, pigweed, Russian thistle, and sowthistle.

Use Precautions

Do not apply Tordon 22K within 50 days before harvest.

Spray mixtures may cause shorter straw on some varieties of cereals but grain yields are usually not affected.

Do not graze or feed forage from treated areas for 2 weeks after treatment. Do not harvest hay from treated grain fields.

Use only on land that will be planted the following year to grass, barley, oats, wheat or fallowed. Do not apply more than 1 1/2 fluid ounces of Tordon 22K per acre during the small grain growing season.

Broadcast Treatment (Ground and Aerial Applications)

Tordon 22K can be applied as a single broadcast treatment by ground or aerially to control several broadleaf weeds by itself or as a tank mix with 2,4-D, MCPA, or sulfonyleurea herbicides such as Ally. Apply Tordon 22K at the rates suggested in the following table in 2 to 5 gallons of water per acre by air or in 5 to 20 gallons of water per acre by ground. The addition of surfactants may aid control under dry conditions, but may cause injury to grain if used over the top. Read and follow directions and precautions on other product labels when tank mixing.

Spring Wheat, Barley and Oats

Apply from the 3 to 5 leaf stage to the early jointing stage of growth as indicated in the table below. Applications at the 3 to 5 leaf stage occasionally cause slight head malformations and straw shortening but normally do not affect yield.

Durum Wheat

Do not treat durum wheat since some varieties of durum wheat may be injured.

Winter Wheat and Barley

Apply after resumption of active growth in the spring until the early jointing stage.

Use Rates for Wheat, Barley and Oats[†]

Weeds	Weed Growth Stage ^{††}	Grain Growth Stage	Amounts of Each Product Per Acre ^{†††}		
			Tordon 22K	4 lb ae/gal 2,4-D or MCPA	6 lb ae/ga 2,4-D or MCPA
More susceptible species, such as: lambquarters pennycress wild mustard mayweed	3 inches	3 to 5 leaf to early tillering	1 fl oz	1/2 pint	1/3 pint
	3 to 6 inches	Tillering to early jointing	1 1/2 fl oz	3/4 pint	1/2 pint
Less susceptible species such as: volunteer sunflower wild buckwheat Russian thistle pigweed Canada thistle, top growth suppression	1 to 6 inches	Tillering to early jointing	1 1/2 fl oz	3/4 to 1 pint	1/2 to 2/3 pint

[†]For oats, do not tank mix with 2,4-D herbicides.

^{††}For best results, treat when weeds have 2 to 4 leaves and are actively growing.

^{†††}When measuring small amounts of Tordon 22K, special care should be taken not to exceed suggested rates.

FALLOW CROPLAND (NOT ROTATED TO BROADLEAF CROPS)

Apply Tordon 22K as a post harvest or fallow treatment in continuous grain or during the fallow period. Tordon 22K may be applied alone or in tank mix combination with 2,4-D or other herbicides registered for this use. Apply in 2 or more gallons of water per acre by air or 5 or more gallons per acre by ground. Spray only under conditions that will prevent injury to nearby susceptible crops or ornamentals. Refer to "General Use Precautions" section for information on preventing drift to off-target areas.

Application Rates

Note: Do not apply more than 1 pint per acre as a broadcast treatment in any calendar year.

Annual Weeds: To control annual weeds such as Russian thistle and wild buckwheat, apply 1/4 to 1/2 pint per acre of Tordon 22K in tank mix combination with 1/2 to 1 lb ae of 2,4-D or other herbicides registered for use on fallow land. Apply when weeds are actively growing.

Field Bindweed: Apply 1/2 to 1 pint per acre of Tordon 22K plus 1/2 to 1 lb ae per acre of 2,4-D when bindweed is actively growing. Optimum time for treatment is when plant runners reach 8 to 12 inches. Use 1/2 pint per acre to control light to moderate infestations under good growing conditions or to reduce the potential for crop injury. Use higher rates for heavy infestations and longer term control. Some regrowth will occur the following season and a re-treatment program for successive years is recommended.

Canada thistle: Apply 1 pint per acre of Tordon 22K plus 1 lb ae per acre of 2,4-D when the majority of thistle plants are emerged but prior to bud stage.

Crop Rotation

Use only on land to be planted the following year to grass, barley, oats, wheat or fallowed. Many broadleaf crops are extremely sensitive to soil residues of Tordon 22K. Do not plant sensitive broadleaf crops for 36 months after treatment or until soil residues have declined to a safe level as indicated by an adequately sensitive bioassay using the intended broadleaf crop. A bioassay is recommended following treatment prior to planting any sensitive broadleaf crop.

Preplant Interval

A preplant interval following Tordon 22K application prior to planting small grains is recommended to reduce or eliminate potential crop injury and/or yield reduction. The possibility for crop injury or yield reduction to occur depends on application rate, soil organic matter, rainfall, temperature and incidence of cereal diseases. Adequate soil moisture and soil temperature during the preplant interval is important in reducing, but may not eliminate, the risk of crop injury. When considering use of Tordon 22K on fallow land, growers should consider the benefit of weed control against the risk of crop damage and treat only if the risk of injury to small grains can be tolerated. The following preplant intervals are recommended:

For applications up to 1/2 pint per acre, allow a minimum of 45 days of soil temperatures above 40°F between application and planting.

For applications of greater than 1/2 pint and up to 1 pint per acre, allow a minimum of 60 days of soil temperatures above 40°F between application and planting, except in the states of Idaho, North Dakota, Nebraska, Montana, Oregon, South Dakota, Washington and Wyoming, where the minimum preplant interval is 90 days.

Spot Treatment

See "Spot Treatment" in "Mixing and Application Methods" section for directions for calibration, spray volume determination and mixing.

Spot treatments of Tordon 22K at rates over 1 pint per acre can be made on fallow, non-irrigated cropland if the treated areas comprise less than 10% of the immediate field in any one year. Tordon 22K should not be applied to cropland at rates exceeding 2 quarts per acre. When Tordon 22K at rates above 1 pint per acre are applied, injury to small grains may result for periods up to two years after treatment.

CONSERVATION RESERVE PROGRAM (CRP) FOR SEEDING TO PERMANENT GRASSES ONLY

Do not use Tordon 22K if legumes are a desired cover during CRP.

Conditions that stress grasses, such as drought, will increase potential for injury to the grass at all stages of growth.

To reduce potential damage to subsequent small grain crops, use the lower rate or discontinue the use of Tordon 22K at least 2 years prior to the seeding of small grain crops. After CRP, do not plant broadleaf crops in treated acres until an adequately sensitive bioassay shows that no detectable picloram is present in the soil.

Broadcast Treatment (Ground and Aerial Applications)

Applications of Tordon 22K should be made after perennial grasses are well established (have developed a good secondary root system and show good vigor). Most perennial grasses show improved tolerance to the herbicide at this stage of development.

For control of actively growing perennial weeds, use up to 1 quart per acre of Tordon 22K after the grass is established. For best results, use in 2 or more gallons of water per acre by air or in 5 or more gallons of water per acre by ground. Increasing the rate of application can increase the risk of injury.

For control of actively growing susceptible annual broadleaf weeds, (including Russian thistle) apply 1/4 to 1/2 pint per acre of Tordon 22K. Tordon 22K can also be tank mixed with 1/2 to 1 pound per acre of 2,4-D where 2,4-D sensitive species present. Read and follow all directions for use and use precautions on other product labels.

Spot Treatment

See "Spot Treatment" in "Mixing and Application Methods" section for directions for calibration, spray volume determination and mixing.

For spot applications when perennial grasses are established, use 1 to 8 pints per acre of Tordon 22K. Rates of 2 quarts per acre or more should only be used for control of deep-rooted perennial broadleaf weeds.

Tordon 22K at rates over 2 pints per acre may suppress certain established grasses such as brome grass, bluegrass and buffalograss. However, subsequent grass growth should be improved by release from weed competition.

Wick Application

See "Wick Application" in "Mixing and Application Methods" section for directions. Apply when weeds are actively growing and are above most desirable plants. For ironweed and goldenrod, best results are obtained with applications made prior to early bud stage.

Warranty Limitations and Disclaimer

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. DOWELANCO MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of DowElanco or the seller. All such risks shall be assumed by Buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at DowElanco's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

DowElanco shall not be liable for losses or damages resulting from handling or use of this product unless DowElanco is promptly notified of such loss or damage in writing. In no case shall DowElanco be liable for consequential or incidental damages or losses.

The terms of the "Warranty Disclaimer" above and this "Limitation of Remedies" cannot be varied by any written or verbal statements or agreements. No employee or sales agent of DowElanco or the seller is authorized to vary or exceed the terms of the "Warranty Disclaimer" or this "Limitation of Remedies" in any manner.

*Trademark of DowElanco
DowElanco • Indianapolis, IN 46268, U.S.A.

LABEL CODE 112-42-002 DATE CODE 292
EPA APPROVAL 12/20/91 REPLACES 112-42-001

Revisions Include:

- 1) Label reformatted and edited for clarity.
- 2) Updated woody plants and broadleaf weeds controlled listed.

Specimen Label

Transline*

Herbicide

For Selective Control of Broadleaf Weeds in Non-Cropland Areas, Industrial Manufacturing and Storage Sites and Rights-of-way

Active Ingredient(s):

Clopyralid (3,6-dichloro-2-pyridinecarboxylic acid) as the monoethanolamine salt40.9%

Inert Ingredient(s):.....59.1%

ACID EQUIVALENT:

3,6-dichloro-2-pyridinecarboxylic acid, 31% - 3 lb/gal

E.P.A. Registration No. 62719-73

E.P.A. Est. 464-MI-1

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUCION:

PRECAUCION AL USUARIO:

Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

**CAUSES EYE INJURY • HARMFUL IF
INHALED OR ABSORBED THROUGH
SKIN**

Avoid Contact With Eyes, Skin Or Clothing

• Avoid Breathing Spray Mist • Wash

Thoroughly With Soap And Water After

Handling • Remove Contaminated Clothing
And Wash Before Reuse

STATEMENTS OF PRACTICAL TREATMENT: If in eyes,
flush with plenty of water. Get medical attention if irritation
persists. If on skin, wash with plenty of soap and water.
Get medical attention.

Physical or Chemical Hazards

**COMBUSTIBLE • Do Not Use or Store Near
Heat or Open Flame. Do Not Cut or Weld
Container.**

Environmental Hazards

Do not contaminate water when disposing of equipment
washwaters. Do not contaminate water used for irrigation
or domestic purposes. Do not apply directly to any body of
water or wetlands.

See additional precautionary statements
elsewhere on this label.

NOTICE

Read and understand the entire label before using. Use
only according to label directions.

Before buying or using this product, read "WARRANTY
LIMITATIONS AND DISCLAIMER" elsewhere on this label.
If terms are not acceptable, return unopened package at
once to seller for full refund of purchase price paid.
Otherwise, use by the buyer or any other user constitutes
acceptance of the terms under WARRANTY LIMITATIONS
AND DISCLAIMER.

IN CASE OF AN EMERGENCY

endangering life or property involving this
product, call collect 517-636-4400

AGRICULTURAL CHEMICAL

**Do Not Ship or Store with Food, Feeds,
Drugs, or Clothing**

*
Transline

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irrigation system.

TRANSLINE Herbicide is recommended for selective, postemergence control of the following broadleaf weeds in non-cropland areas including equipment pathways, industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical power lines, communication lines, pipelines and railroads.

acacias	ladythumb ¹
artichoke, Jerusalem	lettuce, prickly
buckwheat, wild	locoweed, white
buffalobur ¹	locoweed, Lambert
burdock, common	marshelder
Canada thistle	mesquite
(rosette to bud)	musk thistle (rosette to bud)
chamomile, false	nightshade, Eastern black
(scentless)	nightshade, cutleaf
chamomile, mayweed	nightshade, hairy
(dogfennel)	oxeye daisy
clover, sweet	pineappleweed
clover, red	ragweed, common
cocklebur, common	ragweed, giant
coffwood	salsify, meadow (goatsbeard)
cornflower	sicklepod
(bachelor button)	smartweed, green ¹
dandelion	sorrel, red
dock, curly	sowthistle, annual
groundsel, common	sowthistle, perennial ¹
hawkbeard, narrowleaf	starthistle, yellow
horseweed	sunflower (common and wild)
jimsonweed	thistle, Canada
knapsweed, diffuse	thistle, musk
knapsweed, Russian ¹	vetch
knapswood, spotted	

¹ These weeds may only be suppressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree of weed control and duration of effect will vary with weed size and density, spray rate and coverage, and growing conditions before, during, and after the time of treatment.

For perennial weeds, TRANSLINE Herbicide will control the initial topgrowth and inhibit regrowth during the season of application (season-long control). At higher use rates shown on this label, TRANSLINE Herbicide may cause a reduction in shoot regrowth in the season following application; however, plant response may be inconsistent due to inherent variability in shoot regrowth from perennial root systems.

Timing: Apply to actively growing weeds. Extreme growing conditions such as drought or near freezing temperatures prior to, at, and following time of application may reduce weed control. Only weeds which are emerged at the time of application will be affected. Wet foliage at the time of application may decrease control. The treatment with TRANSLINE Herbicide will be rainfast within 6-8 hours after application.

Rate: Generally, lower labeled application rates will be satisfactory for young, succulent growth of sensitive weed species. For less sensitive species, perennials, and under conditions where control is more difficult (plant stress conditions such as drought or extreme temperatures, dense weed stands, and/or larger weeds), the higher rates will be needed.

Coverage: Adequate spray coverage and drift control are important. Obtaining a balance between spray coverage and drift control may sometimes be difficult but can be achieved provided the applicator understands the factors affecting coverage and drift. Factors affecting spray coverage include spray volume, and weed density. As weed density increases, spray volume should be increased to obtain equivalent weed control. Refer to manufacturer's recommendations for information on the relationship between gallons per acre,

spray pressure, sprayer speed, nozzle type and arrangement, nozzle height above the target canopy, droplet size, and drift potential for respective application equipment. Use equipment and nozzle types which are designed for herbicide application. Reducing total spray volume may result in decreased coverage and weed control. Use enough total spray volume and a delivery system to provide thorough coverage and a uniform spray pattern.

Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants.

Use of Adjuvants: Addition of surfactants, crop oils, or other adjuvants is not usually necessary when using TRANSLINE Herbicide. Adding a surfactant to the spray mixture may increase effectiveness on weeds. If an adjuvant is added to the spray solution, follow all manufacturer use guidelines.

Tank Mixes: When tank mixing, read and follow the label of each tank-mix product used for precautionary statements, directions for use, weeds controlled, and geographic and other restrictions. Use in accordance with the most restrictive of label limitations and precautions. No label dosages should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

Non-Cropland

For use on non-cropland areas such as industrial manufacturing and storage sites and rights-of-way such as along roadsides, electrical power lines, communication lines, pipelines and railroads.

Broadcast Application (Ground): For control of broadleaf weeds, apply 1/4 to 1 1/2 pints of TRANSLINE Herbicide per acre (equivalent to 0.09 to 0.5 lbs ae per acre). Non-ionic surfactant should be used in spray mixtures at 1 to 2 quarts per 100 gallons of spray mixture. The lower rate of 1/4 pint per acre provides acceptable control of weeds only under highly favorable plant growing conditions and when plants are no larger than 3 to 6 inches tall. Where Canada thistle or knapsweeds are the primary pest, best results are obtained by applying 2/3 to 1 1/2 pints of TRANSLINE Herbicide per acre after basal leaves are produced. For roadside applications, spray volumes of 25 to 50 gallons per acre will ensure adequate coverage. Addition of 1/4 to 1 ounce Telar per acre may enhance thistle control when low rates of TRANSLINE are used. TRANSLINE Herbicide can be tank mixed with diesel oil or equivalent inert agent approved for use on agricultural crops. Established grasses are tolerant but new grass seedlings may be injured to varying degrees until the grass has become well established.

High-Volume Leaf Stem Treatment (Woody Plants): For control of brush, use 1 to 3 quarts of TRANSLINE Herbicide per 100 gallons of total spray solution. Thorough coverage is necessary for good results, therefore, apply as a complete spray-to-wet foliar application, including all leaves, stems, and root collars but do not exceed application of more than 1 1/2 pints of TRANSLINE Herbicide per acre. To minimize drift, use a maximum spray pressure of 50 psi and keep sprays no higher than the tree crowns. Trees taller than 8 feet in height may be hard to treat efficiently and to obtain necessary coverage.

Do not apply by air.

Unsatisfactory control may result if application is made when brush and weeds are under severe drought stress or other conditions that inhibit good growth. Environmental conditions may influence results considerably. For best results on mesquite, apply in the spring or early summer during the period 40 to 90 days after the first green growth appears and when soil moisture is adequate for good growth. Soil temperatures of 75° to 83°F at a 12 to 18 inch depth are optimal for good plant kills. Soil temperature of less than 75°F at this depth will reduce the ultimate root kill of mesquite.

USE PRECAUTIONS

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. Therefore, do not apply TRANSLINE Herbicide directly to or allow spray drift to come in contact with vegetables, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Avoid Spray Drift: Applications should be made to avoid spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. A drift control or deposition agent such as Nalco-Trol may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

Ground Application: To minimize spray drift, apply TRANSLINE Herbicide in a total spray volume of 10 or more gallons per acre as large-droplet, low-pressure spray. Refer to manufacturer's recommendations for additional information on gallons per acre, spray pressure, sprayer speed, nozzle types and arrangements, nozzle heights above the target canopy, etc., for respective application equipment. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by using no more than 30 pounds spraying pressure with large droplet-producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 6 to 7 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Do not apply by aircraft.

Do Not Transfer Livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants.

Straw from treated areas, or manure from animals that have grazed treated areas, cannot be used for composting or mulching on ground where susceptible crops may be grown the following season. To promote herbicide decomposition, plant material should be evenly incorporated or burned. Adequate moisture is also required to promote breakdown of plant residues which contain clopyralid.

Do not use in a greenhouse. Excessive amounts of this herbicide in the soil may temporarily inhibit seed germination or plant growth.

Spray Equipment - Cleaning Instructions

To avoid injury to desirable plants, equipment used to apply TRANSLINE Herbicide should be thoroughly cleaned before reusing to apply any other chemicals.

1. Rinse and flush application equipment thoroughly after use at least three times with water, and dispose of rinse water in non-cropland area away from water supplies.
2. During the second rinse, add 1 qt of household ammonia for every 25 gallons of water. Circulate the solution through the entire system so that all internal surfaces are contacted (15-20 min.). Let the solution stand for several hours, preferably overnight.

3. Flush the solution out the spray tank through the boom.
4. Rinse the system twice with clean water, recirculating and draining each time.
5. Nozzles and screens should be removed and cleaned separately.

PRECAUTIONARY STATEMENTS

Environmental Hazards

Clopyralid is a chemical which can travel (seep or leach) through soil and under certain conditions contaminate groundwater which may be used for irrigation or drinking purposes. Users are advised not to apply clopyralid where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow, or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into an aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Storage: Store above 28°F or warm to 40°F and agitate before use.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal (Metal): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Container Disposal (Plastic): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

WARRANTY LIMITATIONS AND DISCLAIMER

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions therein under normal conditions of use. THIS IS THE ONLY WARRANTY MADE ON THIS PRODUCT. NO OTHER EXPRESS AND NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE OUTSIDE OF THIS LABEL.

Therefore, neither this warranty nor any other warranty of merchantability or fitness for a particular purpose, express or implied, extends to the use of this product contrary to label instructions (including conditions noted on the label, such as unfavorable temperatures, soil conditions, etc.), under abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes, etc.) or under conditions not reasonably foreseeable to or beyond the control of seller.

When buyer or user suffers losses or damages resulting from the use or handling of this product (including claims based on contract, negligence, strict liability, or other legal theories), buyer or user must promptly notify in writing DowElanco of any claims to be eligible to receive other remedy given below. The EXCLUSIVE REMEDY OF THE BUYER OR USER and the LIMIT OF LIABILITY of DowElanco or any other seller will be one of the following, at the election of DowElanco:

- (1) Refund of purchase price paid by buyer or user for product bought, or
- (2) Replacement of amount of product used.

The seller will not be liable for consequential or incidental damages or losses.

The terms of this Warranty Limitations And Disclaimer cannot be varied by any written or verbal statements or agreements. Any employee or sales agent of the seller is not authorized to vary or exceed the terms of this Warranty Limitations And Disclaimer in any manner.

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DowElanco
Indianapolis, Indiana 46268 U.S.A.
*Trademark of DowElanco

FORM # 113-20-001 (1-92)
SPECIMEN LABEL 86-1936 DATE CODE 290
THIS IS AN INITIAL DOWELANCO PRINTING

HI-DEP[®] BROADLEAF HERBICIDE

CONTROLS MANY TOUGH PERENNIAL WEEDS THAT ESCAPE ORDINARY 2,4-D; ANNUALS, TOO.

Acme HI-DEP[®] High Deposition, Low Volume Broadleaf Herbicide provides outstanding post-emergence control of weeds such as Canada thistle, field bindweed, and hemp dogbane which, until now, have proven very difficult if not extremely costly to control. HI-DEP overcomes the problem because it penetrates deeply enough to get into the extensive root system and kills the root buds where regrowth occurs.

Contrast this to conventional 2,4-D treatments. While they often appear to kill the weeds and may even eliminate their competition with the crop, all too often only the tops are burned back. The same weeds — and more — reappear the next growing season, and year after year.

HI-DEP is a unique formulation of the mixed amine salts, dimethylamine and diethanolamine, of 2,4-D, combined with a special additive which enhances the product's non-evaporative qualities. Unlike ordinary 2,4-D, when applied, HI-DEP droplets tend to resist evaporation in flight and do not crystallize. Therefore, HI-DEP is absorbed more rapidly and completely by the leaf.

A radioisotope tracer study conducted by a major midwestern university, shows that, within four hours, *over twice as much* active ingredient will move into the roots of field bindweed than will standard 2,4-D.

Because of HI-DEP's unique characteristics, the finished spray won't burn the leaf, even when applied straight or in low volume solutions. Penetration is increased, even where thick or waxy cuticles or hairy leaf surfaces tend to leave other herbicides high and dry. HI-DEP gets to the root of the problem — and at a cost that is little more than for ordinary 2,4-D!

HI-DEP[®] is a registered trademark of PBI/Gordon Corporation.

RECOMMENDED USES:

Broadleaf weed control in corn, pasture, wheat and other small grains, stubble, fallow, and grain sorghum and other crops, orchards and non-crop areas as indicated on the label.

ACTIVE INGREDIENTS:

Dimethylamine salt of 2,4-Dichlorophenoxyacetic acid 33.2%
Diethanolamine salt of 2,4-Dichlorophenoxyacetic acid 16.3%

PACKAGING:

2 x 2½ gallon plastic containers per case, shipping 55 lbs.
30 gallon drum, shipping weight 323 lbs.

©1991, PBI/GORDON CORPORATION

NO OTHER POST-EMERGENT DOES MORE, SO WHY PAY MORE?

- Canada thistle, field bindweed and other tough broadleaf perennials controlled at last — including multiflora rose, buckbrush, and other woody species.
- Also very effective on annual broadleaf weeds, including velvetleaf, cocklebur, morningglory, mustards, and ragweed. Over 120 species listed!
- Apply as a low-volume spray, preferably 5 to 10 gals. total solution per acre for most ground applications. Aerially applied, HI-DEP needs only enough water for a total spray volume of 2 quarts minimum per acre.
- Droplets resist evaporation between nozzle and target, thus remaining moist on the leaf surface for improved absorption.

Unlike ordinary 2,4-D, more HI-DEP translocates into the horizontal roots, killing the root buds.

Read label before use.

G pbi / GORDON corporation

1217 W. 12th St. • P.O. BOX 4090
KANSAS CITY, MO 64101 • 816/421-4070
1-800-821-7925
FAX: 816-474-0462

The literature contained herein is not intended to be used as a substitute for the information contained on the label of the product container. Specimen labels and other literature are subject to revision. Before using this product, read and follow all label instructions on the container/package.

ACME®

AGRICULTURAL PRODUCTS

HI-DEP®

HIGH DEPOSITION BROADLEAF HERBICIDE

ACTIVE INGREDIENTS:
Dimethylamine Salt of 2,4-Dichlorophenoxyacetic acid 33.2%
Diethanolamine Salt of 2,4-Dichlorophenoxyacetic acid 16.3%
INERT INGREDIENTS 50.5%
TOTAL 100.0%

This Product Contains:
3.8 lbs. 2,4-Dichlorophenoxyacetic acid equivalent per gallon or 38.6%.
Isomer Specific by AOAC Method.

KEEP OUT OF REACH OF CHILDREN DANGER – PELIGRO

PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que le etiqueta haya sido explicado ampliamente.

See below for additional Precautionary Statements and Statement of Practical Treatment.

U.S. Patent No. 4,971,630

READ THE ENTIRE LABEL FIRST.
OBSERVE ALL PRECAUTIONS AND
FOLLOW DIRECTIONS CAREFULLY.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS & DOMESTIC ANIMALS:

DANGER: Corrosive, causes eye damage and skin irritation. Do not get in eyes, on skin or on clothing. Wear goggles or face shield when handling. When handling this product, wear chemical resistant gloves. Wash thoroughly with soap and water after handling. Harmful if swallowed, absorbed through skin or inhaled. Avoid breathing vapor or spray mist. Remove contaminated clothing and wash before reuse.

STATEMENT OF PRACTICAL TREATMENT:

IF IN EYES: In case of eye contact, immediately flush eyes with plenty of water for 15 minutes. Call a physician at once.

IF ON SKIN: Wash promptly with soap and water. Rinse thoroughly. If irritation develops, get medical attention.

IF SWALLOWED: Drink promptly a large quantity of milk, egg white, or water. Do not induce vomiting. If these are not available, large quantities of water. Avoid alcohol. Call a physician at once.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.

IF INHALED: Remove victim to fresh air and apply respiration if indicated.

ENVIRONMENTAL HAZARDS: Under no circumstances should this herbicide product or any 2,4-D weed killer be used in the vicinity of cotton, tomatoes, garden crops, grapes, ornamentals or other susceptible crops, or severe damage may result. Do not apply on windy days. Do not use equipment used in applying this product or any 2,4-D weed killer to apply insecticides, fungicides, or other materials to susceptible crops. Do not use this product through any type of irrigation system. Avoid contamination of water supplies that may be used to irrigate or water susceptible crops or to be used for domestic purposes. This product is toxic to aquatic invertebrates. Drift or runoff may adversely affect aquatic invertebrates and nontarget plants. Do not apply directly to water except as specified on this label. Do not contaminate water when disposing of equipment washwaters. Do not apply when weather conditions favor drift from treated areas. Do not apply in any manner not specified on this label.

Most cases of groundwater contamination involving phenoxy herbicides such as 2,4-D have been associated with mixing, loading and disposal sites. Caution should be exercised when handling 2,4-D pesticides at such sites to prevent contamination of groundwater supplies. Use of closed systems for mixing or transferring this pesticide will reduce the probability of spills. Placement of the mixing, loading equipment on an impervious pad to contain spills will help prevent groundwater contamination.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area being treated must be vacated by unprotected persons.

