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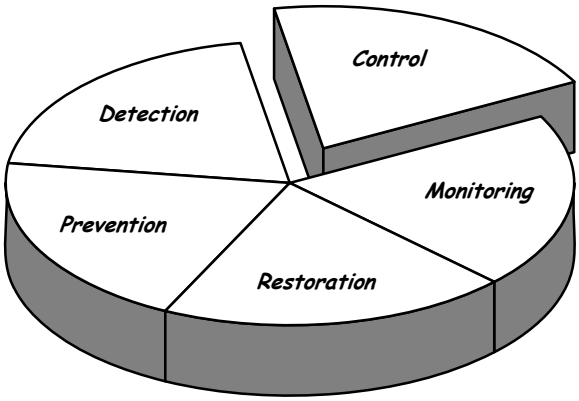
Final Environmental Impact Statement

Weed Management

Custer National Forest

Carbon, Stillwater, Sweet Grass, Park, Powder River, Rosebud, and Carter Counties of Montana and Harding County of South Dakota

EXECUTIVE SUMMARY



CUSTER NATIONAL FOREST
WEED MANAGEMENT
Final Environmental Impact Statement

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Abstract: The Forest Service is updating the 1987 weed control decisions. The Final Environmental Impact Statement documents the analysis for a reasonable course of action given new problems, options and opportunities to combat noxious weeds and other undesirable plants. Earlier decisions did provide the Forest with the ability to be more effective in treating increasing weed infestations. Noxious weeds and other invasive species are reducing ecological productivity, spreading to nearby non-infested lands, and increasing the economic burden on private landowners and state/federal taxpayers. The decision made involves these questions:

- Where and what kind of weed controls will be used
- What adaptive management and protective measures will be required to appropriately implement weed control methods
- Whether aerial application of herbicides can be implemented

Three alternatives were developed to address these objectives. Alternative 1 includes all integrated pest management (IPM) methods used for existing weed control, use of new herbicides, herbicide use within the Absaroka- Beartooth Wilderness Area, and aerial application of herbicides outside of Wilderness. Alternative 2 is to use all integrated pest management methods, but without the use of herbicides. Alternative 3 takes no action to change the current integrated pest management including ground based herbicide treatment with only four herbicide choices, and no herbicide use within the A-B Wilderness Area. The selected alternative is Alternative 1.

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Custer National Forest
Weed Management Final EIS

Executive Summary

Summary

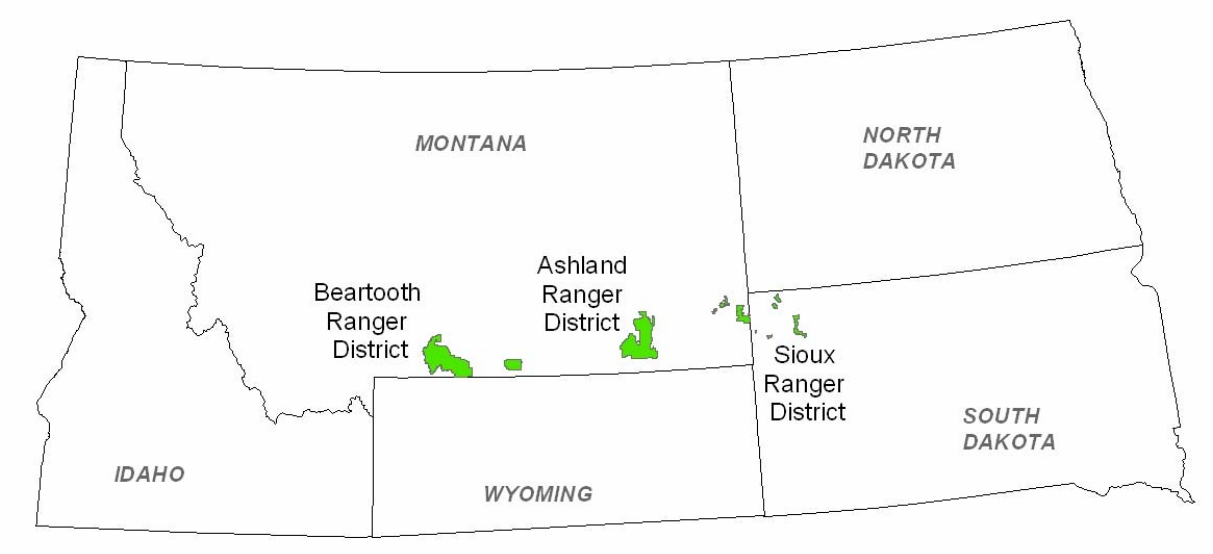
This executive summary of the final environmental assessment has been prepared to briefly examine the purpose and need for the assessment, issues and alternatives, affected environment, and environmental effects of a Forest Service proposal to implement a weed control program. Weed management would be under the overall umbrella of an Integrated Pest Management (IPM) strategy to control or reduce the presence of noxious and other undesirable weeds on the Custer National Forest (CNF).

Forest Plan and Agency objectives for biodiversity, responsibility to health and human safety, responsibility to neighboring lands, and consistency with Federal and State laws dictate an aggressive and effective weed control program. Weed infestations can cause substantial habitat loss as well as negatively affect diversity of plant communities and habitat function.

There is strong public support for taking action on the invasive weed problem. Weeds will not go away by themselves. The formal and informal comments of support in the past indicate the people who live near and recreate on the Forest expect aggressive action to control weeds.

The IPM strategy would be applied on Custer National Forest lands in Carbon, Stillwater, Sweet Grass, Park, Powder River, Rosebud, and Carter counties of Montana and Harding County of South Dakota. The CNF encompasses about 1.2 million acres in south central and southeastern Montana, and in northwestern South Dakota. The Forest shares boundaries with Yellowstone National Park, Bighorn National Recreation Area, Bureau of Land Management, the state border with Wyoming, the Gallatin National Forest, the Crow and Northern Cheyenne Indian Reservations, and numerous state and private lands.

VICINITY MAP



The EIS addresses concerns about noxious weed increases, and impacts of methods to control them. Environmental protection measures address concerns about impacts on people, aquatics, vegetation and wildlife. Because the concerns are largely about herbicides most of the documentation focuses on that aspect. Other avenues of treatment are included. Biological control is a long-term process with a short

history on the Forest. Weed spread is fast. The proposal includes aerial application, which allows weeds that are creeping into remote areas of the Forest to be efficiently attacked. Prevention and education are an established piece of existing treatment program and are not dealt with in detail in the EIS but they are recognized as a critical and continuing element of integrated pest management.

The Environmental Impact Statement (EIS) discloses the environmental impacts of annual treatments of approximately 1,500 net acres of noxious weeds on the CNF within about 14,000 mapped gross acres. Throughout the document, references to weeds include species found on the State and Federal noxious weed lists, and other undesirable vegetation. Total infested acres are less than 1% of the 1.2 million acres of the CNF.

PURPOSE AND NEED FOR ACTION

The Custer National Forest Plan (Forest Plan) directs control of noxious weeds as priority items. The Custer National Forest established an aggressive noxious weed control program to be continued and expanded to reduce or eliminate weeds.

Noxious weeds are increasing and expanding their range. This knowledge is uncontested. We expect the pattern of expansion to continue through transportation of seeds from increasing commercial and recreational travel across the CNF and through continued disturbance on all lands (agricultural, residential, recreational and commercial developments). The spread of weeds from non-Forest lands inside and adjacent to Forest land will also contribute to increased weed infestation. The number of invader species and their distribution will increase if we do not treat weeds.

Although less than one percent of the CNF is now infested with weeds, past experience indicates that weeds become epidemic when an aggressive weed control program is delayed. The Lolo, Bitterroot, Flathead, Kootenai National Forests, for example, comprise 87% of infested acres in Montana, North Dakota and parts of South Dakota. Weed infestations affect 16% of the Bitterroot National Forest lands. The CNF shares boundaries with areas of weed infestations that increase the urgency for continuing an aggressive and updated weed control program.

The Custer National Forest in 1987 implemented a weed control program to manage weed infestations. However, weed infestations in inaccessible areas have increased over the last decade because they were left untreated. Infestations in accessible areas on the Forest are mostly contained or suppressed. This proposal would allow Forest weed coordinators the option to use the most appropriate and effective tools to suppress or control weeds when appropriate, in order to protect ecosystem integrity and enhance native vegetation on the CNF.

Current weed control decisions do not cover herbicide use in the Absaroka-Beartooth Wilderness Area nor does it address aerial spraying opportunities for areas in rough/remote terrain or in large post-fire areas. Sensitive alpine soils limit mechanical treatment in some areas and the cost of labor for hand pulling is prohibitive. (Economic Analysis in Chapters 3 and 4 of the EIS).

The nationwide emphasis on noxious weeds has resulted in the development of better, more effective chemicals. Alternative 1 provides the flexibility to use new herbicides and biologic controls tested and registered by the Environmental Protection Agency. It also provides Districts with the ability to treat new sites and new invaders in a timely fashion under this proposed action.

Alternative 1, as presented in the Custer National Forest Noxious Weed Final Environmental Impact Statement (FEIS) Chapter 2, is the selected alternative. With this proposed action, an integrated weed management strategy for the Forest would be implemented, which includes aerial application of herbicides. Additional changes would incorporate the use of new herbicides registered by the Environmental Protection Agency and treatment of new weeds not considered in previous analyses.

KEY ISSUES

Public involvement resulted in the identification of the following issues, which define the scope of the document and development of the Alternatives. They are:

Effects on Vegetation, Biological Diversity, Production, and Structure.

There is a concern with potential impacts on vegetation, biological diversity, production, and structure from not aggressively treating weeds through an integrated pest management strategy. More specifically they were concerned about further spread of infestations and new starts of new invasive species. They were also concerned about loss of biological diversity, productiveness of the land, and changes in functional plant groups and structure of the vegetation (i.e., native grasslands converting to knapweed).

Effects of Herbicides on Human Health-

There is a concern with potential impacts on human health from the use of herbicides to control weed infestation. More specifically they were concerned about the acute and chronic toxicity, and the carcinogenicity effects of low-level exposure. Some were concerned about the amounts and combination of herbicides and the synergistic effects of herbicide combinations. Respondents also wanted to know how people who are sensitive to herbicides would be protected. Some were concerned about drift from either ground or aerial applications.

