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Intermountain Region

Fishlake National Forest
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ENVIRONMENTAL ASSESSMENT

for

NOXIOUS WEED MANAGEMENT
FISHLAKE NATIONAL FOREST

ENVIRONMENTAL ASSESSMENT

NOXIOUS WEED MANAGEMENT
FISHLAKE NATIONAL FOREST

SEVIER, BEAVER, WAYNE, IRON, GARFIELD, PIUTE, MILLARD, AND JUAB COUNTIES

Responsible Agency: USDA, Forest Service

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ABSTRACT

The Fishlake National Forest proposes a program to control noxious weeds on National Forest System lands in south-central Utah within Sevier, Beaver, Wayne, Iron, Garfield, Piute, Millard, and Juab Counties. Primary noxious weeds known to be established on approximately 7,600 acres of the Fishlake National Forest include black henbane, Canada thistle, dalmation toadflax, dyers woad, leafy spurge, musk thistle, Russian knapweed, scotch thistle, squarose knapweed, yellow toadflax, and whitetop. This Environmental Assessment (EA) provides an analysis of the major noxious weed and invasive plant control considerations on the Fishlake National Forest, including No Action and Integrated Weed Management (an integration of biological, ground-based herbicide applications, physical and mechanical, and cultural control methods). It provides site-specific and plant-specific analysis of the Proposed Action and is tiered to the Intermountain Region Noxious Weed and Poisonous Plant Control Program Final Environmental Impact Statement (October 1988).

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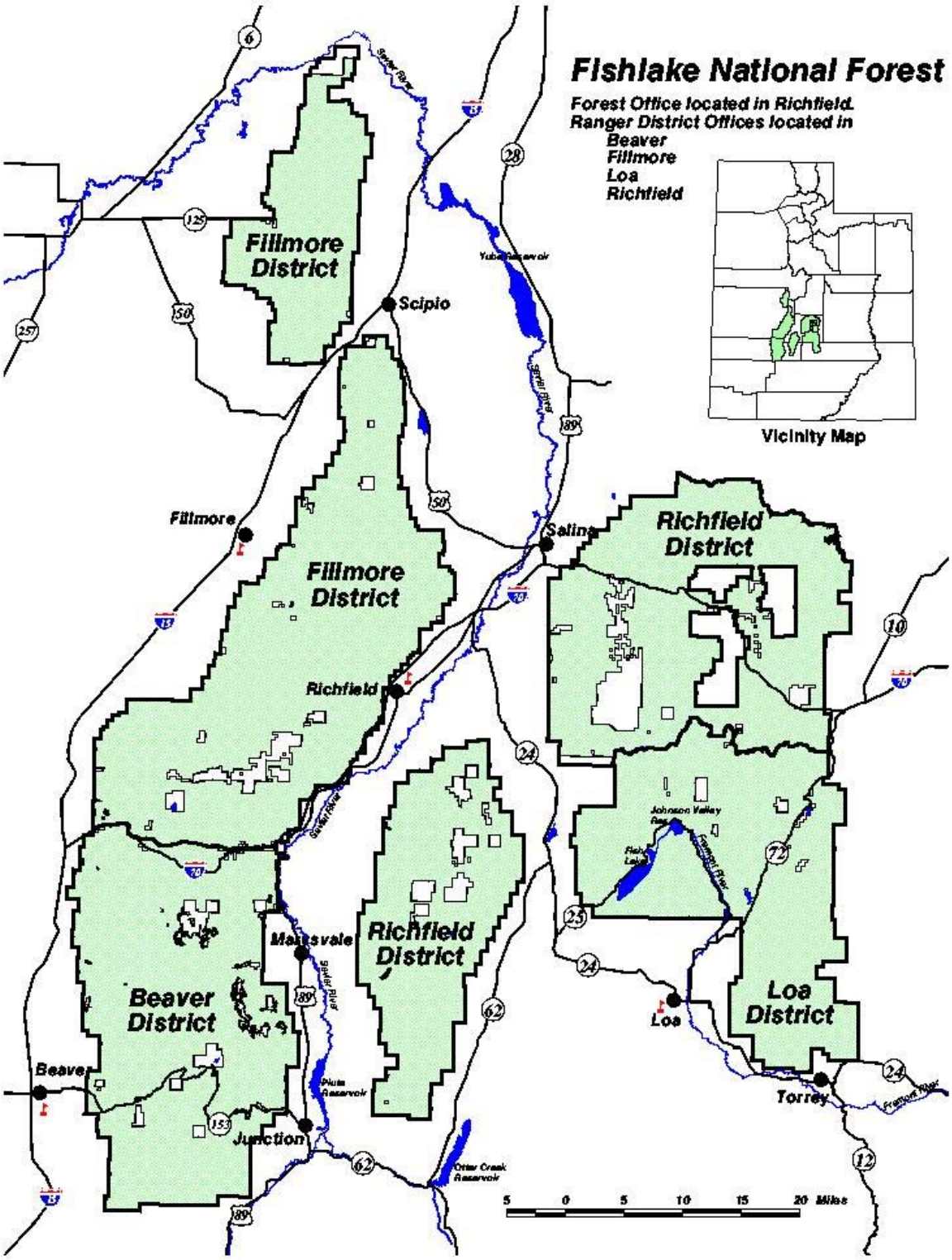

Fishlake National Forest
Forest Office located in Richfield.
Ranger District Offices located in
Beaver
Fillmore
Loa
Richfield
Vicinity Map
Fillmore District
Scipio
Fillmore
Fillmore District
Richfield
Salina
Richfield District
Richfield District
Maltesvale
Beaver District
Beaver
Junction
Loa
Loa District
Torrey
5 0 5 10 15 20 Miles

CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

Invasions by non-native plants degrade biological communities and threaten survival of native species worldwide (Schmitz et. al., 1997) (USDI BLM, 1997). These plants, commonly known as "weeds" or "exotic species", use water, nutrients, and sunlight that normally would be used by native species, thus altering communities and ecosystems. A weed is commonly identified as any plant that interferes with the management objectives for a given area of land at a given point in time. Once a plant has been classified as a weed, it attains a "noxious" status only by legislation. Noxious weeds as defined by law, are plants of foreign origin that can directly or indirectly injure agriculture, navigation, fish or wildlife, or public health. More than 500 weeds are designated as noxious by either weed or seed laws in the United States and Canada (*Duncan, 1997*).

Awareness of noxious weeds is increasing, and may be reaching a level where more resources may be made available to attempt to reduce the impacts and the threat of noxious weeds. Evidence of this increasing awareness became paramount in 1995. On September 7-8, 1995 the Western Weed Meeting was held in Denver, Colorado. During that meeting, U.S. Department of Interior Deputy Secretary Garamendi announced a "major coordinated war on weeds" and invited the USDA and other Federal Departments/Agencies to join in the effort (*USDA FS, 1995*). The Forest Service weed policy was revised in 1995 to include new standards and refined direction for integrated weed management (IWM).

NEED FOR ACTION

The purpose and need for the Proposed Action is to implement integrated weed management programs that will provide more effective control of noxious weeds on the Forest. Monitoring indicates an increasing trend in weed populations. Federal, State, and Local laws require control of these weeds.

Conformance With Weed Laws, Policy, And National Strategy. Direction and authority for invasive weed management comes from the National Forest Management Act (PL 94-588, NFMA), the National Environmental Policy Act (PL 91-190, NEPA), the Federal Land Policy and Management Act (PL-94-579, FLPMA), the Carlson-Foley Act (PL 90-583), and the Federal Noxious Weed Control Act (PL 93-629). NFMA, NEPA, and FLPMA provide general land management and environmental analysis direction. The Carlson-Foley Act allows the States to control noxious weeds on Federal lands, provided that: 1) the control program is approved by the Federal agency that administers the land, 2) the control methods are acceptable to the Federal agency, and 3) the same procedures are followed as would be applied to private land. The Carlson-Foley Act also authorized Federal agencies to reimburse the States for weed control expenses on Federal lands, if provided funds are available for such purposes. The Federal Noxious Weed Act defined noxious weed control agreements between Federal agencies and other agencies, organizations, or individuals.

Increased national attention on the issue of noxious and invasive weeds prompted the Forest Service to develop a national strategy to "stem the invasive tide" of noxious weed establishment and expansion. In February 1996, Chief Jack Ward Thomas issued direction for each Forest Service Region to bring their noxious weed programs in line with national agency strategy (*USDA FS, 1996*). In March 1998, the Intermountain Region Strategy For Noxious Weed Management was completed. This strategy directs the Fishlake National Forest to develop a strong prevention and eradication program (*USDA FS, 1998b*). The 1998 *Forest Service Strategy for Noxious and Nonnative Invasive Plant Management* provided a "roadmap into the future for preventing and controlling the spread of noxious weeds and nonnative invasive plants." Executive Order 13112, signed by President Clinton in February 1999, directs Federal agencies to conduct activities, which reduce invasive weed populations.

State and local laws require landowners to control noxious weeds. The Forest Service must also comply with these laws. The need for the proposed action is based on the present status of noxious weeds on the Forest and the requirement by law to control these weeds.

Threat To Native Ecosystems. Noxious weeds and invasive plant species pose an increasing threat to native ecosystems, croplands, and other plant communities throughout the United States. While weeds have long been recognized as a problem for agriculture, the potential impact to other plant communities, including wildlands, is receiving greater attention. There are an estimated 2,000 invasive and noxious weed species already established in the United States (*USDA FS, 1998a*). Escalating worldwide trade and travel will only increase the risk of further invasions. All ecosystems -- urban, suburban, and rural, including wildlands, rangelands, forests, riparian areas, and wetlands -- are vulnerable to invasion.

Experience and research have shown that invasive and noxious weeds can no longer be considered a problem only on disturbed sites. Noxious and invasive plant species have become established within relatively undisturbed ecosystems. Noxious weeds pose an

increasing threat to the integrity of wildland ecosystems, including specially designated areas such as wilderness and research natural areas.

The Forest Service (FS) has the lead responsibility for noxious weed coordination for the Department of Agriculture (USDA) under the authority contained in the Noxious Weed Act of 1974 and the USDA Policy 9500-10. Under this authority the FS developed the USDA Policy in 1990 and policy direction for the FS in 1991. FS policy was revised in 1995 (FSM 2080) to include new standards and refined direction for integrated weed management (IWM). The revised policy emphasizes the importance of integrating noxious weed management in ecosystem analysis, assessment, and forest planning. The FS policy definition in FSM 2080 (*USDA FS, 1995a*) encompasses invasive, aggressive, or harmful non-indigenous or exotic plant species:
"...those plant species 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 of serious insects or disease and being native or new to or not common to the United States or parts thereof."

