# ENVIRONMENTAL ASSESSMENT

**Lochsa Weeds**
**Lochsa and Powell Ranger Districts**
**Clearwater National Forest**

*Spotted Knapweed*

**April 2007**

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## Lochsa Weeds

### Lochsa and Powell Ranger Districts
### Clearwater National Forest
### Idaho County, Idaho

### April 2007

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# CHAPTER 1 – PURPOSE AND NEED FOR ACTION

## A. INTRODUCTION

The Lochsa and Powell Ranger Districts of the Clearwater National Forest propose to use chemical treatments to control[1] noxious and invasive weeds as part of an overall integrated pest management strategy. Areas of treatment would primarily be along roads, trails, and other weed infestations outside of wilderness within the Lochsa River, Middle Fork Clearwater River, and Lolo Creek drainages. Also included are cost-share roads that cross private lands in the Powell area.

This chapter describes the purpose and need for action, summarizes the proposed action, lists Clearwater National Forest Plan management direction and other direction regarding noxious weed control, defines the scope of the analysis, and states the decision(s) to be made by the deciding official.

### Noxious Weeds Defined

Noxious weeds can be defined in several ways. Noxious weeds are those plant species that have been officially designated as such by federal, state, or county officials. Both federal and state laws define noxious weeds primarily in terms of interference with commodity uses of the land. However, the impacts of weeds on non-commodity resources such as water quality, wildlife, and natural diversity are of increasing concern. Globally, non-native species are now considered by some experts to be the second most important threat to biodiversity after habitat destruction (Randall 1996; Pimm and Gilpin 1989).

In *Weeds of the West* (Whitson et al. 1992), a weed is defined as "a plant that interferes with management objectives for a given area of land at a given point in time."

The Federal Noxious Weed Act of 1974 defines a noxious weed as "a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock, or fish and wildlife resources of the United States, or the public health [P.L. 93-629]."

The Idaho Noxious Weed Law defines a noxious weed as any exotic plant species that is established or that may be introduced in the state which may render land unsuitable for agriculture, forestry, livestock, wildlife, or other beneficial uses and is further designated as either a state-wide or county-wide noxious weed (Idaho Code 24 Chapter 22).

Forest Service Manual 2080 defines noxious weeds as "those plant species that are designated as noxious weeds by the Secretary of Agriculture or by the responsible state official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host to serious insects or disease, and being non-native or new to or not common to the United States or parts thereof."

This Environmental Assessment (EA) considers weeds to be "noxious" if they are designated as noxious in the state of Idaho. Weeds from other states including Washington, Montana, Oregon, or Wyoming are also considered in this assessment, since there is the potential for weeds to spread to and from these areas. This EA considers control measures for five (5) noxious weed species and nine (9) undesired weed species that have been inventoried to date (Table 1.1). Other noxious or undesired weed species would be considered for control measures, using the adaptive strategy described in Chapter 2. See Appendix G for a complete description of the weeds being proposed for treatment.

[1] The word "control" in a broad sense refers to elimination or reduction for some weed populations, and slowing the rate of spread for others.

**Table 1.1 Weed Species Considered for Control Measures (See Table 2.2 for detail.)**

| Inventoried Noxious Weeds | |
|---|---|
| **Common Name** | *Scientific Name* |
| Black henbane | *Hyoscyamus niger* |
| Canada thistle | *Cirsium arvense* |
| Dalmation toadflax | *Linaria gentisfolia spp. Dalmatica* |
| Orange hawkweed | *Hieracium aurantiacum* |
| Spotted knapweed | *Centaurea maculosa* |
| **Inventoried Undesired Weeds[2]** | |
| **Common Name** | *Scientific Name* |
| Bull thistle | *Cirsium vulgare* |
| Common tansy | *Tanacetum vulgare* |
| Houndstongue | *Cynoglossum officinate* |
| Japanese knotweed | *Polygonium cuspidatum* |
| Oxeye daisy | *Chrysanthemum leucanthemum* |
| Perennial peavine | ?? |
| St. Johnswort | *Hypericum perforatum* |
| Sulfur cinquefoil | *Pontentialla recta* |
| Yellow hawkweed | *Hieracium…* |

## B. Purpose and Need for Action

**Purpose:** Minimize the spread of noxious weeds across a wide area, including mixed ownerships, through (1) early detection and rapid response, (2) control and management, and (3) rehabilitation and restoration.

**Need:** Noxious and undesirable weeds are spreading across public lands at an alarming rate. According to science documents for the recent Interior Columbia Basin Ecosystem Management Project, invading weeds can alter ecosystem processes including productivity, decomposition, hydrology, nutrient cycling, and natural disturbance patterns such as the frequency and intensity of wildfires (Quigley and Arbelbide 1997). Changing these processes can lead to the displacement of native plant species, eventually affecting wildlife and plant habitat, recreational opportunities, and scenic beauty.

Weeds are spread primarily by human activities associated with vehicles and roads (Roche and Roche 1991), contaminated livestock feed, contaminated seed, and ineffective revegetation practices on disturbed lands (Callihan et al. 1991). Birds and other wildlife also spread weeds. Weeds most commonly become established in recreation sites, overgrazed acreages, and mining areas.

However, it's important to recognize that weeds can appear on any site, including those least disturbed. For example, in the heart of the Selway-Bitterroot Wilderness Area, as much as an estimated 40,000 acres are occupied by spotted knapweed (Asher 1998).

Vallentine (1989) explains that some of the worst noxious plant problems are caused by weed species such as the hawkweeds, the knapweeds, and common tansy. Hawkweeds and knapweeds are found within the Lochsa River subbasin and have been expanding rapidly over the last several years.

Spotted knapweed infestations, for example, can increase soil erosion in creeks and rivers. Montana State University studies indicated that total water runoff from a 30-minute rain averaged 23 percent on a grass-covered site and 36 percent on a knapweed-dominated site. On average, water runoff was 56 percent higher and sediment losses were 192 percent higher on knapweed-dominated plots (Lacey 1989). Sediment yield tripled on the knapweed-dominated plots.

**Purpose:** Reduce noxious weed competition with native species.

**Need:** When a weed species infests a site, it often becomes dominant and greatly reduces the native grass and forb communities. Researchers have shown that native species have been reduced by up to 90 percent on sites infested with knapweed (Belcher and Wilson 1989; Willard et al. 1988; FEIS Noxious Weed Management Projects, Bonners Ferry 1995).

The plant physiology of knapweeds and other invaders permits them to invade new areas rapidly and out-compete native plants for light, water, and nutrients. Knapweeds, for example, have these characteristics:

- Early maturation.
- Profuse reproduction by seeds.
- Long life in the soil.
- Seed dormancy.
- Extremely long roots.
- Pricks, vines, and thorns that repel animals.
- Survival and seed production under adverse environmental conditions.

[2] While these plants have not been officially or legally defined as noxious, they are exotic non-native plants with the ability to out-compete native vegetation.

## C. Proposed Action

During 2000-2005, inventories of weeds on portions of the Lochsa and Powell Ranger Districts were conducted. Personnel searched suitable and likely locations including travel corridors, dispersed and developed campsites, administrative sites, grazing allotments, and timber sale areas.

Based on those inventories, Clearwater National Forest managers are proposing to control noxious weeds primarily on roads and trails within the following project area:

> All Clearwater National Forest System lands within the Lochsa River and Middle Fork Clearwater River subbasins (outside of wilderness) and the Lolo Creek watershed. The project area also includes approximately 305 miles of cost-share roads through other ownerships, primarily on the Powell Ranger District.

Forest managers propose to control noxious weeds on up to 5,000 acres annually of National Forest lands in various locations throughout the project area. Site-specific resource objectives and goals would be consistent with the direction for the Upper Clearwater Basin Weed Management Area.

An Integrated Pest Management (IPM) approach would be used. This approach uses a combination of control methods which include **mechanical controls,** such as hand pulling weeds; **cultural controls,** including seeding and fertilizing disturbed areas; **biological controls** through the use of parasites and pathogens; and **chemical controls,** using herbicides. **No aerial applications of herbicides would occur.**

The 5,000-acre area proposed for treatment annually is less than 1 percent of the total National Forest System lands administered by the Lochsa and Powell Ranger Districts.

In many areas the weed infestation does not cover 100 percent of the ground. For instance, a dispersed camping area approximately two (2) acres in size might be infested with weeds but the amount of land actually occupied by weeds would be in scattered clumps covering only a few square feet.

Initial or first-year treatments would not likely be 100 percent effective for weed controls since dormant seeds in existing populations germinate in following years. Therefore, follow-up treatments could be needed for up to the next ten (10) years. However, such treatments would likely be at reduced levels, especially where herbicides would be used.

The proposed treatment of up to 5,000 acres annually over the next ten years does not reflect the enormity of the noxious weed problem on the project area, or Idaho County as a whole. Every acre was not inventoried, so more weed populations undoubtedly exist than are identified in this document. Thus, it is highly likely that new sites will be discovered in each of the watershed ecosystems covered in this analysis. As additional infestations are discovered in the next ten years, each site would be evaluated to determine if the site would fit within the scope of this EA and then prioritized for treatment. Those sites selected for control would be treated using the parameters established under the analysis conducted within this EA. Treatment of additional sites would be under an adaptive strategy.

Although private lands are not included in the proposed action (except for the cost-share roads on the mixed ownership lands within the Powell Ranger District boundary and other ownerships identified in the project area), both Districts have an active partnership and have considered actions, including herbicide application, on lands adjacent to National Forest lands.

## D. Management Direction

Federal legislation, regulations, policy, and direction require development and coordination of programs to control noxious weeds. Evaluation of noxious weeds in the planning process includes direction from the following: The National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service Manual (Chapter 2080, as amended) (1995); Executive Order #13112 (February 1999). The Forest Service Handbook (FSH 3409 Forest Pest Management) defines a strategy for managing pests, including noxious weeds, as "a decision-making and action process incorporating biological, economic, and environmental evaluation of pest-host systems to manage pest populations." Best Management Practices (BMPs) for stopping the spread of existing weeds and preventing establishment of new weeds on National Forest-managed lands were made effective in May 2001 (FSM 2080).

## 1. Clearwater National Forest Plan

The Clearwater National Forest Plan lists research needs identified during development, including the following: "Determine the autecology of the noxious weeds . . . and evaluate probable biological control methods for these weeds [Forest Plan II-16]. " The Plan contains a Noxious Weed Appendix (N) describing various weed species, methods of spread, and consequences. Loss of forage habitat for both wildlife species and domestic livestock, degradation of riparian vegetation conditions, fuels and fire hazard increase, decreased visual quality, and negative effects on adjacent landowners are all listed undesirable effects. Control methods identified in the Plan include prevention; biological, chemical, mechanical, and cultural practices.

The proposed treatment sites occur in a variety of land management allocations. Land management allocations affected include Forest Plan Management Areas:

**Table 1.2 Affected Forest Plan Management Allocations**

| | |
|---|---|
| A3 | Dispersed Recreation Unroaded Setting |
| A4 | Visual Travel Corridor |
| A5 | Developed Recreation |
| A6 | Historic/Visual Corridors |
| A7 | Wild and Scenic River Corridor |
| B2 | Recommended Wilderness |
| C3 | Key Big Game Winter Range/Unsuitable for Timber Management |
| C4 | Key Big Game Winter Range/Timber Management |
| C6 | Key Fishery Habitat |
| C8S | Key Big Game Summer Range/Timber Management |
| E1 | Timber Management |
| E3 | Aerial Harvest Systems/Timber Management |
| M1 | Research Natural Areas and Special Areas |
| M2 | Riparian Areas |
| US | Unsuitable Land |

The Forest standard to practice and encourage the use of integrated pest management methods applies to all of these Management Areas.

## 2. Northern Region Overview

Northern Region Forest Service ecosystems and watersheds have been significantly affected by noxious weeds. The Forest Service emphasizes working with states on classifying species, educating Forest users, and developing and implementing noxious weed management strategies. The Northern Region recognizes three categories of noxious weed infestation and management strategies (listed in the following table):

**Table 1.3 Noxious Weed Management Stratification — Northern Region, USDA Forest Service**

| Weed Category | Management Strategies |
|---|---|
| Species well-established and widespread. | Contain and suppress. |
| Species recently introduced to the state and rapidly spreading. | Monitor, contain and eradicate weeds. |
| Species not yet detected or found only in localized, small, scattered infestations. | Early detection and immediate action to eradicate. Consider using noxious weed "Swat Team" for prevention/eradication of particular aggressive invaders. |

### 3. Clearwater Basin Weed Coordinating Committee

In March of 1995, the Clearwater Basin Weed Coordinating Committee (CBWCC) was formed. It has evolved into the Clearwater River Basin Weed Management Area (CRBWMA). The CRBWMA is a working group comprised of the Clearwater and Nez Perce National Forests; Bureau of Land Management; Nez Perce Tribe; Idaho Departments of Fish & Game, Lands, and the Idaho Transportation Department; Clearwater Resource Conservation and Development Council, Inc.; Natural Resources Conservation Service; county governments; and Potlatch Corporation. The CRBWMA's purpose is to bring together those responsible for weed management within the Clearwater River Basin; to develop common management objectives, set realistic management priorities, facilitate effective treatment; and coordinate efforts along logical geographic boundaries with similar landtypes, use patterns, and problem species. The Clearwater Forest is an active participant in the CRBWMA, supporting and implementing weed management practices within constraints set by federal policies as agreed upon by CRBWMA partners.

In December 2005, the CRBWMA was divided into two areas: the CRBWMA and the Upper Clearwater Cooperative Weed Management Area (UCCWMA). The division into two groups was done to improve the effectiveness of accomplishing common weed management objectives across multi-jurisdictional landscapes. The same cooperators as listed for the CRBWMA are included in both divisions. The Lochsa Weeds analysis area is completely contained within the Upper Clearwater Management Area.

## E. Scope of the Analysis

The Code of Federal Regulations (40 CFR 1508.25) requires the Forest Service to consider three types of actions (connected, similar, and cumulative) to determine the scope of the analysis.

**Connected Actions** are those actions that are closely related. In regards to the Lochsa Weeds proposal, there are no outside actions that need to proceed prior to or simultaneously with the proposal, nor is the proposal an interdependent part of a larger action.

**Similar Actions** are those which, when viewed with other reasonably foreseeable proposed actions, have similarities that provide a basis for evaluating their environmental consequences together but are not necessarily connected. This project is focused on an integrated pest management approach to controlling noxious and invasive weeds. The similar actions in this analysis consist of the different treatment methods or combination of methods being considered to control weeds.

**Cumulative Actions** are those actions which, when viewed with other proposed actions, have cumulative impacts and therefore should be discussed in the same analysis. This analysis considers the direct, indirect, and cumulative effects of past, present, and reasonably foreseeable future actions. The effects of existing roads, trails, and administrative sites (the primary vectors of noxious weed spread) and their tie to the existing condition are discussed in Chapter 3, along with the effects of present and any reasonably foreseeable future actions.

The Idaho Transportation Department also considered temporal and spatial aspects of the proposed action, with the scope of this analysis limited to the specific noxious weed treatments described in the proposed action. This proposal is not a general management plan for the area, nor is it a programmatic environmental assessment. If the decision maker selects an action alternative, it would mean that noxious weed treatments could begin in 2007.

## F. Decisions to be Made

The Powell District Ranger is the deciding official for this proposal. The Decision Notice will document:

- What actions, if any, should be taken to control weeds on the Lochsa and Powell Ranger Districts.
- Where treatment should be applied.
- What type of treatment(s) should be used.
- When treatment would occur.
- What mitigation measures would be necessary.

**Note:** If implementation of an action alternative is deferred, no other decision is necessary.

# CHAPTER 2 – ALTERNATIVES

## A. INTRODUCTION

This chapter describes the public involvement and issue development processes used to design and develop alternatives to the proposed weed treatments. Environmental issues identified by the public and agency personnel are described. The proposed action and alternatives are described and compared. Features, or design criteria, of the alternatives are also discussed.

## B. PUBLIC INVOLVEMENT

The public has been involved throughout the development of this EA. Public comment has helped to define issues and develop the range of alternatives for accomplishing management goals and objectives.

Initial scoping efforts for control of noxious weeds on the Lochsa and Powell Ranger Districts began in 2004. Public comment was solicited formally with a scoping letter distributed to approximately 250 individuals and organizations on the Lochsa/Powell NEPA mailing list in July 2004. In addition, public comment was requested through the Clearwater National Forest's quarterly schedule of proposed actions, starting in October 2004.

## C. ISSUES

During initial scoping, comments were received from 15 individuals and organizations. Analysis of those comments resulted in the following list of issues that guided the development of alternatives.

### 1. Effects on Water Quality and Aquatic Organisms

Several commenters indicated a concern that herbicides may inadvertently be sprayed near or across streams, affecting water quality and fish populations.

Much research has been done to determine the level (milligram per liter) at which 50 percent of a given population dies (Lethal Concentration = $LC_{50}$) and the time frame during which that occurs. Although $LC_{50}$ is often used as toxicity standard, fifty percent fish mortality is unacceptable. For this reason, a better parameter to evaluate effects is the No Observable Effect Level (NOEL) or No Observable Effect Concentration (NOEC). Because there are frequently no long-term test results that provide safe concentrations for all chemicals, the EPA has recommended that the 96-hour $LC_{50}$ be divided by 20 to set a standard for concentrations to protect aquatic species when NOEL or NOEC data are not available.

The analysis has several parts. First, the project area was delineated into watersheds. Average low flow values were determined for each watershed. Available information on each proposed herbicide was reviewed to determine the $LC_{50,}$ NOEL, or NOEC values for fish species in the project area. Using this information, the maximum acreage treatable while remaining below the recommended No Observable Effect Level (or equivalent) was calculated for each proposed herbicide by watershed. The total acres requiring treatment with a specific herbicide was compared with the maximum acres possible to be treated in each watershed. These lower limits will be used as thresholds to help guide the proposed spray activities over the next decade.

Within the above calculations, many "worst case" assumptions were used to influence the indicators.

### 2. Education/Prevention

Some commenters were specifically concerned about developing and/or continuing prevention education programs to slow the rate of infestation of noxious and undesirable weeds.

As part of an Integrated Pest Management Strategy, and in cooperation with partners in the Upper Clearwater Cooperative Weed Management Area, the Lochsa and Powell Ranger Districts will implement and enforce practices that are shown to aid in the reduction of noxious and undesirable weed infestations. See Appendix J: Best Management Practices.

Education efforts include weed identification classes, informational booths at county fairs, and public information outreach as well as briefings with contractors, volunteers, and other groups working on National Forest lands.

### 3. Human Risk

Some commenters were concerned about the impact on human health of weed control with herbicides.

The factors that will be used to measure this issue are the potential effects from herbicide applications on project workers and visitors to the project area.

### 4. Use of Chemicals

Several commenters were concerned about the use of herbicides in a general sense.

Due to the nature of some weed species and the size of their populations, use of herbicides may be the only practical control method in the short term. These factors will be included along with a variety of other concerns, i.e., water quality, fisheries, etc., to determine the appropriate use of chemicals.

## D. Methods Available for Noxious Weed Control

### Education

Perhaps the single most powerful tool in controlling noxious weed spread is education. The Clearwater Basin Weed Coordinating Committee has put on training sessions in weed identification for foresters and other field-going personnel from agencies and companies within the partnership boundary.

Methods available for noxious weed control vary and are largely dependent on how each weed species responds to a particular type of treatment. Treatment methods available for each weed species under consideration include mechanical, cultural, biological, and chemical.

### Mechanical Control

Mechanical control methods range from hand pulling and grubbing with hand tools to clipping or mowing the plants. If sufficient root mass is removed, the individual plant can be destroyed. Cutting the plants can reduce reproduction in perennial species and weaken their competitive advantage by depleting carbohydrate reserves in the root systems. Mechanical control can also include burning the plants with a propane torch.

Small infestations of some weed species can be controlled by mechanical methods while larger infestations are more difficult to control. In addition, several weed species will respond to mechanical treatment with aggressive resprouting from even small root fragments left in the soil. Mechanical control often must be repeated several times a year for many years to eradicate prolific seed-producing weed species successfully.

### Cultural Control

Cultural control generally involves manipulating a site to increase the competitive advantage of desirable species and decrease the competitive advantage of undesirable species. Manipulations could involve planting native and desired non-native species to shade out weeds, or covering weed-seed contaminated soil with a layer of uncontaminated soil. Seeding grass species and applying fertilizer on sites where ground cover is sparse could help to control some weeds culturally. Seeding and fertilization are most effective after existing weed populations have been treated to reduce their competitive advantage.

Another method generally classified as a cultural control method is the use of targeted or prescription grazing, usually with goats. During 2005, the Clearwater National Forest in partnership with the Nez Perce Tribe initiated one year of a pilot prescription grazing project within the Parachute Creek drainage (Lloyd and Forestieri 2007). Although the project ended after concern with the contractor's ability to comply with herd management protocols, monitoring showed the grazing to be very effective in reducing seed producing knapweed densities and the overall composition of knapweed compared to other grasses and forbs. Future prescription grazing projects will be analyzed separately from this project.

### Biological Control

Biological control is the use of other living organisms such as insects or fungi to attack undesirable plant species. Populations of native plant species are generally kept from spreading out of control by natural limiting factors such as predators (animals, insects), diseases, and competition for nutrients and moisture. Non-native vegetation has become a problem in many parts of the West due to a lack of such limiting factors. Most experts view the introduction of biological control agents as the best long-term solution to the noxious weed problem where there are large, widespread

populations of a given species. Under ideal circumstances, control agents reach a dynamic equilibrium with target weed species.

Before new biological control agents are introduced into the United States, their host-specificity is tested. The agents are placed with a wide variety of plant species under "eat-or-starve" conditions to ensure that their attack is confined to a narrow range of plant species, preferably to the weed of concern.

The Nez Perce Bio-Control Center provides biological control agent release and monitoring services under contract to the Clearwater National Forest. The USDA Animal, Plant, Health Inspection Service (APHIS) has approved the biological control agents provided by the Nez Perce Bio-Control Center for release. Additional discussion on past releases can be found later in this chapter. Agents being considered for further releases include the following:

**Table 2.1 Agents Considered for Further Releases**

| Agent | Description |
|---|---|
| Larinus minutus | Knapweed seed head weevil |
| Larinus obtustus | Knapweed seed head weevil |
| Metzneria paucipunctella | Spotted knapweed seed head moth – also attacks diffuse knapweed |
| Urophora affinis and Urophora quadrifasciata | Spotted knapweed banded gall fly – seed feeder |
| Cyphocleonus achactes | Knapweed root weevil |
| Agapeta zoegana | Sulfur knapweed moth – root feeder |
| Chrysolina quadrigemina | Klamath beetle - attacks St. Johnswort |
| Urophora carduii | Canada thistle stem gall fly |
| Tyta luctuosa | Bindweed moth |
| Mecinus janthinus | Toadflax stem-boring weevil |

The Forest has been releasing bio-control agents to control spotted knapweed (*Centaurea maculosa*) since 1996. Baseline vegetation data have been recorded in a qualitative manner. To date, monitoring has focused on the question "Are the agents established?" The full report showing all of the monitoring results for the Forest can be found in the project file. The following is a summary of the bio-control agents that have been released on the Forest, and their characteristics.

**Spotted Knapweed Seed Feeders**

*Metzneria paucipunctella*, the spotted knapweed seed head moth, primarily attacks spotted knapweed (*Centauera maculosa*), but it will also attack diffuse knapweed (*C. diffusa*). Larvae feed on developing seeds within the head. This moth produces one generation per year with adult females laying between 60 and 100 eggs beginning in mid-June. The larvae feed through the winter and pupate during May.

*Urophora affinis* and *U. quadrifasciata*, the banded gall fly and UV knapweed seedhead fly respectively, are both seed head flies that attack many of the *Centaurea* species. Developing larvae form galls from the receptacle tissue and feed within the gall. These flies may produce two generations per year with adult females laying up to 120 eggs beginning in early summer.

*Larinus minutus*, the lesser knapweed flower weevil, prefers diffuse knapweed but will attack spotted knapweed. Adults feed on rosette leaves and within the flowers while the larvae consume the seeds within the heads. The weevil produces one generation per year. Adults are long-lived and mate continuously for up to eleven weeks with each female laying up to 130 eggs.

**Spotted Knapweed Root Feeders**

*Agapeta zoegana*, the sulfur knapweed moth, attacks the root of spotted knapweed and to a lesser extent diffuse knapweed. The larvae mine the root tissue within the crown. This moth produces one generation per year with adults emerging from mid-June through August. Females mate within 24 hours of emerging and live about 11 days. Mating and egg laying are dependent upon temperature. Ideal temperatures for mating are between 30 and 86 degrees F. and for egg laying are between 60 and 86 degrees F. The higher the temperature, the more eggs are laid.

*Cyphocleonus achactes*, the knapweed root weevil, attacks primarily spotted knapweed but will attack diffuse knapweed. The larvae mine the central root tissues and form a gall (used for pupation), which causes considerable damage to the root. Adult emergence is dependent upon the accumulations of degrees in the soil. Data provided by APHIS (Hansen 1999) estimates that peak adult emergence occurs when approximately 2,320 degree days above 0 C. have accumulated.

Historical temperature data (taken from Moscow, Idaho, by Hansen) suggests that *Cyphocleonus achates* emergence peaks mid-August and that the average first frost date is September 24. On average there are 32 days between peak emergence and first frost. The data suggest that the Clearwater drainage is suitable for survival and development of this weevil.

**Canada Thistle Agent**

*Urophora cardui*, the thistle stem gall fly, attacks only Canada thistle (*Cirsium arvense*). Larvae tunnel into the stem and form galls which act as a nutrient sink. Galled plants often do not produce flowers above the galls and the number of new shoots formed in subsequent years is reduced. Successful release of this agent appears to be dependent upon abundant moisture (marsh and wetland areas) and cool summer temperatures.

**Field Bindweed Agent**

*Tyta luctuosa*, the bindweed moth, attacks field bindweed (*Convolvulus arvensis*) and some morning glory species (*Calystegia* spp.). The larvae feed at night on leaves and flowers; two generations per year are common, with the second wintering over as pupae.

**Chemical Control**

Chemical control involves the application of herbicides to weed species at certain stages of plant growth. Herbicides kill the treated plant, but often allow remaining seeds to germinate. A description of herbicides proposed for use is included in Appendix F.

Conditions such as vegetation types, soil types, weed species composition, and infestation levels may vary significantly on any given treatment site. Therefore, a combination of chemical and non-chemical methods for a site is often preferred for weed control. The selection of chemical methods for a site does not preclude the application of other methods, either concurrently or as follow-up treatments, on that site.

**Control with Mixtures of Herbicides**

Many control specialists treat several noxious weed species with mixtures of chemicals. There are several reasons for this. Sometimes one chemical by itself will not be effective against a certain weed species, but combining two chemicals may provide better control (Callihan 1989, Vallentine 1989, Ralphs et al. 1991, Lacey et al. 1995). Depending on the biology of the weed, the environment in which it is growing, and the size of the infestation, mixtures of two or more chemicals may be needed. This is often the case for weeds that are somewhat resistant to an individual herbicide.

Applicators can use mixtures to reduce the number of applications required to control resistant weeds. For example, a mixture of picloram and 2,4-D is used for many weed species (Monnig 1988). Both herbicides are broad leaf-selective but inhibit the plant in different ways. The herbicide 2,4-D generally has a shorter half-life while picloram provides longer persistence. Together these two herbicides provide weed control that may not be accomplished by either herbicide alone. The addition of 2,4-D to picloram also reduces the amount of picloram to half of what is normally applied, therefore minimizing effects on non-target plant species.

## E. Alternatives Considered in Detail

Three alternatives were developed to address public and internal issues. These alternatives represent the range of control methods currently available for treatment of noxious and undesirable weeds. In addition to the No Action Alternative (Alternative 1), Alternative 2 involves only non-chemical treatment methods, and Alternative 3 (the Proposed Action) involves the use of both chemical and non-chemical methods of treatment. The comparison of Alternatives 2 and 3 defines the issues of potential environmental and human health effects of herbicide use. The comparison also shows the differences in effectiveness. However, current chemical use for weed treatments in administrative sites and along U.S. Highway 12 by the Idaho Transportation Department would continue in all alternatives.

Analysis of the No Action Alternative discloses the consequences of unchecked expansion of weeds in forest ecosystems. It does not mean, however, that no weed control activities would occur under that alternative. Some weed control activities are included in the No Action Alternative because they represent ongoing activities such as digging and bio-control releases. In addition, the No Action Alternative

would allow the continued use of herbicides at current levels in administrative areas and along U.S. Highway 12. The alternatives are outlined below with a brief discussion of the major issues relevant to each.

## Design Criteria Common to All Alternatives

### Noxious Weed Prevention and Control

Prevention elements such as information signing, web site messages, internal and external education and management requirements, and partnering efforts to prevent weeds will be part of all alternatives, including no action.

Prevention measures discussed in the Best Management Practices (Appendix J) will be implemented regardless of which alternative is chosen. Certified weed-free forage and straw is now required for use on all National Forest lands in the Lochsa and Powell Ranger Districts.

Cleaning of equipment used for forest activities would be required before operating within all areas previously treated for noxious weeds or within areas currently considered weed-free. Provision 2400-3 10.2, C6.26 or CT6.26 would be included in all contracts associated with those areas. Contract Provision CT6.27, which requires purchasers treat weeds along haul routes, would also be part of timber sales.

To prevent the establishment and spread of noxious weeds, all ground disturbances resulting from management activities would be revegetated with an appropriate mix of certified noxious weed-free seed, and fertilized as necessary.

Cultural control would be considered for all sites following weed treatment. After weeds have been eradicated or reduced to acceptable levels, revegetation with more desirable species is often necessary to prevent reinvasion by the weeds. To the extent practicable native species should be used for revegetation, realizing that until local seed sources become more available on a cost-effective basis, non-native species with desirable characteristics would also be used.

Every newly proposed project would be evaluated for the potential of spreading noxious weeds. The weed prevention Best Management Practices (BMPs) listed in Appendix J as well as other measures to halt the spread of noxious weeds would be implemented during the project planning process.

Efforts to educate, inventory, and control noxious weeds with the Upper Clearwater Cooperative Weed Management Area partnership would continue.