Potential effects on human health from herbicides use have been addressed and considered by the EPA (Environmental Protection Agency), as well as the Forest Service. A list of documents assessing risk to human health is contained in the Human Health section of Chapter 4.

Effects of Herbicide on Soils, Water, and Aquatic Resources

Respondents expressed concern about effects of herbicides used for weed control on water quality and aquatic organisms (fisheries, insects and amphibians). Some respondents expressed concern about herbicide drifting from treatment areas into riparian areas, streams, and other lands with unintended consequences. The specific concern was that aerial applied herbicides could not be effectively controlled.

Effects of Herbicide on Threatened, Endangered, or Sensitive Species and Habitats

There is concern about effects of herbicides used for weed control on threatened, endangered, or sensitive species and their habitats.

Effects of Herbicide on Wildlife-

There is concern about the effects of herbicides on wildlife, and the risk of bio-accumulation of herbicides within the environment.

Other Issues

In addition to the key issues identified earlier other concerns were expressed and protection measures (see Appendix C in the EIS) were developed that reduces their significance. These concerns, analyzed in Chapter 4, include the following:

- Effects on wilderness, recommended wilderness, inventoried roadless areas, wild and scenic rivers, and research natural areas;
- Effects on recreation users;
- Effects on heritage resources; and
- Effects on social and economic considerations, including effects on Partnerships/Cooperators.

No additional alternatives were presented throughout the public involvement process. All comments were analyzed and incorporated in the Final EIS. Supportive comments included concerns that the amount of

acres treated would be restricted. Many encouraged use of new herbicides registered by the EPA and urged aggressive treatment of weeds.

Some support weed control but expressed concern about chemical toxicity, adequate buffers for herbicide use near open water, potential for leaching, and control of vectors of weed spread. The analysis included design criteria to provide protective measures for fish, wildlife, and non-target plants from harmful effects.

Some question the adequacy of testing and registration of herbicides and weed spread from off highway vehicle use. None of the comments argued with the need for weed control. Alternative 1 addresses chemical related concerns and contains protection measures for potentially negative effects.

ALTERNATIVES CONSIDERED

Three alternatives were developed and analyzed in this EIS. As described in Chapter 2, the decision is not *whether* to treat weeds, but *how*. The alternatives have been developed to address objectives in all areas of the Custer National Forest.

Alternative 1 includes all integrated pest management (IPM) methods used for existing weed control, use of additional herbicides registered by the EPA (2, 4-D, aminopyralid, chlorsulfuron, clopyralid, dicamba, diuron, glyphosate, hexazinone, imazapic, imazapyr, metsulfuron methyl, picloram, sulfometuron methyl, and triclopyr.), herbicide use within the Absaroka- Beartooth Wilderness Area, and aerial application of herbicides**.**

Alternative 2 is to use all integrated pest management methods, but without the use of herbicides. This alternative addresses concerns about chemical contamination of public lands**.**

Alternative 3 takes no action to change the current integrated pest management including ground based herbicide treatment with only four herbicide choices authorized in 1987(2, 4-D, dicamba, glyphosate, and picloram), and no herbicide use within the A-B Wilderness Area.

Alternative 1 was selected because it best protects native species and habitat diversity with protection measures adequate to protect resources.

The following table displays weed treatment by alternative.

TABLE 1. TREATMENT ACRES (NET AREA) BY ALTERNATIVE[1]

Alt. [2]	Biological Control	Cultural/ Mechanical*	Aerial Herbicide	Ground Herbicide	Ground Herbicide inside Wilderness	Tall Larkspur Herbicide	Infra-structure Herbicide	Weed Acres Not Treated by Herbicide
1	155	5	85[3]	1415	45	60	5	0
2	155	5	0	0	0	0	0	1340
3	155	5	0	1415	0	0	0	45

[1] Some acres are counted more than once because more than one species is present on the same site and each species may have unique treatment strategy.
[2] For all alternatives except Alternative 2, herbicides will be used in conjunction with biological, cultural, and mechanical control methods.
[3] Aerial estimated acreage are mapped where infestations are currently spotty, but are anticipated to grow rapidly due to the difficulty in treating weeds in rough and inaccessible terrain.

TREATMENT PRIORITY CRITERIA

The following table depicts weed treatment priorities for all alternatives due to limited funding and treatment effectiveness aspects. Priority is generally given to those new populations of aggressive invader species where long-term management can be successful. An example would be a new site consisting of five plants of salt cedar. On larger, well established infestations, such as 200 acres of leafy spurge, where long term effectiveness is questionable, containment strategies play a much more important role. Even then, control emphasis is provided along the spread vector areas such as trailheads, roadways, campgrounds, and parking areas.

TABLE 2. TREATMENT PRIORITY CRITERIA

Priority	Description	**Treatment** – choice based on site-specific conditions
Highest Priority for Treatment	• Eradication[4] of new species (focus on aggressive species with potential for significant ecological impact including but not limited to State listed high priority species – Category 3[5]) • New infestations (e.g. populations in areas not yet infested; "spot fires"; any State, County, and Forest-listed highest priority species – Category 2[6]). • Areas of concern such as: Areas of high traffic spread vectors and sources of infestation (e.g. parking lots, trailheads, roadsides, horse camps, gravel pits) • Areas of special concerns: (e.g. wilderness, research natural areas, big game winter ranges, adjacent boundaries/access with National Parks) Riparian corridors or Sensitive plant populations where there is a high threat to species of concern. • Areas where partnership / cooperator agreements are in place.	• Cultural/mechanical - isolated plants or small populations. • Herbicide treatment if manual/mechanical is known to be ineffective or population too large. • Remove seed heads. This is an interim measure if cost/staff is an issue.
Second Priority of Treatment	• Containment[7] of existing large infestations (e.g. focus on State, County, and Forest-listed highest priority species – Category 1[8]) – focus on boundaries of infestation. • Roadsides, Trails, and Trailheads – focus first on access points leading to areas of concern.	• Cultural /mechanical - isolated plants or small populations in spread zones. • Herbicide treatment for larger populations along perimeter.
Third Priority of Treatment	• Control[9] of existing large infestations (e.g. State-listed and Forest second priority species)	• Biocontrol on large infestations • Livestock grazing • Mechanical
Fourth Priority of Treatment	• Suppression[10] of existing large infestations when eradication/control or containment is not possible.	• Biocontrol on large infestations • Livestock grazing • Mechanical

[4] **Eradication:** Attempt to totally eliminate an invasive plant species from a Forest Service unit, recognizing that this may not actually be achieved in the short term since re-establishment/re-invasion may take place initially.
[5] **Category 3 Species** - These invaders are the highest priority for control. The discovery of any new populations would prompt immediate eradication action using the most efficient IPM approach. No populations of Category 3 invaders would be allowed to persist.
[6] **Category 2 Species** - Some infestations of Category 2 species are relatively large, yet they are still geographically limited to only a portion of the CNF. For this reason containment is the primary goal. If contained, many of these Category 2 species can be eradicated if acted upon immediately thus preventing these new invaders from affecting native plant communities. If eradication is not possible, then control and containment is the goal to at least limit the impacts these species would have on the native ecosystem. Category 2 invaders should therefore be prevented from infesting new areas, and should be eliminated in some existing populations, while the remainder would be contained.
[7] **Contain**: Prevent the spread of the weed beyond the perimeter of patches or infestation areas mapped from current inventories.
[8] **Category 1 Species -** Because most of these species exist in extensive, widespread infestations, a great deal of resources would be required to reduce or eradicate populations. For especially hardy species with extensive root systems, eradication of large infestations could prove to be impossible since we do not have the tools or technology to effectively kill all plant parts and prevent regrowth (Sheley and Petroff 1999). Therefore, the key management approach with these species is to control and contain existing populations (keep them from spreading into uninfested areas) and to eradicate new populations in uninfested areas. The IPM approach is to prevent Category 1 species from spreading beyond current infestations. Therefore, Category 1 invaders would not necessarily be eliminated, but infestation spread into uninfested native plant communities would be reduced.
[9] **Contro**l: Reduce the infestation over time; some level of infestation may be acceptable.
[10] **Suppress**: Prevent seed production throughout the target patch and reduce the area coverage. Prevent the invasive species from dominating the vegetation of the area; low levels may be acceptable.

ADAPTIVE MANAGEMENT APPROACH

The adaptive management strategy applies to Alternative 1- Proposed Action and Alternative 2 – No Herbicide. However, herbicide aspects of the adaptive management strategy would not be available under Alternative 2. The adaptive management approach is made up of two principle components:

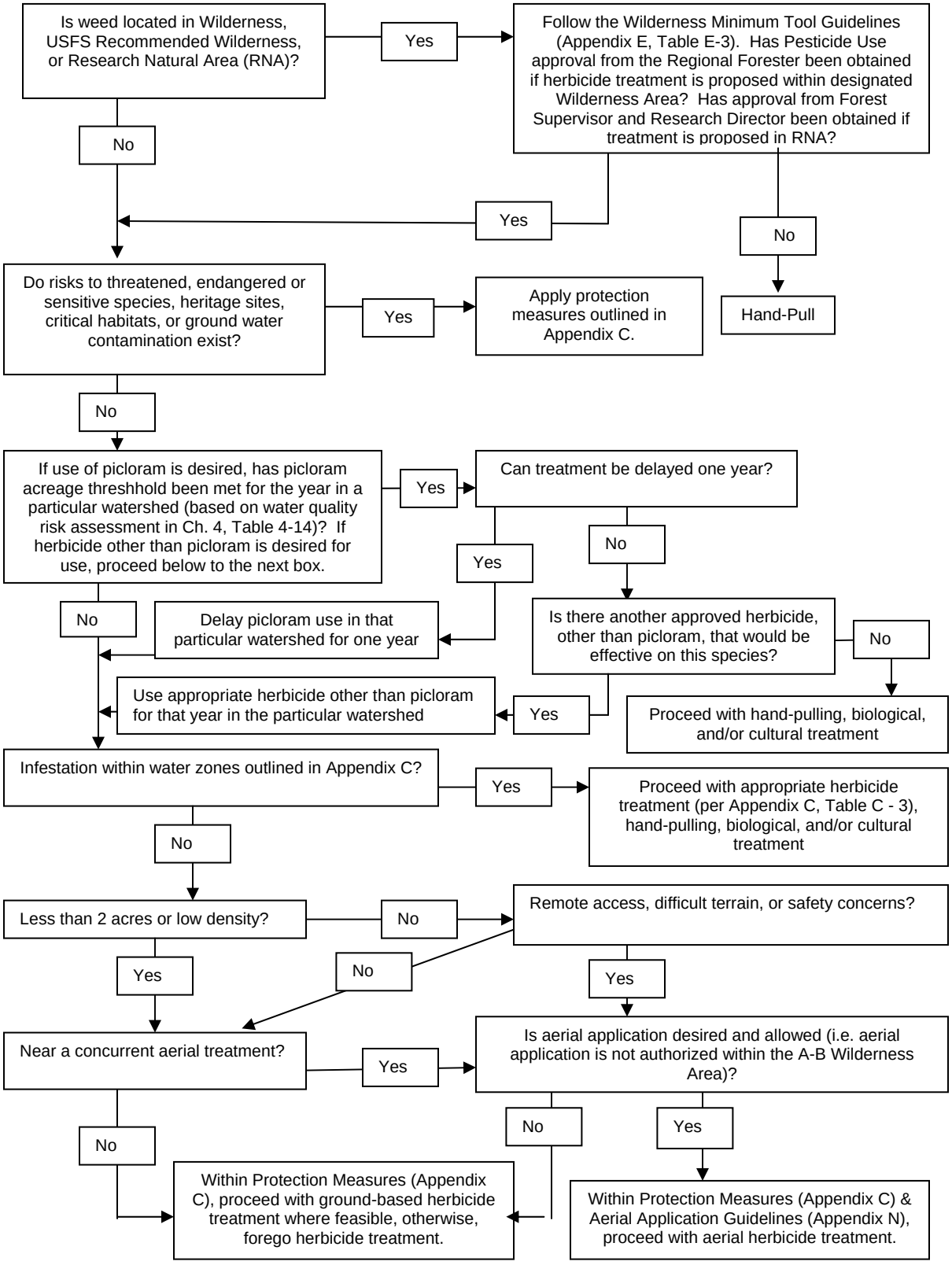
Principle 1: To quickly and effectively treat newly discovered weed infestations, a decision tree based on site characteristics, weed species, and location would be used to select treatment methods (see EIS Appendix E, Table E-2). Using an adaptive management approach allows treatment of new sites or new species without a lengthy delay, while still addressing other resource concerns. Although treatments of weeds are expected to be effective in reducing existing weed infestations, all infestations cannot be treated immediately due to budgetary and logistical constraints. Existing infestations will expand before they can be treated, and new areas will be identified. Since every acre of the Custer National Forest has not been inventoried for weeds many existing sites have yet to be identified. Also, new invasive weed species may be added to the invasive weed list and they will be incorporated into this analysis. The strategy includes:

- The decision (if and how) to treat newly discovered infestations would be driven by the Decision Tree for New Weed Locations as shown in EIS Appendix E, Table E - 2;
- New invaders, as identified by local and State agencies, should be given high priority for eradication, if feasible;
- New infestations may be treated with herbicide as long as the areas treated remain within the limits described in EIS Appendix E, Table E – 1 and adhere to all protection measures listed in EIS Appendix C; and
- Appropriate methods and environmental protection measures described in Appendices C and E would be used.

Principle 2: To improve effectiveness and reduce impacts, new technologies, biological controls, adjuvants, or herbicides would be evaluated for use. New technology, biological controls, herbicide formulations, and supplemental labels are likely to be developed within the next 15 years. These new treatments would be considered when there are indications that they would be more weed-specific than methods analyzed here, less toxic to non-target vegetation, or less persistent and less mobile in the soil. New herbicides may be used when they become available if they are permitted by the EPA, have a human health and environmental risk assessment completed per direction of Forest Service Handbook 2109.14, Chapter 10, and are registered for use by the states of Montana or South Dakota. The Adaptive Management Strategy would allow incorporation of these new treatment methods:

- New herbicides or formulations registered and approved by the US Environmental Protection Agency would be applied according to label specifications;
- Application methods and environmental protection measures described above would be used;
- The decision by the line officer to use a new treatment method would be driven by an interdisciplinary review (FSH 1909.15, 18.4) to confirm that the new treatment is within the scope of the analysis in this EIS, and a site characteristic evaluation (EIS Appendix E, Table E - 2);
- A risk assessment must be completed per Forest Service Handbook 2109.14, Chapter 10 for the herbicide. These assessments could be completed by the Forest Service, the Natural Resources Conservation Service, USDA Agriculture Research Station, Environmental Protection Agency, or other authorized agency.
- New biological control agents that are approved and certified by the Animal Plant Health Inspection Service and the applicable State (Montana or South Dakota) prior to their introduction. Biological agents should be virtually harmless to native or desirable non-native plants, and;
- Cost effect mechanical methods of treatments are developed. These methods would be reviewed before use to determine if other resource quality standards can be maintained.

DECISION TREE FOR NEW WEED LOCATIONS



Summary of Potential Impacts between Alternatives

With each alternative, there is a trade-off between beneficial and adverse impacts. This section focuses on issues described earlier and in Chapter 2 of the EIS. Key components of these issues are impacts to human health, non-target plants, animals, fish, soils, and water. These tradeoffs are analyzed in Chapter 4 of the EIS and summarized in the following Table. Impacts are based upon the application of appropriate protection measures outlined in EIS Appendix C of the EIS.

TABLE 3. SUMMARY OF POTENTIAL IMPACTS BETWEEN ALTERNATIVES

Issue or Concern	Potential Impacts		
	Alt. 1- Proposed Action	**Alt. 2 – No Herbicides**	**Alt. 3- No Action; Current Management**
Impacts of weed spread:			
• **Loss of native plant community; wildlife and fisheries habitats**	- Maximizes native species emphasis	- High loss of natives from weeds	- Moderate loss of natives from weeds
• **Loss of sensitive plant populations;**	-Low risk, effective protection measures	-High risk (weeds out compete rare plants)	-High risk (weeds out compete rare plants)
• **Human Health (e.g. allergies, asthma)**	- Decrease weed impact	- Increased allergies	- Decrease weed impact
• **Social/Economics**	-Moderate economic improvement; containment and control of weed infestations	-Spread of weeds would continue and impact wildlife and aquatic habitats, biological integrity, forage bases; fire regimes, partnership and cooperator relationships, and continued animal death from poisonous weeds. Social lifestyles associated with Wilderness experience will be diminished.	-Moderate economic improvement; containment and control of weed infestations. Continued animal death from poisonous weeds. Social lifestyles associated with Wilderness experience will be diminished.
Impacts of using herbicides:			
• **Human health;**	-Low risk of worker exposure to herbicides due to area treated and IPM methods, effective protection measures;	- No potential for worker exposure to herbicides; some risk involved with mechanical methods such as tilling.	-Low risk, effective protection measures
• **Fish and animals;**	-Low risk, effective protection measures; short-term habitat impact; insignificant Forestwide.	- No risk	-Low risk, effective protection measures; short-term habitat impact; insignificant Forestwide.
• **Non-target plants;**	-Low risk, effective protection measures; short-term habitat impact; insignificant Forestwide.	- No risk	-Low risk, effective protection measures; short-term habitat impact; insignificant Forestwide.
• **Water quality**	-Low risk, effective protection measures.	- No risk	-Low risk, effective protection measures
• **Heritage Resources**	-Low risk, effective protection measures.	- No risk	–Low risk, effective protection measures.
Additional risks of aerial spraying:			
• **Human health;**	-Low risk, effective protection measures	N/A –no aerial herbicide application	N/A – no aerial herbicide application
• **Fish and animals;**	-Low risk, effective protection measures		
• **Non-target plants.**	-Low risk, effective protection measures.		
Impacts of Non-herbicide treatments (Mechanical and			

Issue or Concern	Potential Impacts		
	Alt. 1- Proposed Action	Alt. 2 – No Herbicides	Alt. 3- No Action; Current Management
Cultural)			
• **Air Quality**	-Moderate short-term emissions; air quality standards will not be exceeded.	-Moderate short-term emissions; air quality standards will not be exceeded	-Moderate short-term emissions; air quality standards will not be exceeded.
• **Water Quality / Fisheries**	-Insignificant effects to water quality; effective protection measures.	-Insignificant effects to water quality.	-Insignificant effects to water quality; effective protection measures.
• **Soils**	-Low potential for short-term insignificant soil impacts or surface erosion from mechanical treatment methods.	-Moderate to low potential for short-term insignificant soil impacts or surface erosion from mechanical treatment methods.	-Low potential for short-term insignificant soil impacts or surface erosion from mechanical treatment methods.
• **Vegetation**	-Best weed control; minimum impact to non-target vegetation from biological treatment.	-Poor weed control by mechanical methods with minimum impact to non-target vegetation from biological treatment.	-Good weed control with minimum impact to non-target vegetation from biological treatment.
• **Heritage Resources**	-Some to low probability of site damage from mechanical methods.	-Some probability of site damage from mechanical methods.	-Some to low probability of site damage from mechanical methods.
Wilderness Character			
• **Natural Integrity**	-Maximizes natural integrity	-Natural integrity erodes the most with increasing weed infestations. Higher probability for recreation setting to be disturbed by stickers and weed latex.	- Natural integrity erodes some with increasing weed infestations.
• **Solitude and Remoteness**	-Minor short-term effects when recreational users encounter weed control crews.	-Short-term effects, crews spend more time treating weeds, chance for encounters increase.	-Minor short-term effects when recreational users encounter weed crews.
• **Regional Forester Authority**	Pesticide Use Proposal needs approval from Regional Forester	N/A	Pesticide Use Proposal needs approval from Regional Forester (FSM 2150)
Visual / Recreation Setting / Wild and Scenic Rivers	Little to no visual disturbance from biological methods; some short/long-term reoccurring visual disturbance from tilling/burning; little effect on recreation setting. Good improvement at recreation sites with treated infestations. Temporary closure during treatment.	Little to no visual disturbance from biological methods; some short/long-term reoccurring visual disturbance from tilling/burning; little effect on recreation setting. More likely to encounter plant annoyances such as stickers, burs, and weed latex. No additional constraints required.	Little to no visual disturbance from biological methods; some short/long-term reoccurring visual disturbance from tilling/burning; little effect on recreation setting. Good improvement at recreation sites with treated infestations. Temporary closure during treatment
Social and Economic Considerations	Some loss of forage and habitat for livestock and wildlife. The impact of weed infestations spreading on the private land and being an additional hardship is less likely. Partnerships continue.	Higher loss of forage and habitat for livestock and wildlife. The impact of weed infestations spreading on the private land and being an additional hardship is much more likely. Partnerships are not likely.	Some loss of forage and habitat for livestock and wildlife. The impact of weed infestations spreading on the private land and being an additional hardship is less likely Partnerships continue.
Effectiveness of control actions			
• **Limit spread, or eliminate existing infestations**	Very Effective	Not Very Effective	Effective on limited area; no herbicide use in AB Wilderness; no adaptive management and