On Federal lands in the Western United States, it is estimated that weeds occur on more than 17 million acres, with similar infestations occurring in Canada and Mexico (*USDA FS, 1998a*). It is estimated that these noxious weeds are expanding at the rate of 4,600 acres per day (*Federal Interagencies, 1998*). On National Forest System (NFS) lands, an estimated 6-7 million acres are currently infested and potentially increasing at a rate of 8 to 12 percent per year. The noxious weed situation in the United States has been described by many as a biological disaster, "an explosion in slow motion" (*USDA FS, 1998a*). In September 1995, during the Western Weed Meeting sponsored by the U.S. Department of Interior, the seriousness of noxious weed expansion was discussed:

"If nothing is done to control this, one speaker, Rod Lym of North Dakota State University, believes that by the year 2010, the infestation will reach 140 million acres and be increasing by 20 million acres per year. This extent of infestation will cause a 25 percent reduction in the wildlife and grazing resource, and severe changes in wetland and waterway vegetation. He stated that by the year 2010, weed management will be the largest single item in Federal land management agency budgets...all speakers supported the belief that invasive exotic weeds are an increasing serious problem that will cause economic hardship in many land-based economies, and will severely damage and even eliminate some native plant communities." (*USDA FS, 1995*).

Invasive plants are recognized as a direct threat to agricultural production and biodiversity in the United States. Croplands, rangelands, forests, parks, preserves, wilderness areas, wildlife refuges and urban spaces are all adversely impacted by invasive plants. The habitat of fully two-thirds of all threatened and endangered species is threatened by invasive species. On rangelands, invasive plants crowd out more desirable and nutritious forage, cause soil erosion, and poison some livestock and wildlife species. In natural areas, invasive plants reduce habitat for native and endangered species, degrade riparian areas, create fire hazards, and interfere with recreational activities. Aquatic invasive plants clog lakes and waterways and adversely affect fisheries, public water supplies, irrigation, and recreational activities (*Federal Interagencies, 1988*).

Potential For New Invasions. From 1969 to 1985 noxious weed inventories in the Intermountain Region recorded an increase in noxious-weed-infested areas from 74,658 acres to 150,795 acres. This equates to an annual increase of 5.5 percent. Since 1985 there has been an alarming 433 percent increase in acreage of noxious-weed-infested NFS lands. Reported acres of infestation increased to 864,940 acres in 1997. This is an increase of 47 percent per year from 1985 to 1997, which is well beyond the national average of 8 to 12 percent per year. While it is recognized that this increase is probably due to a combination of more intensive inventories and actual expansion, the Intermountain Regional Office asserts, "we believe we are beyond the 'explosion in slow motion' phrase" (*USDA FS, 1996a*).

The potential for invasion of new weeds onto NFS lands can be a greater threat than all those species that have become established to date. As an example, in 1988 the Idaho Noxious Weed Work Group reported that "over 3,000 weeds not now known to exist in the state, are adaptable to Idaho's climate." These weeds are considered likely to invade unless appropriate preventative measures are taken (*Callihan et. al., 1992*). Indications are that these conditions exist in most states, and it is estimated that nine new noxious weed species are invading each western state each year. These new populations can spread approximately 10% to 25% each year.

In 1990, there were eight species of noxious weeds on approximately 1,500 acres of the Fishlake NF. Today there are 11 species now covering approximately 7,500 acres of the Forest. Although, to some degree this large change is due to improved surveys and inventories, this is still a significant and alarming, increase in number of species and infested acres.

Table 1-1 Acres Infested By Noxious Weed Species		
NOXIOUS WEED	**INFESTATION SIZE**	
SPECIES NAME	**Acres in 1990**	**Acres in 2002**
Black henbane	1	5
Canada thistle	23	2
Dalmation toadflax		1
Dyers Woad	1	1
Leafy spurge	30	59
Musk thistle	1252	2241
Russian knapweed		2
Squarose knapweed		110
Scotch thistle	70	4128
Toadflax (yellow)	20	256
Whitetop	91	731
TOTAL ACRES INFESTED	**1488**	**7536**

The 2002 Fishlake National Forest noxious weed inventory shows the following data:

NOXIOUS WEED	**Table 1-2 ACRES INFESTED BY RANGER DISTRICT**				**SPECIES**
SPECIES NAME	**LOA**	**RICHFIELD**	**FILLMORE**	**BEAVER**	**TOT. NF ACRES**
Black henbane			5		5
Canada thistle		2			2
Dalmation toadflax			1		1
Dyers Woad			1		1
Leafy spurge			37	22	59
Musk thistle		1647	554	40	2241
Russian knapweed			2		2
Spotted knapweed	*				0
Squarose knapweed			110		110
Scotch thistle		9	2462	1657	4128
Toadflax (yellow)			256		256
Whitetop		66	586	79	731
TOTAL DISTRICT ACRES	0	1724	4014	1798	7536
* Unconfirmed reports of Spotted knapweed at Solomon Basin					

These 7,600 acres of infestation represent approximately ½ % of the Fishlake National Forest. Noxious weeds have the ability to spread very rapidly, especially those that have airborne seeds. Our goal is to keep the remaining 97% of the Forest weed-free. Without active control, noxious weeds can spread until they have occupied every suitable ecological niche.

Of considerable concern is the establishment of new species that are not now common to the Fishlake National Forest. There are 53 noxious weed species identified on the Regional Designated Noxious Weed and Undesirable Plant List. Twenty-one of these species are identified as currently existing in the State of Utah (*Utah, 1993*). Thirteen of those 21 species presently occur on the Fishlake National Forest. In addition, from a list of "Important Alien Plant Species in the Northern Arizona/Southern Utah Area" compiled in 1995 by the BLM, Arizona Strip District (*USDI BLM, 1995*), three more species are potential threats to establishment on the Fishlake National Forest. The spread of these noxious weeds to uninfested Forestlands and adjacent, non-Forestlands must be slowed and/or prevented.

Table 1-3 NOXIOUS WEED DISTRIBUTION			
UTAH LISTED NOXIOUS WEEDS	**FISHLAKE NF**	**DIXIE NF**	**NORTHERN AZ SOUTHERN UT**
Black henbane	X		
Canada thistle	X	X	X
Dalmation toadflax	X	X	X
Diffuse knapweed			X
Dyers woad	X		X
Leafy spurge	X		X
Medusahead			X
Musk thistle	X	X	X
Purple loosestrife			X
Russian knapweed	X	X	X
Scotch thistle	X	X	X
Spotted knapweed		X	X
Squarose knapweed	X		X
Whitetop (hoary cress)	X	X	X
Yellow starthistle			X
Yellow toadflax	X		X

Treatment Objectives. Treatment objectives of weed control are closely tied to prevention objectives and measures to limit infestation and spread of noxious weeds (see Appendix F). The majority of noxious weeds found during surveys of the Forest have been identified along travel ways, especially along roads, power line rights-of-way, trails, and campgrounds. Other locations where weed infestations typically occur include old homestead sites, mining claims, gravel pits, and dispersed recreation sites. Ground disturbing activities such as road or trail construction, timber harvests, reforestation, and fire typically provide suitable conditions for noxious weed establishment. The presence of noxious weed infestations does not meet the management objectives for these ecosystems, habitats, and environments.

The general treatment objectives for the Forest would result in an absence of any new invader noxious weed species. A significant reduction of established infestation species is desired in areas receiving heavy human use and areas with special management objectives. These areas include: roadways, rock pits, livestock grazing allotments (especially homestead pastures and meadows), recreation sites (including campgrounds, dispersed campsites and trailheads, and semi-primitive recreation areas), Research Natural Areas (RNAs), plantations, general forest, special wildlife habitats, and administrative sites.

The revegetation objective for roadsides is establishment of perennial grasses on road corridors. Perennial grasses offer the greatest protection against erosion, the greatest sight distance, the best defense against noxious weed invasion and spread, and provide the best source of organic matter soil input for site recovery.

Rock pits are an especially important concern because they serve as a host area with the potential to accelerate the spread of weeds. The management objective for rock and borrow pits is to maintain a weed-free condition and to provide a vegetation buffer free of noxious weeds to prevent incidental contamination of material from external sources.

Because of past management activities, usually prior to acquisition as National Forest System lands, many old homestead pastures and meadows are no longer dominated by native species, and most have been seeded at one time or another with a pasture mix containing introduced species such as timothy, redtop or orchardgrass. The Forest Plan, in accordance with the National Historic Preservation Act and the Antiquities Act, mandates that these areas be maintained in their historic condition. These areas are frequently focal spots for livestock grazing in the Forest's range management program.

The management objective for grazing allotments on the National Forest is to provide an adequate quality and quantity of forage to sustain the number of animal units allowed in grazing allotment management plans.

Management objective for recreation sites is driven by type of activity, timing of use and site conditions. The focus of vegetation management in campgrounds and trailheads is public safety, erosion control, a healthy variety of vegetative species, visual quality, and quality of the experience. Noxious weeds are particularly prone to spread by human activity; therefore, weed control in high-use areas is especially emphasized.

Trailheads would be managed to provide for vegetative diversity, but should be kept in a weed-free condition to avoid spreading weeds into non-contaminated areas. Vegetation in campgrounds would be managed to provide

visual and sound buffers as well as to have an ability to withstand intense human use. A healthy shrub and grass component is important for buffers in campgrounds, and vital for erosion control in dispersed campsites along riparian areas.

Research Natural Areas (RNAs) are designated as Management Area 10A in the Fishlake National Forest Plan (USDA FS, 1986). RNAs are established to provide opportunities for research in ecosystems influenced only by natural processes. They are selected because they contain examples of typical natural ecosystems or unique kinds of vegetation, animals, and land. The management objective of RNAs is the maintenance of natural native species and the suppression or removal of noxious weed species.

General forest areas are managed for diversity, wildlife habitat, visual qualities, and to meet economic resource needs. The management objective is vegetative and structural diversity. The management objective of plantations is reforestation with prescribed species. Administrative sites would be kept free of noxious weeds in order to prevent spread off-site.