All noxious weed control activities would comply with state and local laws and agency guidelines.

### Monitoring

Monitoring of treatment sites would be conducted. Assessment of the effectiveness of control efforts would consider the weed management objective for each site, as well as the infestation size and percent occupancy of the target weed species following treatment.

Instream monitoring would occur where fisheries concerns are the greatest. A detailed monitoring plan has been developed and is in the project file. Spray drift cards in conjunction with water samples will be used. Water samples will be taken before spray is applied, immediately after treatment, and after the first major rainstorm in that area, depending upon spray card results. The samples will be tested for the chemicals used. If levels above the No Observable Effect Concentration or their equivalent are found, further spraying will not occur in that watershed, and application practices will be modified.

Existing inventories have indicated approximately 19,400 acres of weed populations. There are additional populations not yet identified. Under each alternative, up to 5,000 acres could be treated annually depending on budget. Sites have been grouped into nine watersheds for mapping purposes.

### Watersheds

Tables 2.1 and 2.2, in conjunction with the maps in Appendix A, provide the following information:

- Watershed name.
- Weed species present in the watershed.
- Acreages of weed-infested areas in each watershed.
- Weed management objectives.
- Resource objectives.

- Proposed methods of treatment.
- Maximum annual sprayable acreage using each herbicide with no observable effect, or equivalent by watershed.

The maps in Appendix A show more detailed locations of each known site proposed for treatment.

Funding for a weed control program is a factor in the ability to treat weed infestations annually. Optimistic forecasting for the next five (5) years indicates a funding level that could treat up to 5,000 acres annually. This required that sites be prioritized under the following criteria:

- Potential or new invaders located.
- Areas identified as weed free.
- Major travel routes and other areas with potential to spread weeds.
- Minor travel routes and other areas.

Maps in Appendix A show the relative location of all sites.

All gravel pits in the project area would be treated for noxious and undesirable weeds.

Provisions would be made for the prevention and control of weeds within new and existing special use permits as needed.

Weed control would occur at developed campgrounds, trailheads, and high-use dispersed campsites following the standards and guidelines outlined in this document.

All weeds that are hand pulled or dug would be bagged and disposed of by burning at designated sites, or removal to landfills.

New noxious weed invaders, as identified by state and local agencies, would be given high priority for treatment as funding becomes available.

Additional biological control agents may become available for use. Before such agents are released, their effectiveness and impacts to other resources would be evaluated.

**Public Safety**

An annual operating plan outlining proposed treatments would be available to the public at the Lochsa and Powell Ranger District offices. Adjacent landowners would be notified prior to treatment of noxious weeds on National Forest lands.

Traffic control and signing during weed treatment operations would be used as needed to ensure safety of workers and motorists.

**Resource Protection**

All treatment sites would be evaluated for Threatened, Endangered and Sensitive plants (TES) habitat suitability. Highly suitable habitat would be surveyed as necessary prior to treatment.

Riparian areas and TES populations that adjoin or overlap disturbed areas, i.e., roadsides with heavy canopies, would be surveyed and monitored prior to – and during – treatment.

Site-specific treatment guidelines would be developed for infestations within or adjacent to TES plant habitat. See Alternative 3 for specifics regarding chemical use.

**Adaptive Strategy**

Alternative 3 includes an adaptive strategy for future treatment of additional sites with chemicals as new infestations are discovered. Infestations known to occur in the project area but not previously quantified would be inventoried, and site-specific recommendations for treatment would be made. Priorities for treatment would be established based on weed species present, infestation size, and vulnerability of recreational, wildlife, aquatic, and vegetation resources special to the infestation.

Treatment methods for each site would be selected based on weed species ecology, cost-effectiveness of the treatments, the management objective for the site (e.g. eradication or reduction of seed production), and the potential effects on other forest resources. Proposed treatments would be evaluated to determine if they fit within the scope of this EA relative to the issues analyzed.

In addition, monitoring of treatment sites would be conducted. Assessment of the effectiveness of control efforts would consider the weed management objective for each site, as well as the infestation size and percent occupancy of the target weed species following treatment. See Appendix D for a flow chart which illustrates the decision process to be followed in applying the adaptive strategy.

**Table 2.2 Inventory Summary of Known Noxious Weeds**

| Watershed | Weed Species | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spotted knapweed | Canada thistle | Hounds-toungue | Orange hawkweed | Yellow hawkweed | Black henbane | St. Johns-wort | Oxeye daisy | Dalmatian toadflax | Sulfur cinquefoil | Common tansy | Bull thistle | Perennial peavine | Japanese knotweed | **Total Area (acres)** |
| Crooked Fork Creek | 1939 | 814 | 82 | 0 | 0 | 0 | 1031 | 680 | 0 | 37 | 281 | 944 | 0 | <1 | **5808** |
| Colt Killed Creek | 597 | 85 | 5 | 0 | 0 | 0 | 245 | 86 | 0 | 26 | 36 | 55 | 0 | 0 | **1135** |
| Upper Lochsa River | 2991 | 728 | 82 | 0 | 19 | <1 | 1267 | 706 | 15 | 112 | 82 | 875 | 2 | 18 | **6897** |
| Warm Springs Creek | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **43** |
| Middle Lochsa River | 2951 | 66 | 0 | 3 | 132 | 0 | 218 | 43 | 7 | 76 | 0 | 57 | 0 | 0 | **3553** |
| Fish Creek | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **18** |
| Lower Lochsa River | 1172 | 0 | 0 | 110 | 19 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | **1305** |
| Middle Fork Clearwater River | 310 | 0 | 0 | <1 | 104 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **414** |
| Lolo Creek | 94 | 32 | 0 | 0 | 54 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | **198** |
| **Grand Totals** | **10072** | **1768** | **169** | **113** | **328** | **<1** | 2761 | 1516 | **44** | **251** | **399** | 1931 | **2** | **18** | **19371** |

**Table 2.3 Known Noxious Weed Site Descriptions and Proposed Treatments for 2007**

| Watershed | Primary Weed Species | Treatment Objectives | Maximum Acres Treated (Alt 3) | Resource Concerns | Proposed Treatment Alt 1[1] | Proposed Treatment Alt 2[2] | Proposed Treatment Alt 3 |
|---|---|---|---|---|---|---|---|
| Crooked Fork Creek | Spotted Knapweed | Reduce | 325 | Steelhead Trout<br>Bull Trout<br>Spawning | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |
| Colt Killed Creek | Spotted Knapweed | Reduce | 80 | | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |
| Upper Lochsa River | Spotted Knapweed<br>Yellow Hawkweed | Reduce<br>Eradicate | 393 | 303d List<br>Bull Trout<br>Spawning | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |
| Warm Springs Creek | Unspecified Species | Reduce | 5 | | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | |
| Middle Lochsa River | Spotted Knapweed<br>Orange Hawkweed<br>Yellow Hawkweed | Reduce<br>Eradicate<br>Reduce | 293 | 303d List | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |
| Fish Creek | Spotted Knapweed | Reduce | 35 | Steelhead Trout<br>303d List | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |
| Lower Lochsa River | Spotted Knapweed<br>Orange Hawkweed<br>Yellow Hawkweed | Reduce<br>Reduce<br>Reduce | 94 | 303d List | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |
| Middle Fork Clearwater River | Spotted Knapweed<br>Orange Hawkweed<br>Yellow Hawkweed | Reduce<br>Eradicate<br>Reduce | 99 | | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |
| Lolo Creek | Spotted Knapweed<br>Yellow Hawkweed | Reduce<br>Reduce | 10 | Spring Chinook Salmon Spawning<br>303d List | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical | Mechanical<br>Biological<br>Chemical |

[1] Biological Treatments in Alternative 1 are limited to 50 acres. Chemical treatments are limited to current administrative sites and Idaho Transportation Department treatments along U.S. Highway 12.

[2] Chemical treatments in Alternative 2 are limited to current administrative sites and Idaho Transportation Department treatments along U.S. Highway 12.

## Alternative 1: No Action

This alternative would not result in a change in current noxious weed control activities within the project area. This alternative would continue current levels and methods of treatment which include mostly chemical control, with some hand pulling and release of biological control agents at administrative sites and along Highway 12.

Both Districts would continue to annually treat up to 150 acres with chemical control at administrative sites. Chemicals used for weed treatment would include Clopyralid and Picloram products.

Priority treatment areas would be new invasions and weed-free areas.

New noxious weed invaders would be treated when detected and as funding would permit.

## Alternative 2: Mechanical, Biological, and Cultural Treatments

This alternative would use an integrated approach of mechanical, biological, and cultural treatments to control noxious and undesirable weeds. No herbicides would be used, except those currently being used at administrative sites and along Highway 12. Treatments such as hand pulling would be supplemented with cultural methods such as seeding, fertilizing, and planting.

Alternative 2 provides a baseline for comparing the effects of chemicals on the environment predicted under implementation of Alternative 3. Initial treatment methods proposed for each site under this alternative are listed in Table 2.3ogical Control

Release of biological agents (parasites, predators, or pathogens) that have shown promise in reducing weed infestations would be relied on heavily for weed control.

New biological control agents would be released on approximately 300 acres per year. Follow-up monitoring, with additional biological control releases as needed, would be conducted to ensure the biological agent become established over the entire infestation area.

### Cultural Control

Cultural control alone is not planned. Seeding and fertilizing would occur on those sites where mechanical control was successful and on bare areas adjacent to treated areas.

### Mechanical Control

Mowing would be used on approximately 100 acres annually. Some weeds would be hand pulled and disposed of as specified in the design criteria.

### Biological and Cultural Control

A combination of biological and cultural control treatments may be used as a follow-up treatment on some sites based upon site-specific evaluation.

## Alternative 3: Mechanical, Biological, Cultural, and Chemical Treatments

Alternative 3 is the Proposed Action as described in Chapter 1. This fully integrated approach would initially rely more heavily on chemicals (herbicides) and biological control to reduce weed populations significantly in some cases and to eradicate populations in other cases. Subsequent treatment would rely progressively less on these methods as larger populations were reduced.

This alternative was developed in response to the integrated weed management issue. Site-specific control objectives were determined, and integrated management for each site was prescribed. Integrated management often requires a combination of several control methods to reach the objective. This alternative uses all control methods available to reach the site objective including mechanical, cultural, biological, and chemical.

Initial treatment methods proposed for each site under this alternative are listed in Table 2.3. The herbicides listed for each site are those that are effective against the identified target weeds. One or more combinations of the listed herbicides would be used, depending upon their site-specific effectiveness. Follow-up manual, biological and/or chemical treatments would be necessary on some sites.

Optimistic forecasting for the next five (5) years indicates that up to 5,000 acres could be treated annually. This alternative shifts control efforts from long-term biological control and monitoring to immediate control on primary travel routes and recreation sites.

### Herbicide Control

The use of herbicides alone would occur on up to 5,000 acres per year. Nine herbicides (dicamba, aminopyralid, clopyralid, glyphosate products without surfactant, glyphosate products with surfactant, Triclopyrl TEA picloram, metsulfuron methyl, and 2,4-D amine) would be considered for application on various sites.

The use of each herbicide would depend on the weed species, level of infestation, location, other resource concerns, and applicability of the herbicide.

The application of herbicides would follow the Alternative 3 design criteria as well as the guidelines contained in Appendices I and H. Application would be with a backpack sprayer, hand-held sprayer, manual dispersal of pellets, or with a truck or ATV mounted power spray unit. **There would be no aerial application of herbicides.**

### Mechanical Control

This treatment would be used annually on approximately 100 acres.

### Biological Control

Biological control alone is proposed to be used on approximately 300 acres annually. As with Alternative 2, follow-up monitoring and additional releases of biological agents as needed would be conducted to ensure the biological agents become established over the entire infestation area.

### Biological and Cultural Control

A combination of biological and cultural control treatments could be used as follow-up treatment on some sites based upon site-specific evaluation.

### Mechanical and Cultural Control

This combination of treatments (seeding and fertilizing) would be used on those areas where hand pulling was successful.

### Cultural Control

At this time, there is no proposal to use this treatment method alone. It would be used if determined to be effective in combination with either chemical and/or manual control based upon a site-specific evaluation.

### Adaptive Strategy

All design criteria pertinent to Alternative 3 would apply to new treatment sites as well as to follow-up treatments on all sites within the watersheds listed. In addition, any herbicide use proposed on new treatment sites or as follow-up treatments on the sites would have to meet the requirements of parameters established by the interdisciplinary team.

The parameters would require that the combined treatments in any watershed result in a concentration of herbicide in surface water lower than the No Observable Effect Concentration (NOEC) rate for each given treatment year within each individual watershed. Where the NOEC for a specific

herbicide was not available, the $LC_{50}$ ($LC_{50}$ refers to the concentration that is lethal to 50 percent of a given fish species exposed at that level for 96 hours) divided by 20 would be used as a standard for maximum treatment acres. The maximum number of acres that could be treated with a given herbicide in each watershed each year is displayed in Appendix I. The methodology used in the determination of maximum treatment acres can be found in the project file.

If any proposed herbicide application would exceed the established parameters, treatment would be deferred – or an alternative weed control method would be employed. When a combination of herbicides is proposed for use, the maximum herbicide treatment acres for a given watershed would be those for the most restrictive herbicide.

## Mitigation Measures and Design Criteria Specific to Alternative 3

### Pre-Project Implementation

1. The Forest would follow established guidelines and best management practices as stated in: (1) Forest Service Manual 2000 (2080) Noxious Weed Management; (2) Forest Service Soil and Water Conservation Practices Handbook (FSH 2509.22-13) Vegetation Manipulation; and (3) Idaho Forest Practices Act (IDPA 20, Title 02, Chapter 01, 060) Use of Chemicals and Petroleum Products.
2. A spill contingency plan developed for this project (Appendix E) would be reviewed by the project coordinator prior to field work. Individuals involved in herbicide handling or application would be instructed on the spill contingency plan and spill control, containment, and cleanup procedures.
3. A pre-project review of all application areas would be completed by a designated wildlife and fisheries biologist or hydrologist and the project coordinator to discuss methods of application, herbicide products, and necessary herbicide restrictions which may be required. This would include the pre-project evaluation of riparian and surface water buffers.
4. The project coordinator would provide the designated aquatic monitoring personnel a spraying schedule several days in advance in order to set up and conduct the project monitoring.
5. Limited annual application of herbicide chemicals to below the Lethal Concentration (LC50), or No Observed Effect Level/Concentration (NOEL/NOEC) as determined by watershed (Appendix I). However, within any watershed listed in Appendix I (exception: mainstem Lochsa River segments), no more than 1,000 acres of federal herbicide application would occur annually.
6. No more than one application of picloram would be made on a given area within a site in any single year to reduce the potential for picloram accumulation in the soil.
7. No picloram would be used where there are coarse, sandy soils. Use of picloram would be allowed only once every two years to reduce accumulation in the soil. Application would be reduced to a rate of a maximum of 1.0 pounds/acre of picloram with spot treatment of no more that 50 percent of an acre (USDI-EPA 1995a).
8. No application of 2, 4-D ester formulations or triclopyr-BEE would be allowed.
9. The surfactant R-900 would not be used. R-11 would not be tank-mixed with Rodeo, Accord or Aquamaster.
10. No surfactants would be authorized for use within 15 feet of surface water or areas with shallow water tables.
11. Hi-light blue dye would be mixed at a minimum concentration with any herbicide sprays that would be applied 15 to 100 feet from surface waters.
12. No herbicide treatments would be conducted after July 31 in drainages that have documented bull trout spawning areas. Currently the only stream within the project area with substantial bull trout spawning on an annual basis is Waw'aalamnine (Squaw) Creek.
13. The Forest would have a licensed applicator directly supervising all herbicide treatments.

**Field Preparation**

1. A spill cleanup kit would be available at the temporary storage site and in all vehicles carrying herbicides.
2. Equipment used for transportation, storage, or application of herbicides would be maintained in leak-proof condition.
3. No herbicide mixing would be authorized within 100 feet of any live waters. Mixing and loading operations would have to take place in an area where an accidental spill would not contaminate a stream or body of water before it could be contained.
4. Only the quantity needed for the day's operations would be transported from the storage area.
5. In order to ensure accurate spot treatment and facilitate monitoring, a spray dye would be added to herbicide mixes to be applied 15 to 100 feet from surface waters. The colorizer is easily seen by the applicator, which aids in the accomplishment of two objectives: accurate application of the herbicide mix to the target weeds or weed areas, thus limiting overspray to non-target plants or weed-free areas; preventing repeat applications to previously sprayed weeds because treated areas are readily visible. The applicators would use a blue colorant which photo-degrades in approximately one week. This dye is added to the spray tank at approximately 8 fluid ounces per one hundred gallons of water.
6. Treatment areas would be posted prior to and following herbicide applications within areas of special concern. In addition, information on where and when spraying and other treatments would occur would be available at the Ranger District office.
7. Permittees would be notified in advance of treatments on their permit sites and advised of herbicide label requirements regarding use of treated lands.

**Chemical Applications**

1. All pesticide labels would be strictly enforced and other restrictions include the following:
2. Follow procedures for mixing, loading and disposal of herbicides outlined in Appendix E.
3. Refer to Table 2.4 for maximum wind speed restrictions by herbicide application method.
4. Do not spray if precipitation is occurring or is imminent.
5. Do not spray if air turbulence is sufficient to affect the normal spray pattern.
6. Do not spray if snow or ice covers the target foliage.
7. During application, weather conditions would be monitored hourly by trained personnel at spray sites (i.e., wind speed, temperature, relative humidity). Additional weather and application monitoring would occur whenever a weather change could impact safe placement of the herbicide on the target area.
8. Herbicide applications would only treat the minimum area necessary for the control of noxious weeds.
9. All herbicide applications would be ground-based; there would be no aerial application of herbicides.
10. Herbicides would be applied by ground-based multiple or single nozzle applications (truck or ATV).
11. Only ground-based, spot/selective applications of herbicides rated as having a low level of concern for aquatic species would be authorized from 15 to 100 feet from live waters or within riparian areas (whichever is greater). Authorized spray equipment would include pickup and 4-wheeler mounted spray rigs, backpack sprayer, hand pump sprayer, hand-spreading granular formulations, and wicking (e.g. also includes wiping, dipping, painting, or injecting target species).
12. Application methods, appropriate buffers, and chemical restrictions listed in Table 2.4 would be followed.
13. No live water (e.g. ditches, streams, ponds, springs, etc.) would be sprayed with herbicides. Aquatically approved herbicides could be applied to areas within 15 feet of live waters.

14. Within 15 feet of live waters or areas with shallow water tables, only herbicides authorized for use would be aquatic approved herbicides (i.e., Rodeo™), and methods of control would include backpack sprayer, hand pump sprayer, wicking, wiping, dripping, painting, or injecting.
15. All applications within 15 feet of live water would be directed away from surface water.
16. No spraying of picloram would be authorized within 100 feet of surface water.
17. Proposed clopyralid spraying within the 15 to 100 foot riparian zone would be conducted using methods that eliminate the application (direct spray or drift) within 15 feet of surface water. Application methods, such as the spray systems used by a contractor and the Forest during the 2003-2006 roadside noxious weed control programs on the North Fork Clearwater River (refer to Branning's January 21, 2004, memo, located in the project file) or other suitable methods could be used.
18. Manual control (e.g. hand pulling, grubbing, cutting, etc.) would be authorized in all areas, and could be used in sensitive areas to avoid adverse effects to non-target species or water quality. All noxious weed disposal would be in accord with proper disposal methods. Noxious weeds with developed seeds would be bagged and burned.

**Spray Distances from Known Threatened, Endangered, or Sensitive Plants**

- < 25 feet – No chemical spraying. Only mechanical treatment.
- 25 to 50 feet – Only backpack chemical spraying with focused spraying of target species. Mechanical treatments allowed.
- 50 feet – All methods of chemical or mechanical allowed. Vehicle-based spraying devices allowed.

**Project Monitoring**

1. The project coordinator is responsible for the implementation monitoring, which includes assuring the provisions listed above are followed, and overseeing chemical applications.
2. The forest fisheries biologist would be responsible for the effectiveness monitoring, which evaluates if the above mitigation and BMPs were effective. The monitoring plan (located in the project file) would be conducted by designated personnel (fisheries biologist, hydrologist, and biological technician). The overall objective of the project would be to determine if streams and/or aquatic organisms were exposed to herbicides used to control noxious weeds.
3. Water samples would be tested for the chemicals used. If levels above the No Observable Effect Concentration or their equivalent were found, further spraying would not occur in that watershed, and application practices would be modified.
4. Annually, a treatment summary would be prepared for weed treatments that took place over the preceding year. The report would document treatments that took place, methods used, acreage, evaluation of achievement of objectives, brief summary of unexpected effects, evaluation of compliance with this Biological Assessment, and the aquatic monitoring results. The data for the report would be extracted from the Forest Service national database. This summary report would be completed by March 31 of the following year. This report will be sent to the NOAA Fisheries and U.S. Fish & Wildlife Service with the next year's planned treatment project.
5. Annually, a list of the acres planned for treatment in the upcoming year would be provided to the regulatory agencies to determine if the planned treatments would be consistent with the effects analysis and determinations of the pending Biological Opinions.

**Table 2.4 Restrictions Associated With the Use of Herbicides**

| Distance from surface water | Maximum Wind Speed | Herbicide Application Method | Herbicides Authorized |
|---|---|---|---|
| 0 feet | N/A | Chemicals will not be used over water, including water standing or running in ditchlines. | None |
| <15 feet from surface water | 6 mph | Spot spraying of individual plants with aquatically approved chemicals.<br>Ground-based, single nozzle with handgun, wand, wicking, or whipping. | Spot spraying of individual plants with aquatically approved chemicals (glyphosate products without surfactant). |
| 15 to 100 feet from surface water | 6 mph | Focused spraying of target species May include area spraying when weed populations warrant (large patches of weeds, multiple patches in close proximity).<br>Ground based, truck mounted multiple nozzle, ATV multiple nozzle system, single nozzle with handgun, wand, wicking or wiping. | Mixtures of chemicals may be used including those listed above and clopyralid, aminopyralid, glyphosate products with surfactant, dicamba, 2,4 – D amine, methsulfuron methly and triclopyr-TEA. |
| >100 feet from surface water | 10 mph | All appropriate ground application methods. Includes spot spraying, focused spraying, or broadcast spraying as weed populations warrant. | All chemicals listed above as well as picloram. |

## F. ALTERNATIVE COMPARISONS

The following table displays the effects of each alternative in comparative form by management activity and in relation to the issues.

**Table 2.5 Comparison of Management Activities and Issues by Alternative**

| | **Alternative 1**<br>**No Action (current noxious weed control activities)** | **Alternative 2**<br>**Integrated Approach with No Chemicals** | **Alternative 3**<br>**Integrated Approach with Chemicals** |
|---|---|---|---|
| **Management Activity** | | | |
| **Acres of Bio-control Release Per Year** | 50 | 300 | 300 |
| **Acres of Mechanical/Cultural Treatment Per Year** | 100 | 100 | 100 |
| **Acres of Chemical Treatment per Year** | Up to 400 acres at administrative sites and along U.S. Highway 12 | Up to 400 acres at administrative sites and along U.S. Highway 12 | Up to 5,000 acres primarily along roads and trails |
| **Approximate Total Acres of Treatment per Year** | 550 | 800 | 5,400 |
| **Issue 1 – Effects on Water Quality and Aquatic Organisms** | | | |
| Maximum Acres Treatable With Picloram Under NOEC[3] | 3,916 | 3,916 | 3,916 |
| **Issue 2 –Education/Prevention** | | | |
| | Current prevention education programs would continue. | Same as Alternative 1 | Same as Alternative 1 |
| **Issue 3 – Human Risk** | | | |
| Effects on weed control workers | No change | Slight risk of skin and eye irritations, cuts, sprains, and bruises | Same as Alternative 2 – risk from herbicides insignificant |
| Effects on visitors or nearby residents | No change | No effect | Same as Alternative 2 – risk from herbicides insignificant |
| **Issue 4 – Use of Chemicals** | | | |
| Impacts on desired plant species | Decline in desired plant species in the long term – increase in noxious weeds | Decline in desired plant species in the long term – increase in noxious weeds | Potential short term impact to individuals – long-term benefits to desired plant species by reducing noxious weeds |
| Effects on wildlife | Potential long-term decline in forage habitat | Potential long-term decline in forage habitat | Higher likelihood of maintaining long-term forage habitat |

[3] No Observable Effect Concentration. In this case, Picloram Acres are shown. In reality, very little picloram will be used. Clopyralid aminopyralid will be the common herbicide used. Picloram depicts the worst case scenario.

# CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

## A. INTRODUCTION

This chapter describes the baseline (existing) conditions of the physical, biological and human resources which could be affected by the proposed action and discloses the potential environmental consequences of the proposed action within the scope of each of the alternatives.

Analysis of Alternative 1 describes the predicted effects of maintaining current levels of noxious weed management within the project area. This includes continuation of ongoing chemical treatment of weeds in administrative sites and along US Highway 12 by the Idaho Transportation Department (ITD) as well as low levels of biological control agents. Analysis of Alternative 2 outlines potential effects of the same treatments as Alternative 1, but increasing the use of biological control agents. The Alternative 3 analysis explains predicted effects of treating noxious weeds with herbicides in areas in addition to administrative sites and along US Highway 12 by ITD, in addition to using mechanical and biological controls. Alternative 2 is similar to Alternative 1, and Alternative 3 increases the use of chemical weed treatments.

Each resource is discussed in the following order: affected environment, environmental consequences, direct and indirect effects, and cumulative effects for each alternative and a summary of the effects by resource.

Cumulative effects for each alternative will consider the effects of other projects near or within the project.

### Lochsa River, Middle Fork Clearwater, and Lolo Creek Subbasins

The project area is located within the Lochsa, and Middle Fork Clearwater River subbasins and the Lolo Creek watershed.

The analysis area for *cumulative* effects covers approximately 1 million acres. Included in those acres are national forest lands on Powell and Lochsa Ranger Districts of the Clearwater National Forest and adjacent intermingled state and private ownership. Actions on adjacent ownership are included in the cumulative effects analysis. Effects of *direct and indirect* activities will be assessed on national forest lands.

The project area is located primarily within Idaho County. A vicinity map of the area can be found in Appendix A.

## B. EXISTING WEED INFESTATIONS

### Affected Environment — Weed Populations

In 1988 a weed inventory was conducted along the US Highway 12 corridor which runs up the middle of the analysis area. In addition, since 2003, weed inventories have been conducted annually on portions of the project area, primarily by Nez Perce Tribe personnel on the Powell District portion of the area. Nez Perce Tribal Bio-control personnel as well as district personnel have searched suitable and likely locations including travel corridors, dispersed and developed campsites, administrative sites and timber sale areas. Based on the level of infestation and the weed species present as well as resource values at risk, various treatment methods were recommended. The sites were then prioritized for treatment. **Table 2.3 Site Descriptions and Proposed Treatments** (Chapter 2) shows the weed species present and weed management objectives, for each of the sub-watersheds. Results of the weed surveys can be found in the project file.

Approximately 19,300 acres of weed infestations have been documented on national forest lands. The most prevalent species are spotted knapweed, St. Johns-wort, bull thistle, Canada thistle, and oxeye daisy.

A recent weed inventory conducted in partnership with the Nez Perce Tribe Biocontrol Center found these weeds present in the project area.

**Table 3.1 Existing Weed Species**

| Weed Species | # of Acres |
|---|---|
| Spotted knapweed | 9,979 |
| Canada thistle | 1,735 |
| Houndstongue | 169 |
| Orange Hawkweed | 113 |
| Yellow Hawkweed | 274 |
| Black henbane | <1 |
| St. Johns-wort | 2,760 |
| Oxeye daisy | 1,516 |
| Dalmation toadflax | 26 |
| Sulfur cinquefoil | 250 |
| TAVU | 399 |
| Bull thistle | 1,931 |
| LALA4 | 2 |
| Japanese knotweed | 18 |
| Unknown | 120 |
| Total | 19,291 |

Additional infestations of the above species are known or suspected to occur throughout the project area, but have not been quantified.

Other weed species such as leafy spurge, musk thistle, and purple loosestrife are suspected to occur on national forest lands within the project area but have not been quantified. Yellow star thistle is also known to occur.

The characteristics of each weed species and available control methods can be found in Appendix G.

Future surveys will reveal additional weed populations. Treatment methods for those sites will be determined by evaluating site and weed species characteristics and applying the criteria established in the adaptive strategy described in Chapter 2 and illustrated in Appendix G. Future surveys will also help us find new invaders.

## Dynamics of Weed Invasions

According to Cousens and Mortimer *Dynamics of Weed Populations* (1995), weeds generally invade a region (such as the Upper Columbia River Basin) through a three-phase process:

**Introduction** – As a result of dispersal, seeds or plant fragments arrive at a site beyond their previous geographic range and establish populations of adult plants. Potential new invaders such as yellow starthistle could become a serious problem if allowed to advance beyond the introduction phase.

**Colonization** – The plants in the founding population reproduce and increase in number to form a self-perpetuating colony. Houndstongue is an example of a weed species in the colonization phase within the Lochsa River basin.

**Naturalization** – The species establishes new self-perpetuating populations, undergoes widespread dispersal and becomes incorporated within the native flora. For example, spotted knapweed, common tansy and St. Johns-wort have become naturalized within the Upper Columbia River Basin and in some areas of the Lochsa subbasin.

Invasion and range expansion by a weed involves all three phases. Typically, plant invasions do not occur along a single front. Instead, new outbreaks initiated by long distance dispersal become the centers for shorter distance dispersal that eventually fills the gaps between them.

The rate at which weed populations expand can be very difficult to determine, and may be exponential (a constant proportional rate of increase) or two-phased (sudden range expansion followed by a period of little increase).

It is typically only when the naturalization phase is reached that a species is likely to be considered a nuisance and classified as a weed. Weed control efforts are then focused on limiting further spread of naturalized weeds into previously uninfested areas. Eradication is usually the goal for species considered to be new invaders at a more localized level.

Thus, while a weed species may be considered naturalized within the Upper Columbia River Basin, that same species may still be in the introduction or colonization phase for the project area.

