Chapter 4 - Environmental Consequences

Introduction

This chapter summarizes the potential effects of changed conditions which were not evaluated in 1999 (Alternative 1), and also analyzes the environmental effects of additions and/or modifications to current the current weed management program (Alternative 2).

Alternative 1 (No Action) is a continuation of the existing FC-RONRW Integrated Weed Management program. The potential environmental effects of this IWM program was evaluated in the 1999 EIS and is summarized in the 1999 Record of Decision (Appendix M). The continued application of this IWM program will have no additional effects on the biological, physical, or cultural environment. Changed conditions since 1999 may have potential environmental effects that were not analyzed in 1999. These potential effects will be addressed in this section.

The components of Alternative 2 (Proposed Action) that are a modification to the existing Integrated Weed Management program will be analyzed in this section.

Noxious and Invasive Weeds

Initial evaluation of information from established monitoring sites indicates successful reduction of noxious/invasive weeds at these monitoring sites, while adverse effects to non-target vegetation was minimal and within expected levels (Summarized Monitoring Results in Appendix I).

Favorable conditions for noxious/invasive weeds within the FC-RONRW continue to increase due in part to large wildfires. In the year 2000 alone, over 435,000 wilderness acres were burned by wildfires. Many of these sites were considered by managers to be high intensity burns. Following wildfire, especially areas burned with high intensity, the potential for noxious/invasive weed invasion increases (Asher, Dewy, Olivarez, 2001). Weed managers within the FC-RONRW have observed significant spread of noxious/invasive weeds into burned areas, especially in areas adjacent to existing weed sites.

The existing prescribed application rate of authorized herbicides (Alternative 1) is depicted in Chapter 2, Table 2.1. This prescribed rate of application in some cases is significantly less than herbicide label recommendations. For example, the prescribed application rate for Picloram (Tordon 22 K) for all weed species as described in the 1999 EIS is 0.25 lbs active ingredient per acre (approximately 1 pt/ac). The recommended application rate from the EPA approved label is 1 to 2 pts for treatment of spotted knapweed and 2 to 4 pts for treatment of rush skeletonweed.

Treatment of rush skeletonweed within the FC-RONRW at the rate of 1 pt/ac Tordon 22 K has resulted in less than optimal weed mortality. Observations from field crews indicate this authorized application rate of Tordon 22 K, which is ½ to ¼ the recommended label rate, has resulted in ineffective treatment of both rush skeletonweed and spotted knapweed. While a predominant proportion of the target weeds may die at his rate of application, many weeds at the site may not die. As in the case with bacteria and antibiotics, survival of a portion of the population may actually result in artificial genetic selection towards individual weeds more resistant to the herbicide being applied. Application of herbicides at less than the label recommended rates results in increased costs associated with re-treatment, or if sites are not re-treated in a timely manner, may result in the expansion of the weed infestation. One desirable attribute of Tordon 22 K is the residual effect of inhibiting weed seed germination into the next

growing season. The lighter rate of application prescribed by Alternative 1 does not generally result in effective residual properties. Alternative 2 proposes to allow herbicide application up to label rates which will significantly improve the treatment effectiveness on "hard to kill weeds" such as rush skeletonweed.

Since invasive weeds are typically opportunistic pioneers of open sites, practices that favor retention or introduction of desirable plants that compete with exotic plants serve as a prevention measure for noxious weeds. Following manual or herbicide treatments, treatment sites are evaluated for implementation of potential restoration practices. Such restoration practices would purposefully enhance the growth of native vegetation following treatment. Proposed restoration practices would be analyzed for site-specific environmental effects. In many sites occurring in the low elevations of the FC-RONRW, non-native annual grass species will continue to dominate a site once the target weed has been treated. Desired restoration to native perennial vegetation may require the use of a herbicide, such as Plateau, to kill annual grasses within the site. The use of Plateau herbicide, as proposed under Alternative 2, will significantly improve the success of restoration projects.

Table 4.1: Weed Effects Summary by Alternative – Noxious Weed Expansion

Alternative 1	Alternative 2
* Integrated Weed Management will maintain and protect existing native plant communities. * The extent of noxious and invasive weed invasion and expansion is largely dependant upon the availability of resources to combat weeds and implement prevention and education measures. * The effectiveness of treatments can significantly influence the attainment of Integrated Weed Management objectives. The prescribed rate of application (less than label recommendations) and constrained use of biological control may impede attainment of treatment goals.	* Integrated Weed Management will maintain and protect existing native plant communities. * The extent of noxious and invasive weed invasion and expansion is largely dependant upon the availability of resources to combat weeds and implement prevention and education measures. * Alternative 2 is very similar to Alternative 1, but strives to improve effectiveness of treatments, which will result in significantly greater mortality of noxious and invasive weeds, i.e. allows up to label recommended rate of herbicide application and expanded role of biological control.

Cultural Resources

Continued implementation of the existing noxious/invasive weed management program (Alternative 1) will have no effects to cultural resources in addition to those described in the 1999 EIS, pages 60-61. The 1999 EIS concludes that prescribed treatment of noxious/invasive weeds will have far less potential impact to recreation and cultural resources than would uncontrolled and rapid expansion of noxious/invasive weeds.

Alternative 2 (Proposed Action) proposes minor modifications to existing treatment practices and to allow the use of Plateau herbicide. Alternative 2 will have no effects to cultural resources in addition to those described in the 1999 EIS, pages 60-61.

Table 4.2: Weed Effects Summary by Alternative – Cultural Resources

Alternative 1	Alternative 2
* Far less potential impact to cultural resources than would uncontrolled and rapid expansion of noxious/invasive weeds.	* No effects to cultural resources in addition to those described for Alternative 1.