Issue or Concern	Potential Impacts		
	Alt. 1- Proposed Action	Alt. 2 – No Herbicides	Alt. 3- No Action; Current Management
			fewer protection measures than Alternative 1.
• **Percent area treated based on current budget.**	80-95 % plus adaptive management options for new infestations.	10 %	70-80 %

PROTECTION MEASURES

Concerns about use of herbicides and impacts to humans and other components of our ecosystem, especially aquatic species, are shared. Protection measures for herbicide use (see tables below) involves restrictions and special measures to protect open water, riparian zones and incorporates Best Management Practices for herbicide use and type of chemicals used to prevent negative impacts.

The tables below outline the environmental design criteria that would be implemented under each alternative identified as protection measures. They are grouped as general treatment and aerial treatment protection measures. EIS Appendix N also provides additional aerial spray guidelines. As part of the proposed action design, the protection measures outlined in Table C - 3 are intended *to* minimize contamination of water resources and to minimize injury to non-target desired plants from herbicide use in environmentally sensitive sites. All protection measures apply to Alternative 1, Proposed Action. These management requirements and constraints apply to personnel, contractors, or other partners treating weeds on the Custer National Forest. It outlines the issue area, objective, effectiveness, and applicable alternative for each protection measure. Best Management Practices (BMPs) outlined in EIS Appendix D are additional protection measures applied to each alternative.

TABLE 4. GENERAL PROTECTION MEASURES

General Protection Measures	Alternative Applied	Issue Area & Effectiveness[11]
Prevention. Follow Appendix D Best Management Practices for Prevention. Ensure all Forest Service employees are aware of and knowledgeable about Noxious Weeds (FSM 2081.2 11). All employees will inspect, remove and properly dispose of weed seed and plant parts found on their clothing and equipment including Forest Service vehicles and all terrain vehicles (FSM 2081.2 11). Implement prevention and protection measures as outlines in FSM 2080.	1, 2, 3	Effectiveness of Treatment Minimize seed spread; High effectiveness; Logical

[11] The effectiveness column used the following definitions for rating purposes.
High: Protection measures are very effective (estimated to be 90 percent effective). Documentation of effectiveness is available in literature; professional judgment based on previous experience, or applied logic.
Moderate: Protection measures are reasonably effect (estimated between 40 to 89 percent effective). Documentation of effectiveness is available in literature; professional judgment based on previous experience, or applied logic.
Low: Protection measures are somewhat effective (estimated at less than 40 percent). Documentation of the effectiveness is unavailable or professional judgment indicates success is uncertain. Implementation of the protection measure needs to be monitored and the measure may need to be modified if necessary to achieve the objective.
Unknown: Effectiveness is unknowns or unverified; there is little or no documentation, or applied logic is uncertain. The protection measure needs both effectiveness and validation monitoring to determine success in meeting objective.

General Protection Measures	Alternative Applied	Issue Area & Effectiveness[11]
Proper Training and Safety Instruction: Herbicides would be used in accordance with US Environmental Protection Agency label instructions and restrictions. Label restrictions on herbicides are developed to mitigate, reduce, or eliminate potential risks to humans and the environment. Label information and requirements include: Personal Protective Equipment; User Safety; First Aid; Environmental Hazards; Directions for Use; Storage and Disposal; General Information; Mixing and Application Methods; Approved Uses; Weeds Controlled; and Application Rates. All guidelines and protection measures presented in the Forest Service Manual 2150, Pesticide Use Management and Coordination, and in the Forest Service Handbook 2109.14, Pesticide Use Management and Coordination Handbook, will be adhered to. Applicators or operators must wear all protective gear required on the label of the herbicide they are using (FSH 6709.11). Application would be done or supervised by licensed applicators, as required by law. Operators should calibrate spray equipment at regular intervals to ensure proper rates of herbicide applications (see Appendix K). Maintain personnel hygiene when spraying is complete (see Appendix M). Records of herbicide use will be recorded daily in a herbicide use log, including: temperature, wind speed, and direction; herbicide and formulation uses; quantity of herbicide and dilutents applied; location and method of application; acreage; and persons applying herbicides. Herbicide applicators will be advised of the potential for herbicides to run off into streams and will not initiate spraying when heavy rains are forecast that could cause offsite herbicide transport into sensitive resources such as streams. Herbicide effectiveness can also be compromised if spraying occurs too close to heavy rainfall occurrence (see Appendix J and label for Rainfastness information).	1, 3	Human Health Water Quality & Aquatics Ensure responsible application of herbicide; High effectiveness; Professional experience
Weather Monitoring: Weather conditions would be monitored on-site (temperature, humidity, wind speed. Direction), and spot forecasts would be reviewed for adverse weather conditions.	1, 3	Drift Reduction and Herbicide Effectiveness Ensure responsible application of herbicide; High effectiveness; Professional experience
Travel Plan Adherence: Treatment activities in designated Wilderness and Research Natural Areas will follow local motorized travel management plan or applicable public land laws, rules, regulations, and orders. Variances to motorized travel plans may be allowed for administrative motorized access to conduct weed treatment activities in areas outside of Wilderness and RNAs.	1, 2	Travel Plan; Special Areas Avoid conflict with other resources; High effectiveness; Logical
Mixing, Loading, Disposal: Procedures for mixing, loading, and disposal of pesticides and a spill plan would be followed (Label and FSH 2109.14, 43). All herbicide storage, mixing, and post-application equipment cleaning is completed in such a manner as to prevent the potential contamination of any perennial or intermittent waterway, unprotected ephemeral waterway or wetland These procedures are outlined in Appendices L and M. Herbicide applicators shall carry spill containment equipment, be familiar with and carry an Herbicide Emergency Spill Plan (see Appendix M).	1, 3	Human Health Water Quality & Aquatics Ensure responsible application of herbicide; High effectiveness; Professional experience
Dyes: Water-soluble colorants, such as Hi-Light® blue dye, would be used in some situations to enable applicators and inspectors to better see where herbicide has been applied.	1	Herbicide Use and Safety – Dye Safe handling of herbicide; Moderate effectiveness; Logical, Appendix J
Ester Formulations Prohibited: Due to toxicity to fish, ester formulations of herbicides (i.e. 2, 4-D ester, triclopyr ester (Garlon 4)) are prohibited from use in streamside or wetland zones where fisheries occur.	1, 3	Aquatics Protect fish resources; Moderate efficiency; EIS Ch. 4, Table 4 - 13
Posting in Public Use Areas: In public recreation areas (such as developed campgrounds, trailheads, other areas of concentrated use) post treated area until the area is safe to re-enter (as defined by the product label, usually 24 to 48 hours).	1,3	Herbicide Use and Safety – Recreation Areas Inform public; Moderate effectiveness; Logical

General Protection Measures	Alternative Applied	Issue Area & Effectiveness[11]
Herbicide Use Near Potable (Drinking) Water: See Table C - 3 for detailed protection measures in and near surface and ground water. Emphasize non-herbicide alternatives, where feasible. Follow herbicide label restrictions regarding use near functioning potable water sources. Herbicides can have varying setback restrictions near functioning/active potable water intakes. For example, very specific restrictions apply to labels of glyphosate products registered for aquatic weed control state: "*Do not apply this product in flowing water within 0.5 mile up-stream of active potable water intake "*. Unless otherwise directed by label, ground herbicide terrestrial application within a 50 foot radius of functioning potable water sources / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	1	Human Health Protect human health; Moderate efficiency; Logical
Herbicide Use Near Water: See Table C - 3 for detailed protection measures in and near surface and ground water. Emphasize non-herbicide alternatives, where feasible. In watersheds where picloram delivery modeling indicates possible concerns within a watershed (see Ch. 4, Table 4 - 14) use one or more of the following strategies: • Treat some infestations with another appropriate herbicide (see Appendices G & I), • Postpone treatment with picloram for at least a year; and /or • Use biological or mechanical control, where feasible.	1, 3	Aquatics Protect aquatic resources and ground water; Moderate efficiency; EIS Ch. 4-Table 4 - 13
Surfactants Near Water: Only surfactants labeled for use in and around water would be used within 50 feet of water, or the edge of subirrigated land, whichever distance is greater, or on high run-off areas. Some surfactants are labeled for use in and around water including: Activate Plus ®, LI-700 ®, Preference ®, R-11 ®, Widespread® and X-77®. Follow product label.	1	Herbicide Use and Safety & Aquatics – Surfactants Protect Aquatic Resources; High effectiveness; EIS, Appendix J
Risk to Groundwater: See Table C - 3 for detailed protection measures in and near surface and ground water. In areas at high or unacceptable risk to groundwater contamination (see Map section – RAVE Model), use hand applications (spot treat, wick, etc.), or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13 for herbicide leachability). Refer to Table C – 3 for herbicide specific applications in these areas.	1, 3	Herbicide Use and Safety Ensure responsible application of herbicide; High effectiveness; Logical, Label advisories.
Storage Prohibited in Riparian Areas: Storage of fuels and other toxicants within riparian areas and refueling within these areas is prohibited unless there is no other alternative.	1	Aquatics Protect aquatic resources; Moderate efficiency; EIS page 4-23 (INFISH standard FA-4)
Prescribed Burning: All burning would be conducted in accordance with Custer National Forest fire management policy which requires the site specific preparation of a prescribed burn plan before every burn. The prescribed burn plan addresses the objectives of the burn, physical characteristics of the burn area, type of fuels, weather conditions under which the plan will be carried out, expected fire behavior, air and water quality restrictions, ignition pattern and sequence, emergency fire control workforce requirements, public contacts, and safety.	1, 2, 3	Burn Treatments Ensure restoration to a diverse plant community; Moderate effectiveness; Professional experience.
Biological Agents: Biological agents would not be released until screened for host specificity and approved by the USDA Animal Plant Health Inspection Service. Protected biocontrol sites can also function as collection points for redistribution of established biocontrols to other sites. Depending upon management objectives, consideration should be given for possible protection of successful biocontrol sites from other management actions that could negatively influence the biocontrol agent (such as burning or application of herbicides).	1, 3	Biological Agents Minimize injury to non-target species; High effectiveness; Logical
Seeding with Native Seed: Seeding with native seed would only occur if desirable competitive plants do not re-emerge and dominate the vegetation community after the weed species is treated. Seed must be certified weed seed free.	1, 2	Cultural Treatments Ensure restoration to a diverse plant community; High effectiveness; Herbicide label
Timing of Mechanical Treatment. To limit the potential for equipment to spread weed seeds, treatments should be completed before seed becomes viable.	1, 2, 3	Effectiveness of Treatment Minimize seed spread.; High effectiveness; Logical