### Methods of Weed Spread

Forest roads and trails serve as corridors for the dispersal of many weed species. Roche and Roche (1991) discuss the historical perspective of meadow hawkweed invasion in the Pacific Northwest and cite many older studies documenting the influence of road systems. Weed seeds and plant parts are moved along road systems by vehicles and people, allowing the establishment of weeds into previously uninfested areas. Many of the road systems within the project area contain infestations of such species as spotted knapweed, hawkweeds, and St. Johns-wort. As corridors, road systems allow weeds to invade areas where ground disturbance has taken place (i.e. timber harvest units, gravel pits, etc.).

Weeds are also transported by wildlife and domestic livestock. Weed seeds consumed by animals or attached to their fur are carried off road and trail corridors into the forest. Recreationists play a large part in weed spread; hiking, mountain biking, using ATVs and motorcycles, and horseback riding all contribute to the spread of weeds. Some weed seeds are dispersed by the wind, while other are transported to new sites by streams and rivers. In this manner, weeds have been able to occupy undisturbed habitats far removed from road or trail systems.

### Past Weed Control Efforts

With the exception of limited bio-control releases, mowing and the spraying of administrative sites, and ITD spraying along the US Highway 12 right of way, there has not been a strong weed management program within the project area.

### State and County Weed Control Activities

The State of Idaho and Clearwater and Idaho counties have noxious weed control programs. The State of Idaho is responsible for directing noxious weed activities; each county has noxious weed control board which is responsible for controlling weeds along federal, state and county roads, for providing information to residents and other agencies about weed control methods, and for providing technical assistance for weed management on private lands.

County weed control agencies actively treat weed infestations along roads within their jurisdiction. In addition, the boards assist with the Certified Weed Free Hay Program, enforcement of the noxious weed control law, and identification of new weed invaders.

## Environmental Consequences — Weed Populations

### All Alternatives

All alternatives propose the use of bio-control agents, many of which are limited in their availability. Estimates for acres of bio-control releases were based on realistic availability predictions. If additional bio-control agents become available, they will be used.

### Alternative 1: No Action

Herbicides would be available for treatment of new weed invaders but their use would be restricted to administrative sites and the Highway 12 corridor. Alternative 1 would be minimally effective in controlling existing populations. These large populations would continue to spread throughout the project area along road corridors and stream channels. They would continue to serve as a significant source of noxious weed seed infestations into the surrounding landscape.

The limited release of biological control agents into large infestations of spotted knapweed would lessen the rate of spread in some areas, but likely would not result in significant control of most infestations.

Without a comprehensive weed treatment and monitoring plan or an adaptive strategy for the area, most treatment efforts would not be as successful as they could.

The long-term effect of implementation of Alternative 1 would be that as weed infestations become larger and more widespread outside of administrative sites and the US Highway 12 corridor, the cost of control would increase while the chance of success would diminish. New invaders that are not effectively killed with existing herbicides, such as the toadflaxes and rush skeletonweed, would continue to expand. New invaders not successfully treated would likely become naturalized into the ecosystem and once established, would be difficult if not impossible to eradicate.

### Alternative 2: Mechanical, Biological and Cultural Treatments

Alternative 2 would have the effect of controlling some weed populations but many infestations would continue to spread. Large infestations of spotted knapweed would be treated by a combination of biological agents.

Within some locations, mechanical and cultural control could eliminate infestations of knapweed (Lacey et al. 1995), Houndstongue and St. Johns-wort. Houndstongue can be eradicated if plants are pulled the first year since flowering occurs in the second year. Small infestations of knapweed and St. Johns-wort can be eradicated if a sufficient portion of the taproot and lateral roots are removed. However, all three species are prolific seed producers; seed reserves in the soil can remain viable for more than ten years. Disturbed soil around pulled plants would provide a seedbed for the germination of weed seeds. Therefore, hand-pulling would have to continue over many years to be highly effective. Re-vegetation of areas disturbed during mechanical control activities would enhance the effectiveness of these control methods.

Mechanical control methods would have limited success in smaller infestations of meadow and orange hawkweed and Dalmatian toadflax. Hand-pulling may actually stimulate growth and spread by providing a disturbed seed bed, and by fragmenting rhizomes that are left in the soil. Biological control agents are being developed for the hawkweeds and will be utilized as soon as they become available.

Mechanical control is typically unsuccessful in treating Canada thistle infestations. This species has an extensive root system and sends out new shoots from numerous buds on lateral roots. Canada thistle infestations would not be eradicated with mechanical or cultural treatments. The infestations would continue to fill in through vegetative reproduction in spite of a rigorous hand-pulling program. There would be a high risk that Canada thistle would continue to spread vegetatively.

With full implementation of this Alternative, most weed populations would not be brought under control – either due to infestation size or individual species biology. Monitoring of past mechanical and biological methods in the Priest Lake Ranger District Noxious Weed Control EIS (1997, pp III-2,3) indicates that these methods alone have not been successful in controlling populations. While cultural treatments in conjunction with mechanical and biological methods increase the likelihood of success, most weed populations would not be eradicated.

The long-term effect of implementation of Alternative 2 would be a reduction of some weed species considered to be naturalized within the ecosystem. Biological control of spotted knapweed and St. Johns-wort would help to reduce the size of some infestations. However, changes in population size and distribution would not be noticeable for many years. Infestations of those species and Canada thistle, sulfur cinquefoil and Dalmatian toadflax along roads and trails would continue to provide a seed source for their continued spread.

Orange and meadow hawkweed would continue to increase, and would become more difficult to control as populations increase in size and distribution. In addition, new invaders not successfully treated would likely become naturalized within the ecosystem and, once established, would become difficult if not impossible to eradicate.

Where weed infestations are successfully eradicated, follow-up treatments and monitoring of infestation sites combined with re-vegetation activities using desired plant species would reduce the likelihood of re-infestation.

### Alternative 3: Mechanical, Biological, Cultural and Chemical Treatments

The use of herbicides along with mechanical and biological methods would not result in the total elimination of noxious weeds from the project area. However, this Alternative would effectively reduce the size and rate of spread of infestations.

Mechanical control would be used only at those sites where effective weed control is predicted (i.e. small infestations of specific weed species). Therefore, this control method would be more successful under Alternative 3 than under Alternative 2 because the combination of the two treatments – mechanical and chemical – can be more effective. The effectiveness of cultural and biological control methods would be same as under Alternative 2.

Initial use of herbicides in some populations would likely require less follow-up treatment. Herbicide use in orange and meadow hawkweed infestations would offer a much greater chance of success than other control methods. The combination of chemical and biological control of spotted knapweed, St. Johns-wort, Canada thistle, sulfur cinquefoil and Dalmatian toadflax would reduce their occurrence along roads and trails. By effectively reducing weed population along travel corridors, the incidence of weed spread would diminish.

Follow-up treatments and monitoring of treated infestations combined with re-vegetation using desired plant species would reduce the likelihood of re-infestation.

Based on the extent of each infestation and the weed species present at each site, it is estimated that weed infestations would be eradicated or greatly reduced on 70% of the proposed treatment acreage (St. Joe Noxious Weed EIS). At other sites, the risk of weed spread to uninfested areas would be significantly decreased.

## C. VEGETATIVE COMMUNITY DIVERSITY

### Affected Environment — Vegetative Community Diversity

The Clearwater Subbasin ecosystems have some of the most productive and biologically diverse forest lands in the entire Interior Columbia River Basin. Vegetative communities range from dry or semi-dry associations, moist forest associations, wetlands, and cold-wet sub-alpine associations. The following table displays the forest cover type composition of the proposed project area:

**Table 3.2 Forest Cover Types**

| Forest Cover Type | % of Project Area |
|---|---|
| Douglas-fir | 25 |
| Grand fir | 23 |
| Lodgepole pine | 11 |
| Englemann spruce | 10 |
| Western redcedar | 9 |
| Subalpine fir | 8 |
| Ponderosa pine | 3 |
| Mountain hemlock | 1 |
| Western larch | 1 |
| Western white pine | 1 |
| No data | 7 |
| Non-stocked | 1 |

While the productive and diverse Moist Forest Potential Vegetation Group (western hemlock, western redcedar and grand fir cover types) makes up only a small portion (18%) of the Interior Columbia River Basin, it makes up a larger portion (25%) of the North Fork Ranger District and the project area.

The drier Ponderosa pine and Douglas-fir forest cover types occur on 15% of the lands within the project area, while the higher elevation subalpine fir cover type occupies 16% of the project area.

The lodgepole pine forest type currently occupies 10% of the area. Because of the large stand replacement wildfires in the early part of the 1900s, this cover type occupies portions of the Moist Forest Potential Vegetation Group within the drainage.

The long-lived early seral white pine and larch forest types cover an additional 1% of the District.

Englemann spruce grows over a wide range of areas with abundant soil moisture. Spruce is found primarily in riparian areas and in sub-alpine fir habitat types on northern aspects.

Common understory shrubs on drier sites include kinnikinnick, creeping Oregon grape, snowberry, ocean spray, and ninebark. Moister Douglas-fir sites support twinflower, Oregon grape, kinnikinnick, red-osier dogwood, and western aster.

River and stream bottoms are well vegetated with conifers and deciduous trees and shrubs. Associated hardwood tree species include cottonwood, birch and some aspen. Alder and willow are also common riparian area shrubs.

Noxious and undesirable weed species have been found on national forest lands in many of these cover types. Dry communities (Ponderosa Pine/Douglas-fir cover types) as described above are inherently vulnerable to invasions by spotted knapweed, St. Johns-wort, and common tansy (Lacey et al. 1995, Whitson et al. 1992).

The moister cedar/hemlock cover types in the lower elevations are susceptible to invasion by hawkweeds, skeleton weed, and tansy ragwort following soil disturbance and reduction of normal canopy cover (Rice and Toney 1997).

The recent scientific assessment of the Interior Columbia River Basin found that herbaceous and shrub wetland vegetation types in the Upper Columbia River Basin (including riparian habitats) have declined in area from historical conditions – in part due to invasion by certain weed species (Quigley and Arbelbide 1997). Wetland habitat in the North Fork Clearwater Subbasin is susceptible to decline from encroaching weeds.

The rangelands and dry forest types within the Clearwater ecosystem and surrounding region were described in the above assessment as having low ecological integrity – again in part due to noxious weed invasions (Quigley, Haynes et al. 1996).

Table 3.2, adapted from the recent scientific assessment of the Interior Columbia River Basin, displays the susceptibility of the Clearwater Sub-basin ecosystem's major vegetative community types to invasion by several weed species of concern. Susceptibility to invasion depends upon the weed's aggressiveness and the suitability of the community type as habitat for that weed.

Of the cover types within the basin, grasslands (including fescue-bunchgrass), herbaceous wetlands, and drier open-canopied forest (such as interior Douglas-fir and Ponderosa Pine types) are the most susceptible native habitats to weed invasion.

Lower elevations portions of the moist western redcedar/hemlock forest types are also at risk to invasion by hawkweeds, skeleton weed, and tansy ragwort (Rice and Toney 1997). The higher elevation forest of these cover types are less susceptible to weed invasion.

**Table 3.3 Broad-scale Cover Types in the Project Area and Their Susceptibility to Invasion by 14 Weed Species**

(Adapted from *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins*, Vol. II, Table 3.174, June 1997)

| Vegetation Cover Type | Musk Thistle | Diffuse Knapweed | Spotted Knapweed | Yellow Star-thistle | Rush Skeleton-weed | Ox-Eye Daisy | Canada Thistle | Bull Thistle | Leafy Spurge | Orange Hawkweed | Meadow Hawkweed | Dalmatian Toadflax | Purple Loose-strife | Sulfur Cinque-foil |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cottonwood/ Willow | M | M | H | M | M | H | H | M | H | M | H | M | M | M |
| Engelmann Spruce – Subalpine Fir | H | M | M | M | M | H | H | H | M | M | M | M | M | M |
| Fescue - Bunchgrass | H | H | H | H | M | M | H | H | H | L | L | H | L | M |
| Grand Fir | M | M | M | M | M | M | M | M | M | M | U | M | M | M |
| Herbaceous Wetlands | M | | H | H | L | H | H | M | M | H | M | M | H | H |
| Interior Douglas-fir | H | M | H | M | M | M | H | H | M | M | M | M | L | H |
| Interior Ponderosa Pine | M | H | H | M | M | M | M | M | M | L | L | M | L | H |
| Lodgepole Pine | M | M | M | M | M | M | M | M | M | M | L | M | L | M |
| Mixed-Conifer Woodlands | M | M | H | M | M | U | H | M | M | L | L | M | L | H |
| Native Forb | M | M | M | M | M | M | M | M | M | L | L | M | M | H |
| Shrub Or Herb/ Tree Regeneration | M | M | M | M | H | M | M | M | M | M | L | M | L | H |
| Shrub Wetlands | H | M | H | M | L | M | H | H | M | M | M | M | H | M |
| Western Larch | M | M | M | M | M | M | H | M | M | M | M | M | L | M |
| W. Redcedar/ W. Hemlock | H | M | M | M | M | H | H | H | M | M | M | M | M | M |
| Wheatgrass Bunchgrass | M | H | H | H | M | M | H | M | M | L | L | H | | H |

**H = High susceptibility to invasions** – Weed species invades the cover type successfully and becomes dominant or co-dominant even in the absence of intense or frequent disturbance.

**M = Moderate susceptibility to invasion** – Weed species is a "colonizer," and invades the cover type successfully following high intensity or frequent disturbance which impacts the soil surface or removes the normal canopy.

**L = Low susceptibility to invasion** – Weed species does not establish because the cover type does not provide suitable habitat.

**U = Unknown susceptibility to invasion** – Ecological requirements of the weed species are not know, or there was a lack of distribution records for the weed species, or the extent of the cover type in the project are might be so minor as to prevent or restrict the probability of obtaining distribution records.

## Environmental Consequences — Vegetative Community Diversity

### Alternative 1: No Action

This alternative would have no direct effects on vegetative communities outside of administrartive sites and the US Highway 12 corridor since weed control activities would not change from current levels.

There would be no immediately apparent impact on vegetative community diversity outside of this area. However, given the moderate to high susceptibility of most vegetative communities within the ecosystem to invasion by the weed species of concern (see Table 3.2), it would be expected that existing weed populations would continue to spread into new areas – in many cases, with or without disturbance. Weed species that are resistant to treatment with clopyralid would become especially troublesome.

Outside of the administrative sites and the US Highway 12 corridor, orange and meadow hawkweed infestations would continue to invade moist forest and wetland habitats, displacing less competitive native species. Spotted and diffuse knapweed, St. John's wort, Dalmatian toadflax and Canada thistle would also increase in density and distributions. Houndstongue would spread rapidly and future control of this species would be very difficult and costly.

As noxious weeds spread, the negative indirect impact on native plant communities would become increasingly apparent. Corridors such as trails and roadsides would become increasingly infested with noxious weeds. Noxious and undesirable weeds would be likely to dominate many vulnerable habitats.

Planty-Tabacchi et al. (1996) found that the diverse habitats and shifting dynamics of riparian zones make them uniquely susceptible to weed invasions. The researchers also determined that the richest plant communities along a river system were the most vulnerable to invasion by weeds.

Several researchers have demonstrated that the actual number of native species, as well as their total biomass, would decrease in locations infested by noxious weeds. Belcher and Wilson (1989) found seven to eleven other species in locations free of leafy spurge, but only four other species within areas infested by leafy spurge. Tyser and Key (1988) reported significant reductions in species diversity in knapweed-infested fescue grasslands surveyed within Glacier National Park.

The long-term effect of implementation of Alternative 1 would be that, as weed infestations become larger and more widespread, some native species could be eliminated from their habitats, and native plant species diversity in many areas would decline. Most noxious and undesirable weeds would – in effect – be considered as naturalized within the ecosystem.

### Alternative 2: Mechanical, Biological and Cultural Treatments

Only modest success in controlling weed infestations could be expected with full implementation of this alternative.

No direct effects to vegetative communities within the ecosystem would occur and there would be no immediate apparent impact on vegetative community diversity. Through a diligent program of mechanical and cultural control, some sites would have native plant diversity maintained or restored. In addition, control of weed species at these sites would reduce or eliminate their spread to other areas. However, vegetative diversity in many sites would decline as weed populations expand.

The long-term effect of Alternative 2 would be similar to that of the No Action Alternative; however, it would take longer – perhaps years – for the decline in vegetative community diversity to become apparent.

### Alternative 3: Mechanical, Biological, Cultural and Chemical Treatments

The effects of mechanical, cultural and biological treatments on vegetative community diversity would be similar to

those discussed under Alternative 2. The higher predicted effectiveness of mechanical control combined with chemical follow-up when necessary under this alternative would provide greater long-term protection of vegetative community diversity.

Implementation of this Alternative would not produce immediately apparent impacts to vegetative community diversity. However, full implementation of this Alternative could help reverse the trend toward noxious weed dominance.

A fully integrated approach to noxious weed treatment would be the most effective weed control method (Bechinski 1992 and Everett 1994). Therefore, this alternative, combined with an aggressive prevention and education program, would provide greatest long-term protection of vegetative community integrity.

As discussed under Alternative 1, the failure to control noxious weeds on most of the identified treatment sites would increase the probability that noxious weeds would spread to new sites. Likewise, the risk of weed spread would remain high at sites in which weeds are only partially controlled (for example, through mechanical treatment of hawkweeds as described in Alternative 2). The probability of spread is compounded as weeds colonize new sites which then become new seed sources for even greater population expansion. Under Alternative 2, and to a lesser extent, Alternative 1 weed populations would continue to increase.

The impacts of herbicides on vegetative biodiversity tend to be much more easily confined to the site of the application. Although herbicides would directly affect some non-target plant species at the site of the application, the long-term effect on native plant communities would be beneficial.

Herbicides such as picloram and 2,4-D are often perceived as greatly reducing the diversity of plant species on a treated site. For example, picloram is thought to create a grass monoculture at the expense of broadleaf species. This is somewhat overstated. Two studies have been conducted in western Montana to measure the impact of herbicide application on native species. Willard et al. (1988) measured the impact of picloram on native grasses and broadleaf species. With the control of noxious weeds, grass species generally showed marked increases. Some broadleaf species such as arnica and yarrow were greatly reduced. Generally, members of the Asteraceae (composite family), Fabaceae (legume), Polygonaceae (buckwheat), and Apiaceae (parsley family) were affected by picloram. Members of the Brassicaceae (mustard family), Liaceae (lily family), and Scrophylariaceae (figwort family) were less affected by the herbicide.

In a more extensive study, Rice et al. (1992) compared the impacts of the herbicides 2,4-D, picloram and clopyralid to the impact of knapweed invasion on species number and diversity. The knapweed sites were in the initial stages of infestation, thus the diversity on these sites had not suffered as much as in studies cited above by Tyser and Key (1988). Although the untreated knapweed plots in Rice's study started with slightly higher numbers of species and diversity, within two years the species number and diversity were virtually identical on all plots. Initially, the impact to species was greater on sites sprayed with picloram than on sites sprayed with clopyralid.

Clopyralid affects members of only three plant families – the composites, the legumes, and the buckwheats. Thus, this herbicide can be sprayed near tree, shrub and forb species that may be affected by picloram.

On-site impacts to vegetation not withstanding, herbicide application as proposed would have the benefit of reducing sources of further weed spread to currently uninfested areas. Although herbicide application would have small and transitory impacts on some non-target vegetation, it would prevent much more serious long-term effects on many susceptible communities within the ecosystem.

## D. Threatened, Endangered, and Sensitive Plants (TES)

### Affected Environment — TES Plants

A Threatened species, as determined by the U.S. Fish & Wildlife Service (USFWS), is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Sensitive plants are those plant species identified on the Regional Forester's Sensitive Species list for which population viability is a concern, as indicated by a current or predicted downward trend in population numbers or in habitat capability (which would reduce the existing distribution of the species). The majority of sensitive plant species occur in wet western redcedar riparian communities and in moist upland mature cedar/hemlock. Others occur in dry xeric openings in ponderosa pine and Douglas fir communities, meadows and grasslands, broadleaf forests, high elevation subalpine riparian areas, and openings. Table 3.2 (page 27) displays the broad-scale cover types in the Lochsa subbasin.

Of the estimated 800 plant species currently either known or suspected to occur within the subbasin, 32 have currently been identified as species of concern (TES). The majority of these species (28) occurs in wet riparian communities or moist, mid-late seral western redcedar communities. Table 3.1 (page 24) shows that these cover types make up a relatively small percentage of the project area.

#### Methodology

Assessment of the TES plants and their suitable habitat occurrence was accomplished through review of Idaho Conservation Data Center Element Occurrence Records, timber stand examination records, aerial photographs, and topographical maps of the area as well as previous plant surveys.

#### Threatened/Endangered Plant Species

There are no listed threatened or endangered plant species on the Clearwater National Forest.

#### Sensitive Plant Species

There are 32 sensitive plant species known or suspected to occur on the Clearwater National Forest

. Approximately 20 are known or suspected to occur within or near the project area.

Sensitive plant species can be assigned to one or more forest cover types based on similar general habitat requirements. Table 3.1 lists the general forest cover types within the Lochsa, Middle Fork Clearwater, and Lolo Creek drainages. Though cover types do not necessarily represent the forest habitat type or potential vegetation of a site, they do represent the ecological factors of a site. Such factors include moisture, light, temperature and others that dictate the distribution of particular plant species. The large majority of sensitive plant species will occur in wet western redcedar riparian areas or moist western redcedar and hemlock forests.

The treatment sites, by nature, are commonly disturbed sites not generally conducive to potential sensitive plant occurrence. In many cases, the habitat has been altered enough that it is not considered high potential habitat for sensitive plants. Typical examples of such areas include open or recently closed roads, rockpits, administrative sites, campgrounds, and high use trailheads.

If sensitive plants are found within treatment areas, the guidelines listed on the next page under Effects Common to All Alternatives would be followed.

### Environmental Consequences — TES Plants

The effects from the control of noxious weeds on TES plant species are assessed by evaluating the potential for adverse impacts on habitat, known occurrences, and population viability of these species.

Within forest covers, deerfern (*Blechnum spicant*) is generally found in riparian areas and wet cedar/hemlock habitats. No populations have been identified within treatment areas.

#### Effects Common to All Alternatives

Biological control methods should have no effect on TES plant species or their habitat. Insects have been intensively tested for specificity to target weed species.

To ensure the protection of TES plant populations, the following measures would be implemented:

- All treatment sites would be evaluated for TES plant habitat suitability. Highly suitable habitat would be surveyed as necessary prior to treatment.
- Site-specific treatment guidelines would be developed for weed infestations within or adjacent to known TES plant populations.
- No spraying with vehicle-based spraying devices would be done within 50 feet of any known TES plant occurrence.
- No chemical spraying would be done within 25 feet of any known TES plant occurrence. Only mechanical treatment would be used within 25 feet of TES plants.

Protection measures range from not treating the site, to implementing buffers, to monitoring effects. Chosen site-specific measures used would be commensurate with the type of treatment (i.e., mechanical, biological or chemical) and the threat to the species and/or population.

### Alternative 1: No Action

#### Direct and Indirect Effects

There should be no direct impact to sensitive plant populations or suitable sensitive plant habitat with effective mitigation measures in place. Effects to sensitive plants from clopyralid would be the same as Alternative 3. Although there are sensitive plant populations within and/or adjacent to some of the treatment sites, there would be no direct impact to those populations.

Given the known occurrences of TES plant populations, existing high potential habitat conditions, and the existing and anticipated spread of noxious weeds, it is unlikely that the No Action Alternative would adversely impact TES plant habitat or populations. Alternative 1 is also not expected to significantly reduce TES plant population viability or cause a trend towards federal listing of any sensitive species.

#### Cumulative Effects

In the long term, the No Action Alternative could lead to a decrease in the amount of potential habitat for sensitive plant species. As discussed in the Wildlife section, the effects of noxious weeds on forest succession are uncertain. However, the existing weed populations would most likely continue to spread, increasing competition with native plant species and decreasing diversity and abundance.

Meadow and orange hawkweeds have been observed in moist forest habitats. Existing populations would be likely to continue to spread into these areas. Populations of the hawkweeds, Canada thistle, and other weeds would likely spread in riparian areas throughout the project area, as these areas serve as natural travel and linkage corridors.

Most of the sensitive plants known to occur within the project area are associated with moist forest and riparian habitats. Therefore, if noxious weed populations continue to grow and spread into these habitats, a long-term cumulative reduction in sensitive plant habitat capability would be expected.

Assuming adverse noxious weed effects on succession, this could negatively affect the potential for sensitive plant species to colonize potential habitat. As noxious weeds continue to spread, the amount of present or potential habitat for sensitive plant species could decrease, and the possibility of adversely affecting the population viability of sensitive plant species could increase.

### Alternative 2: Mechanical, Biological, and Cultural Treatments

#### Direct and Indirect Effects

There would be no direct impacts to identified sensitive plant occurrences during weed treatment on the large majority of treatment sites. For the few sites where weeds occur within the extent of the sensitive plant population, it is possible some trampling of sensitive plants could occur during hand pulling of weeds. Care would be taken to limit this as much as possible. The effects on a few individual plants are not expected to affect population viability.

Future treatment sites would be assessed for suitable TES plant habitat and would be surveyed prior to treatment as needed. Treatment of additional infestations under the adaptive strategy may necessitate a short-term loss of isolated individuals, primarily from marginal habitats, to protect the integrity of some weed-free habitats and core populations of sensitive plants. Impacts to individuals would not be expected to cause a loss of population or species viability, or lead to federal listing of any sensitive plant species.

Mechanical control of orange and meadow hawkweeds might be successful, provided that treatment efforts removed the entire root mass. Removal of the entire root mass would require repeated, labor-intensive treatments.

Biological control of knapweeds and Dalmatian toadflax is not expected to impact any known sensitive plants directly or indirectly. The biological agents have been tested for host specificity and have a very narrow selection range.

### Cumulative Effects

In the long-term, biological control methods could benefit TES plant species and their habitat by controlling the spread of target weed species into weed-free areas, and eventually reducing weed populations on the sites.

If fully implemented, this alternative would slow the rate of spread of some weed populations. However, because many infestations would not be controlled or eliminated, suitable TES plant habitat would likely be reduced. Thus, the opportunities for expansion of vulnerable TES plant populations into suitable habitat could eventually be reduced.

## Alternative 3: Mechanical, Biological, Cultural, and Chemical Treatments

### Direct and Indirect Effects

Although there are sensitive plant populations within and/or adjacent to some of the treatment sites, there would be no direct impacts to those populations. A 25-foot no herbicide buffer would be implemented surrounding known plant locations. There should be no drifting of spray outside of the treatment areas. Herbicide use is not likely to cause any adverse affects to these known nearby plant populations and, therefore, to their population viability. The potential for adverse effects from mechanical and biological treatment is the same as discussed under Alternative 2.

Removal of competitive weed species could improve habitat for colonization by sensitive species. If colonization occurs, any future treatments should again be preceded by sensitive plant surveys to reevaluate the need for re-treatment.

### Cumulative Effects

In the long term, treatment of noxious weeds with chemicals could reduce the total weed population and improve habitat for potential colonization by sensitive plant species.

Roadside treatments could help prevent the spread of weeds to more natural habitats off road, thereby protecting the diversity of native plants in those areas.

Herbicide treatment on future sites under the adaptive strategy could result in the direct loss of sensitive plant individuals, particularly those at the periphery of established populations. Loss of individuals in not expected to reduce population viability or lead to federal listing of any sensitive plant species. As with mechanical and cultural control, site-specific treatment criteria would be designed to protect the viability of known sensitive plant populations. Herbicide spot applications, under conditions outlined in the design criteria, would allow effective weed control with little or no impact to sensitive plant populations or habitat.

All known sensitive plant populations would be buffered from herbicide application. Future treatment sites would be assessed for suitability as TES plant habitat and would be surveyed as needed prior to treatment. Recommended buffers and treatment criteria for riparian and aquatic sites would prevent indirect effects to sensitive plants or suitable habitat in these areas.

Successfully eliminating or controlling a majority of weed populations would protect and enhance suitable habitat for sensitive plants.

### Forest Plan Consistency

The Clearwater National Forest Plan directs that the habitat of sensitive plant species be managed to prevent further declines in populations that could lead to federal listing under the Endangered Species Act. Alternatives 1, 2, and 3 would be consistent with Forest Plan direction.

## E. SOILS

### Affected Environment — Soils

Due to the nature of interactions of soil characteristics and herbicides, soils are an important part of the analysis. Of particular importance are percent of organic matter in the soil, available water-holding capacity of the soil, and soil permeability. These three characteristics and the chemical properties of a given herbicide determine both the availability of the herbicide for uptake by plants and its tendency to move through the soil.

When incorporated into the soil, a portion of herbicide dissolves in the soil water and a portion is taken into soil particles, primarily fine particles and organic matter. The amount of herbicide absorbed or attached to soil particles depends on the characteristics of the chemical and the amount of organic matter and fine material in the soil. Any herbicide that remains in water is available for uptake by plant roots. However, if the water moves off-site or out of the rooting zone, it takes some of the dissolved herbicide with it. Most undisturbed soils in North Idaho have a litter layer up to 5 inches thick. The lower part of this litter layer is highly decomposed and would have a high likelihood of herbicide absorption. Below the organic litter layer, volcanic ash is a common mineral soil layer. The ash layer varies from being absent, mixed with the soil layer, or up to 25 inches or more thick. The top part of the ash is rich in organic matter. The entire ash layer has a very high water-holding and herbicide nutrient-holding capacity. The risk of herbicide movement through undisturbed forest soils into ground water is low in most places.

Based on soil characteristics, sites can be classified as either infiltration-dominated or runoff-dominated. Infiltration-dominated sites include coarse-textured or gravelly soils such as those in the analysis area. On these soils, water infiltrates at a rate fast enough that runoff does not normally occur. While extremely rare precipitation events may result in some runoff, by far the predominant manner in which water moves is via infiltration. In the process, toxins on the soil surface may be carried by water (rainfall, snowmelt, etc.) as it percolates down through the soil profile.

Runoff-dominated sites, by comparison, occur where soils are either very fine-textured or clayey or have high levels of rock and other coarse fragments that do not absorb water. Percolation or infiltration of water into the soil profile is slow, causing the water to run off in a normal precipitation event producing overland flow. Some of the proposed treatment sites are near streams or drainage ditches and on or near bedrock and very rocky soils that would need to be treated as run-off dominated soils.