Fisheries (Including Threatened, Endangered and Sensitive Species)

The potential environmental effects of implementing the prescribed integrated weed management program in the FC-RONR in relation to fisheries is described in the 1999 EIS, pages 61-66. The 1999 EIS summarizes the effects of prescribed treatment of noxious/invasive weeds on fish and their habitat as follows;

- Impacts of herbicide application (with appropriate mitigation measures) will be minimal.
- Effects on aquatic organisms under normal use scenarios should not be detectable.
- A spill may result in localized fish mortality, especially to young fingerlings, or mortality to the early developmental stages of other aquatic organisms. However, adherence to mitigation measures will reduce the likelihood of such a spill event.

Alternative 1 is a continuation of the existing weed management program. Therefore, the effects of Alternative 1 on fisheries will be the same as those described in 1999 EIS, pages 61-66.

Alternative 2 (Proposed Action) will improve the effectiveness of existing weed management practices, including weed treatment. Alternative 2 proposes label rates of herbicide application, and the potential future use of Plateau herbicide for restoration projects. The potential effects of manual/cultural and biological control actions proposed in Alternative 2 is similar to those described for Alternative 1, and discussed in the 1999 EIS, pages 61-66. An increase in the scope and/or intensity of these treatment methods is expected as more acres are detected and treated. It is also expected that annual acreage treated through herbicide control methods will increase as new infestations are detected. Both the risks and benefits associated with herbicide control of noxious weeds will incrementally increase.

While risk of spills may increase proportional to the expansion of weed infestations and their detection and treatment, existing herbicide handling guidelines (Alternative 1) and proposed herbicide handling guidelines (Alternative 2) will keep the probability of a spill event low (Appendix E). Additional beneficial effects to watershed health through reduction of noxious weeds and establishment of native vegetation is dependent on the efficiency of treatments.

Additional calibration documentation requirements identified for Alternative 2 will further assure that herbicides are being used in accordance with label directions (Appendix G).

Although specific Management Indicator Species (MIS) have changed since 1999 (Table 3.2), conclusions drawn regarding the potential effects of Alternative 1 on identified MIS have not changed, “Effects on aquatic organisms under normal use scenarios should not be detectable”, (1999 EIS, page 66).

The potential effects to FC-RONRW Forest Management Indicator Species, and 303(d) listed waters resulting from implementation of the proposed action (Alternative 2) will be similar to those described for Alternative 1.

Presently, noxious weed infestations in the FC-RONRW are having little effect on sediment yields because the sites occupy a relatively small portion of the total land area. Effects of the current noxious weed treatment program on 303 (d) streams within the wilderness are dependent upon the location of existing infestations. Successful noxious weed treatment in

sediment-listed 303(d) drainages will reduce existing and potential future soil erosion and sedimentation rates and therefore benefit Management Indicator Species.

Although spills of herbicides that reach live waters in sufficient quantity and concentration may negatively impact TES or MIS species, Weed Prevention Measures and mitigations applied under Alternative 2 will keep the probability of such a spill low.

A hypothetical worst-case scenario involving the use of herbicides is described and analyzed in the 1999 EIS, pages 63-66. This worse-case scenario calculates the potential extent of herbicide contamination in two drainages within the FC-RONRW This worst-case analysis assumes that a maximum of 1 percent of the applied herbicide reaches an adjacent stream within 24 hours following a major storm. Calculations based on .25 lbs/ac of Picloram and the size infestations known at that time (plus 30%) yielded worst-case potential contamination of about .0013 mg/L would occur within the adjacent stream. This concentration is about 423 times lower than the 0.55 ppm No-Observable-Effect-Level (NOEL) for fish (Picloram Aquatic Risk Assessment, USDA Forest Service, July 1999 (SERA TR 99-21-15-of1). If these same calculations were made using the labeled rate of Picloram (Alternative 2) for use on rush skeletonweed (1 lb/ac) and acreages were increased due to further expansion of weed sites (100%), the worst-case potential concentration reaching the adjacent stream may be 0.008 ppm, about 70 times lower than the NOEL of 0.55 ppm.

In a report prepared for the U.S.D.A.-FS (SERA TR 99-21-15-of1) under section 4.4.1, Risk Characterization, states "[that] Longer term water concentrations associated with the normal application of Picloram at an application rate of 1 lb (a.i.)/acre are likely to be in the range of 0.01 to 0.06 mg/L in areas with substantial rain fall or as the result of applications in which some initial incidental contaminations of water occurs. All of these concentrations are substantially below concentrations that have been shown to impact aquatic plants or animals. At the highest plausible application rate…Even at the highest estimated concentrations, however, no effects would be anticipated in aquatic animals…" (USDA Forest Service, FEIS Weed Management, Lolo National Forest, July 2001).

Plateau; Alternative 2 proposes to authorize the use of the herbicide Plateau (imazapic) for potential restoration projects in the future. As part of the aquatic analysis for herbicide application, a risk quotient was developed for each herbicide product that may be used to treat noxious weeds within the FC-RONRW. The risk quotient was calculated from a no adverse effect level, derived from known toxicity values for rainbow trout (Table 4.1) divided by an "Expected Environmental Concentration" (EEC). The EEC, expressed in parts per million (ppm), was derived from a direct application of the active ingredient to an acre pond (one-foot deep) using the maximum rate specified on the label (Urban and Cook, 1986). The EEC is an extreme level that is unlikely to occur during implementation and should be viewed as a worst-case situation. The risk quotient (Table 4.2) provides a reference from which a possible worst-case situation can be viewed. If the risk quotient is greater than 10, the level of concern is categorized as "Low". If the risk quotient is between one and 10, the level of concern is "Moderate". If the risk quotient is less than one, the level of concern is "High". Only herbicides identified as having a low or moderate level of aquatic concern are utilized for noxious weed treatment within the FC-RONRW.