General Protection Measures	Alternative Applied	Issue Area & Effectiveness[11]
Mechanical Treatment - Sensitive Plant Populations: Mechanical treatment methods that have potential to adversely affect the viability of known sensitive plant species populations will be avoided or mitigated.	1, 2, 3	TES Species Protect sensitive plant resources High effectiveness; Logical
Mechanical Treatment - Heritage Resources: Mechanical or burning treatment methods that have potential to adversely affect heritage resources will follow applicable public land laws (36 CFR 800) and State Historic Preservation Office agreements. Significant sites that could be damaged by a mechanical or burning treatment will be mapped and provided to weed treatment coordinators in order to avoid any damages.	1, 2, 3	Heritage Protect Heritage Resource sites; High effectiveness; Logical
Disposal of Manually Removed Weeds. Disposal of weeds that are grubbed or manually removed will be as follows: If no flowers or seeds are present, pull the weed and place it off the ground, if possible, to dry out. If flowers or seeds are present, pull and place weeds in a plastic bag or a container to retain seeds. Dispose of weeds by burning them or taking them in closed garbage bags to a sanitary landfill.	1, 2, 3	Effectiveness of Treatment Minimize seed spread.; High effectiveness; Logical
Consultation - Tribal: Where traditional cultural plant gathering areas have been identified, following protection measures outlined in this Appendix for sensitive plant populations. Tribal consultation may be done to address any additional mitigation measures needed to minimize effects to various aspects of the activity. These could include, but are not limited to adjusting the timing of the treatment, adjusting the type of treatment, adjusting the priority of the treatment.	1, 2, 3	Heritage Protect Heritage Resource areas; High effectiveness; Logical
Concurrence Required in RNAs: If any treatment with herbicide is planned within RNA boundaries, concurrence must be obtained through the Research Station Director and Forest Supervisor.	1	Special Areas Ensure policy is followed.; High effectiveness; FSM 4060.
Cooperation: In cooperation with federal, state, and county agencies, Custer National Forest System lands within ¼ mile to other ownership would be selectively treated to coincide with active weed management projects on those adjacent lands. Decisions regarding treatment methods and buffer width on land adjacent to privately owned land or land managed by other agencies would be negotiated between the Forest Service and the other owner/agency.	1	Adjacent Land Prevent weeds from spreading onto FS land; Moderate effectiveness; Professional experience
Coordination - Grazing Restrictions: Coordinate with District Rangeland Management personnel regarding locations of permitted livestock when anticipating using a herbicide that may have grazing restrictions. When applicable, the timing of herbicide treatment will avoid conflict with permitted livestock grazing as required by the herbicide label. See label and Appendix H.	1	Social / Economic Minimize conflicts with permitted livestock High effectiveness Professional experience; Herbicide label

General Protection Measures	Alternative Applied	Issue Area & Effectiveness[11]
Coordination - Biologists: District/Forest wildlife biologists would review and coordinate weed management projects with the District/Forest weed coordinators to identify current raptor nesting areas, grizzly bear core habitat, wolf territories, or other critical wildlife areas that may be affected by weed control activities, to ensure the protection measures described in this Appendix are implemented properly.	1, 2, 3	TES Species Protect wildlife species from weed control; Moderate Effectiveness; Professional experience
Sensitive Plant Populations: Infested sites would be evaluated for Forest Service regionally listed sensitive plants before treatment. If sensitive plants occur in or near infestations, a weed control plan will be developed to help protect the sensitive plant. Provide weed crews or contractors with maps of all known sensitive plant populations so that these sites can be identified and protected. Provide training for weed crews to identify sensitive plants so that new sites can be identified and protected. Consult with botanist or designated resource specialist prior to treating in sensitive plant habitat with known locations. Use the control method with the least impact on the rare plants (for example, pull non-rhizomatous weeds if the roots of the rare plant will not be detrimentally affected by the soil disturbance). Broadcast (boom) applications of chlorsulfuron or sulfometuron methyl are prohibited within 1500 feet of sensitive plant populations[12]. Selective hand spot or wick treatment with this herbicide is allowed within this setback. Diuron, chlorsulfuron, imazapyr, sulfometuron methyl (broad-spectrum herbicides) are prohibited within the 50-foot buffer zone. Remaining herbicides may be spot applied following label instructions. The broad-spectrum herbicide, glyphosate, may be applied within the 50 buffer, only if the sensitive plant species is dormant. When applying herbicides within 50 feet of sensitive plants, spot treat via hand held wands, backpack sprayers, wick, etc. using herbicide that does not persist in the soil (i.e. picloram, imazapic, diuron are more persistent in soils) (see Table 3 - 13, Ch. 3) and protect sensitive plants from herbicide drift (for example cover plant with plastic when spraying herbicide or use a wick applicator). Ensure that the herbicide used does not target the family of the specific sensitive plant species For example; herbicides targeted for the composite/aster family should not be used near Beartooth Goldenrod populations (i.e. Aminopyralid, Clopyralid). Monocots (species of grass, sedge, and lily families) are tolerant to Clopyralid, 2, 4-D, and triclopyr (i.e. pregnant sedge, yellow lady's slipper). Dicamba and picloram are also considered safe around monocots at lower formulations. If a sensitive plant species is located within a streamside, wetland, groundwater vulnerable, wellhead protection, or woodland zone, that zone's protection measures, if more restrictive, would also apply.	1, 3	TES Species Avoid impact to sensitive plants; Moderate effectiveness; Professional experience and EIS pages 4-57 through 61.
Western Toads and Leopard Frogs: When ground application of herbicide is necessary within 50 feet of a water body, surveys of the treatment area will be required. If adult northern leopard frogs or western toads are identified, the extent of distribution within the proposed treatment area will be marked on the ground and reported to the district amphibian specialist (fisheries or wildlife biologist) and weed coordinator. If treatment is not possible without directly spraying individuals then hand pulling or wick application could be applied. If tadpoles or metamorphs of either species are identified, the location will be reported to the local amphibian specialist (fisheries or wildlife biologist) and weed coordinator, and application of herbicides will be delayed until metamorphs disperse.	1, 3	TES Species, Aquatics Protect aquatic resources and ground water; Moderate efficiency; EIS page 4-54
Bald Eagles: No human activities associated with weed control would be allowed within Zone I (<400 meters [¼ mile]) of an active bald eagle nest from February 1-August 15, except within 20 feet of roads that are open for public motorized use.	1, 2, 3	TES Species Protect eagle; Moderate effectiveness; Conservation Strategy

[12] USDI, BLM, 2005.

General Protection Measures	Alternative Applied	Issue Area & Effectiveness[11]
Wolves and Grizzly Bears: If sheep or goat grazing is prescribed, a herder and guard dogs would be present to monitor sheep and goats used for weed control purposes. The herder must notify the local District Ranger within 24 hours of any loss of sheep or goats. Sheep and goats would be removed from the project area within 24 hours of any grizzly bear or wolf depredations. The herder would be required to comply with the Custer National Forest food storage in order to minimize attractants to bears. The carcasses of sheep or goats that die within a project area must be removed within 24 hours to avoid habituation of grizzly bears or wolves to livestock as carrion. Sheep and goats would be contained each night within the perimeter of an electric fence. Herders would be required to receive training from the U.S. Fish & Wildlife Service or other authorized organization in the use of hazing techniques to prevent depredations by wolves. Herders are required to implement these techniques when wolves are known to be in proximity to the project area.	1, 2, 3	TES Species Protect sheep from predation; Moderate effectiveness; Conservation Strategy, EIS page 4-74.
Wolves: No ground-based spraying would occur within ½ mile of a known wolf den site from April 1 thru June 30 (J. Trapp, MT Fish, Wildlife, and Parks, personal communication on 04/29/05).	1	TES Species Reduce impact to wolves; Moderate effectiveness; EIS page 4-74.
Bighorn Sheep: Proposals for goat or sheep grazing for weed control purposes would be coordinated with the appropriate state wildlife biologist to determine if bighorn sheep may occur in the area. At least nine miles of separation would be maintained between bighorn sheep and domestic sheep or goats being used for weed control purposes.	1, 2	Key Wildlife Species Prevent disease spread; Moderate Effectiveness; Professional experience
Avoid Tree Habitat Mortality: See Table C - 3 for detailed protection measures in and near wooded areas. Herbicides would only be applied at concentrations that would avoid tree mortality to protect potential habitat for bald eagles, lynx, and other key species.	1, 3	TES Species Protect wildlife habitat; Moderate Effectiveness; Logical
Diuron: When using diuron or diuron and sulfometuron methyl mix along paved roads, treat a foot from the shoulders' edge or on other hairline fractures in pavement. Pre-treatment with glyphosate is helpful to reduce existing vegetation.	1	Reduce potential for erosion. Moderate effectiveness Logical, Local Experience