It is estimated that approximately 40 percent of the lands in the project area are located on infiltration-dominated sites with the remaining 60 percent on run-off dominated sites.

Two basic categories of vegetation types are associated with proposed treatment sites: riparian areas and upland areas. High water tables are common near stream channels. As one moves away from the stream channel, the chance of encountering a high water table diminishes.

Some of the proposed treatment sites are located in upland areas. These areas do not have the hydrologic regimes and the resulting moisture to support vegetation associated with riparian areas. However, these sites are commonly located along roads or trails, which often lead to or drain into riparian areas.

## Environmental Consequences — Soils

### Alternative 1: No Action

### Direct Effects

There is evidence that soil stability is lowered and erosion rates higher on noxious weed-infested ground than on native grassland sites (Roche and Roche 1999). The decrease in native bunchgrass density results in an increase in the amount of soil exposed to the erosive forces of wind and water. Potentially, erosion losses would result in a decrease in the long-term productivity of the site. The effect of weeds on soil stability and productivity may be relatively minor but would occur over extended periods of time.

Mechanical treatment along approximately 100 acres of road cuts and fills and within riparian areas would not likely result in any detrimental soil impacts. Seeding and fertilization of disturbed sites would improve plant growth of desired species, therefore increasing ground cover and reducing soil erosion.

Up to 200 acres of chemical treatment are ongoing at administrative sites in the analysis area. The minor direct effects on the soil from the ongoing use of selected chemicals for areas inside the Lochsa noxious weeds analysis area would be same for Alternative 2, but lower than Alternative 3.

Two chemical treatment programs are currently being implemented in the Middle Fork Clearwater River and Lochsa River drainages. During 2006 the Forest treated 123 acres at administrative sites within the Lochsa River and Middle Fork Clearwater River drainages. The majority of the treatment (92 percent) involved the use of clopyradlid. Also in 2006 the Idaho Transportation Department treated 192 acres along U.S. Highway 12 from Kooskia to Lolo Pass. Treatment acres for 2007 for the administrative sites and U.S. Highway 12 right-a-way are expected to be similar to 2006 (refer to Appendix K, Table 1).

The acreages within the administrative sites and US Highway 12 corridor that will be sprayed with clopyralid, metsulfuron methyl, picloram, triclopyr-TEA and 2,4-D are well below the maximum acres annually treatable with no effect for aquatic organisms expected (Appendix I, Tables 1and 2).

Release of biological control agents, approximately 50 acres annually, would have no direct detrimental effects on soil properties.

Cultural treatments such as seeding, transplanting, and fertilizing would not affect the soil resource. Fertilizers would be applied according to Forest Service and manufacturer guidelines and would increase soil productivity. Seeding and transplanting activities would involve only limited soil disturbance of very small areas.

### Indirect and Cumulative Effects

Indirect and cumulative effects to the soil resource include the risk of spread to new areas that would potentially result in decreases in soil stability in a much larger area that those currently affected.

Without large-scale, integrated, weed treatments within the analysis area, it becomes increasingly likely that noxious weeds will become more widely established within the project area. An indirect effect of noxious weed invasion could be increased soil erosion and reduced soil productivity from infested sites.

At the present time, most infested sites are along road clearings and other travel corridors. Impacts from the future spread of weeds would depend on the slope, soil characteristics, precipitation patterns, and distance to water from the infested sites. Under the worst-case noxious weed infestation scenario, it is possible that decreases in soil productivity will occur on highly erosive locations where the native ground cover is lost to invasive weed species.

Other activities occurring in this analysis area include timber harvest, grazing, mining, prescribed burning, recreation, road construction, reconstruction, maintenance, and decommissioning. These activities will continue over the next ten years. The amount of each activity is undetermined at this time.

The Forest will follow national direction to prevent the spread of noxious weeds for each of these activities. Management of individual activities to prevent the introduction and spread of noxious weeds is designed to reduce the amount and extent of noxious weeds across the analysis area over time.

The indirect detrimental effects on soil productivity are the highest with this alternative due to the greatest likelihood of increased weed expansion in the basin.

### Alternative 2: Mechanical, Biological, and Cultural Treatments

#### Direct Effects

The direct effects of ongoing chemical treatments would be the same as Alternative 1.

Mechanical treatment along road cuts and fills and within riparian areas would remain the same as Alternative 1 (100 acres).

Release of biological control agents would be increased to approximately 300 acres annually.

There are no direct effects of this alternative on water quality or aquatic organisms from biological treatments annually (approximately 300 acres) and mechanical treatments (100 acres).

Minor direct effects from cultural treatments are the same as Alternative 1.

#### Indirect and Cumulative Effects

Indirect effects from the chemical, mechanical and biological treatments are the same as Alternative 1.

Indirect and cumulative effects to the soil resource would include the risk of spread to new areas that would potentially result in decreases in soil stability in a much larger area that those currently affected.

Without large-scale, integrated weed treatments within the analysis area, it becomes increasingly likely that noxious weeds will become more widely established within the project area. An indirect effect of noxious weed invasion could be increased soil erosion and reduced soil productivity from infested sites.

At the present time, most infested sites are along road clearings and other travel corridors. Impacts from the future spread of weeds would depend on the slope, soil characteristics, precipitation patterns, and distance to water from the infested sites. Under the worst-case noxious weed infestation scenario, it is possible that decreases in soil productivity will occur on highly erosive locations where the native ground cover is lost to invasive weed species.

Other activities occurring in this analysis area include timber harvest, grazing, mining, prescribed burning, recreation, road construction, reconstruction, maintenance, and decommissioning. These activities will continue over the next ten years. The amount of each activity is undetermined at this time.

The Forest will follow national direction to prevent the spread of noxious weeds for each of these activities. Management of individual activities to prevent the introduction and spread of noxious weeds is designed to reduce the amount and extent of noxious weeds across the analysis area over time.

The indirect detrimental effects on soil productivity are less with this alternative than Alternative 1 but greater than Alternative 3.

### Alternative 3: Mechanical, Biological, Cultural, and Chemical Treatments

The effects of mechanical, biological, and cultural treatments are the same as Alternative 2 on the soil resource. The following discussion focuses on additional chemical treatments proposed with this alternative.

#### Direct Effects

There are no direct effects of this alternative on soil physical properties or productivity from chemical treatments.

#### Indirect Effects

Indirect effects include changes to vegetation from the treatment of chemicals. Indicators of indirect effects include the herbicide chemical half-life and sorption in soils.

Indirect effects would include an upward beneficial trend in soil properties and productivity. Herbicides encourage grasses by the selective pressure on broadleaf species. Since grasses have better soil-binding characteristics than the target broadleaf species, herbicide treatment would result in higher soil stability on the treated sites.

Herbicides used for weed control, even in steeper terrains, cause little erosion and maintain good hydrologic conditions. The soil is not disturbed by herbicides, and usually a good litter layer remains or is increased due to the litter provided from successfully treated noxious weeds. A good litter layer mitigates raindrop impacts, promotes infiltration, and reduces erosion.

All the herbicides analyzed here have some soil activity; that is, they dissolve to some extent in water and can be absorbed fairly readily from soil moisture by susceptible plants. These herbicides can move with water as it moves through soil. Although these herbicides are all water soluble and soil active to some extent, they vary significantly in persistence in the environment (see Table 3.7 in Water Quality/Fisheries section). Persistence can be a benefit in restoration efforts because it provides more time for some native grasses and broadleaf plant species to establish themselves prior to reinvasion by noxious weeds. Target weed species all produce many seeds that remain viable in the soil for long periods.

Long-term control requires either multiple applications of low-persistence chemicals or less frequent applications of more persistent herbicides. The critical element to consider is whether a more persistent chemical such as picloram can be held on the site to do the job it is intended to do.

Since these chemicals can move with water, one must consider the permeability and water-holding capacity of the soil on a site. These properties determine how much water moves through the soil into ground or surface water after rainfall. If the soil retains a large quantity of water in its upper horizons for later use by plants, the water and partially dissolved herbicide would have little opportunity to move. In contrast, if a soil is highly permeable and has little water-holding capacity, moisture passes through the soil rapidly and carries some of the herbicide with it.

Soil adsorption coefficient (Koc) can be used as an index of the herbicide mobility. The larger the Koc the more strongly the herbicide is held to soil organic matter and the less likely it will leach. Of the herbicides proposed for treatment, glyphosate is the least likely to leach with a Koc of 24.000, and dicamba is the highest at 2 (see Table 3.4).

Soil half-life is the period of time it takes for one-half of the amount of herbicide in the soil to degrade (see Table 3.4). Each half-life that passes reduces the amount of herbicide present in the soil by one-half. Half-life can vary due to soil microbial populations, soil moisture, soil temperature, and other factors. Non-persistent herbicide would have a half-life of 30 days or less. Persistence herbicides have a half-life of greater than 100 days. On average, all proposed herbicides have a moderate persistence. Metsulfuron methyl has the highest half-life at 120 days, and 2,4-D amine has the lowest at 10 days (BPA 2004; www.efw.bpa.gov). However, Picloram had the longest reported half-life up to 513 days and did not degrade overtime (USDI-EPA 1995a).

Aminopyralid, Clopyralid, and dicamba are similar to picloram, with a low adsorption coefficient and a moderate half-life.

**Table 3.4 Herbicide Characteristics in Soils**

| Chemical Evaluated | Soil Half Life (Days) | Sorption Coefficient (soil Koc) | Soil Adsorption Coefficient |
|---|---|---|---|
| Aminopyralid | 103.5 | 1.05-24.3 | Low to Moderate |
| Clopyralid | 40 | 6 | Low |
| Dicamba | 90 | 2 | Very Low |
| Glyphosate products without surfactant | 47 | 24,000 | Very High |
| Glyphosate products with surfactant | 47 | 24,000 | Very High |
| Metsulfuron Methyl | 120 | 35 | Moderate |
| Picloram | 90-513 | 16 | Moderate |
| Triclopyr - TEA | 46 | 20 | Moderate |
| Triclopyr - BEE | 46 | 780 | High |
| 2,4-D Amine | 10 | 100 | Moderate |

Research on a grassland site in Missoula County found no picloram below 20 inches soil depth (Watson et al. 1989). The minimum detection limit in this study was 10 parts per billion. On a forested site with coarser soils and precipitation rates more comparable to sites analyzed here, this study found picloram levels ranging from 206 to 366 parts per billion in the upper 5 inches of soil after an application of 1 pound of picloram per acre. A maximum concentration of 24 parts per billion was detected at soil depths between 30 and 40 inches. No picloram was measured in shallow groundwater wells with a detection limit of 0.5 parts per billion.

Results reported by Rice et al. (1992) confirm that 2,4-D and clopyralid are less persistent than picloram. Clopyralid was not detected at any time below 10 inches soil depth and, after 30 days, 2,4-D was not detected below 2 inches soil depth. Picloram was detected in the 10- to 20-inch soil strata within 30 days of spraying but was not detected below 10 inches soil depth one to two years after application. The herbicides were not detected because they had decomposed and had not migrated off-site. Detection limit in this study was about 10 parts per billion.

Additional studies of the movement and persistence of herbicides in soil at several sites in western Montana are ongoing. These studies include comparisons of picloram, 2,4-D, and clopyralid. Picloram has been shown to be mobile under field conditions. In Montana picloram was applied at half the maximum label rate (1 pound/acre), and was detectable 790 days after application in the 48- to 60-inch soil layer (soil with 2.2 percent organic matter USDI-EPA 1995).

In the EPA Re-registration Eligibility Decision (RED) for Picloram, the agency was concerned with ground water contamination and risk to endangered species. Data currently available to the EPA indicated that picloram has been detected in groundwater in ten states with concentrations up to 30 parts per billion. Once in groundwater the chemical is unlikely to degrade even over a period of several years (USDI-EPA 1995a, 1995b). The levels detected were below the lethal concentrations for rainbow or cutthroat trout (see Table 3.8).

These indicators show relatively little risk of deep leaching of most of the proposed herbicides except picloram, clopyralid, and dicamba.

Picloram, clopyralid, and dicamba are expected to have a short-term effect to soil productivity and water quality based on the persistence in soil, soil half-life, potential for movement into water, and the possibility of repeat application.

Best Management Practices (BMPs) and mitigation measures that would be applied to minimize the effects to soil and water resources from picloram, aminopyralid, clopyralid, or cicamba are listed in Chapter 2 and summarized here. BMPs that mitigate these effects include the following:

- No direct application to water or areas with high water tables. No application within 100 feet of streams or water for picloram and 15 feet for aminopyralid, clopyralid, dicamba. (Refer to Table 2.4 for distance limits for all herbicides.)
- Limited application by wind speed and weather considerations.
- Reduced application rate to a maximum of 1.0 pounds/acre of picloram with spot treatment of no more that 50% of an acre (USDI-EPA 1995a).
- Use of picloram would be allowed only once every two years to reduce accumulation in the soil (USDI-EPA 1995a).
- Limited application of herbicide chemicals to below the Lethal Concentration (LC50) or No Observed Effect Level/Concentration (NOEL/NOEC) as determined by watershed annually (Appendix I).
- Controlled mixing, storage, and transportation of all herbicides.
- No application of 2,4-D amine (ester formulation) or triclopyr-BEE.

### Cumulative Effects

This alternative would result in indirect effects to soil productivity in the short term. With the application of Best Management Practices and mitigation measures, no cumulative effects are expected.

Other activities occurring in this analysis area include timber harvest, grazing, mining, prescribed burning, recreation, road construction, reconstruction, maintenance, and decommissioning. These activities will continue over the next ten years. The amount of each activity is undetermined at this time.

The Forest will follow national direction to prevent the spread of noxious weeds for each of these activities. Management of individual activities to prevent the introduction and spread of noxious weeds is designed to reduce the amount and extent of noxious weeds across the analysis area over time.

Other projects that include the application of herbicides would be included to determine the maximum allowable acres to be treated annually. This would include other land managers in each watershed. The respective ranger districts would monitor herbicide application. Personnel from the Forest's aquatics program would conduct effectiveness monitoring in relation to water quality similar to what has been completed on the Palouse and North Fork ranger districts (Foltz 2001 and Murphy 2006). Refer to Table 2.3 for the maximum allowable acres by watershed to be treated in 2007 for all treatment methods.

# F. Water Quality and Fisheries

## 1. Affected Environment — Water Quality

The analysis area includes tributaries to the Lochsa River, Middle Fork Clearwater River, and Lolo Creek, a tributary to the Clearwater River (985,850 acres).

### Laws and Regulations

**Clean Water Act.** Section 313 of the Clean Water Act requires federal agencies to comply with all federals state, interstate, and local requirements, administrative authority, and process and sanctions with respect to control and abatement of water pollution. Executive Orders 12088 and 11990 also require the Forest Service to meet the requirements of these Acts. Therefore, all state and federal laws and regulations applicable to water quality would be applied. These include 36 CFR 219.97, the Clean Water Act, the Clearwater Plan, PACFISH and INFISH Riparian Management Objectives (RMOs) and Riparian Habitat Conservation Areas (RHCAs), and Idaho Forest Practices Act.

36 CFR 219.97 sets forth the following requirements:

- Conserving the soil and water resource.
- Protecting streams, stream banks, and wetlands.
- Providing for adequate fish habitat.
- Giving special attention to riparian areas, considering topography, vegetation type, soils, climate, and management objectives.

**State Water Quality Standards and Criteria Necessary to Protect Beneficial Uses.** The *Water Quality Standards and Wastewater Treatment Requirements* for the State of Idaho designates the Lochsa River, Middle Fork Clearwater, and Lolo Creek with the following beneficial uses: domestic water supply, cold water biota, primary and secondary contact recreation, salmonid spawning, and special resource waters.

**Domestic Water Supplies.** There are no state-designated small public water supplies in the analysis area.

**Municipal Watersheds.** There are no state-designated municipal watersheds in the analysis area.

**Water Quality Limited Streams.** The Idaho list of 303(d) Water Quality Limited Streams includes many streams in the analysis area (USDI-EPA 2000; IDEQ 2002; IDEQ 2005). Table 3.4 displays a summary of the streams in the project area, the beneficial uses, and stream status on 303d lists.

The water quality standards listed in *Water Quality Standards and Wastewater Treatment Requirements* for the State of Idaho are to be applied to all streams within the project area to maintain beneficial uses (DEQ 2006, IDAPA 58.01.02).

Hazardous materials: Surface waters of the state shall be free from hazardous materials in concentrations found to be of public health significance or to impair designated beneficial uses. (IDAPA 58.01.02200, 01)

Toxic Substances: Surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses. (IDAPA 58.01.02200, 02)

Domestic water supplies: Waters designated for domestic water supplies are to exhibit the following characteristics — All toxic substance criteria set forth in 40 CFR 131.36(b)(1), Column D1 revised as of December 22, 1992, incorporated by reference. (IDAPA 58.01.02250, 03.a.i)

Hazardous and deleterious material storage: Hazardous and deleterious materials must not be stored, disposed of, or accumulated adjacent to or in the immediate vicinity of state waters unless adequate measure and controls are provide to ensure that those materials will not enter state waters as a result of runoff, wind, storage facility failure, accidents in operation, or unauthorized third party activities. This includes, but is not limited to, trash, rubbish, garbage, oil, gasoline, chemicals, sawdust, and accumulations of manure. (IDAPA 58.01.02800, 01)

**Forest Plan Standards.** In addition to state and federal laws, the Clearwater National Forest Plan would be followed (pages II-27 through II-29).

**Standard 8A**: Maintain the integrity and equilibrium of all stream systems in the forest.

**Standard 8B**: Manage water quality and stream conditions to ensure that the national forest management activities do not cause permanent or long-term damage to existing or specified beneficial uses.

**Standard 8C**: Apply Best Management Practices (BMPs) to project activities to ensure water quality standards are met or exceeded (this also addresses Standard 8K).

BMPs are site specific control mechanisms for non-point source pollutants to enable the achievement of water quality standards. BMPs include but are not limited to structural and non-structural controls and operation and maintenance procedures. BMPs can be applied before, during, and after management activities to reduce or eliminate the introduction of pollutants into receiving waters. BMPs would be implemented as outlined in Appendix J: Best Management Practices.

The following are approved BMPs related to herbicide application activities:

- Idaho Forest Practice rules (see Appendix M) as adopted by the Board of Land Commissioners.
- Forest Service Soil and Water Conservation Practices Handbook, FSH 2509.22 13.07-13 (See Appendix J).

The Forest will utilize the following process in order to ensure compliance with state water quality standards:

- BMP selection and design would be based on site-specific conditions; technical, economic, and institutional feasibility; and the designated beneficial uses of the streams.
- Apply BMPs
- Monitor BMPs to ensure they are being implemented and are effective in protecting designated beneficial uses.
- Evaluate BMP monitoring results.
- Feed the results back into current and future activities and BMP design.

**Standard 8D**: Manage **all** waters in the Forest under a basic standard (Appendix K, Section B of the Forest Plan: USDA-FS 1987).

**Standard 8E**: All watershed systems are considered for the fishery resource. This standard applies to sediment criteria.

**Standard 8F**: Monitor, analyze, and evaluate water quality within critical reaches of specified streams, which are generally third or fourth order streams with watersheds ranging from 4 to 40 square miles. A list of specific streams and their standards is in Appendix K, Section C of the Forest Plan. This standard refers to sediment criteria.

**Table 3.5 Designated Uses (State Water Quality Standards) of Specific Waters in Analysis Area and Their Stream Status (IDEQ 1998; 2002; 2003 draft; USDI-EPA 2000)**

| Subbasin | Subbasin | Stream Name (or tributary) | Domestic Water Supply | Cold Water Biota | Salmonid Spawning | Primary Contact Recreation | Secondary Contact Recreation | Special Resource Water | 303 listed |
|---|---|---|---|---|---|---|---|---|---|
| Lochsa River 17060303 | Crooked Fork Creek | Upper Crooked Fork Creek | | | | | X | | NO |
| | Crooked Fork Creek | Boulder Creek (North) | | | | | X | | NO |
| | Crooked Fork Creek | Lower Crooked Fork Creek | | | | | X | | NO |
| | Crooked Fork Creek | Upper Brushy Fork Creek | | | | | X | | NO |
| | Crooked Fork Creek | Spruce Creek | | | | | X | | NO |
| | Crooked Fork Creek | Lower Brushy Fork Creek | | | | | X | | NO |
| | Colt Killed Creek | Upper Colt Killed Creek | | | | | X | | NO |
| | Colt Killed Creek | Upper Big Sand Creek | | | | | X | | NO |
| | Colt Killed Creek | Hidden Creek | | | | | X | | NO |
| | Colt Killed Creek | Lower Big Sand Creek | | | | | X | | NO |
| | Colt Killed Creek | Middle Colt Killed Creek | | | | | X | | NO |
| | Colt Killed Creek | Colt Creek | | | | | X | | NO |
| | Colt Killed Creek | Storm Creek | | | | | X | | YES |
| | Colt Killed Creek | Lower Colt Killed Creek | | | | | X | | NO |
| | Upper Lochsa River | Lochsa River — Walton Creek | X | X | X | X | | X | YES |
| | Upper Lochsa River | Legendary Bear Creek | | | | | X | | NO |
| | Upper Lochsa River | Lochsa River — Wendover Creek | X | X | X | X | | X | YES |
| | Upper Lochsa River | Fishing Creek | | | | | X | | NO |
| | Warm Springs Creek | Upper Warm Spring Creek | | | | | X | | NO |
| | Warm Springs Creek | Wind Lakes Creek | | | | | X | | NO |
| | Warm Springs Creek | Lower Warm Springs Creek | | | | | X | | NO |

**Table 3.5, cont.**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lochsa River 17060303 | Middle Lochsa River | Lochsa River — abv Post Office | X | X | X | X | | X | YES |
| | Middle Lochsa River | Post Office Creek | | | | | X | | NO |
| | Middle Lochsa River | Weir Creek | | | | | X | | NO |
| | Middle Lochsa River | Indian Grave Creek | | | | | X | | NO |
| | Middle Lochsa River | Lake Creek | | | | | X | | NO |
| | Middle Lochsa River | Lochsa River — abv Boulder (S) | X | X | X | X | | X | YES |
| | Middle Lochsa River | Lochsa River — Stanley Creek | X | X | X | X | | X | YES |
| | Middle Lochsa River | Lochsa River — Bald Mtn Creek | X | X | X | X | | X | YES |
| | Middle Lochsa River | Boulder Creek (South) | | | | | X | | NO |
| | Fish Creek | Upper Fish Creek | | | | | X | | YES |
| | Fish Creek | Hungery Creek | | | | | X | | NO |
| | Fish Creek | Lower Fish Creek | | | | | X | | YES |
| | Lower Lochsa River | Lochsa River — Bimerick Creek | X | X | X | X | | X | YES |
| | Lower Lochsa River | Old Man Creek | | | | | X | | NO |
| | Lower Lochsa River | Split Creek | | | | | X | | NO |
| | Lower Lochsa River | Fire Creek | | | | | X | | NO |
| | Lower Lochsa River | Deadman Creek | | | | | X | | NO |
| | Lower Lochsa River | Lochsa River — Glade Creek | X | X | X | X | | X | YES |
| | Lower Lochsa River | Canyon Creek | | | | | X | | NO |
| | Lower Lochsa River | Pete King Creek | | | | | X | | YES |

**Table 3.5, cont.**

| Subbasin | Subbasin | Stream Name (or tributary) | Domestic Water Supply | Cold Water Biota | Salmonid Spawning | Primary Contact Recreation | Secondary Contact Recreation | Special Resource Water | 303 listed |
|---|---|---|---|---|---|---|---|---|---|
| Middle Fork Clearwater River 17060304 | Middle Fork Clearwater | Middle Fork Clearwater | X | X | X | X | | X | NO |
| | Middle Fork Clearwater | Big Smith Creek | | | | | X | | NO |
| | Middle Fork Clearwater | Swan Creek | | | | | X | | NO |
| | Middle Fork Clearwater | Sutter Creek | | | | | X | | NO |
| | Middle Fork Clearwater | Maggie Creek | | | | | X | | NO |
| Clearwater River 17060306 | Lolo Creek | Upper Lolo Creek | | | | | X | | YES |
| | Lolo Creek | Musselshell Creek | | | | | X | | NO |
| | Lolo Creek | Middle Lolo Creek | | | | | X | | YES |
| | Lolo Creek | Eldorado Creek | | | | | X | | NO |
| | Lolo Creek | Lower Lolo Creek | | | | | X | | YES |

**Standard 8G**: Design, schedule, and implement management practices at the project level that:

- Will maintain water quality and stream conditions that are not likely to cause sustained damage to the biological potential of fish habitat.
- Will not reduce fish habitat productivity in the short term below the assigned standards.
- Will maintain water quality in a condition that is not likely to inhibit recovery of the fish habitat for more than the stated duration.
- Will require a watershed cumulative effects feasibility analysis of projects involving significant vegetation removal prior to including them on implementation schedules to ensure that the project considered with other activities will not increase water yields or sediment beyond acceptable limits. Also requires that this analysis identify any opportunities for mitigating adverse effects on water-related beneficial uses, including capital investments for fish habitat or watershed improvement.

### Standard 14.b: Protection; Insect and Disease

Practice and encourage the use of integrated pest management methods which provide protection of Forest resources with the least hazard to human, wildlife, and the environment. The goal is optimum pest management that considers environmental hazards and economic efficiency.

Use silvicultural methods and schedule cultural practices which reduce the development and/or perpetuation of pest problems.

Favor the use of fire, hand treatment, natural control, or mechanical methods where feasible and economical when considering vegetation management.

Amendments to the Forest Plan were made in 1995 (USDA-FS 1995) to incorporate the Inland Native Fish Strategy — commonly called INFISH — and Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho and portions of California — commonly called PACFISH — (USDA Forest Service and USDI Bureau of Land Management 1995). Those strategies have several objectives that relate to water quality and fisheries habitat potential.

Some of the most important goals and objectives that might be affected by noxious weed treatment are summarized below:

- Stream temperature: seven-day moving average — maximum temperature below 59°F (15°C) within migration and rearing habitats and below 48°F (9°C) within spawning habitats.
- Bank stability (non-forested systems): >80 percent stable.
- Lower bank angle (non-forested systems): > 75 percent of banks with <90 degree angle (i.e., undercut).
- Riparian Habitat Conservation Areas (RHCAs) are portions of watershed where riparian-dependent resources receive primary emphasis. Any management activities within these areas must be designed to further riparian management objectives.
  - Category 1 — Fish-bearing streams: 300 feet slope distance from the edge of all fish-bearing streams.
  - Category 2 — Permanently flowing non-fish-bearing streams: 150 feet slope distance from the edges of the active stream channel.
  - Category 3 — Ponds, lakes, reservoirs, and wetlands greater than 1 acre: 150 feet slope distance from the edge of the feature.
  - Category 4 — Seasonally flowing intermittent streams, wetlands less than 1 acre, and landslides/landslide prone areas: 50 feet slope distance in non-key watersheds, 100 feet for key watersheds.
- Standards and guidelines for various activities are applied to projects and activities in areas inside and outside of RHCAs that would degrade them.
- RA-3. Apply herbicides, pesticides and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on listed anadromous fish (PACFISH) or inland native fish (INFISH).
- RA-4. Prohibit storage of fuels and other toxicants within RHCAs. Prohibit refueling within RHCAs.
- RA-5. Locate water drafting sites to avoid adverse effects to inland native fish and instream flows and in a manner that does not retard or prevent attainment of Riparian Management Objectives.

### Analysis Area

The project area is located within three subbasins in the Clearwater River: Lochsa River, Middle Fork Clearwater River, and Lolo Creek, a tributary to the Clearwater River.

The valleys of these watersheds are typical intermountain valleys. The valleys range from less than one-quarter mile to one mile in width. In some areas narrow, steep canyons are also common. Elevations on the valley floors range from approximately 1,100 feet at the mouth of Lolo Creek to 8,817 feet in the headwaters of the Lochsa River. The surrounding mountains rise to elevations in excess of 7,000 feet.

The climate is primarily affected by maritime weather patterns. Annual precipitation varies from 25 to 80 inches. Snow accumulations in the higher elevations can linger into the summer months. Several landforms exist over these subbasins including alluvial deposits, low relief rolling hills, colluvial midslopes, breaklands, frost-churned ridges, alpine glaciated ridges and trough, and mass-wasted areas.

Several landtypes within the project area have soils that contain a large percentage of volcanic ash and decomposed granite.

### Watershed Boundaries

The project area is located in the Lochsa River, Middle Fork Clearwater River, and Lolo Creek a tributary to the Clearwater River. The proposed activities would take place in three subbasins. Table 3.5 lists the affected subbasins, watershed number, watershed name, and size of each. Maps of these subbasins and watersheds can be found in Appendix A.