Table 4.1 - Toxicology profile of herbicides currently used and proposed for use within the FC-RONRW 1/

	Transline[2]	*Weedar 64*[3]	*Rodeo* [4]	*Escort* [5]	*Tordon 22K* [6]	*Banvel*[7]	*Plateau*[8]
Toxicology	***Clopyralid***	***2,4-D***	***Glyphosate***	***Metsulfuron Methyl***	***Picloram***	***Dicamba***	***Imazapic***
Rainbow Trout (96 hr LC50) (mg/l)	103	250	>1000	>150	5.5-19.3	>1000	>100
Daphnia (96 hr LC50) (mg/l)	232	184	930	>12.5 (48 hr)	68.3	>100	>100
Bio-accumulates	No	No	No	No	No	No	No
Persistence in soil[9]	40 Days (Moderate)	10 Days (Low)	47 Days (Moderate)	30 Days (1-4 Wks) (Low)	90 Days (20-300) (Mod-High)	7-42 Days Low-Mod	7-150 Days (Low-High)
Mobile in soil	No	Yes, but degrades quickly	No	No	Yes	Yes	No

1 Currently utilized herbicides: Clopyralid, 2,4-D, Glyphosate, Picloram, Dicamba; Additional herbicides proposed under Alternative 2: Imazapic

2 USFS, 1999a. Clopyralid Risk Assessment – Final Report.

3 USFS, 1999b. 2,4-Dichlorophenoxyacetic Acid Formulations Risk Assessment – Final Report.

4 USFS, 1999c. Glysophate Risk Assessment.

5 USFS, 1999d. Metsulfuron Methyl Risk Assessment-Final Report

6 USFS, 1999e. Picloram Risk Assessment – Final Report.

7 USFS, 1995. Dicamba Pesticide Fact Sheet.

8 USFS, 2000b. Imazapic Risk Assessment – Final Report.

9 Soil half-life values for herbicides are from Herbicide Handbook (Ahrens, 1994) Pesticides that are considered non-persistent are those with a half-life of less than 30 days; moderately persistent herbicides are those with a half-life of 30 to 100 days; pesticides with a half-life of more than 100 days are considered persistent.

Table 4.2. Aquatic Level of Concern assessment for herbicides currently used and proposed for use within the FC-RONRW 1/

Active Ingredient	Product Name	Typical Application Rate lb ai/ac [2]	Max Label Application Rate Lb ai/ac [2]	EEC (ppm) [4]	Toxicity 96-hour LC50 (mg/L) [5]	Safety Factor 1/20 LC50 (mg/L)	Species Tested	Risk Quotient and Level of Concern [6]
Clopyralid	Transline	0.1-0.375	0.5	0.184	103	5.2	**Rainbow Trout**	28 Low
2,4-D amine	Amine 4, Weedar 64	0.5-1.5	3.0	1.103	250	12.5	**Rainbow Trout**	11 Low
Glyphosate	Rodeo	0.5-2.0	3.75	1.379	1000	50	**Rainbow Trout**	36 Low
Metsulfuron-methyl	Escort	0.25-0.75	2.0 oz	0.046	150	7.5	**Rainbow Trout**	163 Low
Picloram	Tordon 22K	0.125-0.5	1.0 [3]	0.368	19.3	0.965	**Rainbow Trout**	2' Moderate
Dicamba	Banvel	0.25-4.0	4.0	1.47	1000	50	**Rainbow Trout**	34 Low
Imazapic	Plateau	0.06-0.2	0.75	0.276	100	5.0	**Rainbow Trout**	18 Low

[1] Currently utilized herbicides: Clopyralid, 2,4-D, Glyphosate, Picloram, Dicamba;
Additional herbicides proposed under Alternative 2: Imazapic

[2] Application rates are based upon typical and maximum label rates unless otherwise noted.

[3] Maximum application rate for Plicoram is 1 lb per acre; Rates may be higher for smaller portions of the acre, but the total use on the acre cannot exceed 1 lb ai/ac/yr.

[4] Hazard Evaluation Division, Standard Evaluation Procedure – Ecological Risk Assessment (Urban and Cook, 1986). Concentrations derived from Table 2 (Page16) based upon application rate (lbs ai/ac) and one foot water depth.

[5] Rainbow Trout LC50 values from Herbicide Handbook, Seventh Edition (Ahrens,1994) and individual USFS Pesticide Fact Sheets and Risk Assessments (see Table 9 footnotes).

[6] The Risk Quotient and Level of Concern for a mixture of herbicides would reflect the values associated with the mixture's most toxic component. For example, the Level of Concern for a mixture of 2,4-D amine and Picloram would be Moderate, reflecting calculations based upon the higher toxicity of Picloram.

[7] Risk Quotient values for Picloram reflect the range of LC50 toxicity value of 5.5 to 19.3 mg/l identified by various observers. Level of Concern would be Moderate for LC50 values above 7.3 mg/l, including the midpoint value of 12.4 mg/l. Level of Concern would be high based upon LC50 values from 5.5 to 7.3 mg/l.

As indicated in Table 4.2, imazapic ranks as a "low risk" herbicide, classed in the same category as the currently-utilized 2,4-D, glyphosate, clopyralid, dicamba, and metsulfuron methyl. The additional use of imazapic as a chemical treatment option under Alternative 2 would not produce any additional effects or risks to fisheries or aquatic habitats relative to the existing group of herbicides currently authorized for noxious weed treatment within the FC-RONRW.

A Risk Assessment prepared for the Forest Service indicates that aquatic organisms appear to be relatively insensitive to imazapic exposure, relative to both direct toxicity and reproductive effects (USFS, 2001a, USFS, 2001b). Spill risks associated with imazapic use are similar to, and within the range of risks identified for other herbicides currently utilized in FC-RONRW weed treatment. As Plateau (imazapic) is not an aquatic-certified herbicide, application guidelines will limit its use to sites at least 50 feet removed from live waters.