Wildlife needs would be met by maintaining the vegetative historic range of variability in order to provide the quality and quantity of habitat to provide for species viability as prescribed by the Forest Plan. Habitat for threatened, endangered and sensitive species would be managed by the Forest Service in consultation with the U.S. Fish and Wildlife Service.

PROPOSED ACTION

The Fishlake National Forest proposes:

- **Integrated Weed Management**--To emphasize a program to annually treat, through Integrated Weed Management (IWM) control methods, noxious weeds on National Forest System lands in southern Utah in parts of Sevier, Beaver, Wayne, Iron, Garfield, Piute, Millard, and Juab Counties on the Fillmore, Beaver, Richfield, and Loa Ranger Districts.

Integrated Weed Management (IWM) (also called integrated pest management (IPM) or integrated vegetation management (IVM)) is a decision-making process based on site-specific information, which determines management choices. IWM is based on the principle that the management option, which is most effective and best, suited for a particular need and site is the one, which should be used. Often the most effective approach will utilize a combination of management options or strategies.

IWM includes: 1) prescribed fire, 2) mechanical, 3) cultural/revegetation, where competitive vegetation is seeded to compete with invasive weeds, 4) biological control through the use of parasites and pathogens to control invasive weeds, 5) herbicide control using ground application methods, 6) education through the use of programs to inform people of invasive weed effects and methods of invasive weed spread, 7) prevention by using practices that reduce invasive weed spread.

Typical treatment scenarios are intended to: 1) deplete the invasive weed seed source, 2) allow the vigor of desirable and native vegetation to increase, 3) allow vegetative litter to build up, and 4) prevent establishment of new invasive weeds.

Efforts would be made to coordinate treatments with private landowners managing invasive weeds adjacent to National Forest System lands.

- **Non-Significant Forest Plan Amendment**--Implicit in the implementation of a noxious weed program is the additional proposal to provide supporting noxious weed goals, objectives, management direction, and Forest-wide standards and guidelines through the amendment of the Forest Plan. Although the current Forest Plan is consistent with Integrated Weed Management (IWM) treatment recommendations and priorities for managing noxious weeds, it is insufficient in addressing strategies for effecting prevention and control and the social and environmental effects these practices might have. The Forest Plan is silent on implementation of standards and guidelines for noxious weed prevention and control. Incorporated within this Environmental assessment is the proposal to amend the current Forest Plan (Appendix E).

Long-range goal and objectives are proposed to achieve noxious weed control. Objectives are specific actions that will be taken to move toward achievement of the goal. In addition, general directions along with appropriate standards and guidelines are proposed. Standards are specific "required" actions. Guidelines are specific "recommended" actions.

Weed prevention mitigation practices are included as guidelines for application to land-disturbing activities and projects.

PROGRAMMATIC EIS TIERING

This environmental assessment (EA) is tiered to the The Intermountain Region Noxious Weed and Poisonous Plant Control Program FEIS (1986), which provides the basic background information needed for the "tiering" of future project-specific analyses on rangelands or analyses of new control methods in accordance with the CEQ regulations for implementing NEPA (40 CFR 1502.20 and 40 CFR 1508.28). This EIS also describes the environment that might be affected and discloses the potential environmental consequences of implementing any of the alternatives. Therefore, this EA will focus only on relevant forest-level issues and effects, and will rely on

the programmatic EIS for more detailed disclosure of environmental effects.

During June 1986, the Intermountain Region, U.S. Forest Service, released for public review a Noxious Weed and Poisonous Plant Control Final Environmental Impact Statement (FEIS) (*USDA FS, 1986*). This Impact Statement was filed with the Council on Environmental Quality (CEQ) and printed in the Federal Register on December 29, 1986. It was approved without appeal on January 29, 1987. This document covers control programs on National Forest System lands in Utah, Nevada, southern Idaho, western Wyoming, and portions of California and Colorado. The preferred control method addressed in detail in this impact statement is Integrated Weed Management: Noxious weeds are recommended to be treated with biological agents (insects), herbicide applications, and manual techniques--either treatment specific or a combination of treatments. This FEIS is on file and available for public review in the Regional Office, 324 25th Street, Ogden, Utah.

Since 1987, considerable progress has been made in the development of herbicides, biological controls, and the use of Integrated Weed Management techniques for the management of noxious weeds. Herbicides are currently available that provide better control over noxious weeds and yet have significantly reduced effects on man and the environment. In 1992, the Forest Service completed a "Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Administration Sites" (*USDA FS, 1992*)) for many of these herbicides. This assessment describes potential hazards that may be associated with the use of these herbicides. It uses the same basic process for evaluating these risks as was used in the FEIS. This process evaluates the hazards associated with treatment of noxious weeds using typical application rates and methods. When methods and rates are used which result in low or no risk to applicators, Forest users, wildlife and aquatic organisms, the effects of herbicide use are consistent with those described in the FEIS.

The Intermountain Region Noxious Weed and Poisonous Plant Control Program FEIS provides an analysis of the major noxious weed and poisonous plant control considerations in the Intermountain Region. However, it does not address site-specific situations. These are to be analyzed locally by Forest Supervisors or District Rangers for their noxious weed control programs. NEPA provides a tiering procedure whereby decisions can be made at the Regional level for a given program or project. This procedure permits the Forest Service to focus on broad issues that can be resolved at the Regional level and defer site-specific issues, which require decisions at the National Forest or Ranger District level.

FOREST PLAN (LRMP) DIRECTION

This environmental assessment (EA) is tiered to the Fishlake National Forest Land and Resource Management Plan (LRMP) - Final Environmental Impact Statement (1986) and incorporates direction provided in that LRMP.

An underlying purpose is to achieve the overall direction of the Forest Plan to reach and maintain desired rangeland conditions (LRMP, IV-4), while allowing the appropriate use of rangeland resources. The Forest Plan cites “control of noxious weed infestations” as a goal for rangeland health.

The LRMP guides natural resource management activities and has established management direction and Standards and Guidelines for management of the Fishlake National Forest. General Forest Direction includes provisions to prioritize treatment of noxious weed infestations by 1) new species, 2) new areas, 3) expansion of existing areas, and 4) reduction of current infestations (LRMP, IV-23).

The purpose and need for the proposed action is to control or eliminate the existing noxious weed populations and prevent new infestations because:

Forest Plan desired conditions cannot be met if native vegetation communities are invaded by, or replaced by, invasive exotic plants;

The ecological integrity, biodiversity of lands, and condition of Forest resources are not protected or maintained;

Progress toward restoring and maintaining species composition, diversity, distribution, and productivity of populations of riparian dependent species are threatened by these noxious weeds.

DECISION TO BE MADE

The Responsible Official is the Forest Supervisor for the Fishlake National Forest. The completed Environmental Assessment will provide the Responsible Official with the basis upon which to make an informed decision. The decision will outline the requirements necessary to continue noxious weed control: including appropriate inventory and mapping procedures, prevention practices, control and containment methods, and eradication priorities. Following a review of the completed EA the Responsible Official will decide to do one of the following:

1. Amend the Forest Plan to include supporting noxious weed goals, objectives, management direction, and Forest-wide standards and guidelines and implement Integrated Weed Management (an integration of biological, ground-based herbicide applications, physical and mechanical, and cultural control methods) strategies to control noxious weeds.

2. Do not allow noxious weed control on any NFS lands within the Fishlake National Forest.

3. Continue with current management.

INCORPORATION BY REFERENCE

Regulations to implement the National Environmental Policy Act (NEPA) provide for the reduction of bulk and redundancy in environmental impact statements (40 CFR 1502.21), through incorporation by reference when the effect will reduce the size of the document without impeding agency and public review of the action. Documents that may be incorporated by reference in this environmental assessment include:

Intermountain Region Noxious Weed and Poisonous Plant Control Program FEIS (1986). Incorporation by reference occurs in Chapter 2 where identification of major concerns is reiterated from the FEIS. Further, in Chapter 4, Table 4-1 reflects a summary of direct and indirect effects identified in the FEIS for all resources except TEPCS.

1. **Risk Assessment For Herbicide Use In Forest Service Regions 1, 2, 3, 4, and 10 And On Bonneville Power Administration Sites (September 1992).** Incorporation by reference occurs in Chapter 4 where the effects of a wide range of herbicides on fish and wildlife species is based on the Risk Assessment and also in reference to the in-depth human health risk analysis that is included in the Risk Assessment. The Risk Assessment describes potential hazards that may be associated with the use of proposed herbicides.

CHAPTER 2: PUBLIC INVOLVEMENT, ISSUES, and ALTERNATIVES

INTRODUCTION

This chapter describes the scoping and public involvement process used to develop the alternatives, identifies the issues associated with the Proposed Action, and describes and compares the alternatives. As required by law, a "No Action Alternative" is considered.

Notice to the public of intentions to prepare an Environmental Assessment evaluating weed control management on the Fishlake National Forest was first issued by release of a public scoping document on March 28, 2000. With that notice, public comment was solicited formally, announcing the intention to develop an environmental assessment documenting site-specific and noxious weed-specific analysis of noxious weed control. The public was informed of the intent to tier to the Intermountain Region Noxious Weed and Poisonous Plant Control Program FEIS. Twenty-four individuals responded to the invitation to receive a copy of the scoping document, but only three provided comments.

Completion of the Environmental Assessment in the year 2000 was delayed. Because of the lapse of time, late in 2001 an additional scoping document was released.

On November 19, 2001 notice of the availability of a scoping document was mailed to 136 interested publics; including special interest groups, other agencies, congressional offices, and interested citizens. The scoping notice identified the targeted noxious weed species, site-specifically located infestations on each of the various Ranger Districts, and described their associated environments. A description of the Proposed Action and the decision to be made was provided, and a specific request for public comment was made. Seven individuals responded to the invitation to receive a copy of the scoping document, but only four provided comments.

In addition, the status of this project has been announced in the Fishlake National Forest quarterly report beginning with the spring 2000 edition and lastly in the Fall 2001 edition.