**Table 3.6 Acres by Watershed**

| Subbasin | HUC 5 | Watershed Number | Watershed Name | Watershed (acres) | Watershed (sq. miles) |
|---|---|---|---|---|---|
| Lochsa River 17060303 | Crooked Fork Creek | 170603030101 | Upper Crooked Fork Creek | 19,481 | 30 |
| | Crooked Fork Creek | 170603030102 | Boulder Creek (North) | 16,018 | 25 |
| | Crooked Fork Creek | 170603030103 | Lower Crooked Fork Creek | 21,122 | 33 |
| | Crooked Fork Creek | 170603030104 | Upper Brushy Fork Creek | 10,261 | 16 |
| | Crooked Fork Creek | 170603030105 | Spruce Creek | 15,901 | 25 |
| | Crooked Fork Creek | 170603030106 | Lower Brushy Fork Creek | 25,840 | 40 |
| | Colt Killed Creek | 170603030201 | Upper Colt Killed Creek | 24,765 | 39 |
| | Colt Killed Creek | 170603030202 | Upper Big Sand Creek | 17,484 | 27 |
| | Colt Killed Creek | 170603030203 | Hidden Creek | 10,659 | 17 |
| | Colt Killed Creek | 170603030204 | Lower Big Sand Creek | 24,323 | 38 |
| | Colt Killed Creek | 170603030205 | Middle Colt Killed Creek | 10,883 | 17 |
| | Colt Killed Creek | 170603030206 | Colt Creek | 16,650 | 26 |
| | Colt Killed Creek | 170603030207 | Storm Creek | 32,134 | 50 |
| | Colt Killed Creek | 170603030208 | Lower Colt Killed Creek | 21,047 | 33 |
| | Upper Lochsa River | 170603030301 | Lochsa River - Walton Creek | 18,801 | 29 |
| | Upper Lochsa River | 170603030302 | Legendary Bear Creek | 13,242 | 21 |
| | Upper Lochsa River | 170603030303 | Lochsa River - Wendover Creek | 20,702 | 32 |
| | Upper Lochsa River | 170603030304 | Fishing Creek | 17,190 | 27 |
| | Warm Springs Creek | 170603030401 | Upper Warm Spring Creek | 13,795 | 22 |
| | Warm Springs Creek | 170603030402 | Wind Lakes Creek | 12,521 | 20 |
| | Warm Springs Creek | 170603030403 | Lower Warm Springs Creek | 19,475 | 30 |
| | Middle Lochsa River | 170603030501 | Lochsa River – Weir Creek | 33,269 | 52 |
| | Middle Lochsa River | 170603030502 | Post Office Creek | 12,203 | 19 |
| | Middle Lochsa River | 170603030503 | Lake Creek | 33,336 | 52 |
| | Middle Lochsa River | 170603030504 | Lochsa River - Stanley Creek | 31,553 | 49 |
| | Middle Lochsa River | 170603030505 | Lochsa River - Bald Mtn Creek | 28,790 | 45 |
| | Middle Lochsa River | 170603030506 | Boulder Creek (South) | 30,009 | 47 |
| | Fish Creek | 170603030601 | Upper Fish Creek | 23,237 | 36 |
| | Fish Creek | 170603030602 | Hungery Creek | 22,658 | 35 |
| | Fish Creek | 170603030603 | Lower Fish Creek | 10,404 | 16 |
| | Lower Lochsa River | 170603030701 | Lochsa River - Bemerick Creek | 34,478 | 54 |
| | Lower Lochsa River | 170603030702 | Old Man Creek | 28,128 | 44 |
| | Lower Lochsa River | 170603030703 | Split Creek | 9,995 | 16 |
| | Lower Lochsa River | 170603030704 | Fire Creek | 11,261 | 18 |
| | Lower Lochsa River | 170603030705 | Deadman Creek | 12,708 | 20 |
| | Lower Lochsa River | 170603030706 | Lochsa River - Glade Creek | 21,045 | 33 |
| | Lower Lochsa River | 170603030707 | Canyon Creek | 12,612 | 20 |
| | Lower Lochsa River | 170603030708 | Pete King Creek | 17,613 | 28 |
| Middle Fork Clearwater River 17060304 | Middle Fork Clearwater | 170603040000 | Middle Fork Clearwater | 47,826 | 75 |
| | Middle Fork Clearwater | 170603040040 | Big Smith Creek | 3,165 | 5 |
| | Middle Fork Clearwater | 170603040030 | Swan Creek | 1,590 | 2 |
| | Middle Fork Clearwater | 170603040020 | Sutter Creek | 5,212 | 8 |
| | Middle Fork Clearwater | 170603060101 | Maggie Creek | 17,048 | 27 |

| Subbasin | HUC 5 | Watershed Number | Watershed Name | Watershed (acres) | Watershed (sq. miles) |
|---|---|---|---|---|---|
| | | | | | |
| Clearwater River 17060306 | Lolo Creek | 170603060301 | Upper Lolo Creek | 26,846 | 42 |
| | Lolo Creek | 170603060302 | Musselshell Creek | 35,323 | 55 |
| | Lolo Creek | 170603060303 | Middle Lolo Creek | 29,459 | 46 |
| | Lolo Creek | 170603060304 | Eldorado Creek | 27,174 | 42 |
| | Lolo Creek | 170603060305 | Lower Lolo Creek | 36,614 | 57 |
| **Total** | | | | **985,850** | **1,540** |

**Summary by HUC 5**

| | | | | | |
|---|---|---|---|---|---|
| Lochsa River | Crooked Fork Creek | 1706030301 | | 108,623 | 170 |
| | Colt Killed Creek | 1706030302 | | 157,945 | 247 |
| | Upper Lochsa River | 1706030303 | | 69,935 | 109 |
| | Warm Springs Creek | 1706030305 | | 45,791 | 72 |
| | Middle Lochsa River | 1706030306 | | 169,160 | 264 |
| | Fish Creek | 1706030307 | | 56,299 | 88 |
| | Lower Lochsa River | 1706030308 | | 147,840 | 231 |
| Middle Fork Clearwater River | Middle Fork Clearwater | 1706030401 | | 74,841 | 117 |
| Clearwater River | Lolo Creek | 1706030603 | | 155,416 | 243 |
| **Total** | | | | **985,850** | **1,540** |

## 2. Affected Environment — Fisheries

Fish species composition and densities have changed significantly within the mainstem Clearwater River over the last 100 years. The construction of the Lewiston Dam in 1927 and the operation (1927-1973) with inadequate adult fish passage in the initial years virtually eliminated or destroyed the chinook salmon (Oncorhynchus tshawytscha) runs and severely reduced the steelhead trout (Oncorhynchus mykiss) runs into the Clearwater River subbasin (Murphy and Metsker 1962, Mallet 1974, Nez Perce Tribe and Idaho Department of Fish and Game 1990, Murphy and Johnson 1990). The salmon affected included the fall Chinook salmon that spawned and reared in the lower mainstem Clearwater River. The construction of the eight dams on the lower mainstem Snake and Columbia rivers between 1936 and 1975 has also reduced the anadromous fish production within the Clearwater River subbasin, including fall Chinook salmon in the mainstem Clearwater River.

The construction of Dworshak Dam on the North Fork Clearwater River in 1974 eliminated anadromous fish production within 26 percent of the Clearwater River subbasin and most likely affected downstream rearing of salmonids in the mainstem Clearwater River. Resident salmonids and non-salmonids have most likely decreased and increased respectively as result of the dams and increased water temperatures within the mainstem.

The Lochsa weed treatment project area includes FOREST SERVICE lands within the Lochsa River subbasin, Middle Fork Clearwater River subbasin and the upper Lolo Creek drainage.

**Lochsa River Drainage**

The historical assessment of the fish populations within the Lochsa River subbasin and additional information on current conditions was summarized in the USDA-FS publication (1999a). Information presented below for each of the major salmonid species are excerpts from USDA-FS (1999a). Within the North Fork Clearwater River drainage, westslope cutthroat trout (Salmo clarki lewisi), a sensitive species, is the primary indicator species for most streams. Where bull trout (Salvelinus confluentus) spawning and rearing is documented, bull trout replaces westslope cutthroat trout as the indicator species due to more constrained habitat requirements. Other fish species found within the analysis area include rainbow trout (Oncorhynchus mykiss), mountain whitefish (Prosopium williamsoni), and sculpin (Cottus spp.). Species introduced into the North Fork drainage include brook trout (Salvelinus fontinalis).

**Fall Chinook Salmon:** The National Marine Fisheries Service (NMFS) Federal Register (issued December 28, 1993) identified a reach of the mainstem Clearwater River as critical habitat for Snake River fall Chinook salmon. Critical habitat for the fall run Chinook includes only the mainstem of the Clearwater River up to the Idaho/Clearwater county line below the town of Greer, Idaho. Consequently, no critical habitat for this species occurs within the Clearwater National Forest. Under the ESA, the Forest Service must assess cumulative impacts from federally authorized or funded projects on the Clearwater National Forest to fall populations in the lower Clearwater River.

The proposed noxious weed treatment activities within the Lochsa River drainage are located 48-100 miles upstream designated critical habitat for fall Chinook salmon. See Middle Fork Clearwater River subsection following for current status of species within the Clearwater River subbasin.

**Spring Chinook Salmon:** Spring Chinook salmon are not listed under ESA within the Clearwater River basin, but spring Chinook salmon production (naturally and hatchery supplemented) occurs in the mainstem Clearwater River drainage. Spring Chinook salmon rear within the mainstem Lochsa River and many of the larger tributaries within the Lochsa River drainage. The proposed noxious weed treatment activities within the Lochsa River drainage are located within some of these tributaries as well as face drainages along the mainstem Lochsa River.

**Steelhead Trout:** On October 17, 1997, steelhead trout were listed as a threatened species within the Snake River under ESA. Steelhead trout rear within the mainstem Lochsa River and most of the accessible tributaries. Present distribution includes the Salmon River and Clearwater River subbasins. The proposed noxious weed treatment activities are located within some of these tributaries as well as face drainages along the mainstem Lochsa River.

**Bull Trout:** On July 10, 1998, bull trout were listed as a threatened species within the Snake River under the ESA. Historically, adult bull trout used the Lochsa River in the winter and early spring and ascended the river as temperature increased in the spring for summer rearing and fall spawning activities. Current data suggests that bull trout populations are depressed in the mainstem Lochsa River and its fish-bearing streams. Presently, bull trout occur throughout the Lochsa River subbasin. However, recent fish population data show the major populations to be located mostly within the upper Lochsa River drainage (upstream Post Office Creek), Waw'aalamnine (Squaw) Creek, Storm Creek, and upper Crooked Fork Creek and Colt Killed Creek drainages. Small resident populations and/or fluvial populations occur within a few smaller fish-bearing streams including, Beaver, Haskell, Rock, Shotgun, Imnamatnoon (Papoose), Wendover, Badger and Fox creeks. Small resident populations and/or fluvial populations may also occur within the major fish bearing streams in the lower Lochsa River drainage, but surveys have only documented individuals in Fish Creek, Fire Creek, Bald Mountain Creek. No major spawning and early rearing areas have been identified. There is a potential for bull trout adults or sub-adults to occur in any accessible tributary since fluvial adult and subadult bull trout are very nomadic. They may use streams in the analysis area or any of their accessible tributaries as foraging or refuge habitat.

**Westslope Cutthroat Trout:** The Lochsa River subbasin and its fish-bearing tributaries support fluvial, adfluvial, and resident populations of westslope cutthroat trout. While adfluvial populations are restricted to Fish Lake (Lake Creek drainage), fluvial and resident populations are scattered throughout the subbasin. Besides rearing in the mainstem Lochsa River, fluvial westslope cutthroat trout most likely spawn and reside for part of the year in the major tributaries. Fluvial fish are those that rear in larger streams for a few years, migrate down into the mainstem Lochsa, and return to their natal streams to spawn. Fluvial trout spawners in the Lochsa River ranged from 12 to over 24 inches while resident spawners are usually less than 12 inches. Resident fish that spawn and rear yearlong in the same streams inhabit most of the tributaries within the analysis area, especially upstream of migration barriers to migratory fish. Densities of westslope cutthroat trout observed streams within the Lochsa River drainage mostly exhibit strong populations.

**Middle Fork Clearwater River Drainage**

The Middle Fork Clearwater River provides habitat for spring Chinook salmon, steelhead/redband trout, bull trout, westslope cutthroat trout, and mountain whitefish. Nongame species known to or expected to occur include mottled, torrent, and shorthead sculpin (Cottus spp.), redside shiner (Richardsonius balteatus), speckled and longnose dace (Rhinichthys spp.), largescale sucker (Catostomus spp.), northern pike minnow (Ptychocheilus oregonensis), and Pacific lamprey (Lampetra tridentata). Smallmouth bass (Micropterus williamsoni) are the only known nonnative fish established in the watershed.

**Fall Chinook Salmon:** The mouth of the Lolo Creek on the mainstem of the Clearwater River is the upstream boundary of designated critical habitat for fall Chinook. Current data suggest that fall Chinook salmon may have a historic distribution only up to the Lochsa River, which includes the mainstem Middle Fork Clearwater River. The majority if not all of the fall Chinook salmon spawning documented over the last 16 years has occurred within the designated critical habitat reaches of the Clearwater River, mostly downstream of the North Fork Clearwater River. Some limited spawning has been observed in the reach around Orofino Creek, the area near the Lolo Creek confluence, and upstream of the critical habitat near the confluence of the South Fork Clearwater River. These are assumed sporadic and not considered viable/natural sustaining populations (due to natural constraints regarding rearing habitat, water temperatures during incubation, and early rearing).

Spawning ground surveys conducted by the Nez Perce Tribe from 1988 to 2004 have found up to 628 redds in the lower mainstem Clearwater River (Garcia 2000; Nez Perce Tribe 2003, 2004, 2005). Redd counts have ranged from four redds in 1990 and 1992 to 524, 571, 628 redds in 2002, 2003 and 2004 respectively (Garcia 2000; Nez Perce Tribe 2003, 2004, 2005). The majority of redds was located downstream of the North Fork Clearwater River. Less than five percent in any one year were located upstream of the North Fork Clearwater River confluence. Increased spawning success over the past ten years has been attributed to supplementation efforts in the subbasin.

**Spring Chinook Salmon:** The mainstem Middle Fork Clearwater River is primarily a migratory stream for spring Chinook. Other than adult holding during the migration period and some limited juvenile rearing, the mainstem Middle Fork most likely provides limited rearing habitat and most likely no spawning habitat for spring Chinook salmon. With the exception of Clear Creek, a major southern tributary within the Nez Perce National Forest, spring Chinook salmon spawning and rearing does not occur in the tributaries. The tributaries are too small to support spring Chinook salmon spawning.

The proposed noxious weed treatment activities within the Middle Fork Clearwater River drainage are located within several tributaries as well as face drainages along the mainstem Middle Fork Clearwater River.

**Steelhead Trout:** Steelhead trout rear within the mainstem Middle Fork Clearwater River and most of the accessible tributaries. The proposed noxious weed treatment activities are located within some of these tributaries as well as face drainages along the mainstem Middle Fork Clearwater River.

**Bull Trout:** Historically, adult bull trout routinely used the mainstem Middle Fork Clearwater River in the winter and early spring and migrated into the Lochsa River and Selway River drainages as temperature increased in the spring for summer rearing and fall spawning activities. Current data suggests that bull trout populations continue to use the mainstem Middle Fork Clearwater River during the winter period. With the exception of its largest tributary, Clear Creek, fish population surveys have not documented bull trout spawning or rearing within tributaries located on the Clearwater National Forest.

**Westslope Cutthroat Trout:** Similar to bull trout, adult westslope cutthroat trout routinely used the mainstem Middle Fork Clearwater River in the winter and early spring and migrated into the Lochsa River and Selway River drainages as temperature increased in the spring for summer rearing and fall spawning activities. In addition, the tributaries provided spawning and rearing habitat. Current data suggests that westslope cutthroat trout continue to use accessible tributaries such as Big and Little Smith creeks (Isabella Wildlife Works 1997).

**Lolo Creek Drainage**

The Lolo Creek drainage provides habitat to five salmonids: spring Chinook salmon, steelhead trout, westslope cutthroat trout, bull trout, and brook trout. Specific descriptions of fish populations and habitat conditions for the Lolo Creek drainage, including streams within the project area, are documented in the Section 7 Watershed Biological Assessment for the Lolo Creek Drainage (USDA–FS 1999b).

**Fall Chinook Salmon:** No historical records or current documentation of fall Chinook salmon spawning or rearing within the Lolo Creek watershed are available. The mouth of Lolo Creek on the mainstem of the Clearwater River is the upstream boundary of designated critical habitat for fall Chinook. See Middle Fork Clearwater River subsection above for current status of species within the Clearwater River subbasin.

**Spring Chinook Salmon:** Spring Chinook salmon spawning and juvenile rearing presently occurs in the mainstem Lolo Creek and its three major tributaries: Yoosa Creek, Musselshell Creek, and Eldorado Creek. Spring Chinook salmon densities have varied over the last ten years, especially as a result of hatchery supplementation of adults. Due to the small stream size, spring Chinook salmon do not spawn in the smaller tributaries although some juvenile rearing may occur in these drainages during the summer months.

**Steelhead Trout:** The Lolo Creek drainage produces low numbers of steelhead trout due to overall low adult escapement and habitat conditions. Annual monitoring surveys have indicated that steelhead trout densities have mostly shown a decreasing trend over the past ten years. Steelhead trout production is most likely a combination of wild/natural and hatchery production as adult and juvenile plantings have occurred over the past 20 years. Juvenile steelhead rearing has been documented and spawning has been observed in the upper mainstem of Lolo Creek. The overall number of redds observed has been relatively low. Very little spawning has been observed in the Musselshell drainage, presumably due to fine textured substrates in the alluvial meadow systems of that drainage. Although steelhead habitat is available in the Eldorado Creek drainage, natural-returning steelhead trout have only been observed a few times. The Eldorado Falls may still present a partial migration barrier during various streams flows.

The status of steelhead trout populations has been documented during the past 30 years for the Lolo Creek drainages by the Forest, Idaho Department of Fish and Game (IDFG), and the Nez Perce Tribe. Steelhead trout spawning within Lolo Creek was first documented by Murphy and Metsker (1962) during 1959 and 1960 surveys. They also noted that adult steelhead trout were observed spawning in June 1960 in the headwaters of Lolo and Yoosa creeks. The earliest report regarding redd counts was when a Forest contractor reported that 88 steelhead redds were identified within the mainstem Lolo Creek during their July 1988 stream survey (Clearwater BioStudies, Inc. 1988). The report noted that the redds were found upstream of Musselshell Creek and downstream of Yoosa Creek. Most of the redds were associated with the recent enhancement structures in the upper mainstem portion and near or inside channels in the lower mainstem portion. Steelhead trout mostly spawn in the mainstem of Lolo Creek (from Musselshell Creek to Yoosa Creek) and any accessible tributaries in upper Lolo Creek drainage and Yoosa Creek drainage. Some limited spawning may also occur in the Musselshell Creek and Eldorado Creek drainages although spawning data is unavailable and population data shows low numbers of juvenile steelhead.

Fish population surveys over the past 20 years have documented juvenile steelhead trout at most sampling sites throughout the mainstem Lolo Creek. A summary of the available fish population data shows that between 1985 and 2005, a total of 598 snorkel stations were surveyed within the mainstem Lolo Creek and steelhead trout juveniles were observed at 84 percent of these stations. The probability of finding steelhead trout in the tributary streams was lower at approximately 63 percent, but overall 81 percent of the 953 monitoring sites indicated presence of steelhead trout over the 21 year period.

**Threatened, Endangered and Proposed Species:** Threatened and Endangered species are managed under the authority of the Endangered Species Act (ESA) (P.L. 94-205, as amended) and the National Forest Management Act (PL 94-588). The U.S. Fish & Wildlife Service identified the following listed and/or proposed fish species that may occur within North Central Idaho via species list dated December 1, 2006 (File #104.0000 2007-SL-0095). The following fish species were included in the list: sockeye salmon (E), fall Chinook salmon (T), spring Chinook salmon (T), steelhead trout (T) and bull trout (T). Two of the fish species (sockeye salmon and spring Chinook salmon) were not listed within the Clearwater National Forest (specifically the Clearwater River and Palouse River subbasins); therefore, these species will not be discussed as ESA species for this project.

**Sensitive Species:** Sensitive species are determined by the Regional Forester (FSM 2670.5) and are those species for which population viability is a concern. The National Forest Management Act directs the Forest Service to review programs and activities to ensure that species do not become threatened or endangered as a result of Forest Service actions. Forest Plan direction for the Clearwater National Forest states that habitat of sensitive species will be managed to prevent further declines in populations to prevent federal listing.

The Regional Forester for Region One has compiled a listing of sensitive species (USDA Forest Service, April 1999). Fish species from this list which may occur within the project area include the following: spring Chinook salmon, westslope cutthroat trout, Pacific lamprey and interior redband trout.

**Bull Trout:** The Lolo Creek drainage was probably within the historical range of bull trout, but the populations have since been extirpated. Habitat conditions and warmer temperature regimes limit bull trout production in the Lolo Creek drainage. Between 1974 and 2005, very few bull trout have been observed through fish-population monitoring via snorkeling and electrofishing surveys in the Lolo Creek drainage. The State of Idaho (1998) reported in the "Lower Clearwater River Bull Trout Problem Assessment" that several bull trout had been observed in the mainstem of Lolo Creek between 1987 and 1994. USFWS, IDFG, and the Nez Perce Tribe monitoring efforts have observed individual bull trout during snorkeling surveys in the mainstem Lolo Creek and/or monitoring the Nez Perce Tribe's juvenile trapping facility and adult weir in 1987, 1993 to 1995, 1998 to 2000, 2003 and 2004. In these years, a total of 19 bull trout were observed. No observations of bull trout have been documented by these agencies or the Forest during monitoring activities in 1996 to 1997 and 2001-2002. During 2005, bull trout were not observed during snorkeling or captured at the weirs Screw trap data is currently being summarized (Ryan Johnson, personal communications).

Bull trout have not been observed in the Eldorado Creek, Musselshell Creek, or Yoosa Creek drainages. The extent of bull trout spawning/production is assumed very low to nonexistent.

**Westslope Cutthroat Trout:** Westslope cutthroat trout spawning and rearing primarily occurs within the upper headwaters of most of the streams in the Lolo Creek drainage.

**Brook Trout:** Brook trout populations have also been observed in the mainstream of Lolo Creek. These fish are most likely migrants from the upper Yoosa Creek population and lower Lolo Creek tributaries.

## Habitat Conditions

**Stream Temperatures:** High summer water temperatures within the lower mainstem Lochsa River, mainstem Middle Fork Clearwater River, mainstem Lolo Creek, and various tributaries may limit salmonid production to some extent. Alterations of riparian conditions via the removal of existing vegetation and/or delaying successional processes may also affect spawning and rearing habitats. Changes in riparian vegetative conditions may reduce streamside shade, which leads to increases in summer water temperatures. Changes in vegetative stages may also lead to reductions in acting woody debris recruitment, which will eventually decrease the quantity and quality of pools (summer and winter rearing habitat) and gravel depositional areas (spawning habitat). Ongoing and proposed projects have incorporated mitigation measures to avoid or minimize impacts to riparian areas. Avoidance measures such as maintaining INFISH riparian buffers during vegetative management projects and designing specific mitigation measures for prescribed fires should maintain positive recovery trends.

**Substrate Conditions:** The amount of fine sediment in spawning areas and pools influences the quantity and quality of spawning and winter-rearing habitat; both of which are limiting in the majority of the streams within the analysis area. While substrate conditions within the mainstem Lochsa and Middle Fork Clearwater rivers could present limitations if major sediment depositions occurred in the future, substrate conditions within the tributaries are the critical concern at this time.

**Roads:** The construction and existence of roads and the associated timber harvest activities have also influenced stream conditions in some watersheds. Due to the extensive road network on some of Clearwater National Forest lands, many perennial streams are crossed by arterial or collector roads. These roads greatly affect the quality and continuity of aquatic ecosystems. Lochsa River tributaries depend on debris slides and torrents for the recruitment of instream material such as wood and gravel that provide for aquatic habitat development. This material is also critical in the reduction of stream energy. Roads, culverts, and even bridges act like dams constricting flow through a single narrow outlet and preventing transportation of material down the channel. These constriction points also cause deposition and channel widening at the culvert inlet. The channels below culvert outlets are typically downcut and scoured by the high velocity water caused by the constriction.

**Road Crossings:** The road crossings also increase the likelihood of more destructive, unnatural debris torrents due to the erosion of fill material at each road crossing. The additional sediment also causes unnatural sediment depositions within these smaller fish-bearing streams as well as the lower gradient larger streams. In most cases, the additional sediment material deposited within the lower gradient streams exceeds the natural capacity to transport the material efficiently. This results in degraded substrate conditions for extended time periods. Currently, all proposed projects have incorporated road decommissioning projects that have been identified within the specific analysis areas.

Roads and stream crossing structures have also been shown to function as barriers to the upstream movement and dispersal for many fish and wildlife species. Culvert outlets not in contact with stream bottoms do not allow access, nor do undersized culverts which constrict flows, creating high velocity barriers and eliminating substrate from culvert bottoms. These barriers can isolate small aquatic populations, limiting or preventing genetic exchange between populations, and preventing the recolonization of historic or recovering habitats.

Additionally, many culverts are in need of repair or replacement to reduce the risk of road fill failure. Historically, most culverts were sized to pass 25- to 50-year storm events. In many cases, this sizing is not adequate to handle large flood events or debris torrents. Culverts sized for a 100-year storm event (as required by INFISH provisions of the Forest Plan) mimic the active stream channel width and are able to more easily pass the water and debris associated with a large event. Currently, all proposed projects have incorporated fish passage restoration measures to remove or replace culverts that have been identified within the specific analysis areas.

**Water Quality:** Besides elevated sediment conditions (i.e., suspended, surface fines) and elevated summer water temperatures in various drainages, overall water quality conditions on Forest Service lands within the Lochsa River are considered near natural and in very good to excellent condition. No incidents of biological or chemical pollution that have the potential to affect the aquatic resources are known. Influences from private lands are more apparent within the Middle Fork Clearwater River and Lolo Creek watersheds.

**Lochsa River Drainage**

**Stream Temperatures:** The Forest has been collecting water temperature data from 1990-2005 to determine temperature problems and prioritize riparian recovery efforts. In past years, thermograph data revealed that temperatures exceeding the desired rearing temperature criteria by several degrees were maintained for extended periods of time. Comparison of the 2005 stream temperature data from the 91 monitoring sites on the 77 streams with available data with desired maximum temperatures as defined for the "high fishable" and "no effect" standard in the Forest Plan revealed that:

(1) The desired bull trout rearing temperature of 12°C (no effect) was not met at Beaver Creek, the only bull trout designated stream within the Forest Plan.

(2) The desired steelhead trout rearing temperature of 15°C (no effect) was met at two streams (Dan Creek and Fern Creek out of the 14 streams monitored with a "no effect" standard. Two streams, Swamp Creek (two days) and Willow Creek (six days) exceeded the standard on six days or fewer.

(3) The desired steelhead trout rearing temperature of 17°C (high fishable) was met at 26 streams out of the 36 streams monitored with a "high fishable" standard. Skookum Creek (one day), Spruce Creek (two days), and Deadman Creek (seven days) exceeded the standard on seven days or fewer.

(4) The desired spring Chinook trout rearing temperature of 15°C (no effect) was not met at any of the five major streams with Chinook habitat. Two sites on those streams, Crooked Fork Creek (upstream Hopeful Creek) and Waw'aalamnine (Squaw) Creek above West Fork Waw'aalamnine (Squaw) Creek did meet the standard.

(5) The desired westslope cutthroat trout rearing temperature of 13°C was not met at any of the six streams monitored with a "no effect" standard.

(6) The desired westslope cutthroat trout rearing temperature of 16°C (high fishable) was met at 16 of the 20 streams monitored with a "high fishable" standard. Eagle Mountain Creek exceeded the standard five days.

Overall, water temperatures of 76 of the 77 monitoring streams within the Lochsa River drainage were under the state standard for cold-water biota; water temperatures did not exceed the daily maximum of 22°C and the maximum daily average of 19°C. Two of the five sites on the mainstem Lochsa River met the standard while the remaining three sites exceeded the standard for 6 to 23 days. The state standard of 13°C for the spring spawning period (steelhead trout) was met at four streams (Fern Creek, Robin Creek, Spring Creek, and Williams Lake Creek). An additional ten streams exceeded the standard by five days or fewer. The state standard of 13°C for the spring period for westslope cutthroat trout was met at four streams (Bridge Creek, Cooperation Creek, Haskell Creek, and Muleshoe Creek). Beaver Creek, Cabin Creek, Queen Creek, and Shoot Creek exceeded the standard on five days or fewer. Only Bridge Creek and Muleshoe Creek met the bull trout maximum summer rearing temperature of 12°C (consecutive seven-day average of daily maximums) that EPA issued as final temperature guidance for water quality standards throughout the Pacific Northwest.

**Habitat Conditions:** The presence and abundance of fish species within the analysis area is primarily a function of the small, steep, deeply entrenched nature of most of the streams. This type of stream morphology associated with historical major wildland fires is very conducive to change especially regarding streamflows and stream channel and riparian conditions. Major fire events have resulted in modifications to water temperatures, substrate conditions, quantity and quality of summer and winter rearing habitats, and spawning habitat conditions. Between 1910 and 2003, approximately 70 percent of the analysis area was impacted by major fire events. These modifications may be positive (increased acting debris) or negative (increased water temperatures).

Besides limitations due to steep channel gradients, migration barriers, and small stream channels, fish populations within the analysis area primarily respond to the water temperatures, substrate, and riparian conditions of a particular stream. As stream conditions are altered to levels reflecting sub-optimal conditions for salmonids, fish populations will usually respond via reductions in spawning success and lower juvenile and sub-adult densities rearing in the affected stream segments.

### Middle Fork Clearwater River Drainage

**Stream Temperatures:** Stream temperatures were monitored throughout the summer of 2005 at the mouths of Big Smith Creek, Little Smith Creek, and Swan Creek to evaluate habitat conditions for westslope cutthroat trout. During 1997, the Forest started collecting water temperature data from these streams to determine temperature problems and prioritize riparian recovery efforts. Comparison of the 2005 stream temperature data from the three streams and the desired maximum temperatures as defined for the "high fishable" standard in the Forest Plan revealed that:

(1) The desired westslope cutthroat trout rearing temperature of 16°C was met at Big Smith Creek. Little Smith Creek and Swan Creek did not meet this standard. These streams are relatively small and do not contain any significant spring Chinook rearing habitat. Minimal steelhead trout spawning and rearing occurs in these streams; the westslope cutthroat trout rearing standard and spawning period meets the "high fishable" standards for steelhead trout.

(2) Big Smith Creek, Little Smith Creek, and Swan Creek met the state standard for cold-water biota; water temperatures did not exceed the daily maximum of 22°C and the maximum daily average of 19°C. The state standard of 13°C for the spring spawning periods for westslope cutthroat trout was not met. As for bull trout, Big Smith Creek, Little Smith Creek, and Swan Creek have not been designated potential bull trout spawning habitat. They also have exceeded the maximum summer rearing temperature of 12°C (consecutive seven-day average of daily maximums) that EPA issued as final temperature guidance for water quality standards throughout the Pacific Northwest.

**Habitat Conditions:** The Middle Fork Clearwater River functions as a critically important migration corridor with moderate to high habitat potential to support aquatic species. The river provides significant over wintering habitat for both anadromous and resident species. Tributaries provide spawning and rearing habitat for steelhead trout and westslope cutthroat trout and cold water refuge for all salmonid species during the summer. The Middle Fork Clearwater system is important in that it provides relatively contiguous distribution of populations and suitable habitat between the upper Lochsa and Selway rivers and the lower Clearwater River subbasin.