Cumulative Effects. Continued implementation of the existing Integrated Weed Management Program (Alternative 1) and implementation of the proposed action (Alternative 2) will not result in any significant influences on the scope or magnitude of cumulative effects beyond those described in the 1999 EIS for the current program. Potential cumulative effects associated with the use of Plateau (imazapic) herbicide are within the range of potential effects analyzed in the 1999 Noxious Weed Treatment EIS, and no additional effects are anticipated as a result of incorporation of this chemical as a noxious weed treatment tool. No additional cumulative effects would be anticipated through application of Adaptive Management program strategies or implementation of the Noxious Weed Prevention Plan.

Table 4.3: Weed Effects Summary by Alternative – Fisheries

Alternative 1	Alternative 2
* Impacts of herbicide application (with appropriate mitigation measures) will be minimal. * Effects on aquatic organisms under normal use scenarios should not be detectable. * A spill may result in localized fish mortality, especially to young fingerlings, or mortality to the early developmental stages of other aquatic organisms. However, adherence to mitigation measures will reduc the likelihood of such a spill event.	* Impacts of herbicide application (with appropriate mitigation measures) will be minimal. * Effects on aquatic organisms under normal use scenarios should not be detectable. * A spill may result in localized fish mortality, especially to young fingerlings, or mortality to the early developmental stages of other aquatic organisms. However, adherence to mitigation measures will reduce the likelihood of such a spill event. * An increase in the scope and/or intensity of treatment methods is expected as more acres are detected and treated. It is also expected that annual acreage treated through herbicide control methods will increase as new infestations are detected. Although risks are anticipated to be minor, both the risks and benefits associated with herbicide contro of noxious weeds will incrementally increase as treated acres increase.

Human Health

Continued implementation of the existing noxious/invasive weed management program (Alternative 1) will result in no additional human health concerns or effects in addition to those described in the 1999 EIS, pages 69-72. The 1999 EIS concludes that human health impacts from prescribed treatment of noxious/invasive weeds will be insignificant and small.

The proposed alternative (Alternative 2) will authorize the use of an additional herbicide, imazapic (trade name, Plateau). The potential effects associated with the use of Plateau are further discussed. All other components of this proposed noxious/invasive weed management strategy pose no additional potential threats to human health over and above those effects described in the 1999 EIS.

The potential health risks of a variety of herbicides were analyzed in the 1999 EIS. This 1999 analysis reviewed and incorporated several documents related to herbicide safety, including, Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Administration Sites, Human Health Risk Assessment for Herbicide Application to Control Noxious Weeds and Poisonous Plants in the Northern Region, and The Risk Assessment Guidelines of 1986-8/87 (EPA Guidelines 1986). This SEIS also incorporates Imazapic Human Health and Ecological Risk Assessment Final Report, (Appendix O)

Toxicology: Toxicology studies for Plateau have determined the toxic effect levels that would be injurious to human health. Exposures and doses that might occur as a result of projects are estimated for workers and members of the general public. The toxic effect levels established are compared to dose levels to determine the potential for human health impacts.

Plateau does not bioaccumulate or biomagnify. Animals high on the food chain (humans, eagles, wolves) are not expected to acquire concentrated doses of this chemical by feeding on contaminated plants or animals. It is water soluble, not lipid soluble (will not concentrate in fatty tissues), and is excreted quite rapidly.

A No-observed-effect level (NOEL) is the highest dose in a particular test that did not result in adverse health impacts to the test organism. Extrapolating a NOEL from an animal study to humans, is an uncertain process. The U.S./EPA compensates for this uncertainty by dividing NOEL's from animal tests by a safety factor (typically 100) when deciding how much pesticide will be allowed on various foods. This adjusted dose level is referred to as the Acceptable Daily Intake (ADI) and is presumed by the EPA to be a dose that is safe even if received every day for a lifetime. The ADI is a convenient comparison point for determining the significance of doses that people might receive from these weed-control projects. All doses to members of the general public would be below the ADI for the herbicides proposed except for the possibility to persons who gather and eat more than one-half pound of wild food that has been directly sprayed with herbicide. This is very unlikely because wild foods such as raspberries and huckleberries typically do not occur within noxious/invasive weed infestations. If edible fruits did occur within a weed population, application would only be directed onto the weed plants and would probably occur several months prior to fruit ripening. If fruit bearing plants were unintentionally sprayed, they would not develop fruit that season. If spraying occurred within popular locations where wild foods may occur, the area would be signed to warn against consumption. Weed infestations growing at locations where people are known to commonly harvest wild plants for consumption, will be treated using non-herbicide methods. In the unlikely event people were exposed to the chemical imazapic, health risks would be minimal.

Worker doses for imazapic are likely to be below the ADI if reasonable safety precautions are used. There is the possibility of idiosyncratic responses such as hypersensitivity on the part of a small percentage of the population. Such persons are generally aware of their sensitivities since they are typically triggered by a variety of natural and synthetic compounds. These persons should not be permitted to work on the spray crews.

Cancer: Some people have expressed concern about the delayed effects of low levels of chemical exposure, particularly the risk of cancer. Imazapic is not listed as an OSHA, NTP or IARC Carcinogen. EPA carcinogenicity classification is, "Evidence of Non-Carcinogenicity" (Lolo NF Weed Mgt EIS, 2001).

Synergistic Effects: Concerns are occasionally raised about the synergistic interactions of the pesticides and other chemicals in the environment. Synergism is a special type of interaction in which the cumulative impact of two or more chemicals is greater than the impact predicted by adding their individual effects. These include the interaction of the active ingredients in a pesticide formulation with its inert ingredients, the interactions of these chemicals with other chemicals in the environment, and the cumulative impacts of spraying proposed here and other herbicide spraying to which the public might be exposed. The low, short-lived doses that would result from spraying Plateau (imazapic), and other associated herbicides, for noxious/invasive weed management in the Frank Church-River of No Return Wilderness, are very small. For these relatively small doses, a synergistic effect is not realistically expected. EPA has concluded that synergistic affects are rare and certainly not the norm (Lolo Noxious Weed Management EIS 1991).