Do not enter treated areas without protective clothing until sprays have dried.

Because certain states may require more restrictive reentry intervals for various crops treated with this product, consult your State Department of Agriculture for further information. Written or oral warnings must be given to workers who are expected to be in a treated area or in an area about to be treated with this product. Advise workers to stay out of fields during application and until sprays have dried. Regular long-sleeved work clothing should be worn when working in treated fields. See Precautionary Statements, Statement of Practical Treatment and Note to Physician for information on accidental exposures. When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings must be given if there is reason to believe that written warnings cannot be understood by workers. Written warnings must include the following information: **DANGER – PELIGRO**, area treated with HI-DEP Broadleaf Herbicide, date of application, appropriate protective clothing, and reentry interval (i.e. until sprays have dried).

STORAGE & DISPOSAL

STORAGE: Store in original container in a locked storage area inaccessible to children or pets. Keep from freezing. To prevent cross-contamination, do not store near other herbicides, fertilizers, insecticides, fungicides, or near seeds.

PESTICIDE DISPOSAL: Do not contaminate water, food, or feed by storage or disposal. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law and may contaminate groundwater. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: For plastic container, triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed, by state and local authorities, by burning. If burned, stay out of smoke. For metal drums, triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

AUTOMOBILE FINISH PRECAUTION

Undiluted spray droplets may damage automobile finishes. Cars should not be sprayed. If accidental exposure does occur, the car should be washed before product dries.

NOTICE TO USER: This product must be applied in compliance with the pesticide regulations of the state in which application is made. Check with local authorities regarding regulations which may affect the application of this product.

— USE INSTRUCTIONS —

AERIAL APPLICATION: Ready-To-Use, not necessary to dilute for application rates of 1/2 gallon (2 quarts) per acre or higher. For rates lower than 1/2 gallon, dilute with water for a total solution per acre of not less than 1/2 gallon.

AIRCRAFT SPECIFICATIONS (FIXED WING OR ROTARY WING): Boom width should not exceed 3/4 the length of the aircraft wingspan. Do not exceed 25 psi nozzle pressure. Number of nozzles required to obtain desired volume per acre is dependant on swath width and speed of aircraft. Nozzles should be positioned between 135 and 175 degrees from direction of flight for fixed wing. **DO NOT APPLY THROUGH BECOMIST NOZZLE SYSTEMS.** Maintain aircraft altitude of 10 to 12 feet during application. See manufacturer's technical bulletin regarding nozzling and method of application specifications.

GROUND APPLICATION: Apply in water, 1 to 10 gallons total solution per acre minimum with conventional equipment. Use nozzle systems capable of spraying correct gallonage; 25 psi is recommended.

— WEEDS CONTROLLED LIST —

Use HI-DEP herbicide to control many broadleaf weeds including:

PERENNIAL WEEDS

Arichoka	Docks	Locoweed	Toed flax
Aster	Dogbane	Mugwort	Vervains
Goldenrod	Goldenrod	Nettles	Whiteweed
Ground ivy	Ground ivy	Orange hawkweed	(Hoary crass)
Heal-all	Heal-all	Powertyweed	Wild gerlic
Hemlock	Hemlock	Rushes	Wild onion
Ironweed	Ironweed	Sowthistle	Wild sweet potato
Leafy spurge	Leafy spurge	St. Johnswort	Yellow rocket
Knapweed	Knapweed	Stinging nettles	
(spotted)	(spotted)	Strawberry (wild)	
(Russian)	(Russian)	Tell buttercup	
(diffuse)	(diffuse)	Tanweed	

ANNUAL AND BIENNIAL WEEDS

Beggaricks	Galinsoga	Mediterranean sage	Sneezeweed
Bitterweed	Goatsbeard	Mimosa	Sow thistle
Black medic	Goatsfoot	Morningglory (annual)	(common)
Broomweed	Groundsail	Musk thistle	Spanish needles
Bull thistle	Gumweed	Mustard	Sunflower
Burdock	Henbit	Parsnip	Tansy
Carpetweed	Jewelweed	Pennycress	Tansy ragwort
Catchweed bedstraw	Jimsonweed	Pepperweed	Tumbleweed
Chickweed	Jim Hill mustard	Pigweed (redroot)	Tumbleweed
Ciniffoil	(Tumble mustard)	Plantains	Velvetleaf
Cockle	Knottweed	Prickly lettuce	Vetch
Cocklebur	Lambsquarters	Primrose	Wild carrot
Croton	Lettuce (wild)	Puncturevine	Wild persnip
Devilsclaw	Mallow	Radish (wild)	Wild turnip
Fleisellax	Marshelder	Ragweed	Witchweed
Freebane (daisy)	Marshall	Russian thistle	Wormwood
Fluxweed	(Horseweed)	Scotch thistle	Yellow starthistle
Frenchweed	Menjuna	Shepherdspurse	

ALSO CERTAIN 2,4-D SUSCEPTIBLE WOODY PLANTS SUCH AS:

Big sagebrush	Elderberry	Poison ivy	Send shinnery oak
Buckbrush	Hazal	Poison oak	Sumac
Chamise	Locust	Rabbitbrush	Tules (bulrush)
Coastal sage	Menzanita	Sagebrush	Willow

TO CONVERT LOCAL RECOMMENDATIONS INTO TERMS OF HI-DEP USE THE FOLLOWING TABLE:

2,4-D Acid Equivalent:	1 lb.	1/2 lb.	1/4 lb.	1/8 lb.	1/16 lb.	1/32 lb.	1/64 lb.
HI-DEP	2 pt.	1 1/2 pt.	1 pt.	1/2 pt.	1/4 pt.	1/8 pt.	1/16 pt.

TIMING OF APPLICATION MAY VARY — Your State Cooperative Extension Service may have information on the correct application time for your area.

WHEAT, BARLEY, OATS, RYE

See Table I for recommended use rates. Spray after grain begins tillering and before the boot stage (usually 4 to 8 inches tall) and weeds are small. Do not apply before the tiller stage nor from early boot through the milk stage. To control large weeds, preharvest treatment can be applied when the grain is in the dough stage. Best results will be obtained when soil moisture is adequate for plant growth and weeds are growing well. Do not permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within two weeks of treatment.

WHEAT

Perennial broadleaf weeds — Apply 2 pints per acre when weeds are in bud stage, but do not spray grain in the boot to dough stage. The 2 pint (1 pound acid equivalent) per acre application of any 2,4-D product can produce injury to wheat. Balance the severity of your weed problem against the possibility of crop damage. Where perennial weeds are scattered, spot treatment is suggested to minimize the extent of crop injury.

CORN

See Table I for recommended use rates.

PREEMERGENCE — Apply to soil anytime after planting but before corn emerges. Do not use on very light, sandy soil.

EMERGENCE — Apply just as corn plants are breaking ground.

POSTEMERGENCE — Apply to emerged corn. When corn is over 8 inches tall, use drop nozzles and direct spray from corn plant. Do not apply from tasseling to dough stage. Injury to corn is most likely to occur if applied when corn is growing rapidly under high temperatures and high soil moisture conditions. In such situations, use the low rate of 1/2 pint per acre. After application, delay cultivation for 8 to 10 days to allow the corn to overcome any temporary brittleness.

PREHARVEST: After the hard dough or denting stage, apply by air or ground equipment to suppress perennial weeds, decrease weed seed production and control tall weeds such as bindweed, cocklebur, dogbane, jimsonweed, ragweed, sunflower, velvetleaf, and vines that interfere with harvesting.

NOTE: Do not forage or feed corn or fodder for 7 days following application.

NOTE: Hybrids vary in tolerance to 2,4-D. Some are easily injured. Spray only hybrids known to be tolerant to 2,4-D. Consult the seed company or your Agricultural Experiment Station or Extension Service Weed Specialist for this information.

WITH LIQUID NITROGEN SOLUTIONS

The compatibility of HI-DEP, water and the liquid nitrogen solutions should be determined before combining in the spray tank. The testing can be conducted by mixing all the components in a small container in proportionate quantities. If the mixture separates after standing but can be mixed readily by shaking then the mixture can be used as long as good agitation is maintained. If large flakes, sludges, gels or other precipitates form, or if a separate oily layer or oil globules appear, then the herbicide and the liquid fertilizer should not be used in the same spray tank. For late season control of young smartweeds, cocklebur, annual morningglory and other broadleaf weeds less than 1 inch high. Field should be as clean as possible and corn 20 to 30 inches tall. Apply 1 pint with 80 to 120 lbs. nitrogen per acre. The spray MUST be prepared by first adding required amount of liquid nitrogen solution to spray tank. Next dilute 1 pint with 2 quarts of clean water for each acre to be treated with one tankful. Start the tank agitator and SLOWLY add the diluted 2,4-D solution. Spray immediately, maintaining continuous agitation until spray tank is empty. Direct the spray to lower 3" to 4" of corn stalk. Use spray equipment designated to handle corrosive liquid nitrogen solutions. After spraying remove any remaining solution and rinse spray rig thoroughly with water. Mix only one tank at a time. Do not spray during or immediately following cold weather.

SORGHUM (MILO)

See Table I for recommended use rates. Treat only after sorghum is 6 inches high and preferably before it is 15 inches high. Do not treat during the boot, tasseling, or early dough stages. If crop is taller than 6 inches, use drop nozzles to keep the spray off the leaves. Temporary crop injury can be expected under conditions of high soil moisture and high air temperatures. If it is necessary to apply under these conditions, use no more than ½ pint per acre. NOTE: Hybrids vary in tolerance to 2,4-D. Some are easily injured. Spray only hybrids known to be tolerant to 2,4-D. Consult the seed company or your Agricultural Experiment Station or Extension Service Weed Specialist for this information.

RICE

See Table I for recommended use rates. Apply in the late tillering stage of rice development, at the time of first joint development (first to second green ring), usually 6 to 9 weeks after emergence. Do not apply after panicle initiation, after rice internodes exceed ½ inch, at early seeding, early panicle boot, flowering, or early heading growth stages.

NOTE: Some rice varieties under certain conditions can be injured by 2,4-D. Therefore, before spraying, consult local Extension Service or University Specialists for appropriate rates and timing of 2,4-D sprays.

SUGARCANE

See Table I for recommended use rates. Use up to 4 applications per year in accordance with State recommendations.

TABLE I: AMOUNT OF HERBICIDE TO USE IN CROPS

SMALL GRAINS		
Spring postemergence wheat, barley, rye	¼-1½ pt.	2-3 pts
Spring postemergence oats	½-1 pt.	1½-2 pts
Preharvest*** (dough stage) wheat, barley, oats, rye	1-2 pts	2-3 pts
CORN*		
Preemergence	2-4 pts.	
Emergence*	1 pt.	1½ pt.
Postemergence* up to 8 inches tall	½-1 pt.	
8 inches to tasseling (use only directed spray)	1 pt.	1½-2½ pts
Preharvest***	1-2 pts.	1½-2½ pts
SORGHUM (MILO)*		
Postemergence 6 to 8 inches tall	¾-1 pt.	
8 to 15 inches tall (use only directed spray)	1 pt.	1½-2 pts.
RICE		
	1-2½ pts.	2-3 pts.
SUGARCANE		
Fall, after harvesting or planting	2-4 pts.	
Spring, once or twice before close-in	2-4 pts	
Summer	2½ pts.	

*Corn and sorghum hybrids vary in tolerance to 2,4-D; some are easily injured. Before spraying, get information on 2,4-D tolerance of specific hybrids and spray only those known to be tolerant to 2,4-D injury. If plants are more than 8 inches tall, use directed spray and keep off corn and sorghum foliage.

**These higher rates may be needed to handle difficult weed problems in certain areas such as dry conditions, especially in areas west of the Mississippi River. However, do not use unless possible crop injury will be acceptable. Consult State Agricultural Experiment Station or Extension Service Weed Specialists for recommendations or suggestions to fit local conditions.

***Apply after the hard dough (corn) or dough stage (wheat) by air or ground equipment to suppress perennial weeds, decrease weed seed production, and control tall weeds such as bindweed, cocklebur, dogbane, Jimsonweed, ragweed, sunflower, velvetleaf and vines that interfere with harvesting.

FALLOW LAND AND STUBBLE

Annual Weeds — Use 1 to 2 qts. acre. Apply when weeds are actively growing.

Perennial Weeds — Use 2 to 3 qts. acre on weeds such as Canada thistle (apply in late bud or early bloom), field bindweed (50% or greater bloom) and other perennial weeds listed. Do not make application within 90 days of planting or until chemical has disappeared from soil.

PASTURE AND RANGELAND

Annual Weeds — Use 1 to 2 qts. acre. Apply when weeds are actively growing.

Perennial Weeds — Use 2 to 4 qts. acre when perennial weeds are translocating carbohydrates, i.e. Canada thistle (late bud to early bloom), bull thistle (bud stage), musk thistle (spring or fall in rosette or early bud stage), leafy spurge (4 qts.) (early to late bloom). Field bindweed (80% or greater bloom). Higher rates may cause temporary yellowing of grasses.

Do not use on bentgrass, alfalfa, clover, or other legumes. Do not use on newly seeded areas until grass is well established. Do not use from early boot to milk stage where grass seed production is desired.

OBSERVE THESE INTERVALS

1. A 7-day pregrazing interval for dairy cattle.
2. A 30-day preharvest interval for grass cut for hay.
3. A pre-slaughter interval for meat animals of 3 days. Withdrawal is not needed if two weeks or more have elapsed since application.

CONTROL OF SOUTHERN WILD ROSE

On rangelands, roadsides, and fence rows, use 1 gallon and spray thoroughly as soon as foliage is well developed. Two or more treatments may be required. On rangeland, apply a maximum of 6 quarts per acre per season. See grazing restrictions in pasture and rangeland section above.

GRASS SEED CROPS

Use 1 to 4 pints per acre in spring or fall to control broadleaf weeds in grass being grown for seed. Do not apply from early boot to the milk stage. Spray seedling grass only after the five-leaf stage, using ¼ to 1 pint per acre to control small seedling weeds. After the grass is well established, higher rates of up to 4 pints can be used to control hard-to-kill annual or perennial weeds. For best results, apply when soil moisture is adequate for good growth.

NOTE: Do not use on bentgrass unless grass injury can be tolerated. See grazing restrictions in pasture and rangeland section above.

GENERAL WEED CONTROL

Roadsides, Vacant Lots, Fence Rows and Drainage Ditchbanks — Use ¾% solution.

Turf — ½ to 1 gallon 100 gallons of water (4 to 8 tsp. per 1 gallon water).

Woody Plants — 1½ to 2 fluid ounces per 1 gallon water (1½% solution). Wet thoroughly all parts of the plant and stems to point of run-off.

TANK MIXTURES FOR SMALL GRAINS, FALLOW AND RANGE/NONCROPLAND

HI-DEP can be applied as a tank-mixture with Banvel®, Glean®, Lexone®, Sencor®, Roundup®, or Tordon® to broaden the spectrum of weed control. In order to assure maximum safety and weed control follow all precautions and limitations on this label and the labels of products used in tank mixtures with HI-DEP. Where a rate range is given, the rate should be varied depending on the weeds present.

SMALL GRAINS

HI-DEP - Glean®*	1 pint A + ¼-½ oz. A
HI-DEP - Lexone® or Sencor®	1½ pints A - ½ lb. A/A

*Feb. 1991: Glean® has been withdrawn from CO, MT, ND, SD, MN, WY and NE Pannhandle. Still available in South Central Plains and Pacific Northwest.

FALLOW

HI-DEP - Banvel®	3 pints A - 1 pint A
HI-DEP - Roundup®	1-2 pints A - ½-1 Pint A

RANGE AND NON-CROP AREA

HI-DEP - Banvel®	1-3 quarts A - 1-2 pints A
HI-DEP - Tordon®	1-2 quarts A - ¼-2 pints A

STONEFRUIT, NUT AND PISTACHIO ORCHARDS

Broadleaf weeds Use 1½ qts. in 20 to 50 gallons of water per acre of ground sprayed. For band or spot treatment, calculate rates according to the actual portion of an acre treated. Apply as a directed spray onto the weeds to point of run-off when weeds are young and actively growing (pre-bud to early bud stage). Make up to two applications through the growing season as needed. Do not harvest stonefruits within 40 days of application. Do not harvest nuts and pistachios within 60 days of application. Do not graze or feed cover crops from treated orchards to livestock.

FILBERTS

Sucker Control. Mix 1 quart in 100 gallons of water plus 8 fl. ozs. of non-ionic spreader stickler (such as Ortho X-77 or R-11). Spray to run-off when suckers are 6 to 9 inches tall. Spray when needed from April through August. Use large orifice nozzles (.04 nozzle) and low tank pressure (30-35 psi) to produce large droplet size. Apply no more than four times per year. Do not harvest filberts within 45 days of last application. Do not allow livestock to graze in treated areas or the feeding of cover crops grown in treated orchards.

PRECAUTIONS IN APPLYING 2,4-D IN ORCHARDS

Apply only after irrigation and allow maximum time before the next irrigation. Do not apply around fruit trees or vines with hand gun. Use only flat, fan-type nozzles and low pressures — 20-30 psi. Use a fixed boom applicator which can be calibrated and which will deposit the spray uniformly. Avoid contact with fruit, foliage, stems or lower limbs of trees or vines. DO NOT spray bare ground. Apply precisely and uniformly to prevent damage to the trees or vines and to obtain satisfactory weed control. Do not apply during windy periods or extremely high temperatures. In California — not for use in desert valleys or on shallow or sandy soils. Allow maximum time after application and before next irrigation. Late fall applications after harvest and before frost preferred.

BROADLEAF WEED CONTROL IN NON-CROPLAND GRASS AREAS SUCH AS LAWNS, GOLF COURSES, CEMETERIES AND PARKS, AIRFIELDS, ROADSIDES, VACANT LOTS, DRAINAGE DITCHBANKS

Use 1 to 3 quarts per acre. Treat when weeds are young and growing well. Usually 2 quarts per acre will provide adequate weed control. Do not use on dichondra or other herbaceous ground covers. Do not use on creeping grasses such as bentgrass except for spot treating nor on freshly seeded turf until grass is well established. Reseeding of lawns should be delayed following treatment. With spring application, reseed in the fall; with fall application, reseed in the spring. Legumes are usually damaged or killed. Deep rooted perennial weeds such as bindweed and Canada thistle may require repeated applications.

SPOT TREATMENT/NON-CROP

Hand-held and high volume equipment. For control of weeds listed using knapsack sprayers or high volume equipment utilizing hand guns or other nozzle arrangements — Unless otherwise specified, make a 3/4% solution in water and apply to foliage as a coarse spray for general vegetation control. For hard-to-kill woody plants use a 1 1/2% solution. Applications should be made on a spray-to-wet basis and coverage uniform. Do not spray to point of run-off. Prepare the spray solution by mixing in water as per the following table:

DESIRED VOLUME	3/4%	3/4%	1%	1 1/2%
1 gallon	3/4 fl. oz. (4 tsp.)	1 fl. oz. (2 Tbs.)	1 1/4 fl. oz. (8 tsp.)	2 fl. oz. (4 Tbs.)
25 gallon	1 pt.	1 1/4 pt.	1 qt.	1 1/4 qt.
100 gallon	1/2 gal.	3/4 gal.	1 gal.	1 1/2 gal.

2 Tablespoons = 1 fluid ounce

1 Teaspoon = 1/2 Tablespoon = .17 fluid ounce

When using in knapsack sprayers, insure mixture is complete by shaking or inverting sprayer several times.

**CONTROL OF WOODY PLANTS OR
BRUSH AND BROADLEAF WEEDS ON
ROADSIDES, DRAINAGE DITCHBANKS,
RIGHTS-OF-WAY, RAILROADS, FIREBREAKS,
FORESTS (Forest Site Prep), FENCEROWS,
INDUSTRIAL SITES & OTHER
SIMILAR NON-CROP AREAS**

GROUND APPLICATIONS

HIGH VOLUME: Mix at the rate of 1 to 2 gallons per 100 gallons of water (1-2% solution). Rate per acre depends on the density of brush and/or weeds. For small broadleaf weeds, use the lower rate. Heavy dense stands of brush require the high rate with higher water volume. For small applications with small tank sprayers use at the rate of 1.25-2.5 fluid ounces per gallon of water.

To effectively control brush, all leaves, stems and suckers should be thoroughly wetted to the ground. Apply when plants come into full leaf (spring) to the time plants begin to go dormant. Best results are obtained when brush and broadleaf weeds are young and actively growing. Do not cut brush until the herbicide has translocated throughout the plant causing root death. DO NOT APPLY as a stand release or cover spray to established conifers as injury may result.

AERIAL APPLICATIONS

Forestry Site Preparation — For use in dessication controlled burning programs, use 1/2 to 2 gallons of HI-DEP in tank mixes with other herbicides labeled for forestry site preparation (e.g. Garlon®, Tordon®, ARSENAL® Herbicide Applicators Concentrate). Use sufficient water to achieve uniform wetting of target brush species. Do not exceed 25 gallon total spray per acre.

Utility & Pipeline Rights-of-Way — Use 1/2 to 2 gallons of HI-DEP in tank mix combination with other herbicides labeled for rights-of-way and apply in a total spray volume of 5 to 30 gallons per acre.

TANK MIXTURES FOR INDUSTRIAL/NON-CROPLAND AREAS

HI-DEP can be applied as a tank mixture with other recommended herbicides such as Garlon®, Tordon®, and Banvel® to broaden the spectrum of control. In order to ensure maximum safety and weed control, follow all precautions and limitations on this label and the labels of products used in tank mixtures with HI-DEP. Where a rate range is given, the rate should be varied according to the density and target species.

PRODUCTS	RATES
HI-DEP - Garlon® 3A	1/2-2 gal. A - 1/2-1 gal. A
HI-DEP - Garlon® 4E	1/2-2 gal. A - 2-4 qts. A
HI-DEP - Tordon® K	1/2-2 gal. A - 1/4-4 qts. A
HI-DEP - Banvel®	1/2-2 gal. A - 1 qt.-2 gal. A

LEAFY SPURGE CONTROL IN COLORADO, IDAHO, MINNESOTA, MONTANA, NEBRASKA, NORTH DAKOTA, SOUTH DAKOTA, WASHINGTON AND WYOMING

HI-DEP is recommended for use in combination with Tordon® or Banvel® for the suppression and/or control of leafy spurge on industrial, non-cropland sites in Colorado, Idaho, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Washington and Wyoming.

HOW TO USE

Apply 1 to 2 quarts of HI-DEP in combination with 1 quart of Tordon®, or 2 quarts of HI-DEP plus 2 quarts of Banvel®, or 2 quarts of HI-DEP plus 1 pint of Tordon® plus 1 quart of Banvel®.

Rates are on a per acre basis. Mix with water, 1 to 10 gallons per acre minimum with conventional equipment. Use nozzle systems capable of spraying correct gallonage. Add a non-ionic surfactant such as Gordon's Staypar® at 0.25% by volume (1 quart per 100 gallons of solution).

IMPORTANT: BEFORE USING HI-DEP, TORDON® AND/OR BANVEL® IN THESE COMBINATIONS, READ AND CAREFULLY OBSERVE THE CAUTIONARY STATEMENTS AND ALL OTHER INFORMATION APPEARING ON THE PRODUCT LABELS.

FOREST-TREE INJECTION

To control unwanted hardwood trees make injections as near the root collar as possible using one injection per inch of trunk's diameter at breast height. For resistant species such as hickory, injections should overlap. For best results injections should be made during the growing season — May 15 to October 1.

For Concentrate Injection — Use 1 to 2 ml. of concentrate per injection. The injector bit must penetrate the inner bark.

LIMITED WARRANTY AND DISCLAIMER

The manufacturer warrants only that the chemical composition of this product conforms to the ingredient statement given on the label, and that the product is reasonably suited for the labeled use when applied according to the Directions for Use.

THE MANUFACTURER NEITHER MAKES NOR INTENDS ANY OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED. This limited warranty does not extend to the use of the product inconsistent with label instructions, warnings or cautions, or to use of the product under abnormal conditions such as drought, excessive rainfall, tornadoes, hurricanes, etc. These factors are beyond the control of the manufacturer or the seller. Any damages arising from a breach of the manufacturer's warranty shall be limited to direct damages, and shall not include indirect or consequential damages such as loss of profits or values, except as otherwise provided by law.

The terms of this Limited Warranty and Disclaimer cannot be varied by any written or verbal statements or agreements. No employee or agent of the seller is authorized to vary or exceed the terms of this Limited Warranty and Disclaimer in any manner.

HI-DEP® and STAYPAR® are registered trademarks of PBI GORDON CORPORATION.

Garlon® and Tordon® are registered trademarks of DowElenco.

Banvel® is a registered trademark of Sandoz Crop Protection.

Arsenal® is a registered trademark of American Cyanamid Company.

Glean® and Lexone® are registered trademarks of E.I. DuPont de Nemours and Company, Inc.

Sencor® is a registered trademark of Bayer AG, Germany.

Roundup® is a registered trademark of Monsanto Agricultural Products Company.

808 992 AP090991
EPA REG. NO. 2217-703

MANUFACTURED BY
pbi/gordon
corporation
KANSAS CITY, MISSOURI 64101

SPECIMEN LABEL: READ CURRENT LABEL ON PRODUCT CONTAINER BEFORE USE.

Specimen Label

Curtail*

Herbicide

For Selective Control of Broadleaf Weeds in Wheat and Barley Not Underseeded with a Legume, Fallow Cropland, Grasses Grown for Seed and Conservation Reserve Program (CRP) Acres

Active Ingredient(s):

Clopyralid (3,6-Dichloro-2-pyridinecarboxylic acid) as alkanolamine salts
(of the ethanol and isopropanol series)7.5%
2,4-Dichlorophenoxyacetic Acid as alkanolamine salts
(of the ethanol and isopropanol series)38.4%

Inert Ingredient(s):54.1%

Acid Equivalents:

3,6-Dichloro-2-pyridinecarboxylic acid 3.9% - 0.38 lb/gal

2,4-Dichlorophenoxyacetic acid 20.9% - 2.0 lb/gal

E.P.A. Registration No. 62719-48

E.P.A. Est. 464-MI-1

KEEP OUT OF REACH OF CHILDREN

DANGER

PELIGRO:

PRECAUCION AL USUARIO:

Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

CAUSES EYE DAMAGE AND SKIN

IRRITATION • HARMFUL IF

SWALLOWED

Do Not Get In Eyes, On Skin Or On Clothing

• **Wear Goggles Or Face Shield When Handling**

• **When Handling This Product, Wear Chemical**

Resistant Gloves • Wash Thoroughly With

Soap And Water After Handling • Remove

Contaminated Clothing And Wash Before

Reuse

STATEMENTS OF PRACTICAL TREATMENT: If in eyes, flush with plenty of water for at least 15 minutes. Get medical attention. If on skin, wash with plenty of soap and water. Get medical attention if irritation persists. If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Call a physician. Do not induce vomiting or give anything by mouth to an unconscious person.