TABLE C – 2. AERIAL PROTECTION MEASURES (SEE APPENDIX N)

Aerial Protection Measures	Alternative Applied	Issues Area & Effectiveness
Aviation Activities. All aviation activities will be in accordance with FSM 5700 (Aviation Management), FSM 2150 (Pesticide Use Management and Coordination), FSH 5709.16 (Flight Operations Handbook), FSH 2109.14, 50 (Quality Control Monitoring and Post-Treatment Evaluation). A project Aviation Safety Plan will be developed prior to aerial spray applications.	1	Human Health & Safety Ensure responsible application of herbicide; High effectiveness; Professional experience
Herbicide Restrictions. Diuron is projected to have limited use since it would typically be used for small amount of infrastructure maintenance (less than 5 acres annually). Aerial application of diuron is not needed and is therefore prohibited.	1	Non-target Species Prohibit aerial use of broad selection herbicide to prevent reaching non-target species; High effectiveness; Logical
Watershed Assessment During Contract Preparation. During contract preparation for aerial application, reassess surface water quality risk with site-specific information. Once the exact treatment areas are delineated in preparation for the contract, determine treatment acres for 6th hydrologic unit code (HUC) watersheds potentially affected by aerial application if picloram is used. Incorporate these acres into the risk assessment to estimate probable herbicide concentrations and allowable treatment acres. If concentrations of picloram exceed the recommended safe threshold (see Chapter 4, Table 4-14 Surface Water Risk Analysis), reduce treatment acres to the allowable amount or use herbicides approved for use near surface water.	1	Water Quality & Aquatics Prevent high concentration in surface water; High effectiveness; EIS pages 4-51,52.

Aerial Protection Measures	Alternative Applied	Issues Area & Effectiveness
Water Setback. On each side of aquatic, streamside or wetlands zones with, a 300-foot buffer would be established where aerial applications would not be allowed.	1	Water Quality & Aquatics Prevent high concentration of drift from reaching streams & wetlands; High effectiveness; EIS Appendix N Drift Model and USFS Fisheries and Herbicides Work Group Final Findings and Recommendations (March 8, 2004).
Sensitive Plant Setback. Aerial application of chlorsulfuron or sulfometuron methyl will have a setback of 1500 feet from sensitive plant populations. For all other herbicides, a 300-foot buffer would be established where aerial applications would not be allowed adjacent to sensitive plant populations.	1	Non-target Species Minimize effects to sensitive plants; High effectiveness; USDI BLM 2005, ENSR Recommendations
Ground Treatment Within the 300 Foot Aerial Setback. Within 300-foot aerial spray buffers, ground-application of herbicides may occur within protection measures outlined in this Appendix. Herbicide selection would be based on product label restriction, site characteristic evaluation, and protection measures outlined in Tables C – 1 and Table C – 3.	1	Water Quality & Aquatics Treat weeds in buffer area while mitigating resources; High effectiveness; USDA 2001b. page I-8
Minimize Drift. Spray drift is largely a function of droplet particle size, release height, and wind speed. Try to stay within wind speeds up to 6 mph or per label instruction. Incorporate these factors into project design to reduce the risk of drift.	1	Drift Reduction Prevent high concentration of drift from reaching wetlands or other non-target area; High effectiveness; Lolo NF Aerial Guidelines.
Pre-Treatment Mapping. Aerial spray units would be field-validated, flagged, and/or marked using GPS prior to spraying to ensure only appropriate portions of the unit are aerially treated. A GPS system would be used in spray helicopters and each treatment unit mapped before the flight to ensure that only areas marked for treatment are treated.	1	General Ensure accurate location of treatment; High effectiveness; Kulla 2003, page 11-13
Bald Eagles. No aerial spraying would be allowed within Zone I and II (within 1/2 mile) of an active bald eagle nest from February 1 – August 15.	1	TES Species Reduce impact to eagles; Moderate effectiveness; EIS page 4-75.
Goshawks. No aerial spraying would be allowed within ¼ mile of an active goshawk nest from April 1-August 15.	1	TES Species Reduce impact to goshawk; Moderate effectiveness; EIS page 4-78.
Peregrine Falcons. No aerial spraying within one mile of an active peregrine falcon nest from April 1 to August 15.	1	TES Species Reduce impact to peregrine; Moderate effectiveness; EIS page 4-78.
Grizzly Bears. Only 8 hours of aerial spraying would be allowed in grizzly bear core habitat within a given Bear Management Subunit each year.	1	TES Species Reduce impact to grizzly bears; Moderate effectiveness; EIS page 4-71.
Wolves. No aerial spraying would occur within ½ mile of a known wolf den site from April 1 thru June 30 (J. Trapp, MT Fish, Wildlife, and Parks, personal communication on 04/29/05).	1	TES Species Reduce impact to wolves; Moderate effectiveness; EIS page 4-74.

Aerial Protection Measures	Alternative Applied	Issues Area & Effectiveness
Designated Wilderness and RNAs. Aerial applications would be excluded from designated Wilderness and Research Natural Areas.	1, 3	Special Areas Avoid conflict with Wilderness Experience or RNA integrity; High effectiveness; Logical
Campgrounds, Residential, Private Land Areas. Provide a minimum buffer of 300 feet for aerial application of herbicides from developed campgrounds, recreation residences and private residential areas (unless otherwise authorized by adjacent private landowners). Treat outside of high use periods where feasible. Temporary closures of campgrounds may be considered to ensure public safety during spray operations.		Human Health and Non-target Vegetation Reduce Drift in areas where People Recreate or Reside and to non-target vegetation; Moderate effectiveness; Logical
Posting. Signing and on site layout would be performed one to two weeks prior to actual aerial treatment.	1	Human Health Provide public notification; Low effectiveness; Logical
Temporary Closures. Temporary area and road/trail closures would be used to ensure public safety during aerial spray operations.	1	Human Health Ensure public safety; High effectiveness; Logical
Communications. Constant communications would be maintained between the helicopter and project leader during spraying operations. Ground observers would have communication with the project leader. Observers would be located at various locations adjacent to the treatment area to monitor wind direction and speed as well as to visually monitor drift and deposition of herbicide.	1	General Ensure safety and implementation of protection measures; High effectiveness; Logical
Monitoring. To reduce risk of effects on aquatic species, aerial spray operations would be closely monitored. Field inspectors will provide on-site monitoring for drift and label compliance. They will be trained and wearing personal protective equipment.	1	Water Quality & Aquatics Ensure implementation of protection measures; High effectiveness; Logical
Monitoring Cards. A field inspector will be present during all aerial application to monitor drift using spray detection cards placed in buffer areas along any stream or lake comprising a sport fishery, or waters important for Threatened, Endangered or Sensitive (TES) aquatic species. Cards will be placed prior to herbicide application and will be sufficient in number and distribution to adequately determine when drift of herbicide into the buffer area exceeds acceptable levels. Spray cards would be placed out to 350 feet from and perpendicular to nearby water bodies, wetlands, or other sensitive areas to monitor herbicide presence. Non-toxic dye would be added to make herbicide visible on spray cards. Dye would allow observers to see herbicide as it is sprayed and to visually monitor drift or vortices from boom and rotor tips.	1	Water Quality & Aquatics Document herbicide disposition; High effectiveness; Logical and Lolo NF Aerial Guidelines.
Equipment & Drift Reduction. Drift reduction agents, nozzles that create large droplets, and special boom and nozzle placement, would be used to reduce drift during aerial spraying.	1	Drift Reduction Control drift; Moderate effectiveness; EIS Appendix J.
Products & Volatility Reduction. Drift control agents may be used in aerial spraying during low humidity to reduce drift into non-target areas. Products that reduce volatility, have been shown to keep droplet sizes larger, and are appropriate adjuvant for the herbicide (as specified by labeling of both the herbicide and the drift agent, in consultation with the herbicide manufacturer) would be used.	1	Drift Reduction Control drift; Moderate effectiveness; EIS Appendix J
Discontinue Treatment. Aerial spraying will be discontinued if herbicide is drifting within the set-back zone and/or wind speed exceeds those recommended on the product's label.	1	Drift Reduction Protect sensitive area; Moderate Effectiveness; Logical

Aerial Protection Measures	Alternative Applied	Issues Area & Effectiveness
Weather. Weather conditions would be monitored on-site (temperature, humidity, wind speed and direction), and spot forecasts would be reviewed for adverse weather conditions.	1	Drift Reduction Control drift; Moderate effectiveness; Logical

Water and Woodlands

Herbicides that are approved for rangeland use are generally benign to soil and soil microorganisms in most soil types. Nevertheless, the specific properties of the herbicides considered do require special attention, particularly when used near surface waters, shallow groundwater, domestic water supply, and woodlands. As part of the proposed action design, the protection measures outlined in Table C - 3 are intended *to minimize* contamination of water resources and to minimize injury to non-target desired woody plants from herbicide use in environmentally sensitive sites (Table C – 1 addresses protection measures pertaining to sensitive plant habitat). These environmentally sensitive sites include

- Aquatic Zone (AZ): The area where aquatic plants (algae, floating plants, submersed plants and emergent plants, i.e. purple loosestrife and water milfoil), grows in ponds, lakes, reservoirs, marshes, drainage ditches, and streams that are still or slow moving.
- Streamside Zone (SZ): Moving water systems (lotic) containing and adjacent to stream channels and floodplains having the presence of obligate &/or facultative riparian vegetation.
- Wetland Zone (WZ) Saturated wetland systems (lentic) that have saturated or seasonally saturated soils and support mostly obligate &/or facultative wetland vegetation &/or aquatic life); includes swamps, bogs, potholes, lakes, ponds, manmade reservoirs & stock ponds.
- Groundwater Vulnerable Zone (GVZ): Shallow groundwater areas underlying permeable soils that is especially vulnerable to contamination from some herbicides. These areas are shown as high or unacceptable vulnerability areas on the RAVE Model Map found in the Map Section – are most often riparian areas.
- Wellhead Protection Areas (WPA): A 50 foot radius around an underground developed and functioning source of drinking water.
- Woodland Zone (WDZ): Hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Salt Cedar areas are not considered woodlands for use of the following Table.