Inert Ingredients: In the process of formulating pesticides for commercial use a variety of surfactants, emulsifiers, dilatants, and other so-called inert ingredients may be added. The toxicological properties of these additives have come under increased scrutiny. EPA has issued two lists of inerts requiring further regulation or testing. The first list of about 55 chemicals groups the "Inerts of Toxicological Concern", and a second list of 60 chemicals are "Potentially Toxic Inerts/High Priority for Testing." Plateau does not contain any of these listed inert ingredients, (Personal communiqué with Dan Watts, BASF Corp, Sept 4, 2002). The LD50 values for the pesticide formulations are typically higher than those of the active ingredient, indicating that the formulations are less toxic. Unfortunately, chronic tests (exposure over long periods of time) of pesticide formulations are not available and interactive effects on cancer rates or other health effects cannot be ruled out absolutely.

Cumulative Effects: The potential cumulative effects of imazapic are within the range of potential effects analyzed in the 1999 EIS. No additional cumulative effects are anticipated.

The 1999 EIS states that noxious/invasive weed populations occur on ten private property in holdings along the Main Salmon River and several in holdings along the Middle Fork. If these infestations on private lands were chemically treated by the private property owners concurrently with herbicide treatments on adjacent Federal lands, the additive human health risk to spray crews and the public visiting the Wilderness would still be very small. For example, a worker who sprays herbicides on non-Forest Service projects and is also a resident in the vicinity of Forest Service projects might expect, under worst case conditions, an increase in herbicide dose of about 1 percent over his worker dose. Typically, the increase would not be measurable.

The total doses to members of the general public from all sources of herbicides are unlikely to be higher than those estimated in these analyses. The dose to "maximum-exposed" residents assumes that the greatest portion of their diet came from spray-impacted foodstuffs. Any substitution of food from other sources (e.g., food markets) would lessen the dose.

Major Accident Scenarios: Major accidents involving herbicide application projects are extremely rare. The possibility of accidents in the future cannot be completely discounted, however. Worst-case scenarios involve spills from tank trucks with mixed herbicide loads into drinking water reservoirs. The 1999 EIS analyzed potential for herbicide spills associated with

the implementation of prescribed weed treatments. Various accident scenarios, including spills of concentrated herbicide formulations onto people or into drinking water reservoirs, were reviewed in the Northern Region Health Risk Analysis. Spills of concentrate onto people could cause acute effects including nausea, trembling, headache, etc., depending on the degree of exposure, time to cleanup, and individual factors. The calculated probabilities for these accidents are quite low. For the entire Northern Region (assuming 1,220 projects per year), truck spills involving herbicides had calculated probabilities ranging from five every 1,000 years to one in 2,400 years. The probability of such accidents involving drinking water reservoirs were conservatively calculated at one accident every 34,000 years. Risk within the FC-RONRW would be far less than one in 34,000 years because even under the proposed action, annual projects would number far fewer than 1,220, and tank trucks are excluded from the Wilderness.

In summary, we would reasonably expect that the human health impacts from herbicide applications as described in Alternative 2, would remain virtually un-detectable and insignificant.

Table 4.4: Weed Effects Summary by Alternative – Human Health

Alternative 1	Alternative 2
* Human health impacts from prescribed treatment of noxious/invasive weeds will be insignificant and small, even under a worst case situation. * Workers applying 2,4-D who failed to use protective equipment would be at the greatest risk, although this risk would still be very small.	* Human health impacts from prescribed treatment of noxious/invasive weeds including, application of herbicides at recommended label rates and the additional use of Plateau herbicide, will be insignificant and small. * The potential cumulative effects of herbicide treatment to people, including the use of imazapic, are within the range of potential effects analyzed for Alternative 1.

Recreation

Continued implementation of the existing noxious/invasive weed management program (Alternative 1) will have no effects to recreation resources in addition to those described in the 1999 EIS, pages 72-74. The 1999 EIS concludes that anticipated effects from the treatment of noxious/invasive weeds to recreation resources will primarily be beneficial. However, recreationists could encounter dead or dying vegetation for short periods of time.

Alternative 2 (Proposed Action) proposes minor modifications to existing treatment practices and to allow the use of Plateau herbicide. Alternative 2 will have no effects to recreation resources in addition to those described in the 1999 EIS, pages 72-74.

Table 4.5: Weed Effects Summary by Alternative – Recreation

Alternative 1	Alternative 2
* Reductions of noxious weed populations will enhance recreation sites and the recreation experience. * Recreationists may encounter treatment crews and witness evidence of chemical and physical treatment such as wilted plants and weed piles.	* No significant effects to recreation resources in addition to those described for Alternative 1. * Protected or restored native plant communities resulting from more effective weed treatment will further enhance recreation sites and the recreation experience

Plant Community Diversity (Including Threatened, Endangered & Sensitive Plants)

The 1999 EIS concludes that prescribed treatment of noxious/invasive weeds with implementation of specific mitigation measures, will have far less potential impact on native plant diversity and to threatened, endangered or sensitive plant species than will uncontrolled and rapid expansion of noxious/invasive weeds.

Alternative 1 is a continuation of the existing weed management program, therefore the effects of this alternative on plant community diversity would be the same as those described in 1999. (1999 EIS, pages 74-76).

Alternative 2 (Proposed Action) will improve the effectiveness of existing weed management practices, including weed treatment. The 1999 EIS draws the following conclusions regarding the prescribed weed treatments;

- Un-infested native plant communities will remain intact and infested communities will be reclaimed.
- Ecosystem protection and enhancement will be greatest under the selected alternative.
- The impacts on plant diversity from herbicides tend to be localized and short term. Plant diversity has been found to recover to pre-treatment levels within 3 years after treatment (Rice et al 1992).