Environmental Hazards

Drift or runoff may adversely affect nontarget plants. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water when disposing of equipment washwaters. See additional precautionary statements elsewhere on this label.

NOTICE

Read the entire label. Use only according to label directions.

Before buying or using this product, read Warranty Disclaimer and Limitation of Remedies sections elsewhere on this label.

IN CASE OF AN EMERGENCY

endangering life or property involving this product, call collect 517-636-4400

AGRICULTURAL CHEMICAL

Do Not Ship or Store with Food, Feeds, Drugs, or Clothing

*
Curtail

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irrigation system.

CURTAIL Herbicide is recommended for selective, postemergence control of the following broadleaf weeds in wheat and barley not underseeded with a legume, fallow cropland (including summer fallow, post-harvest, and set-aside acres) and land in the Conservation Reserve Program (CRP).

alfalfa	mustard, tumble (Jim Hill)
artichoke, Jerusalem	mustard, wild
buckwheat, wild	nightshade, cutleaf
buffaloburr	nightshade, hairy
burdock, common	pennycress, field (fanweed)
chamomile, false (scentless)	pigweed, redroot
chamomile, mayweed (dogfennel)	pineappleweed
clover, sweet	plantain
clover, red	radish, wild
cocklebur, common	ragweed, common
coffeedweed	ragweed, giant
cornflower (bachelor button)	salsify, meadow (goatsbeard)
dandelion	shepherdspurse
dock, curly	sicklepod
flixweed ¹	smartweed, Pennsylvania
groundsel, common	sorrel, red
hawksbeard, narrowleaf	sowthistle, annual
horseweed	sowthistle, perennial ¹
jimsonweed	starthistle, yellow
knapweed, diffuse	sunflower, common
knapweed, Russian ¹	tansymustard, pinnate ¹
knapweed, spotted	thistle, Canada
kochia (2-4 leaf) ¹	thistle, musk
ladysthumb	thistle, Russian (1-3 leaf)
lambsquarters, common	velvetleaf
lettuce, prickly	vetch
locoweed, white	volunteer beans
locoweed, lambert	volunteer lentils
marshelder	volunteer peas

¹ These weeds may only be suppressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree of weed control and duration of effect will vary with weed size and density, spray rate and coverage, and growing conditions before, during and after the time of treatment. For perennial weeds, CURTAIL Herbicide will control the initial topgrowth and inhibit regrowth during the season of application (season-long control). At higher use rates shown on this label, CURTAIL Herbicide may cause a reduction in shoot regrowth in the season following application, however, plant response may be inconsistent due to inherent variability in shoot regrowth from perennial root systems.

Timing: Apply to actively growing weeds. Extreme growing conditions such as drought or near freezing temperatures prior to, at and following time of application may reduce weed control and increase the risk of crop injury at all stages of growth. **Only weeds which are emerged at the time of application will be affected.** Wet foliage at the time of application may decrease control. The CURTAIL Herbicide treatment will be rainfast within 6-8 hours after application.

Rate: Generally, lower labeled application rates will be satisfactory for young, succulent growth of sensitive weed species. For less sensitive species, perennials and under conditions where control is more difficult (plant stress conditions such as drought or extreme temperatures, dense weed stands and/or larger weeds) the higher rates will be needed. Weeds in fallow or other areas where crop competition is not a factor will generally require higher rates to obtain control or suppression.

Coverage: Adequate spray coverage and drift control are important. Obtaining a balance between spray coverage and drift control may sometimes be difficult but can be achieved, provided the applicator understands the factors affecting coverage and drift. Factors affecting spray coverage include spray volume, crop canopy and weed density. As crop canopy

and weed density increase, spray volume should be increased to obtain equivalent weed control. Refer to manufacturer's recommendations for information on the relationship between gallons per acre, spray pressure, sprayer speed, nozzle type and arrangement, nozzle height above the target canopy, droplet size and drift potential for respective application equipment. Do not apply less than 2 and not more than 40 gallons per acre total spray volume. For best results, apply 5 or more gallons per acre by air and 10 or more gallons per acre by ground. Reducing total spray volume may result in decreased coverage and weed control. Use enough total spray volume and a delivery system to provide thorough coverage and a uniform spray pattern. Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants.

Use of Surfactants: Addition of wetting and/or penetration agents is not usually necessary when using CURTAIL Herbicide; however, if a surfactant will be added to the spray solution, use a nonionic surfactant approved for use on growing crops, such as X-77, of at least 80% active ingredient and do not exceed 4 pints per 100 gallons of spray solution (0.5% v/v). Adding a surfactant to the spray mixture may increase effectiveness on weeds but may reduce selectivity to the crop, particularly under conditions which promote plant stress.

Use With Sprayable Liquid Fertilizer Solutions: CURTAIL Herbicide is compatible with most non-pressurized liquid fertilizer solutions, however, if these solutions are to be sprayed with CURTAIL Herbicide, a compatibility test (jar test) should be made prior to mixing. Jar tests are particularly important when a new batch of fertilizer or pesticide is used, when water source changes, or when tank mixture ingredients or concentrations are changed. A compatibility test is performed by pouring the spray components (in the desired order and proportions) into a clear glass jar before mixing in the spray tank. Use of a compatibility aid such as Unite or Compex may help obtain and maintain a uniform spray solution during mixing and application. Agitation in the spray tank must be vigorous to compare with jar test agitation. For best results, liquid fertilizer rates should not exceed 50% of the total spray volume. Premix CURTAIL Herbicide with water and add to the liquid fertilizer/water mixture while agitating contents of the spray tank. Apply the spray the same day it is prepared while maintaining continuous agitation.

NOTE: Foliar-applied liquid fertilizers can cause yellowing or leaf burn of crop foliage.

Wheat and Barley

Timing: Apply CURTAIL Herbicide in the spring to actively growing wheat or barley once 4 leaves have unfolded on the main stem and tillering has begun up to the jointing stage (first node of main stem detectable). To control or suppress weeds listed above, make application after maximum emergence of the target weeds but before they exceed 3 inches in height or diameter (for rosettes). To obtain season-long control of perennial weeds such as Canada thistle, apply after the majority of the weed's basal leaves have emerged from the soil, but before bud stage. A later timing of application (when the grain is between the jointing and boot stages) may be used to treat later-emerging weeds, however, do not apply unless the risk of injury is acceptable. Do not apply after the boot stage.

NOTE: Do not permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within 1 week after treatment. Do not harvest hay from treated grain fields.

Rate: Apply 2 to 2²/₃ pints of CURTAIL Herbicide per acre. The higher rate may be used when the condition of the weeds and/or crop at the time of treatment may prevent optimum control.

NOTE: Higher rates of CURTAIL Herbicide or CURTAIL Herbicide applications following spring postemergence treatments with 2,4-D or MCPA may increase the risk of crop injury.

Tank Mixtures for Wheat and Barley: This product may be tank mixed with the following herbicides for control of additional weeds in wheat and barley. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions. When tank mixing, use in accordance with the most restrictive of label limitations and precautions. No label dosages should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

Active Ingredient	Product	Formulation	Amount of Product Per Acre
bromoxynil ¹	Buctril	2 lb/gal	3/4 to 1 pt
	Buctril 4EC	4 lb/gal	3/8 to 1/2 pt
chlorsulfuron dicamba ^{1,2} difenzoquat diuron	Glean	75% DF	1/8 to 1/4 wt oz
	Banvel	4 lb/gal	1/8 to 1/4 pt
	Avenge	2 lb/gal	2 1/2 to 4 pt
	Direx 4L	4 lb/gal	1 to 1 1/2 pt
	Diuron 4L		
	Diuron 80 WDG	80% DF	1/2 to 1 lb
MCPA or 2,4-D ² metribuzin	Diuron DF	80% WP	Up to 1/2 pt
	Lexone DF	75% DF	2 1/2 to 4 wt oz
	Sencor DF		
metsulfuron methyl terbutryn	Ally	60% DF	1/10 wt oz
	Igran 80 WP	80% WP	6 to 10 wt oz
thifensulfuron methyl DPX L-5300	Harmony	75% DF	1/3 to 1/2 wt oz
	Express	75% DF	1/6 to 1/4 wt oz

¹ Buctril or Banvel tank mixes with CURTAIL Herbicide may be useful in broadening the annual weed control spectrum but may reduce control of perennials, such as Canada thistle.

² Note: Do not tank mix CURTAIL Herbicide with 2,4-D or dicamba unless the risk of crop injury is acceptable.

Fallow Cropland

Timing: CURTAIL Herbicide can be applied either postharvest, in the spring/summer (during fallow period) or to set-aside acres to control or suppress weeds listed above (refer to rotation restrictions). Apply to young, emerged weeds under conditions that promote active growth. For best results on tough perennial weeds such as Canada thistle, apply after the majority of the basal leaves have emerged, but before bud stage. Later applications may result in less consistent control. Extreme growing conditions (such as drought or near freezing temperatures) prior to, at, and following the time of application may reduce weed control.

For best results, wait 14 to 20 days after application before cultivating or fertilizing with shank-type applicators to allow for thorough translocation. To avoid potential phytotoxicity, allow at least 20 days after application before seeding to wheat, barley or grasses.

Rate: Apply 4 pints of CURTAIL Herbicide per acre. Use the higher rate on perennial weeds or when the condition of the weeds at the time of treatment may prevent optimum control.

Tank Mixtures For Fallow Cropland: To improve control of certain broadleaf weeds, CURTAIL Herbicide at 2 pints per acre may be applied with up to 1.5 lb ae per acre additional 2,4-D. When mixing, read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions. When tank mixing, use in accordance with the most restrictive of label limitations and precautions. No label doses should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

Grasses Grown for Seed

Timing: Apply only to established grasses before the boot stage. Applications in the boot stage and beyond will result in increased injury. Do not apply to bentgrass unless injury can be tolerated.

Rate: Use 2 to 4 pints of CURTAIL Herbicide per acre for control of annual weeds and Canada Thistle. The potential for crop injury exists due to the 2,4-D component of this product and must be balanced against the benefits of improved weed control. Potential for crop injury increases with higher rates. Re-treat as necessary, but do not exceed 4 pints per acre of CURTAIL per season.

NOTE: Do not graze (dairy) cattle in treated areas for 14 days after application. Remove meat animals from freshly treated areas for 7 days before slaughter. Withdrawal is not needed if 2 weeks or more have elapsed since application. Do not cut treated grass for hay within 30 days after application.

Conservation Reserve Program (CRP) For Seeding To Permanent Grasses Only

Do not use CURTAIL Herbicide if legumes or bentgrass are a desired cover during CRP.

Grass grown on CRP acres cannot be grazed or used for hay.

Conditions that stress grasses, such as drought, will increase potential for injury to the grass at all stages of growth. Do not use in newly seeded areas until grass is established.

Timing: CURTAIL Herbicide can be applied when perennial grasses have become established (tillering, with at least 1.5 inches secondary roots, and good vigor). For control of weeds such as musk thistle, Canada thistle and knapweed (diffuse, spotted and Russian), apply to actively growing weeds after the majority of the basal leaves have emerged, but before bud stage. Later applications may result in less consistent control.

Rate: Apply 2 to 5 quarts of CURTAIL Herbicide per acre.

USE PRECAUTIONS

Apply only once per 12-month period, except for grass grown for seed (see Directions For Use). A fallow treatment that precedes or follows a small grain application is also allowed.

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. Therefore, do not apply CURTAIL Herbicide directly to or allow spray drift to come in contact with vegetables, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Wheat, barley, oats, grasses, or sugar beets (including beets grown for seed) may be planted less than 12 months after treatment.

Alfalfa, asparagus, canola, cole crops, mint, onions, safflower, and strawberries may be planted 12 months after treatment. Dry beans, soybeans and sunflowers may also be planted at 12 months after treatment, except in soils with less than 2% organic matter receiving less than 15 inches of natural precipitation in the 12 month period following treatment. For these areas see SPECIAL CONDITIONS below.

To avoid potential phytotoxicity all other crops including peas, lentils, potatoes, and broadleaf crops grown for seed should not be planted for 18 months after treatment unless the risk of injury is acceptable.

SPECIAL CONDITIONS: CURTAIL residues in plant tissues which have not completely decayed may affect succeeding susceptible crops. In areas defined previously as low in organic matter and precipitation, sensitive crops such as dry beans, soybeans, and sunflowers may be injured when planted 12 months after treatment. Unless the risk of injury is acceptable, these crops should not be planted until 18 months after treatment. The potential for injury may be reduced by burning, removal, or incorporation of treated crop residues with a minimum of 2 supplemental Fall irrigations.

Avoid Spray Drift: Applications should be made to avoid spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. Fine droplets can present a drift hazard. A drift control or deposition agent such as Nalco-Trol may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

Ground Application: To minimize spray drift, apply CURTAIL Herbicide in a total spray volume of 10 or more gallons per acre as a large-droplet, low pressure spray. Refer to manufacturer's recommendations for additional information on gallons per acre, spray pressure, sprayer speed, nozzle types and arrangements, nozzle heights above the target canopy, etc., for respective application equipment. Spot treatments should only be applied with a calibrated boom to prevent misapplication. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying no more than 20 gallons of spray per acre; by using no more than 30 pounds spraying pressure with large droplet-producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 6 to 7 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by applying a coarse spray; by using no more than 30 pounds spray pressure at the nozzles; by using straight-stream nozzles directed straight back; by using a spray boom no longer than 3/4 the wing span of the aircraft; and by spraying only when wind velocity is less than 6 mph.

Do Not Apply By Aircraft When An Air Temperature Inversion Exists. Such a condition is characterized by little or no wind and with lower air temperature near the ground than at higher levels. The use of a smoke device on the aircraft or continuous smoke column at or near site of application will indicate air direction and velocity, and whether a temperature inversion is present, which is shown by layering of the smoke.

Do not move treated soil and avoid situations where treated soil particles may blow into areas where susceptible crops are grown. Violent windstorms may move soil particles. If this product is on soil particles and they are blown onto susceptible plants, visible symptoms may appear. Serious injury is unlikely. The hazard of movement of this product on dust is reduced if treated fields are irrigated or if rain occurs shortly after application.

Straw from treated areas, or manure from animals which have grazed treated areas, cannot be used for composting or mulching on ground where susceptible crops may be grown the following season. To promote herbicide decomposition, plant material should be evenly incorporated or burned.

Do not use in a greenhouse. Excessive amounts of this herbicide in the soil may temporarily inhibit seed germination or plant growth.

Do not contaminate water when disposing of equipment washwaters. Apply this product only as specified on this label.

Do not transfer livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants.

Mixing and Loading: Most cases of groundwater contamination involving phenoxy herbicides such as 2,4-D have been associated with mixing/loading and disposal sites. Caution should be exercised when handling 2,4-D pesticides at such sites to prevent contamination of groundwater supplies. Use of closed systems for mixing or transferring this pesticide will reduce the probability of spills. Placement of the mixing/loading equipment on an impervious pad to contain spills will help prevent groundwater contamination.

PRECAUTIONARY STATEMENTS

Environmental Hazards

Clopyralid is a chemical which can travel (seep or leach) through soil and under certain conditions contaminate groundwater which may be used for irrigation or drinking purposes. Users are advised not to apply clopyralid where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow, or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into an aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Storage: Store above 10°F or warm and agitate before use.

Pesticide Disposal: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate, is a violation of Federal Law and may contaminate groundwater. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal (Metal): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Container Disposal (Plastic): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

General: Consult federal, state, or local disposal authorities for approved alternative procedures.

Be sure that use of this product conforms to all application regulations.

WARRANTY DISCLAIMER

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. DOWELANCO MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

INHERENT RISKS OF USE

It is impossible to eliminate all risks associated with use of this product. Crop injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of DowElanco or the seller. All such risks shall be assumed by Buyer.

LIMITATION OF REMEDIES

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at DowElanco's election, one of the following:

- (1) Refund of purchase price paid by buyer or user for product bought, or
- (2) Replacement of amount of product used.

DowElanco shall not be liable for losses or damages resulting from handling or use of this product unless DowElanco is promptly notified of such loss or damage in writing. In no case shall DowElanco be liable for consequential or incidental damages or losses.

The terms of the Warranty Disclaimer above and this Limitation of Remedies cannot be varied by any written or verbal statements or agreements. No employee or sales agent of DowElanco or the seller is authorized to vary or exceed the terms of the Warranty Disclaimer or this Limitation of Remedies in any manner.

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DowElanco

Indianapolis, Indiana 46268 U.S.A.

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Specimen Label

Stinger*

Herbicide

For Selective Postemergence Control of Broadleaf Weeds in Sugar Beets, Field Corn, Wheat, Barley, and Oats Not Underseeded With a Legume, Christmas Tree Plantations and Nurseries, Grasses Grown for Seed, Fallow Cropland, Rangeland and Permanent Grass Pastures, Non-Cropland Areas, and Conservation Reserve Program (CRP) Acres

Active Ingredient(s):

Clopyralid (3,6-dichloro-2-pyridinecarboxylic acid) as the monoethanolamine salt 40.9%

Inert Ingredient(s): 59.1%

ACID EQUIVALENT: 3,6-dichloro-2-pyridinecarboxylic acid, 31% - 3 lb/gal

E.P.A. Registration No. 62719-73

E.P.A. Est. 464-MI-1

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUCION:

PRECAUCION AL USUARIO:

Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

**CAUSES EYE INJURY • HARMFUL IF
INHALED OR ABSORBED THROUGH
SKIN**

Avoid Contact With Eyes, Skin Or Clothing

• Avoid Breathing Spray Mist • Wash
Thoroughly With Soap And Water After
Handling • Remove Contaminated
Clothing And Wash Before Reuse

STATEMENTS OF PRACTICAL TREATMENT: If in eyes,
flush with plenty of water. Get medical attention if irritation
persists. If on skin, wash with plenty of soap and water.
Get medical attention.

Physical or Chemical Hazards

**COMBUSTIBLE • Do Not Use or Store Near
Heat or Open Flame. Do Not Cut or Weld
Container.**

Environmental Hazards

Do not contaminate water when disposing of equipment
washwaters. Do not contaminate water used for irrigation or
domestic purposes. Do not apply directly to any body of
water or wetlands.

See additional precautionary statements elsewhere on
this label.

NOTICE

Read and understand the entire label before using. Use only
according to label directions.

Before buying or using this product, read "WARRANTY
LIMITATIONS AND DISCLAIMER" elsewhere on this label. If
terms are not acceptable, return unopened package at
once to seller for full refund of purchase price paid.
Otherwise, use by the buyer or any other user constitutes
acceptance of the terms under WARRANTY LIMITATIONS
AND DISCLAIMER.

IN CASE OF AN EMERGENCY

endangering life or property involving this
product, call collect 517-636-4400

AGRICULTURAL CHEMICAL

**Do Not Ship or Store with Food, Feeds,
Drugs, or Clothing**

Stinger*

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irrigation system.

STINGER Herbicide is recommended for selective, postemergence control of the following broadleaf weeds in sugar beets, field corn, wheat, barley, and oats not underseeded with a legume, fallow cropland, rangeland and permanent grass pastures, grasses grown for seed, Christmas trees, conservation reserve program (CRP) acres, and non-cropland areas including fence rows, around farm buildings, and equipment pathways.

artichoke, Jerusalem	marshelder
buckwheat, wild	nightshade, Eastern black
buffalobur ¹	nightshade, cutleaf
burdock, common	nightshade, hairy
chamomile, false (scentless)	oxeye daisy
chamomile, mayweed	pineappleweed
(dogfennel)	ragweed, common
clover, sweet	ragweed, giant
clover, red	salsify, meadow
cocklebur, common	(goatsbeard)
coffeedweed	sicklepod
cornflower (bachelor button)	smartweed, green ¹
dandelion	sorrel, red
dock, curly	sowthistle, annual
groundsel, common	sowthistle, perennial ¹
hawksbeard, narrowleaf	starthistle, yellow
horseweed	sunflower
jimsonweed	thistle, Canada
knapweed, diffuse	thistle, musk
knapweed, Russian ¹	vetch
knapweed, spotted	volunteer alfalfa
ladysthumb ¹	volunteer beans
lettuce, prickly	volunteer lentils
locoweed, white	volunteer peas
locoweed, lambert	

¹ These weeds may only be suppressed. Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. The degree of weed control and duration of effect will vary with weed size and density, spray rate and coverage, and growing conditions before, during, and after the time of treatment. For perennial weeds, STINGER Herbicide will control the initial topgrowth and inhibit regrowth during the season of application (season-long control). At higher use rates shown on this label, STINGER Herbicide may cause a reduction in shoot regrowth in the season following application; however, plant response may be inconsistent due to inherent variability in shoot regrowth from perennial root systems.

Timing: Apply to actively growing weeds. Extreme growing conditions such as drought or near freezing temperatures prior to, at, and following time of application may reduce weed control and increase the risk of crop injury at all stages of growth. **Only weeds which are emerged at the time of application will be affected.** Wet foliage at the time of application may decrease control. The treatment with STINGER Herbicide will be rainfast within 6-8 hours after application.

Rate: Generally, lower labeled application rates will be satisfactory for young, succulent growth of sensitive weed species. For less sensitive species, perennials, and under conditions where control is more difficult (plant stress conditions such as drought or extreme temperatures, dense weed stands, and/or larger weeds), the higher rates will be needed. Weeds in fallow or other areas where crop competition is not a factor will generally require higher rates to obtain control or suppression.

Coverage: Adequate spray coverage and drift control are important. Obtaining a balance between spray coverage and drift control may sometimes be difficult but can be achieved provided the applicator understands the factors affecting coverage and drift. Factors affecting spray coverage include spray volume, crop canopy, and weed density. As crop canopy and weed density increase, spray volume should be increased to obtain equivalent weed control. Refer to manufacturer's recommendations for information on the relationship between gallons per acre, spray pressure, sprayer speed, nozzle type and arrangement, nozzle height above the target canopy, droplet size, and drift potential for respective application equipment. Use equipment and nozzle types which are designed for herbicide application. Do not apply less than 2 and not more than 40 gallons per acre total spray volume. For best results, apply 5 or more gallons per acre by air and 10 or more gallons per acre by ground. Reducing total spray volume may result in decreased coverage and weed control. Use enough total spray volume and a delivery system to provide thorough coverage and a uniform spray pattern. Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants.

Use of Adjuvants: Addition of surfactants, crop oils, or other adjuvants is not usually necessary when using STINGER Herbicide. Adding a surfactant to the spray mixture may increase effectiveness on weeds but may reduce selectivity to the crop, particularly under conditions which promote plant stress. If an adjuvant is added to the spray solution, follow all manufacturer use guidelines.

Tank Mixes: When tank mixing, read and follow the label of each tank-mix product used for precautionary statements, directions for use, weeds controlled, and geographic and other restrictions. Use in accordance with the most restrictive of label limitations and precautions. No label dosages should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

WEED CONTROL GUIDELINES ¹ Amount of STINGER Per Acre X Use Site ²

Weed Species	Growth Stage	Sugar Beet, Christmas Trees	Wheat, Barley, Oats	Grasses For Seed	Fallow, Non-Crop	Range & Pasture, CRP	Field Corn
clover cocklebur sunflower ragweeds jimsonweed volunteer soybean vetch marshelder	Up to 5 leaf	¼ - ½ pt	¼ - ½ pt	¼ - ½ pt	¼ - ½ pt	½ - ¾ pt	¼ - ½ pt
wild buckwheat nightshade sp. buffalobur smartweeds (suppression)	1-3 leaf stage, but before vining 2-4 leaf 2-3 leaf	½ pt					
Canada thistle sowthistle (suppression) knapweeds, spotted/diffuse knapweeds, Russian (suppression)	rosette to prebud up to bud stage	½ - ¾ pt ¾ pt	¼ - ½ pt —	½ - ¾ pt ¾ - 1 pt	½ pt —	¾ - 1 pt ¾ - 1 pt 1 - 1½ pt	½ - ¾ pt — —

¹ This table is intended as a reference only. For complete instructions see the body of the text.

² Use the lower rate for light to moderate infestations and good growing conditions and the higher rate for dense infestations or under poor growing conditions such as drought.

Sugar Beets

STINGER Herbicide is recommended for the control of various annual and perennial broadleaf weeds infesting sugar beets. Apply ¼ to ¾ pint of STINGER Herbicide per acre with ground equipment as a broadcast foliar spray. Apply in 10 or more gallons total spray volume per acre when the sugar beets are in the cotyledon to 8 leaf stage of growth and the weeds are young and actively growing. Re-treat as necessary but do not exceed ¾ pint of STINGER Herbicide per acre per season. Do not apply within 105 days before harvest of beet roots and tops. Do not apply to sugar beets grown for seed.

STINGER Herbicide may be applied as a band treatment. Use the formulas below to determine the appropriate rate and volume per treated acre.

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \text{Broadcast rate per treated acre} = \text{Band rate per treated acre}$$

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \text{Broadcast volume per treated acre} = \text{Band volume per treated acre}$$

For annual weed control spray ¼ - ½ pt of STINGER Herbicide per acre on weeds up to the 5 leaf growth stage. Wild buckwheat applications should be made at the 1-3 leaf stage, before vining begins.

For the most effective control of perennials such as Canada thistle and sowthistle, apply ½ - ¾ pint of STINGER Herbicide per acre as a broadcast treatment to the entire infested area. Apply when the majority of basal leaves have emerged, but before the bud stage. Cultivation can disrupt translocation to the roots of perennials such as Canada thistle. For best results do not cultivate thistle patches.

To promote herbicide efficacy wait a minimum of 7 days after application before flood or furrow irrigation.

Tank Mixes: To control additional broadleaf weeds and provide consistent control of difficult weeds such as wild buckwheat, tank mix ¼ - ¾ pint of STINGER Herbicide per acre with 2-6.5 pints of Betamix or Betanex. For best results, apply ¼ pint of STINGER tank mixed with 2-6.5 pints of Betamix or Betanex followed 1-2 weeks later by a second application of ¼ - ½ pint of STINGER per acre tank mixed with Betamix or Betanex. Note: Do not add additional adjuvants when employing a Betamix or Betanex tank mix with STINGER Herbicide due to increased potential for crop injury. (See tank mix section under Directions for Use.)

STINGER Herbicide may be tank mixed with grass herbicides such as Poast for grassy weed control. Be sure to include crop oil or Dash surfactant to optimize grass weed control. (See tank mix section under Directions for Use.)

Field Corn

STINGER Herbicide is recommended for postemergence control of Canada thistle, Jerusalem artichoke, annual sowthistle, common sunflower, common cocklebur, giant and common ragweed, jimsonweed and other broadleaf weeds infesting field corn. Apply STINGER Herbicide at suggested timing and rates for field corn as indicated below.