These protection measures will not guarantee complete abatement of contamination in all areas at all times. Such a guarantee could only be made if the herbicides were not applied. Additional protection measures are found in Table C – 1 and C – 2, and Best Management Practices found in Appendix D.

Table C - 3 describes the protection measures for each environmental zone along with prohibitions or limitations on the use of each herbicide within each zone. Based on the properties and behavior of the herbicides assessed, the herbicides are grouped into three classes for each zone: (i) those that are expressly prohibited, (ii) those that are limited in some defined way, and (iii) those that are generally permitted with no or minor restrictions. Adherence to label directions applies to all herbicides in all zones. See Table C - 2 in Appendix C for Aerial application protection measures.

TABLE C – 3. PROPOSED ACTION HERBICIDE-SPECIFIC PROTECTION MEASURES (see bulleted items; adherence to label directions applies to all herbicides in all zones).

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
2, 4-D[21] Thistles, sulfur cinquefoil, dyers woad, knapweeds, purple loosestrife, Eurasian water milfoil, tall buttercup, whitetop, Some broadleaf, woody and aquatic plants susceptible. Amine is labeled for terrestrial and aquatic use. Hi-Dep IVM is labeled for terrestrial applications, and non-irrigation ditchbanks.	***Use Permitted*** • Aquatic formulations only • Consult with Fisheries Specialist. ***Use Prohibited*** Non-aquatic formulations	***Limited Use*** • Use only formulations approved for use in or near water. In the amine form or aquatic labeled formulations it can be applied up to the water's edge (without direct contact to the water). ***Use Prohibited*** Non-aquatic formulations	***Same as SZ for 2, 4-D except:*** • Allowed up to 25 feet from water's edge if there is a vegetative buffer[22] with slopes <6%	***Use** Permitted* • Aquatic or non-aquatic 2, 4-D may be applied.	***Limited Use*** • Same as SZ and GVZ for 2, 4-D.	***Limited Use*** • Spot treatment only within 50 feet of woodlands. Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil.

[13] Follow label direction as it pertains to use in irrigation ditches. Aminopyralid, chlorsulfuron, clopyralid, hexazinone, imazapic, imazapyr, metsulfuron methyl, picloram, and sulfometuron methyl are not permitted within an irrigation ditch even if the ditch is dry per label instruction. Diuron is allowed within a dry irrigation ditch, only per label instruction.

[14] **AZs.** For ponds with heavy weed infestation, partial treatments may be necessary to prevent oxygen depletion & possible fish suffocation associated with decaying vegetation.

[15] **AZs.** These formulations labeled for aquatic use target broadleaf plants (dicots) such as Eurasian water milfoil and purple loosestrife. Most Native azquatic plants are monocots and not susceptible to these chemicals.

[16] **SZs.** Aminopyralid, and formulations of 2, 4-D amine, glyphosate (i.e., Glypro and Rodeo), and triclopyr (i.e. Renovate 3) approved for use in or near water are compatible for use in SZs and can be applied to the water's edge. Glyphosate is injurious to some desired riparian plants, so it must be applied by spot treatments to target plants within a riparian area. Where 5 foot setbacks from water's edge are in place, alternative treatments may include use of permitted herbicides, wick applications, biocontrols, mechanical options, and/or herbivory by goats or sheep.

[17] Although applications by other means are prohibited or limited within 5- feet of water in SZs, wicking application of prohibited herbicides is allowed up to the water's edge due to direct foliage treatment with no drifting or direct application to soil.

[18] Most herbicide groundwater contamination results from "point sources." Point source contaminations include spills or leaks at storage and handling facilities, improperly discarding containers, and rinsing equipment in loading and handling areas, often times into adjacent drainage ditches. Point sources are characterized by discrete, unidentifiable locations discharging relatively high local concentrations. These contaminations can be avoided through proper calibration, mixing, and cleaning of equipment. Non-point source groundwater contaminations of herbicides are relatively uncommon. They can occur, however, when a mobile herbicide is applied in areas with a shallow water table. In this situation, the choice of an appropriate herbicide or alternative control strategy can prevent contamination of the water source. Water tables can shift seasonally and annually; therefore, the depth to water table can be monitored prior to application of a prohibited or limited herbicide within a GVZ. For example, areas that customarily have high water tables early in the growing season may be suitable for herbicide treatment by the fall if preceding precipitation is low. Glyphosate, and amine formulations of 2, 4-D and triclopyr are currently labeled for aquatic use and would be the materials used within designated buffer zones along streams and bodies of water. Imazapic, imazapyr, and triclopyr could be used in buffer zones as long as they would not be directly applied to water.

[19] Most of the GVZs on the Custer NF (about 600 acres) are found along SZs and WZs. Use the same chemical prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with the listed exceptions by herbicide.

[20] **WPZs.** Biological controls, herbivory, or mechanical options will be emphasized where feasible and effective.

[21] The more restrictive setback distance in WZs than SZs reflects the persistence of 2,4-D and chlorsulfuron in anaerobic conditions, which are more likely to exist in lentic water systems (wetlands) and wetland soils than in lotic (riverine) environments. **GWZs.** 2, 4-D and glyphosate (formulations approved in and near water) will be the only herbicides approved for use within a WPZ. These chemicals have low to intermediate leaching potential.

[22] Vegetative buffer is an area with good vegetative ground cover. Badlands or other low cover areas with bare ground would not be considered as a vegetative buffer.

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
Aminopyralid[23] Perennial and biennial thistles, knapweeds, sulfur cinquefoil. Tolerated by most grasses. Milestone is labeled for terrestrial applications. Do not apply in surface water	***Use Prohibited***	***Permitted Use*** • It can be applied up to the water's edge (without direct contact to the water). • Per label instruction, not to be used in areas of standing water.	***Use Permitted*** • Per label instruction, not to be used in areas of standing water.	***Use Permitted***	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.
Chlorsulfuron[24] • Spot treatment only with hand application methods. Dyer's woad, thistles, common tansy, whitetop, houndstongue, tall buttercup. Some broadleaf plants and grasses susceptible. Telar is labeled for terrestrial use only.	*Use Prohibited*	***Limited Use*** • Do not use in flooded areas or on saturated soils. • Spot treatment allowed up to 5 feet from water's edge. • Use only once per growing season on alkaline soils.	***Same as SZ except:*** • Spot treatment allowed up to 25 feet from water's edge if there is a vegetative buffer with slopes <6%.	***Use Permitted***	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.

[23] SZs. ***Limited Herbicides.*** Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. The use of aminopyralid is effective on a narrow spectrum of plants (especially knapweeds and thistles) and can generally be used in SZs where standing water does not occur.

[24] SZs. ***Limited Herbicides.*** Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. Use of chlorsulfuron must avoid flooded areas and anaerobic conditions, which commonly occur in saturated soils. Also, chlorsulfuron generally targets those plants that prefer upland sites and are not in SZs. The risk of flooding along some perennial streams is seasonal; therefore, use of chlorsulfuron may be restricted temporally during periods when there is a high probability of flooding. The more restrictive setback distance in WZs than SZs reflects the persistence of 2,4-D and chlorsulfuron in anaerobic conditions, which are more likely to exist in lentic water systems (wetlands) and wetland soils than in lotic (riverine) environments.

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
Clopyralid[25] Thistles, yellow starthistle, hawkweeds, knapweeds, rush skeletonweed, oxeye daisy. Many broadleaf and woody species susceptible. Transline, Stinger, and Reclaim are labeled for terrestrial applications. Do not apply in or near surface water. Do not contaminate water used for irrigation or domestic purposes.	***Use Prohibited***	***Use Prohibited*** • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet.	***Same as SZ for Clopyralid***	***Limited Use*** • Hand application only. Broadcast application prohibited.	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands. Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil
Dicamba[26] Houndstongue, knapweeds, oxeye daisy, tall buttercup, leafy spurge, tansy ragwort, common crupina, blueweed, yellow starthistle. Some broadleaf, brush, vines susceptible Vanquish and Banvel are labeled for upland sites and non-irrigation ditchbanks	*Use Prohibited*	***Use Prohibited*** • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet.	*Same as SZ for Dicamba*	***Limited Use*** • Hand application only. Broadcast application prohibited.	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands. Do not use within 3 times the dripline of trees and shrubs (conifers especially sensitive). Avoid direct or indirect application to non-target plants or soil.

[25] SZs: ***Prohibited Herbicides.*** Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Triclopyr targets many of the same noxious weeds as clopyralid and has been formulated for use near water. Consequently triclopyr is a more acceptable alternative than clopyralid or metsulfuron methyl in a SZ.

[26] **SZs:** ***Prohibited Herbicides.*** Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Even though dicamba has low persistence, it is very mobile, easily leached, and breaks down slowly in water or in water-saturated soil. The weeds, which dicamba targets, generally do not occur in wetland or riparian settings. Therefore, the prohibition of dicamba has little bearing on management options. **WZs.** Dicamba can injure woody plants by being exuded through weed roots and being uptaken by trees and shrubs within three times their drip lines.

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
Diuron • No aerial spraying Annual weeds and broadleaves for infrastructure maintenance needs such as right-of-ways. Broad spectrum. Diuron 4L Diuron 80 (DF, WDG) Direx 4L Karmex DF (80 DF) is labeled for Uplands, and ditches when water is not present. Irrigation ditches can only be treated in the non-crop season.	*Use Prohibited*	***Use Prohibited*** • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet.	*Use Prohibited*	***Use Permitted***	*Use Prohibited*	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.
Glyphosate[27] Purple loosestrife, field bindweed, yellow starthistle, thistles, cheatgrass, common crupina, toadflax. Glyphosate does not work on underwater plants such as Eurasian watermilfoil. Broad spectrum. Accord, Glypro, and Rodeo are labeled for certain aquatic weed control applications. The other products are for terrestrial applications, including ditch banks, and dry ditch or canal bottoms.	***Use Permitted*** • Aquatic formulations only • Consult with Fisheries Specialist. ***Use Prohibited*** Non-aquatic formulations	***Limited Use*** • Use only formulations approved for use in or near water (i.e. Glypro, Rodeo). • Spot treat target plants only within riparian area to avoid injury to non-target riparian plants. ***Use Prohibited*** Non-aquatic formulations	***Same as SZ for Glyphosate***	***Use Permitted***	***Use Permitted*** • Use only formulations approved for use in or near water	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.