It is expected, therefore, that the proposed measures associated with Alternative 2, which are intended to improve the effectiveness of weed management, will allow for better long-term protection and maintenance of native plant diversity and stability of plant communities.

The preferred alternative (Alternative 2) includes the potential future use of the herbicide Plateau (imazapic) to reduce exotic annual grass density on low elevation sites. The use of Plateau could contribute significantly to the success of restoration and rehabilitation projects. Successful restoration of native plant communities is a goal of Integrated Weed Management.

Threatened, Endangered, and Sensitive Plants
The potential effects of the existing weed treatments (Alternative 1) on threatened, endangered and sensitive (TES) plant species are analyzed in chapter four of the 1999 EIS, pages 76-90. The 1999 EIS concludes, impacts on native vegetation including TES plants from treatment methods, most notably herbicides could occur. However, impacts would be of short duration and minimized by mitigation measures.

Since 1999, one new threatened plant species, Spalding silene (*Silene spaldingii)* and one candidate species slender moonwort (*Botrychium lineare*) were added to the Nez Perce and Payette National Forests threatened, endangered and sensitive species list requiring consideration or consultation with the USFWS. Treatments associated with Alternative 1 & 2 will not affect either of these species. Habitat for Spalding silene occurs on the lower Salmon River outside the FC-RONRW. Slender moonwort habitat, which may occur in the FC-RONRW at moderate to high elevations in spruce and lodge pole pine habitat, typically occurs outside the proposed treatment areas of grasslands, Douglas fir and Ponderosa pine communities. Habitat for the threatened plant species, Spalding silene (Silene spaldingii) and candidate species slender moonwort (Botrychium lineare) as not been identified on the Bitterroot or Salmon-Challis. Neither species requires consideration or consultation with the USFWS.

Surveys since 1999 have found occupied habitat for three additional sensitive or proposed sensitive plant species within or near weed infestations. They include: Davis stickseed (*Hackelia davisii*), pored lungwort (*Lobaria scrobiculata*), and Borsch's stonecrop (*Sedum borschii*). These species are found in the ponderosa pine and Douglas-fir-grasslands communities of the river canyons on the Payette NF. Davis stickseed occurs on the Middle Fork of the Salmon River and pored lungwort and Borsch's stonecrop occur on the Main Salmon River.

Effects to the three additional sensitive or proposed sensitive plants were not analyzed in the 1999 EIS. All species occupy habitat that is highly susceptible to invasion by spotted or diffuse knapweed. Use of the herbicides, Picloram and Clopyralid (Alternative 1 & 2) may impact Davis stickseed, a member of the borage family (Boraginaceae), pored lungwort, a member of the Lobariaceae family and Borsch's stonecrop, a member of the stonecrops (Crassulaceae). While herbicide treatments (Alternative 1 & 2) may impact individuals plants or habitat, treatments will not lead to federal listing primarily because the mitigation measures developed in the 1999 EIS will continue to protect these plants from treatments.

A total of seven sensitive or proposed sensitive plant species are known to occur within or near weed infestations that may be treated with herbicide. Alternatives 1 & 2 may impact individual sensitive plants or habitat, but will not lead to Federal listing. Potential habitat for these sensitive species will be maintained through control of invasive weeds, and protective mitigation measures will be implemented to protect individual plants by surveying habitat, identifying treatment buffers and/or treatment options prior to project implementation.

The preferred alternative (Alternative 2) includes the potential future use of the herbicide Plateau (imazapic) to reduce exotic annual grass density on low elevation sites. The following is a description of sensitive plants affected by the use of Plateau herbicide;

Payson's milkvetch. This species is in the Pea family (Fabaceae). The native plant species lupine (*Lupinus*), which is also in the Pea family, is tolerant to Plateau both pre and post emergence in mixed grass and forb stands (Plateau herbicide label, BASF 2000). It is possible that Plateau herbicide, applied at the label rate of 2 to 4 ounces per acre, would not necessarily harm individual plants of Payson's milkvetch, if any were present.

Puzzling halimolobos. This species is in the Mustard family (Brassicaceae). According to the label for Plateau (BASF 2000), the herbicide can be used to control species of mustards (*Brassica)*. Therefore, Plateau herbicide, applied at the label rate of 2 to 4 ounces per acre, could possibly adversely affect individual plants of puzzling halimolobos, if any were present. However, pre-treatment surveys as required by mitigation would preclude this.

Lemhi penstemon and bank monkeyflower. These species are both in the Figwort family (Scrophulariaceae). Plateau herbicide, applied at the label rate of 2 to 4 ounces per acre, could adversely affect individual plants of these species, if any were present. However, pre-treatment surveys as required by mitigation would preclude this.

Davis stickweed. This species is in the borage family (Boraginaceae). Effects to this plant family are not specified for the herbicides analyzed in the 1999 Weed EIS, or for Plateau herbicide. These herbicides could adversely affect individual plants, if any were found to be present in the treatment areas. However, pre-treatment surveys as required by mitigation would preclude negative effects to individuals and populations.

Pored lungwort lichen. This lichen is in the Lobariaceae family. Effects to this plant family are not specified for the herbicides analyzed in the 1999 Weed EIS, or for Plateau herbicide. These herbicides could adversely affect individual plants, if any were found to be present in the treatment areas. However, pre-treatment surveys as required by mitigation would preclude negative effects to individuals and populations.

Borsch's stonecrops. This plant is a member of the Stonecrop family (Crassulaceae). Plateau herbicide, applied at the label rate of 2 to 4 ounces per acre, could adversely affect individual plants of these species, if any were present. However, pre-treatment surveys as required by mitigation would preclude negative effects to individuals and populations.