Apply STINGER Herbicide to actively growing broadleaf weeds any time after corn emergence through 24 inch tall corn. Apply with ground equipment as a postemergence broadcast or directed spray in 10 or more gallons of spray volume per acre to ensure uniform and thorough spray coverage of the weed foliage. Use only spray nozzles designed for herbicide application. The use of flat fan nozzles provides the best coverage and distribution of chemical on the plant foliage. Use spray pressures (at the boom) which nozzle manufacturers recommend to obtain desired spray volume. Use higher spray pressures and volumes when weed foliage is dense.

For the most effective control of Canada thistle, apply $\frac{1}{4}$ to $\frac{3}{4}$ pint of STINGER Herbicide per acre as a broadcast treatment to the entire infested area. Apply when the majority of the basal leaves have emerged, thistles are at least 4 inches in diameter or height, but before bud stage. Use the higher rate listed for dense patches or when greater residual control is desired. Cultivation can disrupt translocation to the roots of Canada thistle. For best results, do not cultivate prior to application, and wait 14 to 20 days after application before cultivating to allow for thorough translocation.

For control of common cocklebur, giant ragweed, common ragweed, sunflower, other annual weeds and Jerusalem artichoke, apply $\frac{1}{4}$ to $\frac{1}{2}$ pint of STINGER Herbicide on weeds up to the 5 leaf stage.

Hand-Held Sprayers - Applications should be made on a spray-to-wet basis with spray coverage uniform and complete. Do not spray to the point of runoff. Prepare the desired volume of spray solution by mixing the amount of STINGER Herbicide with water as shown in the following table.

Desired Volume Spray Solution	Amount of STINGER
1 gallon	$\frac{1}{4}$ fl. ounce
25 gallons	$\frac{1}{2}$ pint
100 gallons	1 $\frac{1}{2}$ pints

Restrictions: Re-treat as necessary, but do not apply more than $\frac{3}{4}$ pint of STINGER Herbicide per acre per year. Do not apply to field corn greater than 24 inches tall. Do not allow livestock to graze treated areas or harvest treated corn silage as feed within 40 days after last treatment.

Christmas Tree Plantations And Nurseries

Timing: STINGER Herbicide can be safely applied over the top of actively growing: balsam fir, blue spruce, Douglas fir, Fraser fir, grand fir, lodgepole pine, noble fir, ponderosa pine, Scotch pine, and white pine. For the Pacific Northwest: do not apply in the first year of transplanting. Apply only to trees transplanted at least one year. (Some needle curling has been observed on 1st year transplants.) Apply to actively growing weeds. For control of annual weeds apply STINGER Herbicide up to the 5 leaf growth stage (for wild buckwheat application at 3-5 leaf, but before vining, is recommended). For control of weeds such as Canada thistle and knapweeds, apply after the majority of the basal leaves have emerged, but before bud stage. Later application may result in less consistent control.

Rate: Apply $\frac{1}{4}$ - $\frac{1}{2}$ pint of STINGER Herbicide per acre for control of annual weeds. Apply $\frac{1}{2}$ - $\frac{3}{4}$ pint of STINGER Herbicide per acre for difficult to control weeds such as Canada thistle and knapweeds. Apply as a broadcast or band application in a minimum of 10 gallons per acre by ground application. Use the formula under "sugar beets" to determine the appropriate rate and volume per treated acre. Apply as often as needed, but do not exceed $\frac{3}{4}$ pint per acre. Do not exceed $\frac{1}{2}$ pint per acre for blue spruce. Tree injury may occur with the addition of a surfactant or crop oil with STINGER Herbicide. Do not use unless previous experience shows injury is tolerable.

Grasses Grown For Seed

Timing: Apply only to established grasses before the boot stage. Applications in the boot stage and beyond can result in increased injury. Do not apply to bentgrass unless injury can be tolerated.

Rate: Use $\frac{1}{4}$ to $\frac{3}{4}$ pint of STINGER Herbicide per acre for control of annual weeds and Canada thistle. Re-treat as necessary, but do not exceed $\frac{3}{4}$ pint of STINGER per acre per season.

Fallow Cropland

Timing: STINGER Herbicide can be applied either postharvest, in the spring/summer (during fallow period), or to set-aside acres to control or suppress weeds listed above (refer to rotation restrictions). Apply to young, emerged weeds under conditions that promote active growth. For best results on perennial weeds such as Canada thistle, apply after the majority of the basal leaves have emerged, but before bud stages. Later applications may result in less consistent control. Extreme growing conditions (such as drought or near freezing temperatures) prior to, at, and following the time of application may reduce weed control.

For best results, wait 14 to 20 days after application before cultivating or fertilizing with shank-type applicators to allow for thorough translocation.

Rate: Apply $\frac{1}{4}$ to $\frac{1}{2}$ pint of STINGER Herbicide per acre. Use the higher rate on perennial weeds or when the condition of the weeds at the time of treatment may prevent optimum control.

Tank Mixtures for Fallow Cropland: To improve control of certain broadleaf weeds, STINGER Herbicide may be applied with 0.5-2.0 lb ae per acre 2,4-D.

Non-Cropland

For use on non-cropland areas such as fencerows, around farm buildings and equipment pathways. For control of broadleaf weeds, apply $\frac{1}{4}$ to $1\frac{1}{2}$ pints of STINGER Herbicide per acre. The lower rate of $\frac{1}{4}$ pint per acre provides acceptable control of weeds only under highly favorable growing conditions and when plants are 1-3 inches tall. Apply $\frac{1}{2}$ pint per acre when weeds are 3 to 6 inches tall or under dry conditions. Where Canada thistle or knapweeds are the primary pest, best results are obtained by applying $\frac{3}{4}$ to $1\frac{1}{2}$ pints of STINGER Herbicide per acre. To improve spectrum of activity or to increase activity against taller weeds, STINGER may be tank mixed with 0.5 to 2.0 lbs. ae per acre of 2, 4-D amine or low volatile ester.

Wheat, Barley And Oats

Apply $\frac{1}{4}$ to $\frac{1}{2}$ pint of STINGER Herbicide per acre from the 3 leaf stage up to early boot stage of growth. For control of perennial weeds such as Canada thistle, $\frac{1}{2}$ pint of STINGER Herbicide per acre should be used. Russian knapweed will only be suppressed at this rate.

NOTE: Do not permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within 1 week after treatment. Do not harvest hay from treated grain fields.

Tank Mixtures for Wheat, Barley and Oats: Tank mix $\frac{1}{4}$ to $\frac{1}{2}$ pint per acre of STINGER Herbicide with the herbicides listed below for the control of additional weeds.

Active Ingredient	Product	Formulation	Amount of Product Per Acre
bromoxynil	Buctril	2 lb/gal	$\frac{3}{4}$ to 1 pt
	Buctril 4EC	4 lb/gal	$\frac{3}{8}$ to $\frac{1}{2}$ pt
	Buctril ME4		
chlorsulfuron	Glean	75% DF	$\frac{1}{8}$ to $\frac{1}{4}$ wt oz
dicamba	Banvel	4 lb/gal	$\frac{1}{8}$ to $\frac{1}{4}$ pt
diuron	Direx 4L	4 lb/gal	$\frac{3}{4}$ to 1 $\frac{1}{4}$ pt
	Diuron 4L		
	Diuron 80 WDG	80% DF	$\frac{1}{2}$ to 1 lb
MCPA or 2,4-D ¹	Diuron DF	80% WP	
		4 lb/gal	$\frac{1}{2}$ to 1 pt
		75% DG	2 $\frac{1}{2}$ to 4 wt oz
metribuzin	Lexone DF		
	Sencor DF		
metsulfuron	Ally	60% DF	$\frac{1}{10}$ wt oz
methyl	Igran 80WP	80% WP	7.5 to 12.5 wt oz
terbutryn	Harmony	75% DF	$\frac{1}{8}$ to $\frac{1}{2}$ wt oz
thiameturon	Express	75% DF	$\frac{1}{8}$ to $\frac{1}{4}$ wt oz

¹ Tank mix with 2,4-D for application on wheat and barley only.

Rangeland and Permanent Grass Pastures

Apply $\frac{3}{8}$ to 1 $\frac{1}{2}$ pints of STINGER Herbicide per acre when weeds are young and actively growing. Grasses are tolerant, but new grass seedlings may be injured to varying degrees until the grass has become well established.

NOTE: Some forbs are susceptible to STINGER Herbicide. Do not spray pastures containing desirable forbs, especially legumes, unless injury can be tolerated. However, the stand and growth of established perennial grasses is usually improved after spraying, especially when rainfall is adequate and grazing is deferred.

Do not use hay or straw from treated areas for composting or mulching on susceptible broadleaf crops.

Conservation Reserve Program (CRP) For Seeding To Permanent Grasses Only

Do not use STINGER Herbicide if legumes or bentgrass are a desired cover during CRP.

Grass grown on CRP acres cannot be grazed or used for hay.

Conditions that stress grasses, such as drought, will increase potential for injury to the grass at all stages of growth. Do not use in newly seeded areas until grass is established.

After CRP, do not plant broadleaf crops in treated areas until an adequately sensitive bioassay shows that no detectable clopyralid is present in the soil.

Broadcast Applications (Ground): Applications of STINGER Herbicide should be made when perennial grasses have become established (has tillered, developed a good secondary root system and shows good vigor) since most perennial grasses have shown better tolerance to the herbicide at that stage.

For control of actively growing weeds such as musk thistle, Canada thistle, and knapweed (spotted, diffuse and Russian), use $\frac{3}{8}$ to 1 $\frac{1}{2}$ pints per acre of STINGER Herbicide after the majority of basal leaves have emerged, but before bud stage. For the control of wild buckwheat, volunteer sunflower and musk thistle rosettes, apply $\frac{3}{8}$ pint per acre of STINGER Herbicide. STINGER Herbicide can also be tank mixed with $\frac{1}{2}$ to 1 lb/acre of 2,4-D where species present are sensitive to 2,4-D. For best results, use in 10 or more gallons of water per acre by ground. Increasing the rate of application can increase the risk of injury. Application prior to the flowering stage is recommended (still in the bud stage).

USE PRECAUTIONS

Apply only once per 12 month period, except for sugar beets, field corn and grasses grown for seed. A fallow treatment that precedes or follows a small grain application is also allowed. (See Directions for Use.)

Wheat, barley, oats, grasses, field corn or sugar beets (including beets grown for seed) may be planted at anytime following treatment.

Alfalfa, asparagus, canola, cole crops, mint, onions, safflower, and strawberries may be planted 12 months after treatment. Dry beans, soybeans, and sunflowers may also be planted at 12 months after treatment, except in soils with less than 2% organic matter receiving less than 15 inches of natural precipitation in the 12 month period following treatment. For these areas see SPECIAL CONDITIONS below.

To avoid potential phytotoxicity, all other crops, including peas, lentils, potatoes, and broadleaf crops grown for seed, should not be planted for 18 months after treatment unless the risk of injury is acceptable.

SPECIAL CONDITIONS: Residues of STINGER in plant tissues which have not completely decayed may affect succeeding susceptible crops. In areas defined previously as low in organic matter and precipitation, sensitive crops such as dry beans, soybeans, and sunflowers may be injured when planted 12 months after treatment. Unless the risk of injury is acceptable, these crops should not be planted until 18 months after treatment. The potential for injury may be reduced by burning, removal, or incorporation of treated crop residues with a minimum of 2 supplemental Fall irrigations.

This product can affect susceptible broadleaf plants directly through foliage and indirectly by root uptake from treated soil. Therefore, do not apply STINGER Herbicide directly to or allow spray drift to come in contact with vegetables, flowers, grapes, tomatoes, potatoes, beans, lentils, peas, alfalfa, sunflowers, soybeans, safflower, or other desirable broadleaf crops and ornamental plants or soil where these sensitive crops will be planted the same season.

Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

Avoid Spray Drift: Applications should be made to avoid spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. A drift control or deposition agent such as Nalco-Trol may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

Ground Application: To minimize spray drift, apply STINGER Herbicide in a total spray volume of 10 or more gallons per acre as large-droplet, low-pressure spray. Refer to manufacturer's recommendations for additional information on gallons per acre, spray pressure, sprayer speed, nozzle types and arrangements, nozzle heights above the target canopy, etc., for respective application equipment. Spot treatments should only be applied with a calibrated boom to prevent misapplication. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying no more than 20 gallons of spray per acre; by using no more than 30 pounds spraying pressure with large droplet-producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 6 to 7 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Do not apply by aircraft.

Do Not Transfer Livestock from treated grazing areas onto sensitive broadleaf crop areas without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain enough clopyralid to cause injury to sensitive broadleaf plants.

Do not move treated soil and avoid situations where treated soil particles may blow into area where susceptible crops are grown. Violent windstorms may move soil particles. If this product is on soil particles and they are blown onto susceptible plants, visible symptoms may appear. Serious injury is unlikely. The hazard of movement of this product on dust is reduced if treated fields are irrigated or if rain occurs shortly after application.

Straw from treated areas, or manure from animals that have grazed treated areas, cannot be used for composting or mulching on ground where susceptible crops may be grown the following season. To promote herbicide decomposition, plant material should be evenly incorporated or burned. Adequate moisture is also required to promote breakdown of plant residues which contain clopyralid.

Do not use in a greenhouse. Excessive amounts of this herbicide in the soil may temporarily inhibit seed germination or plant growth.

Spray Equipment - Cleaning Instructions

To avoid injury to desirable plants, equipment used to apply STINGER Herbicide should be thoroughly cleaned before reusing to apply any other chemicals.

1. Rinse and flush application equipment thoroughly after use at least three times with water, and dispose of rinse water in non-cropland area away from water supplies.
2. During the second rinse, add 1 qt of household ammonia for every 25 gallons of water. Circulate the solution through the entire system so that all internal surfaces are contacted (15-20 min.). Let the solution stand for several hours, preferably overnight.
3. Flush the solution out the spray tank through the boom.
4. Rinse the system twice with clean water, recirculating and draining each time.
5. Nozzles and screens should be removed and cleaned separately.

PRECAUTIONARY STATEMENTS

Environmental Hazards

Clopyralid is a chemical which can travel (seep or leach) through soil and under certain conditions contaminate groundwater which may be used for irrigation or drinking purposes. Users are advised not to apply clopyralid where soils have a rapid to very rapid permeability throughout the profile (such as loamy sand to sand) and the water table of an underlying aquifer is shallow, or to soils containing sinkholes over limestone bedrock, severely fractured surfaces, and substrates which would allow direct introduction into an aquifer. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Storage: Store above 28°F or warm to 40°F and agitate before use.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal (Metal): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Container Disposal (Plastic): Do not reuse container. Triple rinse (or equivalent). Puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

WARRANTY LIMITATIONS AND DISCLAIMER

DowElanco warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions therein under normal conditions of use. **THIS IS THE ONLY WARRANTY MADE ON THIS PRODUCT. NO OTHER EXPRESS AND NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE OUTSIDE OF THIS LABEL.** Therefore, neither this warranty nor any other warranty of merchantability or fitness for a particular purpose, express or implied, extends to the use of this product contrary to label instructions (including conditions noted on the label, such as unfavorable temperatures, soil conditions, etc.), under abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes, etc.) or under conditions not reasonably foreseeable to or beyond the control of seller.

When buyer or user suffers losses or damages resulting from the use or handling of this product (including claims based on contract, negligence, strict liability, or other legal theories), buyer or user must promptly notify in writing DowElanco of any claims to be eligible to receive either remedy given below. **The EXCLUSIVE REMEDY OF THE BUYER OR USER and the LIMIT OF LIABILITY of DowElanco or any other seller will be one of the following, at the election of DowElanco:**

- (1) **Refund of purchase price** paid by buyer or user for product bought, or
- (2) **Replacement** of amount of product used.

The seller will not be liable for consequential or incidental damages or losses.

The terms of this Warranty Limitations And Disclaimer cannot be varied by any written or verbal statements or agreements. Any employee or sales agent of the seller is not authorized to vary or exceed the terms of this Warranty Limitations And Disclaimer in any manner.

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DowElanco

Indianapolis, Indiana 46268 U.S.A.

*Trademark of DowElanco

This sample label is current as of January 1, 1993. The product descriptions and recommendations provided in this sample label are for background information only. Always refer to the label on the product container before using Monsanto or any other agrichemical product.

Wilbur-Ellis

Ideas to grow with®

HERBICIDE

Complete Directions for Use

AVOID CONTACT WITH FOLIAGE, GREEN STEMS, OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, SINCE SEVERE INJURY OR DESTRUCTION MAY RESULT.

®Ruler is a registered trademark used under license.

®Trademark of Wilbur-Ellis

EPA Reg. No. 524-326-2935

1992-1

GPL-1100.04/CG

Read the entire label before using this product.

Use only according to label instructions.

Read "LIMIT OF WARRANTY AND LIABILITY" before buying or using. If terms are not acceptable, return at once unopened.

REFORMULATION IS PROHIBITED. SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS.

LIMIT OF WARRANTY AND LIABILITY

This Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

Buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this Company, including, but not limited to, incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather, weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied, as well as weather conditions which are outside the application ranges set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF

THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY, OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES.

Buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement.

PRECAUTIONARY STATEMENTS

Hazards to
Humans and Domestic Animals

Keep out of reach of children.

CAUTION!

MAY CAUSE EYE IRRITATION.

Avoid contact with eyes, skin or clothing.

Wash thoroughly with soap and water after handling.

FIRST AID: IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Get medical attention.

IF ON SKIN, immediately flush with plenty of water.

Wash clothing before reuse.

In case of a human health emergency involving this product, Call Collect, day or night, (314) 694-4000.

Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT USING GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl) glycine,
in the form of its isopropylamine salt ... 41.5%

INERT INGREDIENTS: 58.5%
100.0%

*Contains 480 grams per litre or 4 pounds per U.S. gallon of the active ingredient glyphosate in the form of its isopropylamine salt. Equivalent to 356 grams per litre or 3 pounds per U.S. gallon of the acid, glyphosate.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling.

Storage and Disposal

Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

STORAGE:

STORE ABOVE 10° F (-12° C) TO KEEP PRODUCT FROM CRYSTALLIZING.

Crystals will settle to the bottom. If allowed to crystallize, place in a warm room 68° F (20° C) for several days to redissolve and shake or roll to mix well before using.

DISPOSAL:

Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state or local procedures.

Emptied container retains vapor and product residue. Observe all label safeguards until container is destroyed.

Do not reuse container. Triple rinse container. Then puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

GENERAL INFORMATION

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER CONDITIONS AS SPECIFIED WITHIN THIS LABEL.

This product, a water soluble liquid, mixes readily with water to be applied as a foliar spray for the control or destruction of most herbaceous plants. It may be applied through most standard industrial or field-type sprayers after dilution and thorough mixing with water in accordance with label instructions.

This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days, but on most perennial weeds may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow activity of this product and delay visual effects of control. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of aboveground growth and deterioration of underground plant parts.

Unless otherwise specified on this label, delay application until vegetation has emerged and reached the stages described for control of such vegetation under the "Weeds Controlled" section of this label. Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected by the herbicide and will continue to grow. For this reason, best control of most perennial weeds is obtained when treatment is made at late growth stages approaching maturity.

Always use the higher rate of this product per acre within the recommended range when (1) weed growth is heavy or dense, or (2) weeds are growing in an undisturbed (noncultivated) area.

Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Reduced results may also occur when treating weeds heavily covered with dust.

Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed, or cut, and have not been allowed to regrow to the recommended stage for treatment.

Rainfall or irrigation occurring within 6 hours after application may reduce effectiveness. Heavy rainfall or irrigation within 2 hours after application may wash the chemical off the foliage and a repeat treatment may be required.

This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of Ruler with herbicides or other materials that are not expressly recommended in this labeling. Mixing this product with herbicides or other materials not recommended on this label may result in reduced performance.

For best results, spray coverage should be uniform and complete. Do not spray weed foliage to the point of runoff.

Keep people and pets off treated areas until spray solution has dried to prevent transfer of this product onto desirable vegetation.

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours.

ATTENTION

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift, or splash onto desirable vegetation, since minute quantities of this product can cause severe damage or destruction to the crop, plants, or other areas on which treatment was not intended. The likelihood of injury occurring from the use of this product is greatest when winds are gusty or in excess of 5 miles per hour or when other conditions, including lesser wind velocities, will allow spray drift to occur. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. **AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.**

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. Keep container closed to prevent spills and contamination.

MIXING, ADDITIVES AND APPLICATION INSTRUCTIONS

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES. DO NOT APPLY WHEN WIND OR OTHER CONDITIONS FAVOR DRIFT. HAND GUN APPLICATIONS SHOULD BE PROPERLY DIRECTED TO AVOID SPRAYING DESIRABLE PLANTS. **NOTE: REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, SUCH AS WATER FROM PONDS AND UNLINED DITCHES.**

MIXING

This product requires use with a nonionic surfactant. When using this product, mix 4 to 8 quarts (1 to 2 percent solution) of a nonionic surfactant per 100 gallons of spray solution. Use the 8-quart rate for any surfactant containing less than 50 percent active ingredient. Read and carefully observe surfactant cautionary statements and other information appearing on the surfactant label.

Wilbur-Ellis recommends the use of at least an 80% active ingredient surfactant such as R-11® or similar type agricultural surfactant.

® R-11 is a registered trademark of Wilbur-Ellis Company.

This product mixes readily with water. Mix spray solutions of this product as follows: Fill the mixing or spray tank with the required amount of water. Add the recommended amount of this product (see "Directions for Use" and "Weeds Controlled" sections of this label) and non-ionic surfactant near the end of the filling process and mix well. Remove hose from tank immediately after filling to avoid siphoning back into the carrier source. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent.

TANK MIXTURES

Always predetermine the compatibility of labeled tank mixtures of this product with water carrier by mixing small proportional quantities in advance.

Mix labeled tank mixtures of this product with water as follows:

1. Place a 20 to 35 mesh screen or wetting basket over filling port.
2. Through the screen, fill the sprayer tank one-half full with water and start agitation.
3. If a wettable powder is used, make a slurry with the water carrier, and add it SLOWLY through the screen into the tank. Continue agitation.
4. If a flowable formulation is used, premix one part flowable with one part water. Add diluted mixture SLOWLY through the screen into the tank. Continue agitation.
5. If an emulsifiable concentrate formulation is used, premix one part emulsifiable concentrate with two parts water. Add diluted mixture SLOWLY through the screen into the tank. Continue agitation.
6. Continue filling the sprayer tank with water and add the required amount of this product near the end of the filling process.
7. Add nonionic surfactant to the spray tank before completing the filling process.
8. Add individual formulations to the spray tank as follows: wettable powder, flowable, emulsifiable concentrate, drift control additive, water soluble liquid followed by surfactant.

Maintain good agitation at all times until the contents of the tank are sprayed. If the spray mixture is allowed to settle, thorough agitation is required to resuspend the mixture before spraying is resumed.

Keep by-pass line on or near bottom of tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50 mesh. Carefully select proper nozzle to avoid spraying a fine mist. For best results with conventional ground application equipment, use flat fan nozzles.

CLEAN SPRAYER AND PARTS IMMEDIATELY AFTER USING THIS PRODUCT BY THOROUGHLY FLUSHING WITH WATER AND DISPOSE OF RINSATE ACCORDING TO LABELED USE OR DISPOSAL INSTRUCTIONS.

ADDITIVES

AMMONIUM SULFATE

The addition of 1 to 2 percent dry ammonium sulfate by weight or 8.5 to 17 pounds per 100 gallons of water may increase the performance of this product and this product plus 2,4-D, Banvel™ or residual herbicide tank mixtures on annual and perennial weeds. The improvement in performance may be apparent where environmental stress is a concern. Low-quality ammonium sulfate may contain material that will not readily dissolve which could result in nozzle tip plugging. To determine quality, perform a jar test by adding 1/3 cup of ammonium sulfate to 1 gallon of water and agitate for 1 minute. If undissolved sediment is observed, predissolve the ammonium sulfate in water and filter prior to addition to the spray tank. If ammonium sulfate is added directly to the spray tank, add slowly with agitation. Adding too quickly may clog outlet lines. Ensure that ammonium sulfate is completely dissolved in the spray tank before adding herbicides or surfactant. Thoroughly rinse the spray system with clean water after use to reduce corrosion.

NOTE: The use of ammonium sulfate as an additive does not preclude the need for surfactant. Do not use herbicide rates lower than recommended in this label.

™ Banvel is a trademark of Sandoz, Inc.

COLORANTS OR DYES

Agriculturally approved colorants or marking dyes may be added to this product. Colorants or dyes used in spray solutions of this product may reduce performance, especially at lower rates or dilutions. Use colorants or dyes according to manufacturer's recommendations.

APPLICATION EQUIPMENT AND TECHNIQUES

Do not apply this product through any type of irrigation system.

This product may be applied with the following application equipment:

Aerial — Fixed Wing and Helicopter

Broadcast Spray

Controlled Droplet Application (CDA) — Hand-held or boom-mounted applicators which produce a spray consisting of a narrow range of droplet sizes.

Hand-held and High-Volume Spray Equipment — Knapsack and backpack sprayers, pump-up pressure sprayers, handguns, handwands, lances and other hand-held spray equipment used to direct the spray onto weed foliage and vehicle-mounted, high-volume spray equipment for spray-to-wet applications.

Selective Equipment — Recirculating sprayers, shielded sprayers and wiper applicators.

See the appropriate part of this section for specific rates of application and instructions.

AERIAL EQUIPMENT

Use the recommended rates of this product in 3 to 15 gallons of water per acre unless otherwise specified on this label. See the "Weeds Controlled" section of this label for specific rates. Unless otherwise specified, do

not exceed one quart per acre. (Aerial applications of this product may be made in annual cropping conventional tillage systems, fallow and reduced tillage systems, and preharvest. Refer to the individual use area sections of this label for recommended volumes and application rates.)

Avoid direct application to any body of water.

AVOID DRIFT — DO NOT APPLY DURING INVERSION CONDITIONS, WHEN WINDS ARE GUSTY, OR UNDER ANY OTHER CONDITION WHICH FAVORS DRIFT. DRIFT MAY CAUSE DAMAGE TO ANY VEGETATION CONTACTED TO WHICH TREATMENT IS NOT INTENDED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES MUST BE MAINTAINED.

Coarse sprays are less likely to drift; therefore, do not use nozzles or nozzle configurations which dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure.

Drift control additives may be used. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

Ensure uniform application — To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Thoroughly wash aircraft, especially landing gear, after each day of spraying to remove residues of this product accumulated during spraying or from spills. **PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. LANDING GEAR ARE MOST SUSCEPTIBLE.** The maintenance of an organic coating (paint) which meets aerospace specification MIL-C-38413 may prevent corrosion.

BROADCAST EQUIPMENT

For control of annual or perennial weeds listed on this label using broadcast equipment — Use the recommended rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified on this label. See the "Weeds Controlled" section of this label for specific rates. As density of weeds increases, spray volume should be increased within the recommended range to ensure complete coverage. Carefully select proper nozzle to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

CONTROLLED DROPLET APPLICATION (CDA)

The rate of this product applied per acre by vehicle-mounted CDA equipment must not be less than the amount recommended in this label when applied by conventional broadcast equipment. For vehicle-mounted CDA equipment, apply 3 to 15 gallons of water per acre.