### Lolo Creek Drainage

**Stream Temperatures:** The stream temperatures within the lower mainstem of Lolo Creek downstream of the FOREST SERVICE boundary approach the lethal limits for salmonid production. Inter-Fluve, Inc. (1993) reported water temperatures up to 27º C in the lower mainstem Lolo Creek in 1992.

Water temperatures within the mainstem Lolo Creek and various tributaries have been monitored by the Forest and Nez Perce Tribe from 1990 to 2006. The maximum water temperatures within the mainstem of Lolo Creek (at the section 6 bridge) have ranged from 26º C during the hot, dry summers of 1992 and 1994 to 19º C during the relatively cool, wet summer of 1993. Water temperatures within the lower reaches of the two major tributaries of Lolo Creek, Musselshell Creek and Eldorado Creek have also shown similar high water temperatures. These three streams provide the majority of the current/potential spring Chinook spawning during the late summer and early fall period. Water temperatures during the spring Chinook spawning period are rated as poor during the late summer to good during the early fall period. The streams provide good water temperature conditions for the over wintering incubation of the eggs and early rearing of the juveniles in the spring. Summer rearing of juveniles is rated as poor to fair due to the high water temperatures.

Stream temperature data for the smaller tributaries of Lolo, Musselshell, and Eldorado creeks show water temperatures mostly conducive to salmonid production. Spring spawning conditions for steelhead trout and westslope cutthroat trout are rated as good in the early spring to fair-to-poor during the mid-summer incubation period. The fair-to-poor conditions are a result of the higher than optimum water temperatures during the spawning and incubation period. Most of the streams that were monitored have exceeded the 13º C maximum spawning temperature slightly (14-15º C) during June and July. However, summer water temperatures within these streams provide good conditions for rearing of the steelhead trout and westslope cutthroat trout. The maximum water temperatures of these tributaries remain below 16º C in most years. The exception for several streams (Camp Creek, Six Bit Creek, Fan Creek, Gold Creek, and Yakus Creek) was during the hot, dry summers of 1992 and 1994 that showed maximum water temperatures peaking between 16 and 18º C. Overall, these higher temperature periods in these tributaries are different from the larger mainstem streams, as they are relatively short duration.

In 2005 stream temperatures were monitored throughout the summer at 21 sites on 19 streams (only Forest Service sites) within the Lolo Creek drainage to evaluate habitat conditions for steelhead trout, spring Chinook salmon, westslope cutthroat trout, and bull trout. Comparison of the 2005 stream temperature data and the desired maximum temperatures as defined for appropriate standards in the Forest Plan revealed that:

(1) The desired steelhead trout rearing temperature of 17°C was met at six streams (Dutchman Creek, Knoll Creek, Mike White Creek, Fan Creek, Nevada Creek, and Trout Creek) out of the 11 streams monitored with a "high fishable" standard. Lolo Creek, Eldorado Creek, and Musselshell Creek did not meet the "high fishable" standard for steelhead trout rearing. Lunch Creek exceeded the standard on one day.

(2) The desired spring Chinook trout rearing temperature of 17°C was not met at the current or potential spring Chinook salmon streams (Lolo Creek, Yoosa Creek, Eldorado Creek, and Musselshell Creek).

(3) The desired westslope cutthroat trout rearing temperature of 16°C or below was met at three streams (Brick Creek, Chamook Creek, Panther Creek, and White Creek) out of the six streams monitored with a "high fishable" standard. Yakus Creek exceeded the standard on two days.

(4) The desired westslope cutthroat trout rearing temperature of 18°C or below (moderate fishable standard) was met in Gold Creek and Mud Creek.

(5) The desired westslope cutthroat trout rearing temperature of 20°C or below (low fishable standard) was met in Dan Lee Creek.

Overall, water temperatures within 17 of the 19 streams were under the state standard for cold-water biota; water temperatures did not exceed the daily maximum of 22°C and the maximum daily average of 19°C. The temperature data showed Lolo Creek (eight days) and Musselshell Creek (at the mouth [six days]) exceeded the state cold-water biota standard. The state standard of 13°C for the spring spawning period (steelhead trout) was met at Lunch Creek. Six streams (Dutchman Creek, Fan Creek, Knoll Creek, Panther Creek, Trout Creek, and White Creek) exceeded the spawning period standard by six days or fewer. All streams exceeded the bull trout maximum summer rearing temperature of 12°C (consecutive seven-day average of daily maximums) that EPA issued as final temperature guidance for water quality standards throughout the Pacific Northwest.

**Habitat Conditions:** Stream conditions in Lolo Creek have been altered by farming, mining, grazing, timber harvest, and road building. Farming impacts have been noted throughout the watershed below the Forest boundary. Timber harvest, road construction and grazing impacts are found throughout the entire watershed. Mining impacts are localized primarily within the Forest boundary. The mainstream Lolo Creek and nine tributaries have been designated a Water Quality Limited Streams by the State of Idaho. The primary pollutants of concern are sediment and water temperature. Past, current, and future monitoring within the Lolo Creek drainage will emphasize substrate conditions in terms of sediment and stream water temperatures.

Past reports and personal accounts and more recent observations lend support to the assumption that road construction along the mainstem of Lolo Creek and other fish-bearing tributaries was most likely the dominant impact to the stream channel, riparian, and fish habitat conditions. The construction of Forest Service roads 100, 103, 500, 535, and 540 altered the stream channel in numerous locations and eliminated the recovery of the riparian areas where the road was within 150 feet of the stream. Besides the initial and chronic influx of sediment due to the proximity of the native surfaced and gravel roads, additional sources of erosion developed due to the confinement of the stream channel in various locations. Riparian vegetation removed from the road right-of-way decreased the streamside shade and potential woody debris; high summer water temperatures and decreased quantity and quality of spawning and rearing habitats resulted. As more roads were constructed within the tributaries and headwater reaches, additional sources of sedimentation were created in the smaller fish bearing tributaries as well as the mainstems of Lolo, Eldorado, and Musselshell creeks. Associated timber harvest along these roads also affected the streams as riparian vegetation was removed along most streams. The riparian alterations created stream channel instability, reduced streamside shade, higher summer water temperatures, and reduced instream habitat conditions such as cover and acting and potential woody debris.

Information regarding the lower mainstem of Lolo Creek (downstream of Forest Service lands) and its tributaries is limited to site monitoring and survey data from the Bureau of Land Management and a complete habitat and fish population survey conducted by a BLM contractor in 1992. Inter-Fluve, Inc. (1993) reported that of the 15 stream reaches downstream of Forest Service lands, seven reaches have physical habitat conditions that are basically pristine due to the inaccessibility and high "canyon" type" confinement. These reaches primarily make up the lower 14 miles of the 31 miles of mainstem on non-Forest Service lands. Of the remaining eight reaches, six are located directly downstream of Forest Service lands. These reaches had lower stream gradients and were less confined than reaches in the lower canyon. The report noted that while physical impacts were not noticeable in the lower canyon reaches (except the lower reach near the mouth), the reaches downstream of the Forest Service lands were heavily impacted by grazing. Although the survey noted that the lower gradient reaches downstream of Forest Service lands appeared to have better spawning and rearing habitat than the lower canyon reaches, salmonid densities were found to be lower in the impacted reaches than in the relatively unimpacted lower canyon reaches (Inter-Fluve, Inc. 1993). The primary limiting factor for salmonid production within the lower mainstem Lolo Creek is the high summer water temperatures. BLM and Forest Service monitoring data show water temperatures well above optimum temperatures for salmonid production.

From 1988 to 1994, all streams within the Forest Service boundary in the Lolo Creek drainage were surveyed by the Forest Service and/or Forest Service contractors. Recent surveys administered by the Forest Service have showed that a number of streams within the Lolo Creek drainage can be characterized by fair-to-poor substrate conditions, fair-to-good riparian conditions and fair rearing habitats (Clearwater BioStudies, Inc. 1988, 1992a, 1992b, 1993a, 1993b, 1994, 1998, 1999, and Isabella Wildlife Works 1995a-d). The reports mostly identified the moderate-to-high levels of cobble embeddedness as a primary limiting factor to fish production. The poor substrate conditions affect the quality and quantity of summer and winter rearing habitat. Low levels of acting debris and sub-optimal levels of instream cover were noted as limiting factors in a number of stream reaches. Habitat enhancement projects that were completed from 1981to 1992 have increased the acting woody debris and have resulted in better rearing habitat. Instream sediment removal activities have also taken place in the mainstem Lolo Creek, Eldorado Creek, Yoosa Creek, and several tributaries. This removal of instream sediment from natural and constructed sediment traps has improved substrate conditions in localized areas. Llong-term cumulative effects are believed to be positive, but the limited extent of the activities to specific sites and few years of monitoring data do not show any definite trends.

Resurveys of specific streams are planned every five to ten years dependent upon stream conditions and management proposals. Approximately 20 miles of the mainstem of Lolo Creek (including the project area) were resurveyed during the summer of 1998 to assess any changes in habitat stream conditions from surveys conducted in 1988 and 1993. In general, the surveys noted that the fish habitat within Lolo Creek drainage was generally similar to conditions documented during the 1993 survey. No changes in overall substrate conditions were observed. The 1998 overall cobble embeddedness levels of 41.5 percent for the 20 miles of stream was basically the same as the 1993 level of 41.0 percent. Of the 49 stream reaches, 25 reaches showed decreases and 24 showed increases in cobble embeddedness levels. The substrate conditions do not meet the Desired Future Condition for the appropriate Forest Plan standard. Average cobble embeddedness levels within twelve reaches of Lolo Creek met the desired conditions for a "high fishable" standard of 30 percent to 35 percent cobble embeddedness. The remaining stream reaches exhibited average cobble embeddedness levels of 36 percent to over 61 percent. Although these levels are higher than the desired conditions, the extent the levels are within or outside natural conditions have not been assessed at this time.

### Environmental Consequences — Water Quality and Fisheries

The following analysis focuses on the toxic characteristic of each herbicide proposed for use, the concentration of herbicides to which aquatic biota (fish and invertebrates) are exposed, and the impacts to water quality from the alternatives. Differences in treatment were used to contrast effects on habitat among alternatives and to determine the potential impacts to fish, macro-invertebrates, and water quality. Effects analysis was based upon field reviews, watershed conditions, riparian zone conditions, professional consultation, literature reviews, and the professional judgment of the project hydrologist and fisheries biologist.

## Alternative 1: No Action

### Direct and Indirect Effects

The direct, indirect, and cumulative effects on water quality and fisheries from the ongoing use of selected chemicals for areas inside the Lochsa noxious weeds project would be the same for Alternative 2 but lower than those for Alternative 3.

Two chemical treatment programs are currently being implemented in the Middle Fork Clearwater River and Lochsa River drainages. During 2006, the Forest treated 123 acres at administrative sites within the Lochsa River and Middle Fork Clearwater River drainages. The majority of the treatment (92 percent) involved the use of clopyradlid. Also in 2006, the Idaho Transportation Department treated 192 acres along U.S. Highway 12 from Kooskia to Lolo Pass. Treatment acres for 2007 for the administrative sites and U.S. Highway 12 right-of-way are expected to be similar to 2006 (Appendix K, Table 1).

The acreages within the administrative sites and US Highway 12 corridor that will be sprayed with clopyralid, metsulfuron methyl, picloram, triclopyr-TEA and 2,4-D are well below the maximum acres annually treatable with no effect for aquatic organisms expected (Appendix I, Tables 1 and 2).

Mechanical treatment along road cuts and fills and within riparian areas could result in an increase in sediment to streams on approximately 100 acres. However, this increase would likely be undetectable because project-related soil disturbance would be kept to a minimum and localized in comparison to the entire watershed.

Release of biological control agents (approximately 50 acres annually) would have no direct effect on surface water quality and aquatic organisms. The agents would not compete with aquatic insect species since their food base is very specific, nor would they provide more than an incidental food source for fish.

There would be a slight indirect effect on sediment yield from future spread of weeds associated with this alternative. Even under the worst-case noxious weed infestation scenario, it is unlikey that increases in sediment yield to streams would be sufficient to affect water quality or fisheries.

Cultural treatments such as seeding, transplanting and fertilizing would not affect water quality or fisheries. Fertilizers would be applied according to Forest Service and manufacturer guidelines, and runoff nutrient concentrations would not be sufficient to enrich streams. Seeding and transplanting activities would involve only limited soil disturbance.

As discussed previously, without treatment it becomes increasingly likely that noxious weeds will become more widely established within the project area. There are no direct effects with this alternative. An indirect effect of noxious weed invasion could be increased water runoff and sediment yield from infested sites. Lacey et al. (1989) has shown an almost threefold increase in sediment yield from knapweed sites compared to an uninfested bunchgrass site. This study showed runoff from the knapweed site increased by about 50 percent.

At the present time, most infested sites are along road clearings. Noxious weeds are probably having little effect on sediment yield in comparison to other road-related activities (road use, maintenance, etc.). Impacts from the future spread of weeds would depend on the slope, soil characteristics, precipitation patterns, and distance to water from the infested sites. Even under the worst-case noxious weed infestation scenario, it is unlikely that increases in sediment yield into streams would be sufficient to affect water quality or fisheries.

### Indirect and Cumulative Effects

Indirect and cumulative effects to the water quality include the risk of spread to new areas that would potentially result in decreases in soil stability in a much larger area that those currently affected.

Other activities occurring in this analysis area include timber harvest, grazing, mining, prescribed burning, recreation, road construction, reconstruction, maintenance, and decommissioning. These activities will continue over the next ten years. The amount of each activity is undetermined at this time. The Forest will follow national direction to prevent the spread of noxious weeds for each of these activities. Management of individual activities to prevent the introduction and spread of noxious weeds is designed to reduce the amount and extent of noxious weeds across the analysis area over time.

Other projects that include the application of herbicides will be included to determine the maximum allowable acres to be treated annually. This will include other land managers in each watershed. Personnel from the Forest's aquatics program will conduct effectiveness monitoring in relation to water quality similar to what has been completed on the Palouse and North Fork ranger districts (Foltz 2001 and Murphy 2006). See Appendix I (Tables 1 and 2) for the maximum allowable acres by watershed that could be treated by herbicide.

**Threatened and Endangered Fish Species:** The direct, indirect, and cumulative effects on listed fish species from the ongoing use of selected chemicals, mechanical, and biological treatments would be the same as Alternative 2 but lower than those for Alternative 3. The ongoing chemical treatment of noxious weeds is not likely to have an adverse affect on T & E fish species.

**Sensitive Fish Species:** Similar to T & E species, the direct, indirect, and cumulative effects on sensitive fish species from the ongoing use of selected chemicals, mechanical, and biological treatments would be the same as Alternative 2 but lower than those for Alternative 3. The ongoing chemical treatment of noxious weeds is not likely to have an adverse effect on sensitive fish species.

## Alternative 2: Mechanical, Biological, and Cultural Treatments

### Direct Effects

The direct effects of ongoing chemical treatments would be the same as Alternative 1. The acreages within the administrative sites and U.S. Highway 12 corridor that will be sprayed with clopyralid, metsulfuron methyl, picloram, triclopyr-TEA, and 2,4-D are well below the maximum acres annually treatable with no effect for aquatic organisms expected (Appendix I, Tables 1and 2; Appendix K, Table 1).

Mechanical treatment along road cuts and fills and within riparian areas will remain the same as Alternative 1 (100 acres).

Release of biological control agents would be increased to approximately 300 acres annually.

There are no direct effects of this alternative on water quality or aquatic organisms from biological treatments annually (approximately 300 acres) and mechanical treatments (100 acres).

Minor direct effects from cultural treatments are the same as Alternative 1.

### Indirect Effects

Indirect effects from the chemical, mechanical, and biological treatments are the same as Alternative 1.

### Cumulative Effects

Treatment of approximately 715 acres annually through chemical, mechanical, biological, cultural treatments would not result in cumulative effects to water quality or aquatic organisms. The duration and extent of soil disturbance and possible runoff would be minor.

Other activities occurring in this analysis area include timber harvest, grazing, mining, prescribed burning, recreation, road construction, reconstruction, maintenance, and decommissioning. These activities will continue over the next ten years. The amount of each activity is undetermined at this time. The Forest will follow national direction to prevent the spread of noxious weeds for each of these activities. Management of individual activities to prevent the introduction and spread of noxious weeds is designed to reduce the amount and extent of noxious weeds across the analysis area over time.

**Threatened and Endangered Fish Species:** The direct, indirect, and cumulative effects on listed fish species from the ongoing use of selected chemicals, mechanical, and biological treatments would be the same as Alternative 1 but lower than those for Alternative 3. The ongoing chemical treatment of noxious weeds is not likely to have an adverse affect on T & E fish species.

**Sensitive Fish Species:** Similar to T & E species, the direct, indirect, and cumulative effects on sensitive fish species from the ongoing use of selected chemicals, mechanical, and biological treatments would be the same as Alternative 1 but lower than those for Alternative 3. The ongoing chemical treatment of noxious weeds is not likely to have an adverse e on sensitive fish species.

### Alternative 3: Mechanical, Biological, Cultural, and Chemical Treatments

Effects to water quality and aquatic organisms from mechanical, biological, and cultural treatments would be the same as those discussed in Alternatives 1 and 2. The following discussion focuses on chemical herbicide treatments proposed with this alternative.

### Direct and Indirect Effects

Initial treatment methods proposed for each site are listed in Table 2.3. The herbicides listed for each site are those that are effective against the identified target weeds. One or more combinations of the listed herbicides would be used, depending upon their site-specific effectiveness. Follow-up manual, biological, and/or chemical treatments will be necessary on some sites. Under this analysis, the use of herbicides would be authorized on up to 5,000 acres per year. Currently, approximately 19,300 acres of weeds have been identified in the project area (Appendix I, Tables 1 and 2).

To date, approximately 1,000 acres have been identified for treatment within the project area. Approximately 54 percent (535 acres) of the total area proposed for herbicide treatments occur within the 15- to 100-foot riparian zone. Two percent (22 acres) is proposed for treatment within 15 feet of any stream or surface water, as shown in Appendix K, Table 2.

In addition to the 1,000 acres, a maximum of 200 additional acres may be treated during 2007, if necessary to control new invaders and/or new populations; treatments would be limited to areas up to 20 acres for each of the smaller watersheds within each HUC 5 watershed.

There are four routes chemicals could enter water: direct application, through drift from areas treated that are near water, binding to the soil that washes off terrestrial sites, or leaching through the soil.

Direct application to surface water is most likely to introduce significant quantities of chemicals to surface waters. This would have the most pronounced effects on water quality or aquatic organisms.

Indirect application to surface waters would include drift, overland flow, and leaching. Drift from nearby spraying is similar to direct application, but concentrations would be lower and the probability of impact reduced. Overland flow on bare soils could deliver herbicides to nearby waters. Leaching of herbicides through the soil profile is the least likely route for herbicides to enter water. Herbicides can be broken down as they move through the soil profile, but it is dependent upon the chemicals.

Most herbicide water contamination results from point sources such as spills, leaks, storage, and improper handling of equipment or chemicals. These incidents can be avoided though proper storage, handling, cleaning, and transport of herbicides and equipment.

Table 3.7 displays a comparison of herbicide chemicals and their potential to move into waters. Table 3.3 in the Soils Section also shows herbicide characteristics that influence chemical movement and degradation.

Discussion about the potential movement of herbicides from soils is also discussed in detail in the Soils Section.

**Table 3.7 Potential Movement of Herbicide to Water Sources (BPA 2003)**

| Chemical Evaluated | Herbicide Movement Rating | Into Surface Water | Into Ground Water |
|---|---|---|---|
| Aminopyralid | Very High* | High* | High* |
| Clopyralid | Very High | High | High |
| Dicamba | Very High | High | High |
| Glyphosate products without surfactant | Very Low | Low | Low |
| Glyphosate products with surfactant | Very Low | Low | Low |
| Metsulfuron Methyl | High | High | Low |
| Picloram | Very High | High | High |
| Triclopyr -TEA | Low | Low | High |
| Triclopyr -BEE | Moderate | Moderate | Low |
| 2,4-D | Moderate | Moderate | Moderate |

* No information regarding aminopyralid was found; assumed to have similar characteristics as clopyralid.

The potential effect of herbicide treatment on water quality and aquatic organisms is a concern. Careful analysis of herbicide spraying projects and their effects are an important consideration for fisheries and water quality protection. The potential impact of herbicides on fish and other aquatic organisms is a function of two factors: (1) the toxic characteristics of the compound, and (2) the concentration to which the organism is exposed. These factors are used to determine the risk analysis for water quality and aquatic organisms.

Three methods are references in comparing toxicity to fish and other aquatic organisms: Lethal Concentration ($LC_{50}$), No Observed Effect Level (NOEL), or No Observed Effect Concentration (NOEC). Although the $LC_{50}$ is frequently used as a toxicity standard, 50 percent fish mortality is generally not acceptable. For this reason a better parameter of NOEL or NOEC was used when it was available to evaluate effects.

The herbicides proposed for use are characterized by relatively low aquatic toxicity. The effects of herbicides on fish can be quantified using the 96-hour $LC_{50}$. The 96-hour $LC_{50}$ refers to the concentration that is lethal to 50 percent of the fish exposed at that level for 96 hours. The lower the $LC_{50,}$ the more toxic the compound. The 96-hour $LC_{50}$ for the herbicides proposed for use (plus the parent compound of 2,4-D amine) is provided in Table 3.8. For example, NOEL for picloram on cutthroat trout is 0.29 milligrams per liter (1mg/l = 1 part per million (ppm)). Because there are frequently no long-term test results that provide safe concentrations (NOEL), the EPA has recommended that to set a standard for concentrations to protect endangered aquatic species, divide the 96-hour $LC_{50}$ by 20. Table 3.8 includes those concentrations which are used as a benchmark to measure the significance of possible impacts.

The No Observed Effect Level (NOEL) or No Observed Effect Concentration (NOEC) was used in place of the $LC_{50}$ when it was available from studies. These levels represent a conservative approach to evaluating the active ingredients of the proposed herbicides within each watershed.

No Observed Effect Level/Concentration is the highest concentration of toxicant to which organisms are exposed in a full life-cycle or partial life-cycle test that causes no observable effect on survival, growth, or reproduction of the test population. This would mean there is no significant difference between the test solution and the control, as determined by hypothesis testing.

**Table 3.8 Toxic Levels of Herbicides to Fish (Syracuse: 1999:2001:2003; CDMS 2003 www.cdms.net ; Rice 1990, BPA 2003 www.efw.bpa-gov ; USDI-EPA 1995, 1998, 2005)**

| Herbicide (test species) | 96-hour $LC_{50}$ (milligram/liter) | $LC_{50}$ divided by 20 | NOEL (milligram/liter) | NOEC (milligrams/liter) |
|---|---|---|---|---|
| Aminopyralid (rainbow trout) | >100 | 5 | Not Available | Not Available |
| Clopyralid (rainbow trout) | 103 | 5.2 | 20 | Not Available |
| Dicamba (rainbow trout) | 135 | 6.8 | Not Available | Not Available |
| Glyphosate products without surfactant (rainbow trout, salmon) | 923 | 46 | Not Available | Not Available |
| Glyphosate products with surfactant (rainbow trout) | 22 | 1.1 | Not Available | Not Available |
| Metsulfuron methyl (rainbow trout) | 150 | 7.5 | Not Available | Not Available |
| Picloram (cutthroat trout, rainbow) | 0.8—26 | | Not Available | 0.29—0.55 |
| Triclopyr –TEA (rainbow trout) | 199 | | Not Available | 104 |
| Triclopyr -BEE (rainbow trout) | 0.25—0.65 | | Not Available | 0.24 |
| 2,4-D (fish; salt & esters) | 1—100 | 0.05-5 | 10 | Not Available |

The second part of the risk analysis involves determining the possible herbicide concentration in streams. Field studies of herbicide spray operations have shown that herbicide input to streams ranges from non-detectable to 6 percent of the amount applied (Monnig 1988). To determine the delivery rate of herbicides to streams it is important to distinguish between infiltration-dominated sites and runoff-dominated sites.

An assessment by Rice (1990) reviewed numerous studies of picloram runoff to streams. It was determined that a maximum of ten percent of the herbicide applied to a runoff-dominated site could reach a stream within six hours of a heavy rainfall event. On infiltration-dominated sites, it was found that a maximum of only one percent of the applied herbicide could reach a stream within 24 hours of a heavy storm. Rice's assessment methodology was used in the aquatics effects analysis. For cumulative effects, it was assumed that chemicals from all of the upstream treatment sites would reach the same stream at the same time. This worst-case scenario is extremely unlikely.

Because of its relatively long environmental persistence and relatively high soil mobility, picloram represents the worst-case scenario of a highly mobile herbicide. A report by Scott et al. (1978) of the U.S. Fish & Wildlife Service concluded that a concentration of 0.6 milligrams per liter (mg/l) picloram decreased cutthroat fry growth by 25 percent. No adverse effects were observed when concentrations were below 0.3 mg/l. Woodward (1979) concluded that picloram increased the mortality of fry in concentrations above 1.3 mg/l and reduced their growth in concentrations above 0.61 mg/l when exposure exceeded 20 days.

For the purpose of the analysis, the entire herbicide application was calculated per watershed as if weeds were sprayed continuously along each road in just one day instead of over one to two months. Continuing with the worst-case scenario, the lowest streamflow was calculated for all affected watersheds and used to determine maximum concentration of herbicides within the streams. The lowest stream flows generally occur in the middle of September prior to the fall rains. Though September flows would be the lowest, all spraying would occur between May and August when flows are higher. Streamflow data was calculated using Embry's (1981) water yield formula. His equation was used to calculate the average cubic feet per second (cfs) of water yield for a seven-day, two-year low flow (Q7L2) during September. Table 3.9 shows the data for each watershed.

The environmental fate and effects of clopyralid were reviewed. The following text is a summary of the Ecological Risk Assessment of Clopyralid (Syracuse Environmental Research Associates, Inc. 1999).

Clopyralid does not bind tightly to soils and thus would seem to have high potential for leaching. While there is little doubt that clopyralid will leach under conditions that favor leaching (i.e., sandy soils, sparse microbial populations, and high rainfall), the potential for leaching of runoff is functionally reduced by the relative rapid degradation of clopyralid in soil. A number of field lysimeter studies and one long-term field study indicate that leaching and subsequent contamination of ground water are not likely to be substantial. This conclusion is also consistent with a short-term monitoring study of clopyralid in surface water after aerial application.

Based on the results of acute bioassays, fish and aquatic invertebrates are equally sensitive to clopyralid. Given the low levels of plausible exposure to clopyralid in water of NOEL, 20 mg/l can be used to characterize risk to both fish and aquatic invertebrates.

Soil contamination by runoff, which could potentially harm off-site plant or aquatic species, does not appear to be a major concern with clopyralid. Rains are most likely to cause clopyralid to leach into the soil column rather than wash off. The best available estimate of runoff is in the order of 0.015 (1½ percent) of the applied amount. Once in the soil column, clopyralid will be rapidly degraded except in arid soil with low microbial populations.

In 2006, the Forest proposed the use of a newer chemical, aminopyralid, to supplement or replace clopyralid in the treatment of specific noxious weeds. Branning (2006) summarized available information pertaining to aminopyralid and assessed the use of the chemical using the same analyses in the Environmental Assessment for the North Fork Noxious Weed Treatment project (Forest Service 2005). The pesticide fact sheet issued by EPA (August 10, 2005) noted that "aminopyralid has been shown to be practically non-toxic to birds, fish, honeybees, earthworms, and aquatic invertebrates." Branning's analysis concluded that "aminopyralid appears to exhibit risks and potential adverse impacts that are minimal overall and comparable to or less than clopyralid." (Refer to Branning's April 11, 2006, memo, located in the project file.)

Other assumptions used in completing the aquatics/herbicide analysis include the following:

- All sites will be treated within the same year.
- With the exception of aquatically approved glyphosate products without surfactant, no chemicals will be sprayed within 15 feet of perennial flowing streams, rivers, wetlands, or water.
- The picloram application rate of 1.0 pounds of active ingredient per acre corresponds to four pints of liquid picloram per acre. This is the current maximum recommended rate. In most cases, a lesser amount would actually be used.
- All acres would be treated with herbicides. In reality, some of the acreage would be treated by mechanical or biological means.

Using this information, the acreage capable of being sprayed with each herbicide was calculated in each affected watershed – without exceeding the lethal amount ($LC_{50}$/20 or NOEL or NOEC) for trout or salmon. Appendix I (Tables 1 and 2) summarizes those results.