Cumulative Effects The predominant threat to plant community diversity within the FC-RONRW, including threatened, endangered and sensitive plant species, is the unimpeded expansion of exotic and invasive plants. Noxious and invasive weed management associated with Alternative 1 & 2, including the prescribed use of herbicides, will have no adverse effects that accumulate with other impacts to cause a significant detriment to plant community diversity or TES plant species.

Table 4.6: Weed Effects Summary by Alternative – Vegetative Diversity

Alternative 1	Alternative 2
* Impacts on native vegetation including TES plants from treatment methods, most notably herbicides, may occur. However, impacts will be of short duration and minimized by mitigation measures. * Ecosystem protection and enhancement will improve under this alternative.	* Impacts on native vegetation including TES plants from treatment methods, most notably herbicides, may occur. However, impacts will be of short duration and minimized by mitigation measures. * The proposed measures associated with Alternative 2, which are intended to improve the effectiveness of weed management, will allow for greater long-term protection and maintenance of native plant diversity and stability of plant communities. * The use of Plateau herbicide may contribute significantly to the success of future rehabilitation projects aimed at restoring native vegetation.

Wildlife (Including Threatened, Endangered and Sensitive Wildlife Species)

The potential environmental effects of implementing the prescribed integrated weed management program in the FC-RONRW in relation to wildlife, is described in the 1999 EIS, pages 80-86. The 1999 EIS summarizes the effects of prescribed treatment of noxious/invasive weeds on wildlife and their habitat as follows;

- Existing plant communities would remain intact and infested sites would be reclaimed. Subsequently, this alternative provides the greatest protection to wildlife habitat, including TES.
- Potential risks of herbicides affecting wildlife species health is greatest as the need for herbicide application increases. However, this risk would be very small.
- Toxicity of the herbicides approved for use in the FC-RONRW at potential doses associated with noxious/invasive weed treatment, even under worst-case scenarios, is fairly non-toxic to test animals and thus their wild counterparts.

Alternative 1 is a continuation of the existing weed management program. Therefore, the effects of Alternative 1 on wildlife will be the same as those described in the 1999 EIS, pages 80-86.

Alternative 2 (Proposed Action) will improve the effectiveness of existing weed management practices and therefore have the greatest potential to maintain wildlife habitats.

The 1999 EIS reviewed the toxicity rates of various herbicides (LD50) with the sensitivity of selected domestic animals representing similar wild species determined through laboratory studies. This analysis concluded that the toxicity of the herbicides approved for use in the FC-RONRW at potential doses associated with noxious/invasive weed treatment, even under worst case scenarios, are fairly non-toxic to test animals and thus their wild counterparts.

The level of toxicity of Picloram (Tordon 22K) ranges from 540 mg/Kg of body weight for large herbivores, such as cattle and elk, to > 2,000 mg/Kg of body weight for smaller mammals including mice, mallards and rabbits (Lolo Noxious Weed Management EIS 1991). The smaller the LC50 value, the higher the level of toxicity to that particular species. Picloram is more toxic to elk than to smaller animals such as mice, rabbits or mallards. Alternative 2 allows the use of Picloram at the Label recommended rate of 2–4 pints/acre (1 lb A.I./ac). This rate of application could result in the worst-case consumed dose of herbicide by a herbivore the size of an elk of 18 mg/Kg of body weight.

According to a study done by Hoerger and Kenaga (1972 from USDA Lolo EIS.1991), an application rate of one pound per acre results in a herbicide concentration on range grass of 125 mg/Kg. Assume that at one pound per acre application rates (Alternative 2), the concentration would be 125 mg/Kg and that the animals feed immediately after spraying and on nothing but sprayed vegetation. The worst-case dose calculations for cattle and elk are as follows:

> **Cattle**. Assuming that a steer eats 75 pounds of green forage/day (35 Kg/day) and weighs 1000 lbs. (450 Kg), the dosage is 125 mg/Kg x 35 Kg/steer x steer/450Kg = 9.7 mg/Kg. This figure is only 1.8 percent of the LD50, so Picloram at prescribed rates can thus be considered to be fairly non-toxic to cattle.
>
> **Elk**. Assuming that an elk eats 36 pounds of green forage/day (16.4 Kg/day) and weighs 500 lbs. (230 Kg), the dosage is 125 mg/Kg x 16.4 Kg/elk x elk/230 Kg = 8.9 mg/Kg. This figure is only 1.7 percent of the LD50, so assuming that elk have an LD50 comparable to cattle, Picloram at prescribed rates can be considered fairly non-toxic to elk.

The potential dose of herbicide obtained from a predator, such as a coyote or wolf, ingesting contaminated meat from the above toxicity exercise involving elk, is much less, about .01 mg/kg of body weight.

The Human Health Risk Assessment indicates these herbicides including Picloram, are quickly excreted by exposed animals. Therefore, effects on predators such as wolves or on raptors such as bald eagles or peregrine falcons are not expected. Because these herbicides do not bioaccumulate, the cumulative impacts of spraying sites inside and outside the Wilderness would be insignificant.

Imazapic (Plateau) is essentially non-toxic to terrestrial mammal, birds, amphibians, aquatic invertebrates and insects. It degrades by soil microbial metabolism. It does not bioaccumulate in animals and is excreted in urine and feces. The oral LD50 of imazapic is greater than 5,000

mg/kg of body weight for rats and 2,150 mg/kg for quail, indicating relative non-toxicity by ingestion. The LD50 for honeybees is greater than 100 mg/ bee, indicating imazapic is non-toxic to bees. Imazapic is non-irritating to eyes and skin, even in direct applications. The inhalation toxicity is very low. Chronic consumption in rats for two years and in mice for 18 months elicited no adverse effects at the highest doses administered. Chronic consumption by dogs for one year caused minimal effects. (Tu et al. 2001)

A herbicide spill could result in concentrations hundreds of times greater than that occurring in treated areas. Potentially, if an animal were to feed exclusively within a spill area for an extended period of time, the LD50 could be exceeded. It's assumed, however, that spills of concentrated herbicide will be immediately treated as a toxic waste spill, that the area impacted will be small, and that animals will be largely excluded due to human activity in the area. Weed Prevention Measures and mitigations applied under Alternative 1 & 2 will keep the probability of such a spill low. Consequently, spills do not comprise a significant risk to wildlife populations. Additionally, the number of animals affected by such an event would be small due to the limited and local nature of such events.