The public was informed of the following framework for this analysis:
1. This analysis should comply with and supplement the parent FEIS with any new local issues and concerns not already cited in the FEIS.
2. This analysis should provide site-specific descriptions (current infestation sites, species, and any information on the affected environment).
3. This analysis should allow for public participation.
4. This analysis should address the local characteristics of the particular control projects, which are too detailed to have been specifically analyzed in the FEIS (FEIS, 2-12).
5. This analysis should not re-analyze alternatives to Integrated Weed Management control methods or re-analyze environmental consequences that are already assessed in the FEIS.
6. This analysis should consider significant aspects of site-specific environmental impacts of the Proposed Action and inform the public that environmental concerns have been considered in the decision-making process.
7. This analysis should provide sufficient evaluation to the Deciding Officer to make an informed decision regarding management of invasive noxious weeds on the Fishlake National Forest.

The following list of questions were presented to the public to generate constructive discussion about opportunities to improve noxious weed management efforts:
1. How effective are current noxious weed management efforts?
2. How might noxious weed management efforts be improved to reduce or preclude impacts?
3. What do you think the priorities should be for potential control targets?
4. How should the emphasis be placed for prevention, control, containment, and eradication?
5. In what ways can management efforts be better coordinated?
6. In addition to the analysis provided in the FEIS, what are the site-specific potential impacts of weed control methods, particularly herbicide application, on forest resources?

The Forest Service Interdisciplinary Team (IDT) thoroughly reviewed comments received from people interested in the proposal. All concerns raised by the public were considered in evaluation of alternatives.

ISSUES

From 570 comments received during the scoping period for the 1986 Intermountain Region FEIS, 15 major issues or concerns were identified (*USDA FS, 1986*):

1. Effects of herbicides on the human environment.
2. Noxious weed and poisonous plant impacts on downstream agricultural economics caused by spread from National Forest System lands.
3. Loss of investments on public and private lands from the invasion of noxious weeds and poisonous plants.
4. Treatment of noxious weeds and poisonous plants in designated wilderness and special areas.
5. Noxious weed and poisonous plant effects on other vegetation, livestock, wildlife, and other resources.
6. Effects of control activities on other vegetation.
7. Effects of control activities on domestic livestock, wildlife, fish, and other animals.

8. Cost of control and adequacy of funding.
9. Legislation requiring control and coordination of the control efforts with groups.
10. Public awareness of noxious weeds and poisonous plants and their existing and potential impacts.
11. Health hazards and safety aspects of aerial herbicide applications.
12. Amount and significance of soil and water contamination from control efforts.
13. Impact of aerial herbicide applications on non-target vegetation.
14. Effectiveness of the various control methods and need for integrated control and control method research.
15. Noxious weed and poisonous plant control lists and the prioritization of plants for control.

The issues receiving the most public comment were 14, 2, and 5, with issue 14 receiving approximately one-third of the total comments. It is the intent of this EA to only address any new issues that are identified through local scooping or that are important at a site-specific scale.

Of primary concern for this analysis are the key concerns identified by the ID team that were also a focus of comments received from the public. Although there were no public issues that were identified as "significant" or unresolvable, several comments do indicate a common concern about some resources.

Key issues expressed by the public and identified by the ID Team are:

1. **Environmental Effects of Herbicide Use**. There is common concern regarding the use of herbicides relating to possible health risks to both humans and wildlife and non-targeted vegetation. Concerns for human health risks are primarily focused on use of herbicides in the vicinity of open water sources, which provide for domestic use and at recreation sites. Concerns for wildlife health risks are focused on both single dose exposure and bioaccumulation of herbicides in migratory species and fisheries. Concerns for potential visual impacts related to herbicide use are focused on the appearance of dead vegetation along scenic travel routes and in recreation areas. Public comments identified no additional components of the "Affected Environment". Analysis of these comments indicates that respondents are more concerned about environmental effects of the No Action alternative.

Each of the Proposed Action and No Action alternatives contemplated under this EA have environmental impacts that cannot be avoided. Herbicide applications, for example, are likely to affect some non-target plants. Although mitigation measures would probably reduce the potential that significant concentrations of herbicide would reach surface water or groundwater, it is possible that minute amounts of herbicide could migrate from the site. Under reasonably foreseeable circumstances this would not have a significant environmental impact. The adoption of the No Action alternative would not immediately result in unavoidable environmental impacts. However, it is clear that alternatives which allow the continued spread of noxious weeds and the continued development of dense forest stands on these dry sites would eventually result in unavoidable environmental effects to various forest resources. None of the alternatives would conflict with State and Federal water or air quality regulations or with U.S. Fish and Wildlife Service recovery plans for threatened and endangered species. A full disclosure of environmental effects resulting from the selected alternative will be included in the Biological Assessment prepared after the selection of an alternative. Although the Proposed Action could have short-term impacts on various resources, the Proposed Action alternative is designed to improve the long-term productivity and sustainability of resources on the project area.

2. **Cooperation with owners of adjacent lands.** One of the greatest obstacles to effective weed control has been a lack of social coordination between numerous individuals and agencies working to control weeds. Many people have made valiant efforts to deal with the weed problem, but their efforts have been largely in vain when surrounding landowners – public or private –were not also involved with the cause. The increasing threat of invasive noxious weed entry and spread - the threat of epidemic proportions of weeds "out-of-control"- has become the major concern of recent years. At issue is the realization that invasive plants are introduced and then spread without any respect for jurisdiction or property boundaries. The challenge is to create public awareness of this issue and focus public and private resources to implement cooperative action on a scale commensurate to meet the seriousness of the invasion.

Comments received suggest support for the Coordination and Cooperation element of the Noxious Weed Control and Management Strategy.

3. **Priorities for control.** These comments favor control of noxious weeds and offer a variety of prioritizations and suggestions. There is no discussion, debate, or dispute about the environmental effects of the Proposed Action. Uniformly, the comments suggest prioritizing noxious weed control efforts. These comments do not constitute a different array of alternatives; they simply provide discussion of how to implement the Noxious Weed Strategy.

4. **Economic Impact of Noxious Weed Spread.** There is increasing concern about the potential economic impacts of noxious weed infestations. Because livestock avoid grazing many noxious weeds, these weeds affect Utah's grazing industry, specifically ranchers, landowners, businesses supplying livestock products, and communities that rely on ranching as an economic base.

Economic impacts to ranchers and landowners include reduced income from lower grazing capacity (capacity for livestock grazing decreases proportionately with the loss of forage caused by weed infestation), lost livestock sales, and reduced grazing land values. Noxious weeds reduce net returns by either increasing operating expenses, decreasing total returns, or both. Operating expenses increase when landowners implement strategies to limit weed invasion or manage current infestations. Total returns are directly affected when weight gains of livestock are reduced or animals are poisoned by certain noxious weeds. The productive value of agricultural and ranch lands is decreased by weeds which detract from or limit its productivity, or increase operating and management costs. Any factor that reduces potential net returns from the land will diminish its value.

5. **Effectiveness of weed control strategies.** Although most commenters acknowledged the potential threat of noxious weeds, many had concerns about the effectiveness of various methods of treatment. Methods available for noxious weed control vary and are largely dependent on how each weed species responds to a particular type of treatment. Some people were concerned about the impact of herbicides on biological resources and water quality. Others were interested in the use and effectiveness of biological control methods. Others advanced a full range of control measures, specifying that we try to use as integrated an approach as possible. Predicted effectiveness of each methodology is known and will be used in development of specific weed control strategies. Integrated weed management on rangeland involves the use of several management techniques in a well-planned, coordinated, and organized program. Successful weed management requires not only the development of a strategy for killing existing weeds, but long-term plans for preventing their reestablishment or the invasion of other weedy species through careful land management. The best eradication technology will be a combination of improved vegetation management and a variety of treatment methods, and should include alternate treatments in case the primary treatments fail.

6. **Impacts of Weed Prevention Measures on Forest resource users.** Although most of the public respondents recognize "prevention" as the most important action of the Noxious Weed Control and Management Strategy, comments express concern about use and/or activity restrictions in concert with IWM techniques. The object of weed control is not to restrict access to or use of the National Forest. Rather, it is to control weeds and weed species. The purpose is to suppress, exclude and eliminate dangerously interfering species in and from sensitive areas strategic to the welfare of man, and to restrict the geographical distribution and encroachment of interfering plant species in an effort to responsibly manage the environment for the welfare of man. The use and misuse of land and land resources provides opportunities for undesirable weeds to invade an area. Knowledge of sites that can contribute to weed invasions can aid in the decision process for management of land and resources. Types of such sites are listed in the mitigation practices, including: roads; recreation, wilderness, roadless areas; cultural resources; grazing allotment management; timber; minerals; soil and water; lands and special uses; and fire. Each of these uses or activities has a set of management practices prescribed to mitigate hazards of noxious weed establishment or measures to prevent invasion.

ALTERNATIVE DEVELOPMENT

This analysis is supplemental to the parent Intermountain Region FEIS. The selected control method in that FEIS is Integrated Weed Management (IWM). Public scoping produced no new issues, which would drive the creation of alternatives other than those presented in the FEIS. Therefore, this EA will not develop additional alternatives to the IWM alternative. The purpose of this analysis is to evaluate whether there are any additional site-specific direct, indirect, or cumulative effects of implementing IWM, which have not been disclosed in the FEIS.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

1. Manual and/or Mechanical Control alone. Hand pulling and hand tools (shovel, hoe, pulaski) represent the most common techniques for manual control. This method of control is largely ineffective for some species, depending on growth characteristics. Target plants with spreading underground roots are not good candidates due to the difficulty in removing all plant parts. Any portion of the spreading underground parts not removed has a high probability of generating new growth. The cost of manual control is excessive (for broad-scale applications), and therefore fewer acres could be treated with expected funding. Hand pulling or grubbing can be an effective method for controlling weeds in riparian areas. This method is especially useful for controlling newly established weeds that have not produced seeds or developed an extensive root system. Grubbing each year for 10 to 15 years is required to deplete root and/or seed reserves of well-established plants. Cultivation can be an effective weed control method. However, for most rangeland treatment areas, it is impractical. Cultivation is usually required on 2 to 3 week intervals for at least two consecutive years for many perennial weeds. One of the most important methods of prevention or control is hand rogueing; the process of removing individual plants in the field. Rogueing can be a very effective method for controlling some weed species in hard to reach spots such as fence lines, canal banks, wooded areas, and may be the only practical control method in difficult terrain or in forests and sites with associated sensitive plants.

2. Prescribed Fire Control alone. Burning is not usually effective because soil temperatures reached are

not sufficient to kill root buds or buried seeds. In some cases, burning can increase the competitiveness of the noxious weed by removing desirable plants. Removal of top growth could also stimulate production of noxious weed vegetative shoots. In order to deplete root reserves, burning must be repeated as new shoots emerge to avoid replenishment of root reserves. Seeding infested areas after burning would be required to assure any degree of success in providing long-term weed population reductions.