For the control of labeled annual weeds with hand-held CDA units, apply a 20 percent solution of this product plus a 5 percent solution of nonionic surfactant at a flow rate of 2 fluid ounces per minute and a walking speed of 1.5 MPH (1 quart per acre). For the control of labeled perennial weeds, apply a 20 to 40 percent solution of this product plus a 5 to 10 percent solution of nonionic surfactant at a flow rate of 2 fluid ounces per minute and a walking speed of 0.75 MPH (2 to 4 quarts per acre).

Controlled droplet application equipment produces a spray pattern which is not easily visible. Extreme care

must be exercised to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation as damage or destruction may result.

HAND-HELD and HIGH-VOLUME EQUIPMENT

Use coarse sprays only.

Mix this product in clean water and apply to foliage of vegetation to be controlled. For applications made on a spray-to-wet basis, spray coverage should be uniform and complete. Do not spray to the point of runoff.

For control of annual weeds listed on this label, apply 0.5 percent solution of this product plus nonionic surfactant to weeds less than 6 inches in height or runner length. Apply prior to seedhead formation in grasses or bud formation in broadleaf weeds. Allow three or more days before tillage or mowing.

For annual weeds over 6 inches tall, or unless otherwise specified, use a 1 percent solution. For best results, use a 2 percent solution on harder-to-control perennials, such as bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

Less than complete coverage of weeds may result from the use of spray equipment designed for motorized spot treatments. Where less than complete coverage of annual weeds occurs, use a 5 percent solution. Do not reduce recommended concentrations of this product when adding surfactant.

Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table:

Spray Solution					
AMOUNT OF RULER®					
DESIRED VOLUME	1/2%	1%	1-1/2%	2%	5%
1 gallon	2/3 oz	1-1/3 oz	2 oz	2-2/3 oz	6-1/2 oz
25 gallons	1 pt	1 qt	1-1/2 qt	2 qt	5 qt
100 gallons	2 qt	1 gal	1-1/2 gal	2 gal	5 gal
2 tablespoons = 1 fluid ounce					
Add surfactant at a rate of 1 to 2 oz. per gallon of spray mix.					

For use in knapsack sprayers, it is suggested that the recommended amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution and add the correct amount of surfactant.

SELECTIVE EQUIPMENT

This product may be applied through a recirculating spray system, a shielded applicator, or a wiper applicator after dilution and thorough mixing with water to listed weeds growing in any noncrop site specified on this label and only when specifically recommended in cropping systems.

A recirculating spray system directs the spray solution onto weeds growing above desirable vegetation, while spray solution not intercepted by weeds is collected and returned to the spray tank for reuse.

A shielded applicator directs the herbicide solution onto weeds while shielding desirable vegetation from the herbicide.

A wiper applicator applies the herbicide solution onto weeds by rubbing the weed with an absorbent material containing the herbicide solution.

AVOID CONTACT WITH DESIRABLE VEGETATION.

Contact of the herbicide solution with the desirable vege-

tation may result in damage or destruction. Applicators used above desired vegetation should be adjusted so that the lowest spray stream or wiper contact point is at least two inches above the desirable vegetation. Droplets, mist, foam, or splatter of the herbicide solution settling on desirable vegetation may result in discoloration, stunting, or destruction.

Applications made above the crops should be made when the weeds are a minimum of 6 inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations, or when the height of the weeds varies so that not all weeds are contacted. In these instances, repeat treatment may be necessary.

See the "Weeds Controlled" section of this label for recommended stage of growth for specific weeds.

NOTE

- Maintain equipment in good operating condition. Avoid leakage or dripping onto desirable vegetation.
- Adjust height of applicator to ensure adequate contact with weeds.
- Keep nozzle tips and wiping surfaces clean.
- Keep spray patterns aligned into recovery chamber of the recirculating sprayer.
- Keep shields on shielded applicators adjusted to protect desirable vegetation.
- Maintain recommended roller RPM on roller applicators while in use.
- Keep wiper material at proper degree of saturation with herbicide solution.
- DO NOT use wiper equipment when weeds are wet.
- DO NOT operate equipment at ground speeds greater than 5 mph. Weed control may be affected by speed of application equipment. As weed density increases, reduce equipment ground speed to ensure good coverage of weeds.
- Be aware that on sloping ground the herbicide solution may migrate, causing dripping on the lower end and drying on the upper end of a wiper applicator.
- Variation in equipment design may affect weed control. With wiper applicators, the wiping material and its orientation must allow delivery of sufficient quantities of the recommended herbicide solution directly to the weed.
- Care must be taken with all types of wipers to ensure that the absorbent material does not become oversaturated, causing the herbicide to drip on desirable vegetation.
- Mix only the amount of solution to be used during a one-day period, as reduced activity may result from use of leftover solutions. With all equipment, drain and clean sprayer and wiper parts immediately after using this product by thoroughly flushing with water.

RECIRCULATING SPRAYERS

Recirculating sprayer calibration is made on the basis of ground speed and delivery volume. Two procedures can be used to calibrate: (1) determining the discharge being delivered per minute, then operate at the designated ground speed, or (2) select the desired ground speed and then adjust the sprayer to deliver the recommended volume per minute (this may require nozzle changes). Use the appropriate time table below.

Do not operate at nozzle pressure above 20 PSI.

Table 1. Use this table when calibrating box or row-type recirculating sprayers. Box or row-type sprayer calibration is based on the total discharge collected per row. Use only straight stream or 15° fan-type nozzles.

***VOLUME PER MINUTE PER ROW**

MPH	Fluid Ounces
2	26 to 35
3	38 to 51
4	51 to 68
5	65 to 86

*NOTE: Be certain the amount collected is for all spray streams treating one row.

Table 2. Use this table when calibrating broadcast type recirculating sprayers. Broadcast recirculating sprayer calibration is based on the discharge collected per minute from one nozzle on a 20-inch spacing.

VOLUME PER MINUTE PER NOZZLE

MPH	Fluid Ounces
2	7 to 9
3	10 to 13
4	13 to 18
5	16 to 22

When applied as recommended under the conditions described for recirculating sprayers, this product will control the following weeds growing a minimum of 6 inches above desirable vegetation.

Perennial Broadleaf Weeds — To SUPPRESS the following weeds, mix in a ratio of 4 quarts of this product in 20 gallons of water and apply as directed.

Dogbane, hemp <i>Apocynum cannabinum</i>	Milkweed <i>Asclepias syriaca</i>
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Perennial Grasses and Annual Broadleaf Weeds — To control the following weeds, mix in a ratio of 3 quarts of this product in 20 gallons of water and apply as directed:

Cocklebur <i>Xanthium strumarium</i>	Pigweed, redroot <i>Amaranthus retroflexus</i>
Johnsongrass <i>Sorghum halepense</i>	Sunflower <i>Helianthus annuus</i>

Annual Grasses — To CONTROL the following weeds, mix in a ratio of 2 quarts of this product in 20 gallons of water and apply as directed:

Corn <i>Zea mays</i>	Shattercane <i>Sorghum bicolor</i>
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SHIELDED APPLICATORS

When applied as directed under conditions described for shielded applicators, this product will control those weeds listed in the "Weeds Controlled" section of this label.

Shielded applicators which apply the herbicide solution as a spray band should be calibrated on a broadcast equivalent rate and volume basis. To determine these:

Band width in inches	x	Herbicide broadcast RATE per acre	=	Herbicide band RATE per acre
Row width in inches				
Band width in inches	x	Broadcast VOLUME of solution per acre	=	Band VOLUME of solution per acre
Row width in inches				

Use nozzles that provide uniform coverage within the treated area. **EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT WITH DESIRABLE VEGETATION.**

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

WIPER APPLICATORS

Wiper applicators include either roller or wick devices which physically wipe appropriate concentrations or amounts of this product directly onto the weed. Equipment must be designed, maintained, and operated to prevent the herbicide solution from contacting desirable vegetation. Operate this equipment at ground speeds no greater than 5 mph. Performance may be improved by reducing speed in areas of heavy weed infestations to ensure adequate wiper saturation. Better results may be obtained if two applications are made in opposite directions.

For Roller Applicators — Mix 1 gallon of this product in enough water to prepare 10 gallons of herbicide solution (10 percent solution). Apply this solution to perennial weeds or annual broadleaf weeds listed in this "Wiper Applicators" section.

Mix 1 gallon of this product in enough water to provide 20 gallons of herbicide solution (5 percent solution). Apply this solution to annual grasses listed in this "Wiper Applicators" section.

Roller speed should be maintained at 40 to 60 RPM.

For Wick or Wiper Applicators — Mix 1 gallon of this product in 2 gallons of water to prepare a 33 percent solution. Apply this solution to weeds listed in this "Wiper Applicators" section.

In severe infestations, reduce equipment ground speed to ensure that adequate amounts of this product are wiped on the weeds. A second treatment in the opposite direction may be beneficial.

Do not permit herbicide solution to contact desirable vegetation.

When applied as recommended under the conditions described for "Wiper Applicators", this product **CONTROLS** the following weeds:

ANNUAL GRASSES

Corn <i>Zea mays</i>	Rye, common <i>Secale cereale</i>
Panicum, Texas <i>Panicum texanum</i>	Shattercane <i>Sorghum bicolor</i>

ANNUAL BROADLEAVES

Sicklepod <i>Cassia obtusifolia</i>	Starbur, bristly <i>Acanthospermum hispidum</i>
Spanishneedles <i>Bidens bipinnata</i>	

When applied as recommended under the conditions described for "Wiper Applicators", this product **SUPPRESSES** the following weeds:

ANNUAL BROADLEAVES

Beggarweed, Florida <i>Desmodium tortuosum</i>	Ragweed, giant <i>Ambrosia trifida</i>
Dogfennel <i>Eupatorium capilliflorum</i>	Sunflower <i>Helianthus annuus</i>
	Thistle, musk <i>Carduus nutans</i>

Pigweed, redroot <i>Amaranthus retroflexus</i>	Velvetleaf <i>Abutilon theophrasti</i>
Ragweed, common <i>Ambrosia artemisiifolia</i>	

PERENNIAL GRASSES

Bermudagrass <i>Cynodon dactylon</i>	Smutgrass <i>Sporobolus poiretii</i>
Guineagrass <i>Panicum maximum</i>	Vaseygrass <i>Paspalum urvillei</i>
Johnsongrass <i>Sorghum halepense</i>	

PERENNIAL BROADLEAVES

Dogbane, hemp <i>Apocynum cannabinum</i>	Nightshade, silverleaf <i>Solanum elaeagnifolium</i>
Milkweed <i>Asclepias syriaca</i>	Thistle, Canada <i>Cirsium arvense</i>

WEEDS CONTROLLED

This herbicide controls many annual and perennial grasses and broadleaf weeds.

ANNUAL WEEDS

- Apply to actively growing grass and broadleaf weeds.
- Allow at least 3 days after treatment before tillage.
- For maximum agronomic benefit, apply when weeds are 6 inches or less in height.
- To prevent seed production, applications should be made prior to seedhead formation.
- This product does not provide residual control; therefore, delay application until maximum weed emergence. Repeat treatments may be necessary to control later germinating weeds.

**LOW-VOLUME BROADCAST APPLICATION
(LOW-RATE TECHNOLOGY)**

When applied as directed under the conditions described, this product will control the weeds listed below when water carrier volumes of 3 to 10 gallons per acre for ground applications and 3 to 5 gallons per acre for aerial applications are recommended. (See the "Aerial Equipment" section of this label for approved sites.)

NOTE

- The addition of 2 percent dry ammonium sulfate by weight or 17 pounds per 100 gallons of water may increase the performance of this product on annual weeds. The improvement in performance may be apparent where environmental stress is a concern. Refer to the "Mixing, Additives and Application Instructions" section of this label.
- Do not tank-mix with soil-residual herbicides when using these rates unless otherwise specified.
- For weeds that have been mowed, grazed or cut, allow regrowth to occur prior to treatment.
- Refer to the "Tank Mixtures" portion of this section for control of additional broadleaf weeds.

WEED SPECIES	MAXIMUM HEIGHT/ LENGTH	RATE PER ACRE** (FLUID OUNCES)
Foxtail <i>Setaria spp.</i>	12"	8 oz.

WEED SPECIES	MAXIMUM HEIGHT/LENGTH	RATE PER ACRE ^{1,2} (FLUID OUNCES)
Barnyardgrass <i>Echinochloa crus-galli</i>	6" (0 to 4" 4 to 6")	12 oz. 16 oz. ¹ 24 oz. ¹
Bluegrass, annual <i>Poa annua</i>		
Brome, downy [*] <i>Bromus tectorum</i>		
Mustard, blue <i>Chorispora tenella</i>		
Mustard, tansy <i>Descurainia pinnata</i>		
Mustard, tumble <i>Sisymbrium altissimum</i>		
Mustard, wild <i>Sinapis arvensis</i>		
Spurry, umbrella <i>Holosteum umbellatum</i>		
Barley <i>Hordeum vulgare</i>	12"	
Rye <i>Secale cereale</i>		
Sandbur, field <i>Cenchrus spp.</i>		
Shattercane <i>Sorghum bicolor</i>		
Stinkgrass <i>Eragrostis cilianensis</i>		
Wheat <i>Triticum aestivum</i>	18"	
Morningglory <i>Ipomoea spp.</i>	2"	16 oz.
Sicklepod <i>Cassia obtusifolia</i>		
Bluegrass, bulbous <i>Poa bulbosa</i>	6"	
Cheat <i>Bromus secalinus</i>		
Chickweed, common <i>Stellaria media</i>		
Chickweed, mouseear <i>Cerastium vulgatum</i>		
Corn <i>Zea mays</i>		
Goatgrass, jointed <i>Aegilops cylindrica</i>		
Groundsel, common <i>Senecio vulgaris</i>		
Horseweed/Marestail <i>Conyza canadensis</i>		
Lambsquarters, common <i>Chenopodium album</i>		
Pennycress, field Fanweed <i>Thlaspi arvense</i>		
Rocket, London <i>Sisymbrium irio</i>		

WEED SPECIES	MAXIMUM HEIGHT/LENGTH	RATE PER ACRE ^{1,2} (FLUID OUNCES)
Ryegrass, Italian <i>Lolium multiflorum</i>	6"	16 oz.
Shepherdspurse <i>Capsella bursa-pastoris</i>		
Spurge, annual <i>Euphorbia spp.</i>		
Buttercup <i>Ranunculus spp.</i>	12"	
Cocklebur <i>Xanthium strumarium</i>		
Crabgrass <i>Digitaria spp.</i>		
Dwarf dandelion <i>Krigia cespitosa</i>		
Falseflax, smallseed <i>Camelina microcarpa</i>		
Foxtail, Carolina <i>Alopecurus carolinianus</i>		
Johnsongrass, seedling <i>Sorghum halepense</i>		
Oats, wild <i>Avena fatua</i>		
Panicum, fall <i>Panicum dichotomiflorum</i>		
Panicum, Texas <i>Panicum texanum</i>		
Pigweed, redroot <i>Amaranthus retroflexus</i>		
Pigweed, smooth <i>Amaranthus hybridus</i>		
Witchgrass <i>Panicum capillare</i>		
Sicklepod <i>Cassia obtusifolia</i>	3 to 4"	24 oz.
Signalgrass, broadleaf <i>Brachiaria platyphylla</i>	4"	
Horseweed/Marestail <i>Conyza canadensis</i>	7 to 12"	
Lambsquarters, common <i>Chenopodium album</i>		
Spurge, annual <i>Euphorbia spp.</i>		
Rice, red <i>Oryza sativa</i>	4"	32 oz.
Teaweed <i>Sida spinosa</i>		
Sprangletop <i>Leptochloa spp.</i>	6"	
Geranium, Carolina <i>Geranium carolinianum</i>	12"	
Goosegrass <i>Eleusine indica</i>		

WEED SPECIES	MAXIMUM HEIGHT/LENGTH	RATE PER ACRE ^{1,2} (FLUID OUNCES)
Primrose, cutleaf evening <i>Oenothera laciniate</i>	12"	32 oz.
Pusley, Florida <i>Richardia scabra</i>	5 to 12"	
Sicklepod <i>Cassia obtusifolia</i>		
Spanishneedles <i>Bidens bipinnata</i>		
Filaree <i>Erodium spp.</i>	12"	48 oz.
Sprangletop <i>Leptochloa spp.</i>		

¹Use these rates to control barnyardgrass in Alabama, Arkansas, Mississippi, Louisiana, Missouri and Texas for preplant treatments.

^{*}For control in no-till systems, use 16 fluid ounces per acre.

^{**}For those rates less than 32 fluid ounces per acre, this product at rates up to 32 fluid ounces per acre may be used where heavy weed densities exist.

TANK MIXTURES

RULER[®] plus BANVEL

plus NONIONIC SURFACTANT

RULER plus 2,4-D

plus NONIONIC SURFACTANT

These tank mixtures are recommended for use in fallow and reduced tillage areas only. Follow use directions as given in this "Low-Volume Broadcast Application" section.

This product plus Banvel or 2,4-D will control the annual grasses and broadleaf weeds previously listed for this product alone at the indicated heights (except 8 fluid ounces per acre applications), plus the following broadleaf weeds. For those weeds previously listed at 8 fluid ounces of this product alone per acre, use 12 fluid ounces in these tank mixtures.

NOTE: Refer to the specific product labels for crop rotation restrictions and cautionary statements of all products used in tank mixtures. Some crop injury may occur if Banvel is applied within 45 days of planting. The addition of Banvel in a mixture with this product may provide short-term residual control of selected weed species.

Apply 12 to 16 fluid ounces of this product plus 0.25 lb. a.i. of Banvel or 0.5 pound a.i. of 2,4-D per acre to control dense populations of the following annual broadleaf weeds when less than the height indicated:

Cocklebur (12") <i>Xanthium strumarium</i>	Morningglory (6") <i>Ipomoea spp.</i>
Kochia* (6") <i>Kochia scoparia</i>	Pigweed, redroot (12") <i>Amaranthus retroflexus</i>
Lambsquarters (12") <i>Chenopodium album</i>	Pigweed, smooth (12") <i>Amaranthus hybridus</i>
Lettuce, prickly (6") <i>Lactuca serriola</i>	Thistle, Russian (12") <i>Salsola kali</i>
Marestail/Horseweed (6") <i>Conyza canadensis</i>	

*Controlled with Banvel tank mixture only.

Apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D per acre to control the following annual broad-leaf weeds when less than 6 inches in height.

Ragweed, common	Smartweed, Pennsylvania
<i>Ambrosia artemisiifolia</i>	<i>Polygonum pennsylvanicum</i>
Ragweed, giant	Velvetleaf
<i>Ambrosia trifida</i>	<i>Abutilon theophrasti</i>

HIGH-VOLUME BROADCAST APPLICATIONS

When applied as directed under the conditions described, this product will control the weeds listed below when water carrier volumes are 10 to 40 gallons per acre for ground applications.

Use 1 quart of this product per acre if weeds are less than 6 inches tall. If weeds are over 6 inches tall, use 1.5 quarts of this product per acre. If weeds have been mowed, grazed, or cut, allow adequate time for new growth to recommended stages prior to treatment. These rates will also provide control of weeds listed in the "Low-Volume Broadcast Application" section.

WEED SPECIES

Balsamapple*	Panicum
<i>Momordica charantia</i>	<i>Panicum spp.</i>
Bassia, fivehook	Ragweed, common
<i>Bassia hyssopifolia</i>	<i>Ambrosia artemisiifolia</i>
Brome	Ragweed, giant
<i>Bromus spp.</i>	<i>Ambrosia trifida</i>
Fiddleneck	Smartweed, Pennsylvania
<i>Amsinckia spp.</i>	<i>Polygonum pennsylvanicum</i>
Flaxleaf, hairy	Sowthistle, annual
<i>Conyza bonariensis</i>	<i>Sonchus oleraceus</i>
Flabane	
<i>Erigeron spp.</i>	
Kochia	Sunflower
<i>Kochia scoparia</i>	<i>Helianthus annuus</i>
Lettuce, prickly	Thistle, Russian
<i>Lactuca serriola</i>	<i>Salsola kali</i>
	Velvetleaf
	<i>Abutilon theophrasti</i>

*Apply with hand-held equipment only.

PERENNIAL WEEDS

Apply this product as follows to control or destroy most perennial weeds:

NOTE: If weeds have been mowed or tilled, do not treat until plants have resumed active growth and have reached the recommended stages of growth.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. Repeat treatments must be made prior to crop emergence.

The addition of 1 to 2 percent dry ammonium sulfate by weight or 8.5 to 17 pounds per 100 gallons of water may increase the performance of this product on perennial weeds. The improvement in performance may be apparent where environmental stress is a concern. Refer to the "Mixing, Additives and Application Instructions" section of this label.

When applied as recommended under the conditions described, this product WILL CONTROL the following PERENNIAL WEEDS:

Alfalfa	Johnsongrass
<i>Medicago sativa</i>	<i>Sorghum halepense</i>
Alligatorweed*	Kikuyugrass
<i>Alternanthera philoxeroides</i>	<i>Pennisetum clandestinum</i>

Artichoke, Jerusalem	Knapweed
<i>Helianthus tuberosus</i>	<i>Centaurea repens</i>
Bahiagrass	Lantana
<i>Paspalum notatum</i>	<i>Lantana camara</i>
Bentgrass	Milkweed
<i>Agrostis spp.</i>	<i>Asclepias spp.</i>
Bermudagrass	Muhly, wirestem
<i>Cynodon dactylon</i>	<i>Muhlenbergia frondosa</i>
Bermudagrass, water (knotgrass)	Mullein, common
<i>Paspalum distichum</i>	<i>Verbascum thapsus</i>
Bindweed, field	Napiergrass
<i>Convolvulus arvensis</i>	<i>Pennisetum purpureum</i>
Bluegrass, Kentucky	Nightshade, silverleaf
<i>Poa spp.</i>	<i>Solanum elaeagnifolium</i>
Blueweed, Texas	Nutsedge: purple, yellow
<i>Helianthus ciliaris</i>	<i>Cyperus rotundus</i>
Brackenfern	<i>Cyperus esculentus</i>
<i>Pteridium aquilinum</i>	Orchardgrass
Bromegrass, smooth	<i>Dactylis glomerata</i>
<i>Bromus inermis</i>	Pampas
Bursage, woollyleaf	<i>Cortaderia jubata</i>
<i>Franseria tomentosa</i>	Paragrass
Canarygrass, reed	<i>Brachiaria mutica</i>
<i>Phalaris arundinacea</i>	Phragmites*
Cattail	<i>Phragmites spp.</i>
<i>Typha spp.</i>	Quackgrass
Clover, red	<i>Agropyron repens</i>
<i>Trifolium pratense</i>	Redvine*
Clover, white	<i>Brunnichia ovata</i>
<i>Trifolium repens</i>	Reed, giant
Cogongrass	<i>Arundo donax</i>
<i>Imperata cylindrica</i>	Ryegrass, perennial
Dallisgrass	<i>Lolium perenne</i>
<i>Paspalum dilatatum</i>	Smartweed, swamp
Dandelion	<i>Polygonum coccineum</i>
<i>Taraxacum officinale</i>	Spurge, leafy*
Dock, curly	<i>Euphorbia esula</i>
<i>Rumex crispus</i>	Sweet potato, wild*
Dogbane, hemp	<i>Ipomoea pandurata</i>
<i>Apocynum cannabinum</i>	Thistle, Canada
Fescues	<i>Cirsium arvense</i>
<i>Festuca spp.</i>	Timothy
Fescue, tall	<i>Phleum pratense</i>
<i>Festuca arundinacea</i>	Torpedograss*
Guineagrass	<i>Panicum repens</i>
<i>Panicum maximum</i>	Trumpet creeper*
Horsenettle	<i>Campsis radicans</i>
<i>Solanum carolinense</i>	Vaseygrass
Horseradish	<i>Paspalum urvillei</i>
<i>Armoracia rusticana</i>	Wheatgrass, western
	<i>Agropyron smithii</i>

*Partial control

Alfalfa — Apply 1 quart of this product in 3 to 10 gallons of water per acre. Make application after last hay cutting in the fall. Allow alfalfa to regrow to a height of 6 to 8 inches or more prior to treatment. Applications should be followed with deep tillage at least 7 days after treatment, but before soil freeze-up.

Alligatorweed — Apply 4 quarts of this product per acre or apply a 1-1/2 percent solution with hand-held equipment to provide partial control. Apply when most of the

plants are in bloom. Repeat applications will be required to maintain such control.

Bentgrass — For suppression in grass seed production areas. For ground applications only, apply 1.5 quarts of this product in 10 to 20 gallons of water per acre. Ensure entire crown area has resumed growth prior to a fall application. Bentgrass should have at least 3 inches of growth. Tillage prior to treatment should be avoided. Tillage 7 to 10 days after application is recommended for best results. Failure to use tillage after treatment may result in unacceptable control.

Bermudagrass — For control, apply 5 quarts of this product per acre and, for partial control, apply 3 quarts per acre. Treat when bermudagrass is actively growing and seedheads are present. Retreatment may be necessary to maintain control. Allow 7 or more days after application before tillage.

Bermudagrass, water (knotgrass)—Apply 1.5 quarts of this product in 5 to 10 gallons of water per acre. Apply when water bermudagrass is actively growing and 12 to 18 inches in length. Allow 7 or more days before tilling, flushing or flooding the field.

Fall applications only—Apply 1 quart of this product in 5 to 10 gallons of water per acre. Fallow fields should be tilled prior to application. Apply prior to frost on water bermudagrass that is actively growing and 12 to 18 inches in length. Allow 7 or more days before tillage.

Bindweed, field—For control, apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts east of the Mississippi River. Apply when the weeds are actively growing and are at or beyond full bloom. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost. Allow 7 or more days after application before tillage.

Also for control, apply 2 quarts of this product plus 0.5 pound a.i. of Banvel in 10 to 20 gallons of water per acre. At these rates, apply using ground application only.

The following tank mixtures with 2,4-D may be applied using aerial application equipment in fallow and reduced tillage systems only.

For suppression on irrigated agricultural land apply 1 to 2 quarts of this product plus 1 pound a.i. of 2,4-D in 10 to 20 gallons of water per acre with ground equipment only. Applications should be made following harvest or on fall fallow ground when the bindweed is actively growing and the majority of runners are 12 inches or more in length. The use of at least one irrigation will promote active bindweed growth.

For suppression, apply 16 fluid ounces of this product plus 0.5 pounds a.i. of 2,4-D in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Applications should be delayed until maximum emergence has occurred and when vines are between 6 to 18 inches in length.

Bluegrass, Kentucky / Bromegrass, smooth / Orchardgrass — Apply 2 quarts of this product in 10 to 40 gallons of water per acre when the grasses are actively growing and most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1-1/2 quarts of this product in 5 to 10 gallons of water per acre.

Apply to actively growing plants when most have reached 4 to 12 inches in height. Allow 7 or more days after application before tillage.