The list of Forest Service wildlife Management Indicator Species (MIS) has changed since the 1999 EIS (see Chapter 3). Wildlife species, including wildlife MIS, are analyzed in the 1999 EIS by extrapolating effects from similar-sized domestic animal dosage studies. Many wildlife MIS reside or utilize habitats that will not be affected by treatment activities or herbicides. Although sagegrouse was not analyzed in 1999, this species does not inhabit the Frank Church River of No Return Wilderness and does not require further analysis. Weed treatments associated with Alternatives 1 & 2 are not expected to have effects to wildlife MIS in addition to those effects to wildlife described in the 1999 EIS, pages 80-85.

Threatened, Endangered and Sensitive Wildlife Species
Implementation of Alternative 2, with proposed modifications, including the potential use of Plateau herbicide may potentially affect bald eagles, lynx, wolves, or grizzly bears, but is not expected to adversely affect these species. Individual animals of these species considered threatened or sensitive may be impacted by the implementation of Alternative 2, but a loss of population viability or a trend towards further federal listing is not expected

Table 4.7: Weed Effects Summary by Alternative – Wildlife

Alternative 1	Alternative 2
* Existing plant communities will remain intact and infested sites will be reclaimed. Subsequently, this alternative provides protection to wildlife habitat, including TES. * Potential risks of herbicides affecting wildlife species health are very small.	* Existing plant communities will remain intact and infested sites will be reclaimed. Subsequently, this alternative provides protection to wildlife habitat, including TES. * At the prescribed label rates of herbicide application, potential risks of herbicides affecting wildlife species health are very small. * Measures to improve the effectiveness of existing weed management practices will have the greatest potential to maintain wildlife habitats.

Wilderness and Wild & Scenic River Values

Continued implementation of the existing noxious/invasive weed management program (Alternative 1) will have no effects to wilderness and wild and scenic river values in addition to those described in the 1999 EIS, pages 86-90. The 1999 EIS recognizes that the use of

herbicide may reduce the wilderness experience for some wilderness users, but that active treatment provides the best protection of wilderness values. This analysis also concludes that the release of approved biological control agents (insects and pathogens) assists in the protection of wilderness values and does not violate wilderness direction and mandates.

Alternative 2 (Proposed Action) proposes minor modifications to existing treatment practices and to allow the use of Plateau herbicide. Alternative 2 will have no effects to wilderness and wild and scenic river values in addition to those described in the 1999 EIS, pages 86-90.

The somewhat expanded role of biological control to that of an activity used in combination with other treatments will enhance the effectiveness of existing treatments. The approved use of Plateau will allow for greater flexibility and effectiveness in implementing restoration projects. Restoration of weed sites to a native plant community is the ultimate expression of "preserving natural conditions".

Clarifying the intent of "ground based" application methods to portray the use of pumps and sprayers mounted in jet boats may seem to be an infringement on the "wilderness" experience of some users not anticipating this activity. Jet boat use is clearly an approved activity recognized in the Central Idaho Wilderness Act, Public Law 96-312-July 23, 1980. Following implementation of the management decisions associated with the 1999 EIS, river users have been impressed and supportive of the herbicide application activities. Some of the herbicide application has involved using the Forest Service jet boat on the Main Salmon River below Painter Bar. Positive support of this program by the river users is anticipated to continue as the weed treatment program progresses.

Table 4.8: Weed Effects Summary by Alternative – Wilderness and Wild & Scenic Rivers

Alternative 1	Alternative 2
* Halting the spread of and reducing existing exotic plant populations will best protect wilderness values as defined in the Wilderness Act and CIWA. * Treatment of noxious weeds, particularly with herbicides, may reduce the wilderness experience for some users.	* Halting the spread of and reducing existing exotic plant populations would best protect wilderness values as defined in the Wilderness Act and Central Idaho Wilderness Act. * Treatment of noxious weeds, particularly with herbicides, may reduce the wilderness experience for some users. * The somewhat expanded role of biological control to that of an activity used in combination with other treatments will enhance the effectiveness of existing treatments. * Restoration of weed sites, including the proposed use of Plateau herbicide, will better achieve the management goals of "preserving natural conditions". * Clarifying the intent of "ground based" application methods to portray some use of pumps and equipment mounted in jet boats may seem to be an infringement on the "wilderness" experience of some users not anticipating this activity.

Visual Quality

Continued implementation of the existing noxious/invasive weed management program (Alternative 1) will have no effects to visual quality in addition to those described in the 1999 EIS, pages 90-91. The 1999 EIS concludes that following treatments, the predominance of natural appearing landscapes enhance the visual quality to some individuals or user groups. Short term visual effects of treatment may adversely affect the experience of other individuals.

Alternative 2 (Proposed Action) proposes minor modifications to existing treatment practices and to allow the use of Plateau herbicide. Alternative 2 will have no effects to visual quality in addition to those described in the 1999 EIS, pages 90-91.

Table 4.9: Weed Effects Summary by Alternative – Visual Quality

Alternative 1	Alternative 2
* The predominance of natural appearing landscapes will enhance the visual quality to some user groups. Visual effects of treatment may adversely affect the experience of others.	* No significant negative effects to visual quality in addition to those described for Alternative 1. * Protected or restores native plant communities resulting from more effective weed treatment will further enhance the visual quality to some user groups.