3. Integrated Weed Management, including aerial application of herbicides. In most extensive range weed control projects, the herbicide is applied by aircraft, either fixed wing or helicopter. Economically, the size of the infestation or the extent of scattered infestations would need to be at least 200 acres to be cost-effective. Application controls with regard to drift and desired spray patterns are generally much more restrictive than with ground-based herbicide applications. On small areas (as is generally the case on the Fishlake National Forest), ground or hand equipment is most economical.

4. Integrated Weed Management, without herbicide control. Under this alternative, managers would use biological and manual methods to control noxious weeds. Biological control appears to be well suited for controlling weeds along riparian areas because they do not impact water quality. However, most biological control agents stress weeds or reduce seed production, but do not kill the plants. Biological control will not eradicate an infestation. A main objective in riparian areas is to control weeds immediately to prevent rapid seed dispersal by moving water.

5. Control by Excluding Livestock Grazing.
Regulations at FSH / 1909.15 / Chapter 10 (14.2) /Other Alternatives state that: "Alternatives must meet the purpose and need of the proposed action and specify any activities that may produce environmental changes." It is not the purpose and need of the proposed action to eliminate uses of the National Forest. The purpose and need, simply stated, is to prevent invasion of, contain, control and/or eradicate invasive noxious weeds within the Fishlake National Forest. Although it is recognized that livestock, as well as many other forest management activities, contribute to the spread of noxious weeds, and it is valid to consider the impacts of livestock grazing on the spread of noxious weeds, the issue is beyond the scope of this project's analysis. The intent of this EA is to address current weed infestations and address current weed treatment guidelines for future projects, which may potentially contribute to weed spread. For this reason, limiting livestock grazing is a decision outside the scope of this EA. When livestock grazing is proposed, effects of this activity on noxious weed spread will be analyzed within the scope of site-specific analyses.
The object of weed control is not to restrict use of the National Forest. Rather, it is to control weeds and weed species. The purpose is to suppress, exclude and eliminate dangerously interfering species in and from sensitive areas and to restrict the geographical distribution and encroachment of interfering plant species.

Knowledge of disturbances or sites that contribute to weed invasions can aid in the decision process for management of land and resources. Types of disturbances and sites are listed in the weed prevention practices, including: roads; recreation, wilderness, roadless areas; cultural resources; grazing allotment management; timber; minerals; soil and water; lands and special uses; and fire. Each of these uses or activities has a set of practices prescribed to prevent or reduce the likelihood of noxious weed establishment. Ten weed prevention measures are provided in the proposed Forest Plan Amendment as weed prevention practices to address livestock use concurrently with emphasizing prevention of weed invasion and limiting noxious weed spread. Prevention measures include the provision for eliminating livestock grazing within weed-infested areas when scheduling entry of livestock into weed-infested units cannot be coordinated or when necessary for reclamation of weed-infested sites.

Cultural weed management, which includes the use or exclusion of livestock to enhance desirable vegetation to minimize weed invasion, is included as one of the proposed IWM control techniques. Since elimination of uses on National Forest System lands is outside the scope of this EA and is in conflict with the Forest Plan, there is no justification to develop and evaluate an alternative that proposes exclusion of livestock for which provisions already exist in routine forest operations and grazing permit administration procedures. Furthermore, since provisions are provided through the proposed Forest Plan Amendment to control or manage livestock grazing to prevent invasion and/or spread of noxious weeds, there is no need to develop a no livestock-grazing alternative.

6. Control by Closing Roads. While access into the National Forest by roads and trails, as well as many other forest management activities, contributes to the spread of invasive weeds, and it is valid to consider the impacts of roads and public access on the spread of noxious weeds, the issue is beyond the scope of this project's analysis. This EA addresses current weed infestations and addresses current weed treatment guidelines for future projects that may potentially contribute to weed spread. For this reason, limiting public access is a decision outside the scope of this EA. When access management issues are analyzed and evaluated, effects of these activities on noxious weed spread will be analyzed within the scope of site-specific analyses.

Roads and road maintenance, as well as all transportation activities, are identified in the Proposed Forest Plan Weed Prevention Practices as sites that can contribute to noxious weed invasion. These uses or activities have a set

of practices prescribed to manage the likelihood of noxious weed establishment or measures to prevent invasion. Sixteen weed prevention practices are provided in the proposed Forest Plan Amendment as measures to address road construction and maintenance activities concurrently with emphasizing prevention of weed invasion and limiting noxious weed spread (Appendix F). Four additional measures are provided to minimize transport and establishment of noxious weeds through recreational activities.

The object of weed control is not to restrict access to the National Forest. Therefore, there is no justification to develop and evaluate an alternative that proposes restricting public access for which provisions already exist in routine forest operations and road closure policies. Furthermore, since provisions are provided through the proposed Forest Plan Amendment to manage transportation routes in a way that invasion and/or spread of noxious weeds is controlled, there is no need to develop a road closure alternative.

7. Native Community Restoration. Except for relatively small areas on high-value sites, cost of such an alternative is prohibitive. Due to the large acreages proposed for treatment and the high demand for native seed, there is not adequate native seed available of the same ecotypes as that within the project areas. If seed were available, it would be of varied ecotypes and would cost approximately $250 per acre (at about 20 pounds per acre seeding rate). Seeding is most successful when drilled or when the soil is scarified. The topography of the project areas would, in most cases, not permit this. Double-rate seeding is recommended if you cannot drill or scarify. This would increase the seeding cost to approximately $500 per acre. If 50% of the 7,600 maximum treatment acres were seeded, double-rate seeding costs alone would be $21.5 million in addition to the weed control costs.

Planting nursery-raised, container or bare root stock native plants would be even more expensive than seeding.

ALTERNATIVES CONSIDERED IN DETAIL

1. <u>The Proposed Action.</u> Target plants would be treated with one or more of the following management techniques: biological control agents (BCAs), ground-based herbicide applications, physical and/or mechanical techniques, or cultural treatment. The method or combination of methods selected would be determined using knowledge of target plant physiology and site-specific considerations. Prevention is a key element of this alternative, and weed prevention measures are incorporated for project planning and implementation as well as for resource user consideration.

The Proposed Action includes a Non-Significant Forest Plan Amendment which provides supporting noxious weed goals, objectives, management direction, Forest-wide standards and guidelines, and weed prevention mitigation practices (see Appendix F).

2. <u>Continue Current Control Strategies</u>. Current control strategies are mostly limited to some mechanical control (hand grubbing) and primarily ground application of herbicides. Emphasis is placed on control of existing infestations. No formal application of weed prevention measures is practiced with project implementation or required of Forest resource users

3. <u>No Action.</u> Target plants would not be treated. Current treatment programs would be halted, resulting in uncontrolled spread of noxious weeds to uninfested public and private lands.

DESCRIPTION OF ALTERNATIVES CONSIDERED IN DETAIL

ALTERNATIVE 1--PROPOSED ACTION

The Fishlake National Forest is proposing to implement a modification of the FEIS selected alternative. The FEIS selected alternative prescribes the use of aerial herbicide applications. This Proposed Action modifies the FEIS alternative to exclude aerial application of herbicides. Under the Proposed Action, managers would implement a prevention and early detection strategy and would use biological, ground-based chemical, cultural, mechanical, or manual methods to control noxious weed infestations.

This alternative would implement a noxious weed prevention, control, and eradication program that is divided into seven areas:

1. Administration and Planning
2. Education and Awareness
3. Prevention and Early Detection
4. Coordination and Cooperation
5. Inventory and Mapping
6. Monitoring
7. Containment/Control/Eradication

1. Administration and Planning.

Alternative 1 would require the allocatation of sufficient funding for equipment, herbicides, and manpower resources to provide effective planning, inventory, prevention, control, and monitoring. It includes direction for multi-resource funding of noxious weed control efforts. It includes the incorporation of a Forest Plan Amendment to provide supporting noxious weed goals, objectives, management direction, and Forest-wide standards and guidelines.

With the inclusion of Weed Prevention mitigation measures, Alternative 1 institutionalizes consideration of noxious weeds in resource planning and project analyses and requires complete and adequate environmental assessment (NEPA) to provide site-specific documentation of the effects of noxious weed control methods on forest resources. Noxious weed prevention measures would be incorporated into project layout, design, and alternative evaluation.

Alternative 1 uses adaptive management provisions to update inventories, acreages, and use of additional, more effective and safer chemicals as they become available and suitable for treatment.

2. Education and Awareness.

On-going education efforts will be strengthened with the intent of assisting the Forest user in identification of existing weeds and potential new invaders and increasing the Forest user's awareness of the presence of, or potential for, noxious weed infestations. As used here, the term "Forest user" includes the general public, specific user groups, timber sale purchasers, special use and grazing permittees, contractors, Forest Service employees, volunteers, and partners. Emphasis will be placed on everybody's personal responsibility in preventing the introduction or spread of weeds.

Specific actions would include:

- Presentations to the general public (through visits to local schools, service organization meetings, Chambers of Commerce meetings, evening talks given in developed campgrounds, and incorporation into other outdoor education activities and displays).
- Presentations to specific user groups, such as Backcountry Horsemen, Boy Scouts of America, ATV groups, etc. (through visits to their organization meeting, as a part of their outings, or as conducted tours of infested sites).
- Presentations to purchasers, permittees, and contractors (during pre-work and annual meetings).
- Provide training for field-going personnel on weed identification, treatment methods, herbicide application, and monitoring.
- Development and installation of educational signs and posters. These signs would identify measures that should be taken to prevent the invasion of noxious weeds.

3. Prevention and early detection.

The goal of a prevention program is to prevent or reduce the likelihood and frequency of invasion by weed species that are as yet unrecorded in the management unit. Prevention means to detect and correct the conditions that cause or favor the presence of competing or unwanted vegetation. Prevention should be directed at all federally listed invasive noxious weed species. Prevention programs should include such techniques as limiting weed seed dispersal, minimizing soil disturbance, and properly managing desirable vegetation. A prevention strategy specific to the project or management area should be developed as part of the analysis to be used in planning for, and before proceeding with, site-specific projects. This site-specific analysis should be done in conjunction with, and considered part of the project review and documentation process required by NEPA. All activities authorized or conducted on the Forest would be reviewed for their potential to spread weeds or create conditions that are conducive to weed establishment. Weed prevention practices would be implemented. In effect, any project that may have implications for vegetative management is required to address how noxious weed

infestations will be prevented (and/or controlled if prevention alone is insufficient or infeasible) during project implementation.