**Table 3.9 Watershed Characteristics and Average Annual Low Flow**

| Subbasin | HUC 5 | Watershed Name | Watershed (acres) | Watershed (sq. miles) | Average Annual Precipitation (inches) | Average Annual flow Qaa (cfs) | Average Low Flow Qlow (cfs) |
|---|---|---|---|---|---|---|---|
| Lochsa River 17060303 | Crooked Fork Creek | Upper Crooked Fork Creek | 19,481 | 30 | 62 | 58.30 | 5.69 |
| | | Boulder Creek (North) | 16,018 | 25 | 61 | 47.52 | 4.57 |
| | | Lower Crooked Fork Creek | 21,122 | 33 | 45 | 46.28 | 4.44 |
| | | Upper Brushy Fork Creek | 10,261 | 16 | 56 | 28.49 | 2.64 |
| | | Spruce Creek | 15,901 | 25 | 53 | 41.21 | 3.93 |
| | | Lower Brushy Fork Creek | 25,840 | 40 | 51 | 63.41 | 6.23 |
| | Colt Killed Creek | Upper Colt Killed Creek | 24,765 | 39 | 56 | 66.61 | 6.56 |
| | | Upper Big Sand Creek | 17,484 | 27 | 51 | 43.51 | 4.16 |
| | | Hidden Creek | 10,659 | 17 | 57 | 30.06 | 2.80 |
| | | Lower Big Sand Creek | 24,323 | 38 | 51 | 59.82 | 5.85 |
| | | Middle Colt Killed Creek | 10,883 | 17 | 54 | 29.11 | 2.71 |
| | | Colt Creek | 16,650 | 26 | 51 | 41.51 | 3.96 |
| | | Storm Creek | 32,134 | 50 | 54 | 82.68 | 8.27 |
| | | Lower Colt Killed Creek | 21,047 | 33 | 46 | 47.11 | 4.53 |
| | Upper Lochsa River | Lochsa River — Walton Creek | 18,801 | 29 | 39 | 36.03 | 3.40 |
| | | Legendary Bear Creek | 13,242 | 21 | 50 | 32.66 | 3.06 |
| | | Lochsa River - Wendover Creek | 20,702 | 32 | 39 | 39.54 | 3.76 |
| | | Fishing Creek | 17,190 | 27 | 53 | 44.42 | 4.25 |
| | Warm Springs Creek | Upper Warm Spring Creek | 13,795 | 22 | 47 | 32.00 | 3.00 |
| | | Wind Lakes Creek | 12,521 | 20 | 48 | 29.75 | 2.77 |
| | | Lower Warm Springs Creek | 19,475 | 30 | 43 | 40.96 | 3.90 |
| | Middle Lochsa River | Lochsa River - Weir | 33,269 | 52 | 42 | 67.48 | 6.65 |
| | | Post Office Creek | 12,203 | 19 | 47 | 28.43 | 2.64 |
| | | Lake Creek | 33,336 | 52 | 53 | 84.13 | 8.42 |
| | | Lochsa River — Stanley Creek | 31,553 | 49 | 40 | 60.83 | 5.95 |
| | | Lochsa River — Bald Mtn Creek | 28,790 | 45 | 39 | 54.34 | 5.28 |
| | | Boulder Creek (South) | 30,009 | 47 | 46 | 66.31 | 6.53 |
| | Fish Creek | Upper Fish Creek | 23,237 | 36 | 43 | 48.56 | 4.68 |
| | | Hungery Creek | 22,658 | 35 | 53 | 57.98 | 5.66 |
| | | Lower Fish Creek | 10,404 | 16 | 38 | 19.86 | 1.80 |
| | Lower Lochsa River | Lochsa River — Bemerick Creek | 34,478 | 54 | 35 | 58.25 | 5.69 |
| | | Old Man Creek | 28,128 | 44 | 47 | 63.61 | 6.25 |
| | | Split Creek | 9,995 | 16 | 44 | 22.01 | 2.01 |
| | | Fire Creek | 11,261 | 18 | 45 | 25.24 | 2.32 |
| | | Deadman Creek | 12,708 | 20 | 38 | 24.09 | 2.21 |
| | | Lochsa River — Glade Creek | 21,045 | 33 | 34 | 35.19 | 3.32 |
| | | Canyon Creek | 12,612 | 20 | 38 | 23.91 | 2.19 |
| | | Pete King Creek | 17,613 | 28 | 37 | 32.16 | 3.01 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Middle Fork Clearwater River 17060304 | Middle Fork Clearwater | Middle Fork Clearwater | 47,826 | 75 | 27 | 62.18 | 6.10 |
| | | Big Smith Creek | 3,165 | 5 | 34 | 5.67 | 0.47 |
| | | Swan Creek | 1,590 | 2 | 32 | 2.75 | 0.22 |
| | | Sutter Creek | 5,212 | 8 | 26 | 7.08 | 0.60 |
| | | Maggie Creek | 17,048 | 27 | 23 | 19.71 | 1.78 |
| Clearwater River 17060306 | Lolo Creek | Upper Lolo Creek | 26,846 | 42 | 40 | 52.05 | 5.04 |
| | | Musselshell Creek | 35,323 | 55 | 32 | 54.69 | 5.31 |
| | | Middle Lolo Creek | 29,459 | 46 | 30 | 43.14 | 4.12 |
| | | Eldorado Creek | 27,174 | 42 | 35 | 46.30 | 4.45 |
| | | Lower Lolo Creek | 36,614 | 57 | 41 | 72.04 | 7.14 |
| **Total** | | | **985,850** | **1,540** | 44 | 1836.44 | 228.29 |

Average Annual Flow = 0.0405 (Precipitation * Area) ^0.9641

Average Low Flow = 0.0734 * Average Annual Flow ^1.0701

Capacity = Average Low Flow * 62.43 * 54,000

Yield = NOEL * Capacity / 1,000,000

Maximum Acres to be Treated = Yield (Application Rate * 0.05)

**Table 3.10 Watershed Characteristics and Average Annual Low Flow Summarized by HUC 5**

| Subbasin | HUC 5 | Watershed (acres) | Watershed (sq. miles) | Average Annual Precipitation (inches) | Average Annual flow Qaa (cfs) | Average Low Flow Qlow (cfs) |
|---|---|---|---|---|---|---|
| Lochsa River | Crooked Fork Creek | 108,626 | 170 | 54 | 267.52 | 29.05 |
| | Colt Killed Creek | 157,947 | 247 | 52 | 370.08 | 41.12 |
| | Upper Lochsa River | 69,937 | 109 | 47 | 153.06 | 15.99 |
| | Warm Springs Creek | 45,792 | 72 | 45 | 97.58 | 9.87 |
| | Middle Lochsa River | 169,162 | 264 | 44 | 336.57 | 37.15 |
| | Fish Creek | 56,300 | 88 | 46 | 121.63 | 12.50 |
| | Lower Lochsa River | 147,843 | 231 | 39 | 263.13 | 28.54 |
| Middle Fork Clearwater River | Middle Fork Clearwater | 74,784 | 117 | 26 | 92.26 | 9.30 |
| Clearwater River | Lolo Creek | 155,417 | 243 | 31 | 221.29 | 23.72 |
| | **Total** | **985,808** | **1,540** | **44** | **1841.13** | **228.91** |

Average Annual Flow = 0.0405 (Precipitation * Area) ^0.9641

Average Low Flow = 0.0734 * Average Annual Flow ^1.0701

Capacity = Average Low Flow * 62.43 * 54,000

Yield = NOEL * Capacity / 1,000,000

Maximum Acres to be Treated = Yield (Application Rate * 0.05)

From this analysis, each herbicide has a limited number of acres that can be treated by watershed annually (Appendix I, Tables 1 and 2). These acres would include activities on adjacent ownerships and still remain below the no observable effects level. The ranger districts would track the acres treated with herbicides annually.

The acreages proposed for spraying with clopyralid, aminopyralid, dicamba, glyphosate products with surfactant, glyphosate products without surfactant, metsulfuron methyl, picloram, triclopyr-TEA and 2,4-D are well below the maximum acres annually treatable with no effect for aquatic organisms expected. Triclopyr-BEE would not be applied based on comments received during scoping with regulatory agencies.

As an example, approximately 3,917 acres within the project area (3,228 Lochsa River, 179 Middle Fork Clearwater River, and 510 Lolo Creek) could be sprayed annually using picloram without exceeding the NOEC for cutthroat trout. The 60 acres proposed for treatment in Alternative 3 would be below this overall threshold and thresholds for individual drainages (See Appendix K, Table 1, for proposed treatments) Picloram is to be used only for those weeds that have thicker leaves and waxy surfaces, such as the toadflaxes or rush skeltonweed. Surveyed acres proposed for treatment would not exceed the maximum treatable acres per watershed.

It should be emphasized that the effects analysis calculations represent the worst-case scenario. The likelihood of reaching the levels of chemical concentrations shown in the previous table would be very low. In fact, it is unlikely that any herbicide would be detected in stream water as result of proposed herbicide applications because of the low level of herbicide use spread over a period of two months or more compared to the higher water yields in these watersheds over the same period of time.

For example, the spraying of picloram (applied under similar conditions as the proposed action) was monitored along a streamside in Montana (Watson et al. 1989). In this study no herbicide was detected in the stream at the one-part-per-billion detection limit. Application of site-specific Best Management Practices (see Appendix J) would further reduce the likelihood of herbicide being detected in stream waters.

Application procedures would follow INFISH Standard and Guideline RA-3 and PACFISH strategies as well as State of Idaho Best Management Practices (BMPs) guideline for herbicide use within Riparian Habitat Conservation Areas.

Therefore, herbicide concentrations in streams smaller than those identified above are not expected to reach NOEL/NOEC levels. An explanation of the formula used to determine the acreages capable of being sprayed with the proposed herbicides in each watershed can be found in the project file.

Based on the persistence in soil, soil half-life, potential for movement into water, and the possibility of repeat application, picloram, clopyralid, and dicamba, are expected to have a short-term effect to water quality and aquatic organisms. Based on analysis of the concentration being delivered, it would be non-lethal to aquatic species.

### Synergistic Effects

When herbicides are applied, there is often concern that they will bio-concentrate in organisms through uptake and retention by tissue or gills. Norris et al. (1991) reported that bioconcentration of chemicals has resulted in organisms exhibiting 100,000 times the concentration of the chemical in the water. For this to occur, retention of a pollutant must exhibit a high resistance to breakdown or excretion by an organism to allow a sufficient uptake period for an elevated concentration. A high concentration must also be applied for an extended period of time. The predominant factors that determine the extent of bioconcentration are physiochemical properties of the compound and the organism. The ratio of fat solubility to water solubility of the chemical and the amount of fat in the organism are of primary importance. Bioconcentrations are greatest in organisms with a high fat content when exposed to chemicals with a high ratio of fat to water solubilities. Bioconcentration factors provide an indicator of potential for a chemical to bioconcentrate. Chemicals with a Bioconcentration Factor (BCF) of greater than 1,000 indicated a need for a precise risk analysis, and values less than 100 suggest experimental verification of the

chemical's potential to bioconcentrate is not warranted. In terms of the amount and timing of this project's application of herbicides, as well as the BCFs for herbicides proposed for use (Norris et al. 1991), there is a low risk of bioconcentration. BCFs for each of the herbicides proposed for use can be found in Appendix C.

Concern has been expressed over the possible cumulative or synergistic effects of mixtures of chemicals on sensitive resources. Synergism is a special type of interaction in which the combined effect of a certain herbicide with other chemicals in the environment is greater that the effect of any one chemical alone. This issue is discussed in greater detail in the section on Human Health Impacts. As noted there, EPA currently supports an additive model in predicting such interactions. Even with the assumption that the chemicals are present simultaneously, their additive concentrations are still well below the NOEL/NOEC threshold.

Margins of safety can be used to indicate the toxic risk associated with herbicide applications by watershed. These calculations can also help assess the potential for individual herbicides to act in synergism with one another. Margins of safety that equal one result when the exposure of an organism to an herbicide is equal to the no-effect level (defined as the concentration that causes no mortality of test animals in acute toxicity tests). Margins of safety less than one suggest a direct toxic effect is likely. Margins greater than one indicate that toxic effects are less likely to occur. Various standards have been used for margins of safety. Margins of safety around 100 are typically used for pesticide tolerances in food while margins may be appropriately set much greater than 100 when rare organisms will be exposed to the chemical.

Due to the method of calculating the potential acres for herbicide treatment, margins of safety for herbicide applications in Alternative 3 would always be greater than or equal to one for each watershed. Margins of safety would only equal one in the unlikely event that sufficient funding is available to treat all of the 19,300 acres at the same time and the analyzed worst-case scenario materializes. Therefore, it is expected that Alternative 3 will result in margins of safety that exceed one for herbicide applications.

To help address the concern for synergistic effects in situations where more than one herbicide would be applied, the amount of each chemical is reduced (Klarich 1997). Alternative 3 includes a provision that limits the maximum number of acres that can be treated with herbicides within a watershed when multiple herbicides would be used. This limit is identified by the number of acres capable of being sprayed with the most restrictive chemical, e.g. picloram. This criterion helps ensure that margins of safety will always be greater than one in the situation where multiple herbicides would be applied. Therefore, synergistic effects are not expected from implementation of Alternative 3.

According to risk calculations for realistic exposures, risks to aquatic species are low for all herbicides proposed for use. No adverse effects are expected on the aquatic ecosystem as a whole. Risks from accidental direct spray of a water body or an accidental spill of herbicide mixture into a water body are very low, and the probability of either event occurring is very low.

The effects of proposed treatment of 1,000 acres within the Lochsa River (965 acres), Middle Fork Clearwater River (25), and Lolo Creek (10) drainages is minimal when compared to the effects threshold acres (maximum acres treated without lethal effects) for each of the individual watersheds (see Appendices I and K). With the exception of several drainages involving treatments with picloram, the proposed treatment acres are 0.01 percent or less of the threshold acreages determined for the nine herbicides and 48 watersheds analyzed. Picloram treatments in four drainages ranged from 11 to 23 percent of the threshold acreages. Cumulatively, the acreage proposed for treatment (577 acres) with aminopyralid (the primary chemical) is 0.09 percent of the total threshold acreage for aminopyralid in the project area.

### Cumulative Effects

This alternative would result in indirect effects to water quality and aquatic organisms in the short term. With the application of Best Management Practices and mitigation measures no cumulative effects are expected.

Other activities occurring in this analysis area include timber harvest, grazing, mining, prescribed burning, recreation, road construction, reconstruction, maintenance, and decommissioning. These activities will continue over the next ten years. The amount of each activity is undetermined at this time. The Forest will follow national direction to prevent the spread of noxious weeds for each of these activities. Management of individual activities to prevent the introduction and spread of noxious weeds is designed to reduce the amount and extent of noxious weeds across the analysis area over time.

Other projects that include the application of herbicides will be included to determine the maximum allowable acres to be treated annually. This will include other land managers in each watershed. The Lochsa and Powell ranger districts will monitor herbicide applications. Personnel from the Forest's aquatics program will conduct effectiveness monitoring in relation to water quality similar to what has been completed on the Palouse and North Fork ranger districts (Foltz 2001 and Murphy 2006). See Appendix I (Tables 1 and 2) for the maximum allowable acres by watershed to be treated by herbicide.

The Clearwater National Forest began implementation of similar projects on the Potlatch Ranger District (2001) and North Fork Clearwater River drainage (2005). On the Potlatch Ranger District, water quality was monitored during implementation of spraying of glyphosate to control noxious weeds. Monitoring found no detectable levels of glyphosate in streams as a result of drift or runoff from the treated area (Foltz 2001). The application of clopyralid via a truck-mounted sprayer was monitored in 2005 via spray cards. The monitoring noted some evidence of spray within the 15-foot no spray buffer. None of the spray was noted at the water's edge (Murphy 2006). Monitoring results for the 2006 treatment period have not been summarized. However, initial spray card monitoring indicated 8% of the spray cards within the 15-foot buffer had chemical presence while one of the cards at the water's edge showed chemical spray. The lab analyses of water samples did not indicate any presence of clopyralid or aminopyralid.

**Threatened and Endangered Fish Species:** It is recognized that herbicide application projects within 6th code HUCs may have supporting rationale for "no effect", "not likely to adversely affect", and "likely to adversely affect" determinations for listed fish, which is dependent on herbicide application rates/methods, species/life stage occurrence, risks for reaching live waters, stream characteristics, environmental conditions, and potential impacts to non-target riparian vegetation. Herbicide applications have lower risks to aquatic species when such occurs out of the riparian areas or RHCA's. The biological assessment documents the analyses, rationale and determinations for each of the three listed fish species.

*Fall Chinook Salmon:* The determination for implementation of the Lochsa Noxious Weed Treatment Project for Snake River fall Chinook salmon and designated critical habitat is "no effect". Fall chinook salmon are located downstream of the Middle Fork Clearwater River and Lochsa River. The majority if not all of the fall chinook salmon spawning documented over the last 19 years has occurred within the designated critical habitat reaches of the Clearwater River, mostly downstream of the North Fork Clearwater River. Some limited spawning has been observed in the reach around Orofino Creek, the area near the Lolo Creek confluence and upstream of the critical habitat near the confluence of the South Fork Clearwater River. They also do not occur in Lolo Creek due to the small stream size. The proposed noxious weed activities within the Lolo Creek drainage are located approximately 25 miles upstream from the mainstem Clearwater River. Therefore, since fall chinook salmon and habitat are located a substantial distance downstream from the project area, and coupled with the low risks to these fish in the larger mainstem rivers (due to the dilution effects of the large stream flows), the proposed project will have no effect on the fall chinook salmon, critical habitat or recovery efforts.

*Steelhead Trout:* The determination for implementation of the Lochsa Noxious Weed Treatment Project for steelhead trout is "may affect – likely to adversely affect" (LAA). However, the proposed project is not likely to destroy or adversely modify designated critical habitat. The risks, uncertainties and potential

adverse effects associated with the LAA determination can substantially reduced by the Project Design Criteria (Mitigation/BMPs). The proposed project contains many provisions to minimize the adverse effects to steelhead trout and designated critical habitat. See biological assessment for more information.

*Bull Trout:* The determination for implementation of the Lochsa Noxious Weed Treatment Project for bull trout is "may affect – likely to adversely affect" (LAA). Like steelhead trout, the risks, uncertainties and potential adverse effects associated with the LAA determination can substantially reduced by the Project Design Criteria (Mitigation/BMPs). The proposed project contains many provisions to minimize the adverse effects to bull trout and proposed critical habitat. See biological assessment for more information.

**Sensitive Fish Species:** The same rationale concerning exposure to and effects from herbicide treatment that were discussed for T&E fish species also applies to four sensitive fish species. See biological evaluation for more information.

### Other Sensitive Aquatic Biota

Herbicides can also indirectly influence fish populations by affecting the populations of other organisms upon which fish are dependent. Table 3.11 provides toxicity data for other aquatic organisms, e.g. macroinvertebrates (USDA Forest Service 1992).

As shown in Table 3.11, these herbicides are generally less toxic to lower orders of aquatic organisms than to fish species. Although the species listed in the table are not the only aquatic organisms found in these waters, the U.S. Fish and Wildlife Service and the EPA use them as indicators of a wide range of aquatic organisms. The acreage proposed for spraying each year in Alternative 3 is below the acreage that could be sprayed while meeting chemical concentration thresholds for these organisms.

The aquatic organisms generally have higher tolerances to toxic materials than fish, so keeping herbicide treatment rates in Alternative 3 below the NOEL for fish should indicate very low risk to these organisms.

### Adaptive Strategy

New sites proposed for future treatment must meet the requirements of the adaptive strategy. (See Chapter 2.) The adaptive strategy includes parameters established by the project aquatics specialist to ensure that future herbicide treatment falls within the scope of this EA relative to aquatic resources. The parameters require that the combined treatments in any watershed would result in a concentration of herbicide in surface water lower than the lethal concentration/NOEL/NOEC for each watershed within any given treatment year.

Combined with the project design criteria listed above and summarized in Chapter 2 and herbicide application guidelines in Appendix F, use of these parameters would protect aquatic resources from the potential effects of herbicide treatment. No adverse effects to soils or aquatic resources would be expected to occur from future herbicide applications under the adaptive strategy.

### Forest Plan Consistency

All Clearwater National Forest Plan water quality standards as listed on pages II-27 to 29 would be followed throughout project design development and implementation phases.

**Table 3.11 Levels of Herbicide Toxic to Aquatic Organisms Other Than Fish**

| Herbicide | Test Species | Test Results |
|---|---|---|
| Picloram | Daphnia magna | 48-hr $LC_{50}$ is 76 mg/l |
| Picloram | Scuds (Gammarus fasciatus) | 96-hr $LC_{50}$ is 27 mg/l |
| Picloram | Scuds (Gammarus pseudolimnaeus) | 96-hr $LC_{50}$ is 16.5 mg/l |
| Picloram | Stonefly (Pteronarcys californica) | 96-hr $LC_{50}$ is 4.8 mg/l |
| 2,4-D amine | Daphnia magna | 48-hr $LC_{50}$ is greater than 100 mg/l |
| 2,4-D amine | Seed shrimp (Cypridopsis vidua) | 48-hr $LC_{50}$ is 8 mg/l |
| 2,4-D amine | Scuds (Gammarus fasciatus) | 96-hr $LC_{50}$ is greater than 100 mg/l |
| 2,4-D amine | Midges (Chironomus plumosus) | 48-hr $LC_{50}$ is greater than 100 mg/l |
| Glyphosate | Scuds (Gammarus fasciatus) | 96-hr $LC_{50}$ is greater than 43 mg/l |
| Glyphosate | Midge Larvae | 48-hr $LC_{50}$ is 18 mg/l |
| Glyphosate | Water Flea (*Daphnia magna*) | 48-hr $LC_{50}$ is 3 mg/l |
| Glyphosate | Copepod (Nitocra spinipes) | 96-hr $LC_{50}$ is 22 mg/l |
| Dicamba | Daphnia magna | 96-hr $LC_{50}$ is greater than 100 mg/l |
| Dicamba | Sow bugs (Asellus brevicaudus) | 96-hr $LC_{50}$ is greater than 100 mg/l |
| Dicamba | Scuds (Gammarus faciatus) | 96-hr $LC_{50}$ is greater than 100 mg/l |
| Dicamba | Shrimp (Palaemonetes kadiasis) | 96-hr $LC_{50}$ is 28 mg/l |
| Dicamba | Frog, tadpole (1-2 wks) (*Adelotus brevis*) | 96-hr $LC_{50}$ is 185 mg/l |
| Dicamba | Frog, tadpole (1-2 wks) (*Limnodynastes peroni*) | 96-hr $LC_{50}$ is 106 mg/l |
| Clopyralid | Ram's Horn Snail (*Helisoma trivolvis*) | No mortality after 48 hrs in 1 mg/l solution |
| Clopyralid | Green algae (seenastrum capricornutum) | 96-hr $LC_{50}$ is 61 mg/l |
| Clopyralid | Duck weed (*Lemna minor*) | No growth reduction at 2 mg/l after 21 days |
| Clopyralid | Daphnids (*Daphnia sp.*) | 48-hr $LC_{50}$ is 225 mg/l |
| Aminopyralid | *Daphnia magna* | 48-hr $LC_{50}$ is >98.6 mg a.e./l |
| Aminopyralid | Northern leopard frog | 96-hr $LC_{50}$ is >95.2 mg a.e./l |
| Triclopyr | Daphnia magna | 48-hr $LC_{50}$ is 1170 mg/l |
| Metsulfuron Methyl | Daphnia magna | 48-hr $LC_{50}$ is greater than 150 mg/l |

## G. AIR QUALITY

### Affected Environment

All projects of the Clearwater National Forest must comply with procedural requirements of the Clean Air Act (U.S. EPA 1971) and state Implementation and Smoke Management plans. EPA has adopted national primary and secondary ambient air quality standards under the authority of Section 109 of the Clean Air Act.

These standards include acceptable levels of pollutants and particulate matter. The Prevention of Significant Deterioration requirements of this Act limit the increase of pollutants such as these from point sources that could impact Class 1 areas. All areas within the project area are designated as Class 2.

The air quality within the project area is generally good to excellent throughout a majority of the year. Smoke and dust accumulations cause a seasonal deterioration of air quality. Smoke is generated from natural fires and prescribed burning while dust primarily results from vehicle traffic on roads surfaced with gravel and native materials.

The climate in northern Idaho is characterized by dry summers and wet winters. Late May and June are characterized by a moisture pattern that gives way in late June to the summer drought when the subtropical high pressure system along the West coast shifts abruptly north. Little moisture is received in the area during July, August, and early September. By mid- to late September, the winter climatic pattern begins to form. The subtropical high pressure shifts south and permits prevailing westerly winds to become reestablished. This allows a succession of high and low pressure systems to move through the area (Ross and Savage 1967).

### Environmental Consequences

#### Effects Common to Each Alternative

All three alternatives would have short-term localized impacts on air quality because of the drift of herbicide spray particles. Generally the greatest part of this drift would settle out within 25 feet of the site although small amounts could carry greater distances (USDA Forest Service 1993). The smell of chemicals such as 2,4-D may also persist at a spray site for several days following spraying.

Alternatives 1 and 2 would have less impact (current chemical treatment on up to 400 acres at administrative sites and along US Highway 12) compared with Alternative 3 (proposed chemical treatment on up to 5,000 acres primarily along roads and trails).

## H. HUMAN RESOURCE AND HUMAN HEALTH

### Affected Environment

In general, the presence of noxious and undesirable weeds does not pose significant health threats to a large portion of the population. However, some individuals are affected by allergies and minor skin irritations from certain weed species. For example, leafy spurge contains a latex-bearing sap which irritates human skin and can cause blindness in humans upon contacts with the eye (Callihan et al. 1991). Some species of weeds, such as the thistles, cause minor scrapes and irritations.

Hand pulling weeds can cause minor skin irritations in situations where gloves are not used. The sap of Russian knapweed contains a known carcinogen.

Exposure to herbicides currently used by state, county, and private landowners may also result in a reaction in some people. The possibility of an illness or accident occurring from exposure to an herbicide varies from person to person but is considered to be low. The potential for impacts is dependent upon the herbicide used, the method of application, and the size of the treated area.

The proposed herbicide control sites vary in location from being isolated from concentrated human activity to heavily used recreation sites. In the preparation of this proposal, a number of possible vectors for impacts to human health were considered per the Northern Region's "*Human Risk Assessment for Herbicide Applications to Control Noxious Weeds and Poisonous Plants in the Northern Region: 1988 Edition*" (Monnig 1988).

## Environmental Consequences

### Alternative 1: No Action

The direct, indirect, and cumulative effects on human health from the current use of chemicals (primarily clopyralid) for administrative sites and along U.S. Highway 12 would be the same as Alternative 3.

The spread of noxious weeds within the national forest lands is likely to have little impact on human health and safety. Human reactions range from allergic reaction to skin irritation and, as in the case of leafy spurge, the possibility of blindness (Callihan et al. 1991). It should also be noted that while the potential does exist for severe reactions, the probability of their occurrence is very low.

### Alternative 2: Mechanical, Biological, and Cultural Treatments

The direct, indirect, and cumulative effects on human health from the current use of chemicals (primarily clopyralid or aminopyralid) for administrative sites and along U.S. Highway 12 would be the same as Alternative 3.

Impacts to human health and safety from mechanical and cultural treatments are likely to be minimal. Possible effects include cuts, burns, allergies, and skin irritation to the individuals performing the work. Skin irritations may result from a reaction to the sap of various noxious weeds such as knapweed or to the physical parts of the plant itself such as the spines on thistles. Gloves, long-sleeved shirts, and boots would be required for mechanical treatment and would minimize the risk of injury or irritation.

Due to the nature of the work sites, injuries such as sprains or strains from repeated bending or working on uneven ground surfaces may result. Cumulative effects to human health would be insignificant because the risks associated with weed treatment under this alternative would be similar to those of other forest activities.

The release of biological control agents for different species of noxious weeds would pose no threat to human health or safety beyond that associated with working on uneven ground surfaces.

### Alternative 3: Mechanical, Biological, Cultural, and Chemical Treatments

Impacts on human health from mechanical and biological treatments would be the same as those disclosed under Alternative 1.

### Treatment with Herbicides

There are a wide variety of opinions within the general population on the value and safety of herbicides, including those proposed for use. Many people, particularly in rural and agricultural settings, view herbicides as a necessary part of business and, if used properly, a relatively safe tool. However, the risks of herbicides are being questioned for many reasons. For example, concerns over worker safety are being raised.

Appropriate specialists in the Northern Region of the Forest Service (Region One) have analyzed the risk of the use of clopyralid, 2,4-D, dicamba, glyphosate, metsulfuron methyl, triclopyr, and picloram to control noxious weeds. This analysis is presented in two documents: (1) *Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 on Bonneville Power Administration Sites* (USDA Forest Service 1992), and (2) *Human Health Risk Assessment for Herbicide Application to Control Noxious Weeds and Poisonous Plants in the Northern Region* (Monnig 1988).

Analysis of the human health risk from herbicide use follows the same basic format as outlined under the Chapter 3 section for aquatics. Toxicity information for the herbicides of interest is reviewed to determine the levels of these chemicals that would be harmful to human health. Exposures and doses that might occur as a result of these projects are then estimated for workers and members of the general public. The toxic effect levels established are compared to predicted dose levels to determine the possibility of health impacts.

A considerable body of data from tests on laboratory animals is available for these herbicides. Most of these tests have been conducted as a requirement of EPA registration of these compounds for use in the United States. It should be noted that none of these compounds has completed all testing required for final registration. Current federal regulations allow for conditional registration pending the completion of all tests as long as no unreasonable adverse effects are found in the interim. This allowance for continued use before all testing is completed concerns some members of the public and has led to charges that "untested" pesticides are allowed on the market. All of the herbicides proposed for use within this project are EPA approved according to their labeled instructions, are *conditionally* registered, and have been assigned EPA registration numbers.

All of the herbicides proposed for use have been long subjected to long-term feeding studies that test for general systemic effects such as kidney and liver damage. In addition, test of the effects on reproductive systems, mutagenicity (birth defects), and carcinogenicity (cancer) have been conducted. No observable effect levels (NOEL) are available for most types of tests.

Extrapolating a NOEL from an animal study to humans is an uncertain process. The EPA compensates for this uncertainty by dividing NOELs 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. This value is usually expressed as milligrams of herbicide allowed per kilogram of body weight (mg/kg). The following table displays the ADIs for the herbicides proposed for treatment.

**Table 3.12 Acceptable Daily Intake (ADI) mg/kg/day**

| Herbicide | ADI |
|---|---|
| Aminopyralid | NA |
| Picloram | 0.07 |
| 2,4-D | 0.01 (0.3)* |
| Glyphosate | 0.1 |
| Dicamba | 0.03 |
| Clopyralid | 0.5 |
| Triclopyr | 0.025 |
| Metsulfuron Methyl | 0.25 |

Note: Values for ADI taken from USDA Forest Service (1992). The values are established by the EPA and are listed for all of the chemicals of concern.

*For 2,4-D the World Health Organization has established an ADI of 0.3.

Potential effects of herbicide treatment on human health were evaluated in three ways. **Direct effects** are those that may occur from direct contact with an herbicide such as when an applicator sprays an herbicide. **Indirect effects** are those that may occur from secondary contact with an herbicide such as when people pick berries in an area where herbicide was absorbed by the plant through the soil. **Cumulative effects** are those that may occur in combination with other effects or have an increased effect over time such as continued exposure to herbicides.

## Direct Effects

Worker doses vary depending on several factors. The conditions under which a given herbicide is applied will affect the level of exposure. Higher winds create more drift, especially when using a high-pressure nozzle, which creates more vapor.