Blueweed, Texas—Apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts per acre east of the Mississippi River. Apply when weed is actively growing and is at or beyond full bloom. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth. New leaf development indicates active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost. Allow 7 or more days after application before tillage.

Brackenfern—Apply 3 to 4 quarts of this product per acre as a broadcast spray or as a 1 to 1-1/2 percent solution with hand-held equipment. Apply to fully expanded fronds which are at least 18 inches long.

Bursage, woollyleaf—For control, apply 2 quarts of this product plus 1 pint of Banvel per acre. For partial control, apply 1 quart of this product plus 1 pint of Banvel per acre. Apply 3 to 20 gallons of water per acre. Apply when plants are producing new active growth which has been initiated by moisture for at least 2 weeks and when plants are at or beyond flowering.

Canarygrass, reed / Timothy / Wheatgrass, western—Apply 2 to 3 quarts of this product per acre. For best results, apply to actively growing plants when most have reached the boot-to-head stage of growth. Allow 7 or more days after application before tillage.

Cogongrass—Apply 3 to 5 quarts of this product in 10 to 40 gallons of water per acre. Apply when cogongrass is at least 18 inches tall and actively growing in late summer or fall. Allow 7 or more days after application before tillage or mowing. Due to uneven stages of growth and the dense nature of vegetation preventing good spray coverage, repeat treatments may be necessary to maintain control.

Dandelion/Dock, curly—Apply 3 to 5 quarts of this product per acre when plants are actively growing and most have reached the early bud stage of growth. Allow 7 or more days after application before tillage.

Also for control, apply 16 fluid ounces of this product plus 0.5 pounds a.i. of 2,4-D plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre.

Dogbane, hemp—Apply 4 quarts of this product per acre. Apply when actively growing and when most weeds have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or fall. Allow 7 or more days after application before tillage.

For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D plus 0.5 to 1 percent nonionic surfactant by total spray volume in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Delay applications until maximum emergence of dogbane has occurred.

Fescue, tall—Apply 3 quarts of this product in 10 to 40 gallons of water per acre to actively growing plants when most have reached boot-to-early seedhead stage of development.

Fall applications only—Apply 1 quart of this product in 3 to 10 gallons of water per acre. Apply to fescue in the fall when actively growing and plants have 6 to 12 inches of new growth. Allow 7 or more days after application before tillage. A sequential application of 1 pint per acre of this product will improve long-term control and con-

trol seedlings germinating after fall treatments or the following spring.

Guineagrass—Apply 3 quarts of this product per acre or use a 1 percent solution with hand-held equipment. Apply to actively growing guineagrass when most have reached at least the 7-leaf stage of growth. Ensure thorough coverage when using hand-held equipment. Allow 7 or more days after application before tillage.

Johnsongrass / Ryegrass, perennial—Apply 1 to 3 quarts of this product per acre. In annual cropping systems, apply 1 to 2 quarts of this product per acre. Apply 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre. In noncrop or areas where annual tillage (no-till) is not performed, apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre. For best results, apply to actively growing plants when most have reached the boot-to-head stage of growth. Allow 7 or more days after application before tillage. Do not tank-mix with residual herbicides when using the 1 quart per acre rate.

For burndown of johnsongrass, apply 1 pint per acre in 3 to 10 gallons of water per acre before the plants reach a height of 12 inches. For this use, allow at least 3 days after treatment before tillage.

Spot Treatment (partial control or suppression)—Apply a 1 percent solution of this product when johnsongrass is 12 to 18 inches in height. Coverage should be uniform and complete.

Kikuyugrass—Apply 2 to 3 quarts of this product per acre. Spray when most kikuyugrass is at least 8 inches in height (3 or 4-leaf stage of growth) and actively growing. Allow 3 or more days after application before tillage.

Knapweed/Horseradish—Apply 4 quarts of this product per acre. Apply when actively growing and when most weeds have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or fall. Allow 7 or more days after application before tillage.

Lantana—Apply this product as a 1 to 1-1/4 percent solution using hand-held equipment only. Apply to actively growing lantana at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody stage of growth. Allow 7 or more days after application before tillage.

Milkweed, common—Apply 3 quarts of this product per acre. Apply when actively growing and most of the milkweed has reached the late bud to flower stage of growth. Following small grain harvest or mowing, allow milkweed to regrow to a mature stage prior to treatment. Allow 7 or more days after application before tillage.

Muhly, wirestem—Apply 1 to 2 quarts of this product per acre. Use 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre or in pasture, sod, or noncrop areas. Spray when the wirestem muhly is 8 inches or more in height and actively growing. Do not till between harvest and fall applications or in the fall or spring prior to spring applications. Allow 3 or more days after application before tillage. This product will not provide residual control of wirestem muhly from seeds which germinate after a Ruler herbicide application. Do not tank mix with residual herbicides when using the 1 quart per acre rate.

Nightshade, silverleaf—For control, apply 2 quarts of this product in 3 to 10 gallons of water per acre. Applications should be made when at least 60 percent of plants have berries. Fall treatments must be applied before a killing frost. Allow 7 or more days after application before tillage. Do not treat when weed is under drought stress, as good soil moisture is necessary for active growth.

Nutsedge: purple, yellow—Apply 3 quarts of this product per acre as a broadcast spray, or apply a 2 percent solution from hand-held equipment to control existing nutsedge plants and immature nutlets attached to treated plants. Treat when plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control of ungerminated tubers. Sequential applications of 1 to 2 quarts of this product in 3 to 10 gallons of water per acre will provide control. Make applications when a majority of the plants are in the 3 to 5 leaf stage (less than 6 inches tall). Repeat this application, as necessary, when newly emerging plants reach the 3 to 5 leaf stage. Subsequent applications will be necessary for long-term control.

For suppression of existing plants, apply 1 pint to 2 quarts of this product in 3 to 40 gallons of water per acre. Treat when plants have 3 to 5 leaves and most are less than 6 inches tall. Repeat treatments will be required to control subsequent emerging plants or regrowth of existing plants. Wait 7 days after treatment before tillage or mowing.

Pampas—Apply this product as a 1-1/2 to 2 percent solution using hand-held equipment. Apply to plants that are actively growing at or beyond the boot stage of growth. Thorough coverage is necessary for best control.

Phragmites—For partial control of phragmites in Florida and the counties of other states bordering the Gulf of Mexico, apply 5 quarts per acre as a broadcast spray or apply a 2 percent solution from hand-held equipment. In other areas of the U.S., apply 3 quarts per acre as a broadcast spray or apply a 1 percent solution from hand-held equipment for partial control. For best results, treat during late summer or fall months or when plants are actively growing and in full bloom. Treatment before or after this stage may lead to reduced control. Due to the dense nature of the vegetation, which may prevent good spray coverage or uneven stages of growth, repeat treatments may be necessary to maintain control. Visual control symptom will be slow to develop.

Quackgrass—In Annual Cropping Systems, or in Pastures and Sods Followed by Deep Tillage: Apply 1 to 2 quarts of this product per acre. For the one quart rate, apply in 3 to 10 gallons of water per acre. For the 2 quart rate, apply in 10 to 40 gallons of water per acre. Do not tank mix with residual herbicides when using the 1 quart rate. Spray when quackgrass is 8 to 12 inches in height and actively growing. Do not till between harvest and fall applications or in fall or spring prior to spring application. Allow 3 or more days after application before tillage. In pastures or sods, for best results use a mold-board plow.

Quackgrass—Pasture or Sod or Other Noncrop Areas Where Deep Tillage is Not Planned Following Application: Apply 2 to 3 quarts in 10 to 40 gallons of water per acre. Spray when the quackgrass is greater than 8 inches tall and actively growing. Do not till between harvest and fall application or in fall or spring prior to spring application. Allow 3 or more days after application before tillage.

Redvine—For suppression, apply 24 fluid ounces of this product per acre at each of two applications 7 to 14 days apart or a single application of 2 quarts per acre. Apply recommended rates in 5 to 10 gallons of water per acre. Apply to actively growing plants in late September or early October, which are at least 18 inches tall and have been growing 45 to 60 days since the last tillage operation. Make applications at least one week before a killing frost.

Reed, giant — For control of giant reed, apply a 2 percent solution of this product when plants are actively growing. Best results are obtained when applications are made in late summer to fall.

Smartweed, swamp—Apply 3 to 5 quarts of this product per acre when plants are actively growing and most have reached the early bud stage of growth. Allow 7 or more days after application before tillage.

Also for control, apply 16 fluid ounces of this product plus 0.5 pound active ingredient of 2,4-D in 3 to 10 gallons of water per acre in the late summer or fall. Apply when plants are actively growing and most have reached the early bud stage of growth. Allow 7 or more days after application before tillage.

Spurge, leafy—For suppression, apply 16 fluid ounces of this product plus 0.5 pound active ingredient 2,4-D in 3 to 10 gallons of water per acre in the late summer or fall. Apply when plants are actively growing. If mowing has occurred prior to treatment, apply when most of the plants are 12 inches tall. Allow 7 or more days after application before tillage.

Sweet Potato, wild — Apply this product as a 2 percent solution using hand-held equipment. Apply to actively growing weeds that are at or beyond the bloom stage of growth. Repeat applications will be required. Allow the plant to reach the recommended stage of growth before retreatment. Allow 7 or more days before tillage.

Thistle, Canada — Apply 2 to 3 quarts of this product per acre. Apply to actively growing thistles when most are at or beyond the bud stage of growth. After harvest, mowing or tillage in the late summer or fall, allow at least 4 weeks for initiation of active growth and rosette development prior to the application of this product. Fall treatments must be applied before a killing frost. Allow 3 or more days after application before tillage.

For suppression of Canada thistle, apply 1 quart of this product, or 1 pint of this product plus 0.5 pound a.i. 2,4-D, in 3 to 10 gallons of water per acre in the late summer or fall after harvest, mowing or tillage. Allow rosette regrowth to a minimum of 6 inches in diameter before treating. Applications can be made as long as leaves are still green and plants are actively growing at the time of application. Allow 3 or more days after application before tillage.

Torpedograss — Apply 4 to 5 quarts of this product per acre to provide partial control of torpedograss. Apply to actively growing torpedograss when most plants are at or beyond the seedhead stage of growth. Repeat applications will be required to maintain control. Fall treatments must be applied before frost. Allow 7 or more days after application before tillage.

Trumpet creeper—For control, apply 2 quarts of this product in 5 to 10 gallons of water per acre. Apply in late September or October to actively growing plants which are at least 18 inches tall and have been growing 45 to 60 days since the last tillage operation. Make applications at least 1 week before a killing frost.

Other perennials listed on this label — Apply 3 to 5 quarts

of this product per acre. Apply when actively growing and most have reached early head or early bud stage of growth. Allow 7 or more days after application before tillage.

WOODY BRUSH AND TREES

When applied as recommended under the conditions described, this product CONTROLS or PARTIALLY CONTROLS the following woody brush, plants and trees:

Alder	Maple:
<i>Alnus spp.</i>	Red**
Ash*	<i>Acer rubrum</i>
<i>Fraxinus spp.</i>	Sugar
Aspen, quaking	<i>Acer saccharum</i>
<i>Populus tremuloides</i>	
Bearmat (Bearclover)	Vine*
<i>Chamaebatia foliolosa</i>	<i>Acer circinatum</i>
Birch	Monkey Flower*
<i>Betula spp.</i>	<i>Mimulus guttatus</i>
Blackberry	Oak:
<i>Rubus spp.</i>	Black*
Broom:	<i>Quercus velutina</i>
French	Northern Pin
<i>Cytisus</i>	<i>Quercus palustris</i>
<i>monspessulanus</i>	Post
Scotch	<i>Quercus stellata</i>
<i>Cytisus scoparius</i>	Red
Buckwheat, California*	<i>Quercus rubra</i>
<i>Eriogonum fasciculatum</i>	Southern Red
Cascara*	<i>Quercus falcata</i>
<i>Rhamnus purshiana</i>	White*
Catsclaw*	<i>Quercus alba</i>
<i>Acacia greggi</i>	Persimmon*
Ceanothus*	<i>Diospyros spp.</i>
<i>Ceanothus spp.</i>	Poison Ivy
Chamise	<i>Rhus radicans</i>
<i>Adenostoma</i>	Poison Oak
<i>fasciculatum</i>	<i>Rhus toxicodendron</i>
Cherry:	Poplar*, yellow
Bitter	<i>Liriodendron tulipifera</i>
<i>Prunus emarginata</i>	Raspberry
	<i>Rubus spp.</i>
Black	Rose, multiflora
<i>Prunus serotina</i>	<i>Rosa multiflora</i>
Pin	Russian-olive
<i>Prunus pensylvanica</i>	<i>Eleagnus angustifolia</i>
Coyote brush	Sage, black
<i>Baccharis consanguinea</i>	<i>Salvia mellifera</i>
Creeper, Virginia*	Sagebrush, California
<i>Parthenocissus</i>	<i>Artemisia californica</i>
<i>quinquefolia</i>	Salmonberry
Dewberry	<i>Rubus spectabilis</i>
<i>Rubus trivialis</i>	Sassafras
Elderberry	<i>Sassafras albidum</i>
<i>Sambucus spp.</i>	Sourwood
Elm*	<i>Oxydendrum arboreum</i>
<i>Ulmus spp.</i>	Sumac:
Eucalyptus, bluegum	Poison*
<i>Eucalyptus glotulus</i>	<i>Rhus vernix</i>
Hasardia*	Smooth*
<i>Haplopappus squamosus</i>	<i>Rhus glabra</i>
Hawthorn	Winged*
<i>Crataegus spp.</i>	<i>Rhus copallina</i>

Hazel	Sweetgum
<i>Corylus spp.</i>	<i>Liquidambar styraciflua</i>
Honeysuckle	Swordfern*
<i>Lonicera spp.</i>	<i>Polystichum munitum</i>
Kudzu	Tallowtree, Chinese
<i>Pueraria lobata</i>	<i>Sapium sebiferum</i>
Locust, black*	Tan oak
<i>Robinia pseudoacacia</i>	<i>Lithocarpus densiflorus</i>
Madrone	Thimbleberry
<i>Arbutus menziesii</i>	<i>Rubus parviflorus</i>
Manzanita	Tobacco, tree*
<i>Arctostaphylos spp.</i>	<i>Nicotiana glauca</i>
	Trumpet creeper
	<i>Campsis radicans</i>
	Willow
	<i>Salix spp.</i>

*Partial control

**See below for control or partial control instructions.

NOTE: If brush has been mowed or tilled or trees have been cut, do not treat until regrowth has reached the recommended stages of growth.

Apply this product when plants are actively growing, and unless otherwise directed, after full leaf expansion. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when application is made in the spring to early summer when brush species are at high moisture content and are flowering. Ensure thorough coverage when using hand-held equipment. Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

Apply this product as follows to control or partially control the following woody brush and trees.

Alder / Dewberry / Honeysuckle / Post Oak / Raspberry — For control, apply 3 to 4 quarts per acre of this product as a broadcast spray or as a 1 to 1-1/2 percent solution with hand-held equipment.

Aspen, quaking / Cherry, bitter, black, pin / Hawthorn / Oak, southern red / Sweetgum / Trumpet creeper — For control, apply 2 to 3 quarts of this product per acre as a broadcast spray or as a 1 to 1-1/2 percent solution with hand-held equipment.

Birch / Elderberry / Hazel / Salmonberry / Thimbleberry — For control, apply 2 quarts per acre of this product as a broadcast spray or as a 1 percent solution with hand-held equipment.

Blackberry — For control, apply 3 to 4 quarts per acre of this product as a broadcast spray, or 1 to 1-1/2 percent solution with hand-held equipment. Make application after plants have reached full leaf maturity. Best results are obtained when applications are made in late summer or fall. After berries have set or dropped in late fall, blackberry can be controlled by applying a 3/4

percent solution of this product with hand-held equipment. For control of blackberries after leaf drop and until killing frost or as long as stems are green, apply 3 to 4 quarts of this product in 10 to 40 gallons of water per acre.

Broom: French, Scotch — For control, apply a 1-1/2 to 2 percent solution with hand-held equipment.

Buckwheat, California / Hasardia / Monkey Flower / Tobacco, tree — For partial control of these species, apply a 1 to 2 percent solution of this product as a foliar spray with hand-held equipment. Thorough coverage of foliage is necessary for best results.

Catsclaw — For partial control, apply as a 1 to 1-1/2 percent solution with hand-held equipment.

Coyote Brush — For control, apply a 1-1/2 to 2 percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

Eucalyptus, bluegum — For control of eucalyptus resprouts, apply a 2 percent solution of this product with hand-held equipment when resprouts are 6 to 12 feet tall. Ensure complete coverage. Apply when plants are growing actively. Avoid application to drought-stressed plants. For control of eucalyptus trees 2 inches or less in diameter, cut trees as close to the soil surface as desired. Apply a 50 to 100 percent solution of this product to the freshly cut surface immediately after cutting. Delay in applying this product may result in reduced performance.

Kudzu — For control, apply 4 quarts of this product per acre as a broadcast spray or as a 2 percent solution with hand-held equipment. Repeat applications will be required to maintain control.

Madrone resprouts — For suppression or partial control, apply a 2 percent solution of this product to resprouts less than 3 to 6 feet tall. Best results are obtained with spring/early summer treatments.

Maple, red — For control, apply as a 1 to 1-1/2 percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed. For partial control, apply 2 to 4 quarts of this product per acre as a broadcast spray.

Maple, sugar / Oak, northern pin / Oak, red — For control, apply as a 1 to 1-1/2 percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

Poison Ivy / Poison Oak — For control, apply 4 to 5 quarts of this product per acre as a broadcast spray or as a 2 percent solution with hand-held equipment. Repeat applications may be required to maintain control. Fall treatments must be applied before leaves lose green color.

Rose, multiflora — For control, apply 2 quarts of this product per acre as a broadcast spray or as a 1 percent solution with hand-held equipment. Treatments should be made prior to leaf deterioration by leaf-feeding insects.

Sage, black / Sagebrush, California / Chamise / Tallow-tree, Chinese — For control of these species, apply a 1 percent solution of this product as a foliar spray with hand-held equipment. Thorough coverage of foliage is necessary for best results.

Tan oak resprouts — For suppression or partial control, apply a 2 percent solution of this product to resprouts less than 3 to 6 feet tall. Best results are obtained with spring/early summer treatments.

Willow — For control, apply 3 quarts of this product per

acre as a broadcast spray or as a 1 percent solution with hand-held equipment.

Other Woody Brush and Trees listed on this label — For partial control, apply 2 to 4 quarts of this product per acre as a broadcast spray or as a 1 to 1-1/2 percent solution with hand-held equipment.

NONCROP USES

See "General Information" and "Mixing, Additives and Application Instructions" sections of this label for essential product performance information and the following "Noncrop" sections for specific recommended uses.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF SPRAY WITH FOLIAGE OF DESIRABLE TURFGRASSES, TREES, SHRUBS, OR OTHER DESIRABLE VEGETATION SINCE SEVERE DAMAGE OR DESTRUCTION MAY RESULT.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seeds.

This product does not provide residual weed control. For subsequent weed control, follow a label-approved herbicide program.

Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

FARMSTEAD WEED CONTROL

When applied as directed for "Noncrop Uses", under conditions described, this product controls undesirable vegetation listed on this label around farmstead building foundations, along and in fences, shelterbelts, and for general nonselective farmstead weed control.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

GRASSES FOR SEED PRODUCTION

■ PREPLANT AND RENOVATION ■

When applied as directed for "Noncrop" uses, under conditions described, this product controls most existing vegetation prior to the planting or renovation of grass seed production areas.

For specific rates of application and instructions for control of various annual and perennial weeds, and woody brush and trees, see the "Weeds Controlled" section of this label.

For maximum control of existing vegetation, delay planting to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses, such as bermudagrass, summer or fall applications provide best control.

DO NOT DISTURB SOIL OR UNDERGROUND PLANT PARTS BEFORE TREATMENT. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow proper translocation into underground plant parts.

Apply this product to actively growing weeds at the stages of growth given in the "Weeds Controlled" section of this

label prior to planting or renovation of turf or forage grass areas grown for seed production.

DO NOT feed or graze treated areas within 8 weeks after application.

CROPPING SYSTEMS

When applied as directed for "Cropping Systems", under the conditions described, this product controls annual and perennial weeds listed on this label, prior to the emergence of direct seeded crops or prior to transplanting of crops listed on this label.

See the "General Information" and "Mixing, Additives and Application Instructions" sections of this label for essential product performance information.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF SPRAY WITH FOLIAGE, GREEN STEMS OR FRUIT OF DESIRABLE CROPS, PLANTS, TREES OR OTHER DESIRABLE VEGETATION SINCE SEVERE DAMAGE OR DESTRUCTION MAY RESULT.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. Except as otherwise specified on this label, repeat treatments must be made before the crop emerges in accordance with the instructions of this label.

Except as otherwise specified in a crop section of this label, the combined total of all treatments must not exceed 8 quarts per acre of this product per year.

Do not plant subsequent crops other than those on the label for 30 days following application.

Do not harvest or feed treated vegetation for 8 weeks following application. Following spot treatment or selective equipment use, allow 14 days before grazing domestic livestock or harvesting forage grasses and legumes.

ALFALFA*	LOGANBERRY
ARTICHOKE	LONGAN
(Jerusalem)	LYCHEE
ASPARAGUS*	MELONS***
ATEMOYA	MUSTARD GREENS
BARLEY*	OATS*
BEANS (All)	OKRA
BEET GREENS	OLLALIBERRY
BEETS (Red, Sugar)	ONION
BLACKBERRY	PARSNIPS
BLUEBERRY	PASSION FRUIT
BOYSENBERRY	PEANUTS
BREADFRUIT	PEAS (All)
BROCCOLI	PEPPER***
CABBAGE	PERSIMMONS
CANISTEL	PINEAPPLE††
CARAMBOLA	POTATO (Irish, Sweet)
CARROT	PUMPKIN***
CAULIFLOWER	RADISH
CELERY	RASPBERRY
CHICORY	(Black, Red)
CORN (All)*	RICE**
COTTON*	RUTABAGA
CRANBERRY	SAPODILLA
CUCUMBER***	SAPOTE (Black, Mamey, White)
CURRENT	SORGHUM (Milo)*
DATES	SOURSOP
DEWBERRY	

EGGPLANT***
ELDERBERRY
FORAGE GRASSES*
FORAGE LEGUMES*
GARLIC***
GOOSEBERRY
GOURDS***
HORSERADISH
HUCKLEBERRY
JABOTICABA
JACKFRUIT
KALE
LENTILS
LETTUCE

SOYBEANS*
SPINACH
SQUASH***
(Summer, Winter)
SUGAR APPLE
SUGARCANE
TAMARIND
TOMATILLO***
TOMATOES***†
TURNIPS
WATERCRESS***
WATERMELON***
WHEAT*
YAMS

*Spot treatments may be applied in these crops.

**Do not treat rice fields or levees when the fields contain flood water.

***Apply only prior to planting. Allow at least 3 days between application and planting.

†Use is restricted to direct seeded crops only.

††Do not feed or graze treated pineapple forage following application.

When applying this product prior to transplanting crops into plastic mulch, care must be taken to remove residues of this product from the plastic prior to transplanting. Residues can be removed by ½ inch natural rainfall or by applying water via a sprinkler irrigation system.

Spot Treatment (Only those crops with "*" can be spot treated) — Applications in growing crops must be made prior to heading of small grains and milo, initial pod set in soybeans, silking of corn, or boll opening on cotton.

For forage grasses and forage legumes, see the "Spot Treatment" in the "Pastures" section of "Cropping Systems" in this label.

For dilution and rates of application using boom or hand-held equipment, see the "Mixing, Additives and Application Instructions" and "Weeds Controlled" sections of this label.

NOTE: FOR FORAGE GRASSES AND FORAGE LEGUMES, NO MORE THAN ONE-TENTH OF ANY ACRE SHOULD BE TREATED AT ONE TIME. FOR ALL OTHER CROPS, DO NOT TREAT MORE THAN 10 PERCENT OF THE TOTAL FIELD AREA TO BE HARVESTED.

THE CROP RECEIVING SPRAY IN TREATED AREA WILL BE KILLED. TAKE CARE TO AVOID DRIFT OR SPRAY OUTSIDE TARGET AREA FOR THE SAME REASON.

Selective Equipment — This product may be applied through recirculating sprayers, shielded applicators, or wiper applicators in cotton and soybeans. Shielded and wiper applicators may also be used in tree crops and grapes. Wiper applicators may be used in rutabagas, forage grasses and forage legumes, including pasture sites and grain sorghum (milo).

See the "Selective Equipment" part of the "Application Equipment and Techniques" section of this label for information on proper use and calibration of this equipment.

Allow at least the following time intervals between application and harvest:

Cotton, Soybeans 7 days
Apples, Atemoya, Avocado, Breadfruit, Canistel,

Carambola, Cherry, Citrus, Dates, Grapes,
Jaboticaba, Jackfruit, Longan, Lychee, Passion
Fruit, Pear, Persimmons, Rutabagas, Sapodilla,
Sapote, Soursop, Sugar apple, Tamarind . . . 14 days
Stone Fruit 17 days
Nut Crops 21 days
Sorghum (milo)* 40 days

*Do not use roller applicators. Do not feed or graze treated milo fodder. Do not ensile treated vegetation.

ASPARAGUS

When applied as directed for "Cropping Systems", under the conditions described, this product controls weeds listed on this label in asparagus.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

Prior to Crop Emergence — Apply this product prior to planting or emergence of spears in an established crop for the control of emerged labeled annual and perennial weeds. **DO NOT APPLY WITHIN A WEEK BEFORE THE FIRST SPEARS EMERGE.**

Spot Treatment — Apply this product immediately after cutting, but prior to the emergence of new spears. Do not treat more than 10 percent of the total field to be harvested. Do not harvest within 5 days of treatment.

Postharvest — Apply this product after the last harvest and all spears have been removed. If spears are allowed to regrow, delay application until ferns have developed. Delayed treatments should be applied as directed or shielded spray in order to avoid contact of the spray with ferns, stems or spears. Direct contact of the spray with the asparagus may result in serious crop injury.

NOTE: Select and use recommended types of spray equipment for postemergence postharvest applications. A directed spray is any application where the spray pattern is aligned in such a way as to avoid direct contact of the spray with the crop. A shielded spray is any application where a physical barrier is positioned and maintained between the spray and the crop to prevent contact of the spray with the crop.

BERRIES AND SMALL FRUIT

For cranberries, apply after fruit set and no later than 30 days before harvest.

Wiper applicators may be used in cranberries in accordance with instructions in this section.

For other berries, apply as a preplant broadcast application, or as a directed spray or wiper application post-planting.

See the "General Information" and "Mixing, Additives and Application Instructions" sections of this label for essential product performance information.

See the "Selective Equipment" part of the "Application Equipment and Techniques" section of this label for information on recommended use and calibration of this equipment.