- Weed Prevention Mitigation Practices implemented with Alternative 1 and incorporated by way of a Forest Plan Amendment include prescribed prevention measures for:
  1. Land Use Planning and Implementation
  2. Ground Disturbance and Revegetation
  3. Gravel Pits and Material Borrow Sources
  4. Roadway Construction, Maintenance, Obliteration
  5. Recreation, Wilderness, Roadless Areas
  6. Cultural Resources
  7. Wildlife Grazing Impacts ;Fish Habitat Projects
  8. Grazing Allotment Management
  9. Timber Harvest
  10. Post Timber Harvest
  11. Mining and Minerals Exploration
  12. Soil and Water Restoration Projects
  13. Lands and Special Uses
  14. Wildfire Management and Impacts
  15. Prescribed Fire Management and Impacts
  16. Fire Rehabilitation
  17. Administration

- The Early Detection goal of Alternative 1 emphasizes the importance of finding new invaders before infestations reach 1 acre in size. This target level size is low because the feasibility of removing the species is much greater both economically and logistically at this level. First response to a new exotic plant would be to stop all seed production. If the plants are found in the flowering and seed development stages, hand removal of the seeds are a must. If the plant population is small enough, hand pulling should be considered for the entire site. The seeds should be burned in a confined area that can be monitored for future seed germination. If the noxious weed is a perennial, measures should be taken to kill the root system. Digging and pulling may be effective if it has a taproot. If it has a rhizome-like root system, it most likely will need to be done with an herbicide.

- The Proposed Action would emphasize enforcement of FS Order #04-00-052, closing all NFS lands on the Fishlake NF to possessing or storing hay, straw, or mulch which has not been certified as weed-free by any authorized State or County Officer.

4. <u>Coordination and Cooperation.</u>

A specific objective of the proposed action is to cooperate and coordinate with State agencies, private landowners, weed control districts and boards, local governments, the university/research community, and other Federal agencies to promote increased efficiencies and effectiveness in the successful prevention and control of noxious weeds.

Specific emphasis items include:
a. Coordination of weed management programs with adjacent and intermingled landownership.
b. Participation in local weed boards, organizations, and rural development planning.
c. Cooperation with Federal, State, County, and local road and highway departments to integrate cooperative control efforts across all ownership.
d. Cooperation with other Federal agencies to ensure that data is compatible and accessible within the FS and to outside users.
e. Cooperation with other Federal agencies in inventory, monitoring, and mapping, use of remote sensing information and database management for compatible data systems.
f. Cooperation with Federal and non-Federal partners and cooperators in development of educational programs.
g. Cooperation with Federal and non-Federal partners and cooperators to pool funding with public and private landowners for the most efficient use of funds in noxious weed management.
h. Seeking of cooperation and funding from private sources including cooperate foundations, grants, and organizations.
i. Participation as a cooperator in a Cooperative Weed Management Area (CWMA) for South-Central Utah. A CWMA is intended to bring together those responsible for weed management within South-Central Utah to develop common management objectives, facilitate effective treatment, and coordinate efforts along logical geographic boundaries with similar land types, use patterns, and problem species. Cooperators include private landowners, county governments, federal land management agencies, and interested organizations and individuals. Cooperators will jointly: 1) establish control priorities, 2) establish specific weed management objectives, 3) create treatment zones within the weed management areas, 4) treat individual weed species/infestations, 5) coordinate the use of resources and manpower, 6) develop common inventory techniques and mapping, and 7) manage designated noxious weeds in an integrated approach.

Treatment needs to be a continuing program. The weed problem must be recognized as an on-going management problem. Weed control can best be obtained through a carefully planned, integrated, and cooperative effort of public agencies and private citizens through on-going programs. A meaningful noxious weed control program requires consistent and continued financial support to be effective. Many noxious weeds cannot be successfully controlled in a single year due to carry-over seeds in the soil or due to differences in plant susceptibility on a given site at any one time. In many instances, treatment must be repeated over two or more years to be effective.

5. Inventory and Mapping.

Surveying for noxious weeds is an important component of the Proposed Action. Surveys are conducted to determine and document the presence, location, and extent of noxious weed populations. Current data collection and analysis methods emphasize a watershed approach to define weed infestations, spread rates and prediction of areas potentially susceptible to infestation. This watershed approach facilitates the detection and treatment of noxious weeds by identifying areas of somewhat homogeneous conditions.

Specific action items include:

a. In all resource assessments, studies, and evaluations ensure that information on the occurrence of noxious weeds is also included in the collection of data; e.g. stand examinations, range analysis, wildlife habitat evaluations, etc.
b. Conduct annual inspections at trailheads, dispersed campsites, developed campgrounds, interpretive sites, wildlife feeding areas, and administrative sites with emphasis on detection of new invader species.
c. Annually, survey open transportation systems, gravel or material borrow sites.
d. Record baseline noxious weed inventory information to include 1) weed species, 2) locations of infestations, 3) acreage infested, 4) density of plants, 5) ecosystem community type, 6) environmental conditions; e.g. soil conditions, exposure, level of disturbance, and current land-use activities.
e. Information collected will be recorded on a Site Inventory form that will be filed in a project file set up for that site and recorded in corporate noxious weed data bases.
f. Noxious weed infestations will be located using Global Positioning Systems (GPS) technology and mapped using Geographic Information Systems (GIS) technology.
g. All survey information will be shared with the appropriate County Noxious Weed Boards.

6. Monitoring.

Monitoring is conducted to evaluate implementation and effectiveness of management activities. Monitoring is defined as the orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives. Specific monitoring activities are designed as an integral part of the overall noxious weed management project description. Monitoring includes information on both vegetation and human health conditions.

Monitoring of noxious weed management activities is conducted in three phases:

a. **Before Treatment Activity**. Monitoring before treatment is employed to collect baseline information for use in determining rates of spread and/or effectiveness of management activities. Not all projects will require the collection of baseline data. When appropriate, the collection of baseline data facilitates the monitoring of the various weed treatments. This data would allow later comparisons to determine effectiveness of treatments in meeting management objectives.
b. **During Treatment Activity**. Monitoring during treatment activity is employed to minimize human exposure and to avoid adverse health effects. Herbicide projects are closely monitored for appropriate weather conditions. Speed and direction of wind in relation to the spray site are critical to proper operation. As necessary, water quality monitoring is conducted to ensure compliance with State water quality standards. Adherence to safety practices, specific restrictions, and any worker accidents are monitored and recorded.
c. **Following Treatment Activity**. Monitoring after treatment activity evaluates treatment effectiveness. All treatment sites will be visited approximately one month after treatment to determine effectiveness. A longer period, such as annual monitoring, may be established in the management prescription for the project if a long-term trend study is needed. Annually, each inventoried noxious weed infestation will be surveyed to determine extent and rate of spread or treatment effectiveness.

7. Containment/Control/Eradication.

Prioritization of treatment must be determined on the basis of 1) maintaining integrity of and protecting Research Natural Areas (RNAs), 2) reducing risk of weed-seed spread through management of high-risk areas, 3) coordinated treatment efforts (common boundaries with other landowners and collaboration with Cooperative Weed Management Areas (CWMAs), and 4) focus on targeted species.

RNAs are established to provide opportunities for research in ecosystems influenced only by natural processes. Highest priority is placed on prevention of establishment of noxious weeds in the Cove and Ant Hill proposed RNAs.

Because of the propensity for weed dispersal and rapid invasion in new areas, specific high-risk locations have critical priorities for treatment and must be identified by managers for preference treatment: 1) Rights-of-way comprise the single most important point of noxious weed invasion. Roads and trails provide a means for weed vectors (things that move weeds) to travel and transport seed and plant parts great distances from the source. Trails and trailheads provide channels for weeds to migrate to remote areas of forest and rangelands; 2) Developed and undeveloped recreational areas are included as points of noxious weed invasion and should be considered as conduits for weed-seed dispersal. But

they are also areas for priority treatment because noxious weeds reduce the quality of recreational use and can make some areas unusable; 3) Forest streams are also conduits for the spread of noxious weeds. Invading weeds along forest streams provide seeds that can spread downstream to agricultural lands and water impoundments. Riparian areas are also essential habitats for multitudes of wildlife and fish; 4) Some weed species are much more aggressive than others, producing hundreds of thousands of seeds per plant with seeds remaining viable for longer periods. These weed species need to be prioritized for treatment.

Following is the proposed strategy for containment, control, and eradication by specific weed species:

1. First priority for **containment and control** treatment are areas infested by musk thistle, leafy spurge, and Scotch thistle. These weed species spread much faster than the other established species and produce seed that is viable for many years. These infestations **MUST** be treated annually to prevent any increase in size.

Noxious Weed	Acs	District
Leafy spurge	37	Fillmore
	22	Beaver
Musk thistle	1647	Richfield
	554	Fillmore
	40	Beaver
Scotch thistle	2462	Fillmore
	1657	Beaver
	9	Richfield

2. First priority for **eradication** treatment is noxious weed species with limited extent of infestation: Follow-up treatments at least twice a year for a minimum of 5 years.

Noxious Weed	Acs	District
Canada thistle	2	Richfield
Dalmation toadflax	1	Fillmore
Dyers woad	1	Fillmore
Black henbane	5	Fillmore
Russian Knapweed	2	Fillmore

3. Second priority for **containment and control** treatment are isolated **new infestations** of established invaders (invasive spread).

Noxious Weed	Acs	District
Squarose knapweed	110	Fillmore
Toadflax (yellow)	256	Fillmore
Whitetop	79	Beaver
	586	Fillmore
	66	Richfield
Squarose knapweed	110	Fillmore

4. Develop strategies for control of noxious weeds where the use of herbicides may not be appropriate; i.e., riparian areas. Biological Control Agents may be appropriate treatments in these areas.