Using appropriate personal protective equipment (PPE) as required can lower the exposure for workers by as much as 68 percent (USDA Forest Service 1992). The use of PPE is critical since most of the application exposure to herbicides is absorption through the skin rather than inhalation through the lungs (Monnig 1988).

Finally, the attention and care given by a worker mixing, loading, or applying herbicides greatly influences the risk of exposure. Proper training and certification for the mixing, loading, and application of herbicides is essential to reduce the risks.

It is highly unlikely that the one-day exposure for workers applying 2,4-D with a backpack sprayer would exceed the EPA's recommended daily dose. The risks would be very small because the spraying would only take place a few weeks per year, and ADI assumes a lifetime of daily doses. Furthermore, use of design criteria listed in Chapter 2, herbicide handling guidelines (Appendix E), and herbicide application guidelines (Appendix F) during project implementation would reduce the incidence of worker exposure to herbicides.

There is the possibility of hypersensitivity in a small percentage of the population. These persons are generally aware of their sensitivities since these are typically triggered by a variety of natural and synthetic compounds. Such persons would not be permitted to work on the spray crews.

### Indirect Effects

Indirect effects could result from people entering a previously treated area and being exposed to herbicide residues. Concerns are raised about the possibility of consuming wild foods such as berries or mushrooms after herbicide treatment has occurred. The potential for this is low. Most of the spraying would occur along road rights-of-way where the occurrence of wild foods is low. Occasionally, a spray swath may overlap with huckleberries, and the berries may be sprayed. Within a few days of treatment the huckleberry plants would turn brown and lose their fruit. However, berries could be picked and consumed before they drop off.

To determine the dose for consumption of huckleberries that might accidentally be sprayed with herbicide, the 1992 USDA Forest Service Risk Assessment methodology was used. Oral consumption of 2,4-D was used to analyze the concentration in the berries and the dose received by the person consuming the sprayed berries. The analysis used 2,4-D because it would have the highest concentration based on its application rate.

Based on this methodology, a 150-pound person would have to consume 210 pounds of huckleberries each day for a lifetime to reach the EPA's acceptable daily intake (ADI) if the huckleberry plants occurred on the edge of the spray zone and received only drift spray. In the worst case scenario where the huckleberry plants were sprayed directly, that same 150-pound person would have to consume a half pound of huckleberries daily for their lifetime in order to reach the ADI for 2,4-D. The likelihood of a person reaching the ADI for 2,4-D is extremely low for several reasons. First, the probability of a large amount of huckleberries being sprayed in a road right-of-way is very low. Second, the chance of a person picking huckleberries in a road right-of-way where weeds are occurring (cut banks and fill slopes) is also low. Third, the probability of a person picking and consuming even a half-pound of huckleberries every day of their life is extremely low. Fourth, the time period between when the plants are sprayed and the berries dry up is generally less than a week, which reduces the chance of those berries being picked. Lastly, signing of the sprayed areas would discourage berry-picking at those sites.

Similarly, the risk of exposure to people hiking though a recently sprayed area would be low (USDA Forest Service 1992 and Monnig 1988). The main route of ingestion of herbicide would be through the skin. If a hiker did walk through an area just sprayed with 2,4-D, the dose received would be 40 times lower than the ADI established by the EPA. Mullison (1985) concluded that, based upon several studies, picloram is not likely to cause skin irritation. For people picking berries in recently sprayed areas, the dose of picloram received in one hour would be 37 times lower than the ADI.

## Cumulative Effects

Cumulative effects would apply both to workers and to the public, who may experience continued exposure to herbicides. The ADI used for analysis is based on the level of herbicide that would be acceptable each day for a lifetime. Over time, a person may be exposed to some quantity of herbicide, but since spraying would occur for only a few weeks each year, the daily intake over a lifetime would not approach the EPA standard.

The issue of delayed effects of low levels of chemical exposure is raised among some people. Principal among these effects is cancer. All of these herbicides have been tested for carcinogenicity. The evidence for cancer initiation or promotion from 2,4-D and picloram has been widely debated. Current evidence is mixed, and these compounds seem, at most, mildly carcinogenic. The project file contains a summary of a report from the EPA's Science Advisory Board Joint Committee regarding carcinogenicity of 2,4-D. The report discloses that 2,4-D might be a carcinogen. However, the committee concluded that current research couldn't distinguish whether observed risks are due to the use of 2,4-D or to daily exposure to other substances. Also included in the project file is a letter from Dr. John Graham of the Harvard University School of Public Health summarizing the current evidence on 2,4-D. As noted in the letter, the weight of evidence that 2,4-D is a carcinogen is not strong, and even if it is ultimately shown to be an animal carcinogen, it is not likely to be potent.

Nonetheless, the risk assessments cited above assume that the two herbicides are carcinogens. Those analyses also assume that any dose of a carcinogen could cause cancer and that the probability of cancer increases with increasing doses. Estimations of the probability of developing cancer from exposure to these compounds are based on a conservative extrapolation from cancer rates in animals subjected to a given chemical over a lifetime.

The risks are relatively low compared to other commonly encountered risks. For example, there is an increased risk of cancer accumulated from living in Denver, Colorado (high elevation), for 1.5 months compared with living at sea-level. This is due to cosmic rays. Smoking two cigarettes increases the risk of cancer by one in a million.

Projected cancer rates are highest for workers since their exposure is the highest. Cancer probabilities of workers would increase by about one in a million after spraying 2,4-D for 193 days or spraying picloram for 17,000 days (Monnig 1988). These numbers were derived using a worst-case scenario of a high dose of herbicide with a low amount of worker protection. Given the requirements for worker protection outlined in **Appendix E: Handling of Herbicides**, the cumulative impact from spraying at the rates proposed would be insignificant.

Concerns are occasionally raised about the cumulative and synergistic interaction 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. The risk assessments referenced above address the possibility of a variety of such interactions. 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 herbicide treatment as proposed and other herbicide use to which the public might be exposed.

There is no absolute guarantee of the absence of a synergistic interaction between the herbicides proposed for use and the other chemicals to which workers or the public might be exposed. Testing the virtually infinite number of chemical combinations would be impossible.

There are a number of reasons to expect that synergistic or other unusual cumulative interactions would be rare. Mullison (1985), Monnig (1988), USDA Forest Service Risk Assessment (1992), an EPA (1994) refer to low teratogenic, mutagenic, and carcinogenic properties of herbicides compared to naturally occurring chemicals in foods. The low, short-lived doses that would result from spraying these herbicides are very small compared to many other chemicals in the environment. The EPA states in a discussion entitled *Guidelines for Health Risk Assessment of Chemicals* (Federal Register September 24, 1986) that, for these relatively small doses, a synergistic effect is not expected. They suggest in their discussion of interactions (synergistic or antagonistic effects) that "there seems to be consensus that for public health concerns regarding causative (toxic) agents, the additive model is more appropriate [than any multiplicative model]."

There have been some recent concerns regarding this claim. Arnold et al. (1996) discuss their findings of higher than expected synergistic effects of four pesticides (three of these four pesticides have been banned in the U.S.). In discussing this new study, Kaiser (1996) describes how the findings may cause need to revise current assumptions concerning synergism. Kaiser also cites that more work needs to be done to determine any relevance to humans and that currently there are more questions than answers concerning the new findings. While this one study does show the possibility of increased risk, there is not yet sufficient scientific research to conclude that the chemicals being proposed for use would exhibit the same results as found in the Arnold study. Based on the best scientific information available, there would be a reasonable expectation that human health impacts from herbicide applications on the proposed sites would be insignificant.

## I. RECREATION

### Affected Environment

There are dozens of developed recreation sites (mostly along U.S. Highway 12) within the project area. Included are campgrounds, picnic areas, visitor centers, and trailheads. Most of these sites currently receive some level of chemical, mechanical, and cultural weed treatment. Chemical weed treatments were initiated about 10 years ago and have reduced weed population densities in most recreation sites. Continued treatment is needed to maintain reduced populations and address new invaders. The primary objective of weed treatments in developed sites has been to reduce the potential for weed seed spread outside of the recreation site. Secondary objectives include reducing unpleasant human/weed interactions such as poison ivy infection and scratched legs from hiking in spotted knapweed.

Within the project area, chemical weed treatments typically start in April at low elevations near Kooskia and work upriver to higher elevations in about July. This approach results in just a few recreation sites being treated at any one time although all recreations sites are eventually treated. This phased approach gives Forest visitors options to avoid using or staying in recently treated areas. Signs are placed at recreation sites to inform Forest visitors when chemical treatments occur. Recreation sites are not closed before, during, or after treatment.

The project area includes an unknown number of dispersed camping and recreation opportunities along Forest roads and trails. Throughout the project area activities such as camping, hiking, fishing, and hunting take place. Currently no chemical weed treatments occur at dispersed recreation sites, but some mechanical and cultural treatments have taken place on small isolated weed populations. No monitoring of the effectiveness of these treatments is available.

## Environmental Consequences

The effects to recreation from the proposed weed treatment alternatives were evaluated using the following criteria:

- Visual presence of weeds.
- Interactions between weeds and humans.
- Physical effect of treatments to recreation sites.

Potential effects of chemical treatments on humans are described in Section H.

### Alternative 1: No Action

While treatment of developed campgrounds and picnic areas would continue, many dispersed recreation sites would remain untreated. Thus, the spread of noxious weeds would remain mostly unchecked and may negatively impact recreation use and enjoyment within the project area. Recreation use in weed-infested areas also leads to spread of weed seeds beyond the existing weed populations.

With chemical treatments in campgrounds and at trailheads, the visual affect is yellow and withered plants after treatment. Chemical treatments are designed to treat only the target weed species and retain the native and desirable plants unaffected.

Human/weed interactions (poison ivy, knapweed, etc.) in developed recreation sites would continue to decrease with continued chemical treatment. Similar interactions in dispersed recreation sites would be unchanged.

For many people the presence of noxious weeds is evidence of negative human impact and negligence in the stewardship of natural resources and public lands. For some who disagree with or do not understand the application of herbicides, the warning signs posted at recreation sites informing Forest visitors of herbicide use may be disturbing.

### Alternative 2: Mechanical, Biological, and Cultural Treatments

Chemical controls in campgrounds and at trailheads would continue. Mechanical treatments, specifically mowing, are currently employed at some campgrounds and would continue. These combined efforts have resulted in moderate-to-high success rates of reducing weed populations within the campgrounds and at trailheads. Reducing weed populations has reduced the potential for those weeds to be spread by humans beyond the campgrounds and trailheads.

Mowing reduces the number of plants that produce seed and gives the appearance of a manicured landscape.

Employing mechanical, biological, and cultural treatments at dispersed recreation sites (because of the low estimated effectiveness of these treatments) would be similar to Alternative 1. Thus the spread of noxious weeds could negatively impact recreation use and enjoyment within the project area as described in Alternative 1.

Biological controls are not recommended for developed recreation sites. The intensive management scenario in most campgrounds may lead to disturbance of agent populations, and effectiveness of biological controls would not meet the objective of eradicating weeds from high human use areas. Biological controls may reduce some weed populations over the long term, but a certain level of weeds would remain to sustain those populations. Biological controls would best meet objectives in areas with limited human activity where the agent could work with minimal disturbance and weed seeds would not be spread to outside areas.

### Alternative 3: Mechanical, Biological, Cultural, and Chemical Treatments

An aggressive integrated treatment program could greatly decrease the likelihood of the spread of non-native invasive vegetation within the project area as well as minimize the negative impact of weeds on recreation. However, the treatment itself could affect recreational users, particularly during the short time periods when the treatment would occur on a particular site. These short-term impacts would be identical to those described under the Affected Environment and Alternative 1 for chemical use in campgrounds and at trailheads. These short-duration impacts, however, would be more widespread.

Visual impacts of some mechanical and chemical treatments would be temporary. Once the weed is removed or sprayed, the plants would begin to yellow and wither. This process would not look too much different than the natural wilting of plants. The species specificity of the mechanical and chemical treatments would retain other green vegetation on sites. For roadside brushing treatments, the visual effects would be greater because the potential for treating larger areas exists.

Signs posted at recreation sites informing Forest visitors of herbicide use at the site may disturb some visitors who disagree with or do not understand the application of herbicides.

## J. WILDLIFE

### Affected Environment

A range of wildlife species may intermittently be present on or adjacent to some sites proposed for treatment. Wildlife which may be present include big game (deer, elk, bear), small mammals (coyote, ground rodents), and land birds (numerous species).

The analysis addresses wildlife species for which treatment sites may be providing suitable habitat or with potential to be affected by the proposed action.

Effects of management activities were assessed by analyzing:

- Potential changes in vegetation/habitat for each species or group of species.
- Responses to habitat changes.
- Direct effects on wildlife from treatment (e.g. chemical).
- The response of species to disturbance.

A combination of factors, including the resource/species being considered, potential effects, consequences of potential effects, and the ability to measure effects determines the geographic scope of wildlife analysis. The scope for direct/indirect effects is the proposed treatment sites and immediate adjacent areas while cumulative effects were considered within the area encompassed by the treatment sites.

Noxious weeds provide neither the same food nor cover that native wildlife species evolved with. Big game show a low preference for all of the targeted weed species, especially when given a choice to use native forage species. However, elk and deer do forage on some weed species, i.e., knapweed. Some species of birds, notably black-capped chickadees, have also learned to eat the seeds and the seedhead gall fly larvae of knapweed.

The sites proposed for treatment are disturbed sites either directly disturbed by human activity (e.g. campgrounds) or adjacent to human travel corridors (e.g. road fills). They provide little habitat for Threatened and Endangered (T & E ) species, sensitive species, or Management Indicator Species (MIS). Most of these species are known, or suspected, to occur on the Forest and do so in areas associated with water, riparian areas, mature/old-growth forest habitat, cavity habitat, or areas with low human disturbance.

## Threatened, Endangered and Proposed Species

Threatened and Endangered species are managed under the authority of the Endangered Species Act (ESA) (P.L. 94-205, as amended) and the National Forest Management Act (NFM) (PL 94-588). The U.S. Fish & Wildlife Service identified the following listed and/or proposed wildlife species that may occur on the Clearwater National Forest (File #104.0000 200-7-SL-0095 — U.S. Fish & Wildlife Service — December 1, 2006): bald eagle, gray wolf, and Canada lynx.

Direction provided by the USFWS was used to develop a project-specific species list requiring analysis. Using the species list, a review of the areas to be treated, a search of district records and scientific literature, professional knowledge of the area, and a review of information from the Conservation Data Center, it has been determined that the species which may occur within the vicinity of treatment areas and/or with potential to be impacted by the proposed actions include gray wolf, bald eagle, and lynx.

### Gray Wolf

Quality gray wolf habitat is characterized by high prey densities, particularly big game, and isolation from human disturbance. Other important habitat features for wolves include den and rendezvous sites (Hansen 1986).

The project area falls within the central Idaho reintroduction area where gray wolves are classified as non-essential experimental populations. This classification treats wolves as proposed for listing under the ESA. With the reintroduction of wolves in central Idaho, there was no envisioning of conflicts with current or anticipated management actions. No changes in land use restrictions (other than the possibility of temporary restrictions near den sites) are required because of the reintroduction.

Wolf habitat within the project area ranges from low to high quality. Wolves are known to occur within the project area. However, no proposed treatment will affect the natural activities of the pack.

### Bald Eagle

Bald eagles are winter visitors and yearlong residents of northern Idaho. They are attracted to the area's large lakes and rivers and the accompanying food supply. Bald eagles are opportunistic feeders and will prey on fish, waterfowl, small mammals, and carrion.

Bald eagles generally nest in large dominant live trees or snags with open crowns in areas relatively free from disturbance. Nest sites occur within one mile of a large body of water, most often within one-quarter mile (MBEWG 1991).

Perch sites, roost sites, and access to prey are the essential components of winter habitat. Bald eagles generally use traditional communal roost sites in the winter, especially during periods of severe weather. Roosts are often located in large trees at the head of sheltered draws that provide protection from wind and inclement weather. Although proximity to food resources is not critical, roosts are often in the closest available forest stand. Roosts at greater distances from food sources will require more energy expenditures (MBEWG 1991).

No occupied nesting territories or known communal roosts are located within the project area. Proposed activities will have no effects on eagle activities.

### Canada Lynx

Lynx are associated with alpine and montane boreal plant communities generally above a 4,000 foot elevation (IDF&G 1995). Lynx habitat in the western mountains consists primarily of two forest structural stages: (1) early successional structures (foraging cover) that provide habitat for prey (especially snowshoe hare); and (2) late successional structure for denning (denning cover). Denning cover and foraging cover must be in close proximity and interconnected by stands suitable for lynx travel. Lynx population presence can be threatened by low quality, quantities, and interspersion of habitat.

Human access into remote areas may also have direct and indirect negative effects on lynx populations. Female lynx may move kittens in response to disturbance. Incidental take by trappers targeting coyote or bobcat may affect lynx distribution, and snowmobile or cross-country ski trails may allow lynx competitors to infiltrate high elevations, thereby increasing competition for food.

## Sensitive Species

Sensitive species are determined by the Regional Forester (FSM 2670.5) and are those species for which population viability is a concern. The National Forest Management Act directs the Forest Service to review programs and activities to ensure that species do not become threatened or endangered as a result of Forest Service actions.

Forest Plan direction for the Clearwater National Forest states that habitat of sensitive species will be managed to prevent further declines in populations to prevent federal listing.

The Regional Forester for Region One has compiled a listing of sensitive species (USDA Forest Service, April 1999). Species from this list which may occur within the project area, a short description of habitat requirements, treatment site presence, and comments are displayed in Table 3.13.

The composition and structure of treatment sites do not provide optimal habitat for sensitive wildlife species. Sensitive species within the project area are associated within narrow habitat requirements such as mature/old growth forest habitat, areas removed from human disturbance, lakes, or other specialized habitats (e.g. caves).

**Table 3.13 Terrestrial MIS/TES Species: Their Status, Occurrence, and Habitat Within the Lochsa Ranger District**

| Species | Status | Occurrence | Comments |
|---|---|---|---|
| Bald Eagle | T (MIS) | Winter only | Suitable |
| Gray Wolf | Ex/N (MIS) | Known | Suitable |
| Lynx | Proposed | Rare | Suitable |
| Wolverine | S | Rare | Suitable |
| Harlequin Duck | S | Known | Suitable |
| Fisher | S | Known | Suitable |
| Flammulated Owl | S | Known | Suitable |
| Northern Goshawk | S (MIS) | Known | Suitable |
| Black Backed Woodpecker | S | Known | Suitable |
| Coeur d'Alene Salamander | S | Known | Suitable |
| Boreal Toad | S | Known | Suitable |
| Northern Leopard Frog | S | Not present | Not Suitable |
| Pine Marten | MIS | Known | Suitable |
| Pileated Woodpecker | MIS | Common | Suitable |
| Elk | MIS | Common | Suitable |
| Moose | MIS | Present | Suitable |
| White-tail Deer | MIS | Common | Suitable |
| Belted Kingfisher | MIS | Common | Suitable |

E = Endangered, Ex/N = Experimental Populations/ Non-essential

T = Threatened (USFWS Federal Status),

S = Sensitive (USFS Region One),

MIS = Management Indicator Species (Clearwater National Forest)

The nature and location of treatment sites, i.e., disturbed sites adjacent to human travel corridors, make it highly unlikely that these areas are providing habitat for any sensitive species. However, the project area may be providing sub-marginal habitat and/or routes of movement for some species.

### Management Indicator Species

Since it is impractical to estimate the effects of proposed actions and alternatives on each and every species, ten wildlife species were selected because changes in their populations and preferred habitat are thought to represent most of the parameters that would be important to other wildlife species. It is recognized that individual species may have unique habitat requirements, but it has generally been accepted that if the needs of management indicator species are met, then the needs of the remaining species utilizing the project area would also be met. The wildlife management indicator species in the Clearwater National Forest Plan include three threatened and endangered species (previously discussed), three big-game species, three species dependent on older forests, and one riparian-dependent species.

### Other Wildlife Species

Other native wildlife species of interest include a diverse group of land birds. These birds include small songbirds that migrate from northern breeding grounds to neotropic locations and resident birds that remain in the area year-round. Their habitat requirements vary from rocky slopes (rock wrens) to meadows and lower seral stages (chipping sparrows) to densely timbered old growth (winter wren).

## Environmental Consequences

### Action 1: No Action

### Threatened, Endangered, and Proposed Species

The direct, indirect, and cumulative effects on wildlife species from use of clopyralid for areas inside the project would be the same as Alternative 3.

As noted in the discussion on vegetative community diversity, untreated weeds can effectively displace native herbaceous vegetation, including preferred forage species. As native plant species are displaced by expanding weed populations, long-term habitat quality diminishes. At this time, there is no method for measuring the potential impacts and consequences within the Lochsa and Clearwater river basin.

The majority of infestation sites at this time are areas that do not provide high quality habitat for T & E species or their prey, e.g. big game and snowshoe hare, or other native wildlife species. By their nature most sites are physically disturbed and/or subject to high human disturbance levels. Acknowledging the spread of noxious weeds and the potential for effects on wildlife habitat suitability from competition with native plant communities, the effects of noxious weed infestations are not expected to have a significant effect on herbivores (prey species for gray wolves and lynx).

Given the relationship (albeit inconclusive) between noxious weeds and big-game populations and the fact that wolves prey on big game, the spread of noxious weeds could potentially lead to a reduction in the ability of an area to support gray wolves. The nature and location of infestations, the relatively small area potentially affected within the project area during the scope of this analysis, and the limited occurrence of wolves within the project drainage limit the potential for effects on the prey species of wolves. Direct or indirect effects on prey availability or the gray wolf are unlikely within the temporal scope of this analysis.

Lynx could be potentially affected in a manner similar to the gray wolf in that prey availability could be reduced by the spread of noxious weeds. However, because of the nature and location of noxious weed habitat and the habitat associations of lynx and their primary prey, any effect on prey availability is unlikely. There would be no anticipated direct or indirect effect from existing infestations and/or the spread of noxious weeds on lynx.

The habitat requirements of bald eagles or peregrine falcons are not dependent on ground vegetation. There is likely to be little effect on fish populations or prey species for peregrine falcons. (See disclosed effects on succeeding pages.) Therefore, the bald eagle and peregrine falcon would not be affected, directly or indirectly, from existing and/or anticipated noxious weed infestations.

The No Action Alternative would have no direct impact on threatened, endangered, or wildlife species proposed for listing. Noxious weeds would continue to spread at current or accelerated rates.

### Sensitive Species

Sensitive wildlife species tied to habitat features that are not influenced by noxious weed contamination would not be impacted. Such species include the black-backed woodpecker, flammulated owl, northern goshawk, boreal toad, Coeur d'Alene salamander, harlequin duck, and northern leopard frog. The black-backed woodpecker and flammulated owl depend more on forest structure, i.e., snags, than on-ground vegetation. The Coeur d'Alene salamander, boreal toad, northern leopard frog, and harlequin duck are associated with aquatic environments where there are no current noxious weed threats to their habitat. Townsend's big-eared bat requires caves/old mine adits and would be unaffected. Goshawks, associated with mature/old-growth forest vegetation, are predators on species, some of which could be affected by the spread of noxious weeds. However, because of the nature and location of noxious weed habitat, any effect on goshawk prey availability is unlikely.

There would be no direct effect from existing infestations and/or the spread of noxious weeds on sensitive forest carnivore species (fisher and wolverine). They could be potentially affected in a manner similar to the gray wolf and lynx in that their prey availability could be reduced. This is also unlikely.

### Management Indicator Species

As noted previously, biggame species such as moose and elk could be impacted by the spread of noxious weeds. However, given the location of infestations and the relatively small area affected, significant effects on big game populations are not likely.

Pileated woodpeckers and pine martens are not likely to be affected, as their habitat is primarily mature/old-growth timbered stands that are not favored by noxious weeds. The potential impacts to goshawks have been discussed earlier.

### Other Wildlife Species

Impacts to other species such as forest land birds would vary depending on their habitat needs. In general, bird species that eat insects or seeds would be most affected by the spread of noxious weeds that cause a reduction in native vegetation and subsequent food supplies. The least impacted birds would be those that are tied to habitat features that are not strongly influenced by noxious weed contamination, e.g. forest structure or undisturbed moist forest conditions.

### Alternative 2: Mechanical, Biological, and Cultural Treatments

Alternative 2 would continue to allow the spread of many weed species as discussed above in Alternative 1. Most infestations would not be brought under control. The potential negative effects of Alternative 2 on wildlife would be greater than those of Alternative 1, especially for those areas inside of the project area.

The treatment of noxious weeds under Alternative 2 would reduce the potential for adverse effects on wildlife from the spread of noxious weeds on those sites where the treatment maintains or restores the native plant diversity.

## Alternative 3: Mechanical, Biological, Cultural, and Chemical Treatments

The direct effects of cultural, mechanical, and biological treatments to wildlife would be the same as those discussed under Alternatives 1 and 2. As a result, the discussion of effects for this alternative will concentrate on the effects of herbicide treatment to wildlife.

None of the herbicides proposed for use bio-accumulate in wildlife in concentrations greater than their general environmental concentrations. Inferences of possible effects can be made by comparing the exposure levels wildlife would experience with the concentrations that elicit responses in wildlife. As discussed in the *Human Health Risk Assessment for Herbicide Application to Control Noxious Weeds and Poisonous Plants in the Northern Region* (Monnig 1988), immediately following an application of one pound of herbicide per acre, the herbicide concentration on grasses and small forbs would be about 125 parts per million (ppm). Within 90 days, the concentration of picloram on vegetation would be about 25 ppm (Watson et al. 1989). The concentrations of 2,4-D amine, dicamba, and clopyralid would likely be less than that of picloram because of their faster decomposition rates.

The avian toxicity of herbicides proposed for use is extremely low (USDA Forest Service 1984). The picloram $LC_{50}$ for mallard ducks and quail is in excess of 10,000 ppm, which was the highest dose tested. Comparable values for the highest dose of clopyralid are 4,640 ppm; for dicamba, in excess of 10,000 ppm; and for 2,4-D amine, in excess of 5,000 ppm.

Feeding studies on grazing animals confirm the low toxicity of these herbicides. Deer that were fed foliage treated with 2,4-D at up to four times the rate proposed for this project showed no ill effects (Campbell et al. 1981). Cattle fed picloram-treated hay with concentrations 20 or more times greater than those expected on the proposed sites suffered no lethal effects (Monnig 1988). Heifers given dicamba at 20,000 ppm in feed showed no ill effects (Edson and Sanderson 1965). Clopyralid feeding studies with grazing animals are not available but would likely be similar to picloram, which is close to clopyralid's chemical analogue.

A comparison of expected environmental concentrations with the toxicity levels of these herbicides indicates that negative impacts on birds, rodents, and grazing animals are not expected. In addition, the evidence reviewed in the Human Health Risk Assessment indicates that animals quickly excrete these herbicides. Thus, impacts on predators such as wolves or raptors are not expected. Because these herbicides do not bio-accumulate, cumulative effects from the proposed herbicide application would not be expected.

Alternative 3 has the highest predicted effectiveness at controlling weeds, thereby preserving native plant community diversity. Inclusion of herbicide use would therefore increase the overall benefit of weed control to wildlife habitat.

### Threatened, Endangered, and Proposed Species

Chemical treatment of noxious weeds is not likely to have an adverse affect on T & E species.

There is a negligible likelihood of exposure to herbicides to the gray wolf or the lynx. The treatment sites are very small compared to the area available for either species. The location and nature of known wolf populations as well as the potential for additional wolf or lynx populations further decrease the likelihood of exposure. In addition, the herbicides proposed for use have a low toxicity and do not bio-accumulate in the environment or in wildlife. Adverse effects from herbicides are not reasonably expected.

Bald eagles and peregrine falcons are unlikely to be exposed to the herbicides. The treatment of the noxious weed infestations is unlikely to affect the prey of bald eagles, e.g. fish populations.

### Sensitive Species

The same rationale concerning exposure to and effects from herbicide treatment that were discussed under T & E species also applies to most sensitive species. It is unlikely that any of the sensitive wildlife species known or thought to inhabit the project area would be exposed to herbicides. These species occupy habitats that are not likely to be located near proposed treatment sites such as travel corridors, dispersed and developed campgrounds, timber sale areas, or administrative sites.

### Forest Plan Consistency — All Alternatives

The Clearwater National Forest Plan directs that sensitive species be managed to prevent further declines which could lead to federal listing under the Endangered Species Act, and that management activities contribute to the conservation and recovery of threatened and endangered species. For other species, the Forest Plan directs that habitat be managed to maintain viable populations. All alternatives would meet that direction.

## K. Other Environmental Consequences

### Probable Environmental Effects that Cannot Be Avoided

The application of herbicides brings with it the likelihood of some environmental impacts that cannot be avoided. These have been discussed above and would primarily involve non-target plants. Although it is possible that minute amounts of herbicide would migrate from treatment sites, alternative design criteria would prevent environmentally significant concentrations of herbicide from reaching surface or ground water. Thus, under reasonably foreseeable circumstances, there would be no significant environmental effects.

The adoption of Alternative 1 or 2 would not immediately result in unavoidable environmental impacts. However, it is clear that alternatives which allow the continued spread of noxious weeds would eventually result in unavoidable environmental effects. Weed species that are considered naturalized in an area are very difficult to control. A visible example is the level of spotted knapweed infestation in many areas of northern Idaho. Although spotted knapweed is generally considered to be naturalized in many locations, there are still areas that are relatively uninfested by this weed. Successful eradication of small populations of this species, and reduction of seed production in large populations, would slow its rate of spread and reduce its occurrence relative to other more desired species. But when infestation levels increase to the point that is not practical or economically feasible to control, adverse environmental impacts are unavoidable.

### Possible Conflicts with Planning and Policies of Other Jurisdictions

The Idaho noxious weeds laws direct the county control authorities to make all reasonable efforts to develop and implement a noxious weed program. The lack of weed control under the No Action Alternative would conflict with these state and county weed plans and policies. The adoption of Alternative 3 would indicate that the Forest Service is committed to the management of noxious and undesirable weeds within the project area.

None of the alternatives would conflict with state and federal water or air quality regulations or with U.S. Fish & Wildlife Service recovery plans for threatened and endangered species.

### Irreversible and Irretrievable Commitment of Resources

All action alternatives would involve an irretrievable commitment of labor, fossil fuels, and economic resources.

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