For Wick or other Wiper Applicators — Mix 1 gallon of this product in 4 gallons of water to prepare a 20 percent solution. Apply the solution to emerged weeds. Apply after cranberry fruit set and no later than 30 days before harvest.

In severe infestations, reduce equipment ground speed

to insure that adequate amounts of this product are wiped on the weeds. A second treatment in the opposite direction may be beneficial.

Do not permit herbicide solution to contact desirable vegetation, including green shoots, canes, or foliage.

FALLOW AND REDUCED TILLAGE SYSTEMS

Use this product in fallow and reduced tillage systems for control of annual weeds prior to emergence of crops listed in this label. Refer to the "Weeds Controlled" section of this label for specific rates and instructions. This product may be applied using ground or aerial spray equipment. See the "Application Equipment and Techniques" section of this label for instructions.

■	TANK MIXTURES	■
■	RULER® plus BANVEL	■
■	RULER plus 2,4-D	■
■	RULER plus GOAL™	■

Applications of 2,4-D or Banvel must be made at least 7 days prior to planting corn. Applications of 2,4-D must be made at least 30 days prior to planting soybeans.

The addition of Banvel in a mixture with this product may provide short-term residual control of selected weed species. Some crop injury may occur if Banvel is applied within 45 days of planting. Refer to the Banvel and 2,4-D labels for cropping restrictions and other use instructions.

Ruler® plus Goal Tank Mixtures

This product alone or in tank mixtures with Goal will provide control of those weeds listed below.

Make applications when weeds are actively growing and at the recommended stages of growth. Avoid spraying when weeds are subject to moisture stress, when dust is on the foliage or when straw canopy covers the weeds.

	RULER® 12 fluid oz/acre	RULER® 16 fluid oz/acre
Wheat	18"	Annual grasses at
Barley	12"	left plus:
Bluegrass, annual	6"	Ryegrass, annual
Barnyardgrass	6"	Chickweed
Rye	6"	Groundsel
		Marestail
		Rocket, London
		Shepherdspurse
		Crabgrass
		Johnsongrass, seedling
		Lambsquarters
		Oats, wild
		Pigweed, redroot
		Mustards

RULER 12 fluid oz/acre + GOAL** 2 to 4 fluid oz/acre	RULER 16 fluid oz/acre + GOAL** 2 to 4 fluid oz/acre
Annual grasses above plus:	Annual weeds above plus:
Cheeseweed	Cheeseweed
3"	6"

RULER 12 fluid oz/acre + GOAL**	RULER 16 fluid oz/acre + GOAL**
2 to 4 fluid oz/acre	2 to 4 fluid oz/acre
Chickweed 3"	Groundsel 6"
Groundsel 3"	Chickweed 6"
Rocket, London 6"	Rocket, London 12"
Shepherdspurse 6"	Shepherdspurse 12"

*Maximum height or length in inches.

**Use the higher rate when weeds approach maximum recommended height or stands are dense.

TMGoal is a trademark of Rohm and Haas Company.

ECOFARMING SYSTEMS

The Ecofarming System consists of the following rotation: winter wheat, corn/sorghum, ecofallow.

Use the following tank mixtures for control of emerged annual weeds before planting corn or sorghum in the Ecofarming System.

RULER® at 16 to 20 fluid ounces per acre
plus

2,4-D at 0.375 to 0.5 pound a.i. per acre
plus

ATRAZINE at 0.75 to 1 pound a.i. per acre
plus

LISSO® at 2.5 to 3 quarts per acre

The above tank mixture should be applied in 28-0-0 or 32-0-0 liquid fertilizer carrier at 20 to 30 gallons per acre.

The liquid fertilizer may be diluted with water to achieve the required carrier volume.

WEEDS CONTROLLED—The following weeds, up to a maximum height of 4 inches, will be controlled:

Brome, downy <i>Bromus tectorum</i>	Lettuce, prickly <i>Lactuca serriola</i>
Cheat <i>Bromus secalinus</i>	Pigweed, redroot <i>Amaranthus retroflexus</i>
Foxtail, green <i>Setaria viridis</i>	Thistle, Russian <i>Salsola kali</i>
Foxtail, yellow <i>Setaria lutescens</i>	Wheat, volunteer <i>Triticum aestivum</i>
Kochia* <i>Kochia scoparia</i>	

*For improved control of kochia, add 4 fluid ounces per acre (0.125 pound a.i. per acre) of Banvel to the above tank mixture.

Risk of crop injury from 2,4-D or Banvel can be reduced by applying this treatment 7 to 14 days before planting.

Refer to the label booklet for Lasso herbicide for pre-emergence weed control achieved by this tank mixture.

Refer to the specific product labels for crop rotation restrictions and cautionary statements for all products used in these tank mixtures.

© Lasso is a registered trademark of Monsanto Company.

AID TO TILLAGE

This product, when used in conjunction with preplant tillage practices, will provide control of downy brome, cheat, volunteer wheat, tansy mustard and foxtail. Apply 8 fluid ounces of this product in 3 to 10 gallons of water per acre. Make applications when weeds are actively growing and before they are 6 inches in height. Application must be followed by conventional tillage practices no later than 15 days after treatment and

before regrowth occurs. Allow at least 1 day after application before tillage. Tank mixtures with residual herbicides may result in reduced performance.

PASTURES

Apply this product prior to planting forage grasses and legumes.

Pasture or Hay Crop Renovation — When applied as a broadcast spray, this product controls the annual and perennial weeds listed in this label prior to planting forage grasses or legumes. Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

Spot Treatment — When applied as a spot treatment as recommended, this product controls annual and perennial weeds listed in this label which are growing in pastures, forage grasses and forage legumes composed of bahiagrass, bermudagrass, bluegrass, brome, fescue, orchardgrass, ryegrass, timothy, wheatgrass, alfalfa or clover.

Wiper Application — When applied as directed, this product controls or suppresses the weeds listed under "Wiper Applicators" in the "Selective Equipment" section of this label.

For spot treatment and wiper application, apply in areas where the movement of domestic livestock can be controlled. No more than one-tenth of any acre should be treated at one time. Further applications may be made in the same area at 30-day intervals. Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.

SUGARCANE

When applied as directed for "Cropping Systems", under the condition described, this product controls those emerged annual and perennial weeds listed on this label growing in or around sugarcane or in fields to be planted to sugarcane. This product will also control undesirable sugarcane.

NOTE: Where repeat treatments are necessary, do not exceed a total of 10.6 quarts of this product per acre per year. Do not apply to vegetation in or around ditches, canals or ponds containing water to be used for irrigation.

Broadcast Treatment — Apply this product in 10 to 40 gallons of water per acre on emerged weeds growing in fields to be planted to sugarcane.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

For removal of last stubble or ratoon cane, apply 4 to 5 quarts of this product in 10 to 40 gallons of water per acre to new growth having at least 7 or more new leaves. Allow 7 or more days after application before tillage.

Spot Treatment in or Around Sugarcane Fields—For dilution and rates of application using hand-held equipment, see "Mixing, Additives and Application Instructions" and "Weeds Controlled" sections of this label.

For control of volunteer or diseased sugarcane, make a 1 percent solution of this product in water and spray to wet the foliage of vegetation to be controlled.

NOTE: When spraying volunteer or diseased sugarcane, the plants should have at least 7 new leaves.

Avoid spray contact with healthy cane plants since severe damage or destruction may result.

Do not feed or graze treated sugarcane forage following application.

CONSERVATION TILLAGE, MINIMUM TILLAGE AND NO-TILL SYSTEMS CORN AND SOYBEANS Tank Mixtures

When applied as recommended under the conditions described, the tank mixtures listed in this section control many emerged weeds, and give preemergence control of many annual weeds where corn or soybeans will be planted directly into a cover crop, established sod, or in previous crop residues.

Refer to specific product labels for crop rotation restrictions and cautionary statements of all products used in these tank mixtures. For mixing instructions, see the "Mixing, Additives and Application Instructions" section of this label.

Apply these tank mixtures in 10 to 20 gallons of water or 10 to 60 gallons of nitrogen solutions per acre before, during or after planting. Do not apply these mixtures after crop emergence.

The addition of 1 to 2 percent dry ammonium sulfate by weight may increase the performance of this product.

NOTE: When using these tank mixtures, do not exceed 4 quarts of this product per acre.

CORN

For residual control, this product may be tank-mixed with the following herbicides or combination of herbicides:

LISSO®/ALACHLOR	ATRAZINE
LARIAT®	CYANAZINE
BULLET®	SIMAZINE
DUAL™	PROWL™
BICEP™	

For improved burndown, this product may be tank-mixed with 2,4-D or dicamba. Applications of 2,4-D or dicamba must be made at least 7 days prior to planting corn. See the "Weeds Controlled" section for specific rate information.

SOYBEANS

For residual control, this product may be tank-mixed with the following herbicides or combination of herbicides:

CANOPY™	LOROX™ PLUS
COMMAND™	PREVIEW™
DUAL™	PROWL™
GEMINI™	TURBO™
LISSO®/ALACHLOR	SCEPTER™
LEXONE™	SENCOR™
LINURON	SQUADRON™

For improved burndown, this product may be tank-mixed with the following herbicides:

2,4-DB
2,4-D*

*Applications of 2,4-D must be made at least 30 days prior to planting soybeans. See the "Weeds Controlled" section for specific rate information.

CORN AND SOYBEANS

Annual Weeds—For difficult to control weeds such as fall panicum, barnyardgrass, crabgrass, shattercane and broadleaf signalgrass up to 2 inches tall, and Pennsylvania smartweed up to 6 inches tall, apply this product at 2 pints per acre in these tank mixtures. For other

labeled annual weeds, apply 1 to 1.5 pints of this product per acre when weeds are less than 6 inches tall, and 2 to 3 pints when weeds are over 6 inches tall. For a complete list of annual weeds controlled, see the "Weeds Controlled" section of this label.

Perennial Weeds—At normal application times in minimum tillage systems, perennial weeds may not be at the proper stage of growth for control. See the "Weeds Controlled" section of this label for the proper stage of growth for perennial weeds.

Use of 2 to 4 quarts of this product per acre in the tank mixtures mentioned above, under these conditions provides top kill and reduces competition from many emerged perennial grass and broadleaf weeds. For emerged perennial weeds controlled, see the "Weeds Controlled" section of this label.

To obtain the desired stage of growth, it may be necessary to apply this product alone in the late summer or fall and then follow with a label-approved, seedling weed control program at planting.

USE OF THESE TANK MIXTURES FOR BERMUOAGRASS OR JOHNSONGRASS CONTROL IN MINIMUM TILLAGE SYSTEMS IS NOT RECOMMENDED. For bermudagrass control, follow the instructions under "Control of Perennial Weeds" section of this label and then use a label-approved, seedling weed-control program in a minimum tillage or conventional tillage system. For johnsongrass control, follow instructions under "Control of Perennial Weeds" section of this label, and then use a label approved seedling weed control program with conventional tillage.

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™ Sencor and Turbo are trademarks of Bayer AG.

™ Prowl, Sceptor and Squadron are trademarks of American Cyanamid Company.

™ Command is a trademark of FMC Corporation.

PREHARVEST APPLICATIONS

COTTON

When applied as directed under the conditions described, this product controls annual and perennial weeds listed on this label prior to the harvest of cotton.

Broadcast Applications—This product may be applied using either aerial or ground spray equipment. For ground applications with broadcast equipment, apply this product in 10 to 20 gallons of water per acre. For aerial applications, apply this product in 3 to 10 gallons of water per acre.

FOR AERIAL APPLICATIONS, REFER TO THE "APPLICATION EQUIPMENT AND TECHNIQUES" AND "AERIAL EQUIPMENT" SECTIONS OF THIS LABEL.

DO NOT EXCEED A MAXIMUM RATE OF 1 QUART PER ACRE OF THIS PRODUCT WHEN MAKING APPLICATIONS BY AIR.

Weed Control—For specific rates of application and instructions for control of various annual and perennial weeds for this product used alone or in the following tank mixtures, see the "Weeds Controlled" section of this label.

To control johnsongrass using multiple directed or broadcast over-the-top spray equipment, apply 1 quart of this

product in 10 to 20 gallons of water per acre. Ensure complete coverage.

For partial control of field bindweed, apply 1 quart of this product in 3 to 20 gallons of water per acre. Apply when bindweed is actively growing and 12 inches or greater in length. Reduced performance may result if bindweed is under drought stress.

Tank Mixtures

RULER® plus DEF™ 6

RULER plus FOLEX™

RULER plus PREP™

RULER plus PREP plus DEF 6 or FOLEX

When applied as recommended under the conditions described, these tank mixtures control annual and perennial weeds listed on this label prior to the harvest of cotton. For application guidelines, precautions and use-rates, refer to the Def, Folex and Prep labels.

This product when tank mixed with Def 6 or Folex defoliant may provide enhancement of cotton leaf drop and regrowth inhibition.

Timing of Application—Apply this product or these tank mixtures for preharvest weed control after 60 percent of the cotton bolls have opened.

NOTE: DO NOT APPLY TO CROPS GROWN FOR SEED.

Allow a minimum of 7 days between application and harvest. Do not feed or graze treated cotton forage or hay following preharvest applications.

™ Def is a trademark of Mobay Chemical Company

™ Folex and Prep are trademarks of Rhone-Poulenc, Inc.

TREE AND VINE CROPS

This product is recommended for weed control in established groves, vineyards, or orchards, or for site preparation prior to transplanting crops listed in this section. Applications may be made with boom equipment, COA, shielded sprayers, hand-held and high-volume wands, lances, or orchard guns, or with wiper applicator equipment, except as directed in this section. See the "Application Equipment and Techniques" section of this label for specific information on use of equipment.

When applying this product, refer to the "Weeds Controlled" section of this label and to specific recommendations in this section for rates to be used.

NOTE

Repeat treatments may be necessary to control weeds originating from underground parts of untreated weeds or from seeds. This product does not provide residual weed control. For subsequent weed control, use repeated applications of this product. Do not apply more than 10.6 quarts of this product per acre per year.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE SOLUTION, SPRAY, ORIFT, OR MIST WITH FOLIAGE OR GREEN BARK OF TRUNK, BRANCHES, SUCKERS, FRUIT, OR OTHER PARTS OF TREES OR VINES. CONTACT OF THIS PRODUCT WITH OTHER THAN MATURED BROWN BARK CAN RESULT IN SERIOUS CROP DAMAGE.

AVOID PAINTING OUT STUMPS WITH THIS PRODUCT AS INJURY RESULTING FROM ROOT GRAFTING MAY OCCUR IN ADJACENT TREES.

Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed or cut and have not been allowed to regrow to the recommended stage for treatment.

For specific rates of applications and instructions, see the "Weeds Controlled" section of this label, and to specific recommendations which follow.

MIDDLES MANAGEMENT

FOR ANNUAL WEEDS IN MIDDLES BETWEEN ROWS OF TREE AND VINE CROPS

For citrus crops treat uniformly between trees.

■ **RULER®** ■

■ **RULER plus GOAL** ■

This product alone or in mixtures with Goal will control or suppress the annual weeds listed below.

Apply the recommended rates of this product, either alone or in mixtures with Goal, in 3 to 10 gallons of water per acre. Apply when weeds are actively growing and less than 6 inches in height or rosette diameter. If weeds are under drought stress, irrigate prior to application. Reduced control may occur if weeds have been mowed prior to application. Up to 48 fluid ounces per acre of this product may be used to control weeds which have been mowed, are stressed, or are growing in dense populations.

WEED SPECIES	MAXIMUM HEIGHT/ DIAMETER (INCHES)	Rate Per Acre	
		RULER (FLUID OUNCES)	GOAL (FLUID OUNCES)
Barley	6	8	•
<i>Hordeum vulgare</i>			
Bluegrass, annual			
<i>Poa annua</i>			
Barnyardgrass	6	12	•
<i>Echinochloa crus-galli</i>			
Chickweed, common			
<i>Stellaria media</i>			
Red Maids			
<i>Calandrinia ciliata</i>			
Crabgrass	6	16	•
<i>Digitaria spp.</i>			
Fleabane, flaxleaf			OR
<i>Conyza bonariensis</i>			
Groundsel, common			
<i>Senecio vulgaris</i>		16 to 32 + 4 to 16**	
Junglerice			
<i>Echinochloa colonum</i>			
Lambsquarters, common			
<i>Chenopodium album</i>			
Pigweed, redroot			
<i>Amaranthus retroflexus</i>			
Rocket, London			
<i>Sisymbrium irio</i>			
Ryegrass, common			
<i>Lolium multiflorum</i>			
Shepherdspurse			
<i>Capsella bursa-pastoris</i>			
Sowthistle, annual			
<i>Sonchus oleraceus</i>			
Cheeseweed, common	3	12 to 32 + 4 to 16	
<i>Malva spp.</i>			
Cheeseweed, common	6	16 to 32 + 4 to 16	
<i>Malva spp.</i>			
Filaree*			
<i>Erodium spp.</i>			

Horseweed/Marestail
Conyza canadensis
 Nettle, stinging
Urtica dioica
 Purslane, common*
Portulaca oleracea

*Suppression only

**The mixture of this product plus Goal is recommended when weeds are stressed or growing in dense populations.

STRIPS FOR ANNUAL AND PERENNIAL WEEDS IN STRIPS OF TREE AND VINE CROPS

TANK MIXTURES WITH RESIDUAL HERBICIDES

When applied as a tank mixture, this product provides control of the emerged annual weeds and control or suppression of emerged perennial weeds listed in this label. The following residual herbicides will provide pre-emergence control of those weeds listed in the individual product labels.

■	RULER® plus GOAL 1.6E	■
■	RULER plus KARMEX™ DF	■
■	RULER plus KROVAR I	■
■	RULER plus KROVAR II	■
■	RULER plus SIMAZINE, PRINCEP CALIBER™ 90	■
■	RULER plus SIMAZINE 4L	■
■	RULER plus SIMAZINE 80W	■
■	RULER plus SOLICAM™ 80DF	■
■	RULER plus SURFLAN™ AS	■
■	RULER plus SURFLAN 75W	■
■	RULER plus SIMAZINE (80W, or 4L, or PRINCEP CALIBER 90) plus SURFLAN (AS or 75W)	■
■	RULER plus GOAL (1.6E) plus SURFLAN (AS or 75W)	■
■	RULER plus GOAL (1.6E) plus SIMAZINE (80W, or 4L, or PRINCEP CALIBER 90)	■
■	RULER plus GOAL (1.6E) plus SURFLAN (AS or 75W) plus SIMAZINE (80W, 4L, or PRINCEP CALIBER 90)	■

Do not apply these tank mixtures in Puerto Rico.

Refer to the individual product labels for specific crops, rates, geographical restrictions and precautionary statements.

Read and carefully observe the label claims, cautionary statements, rates and all other information on the labels of all products.

™Karmex is a trademark of E.I. duPont de Nemours and Company.

RECOMMENDED RATES

Annual Weeds—Apply 1 to 5 quarts per acre of this product in these tank mixtures. Use rates at the higher end of the recommended range when weeds are stressed, growing in dense populations or are greater than 12 inches tall.

Perennial Weeds—Apply 1 pint to 5 quarts per acre of this product in these tank mixtures to control or suppress

perennial weeds. Follow the recommendations in the "Weeds Controlled" section of this label for stage of growth and application rates for specific perennial weeds.

RULER® plus GOAL plus SIMAZINE/SURFLAN

This product plus low rates of Goal in three-way or four-way mixtures with simazine and/or Surflan will provide postemergence control of the weeds listed below.

Refer to the individual simazine and Surflan labels for preemergence rates, weeds controlled, precautionary statements and other important information.

Apply 1 to 5 quarts per acre of this product plus 4 to 48 fluid ounces per acre of Goal plus labeled rates of simazine and/or Surflan in 3 to 40 gallons of water per acre to control the following weeds:

Barley, wild <i>Hordeum leporinum</i>	Horseweed/Marestail <i>Conyza canadensis</i>
Bluegrass, annual <i>Poa annua</i>	Nettle, stinging <i>Urtica dioica</i>
Cheeseweed, common <i>Malva spp.</i>	Pineappleweed <i>Matricaria matricariodes</i>
Chickweed, common <i>Stellaria media</i>	Rocket, London <i>Sisymbrium irio</i>
Filaree* <i>Erodium spp.</i>	Shepherdspurse <i>Capsella bursa-pastoris</i>
Fleabane, flaxleaf <i>Conyza bonariensis</i>	Sowthistle, annual <i>Sonchus oleraceus</i>
Groundsel, common <i>Senecio vulgaris</i>	

*Use a minimum of 1.5 quarts of this product in these mixtures.

NOTE: This recommendation does not preclude the use of Goal in these mixtures at higher, labeled rates for preemergence weed control.

PERENNIAL GRASS SUPPRESSION ORCHARD FLOORS

When applied as directed, this product will suppress vegetative growth as indicated below.

Bahiagrass

This product will provide significant inhibition of seed-head emergence and will suppress vegetative growth for a period of approximately 45 days with a single application and approximately 120 days with sequential applications. Apply this product 1 to 2 weeks after full green-up or after mowing to a uniform height of 3 to 4 inches. Applications must be made prior to seedhead emergence. Apply 6 fluid ounces of this product in 10 to 25 gallons of water per acre.

Sequential applications of this product may be made at approximately 45-day intervals to extend the period of seedhead and vegetative growth suppression. For continued seedhead suppression, sequential applications must be made prior to seedhead emergence. Apply no more than 2 sequential applications per year. As a first sequential application, apply 4 fluid ounces of this product per acre. A second sequential application of 2 to 4 fluid ounces per acre may be made approximately 45 days after the last application.

Bermudagrass

For burndown, apply 1 to 2 quarts of this product in 3 to 20 gallons of water per acre. Use 1 quart in 3 to 20 gallons of water per acre east of the Rocky Mountains. Use 1 to 2 quarts of this product in 3 to 10 gallons of water per acre west of the Rocky Mountains. Use this treatment only if reduction of the bermudagrass stand

can be tolerated. When burndown is required prior to harvest, allow at least 21 days to ensure sufficient time for burndown to occur.

Suppression only — (east of the Rocky Mountains). Apply 6 to 16 fluid ounces of this product in 3 to 20 gallons of water per acre no sooner than 1 to 2 weeks after full green-up. Mowing prior to application may occur provided a minimum height of 3 inches is maintained. Rates of 6 to 10 fluid ounces should be used where a lesser degree of suppression is desired. Sequential applications may be made when regrowth occurs and bermudagrass injury and stand reduction can be tolerated.

Suppression only — (west of the Rocky Mountains). Apply 16 fluid ounces of this product in 3 to 10 gallons of water per acre to bermudagrass up to 6 inches in height and no sooner than 1 to 2 weeks after full green-up. Mowing prior to application may occur provided a minimum height of 3 inches is maintained. Sequential applications may be made when regrowth occurs and bermudagrass injury and stand reduction can be tolerated.

Cool-Season Grass Covers

For suppression of tall fescue, fine fescue, orchardgrass and quackgrass, apply 8 fluid ounces of this product in 10 to 20 gallons of water per acre. For best suppression, add ammonium sulfate to the spray solution at a rate of 2 percent by weight or 17 pounds per 100 gallons of spray solution.

For suppression of Kentucky bluegrass covers, apply 6 fluid ounces of this product per acre. Do not add ammonium sulfate.

For best results, mow cool-season grass cover in the spring to even the height and apply the recommended rate of this product 3 to 4 days after mowing. Avoid treating cool-season grass covers under poor growing conditions, such as drought stress (drip irrigation), disease or insect damage.

LOW-VOLUME APPLICATION (Florida and Texas)

For burndown or control of the weeds listed, apply the recommended rate of this product in 3 to 30 gallons of water per acre. Where weed foliage is dense, use 10 to 30 gallons of water per acre.

Annual Weeds

Goatweed—Apply 2 to 3 quarts per acre of this product plus 17 pounds of ammonium sulfate per 100 gallons of water. Apply in 20 to 30 gallons of water per acre when plants are actively growing. Use 2 quarts per acre when plants are less than 8 inches tall and 3 quarts per acre when plants are greater than 8 inches. If goatweed is greater than 8 inches, the addition of Krovar™ II or Karmex™ may improve control. Use labeled rates for these residual products.

Read and carefully observe the label claims, cautionary statements, rates and all other information on the Krovar II and Karmex labels.

Perennial Weeds

Apply when weeds are actively growing and at the growth states listed in the "Perennial Weeds Controlled" section of this label. If perennial weeds are mowed, allow weeds to regrow to the recommended stage of growth.

S = Suppression, B = Burndown, C = Control,
PC = Partial control

WEED SPECIES	RULER® RATE PER ACRE			
	1 qt	2 qt	3 qt	5 qt
Bermudagrass	B	•	PC	C
Guineagrass				
Texas and Florida Ridge	B	C	C	C
Florida Flatwoods	•	B	C	C
Paragrass	B	C	C	C
Torpedograss	S	•	PC	C

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™Surflan is a trademark of Elanco Products Company.

TREE CROPS

Citrus*: citron, grapefruit, kumquat, lemon, lime, orange, pummelo, tangelo, tangerine, tangors.

Nuts:** almond, chestnuts, filbert, macadamia, pecan, pistachio, walnut.

Pome Fruit*: apple, pear.

Stone Fruit*:** apricots, cherries, nectarines, olives, peaches, plums/prunes.

For cherries, any application equipment listed in this section may be used in all states.

For citron and olives, apply as a directed spray only.

Any application equipment listed in this section may be used in apricots, nectarines, peaches, and plums/prunes growing in Arizona, California, Colorado, Idaho, Kansas, Kentucky, New Jersey, North Dakota, Oklahoma, Oregon, Texas, Utah, and Washington, except for peaches grown in the states specified in the following paragraph. In all other states use wiper equipment only.

For PEACHES grown in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee only, apply with a shielded boom sprayer or shielded wiper applicator which prevents any contact of this product with the foliage or bark of trees. Apply no later than 90 days after first bloom. Applications made after this time may result in severe damage. Remove suckers and low hanging limbs at least 10 days prior to application. Avoid applications near trees with recent pruning wounds or other mechanical injury. Apply only near trees which have been planted in the orchard for 2 or more years. **EXTREME CARE MUST BE TAKEN TO ENSURE NO PART OF THE PEACH TREE IS CONTACTED.**

Tropical Fruit: acerola, atemoya*, avocado*, banana (plantains), breadfruit*, canistel*, carambola*, coffee****, dates*, figs*, guava, jaboticaba*, jackfruit*, longan*, lychee*, mango*, papaya, passion fruit*, persimmons*, sapodilla, sapote, soursop, sugar apple*, tamarind, tea. Allow a minimum of 1 day between last application and harvest of guava and papaya. In coffee and banana, delay applications 3 months after transplanting to allow the new coffee or banana plant to become established.

NOTE:

*Allow a minimum of 14 days between last application and harvest.

**Allow a minimum of 21 days between last application and harvest.

***Allow a minimum of 17 days between last application and harvest.

****Allow a minimum of 28 days between last application and harvest.

VINE CROPS

Kiwi Fruit

Grapes: Any variety of table, wine, or raisin grape may be treated with any equipment listed in this section.