Integrated Weed Management Methods

The Proposed Action considers four general methods for managing noxious weeds:

1. Ground-based chemical weed control
2. Biological Weed Control
3. Manual and Mechanical Control
4. Cultural Weed Management

1. **Ground-based chemical weed control.** Selective herbicides can effectively remove broad-leaved weeds, and shift the competitive balance in favor of desired grasses. In most cases, weed control is temporary and requires repeated applications. The most commonly used broad-leaved herbicides used for noxious weed control are 2,4-D, picloram, and dicamba. The most common non-selective herbicide used on rangeland is glyphosate. Herbicide application is compatible with and compliments State and County noxious weed control programs. Herbicides are applied in several ways, depending upon the treatment objective, accessibility and topography of the treatment area, target species, expected costs, equipment limitations, and potential environmental impacts. Hand applications include backpack spraying, wiper application, and broadcast spreading (granular formulations). Backpack sprayers are operated at low pressure and low volume and generally release herbicide through a single nozzle.

Conventional herbicidal treatment for most broadleaf weeds has primarily relied on a standard mixture of the herbicides 2,4-D and Dicamba (Dicamba at .5-1 lb ai/ac with 2 lbs ae/ac of 2,4-D). Methods of application depend on the species, terrain, and size of the area to be treated. The Proposed Action would allow for the use of herbicides approved for noxious weed control at the rates described on the herbicide labels and approved by the Environmental Protection Agency (EPA). This would include, the list of herbicides and carriers identified in the 1992 "Risk Assessment for Herbicide Use In Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Administration Sites" (*USDA FS, 1992*). It is intended that as newer, safer, and more efficient herbicides are developed, approved for use, and risk assessments prepared that these chemicals would also be included for appropriate noxious weed control. The Proposed Action:

Allows for the use of herbicides listed in Table III-B-1 of the Risk Assessment and all approved, newly developed herbicides which are appropriate for use in herbicide control of noxious weeds.

1. Provides for the application of herbicides at rates described on the herbicide labels. However, general application rates will conform to the typical application rates described in Table III-B-1 of the Risk Assessment. Higher application rates will only be used when the District noxious weed program manager documents the need based on inability to control the specific target noxious weed infestation at the typical application rate.
2. Limits the daily amount of active ingredient applied by any one applicator to that amount displayed in Tables III-E-21 through III-E-26 of the Risk Assessment such that his dose does not exceed the low risk level.
3. Limits the application of herbicides to the typical case or extreme case scenarios which show low risk for possible toxic effects on wildlife, fish or aquatic organisms as displayed in Tables III-H-2, III-H-3, and III-H-6 in the Risk Assessment.
4. Includes mitigation requirements described in the Risk Assessment on page III-B-7 (page 2-8).

Herbicide treatments are intended to be just a part of the overall IWM approach, and would be used in conjunction with other measures in the control of noxious weeds.

Advantages of herbicide methods include a wide range of selectivity from targeting specific or individual plants to killing all vegetation on site. Residual effects may vary depending on a multitude of variables including soil type, temperature, type of herbicide, and rainfall. In many cases it is an advantage to use herbicides that have residual properties in the forest environment as they provide control of weeds that germinate some time after herbicide application. By using herbicides at the earliest possible stage of infestation (smaller area/lowest dominance rating), the overall reliance on herbicides is reduced. The weed is controlled before it out competes native species or spreads over larger areas. In most cases, direct application of herbicides is more effective and costs less than other methods of weed control.

A disadvantage of the use of herbicides is the temporary introduction of foreign chemical substances into the environment, and the potential for causing direct or indirect effects on health or environment. Non-target species may be adversely affected. Selectivity and off-site effects vary by herbicide type.

The 1993-94 Montana/Utah/Wyoming Weed Control Handbook (*Whitson et. al., 1993*) recommends the following herbicide treatment for the identified noxious weeds:

Herbicide Treatment Recommendations
Table 2-1

Noxious Weed	Herbicide	Application Rate	Application Time
Canada thistle	Amitrole (Amitrol-T)	Spot: .5 lb ai/12 gal water Broadcast: 4 lb ai/ac	Before bud stage, 6" height
	Clopyrid (Curtail)	1/2-2/3 gal/ac Curtail; 2/3-1 pt/ac Stinger	Active growing rosettes to bloom
	Chlorsulfuron (Telar 75)	.75-1.5 oz ai or 1-2 oz prod/ac	Bloom or early seed development
	Dicamba (banvel)	2-4 lb ae/acre Spot: 2-4 lb ae/100 gal water	Anytime during growing season
	Picloram (Tordon 22K	.5-1 lb ae or 1-2 qt prod/acre Spot: 2-3 qt prod/100 gal water	Before or at bud stage
	Metsulfuron (Escort/Ally)	.6 oz ai/ac or 1 oz prod/acre	Active growth to bloom stage
	Glyphosate (Roundup)	Wiper applic: 10-33% solution	Active growth past bud growth
Dalmation toadflax **Yellow toadflax**	Dicamba (banvel) Picloram (Tordon 22K	4-6 lb ae or 4-6 qts prod/ac 1-1.5 lb ae or 2-3 qts prod/ac	Early spring prior to bloom stage Spring before full bloom
Spotted knapweed **Squarrose knapweed**	Picloram (Tordon 22K) 2,4-D (4 or 6 EC)	.25-.5 ae or 1-2 qt prod/ac 2 lb ae/ac or 2 qt (4EC) or 2.7 pt (6EC)/ac	From rosette to mid-bolt stage Spring: Flower stem elongation
	Dicamba (banvel) + 2,4-D	.5 lb ai/ac or 1 pt Banvel/ac + 1 lb ai/ac 2,4-D	Active growing rosettes, pre-bolt
	Clopyralid + 2,4-D amine	2-3 qt/ac Curtail; 2/3 pt/ac Stinger	Before flower stem elongation
Hoary Cress (whitetop)	2,4-D (4 or 6EC)	2-3 lb ae or 2-3 qt (4EC) or 2.7-4 pt (6EC)/ac	Early in growth stage: Little control is attained after the bud stage
	Chlorsulfuron (Telar 75)	.75 oz ai/ac or 1 oz prod/ac	Bud to early bloom stage
	Metsulfuron (Escort/Ally)	.3-.5 oz ai or .5-.75 oz prod/ac	Bud to early bloom stage
	Amitrole (Amitrol-T)	Spot: 3 lb ai/50 gal water	Before the first bloom opens
Scotch thistle **Musk thistle**	Clopyralid + 2,4-D amine Picloram (Tordon 22K Chlorsulfuron (Telar 75)	1-2 qt/ac Curtail .25-.5 ae or 1-2 qt prod/ac .75-2.2 oz ai/ac; 1-3 oz prod/ac	Before flower stem development Spring: Prior to seed stalks Young, actively growing plants
Russian knapweed	Glyphosate Tordon 22K (2EC) Clopyralid + 2,4-D amine Telar (75DF)	3 lb ae/ac or 1 gal prod/ac 0.5-1 lb ae/ac or 1-2 qt prod/ac 2.5-5 qt/ac mixture (Curtail) .5-1.5 oz ai/ac; .7-2 oz prod/ac	Late bud-early flower Early flower-killing frost Before flower stem elongation post bloom stage
Leafy spurge	Amitrole Dicamba Picloram 2,4-D	8 lb ai/ac 2-6 lb ae/ac; 2-6 qts product/ac .5-2 lb ae/ac; 1-4 qt product/ac 1 lb ae/ac; 1 qt 4EC product/ac	Bud to bloom stage Spring or early summer Growing season up to first frost Bud to early bloom stage
Dyers woad	2,4-D Dicamba + 2,4-D (4#/gal) Metsulfuron Chlorsulfuron	1.5-2 lb ae/ac; 1.5-2 qt 4EC/ac .5 pt banvel + 1 pt 2,4-D/ac .3-.5 oz ai/ac; .5-.75 oz prod/ac .75 oz ai/ac; 1 oz prod/ac	Rosette stage; after fall growth Bud or bloom stage; fall germin. Post emergence-young plants Pre- or early-post emergence
Black henbane	2,4-D and Dicamba	.75 lbs ai/ac 2,4-D and .25 lbs ai/ac Dicamba	Actively growing plants
	Picloram (Tordon 22K)	1-2 pts/ac	Activiely growing plants

2. Biological weed control. Biological control involves using living organisms, such as insects, pathogens, parasites, or grazing animals (such as goats and sheep) to suppress the weed infestation to an acceptable level that shifts the competitive balance in favor of desired plant species. Classical biological control is the distribution of natural enemies collected from the weeds' area of origin. The ability to effectively use biological control agents is limited primarily by the availability of agents. If complete eradication of a weed is necessary or possible, biocontrol agents are not a good choice (*Rees et. al., 1996*). Classical biological control involves the introduction and management of selected natural enemies of a weed. Most BCAs for noxious weeds feed on the flower heads. Other BCAs feed on the crown and stems, leaves, and roots. To be successful, an introduced biological control agent need not kill its weedy host outright. If the insect can stress the plant and reduce its competitive advantage, more desirable vegetation can displace the weed.

Biological control is slower than other weed control methods. Another disadvantage of this biological vegetation management technique is that it does not control the spread of noxious weeds, but instead suppresses it. This is because the insects require a residual population of the host plants in order to survive. Biological agents may significantly reduce the number of viable plants but they will not completely eradicate their host. After populations of the host weeds decrease, populations of BCAs will correspondingly decrease. Therefore a resurgence of weed populations may occur due to seed reserves in the soil, missed plants, and lagging populations of BCAs. Another disadvantage lies in the fact that although introduction of host-specific insects is carefully studied and planned in advance, there is always the potential risk of disrupting natural ecosystems. This risk has been minimized by using host-specific agents, careful suitability studies, and intensive monitoring.

3. **Manual and mechanical control.** Physical weed control methods can be effective on small infestations. Hand-pulling, hoeing, tilling,
mulching, burning, and mowing are all commonly used to control noxious weeds. Manual treatment consists of hand pulling or grubbing with hand tools and, therefore, is very labor intensive. Hand pulling and hoeing are most successful under conditions where complete crown removal can be obtained. Shallow-rooted weeds can be removed by hand pulling where the soil is loose or moist. Tillage can be successfully used in level areas. A single low-intensity fire does not effectively control weeds because it is not hot enough to prevent resprouting from crowns or re-establishment from viable seeds in the soil. Fires may create the type of disturbance that promotes the colonization of many weeds. However, herbicide efficiency may increase when applied post-burn. Mowing reduces seed production in some plants, especially annuals. However, the stage of growth and weather after mowing appears critical (*Isaacson et. al., 1998*).