[27] **GWZs.** 2,4-D and glyphosate (see specific formulations) will be the only herbicides approved for use within a WPZ. These chemicals have low to intermediate leaching potential.

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
Hexazinone Poison Hemlock, Cheatgrass, oxeye daisy, yellow starthistle, thistles. Broad spectrum control with some selectivity for conifers. Velpar and Pronone are labeled for terrestrial applicaionts.	***Use Prohibited***	***Use Prohibited*** • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet.	***Same as SZ for Hexazinone***	***Limited Use*** • Hand application only. Broadcast application prohibited.	***Use Prohibited***	***Limited Use*** • Follow Label direction in and near conifers. • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.
Imazapic[28] Cheatgrass, leafy spurge, toadflax.Some broadleaf plants and grasses susceptible. Plateau is labeled for terrestrial use only. Do not apply near water.	***Use Prohibited***	***Limited Use*** • Maximum of 0.188 lb a.e./ac. • Allowed up to 5 feet from water's edge if there is a vegetative buffer that has slopes <6%	***Same as SZ for Imazapic***	***Limited Use*** • Maximum of 0.188 lb a.e./ac. • Exception: No slope limitations	***Use Prohibited***	***Limited Use*** • When making fall applications, potential injury to tree and brush species from foliar contact may be minimized by making the application after the leaves have begun to senesce (fall color) or after leaf drop. Conifers are generally tolerant to fall applications. Applications in and around tree and brush species should be made at the recommended timing for the target weed species.

- [28] **SZs.** ***Limited Herbicides*****.** Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. The use of imazapic is desirable because it acts on a narrow spectrum of plants and is generally non-injurious to non-target forbs at low application rates and when applied after seed-set has occurred. Furthermore, imazapic is rapidly photodegraded by sunlight in surface waters. Imazapic and imazapyr are limited to reaches where a well vegetated buffer zone exists and grounds slopes are less than 6 percent between the application site and surface water. These requirements are imposed to keep these herbicides from entering surface water via runoff from overland flow. Also, the maximum application rate for imazapic is 0.188 lb acid equivalent/acre, based on studies that demonstrate limited mobility at this and lower application rates (BASF Corporation, 2006, p. 4). The slope restrictions on imazapic and imazapyr do not apply within a GVZ because physical translocation of soil-adsorbed chemicals will not affect the groundwater.

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
Imazapyr[29] Salt Cedar, Purple loosestrife, dyers woad, field bindweed. Imazapyr does not work on underwater plants such as Eurasian watermilfoil. Broad spectrum. Arsenal is labeled for uplands, non-tidal wetlands where surface water is not present, non-irrigation ditchbanks, and ditchbottoms where only isolated puddles of surface water occur.	***Use Permitted*** • Consult with Fisheries Specialist.	***Limited Use*** • Use of Habitat or Arsenal on cut stump or hand spraying salt cedar may come into contact with surface water per label instruction. • For all other species, use of imazapyr is allowed up to 5 feet from water's edge if there is a vegetative buffer that has slopes <6%.	***Same as SZ for Imazapyr***	***Use Permitted*** • Exception: No slope limitations	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.
Metsulfuron methyl[30] [31] Houndstongue, thistle, sulfur cinquefoil, common crupina, dyers woad, purple loosestrife, common tansy, whitetop, blueweed. Escort is labeled for Terrestrial applications. Escort can be applied to floodplains, terrestrial areas of deltas, and drained areas of low-lying areas where there may be isolated puddles.	***Use Prohibited***	***Use Prohibited*** • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet.	***Same as SZ for Metsulfuron methyl***	***Use Prohibited***	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.

[29] **SZs. *Limited Herbicides*.** Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. Imazapic and imazapyr are limited to reaches where a well vegetated buffer zone exists and grounds slopes are less than 6 percent between the application site and surface water. These requirements are imposed to keep these herbicides from entering surface water via runoff from overland flow. Imazapyr may be transported on eroded soil particles. Setback and vegetation buffer limitations have been applied to minimize soil transport when imazapyr is applied near water. The slope restrictions on imazapic and imazapyr do not apply within a GVZ because physical translocation of soil-adsorbed chemicals will not affect the groundwater.

[30] **SZs: *Prohibited Herbicides*.** Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Metsulfuron methyl is slow to break down in surface water, especially alkaline waters. Triclopyr is a more acceptable alternative than clopyralid or metsulfuron methyl in a SZ.

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
Picloram[32] Thistles, yellow starthistle, common crupina, hawkweeds, knapweeds, rush skeleton weed, common tansy, toadflax, leafy spurge. Grasses are tolerant. Tordon is labeled for Terrestrial applications. Should not be used where conditions favor off-site movement due to leaching or run-off.	***Use Prohibited***	***Use Prohibited*** • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet.	***Same as SZ for picloram***	***Limited Use*** • Hand application only. Broadcast application prohibited.	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants, especially within 3 times the dripline of trees and shrubs. Avoid direct or indirect application to non-target plants or soil.
Sulfometuron methyl[33] • Spot treatment only with hand application methods. Cheatgrass, whitetop, oxeye daisy, tansy ragwort, musk thistle. Broad spectrum. Oust: - Do not apply near open water.	***Use Prohibited*** • Broadcast application prohibited within 100 feet of AZs. [34] • Aerial application prohibited within 1500 feet of AZs.[35]	***Limited Use*** • Allowed up to 25 feet from water's edge if there is a vegetative buffer with slopes <6%.	***Same as SZ for sulfometuron methyl***	***Use Permitted***	*Use Prohibited*	***Limited Use*** • Spot treatment only within 50 feet of woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.

[32] **WZs.** Picloram can injure woody plants by being exuded through weed roots and being uptaken by trees and shrubs within three times their drip lines.
[33] **SZs.** Sulfometuron methyl limitations are designed to prevent transportation to surface water by overland flow.
[34] USDI BLM, 2005.
[35] USDI BLM, 2005.

Management Zone[13] / General Protection Measures	**Aquatic Zone (AZ)** - still or slow waters with aquatic plants (i.e. purple loosestrife and water milfoil). .[14] • Only those formulations of 2, 4-D, glyphosate, imazapyr, or triclopyr that have been approved for use in or near water are permitted[15]. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted.	**Streamside Zone (SZ)**[16] – perennial and intermittent stream riparian areas. • Ground based boom application is allowed up to 50 feet from water's edge. • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). • Wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.[17] • Only surfactants labeled for use in and around water would be permitted. • Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur.	**Wetland Zone (WZ)** – seasonal and permanent wetlands. • Same Protection Measures as SZs.	**Groundwater Vulnerable Zone (GVZ)[18]** - shallow groundwater beneath permeable soils; most often are riparian areas.[19]. • Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram (see Ch.3, Table 3 -13). • The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below.	**Wellhead Protection Zone (WPZ)[20]** - a 50 foot radius around a functioning well for drinking water. • Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only glyphosate or 2, 4-D formulations approved for use in or near water.	**Woodland Zone (WZ)** - hardwood draws and conifers (woody weeds, such as salt cedar, are excluded from this category).
Triclopyr[36] • Do not use high application rates in order to avoid potential hazards to birds and mammals • The use of triclopyr is limited to selective application techniques only (e.g., spot spraying, wiping, basal bark, cut stump, injection). No aerial spraying. Purple loosestrife, Eurasian watermilfoil, Hawkweeds, sulfur cinquefoil, knapweed, oxeye daisy, thistle. Woody, some broadleaf, & root-sprouting species are susceptible. Grasses are tolerant. Renovate3 (TEA formulation) is labeled for aquatic applications. Garlon 3A, Garlon 4, and Pathfinder II is labeled for Upland sites, non-irrigation ditchbanks, and seasonally dry wetlands, floodplains, deltas, and transition areas between uplands and wetlands. Do not apply directly to water.	***Use Permitted*** • **Aquatic formulations only** • Consult with Fisheries Specialist. ***Use Prohibited*** • **Non-aquatic formulations**	***Limited Use*** • Use only formulations approved for use in or near water. Aquatic labeled formulations can be applied up to the water's edge (without direct contact to the water). ***Use Prohibited*** **Non-aquatic formulations**	***Same as SZ for triclopyr***	***Use Permitted***	***Use Prohibited***	***Limited Use*** • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.

[36] SZs: ***Prohibited Herbicides.*** Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Triclopyr targets many of the same noxious weeds as clopyralid and has been formulated for use near water. Consequently triclopyr is a more acceptable alternative than clopyralid or metsulfuron methyl in a SZ.

Monitoring and Evaluation

Monitoring of treatment sites will be conducted annually. Assessment of the effectiveness of control efforts will consider the weed management objective for each site as well as the infestation size and percent occupancy of the target weed species following treatment. Monitoring will evaluate how well objectives of the EIS are being met and to determine the effects of project implementation on the environment. Depending on the stage of the project, monitoring will vary in intensity by resource element being monitored. All monitoring programs are designed to assure impacts to resources are minimal and to allow corrective actions to be taken immediately should unanticipated actions occur.

The adequacy of the findings and resource data in the EIS will be monitored over time to insure future weed treatment conforms to laws, regulations and resource management requirements in effect at that time. Monitoring results will evaluate: 1) Whether existing weed treatment should continue, be modified or discontinued, and 2) Whether additional monitoring is needed

Treatment methods for each site will be determined based on weed species ecology, cost-effectiveness of treatment and management objectives for the site, (eradication or reduction of seed production). Proposed treatments will be evaluated to determine if they fit within the scope of the EIS relative to the issues analyzed.

DECISION TO BE MADE

Based upon the effects of the alternatives, the responsible official decided to authorize expanded integrated pest management efforts to control noxious and invasive weed infestations across the Custer National Forest. This includes an expansion of ground and/or aerial-based application of herbicides. The decision describes when and under what terms and conditions, and what measures would need to occur to meet Forest Plan goals and standards.