In the northeast and Great Lakes regions, applications must be made prior to the end of bloom stage of grapes to avoid injury.

NOTE:

Applications should not be made when green shoots, canes, or foliage are in the spray zone.

Allow a minimum of 14 days between last application and harvest.

Product protected by
U.S. Pat. No. 4,405,531.
Other patents pending.

No license granted under any non-U.S. patent(s).

EPA Reg. No. 524-326-2935 GPL-1100.04/CG

In case of a human health emergency involving this product, Call Collect, day or night, (314) 694-4000.

Distributed by
Wilbur-Ellis Company
P.O. Box 16458
Fresno, CA 93755

WEEDAR® 64

Brand Herbicide

RHÔNE-POULENC

The 2,4-D Amine Weed Killer

ACTIVE INGREDIENT:

2,4-Dichlorophenoxyacetic acid, dimethylamine salt*46.8%

INERT INGREDIENTS:53.2%

*2,4-Dichlorophenoxyacetic acid equivalent 38.9% by weight or 3.8 pounds per gallon

*Isomer specific by AOAC method No. 6.D01-5

E.P.A. Reg. No. 264-2AA

E.P.A. Est. No. 264-MO-01

KEEP OUT OF REACH OF CHILDREN DANGER PELIGRO

PRECAUTION AL USARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta le haya sido explicado ampliamente.

For PRODUCT USE Information Call 1-800-334-9745

For EMERGENCY Information ONLY Call 24 Hours A Day 1-800-334-7577.

STATEMENT OF PRACTICAL TREATMENT

IF ON SKIN: Wash skin with plenty of soap and water. Remove contaminated clothing. Get medical attention.

IF SWALLOWED: If patient is conscious and alert, give 2 to 3 glasses of water or milk to drink. If available, give one tablespoon of Syrup of Ipecac to induce vomiting. Alternatively, induce vomiting by touching back of throat with finger. Do not make an unconscious person vomit. Get medical attention.

IF IN EYES: Flush with water for at least 15 minutes. Get medical attention, **PREFERABLY AN OPHTHAMOLOGIST.**

IF INHALED: Move to an uncontaminated area. Get medical attention.

NOTE TO PHYSICIAN

This product contains a phenoxy herbicidal chemical. There is no specific antidote. All treatments should be based on observed signs and symptoms of distress in the patient. Overexposure to materials other than this product may have occurred.

PRECAUTIONARY STATEMENTS

DANGER

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Harmful if swallowed. May be fatal if absorbed through the skin. Causes irreversible eye damage. Avoid breathing vapors or spray mist. Do not get in eyes, on skin, or on clothing. When handling this product, wear goggles or safety glasses, protective clothing and chemical resistant gloves. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

This product is toxic to aquatic invertebrates. Drift or runoff may adversely affect aquatic invertebrates and non-target plants. Do not apply directly to water except as specified on this label. Do not contaminate water when disposing of equipment washwaters. Do not apply when weather conditions favor drift from treated areas. Do not use the same spray equipment for other purposes unless thoroughly cleaned.

Do not contaminate water used for irrigation or domestic purposes (except as specifically recommended on this label) especially in areas where grapes, cotton, tomatoes or other susceptible plants are grown.

Do not treat irrigation ditches in areas where water will be used to overhead (sprinkler) irrigate susceptible crops especially grapes, tomatoes, tobacco, and cotton.

MIXING AND LOADING: Most cases of ground water contamination involving phenoxy herbicides such as 2,4-D have been associated with mixing/loading and disposal sites. Caution should be exercised when handling 2,4-D pesticides at such sites to prevent contamination of ground water supplies. Use of closed systems for mixing or transferring this pesticide will reduce the probability of spills. Placement of the mixing/loading equipment on an impervious pad to contain spills will help prevent ground water contamination.

Do not apply WEEDAR® 64 Broadleaf Herbicide directly to, or permit to drift onto cotton, okra, grapes tomatoes, fruit trees, vegetables, flowers or other desirable crop or ornamental plants which are susceptible to 2,4-D herbicide. Do not apply near susceptible plants since very small quantities of the 2,4-D will cause severe injury during the growing or dormant periods. Crops contacted by WEEDAR® 64 Broadleaf Herbicide sprays or spray drift may be killed or suffer significant stand loss with extensive quality and yield reduction.

Do not apply when a temperature air inversion exists. Such a condition is characterized by little or no air movement and an increase in air temperature with an increase in height. In humid regions, a fog or mist may form. An inversion may be detected by producing a smoke column and checking for a layering effect. If questions exist pertaining to the existence of an inversion, consult with local weather services before making an application.

Use coarse sprays to minimize drift. Do not apply with hollow cone-type insecticide or other nozzles that produce fine spray droplets. Drift from aerial or ground application may be reduced by: (1) applying as near to the target as possible in order to obtain coverage; (2) by increasing the volume of spray mix per acre; (3) by decreasing the pounds of pressure at the nozzle tips; and (4) by using nozzles which produce a coarse spray pattern; (5) by not applying when wind is blowing toward susceptible crops or valuable plants.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read entire label before using this label.

GENERAL WORKER PROTECTION STATEMENTS

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area treated must be vacated by unprotected persons. Do not enter treated areas without protective clothing until sprays have dried. Because certain states may require more restrictive reentry intervals for various crops treated with this product, consult your State Department of Agriculture for further information. Written or oral warnings must be given to workers who are expected to be in a treated area or in an area about to be treated with this product. Advise workers to stay out of fields during application and until sprays have dried. Regular long-sleeved work clothing should be worn when working in treated fields. See PRECAUTIONARY STATEMENTS, STATEMENT OF PRACTICAL TREATMENT and NOTE TO PHYSICIAN for information on accidental exposures. When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings must be given if there is reason to believe that written warnings cannot be understood by workers. Written warnings must include the following information: appropriate signal word (DANGER - PELIGRO), area treated with WEEDAR® 64 Broadleaf Herbicide, date of application, appropriate protective clothing, and reentry interval (i.e. until sprays have dried).

STORAGE AND DISPOSAL

STORAGE

Do not contaminate water, food or feed by storage or disposal. Store in original container in a dry secured storage area. Keep container tightly closed when not in use.

PESTICIDE DISPOSAL

Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law and may contaminate ground water. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL

Triple rinse or (equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

GENERAL CAUTIONS AND RESTRICTIONS

Do not apply WEEDAR® 64 Broadleaf Herbicide through any type of irrigation system.

Do not use in or near a greenhouse.

RESTRICTIONS AND LIMITATIONS FOR USE ON CEREAL GRAINS

For aerial application on grain, apply WEEDAR® 64 Broadleaf Herbicide in 3 to 10 gallons of water per acre.

For ground application a minimum of 10 to 15 gallons of water per acre is recommended for proper spray coverage.

Do not permit dairy animals or meat animals being finished for slaughter to forage treated grain fields within 2 weeks after treatment.

Do not feed treated straw to livestock if an emergency treatment as described below is applied.

RESTRICTIONS AND LIMITATIONS FOR USE ON CORN AND SORGHUM

Do not forage or feed fodder for 7 days following application.

RESTRICTIONS AND LIMITATIONS FOR USE IN FALLOWLAND AND CROP STUBBLE

Do not plant any crop for 3 months after treatment or until chemical has disappeared from the soil.

RESTRICTIONS AND LIMITATIONS FOR USE IN PASTURES AND RANGELANDS

Do not graze (dairy) cattle in treated areas for 7 days after application.

Do not cut forage for hay within 30 days of application.

Do not permit dairy animals or meat animals being finished for slaughter to forage treated fields within 3 days of slaughter.

RESTRICTIONS AND LIMITATIONS FOR USE ON CONSERVATION RESERVE PROGRAM AREAS:

Use at least 2 gallons of water per acre by air and 5 gallons of water per acre by ground.

Do not harvest or graze treated Conservation Reserve Program areas.

Do not apply to grasses in the boot to dough stage if grass seed production is desired.

RESTRICTIONS AND LIMITATIONS FOR USE ON GRASSES FOR SEED PRODUCTION

Do not graze dairy animals or cut forage for hay within 7 days of application.

RESTRICTIONS AND LIMITATIONS FOR USE ON NON-CROPLAND

Do not graze dairy animals for 7 days following application.

Use sufficient gallonage for thorough and uniform coverage.

RESTRICTIONS AND LIMITATIONS FOR USE IN STONE FRUIT AND NUT ORCHARDS

Do not apply to bare ground as injury may result.

Do not apply immediately before irrigation and withhold irrigation for 2 days before and for 3 days after treatment.

Do not allow spray to drift onto or contact foliage, fruit, stems, trunks of trees or exposed roots as injury may result.

Do not apply to newly established or young orchards. Trees must be at least 1 year old and in vigorous condition.

Do not apply during bloom.

Do not graze or feed cover crops from treated orchards.

Do not make more than 2 applications per year.

Do not harvest stone fruit within 40 days of application.

Do not harvest nuts within 60 days of application.

MIXING INSTRUCTIONS

Mix WEEDAR® 64 Broadleaf Herbicide only with water, unless otherwise directed on this label. Add about one-half the water to the mixing tank, then add WEEDAR® 64 with agitation and finally the rest of water with continuing agitation.

NOTE: Adding oil, wetting agent, or other surfactants to the spray may increase effectiveness on weeds but also may reduce selectivity to crops, resulting in crop damage.

COMPATIBILITY

If WEEDAR® 64 Broadleaf Herbicide is to be tank mixed with fertilizers or with other pesticides, compatibility should be tested prior to mixing. To test for compatibility, use a small container and mix a small amount (0.5 to 1 qt) of spray, combining all ingredients in the same ratio as the anticipated use. If any indications of physical incompatibility develop, do not use this mixture for spraying. Indications of incompatibility usually will appear within 5 to 15 minutes after mixing.

Read and follow all directions and precautions on this label and on the labels of any products for which a tank mixture is being considered.

APPLICATION PROCEDURES

Apply by air or ground equipment in sufficient gallonage to obtain adequate coverage, except as otherwise directed on this label.

Use 2 or more gallons of water per acre for aerial application and 10 or more gallons of water per acre for ground application.

GENERAL INFORMATION

INJURY TO CROPS FROM THIS HERBICIDE MAY OCCUR. IF YOU ARE NOT PREPARED TO ACCEPT SOME DEGREE OF CROP INJURY DO NOT USE THIS PRODUCT.

Crop varieties vary in response to 2,4-D and some are easily injured. Apply WEEDAR® 64 Broadleaf Herbicide only to varieties known to be tolerant to 2,4-D. If you are uncertain concerning tolerant varieties or local use situations that may affect crop tolerance to 2,4-D, consult your seed company, state Agricultural Extension Service or qualified crop consultant for advice.

Be sure that use of this product conforms to all applicable laws, rules and regulations. Certain states have restrictions pertaining to application distances from susceptible crops. The applicator should become familiar with these laws, rules or regulations and follow them exactly.

GENERAL WEED LIST

Annual and Biennial Weeds

*beggarticks	*mallow (venice or little)	*Russian thistle
bullthistle	marshelder	Salsify (western or common)
coffeeweed	morningglory (common, ivy, wooly)	*smartweeds (annual species)
common cocklebur	*musk thistle(***)	sowthistles (annual or spiny)
common burdock	mustards (except blue mustard)	sunflower
common evening primrose	pepper weeds (except perennial)	*vervains
common lambsquarters	**pigweeds (Amaranthus spp.)	vetches
hairy galinsoga	prickly lettuce	wild carrot
jimsonweed	ragweed (common or giant)	wild lettuce
*knotweed	rough fleabane	wild parsnips

Perennial Weeds

*bindweed (hedge, field, European)	*goldenrod	**nettles (including stinging)
blue lettuce	*ground ivy	*orange hawkweed
*Canada thistle	healall	plantains
catnip	*hoary cress	sowthistle (perennial)
chicory	*ironweed	*vervains
dandelion	Jerusalem-artichoke	*wild garlic
*docks	many flowered aster	*wild onion
*dogbanes		

*These species may require repeated applications and/or use of the higher rate recommended on this product label even under ideal conditions for application.

**Control of pigweeds in the High Plains area of Texas and Oklahoma may not be satisfactory with this product.

***Not registered for control of musk thistle in California.

SPECIFIC USE DIRECTIONS

CEREAL GRAINS

CROP	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Wheat, Barley, Oats and Rye (not underseeded with legumes) Postemergence Annual and biennial broadleaf weeds Perennial broadleaf weeds	1/2 to 2 pints* 1 to 2 pints*	Apply after grain is fully tillered (usually 4 to 8 inches high) but not forming joints in the stem. Do not spray grain in the boot to dough stage.
Wheat, Barley, Oats and Rye (underseeded with legumes)	1/4 to 1/2 pint*	Apply after grain is 8 inches tall. Do not spray grain in boot to dough stage. Do not spray alfalfa or sweet clover unless the infestation is severe and injury to these legumes can be tolerated.
Emergency weed control in Wheat Perennial broadleaf weeds	3 pints	Apply when weeds are approaching bud stage, after the grain dough stage. Do not spray during the boot to dough stage. The 3 pints per acre application can product injury to wheat. Balance the severity of your weed problem against the possibility of crop damage. Where perennial weeds are scattered, spot treatment is suggested to minimize the extent of crop injury.

*Use the lower rate if small annual and biennial weeds are the major problem. Use the higher rate if perennial weeds or annual and biennial weeds are present which are in the hard-to-kill categories as determined by local experience. The higher rates increase the risk of grain injury and should be used only where the weed control problem justifies the grain damage risk. Do not apply WEEDAR® 64 to grain in the seedling stage.

CORN AND SORGHUM

CROP	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
CORN (Field and Sweet)		
Preplant	1 to 2 pints	To control emerged broadleaf weed seedlings or existing cover crops prior to planting corn, apply 7 to 14 days before planting. Do not use on light, sandy soil, or where soil moisture is inadequate for normal weed growth. Use high rate for less susceptible weeds or cover crops such alfalfa.
Preemergence	2 to 3 pints	Apply 3 to 5 days after planting but before corn emerges. Do not use on light, sandy soils or where soil moisture is low.
Postemergence		Apply when weeds are small and corn is less than 8 inches tall (to top of canopy). When corn is over 8 inches tall, use drop nozzles and keep spray off foliage. Treat perennial weeds when they are in the bud to bloom stage. Do not spray corn in the tassel to dough stage. Corn treated with 2,4-D may become temporarily brittle. Winds or cultivation may cause stalk breakage during the period of time when the corn is brittle.
Annual broadleaf weeds	1/2 to 1 pint	
Perennial broadleaf weeds	1 to 1 1/2 pints	
Grain Sorghum (Milo)		
Postemergence	1 pint	Apply when sorghum is 6 to 15 inches tall. If sorghum is taller than 8 inches to top of the canopy, use drop nozzles and keep spray off the foliage. Do not treat during the boot, flowering or dough stage.

RICE, SUGARCANE, FALLOWLAND AND CROP STUBBLE

CROP	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Rice	1 to 2 1/2 pints	Apply when rice is in the late tillering stage of development at the time of first joint development. Do not apply after panicle initiation, after rice internodes exceed one-half inch, at early seedling, early panicle, boot or heading stages. Consult local university or Agricultural Extension Service specialists for more specific information on rates and timing of application.
Sugarcane		
Preemergence	4 pints	Apply before canes appear for control of emerged broadleaf weeds. Apply after cane emerges and through lay-by. DO NOT USE IN CALIFORNIA.
Postemergence	1 1/2 to 2 pints	
Fallowland and Crop Stubble		
Annual broadleaf weeds	1 to 2 pints	Use the lower rate when weeds are small (2 to 3 inches tall) and actively growing. Use the higher rate on older and drought-stressed plants.
Biennial broadleaf weeds	2 to 4 pints	Spray while musk thistles or other biennial species are in the seedling to rosette stage and before flower stalks become apparent. The lower rate can be used in the spring during rosette stage. Use the highest rate in the fall or after flower stalks have developed.
Perennial broadleaf weeds	2 to 6 pints	Spray weed in the bud to bloom stage or while in good vegetative growth. Do not disturb treated areas for at least 2 weeks after treatment, or until tops are dead.
Wild garlic and onion in crop stubble	4 to 6 pints	Apply to new regrowth of wild garlic or onion which occurs in the fall following harvest of small grains, corn or grain sorghum.

ESTABLISHED GRASS PASTURES, RANGELAND, AND CONSERVATION RESERVE PROGRAM AREAS

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	2 pints	Apply when weeds are small and actively growing and prior to bud stage. Spray while musk thistles or other biennial species are in the seedling to rosette stage and before flower stalks become apparent. The lower rate can be used in the spring during rosette stage. Use the highest rate in the fall or after flower stalks have developed. Do not apply to newly seeded areas until grass is well established. Do not apply to grass in the early boot through milk stage if grass seed production is desired. Bentgrass and legumes may be injured by this treatment.
Biennial and perennial broadleaf weeds	2 to 4 pints	

CONSERVATION RESERVE PROGRAM AREAS

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	1/2 to 1 pint	Apply to actively growing annual broadleaf weeds. Use 1/2 to 1 pint when weeds are small; use higher rates on older weeds. Do not apply to young grasses with fewer than 6 leaves or prior to tillering, as excessive injury may result. Do not apply more than 1 pint until grasses are well established as excessive injury may result.
In young grasses		
In established grasses	1/2 to 2 pints	Treat when biennial weeds are in the seedling to rosette stage and before flower stalks become apparent. Treat perennial weeds in the bud to bloom stage. Apply to actively growing weeds.
Biennial and perennial broadleaf weeds	2 to 4 pints	
In established grasses		

GRASSES FOR SEED PRODUCTION

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual and perennial broadleaf weeds	2 to 4 pints	Apply to established stands in spring from tiller to early boot stage. Do not spray in boot stage. New spring seedlings may be treated with the lower rate after grass seedlings have at least 5 leaves. Perennial weed regrowth may be treated in the fall. DO NOT USE IN CALIFORNIA.

NON-CROPLAND

fencerows, roadsides, drainage ditches, golf courses, cemeteries, parks, turfgrass, and other grass areas

WEEDS	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	2 to 4 pints	Treat when weeds are young and actively growing. Perennial weeds should be near the bud stage, but not flowering at application. Do not use on susceptible southern grasses such as St. Augustine. Do not apply to newly seeded areas until grass is well established. Bentgrass, clover, legumes and dichondria may be injured by this treatment.
Biennial and perennial broadleaf weeds	4 to 8 pints	

SPOT TREATMENT IN NON-CROP AREAS

Mix 2 to 3 fluid ounces of WEEDAR® 64 Broadleaf Herbicide in 3 gallons of water. Wet all weeds and stems thoroughly. For best results, treat when weeds are actively growing.

FORESTRY - TREE INJECTION

For controlling species such as alder, aspen, birch, blackgum, cherry, oak, sweetgum, and tulip poplar

Make injections as near to the root collar as possible, using one injection per inch of trunk dbh (4 1/2 feet). For resistant species such as hickory, injections should overlap. For best results, injections should be made during the growing season, May 15th through October 15th.

For Dilute Injection: Mix 1 gallon of WEEDAR® 64 Broadleaf Herbicide in 19 gallons of water for dilute injections.

For Concentrate Injections: Use 1 to 2 ml of concentrate WEEDAR® 64 Broadleaf Herbicide per injection. The injection bit must penetrate the inner bark.

STONE FRUIT AND NUT ORCHARDS

WEEDS IN CROP	AMOUNT OF WEEDAR® 64 PER ACRE	DIRECTIONS
Annual broadleaf weeds	3 pints	For control of weeds on the orchard floor, apply using coarse sprays and low pressure in sufficient volume of water to obtain thorough wetting of weeds. Treat when weeds are small and actively growing. Do not use on light, sandy soil. DO NOT USE IN CALIFORNIA.

WEEDS AND BRUSH IRRIGATION CANAL DITCHBANKS

(Seventeen Western States: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, Nevada, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming).

For control of annual and perennial broadleaf weeds, apply 1 to 2 quarts of WEEDAR® 64 Broadleaf Herbicide per acre in approximately 20 to 100 gallons per acre. Treat when weeds are young and actively growing before the bud or early bloom stage. For harder-to-control weeds, a repeat spray after 3 to 4 weeks using the same rates may be needed for maximum results. Apply no more than two treatments per season.

For woody brush and patches of perennial broadleaf weeds, mix 1 gallon of WEEDAR® 64 in 150 gallons of water. Wet foliage thoroughly using about 1 gallon of solution per square rod.

SPRAYING INSTRUCTIONS

Apply with low pressure (10 to 40 psi) power spray equipment mounted on a truck, tractor, or boat. Apply while traveling upstream to avoid accidental concentration of chemical into water. Spray when the air is fairly calm, 5 mph or less. Do not use on small canals (less than 10 cfs) where water will be used for drinking purposes.

Boom spraying onto water surface must be held to a minimum and no cross-stream spraying to opposite banks should be permitted. When spraying shoreline weeds, allow no more than 2 foot overspray onto water with an average of less than 1 foot overspray to prevent introduction of greater than negligible amounts of chemical into the water.

Do not allow dairy animals to graze on treated areas for at least 7 days after spraying. Water within treated banks should not be fished.

AQUATIC WEED CONTROL

For use in ponds, lakes, reservoirs, marshes, bayous, drainage ditches, canals, rivers and streams that are quiescent or slow moving.

NOTICE TO APPLICATORS

State and Local Coordination: Before application, coordination and approval of local and state authorities may be required, either by letter of agreement or issuance of special permits for such use.

Fish Toxicity - Oxygen Ratio: Fish breathe oxygen in the water and a water - oxygen ratio must be maintained. Decaying weeds use up oxygen. To avoid fish kill from decaying plant material do not treat more than one half the lake or pond at one time. For large bodies of weed infested waters leave buffer strips of at least 100 feet wide and delay treatment of these strips for 4 to 5 weeks or until the dead vegetation has decomposed.

Wind Velocity - Ground or Surface Application: Do not apply when wind speeds are at or above 10 mph. **Air Application:** Do not apply when wind speeds are at or above 5 mph. The restrictions do not apply to subsurface applications used in weed control programs.

Irrigation: Delay the use of treated waters for irrigation for three weeks after treatment unless an approved assay shows that the water does not contain more than 0.1 ppm 2,4-D acid. Do not treat irrigation ditches in areas where water will be used to overhead sprinkler irrigate susceptible crops especially grapes, tomatoes and cotton.

Potable Water: Delay the use of treated water for domestic purposes for a period of three weeks or until such time as an approved agency shows that the water contains no more than 0.1 ppm 2,4-D acid.

Water Hyacinth (*Eichornia crassipe*) - Directions For Use

WEEDAR® 64 will control water hyacinth with surface and air applications.

Amounts to Use: 2 to 4 quarts (4 lb. acid equivalent per gallon) per acre. Spray the weed mass only. Use 4 quarts when plants are matured or when the weed mass is dense.

When To Apply: Spray when water hyacinth plants are actively growing. Repeat as necessary to kill regrowth and hyacinth plants missed in the previous operation.

How To Use - Surface Application: Use power sprayers operated with a boom or spray gun mounted on a boat, tractor or truck. Thorough wetting of foliage is essential for maximum control. Use 100 to 400 gal./A of spray mixture. Special precautions such as the use of low pressure, large nozzles and thickening agents should be taken to avoid spray drift in areas of sensitive crops. For DIRECTA-SPRA™ operation use WEEDAR® 64 with 1 pint of drift control agent in 50 to 100 gallons of water. For other applications, follow the drift control agent label for mixing directions. Air Application: Use drift control spray equipment or thickening agents mixed into the spray solution. Apply 1.0 gallon per acre of WEEDAR® 64 through standard boom systems with a minimum of 5 gallons of spray mix per acre. For MICROFOIL® drift control spray systems, apply WEEDAR® 64 in 12 to 15 gallons spray mix per acre.

2,4-D Acid Equivalent	1/2 lb.	1 lb.	2 lbs.	3 lbs.	4 lbs.
WEEDAR® 64	1 pt.	2 pts.	2 qts.	3 qts.	4 qts.

Water Milfoil (*Myriophyllum spicatum*) - Directions For Use

For Eurasian Water Milfoil in programs conducted by the Tennessee Valley Authority in dams and reservoirs of the TVA system.

WEEDAR® 64 will control water milfoil with surface, subsurface and air applications.

How To Use: To control water milfoil when less than 5 gallons of concentrate per acre is recommended, dilute the concentrate with water to apply a minimum of 5 gallons of spray mix per acre. Do not treat within 1/2 mile of potable water intakes. Shoreline areas should be treated by sub-surface injection applied by boat to avoid aerial drift. Do not apply when weather conditions favor drift from target area. Do not contaminate water by cleaning of equipment washwaters.

Open Water Areas: To reduce contamination and prevent undue exposure to fish and other aquatic organism, do not treat water areas that are not infested with aquatic weeds.

Amounts To Use: Apply 2.5 to 10 gallons of WEEDAR® 64 per acre. The higher rate is used in areas of greater water exchange. These areas may require a repeat application.

When To Apply: For best results, apply in spring or early summer when milfoil starts to grow. This timing can be checked by sampling the lake bottom in areas heavily infested with weeds the year before.

Subsurface Application: Apply 2.5 to 10 gallons of WEEDAR® 64 per acre as a concentrate directly into the water through boat mounted distribution systems.

Surface Application: Apply 2.5 to 10 gallons of WEEDAR® 64 per acre in a minimum spray volume of 5 gallons mix per acre.

Air Application: Use drift control spray equipment or thickening agents mixed into the spray solution. Apply 2.5 to 10 gallons per acre of WEEDAR® 64 through standard boom systems with a minimum of 5 gallons of spray mix per acre. For MICROFOIL® drift control spray systems apply WEEDAR® 64 in 12 to 15 gallons spray mix per acre.

LIMITED WARRANTY AND DISCLAIMER

The manufacturer warrants that this product conforms to the chemical description on the label; that this product is reasonably fit for the purposes set forth in the directions for use when it is used in accordance with such directions; and that the directions, warnings and other statements on this label are based upon responsible experts' evaluation of reasonable tests of effectiveness, of toxicity to laboratory animals and to plants, and of residues on food crops, and upon reports of field experience. Tests have not been made on all varieties or in all states or under all conditions. THE MANUFACTURER NEITHER MAKES NOR INTENDS, NOR DOES IT AUTHORIZE ANY AGENT OR REPRESENTATIVE TO MAKE, ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, AND IT EXPRESSLY EXCLUDES AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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NOTICE TO BUYER

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THIS SPECIMEN LABEL IS INTENDED FOR USE ONLY AS A GUIDE IN PROVIDING GENERAL INFORMATION REGARDING THE DIRECTIONS, WARNINGS AND CAUTIONS ASSOCIATED WITH THE USE OF THIS PRODUCT. AS WITH ANY AGRICULTURAL CHEMICAL, ALWAYS FOLLOW THE LABEL INSTRUCTIONS ON THE PACKAGE BEFORE USING.

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