The effectiveness of hand pulling is limited to plants that spread primarily by seed. Success is more likely when the size or level of infestation is low. Hand pulling or digging may be an effective tool when used to remove missed or late-blooming plants in follow-up treatments. Cost of manual control is much higher per acre than herbicide methods; therefore fewer acres can be treated with equal funding.

4. **Cultural weed management.** Cultural methods are generally aimed at enhancing desirable vegetation to minimize weed invasion. Plant competition, grazing, and fertilization can favor desired species. Revegetation with desirable plants may be the best long-term alternative for controlling weeds on sites without an understory of desirable species. Establishing competitive grasses can minimize the re-invasion of rangeland weeds and provide excellent forage production (*Isaacson et. al., 1998*).

Additional Requirements of Alternative 1 – Proposed Action

The following requirements will be implemented under this proposed action (Alternative 1). These measures are required to alleviate adverse effects to TEPCS/MIS plants, animals, fish, and other wildlife species.

1. Ranger Districts will annually prepare Pesticide Use Proposals for treatment of each weed species (see Appendix G). These proposals will be reviewed and approved by the Forest Noxious weed coordinator for consistency with this analysis and appropriate application and treatment procedures.

2. The size, width, and extent of modified treatment areas will be identified and determined on a case-by-case basis considering factors such as proximity to habitations, TEPCS/MIS habitats, and the presence of water. The application of herbicides by vehicle-mounted boom sprayers will not be permitted in modified treatment areas. Target plants adjacent to streams, dwellings, or occupied TEPCS/MIS habitats will be treated to achieve effective control and minimize spread. In these areas, target plants will be controlled using spot treatments with herbicides or other suitable methods. Any herbicide used will be carefully selected to minimize drift and adverse effects to live water, human habitations, and/or TEPCS/MIS species.

3. Within riparian areas, biological and mechanical treatment methods are preferred over chemical methods. Chemical treatment may be used if it is determined that would be most effective, however, herbicides must be applied on a site-specific basis using spot treatment methods directed at individual plants. No boom mounted sprayers or other similar devices would be allowed.

4. As new information or locations of noxious weeds becomes available, each district will informally discuss this new information with the District, Zone, or Forest Wildlife Biologist to determine if potential problems exist related to treatments. This will be required if the new noxious weed infestations are greater than 10 acres or are in a potentially sensitive area.

5. In treatment areas where Utah prairie dogs are known to occur, the use of 2,4-D and triclopyr would not be allowed.

ALTERNATIVE 2--CONTINUE CURRENT CONTROL STRATEGIES

Under this alternative, there would be no change in invasive weed management on project areas. Currently approved ground-based invasive weed treatments would continue. Release of Biological control agents (parasites and predators and pathogens) would be limited and approved with site-specific analyses.

The majority of historical control efforts have been by the use of herbicides (both ground-based broadcast and spot treatment applications) and physical and mechanical (hand pulling/digging). In 1987, a site-specific evaluation was completed for treatment of noxious weed infestations on the Forest as directed in the Regional Noxious Weed and Poisonous Plant Control Final Environmental Impact Statement (FEIS) (USDA FS, 1986). That evaluation was updated in 1989, and on April 16, 1990, a Decision Notice and Finding of No Significant Impact was approved for controlling noxious weeds on the Fishlake National Forest. Annually, approximately 1,000 acres have been chemically and/or mechanically treated under these programs and approved pesticide-use proposals. Most noxious weed areas have been treated with herbicides for many years (15 to 20 years, and longer in some cases). Most species have been treated with 2,4-D. More recent invaders have been sprayed
with some of the more selective and systemic herbicides such as Amitrol-T, Dicamba, and Tordon. In each instance, spot treatments with ground rig or backpack sprayers were used.

The targeted acreage of noxious weeds for treatment under this alternative is the same as that for the Proposed Action.

Under this alternative no Forest Plan amendment would be developed to include revised goals and objectives for noxious weed control and management. No weed prevention practices would be emphasized for resource uses and activities.

Aggressive control of weed infestations would not occur. There would be no adaptive strategy to plan for eradication of new invaders or to adjust treatment needs if site conditions in existing infestations change.

Proposed weed control efforts would likely be addressed on a project-by-project or site-by-site basis, but with no overall strategy or prioritization. New noxious weed invaders would be treated, as they are detected and as funding permits.

Under this alternative, most noxious weed species would be considered an established part of the ecosystem.

Requirements of Alternative 2

The following five requirements will be implemented under Alternative 2. These measures are required to alleviate adverse effects to TEPCS/MIS plants, animals, fish, and other wildlife species

1. The size, width, and extent of modified treatment areas will be identified and determined on a case-by-case basis considering factors such as proximity to habitations, TEPCS/MIS habitats, and the presence of water. The application of herbicides by vehicle-mounted boom sprayers will not be permitted in modified treatment areas. Target plants adjacent to streams, dwellings, or occupied TEPCS/MIS habitats will be treated to achieve effective control and minimize spread. In these areas, target plants will be controlled using spot treatments with herbicides or other suitable methods. Any herbicide used will be carefully selected to minimize drift and adverse effects to live water, human habitations, and/or TEPCS/MIS species.

2. Within riparian areas biological and mechanical treatment methods will be encouraged over chemical methods. If it is determined that chemical treatment would be most effective, then it may be used, however, herbicides must be applied on a plant-specific basis using spot treatment methods directed at individual plants. No boom mounted sprayers or other similar devices would be allowed.

3. As new information or locations of noxious weeds becomes available, each district will informally discuss this new information with the District, Zone, or Forest Wildlife Biologist to determine if potential problems exist related to treatments. This will be required if the new noxious weed infestations are greater than 10 acres or are in a potentially sensitive area.

4. In treatment areas where Utah prairie dogs are known to occur, the use of 2,4-D and triclopyr would not be allowed.

5. On riparian treatment sites where the Colorado cutthroat trout is known to occur, a Fisheries, District, Zone or Forest Wildlife Biologist will be consulted to

determine if specific actions are necessary to minimize impacts to this species.

ALTERNATIVE 3--NO ACTION (NO TREATMENT)

The No Action alternative is required by the National Environmental Policy Act (NEPA) as a means to describe the conditions that would exist without conducting the proposed action. The intent of this alternative is to provide a baseline against which the effects associated with the two action alternatives could be compared.

Under Alternative 3 there would be no noxious weed control activities on the Fishlake National Forest. Preventative measures to reduce the current spread of noxious weeds or the likelihood of new infestations could be implemented or required by other management programs, but their application would not be stipulated by established direction. The noxious weeds that currently exist on the Forest would be allowed to continue to spread and no actions would be taken to reduce the risk of new invasions by other weeds. The No Action alternative would result in uncontrolled spread of noxious weeds to uninfested public and private lands. Without suppression or containment, weeds will continue to spread into susceptible areas not presently occupied by these plants. Many susceptible plant communities are rapidly becoming infested with undesirable weeds to the extent that native plant communities are irreversibly changed.

If noxious weeds are not managed, there will be high potential for increasingly adverse short-term (0-1 year), long-term (1-5 years), and cumulative effects to occur on Forest resources and activities.

Left uncontrolled, these plants severely threaten biodiversity, habitat quality, and ecosystem functions (see Chapter 4)

MITIGATION MEASURES

Mitigation measures are intended to ensure the proper and safe application of herbicides on lands that may be treated in Forest Service vegetation management programs. Federal and State laws set minimum standards to follow when applying herbicides on Government-owned forest and rangelands. Each regional and district office may develop additional restrictions and precautions. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires pesticide manufacturers to register their chemicals with the Federal Government and to list allowable uses, application rates, and special restrictions on each herbicide's label. All of the pesticides considered in this Environmental Analysis are registered under FIFRA with EPA. Application operations must comply with the label rates, uses, and handling instructions according to Federal law.

Herbicide ground application procedures undergo detailed planning weeks or even months in advance. Specific mitigation measures include not spraying in sensitive areas, notifying the public, posting warning signs, and conducting monitoring.

Herbicide Application. Specific examples of project safety and mitigation may include:

- Suspension of application operations will occur when any one of the following conditions exist:

  -- Wind velocity exceeds 6 miles per hour for liquids or 15 miles per hour for granular herbicides, unless a lower maximum wind speed is specified on the label.

  -- Snow or ice covers the target foliage

  -- Precipitation is occurring or is forecasted within 24 hours of treatment

  -- Fog significantly reduces visibility

  -- Air turbulence, such as thermal updrafts, is sufficient to affect the normal herbicide distribution pattern

- Maintenance of radio network will link all parts of the project

- Use of equipment will be designed to deliver a median droplet diameter of 200 to 800 microns (droplet sizes large enough to avoid excessive drift while providing adequate coverage of target vegetation.)

- Individuals involved in the safe handling and application of herbicides will be trained and certified.

- The use of products which have narrow margins of safety will be restricted or approval for use of these products reserved to higher authority.

- Public access to areas during and for a period following treatment may be restricted.

- The use of herbicides near residences, culinary water sources, food crops, or gardens will be restricted.

- The number of days or hours per day that application crews may apply products with narrow margins of safety will be restricted.

- Livestock will be prevented from grazing in areas treated with some herbicides.

- The use of clothing approved for herbicide application will be required.

REQUIRED DESIGN CRITERIA

The following specific criteria must be applied during project implementation if an action alternative is selected. The purpose of these measures is to completely avoid, or to the fullest extent possible, minimize the potential for adverse effects to soil and water resources. The effects analysis assumes their implementation. Informal Forest Plan monitoring, a review done by Norris et. al. 1991, and past experience have shown that the included measures are effective if diligently and correctly applied.

Water Quality.

The likelihood of an herbicide impacting surface water, groundwater, or culinary sources will be greatly decreased through the use of the following mitigation measures:

- Non-aquatic weeds. Buffer zones (200 feet minimum) will be designated around lakes, springs, reservoirs, wetlands, perennial and intermittent streams. Cultural, mechanical and biological weed treatments can occur in these areas. Herbicide use will not occur within buffer zones to protect aquatic species and water quality.

- Non-aquatic weeds. Within riparian areas, that have no standing or running water or that have infestations outside a buffer zone protecting a water source, biological and mechanical treatment methods will be encouraged over chemical methods. If it is determined that chemical treatment will be more effective then it may be used, however, herbicides must be applied on a site-specific basis using spot treatment methods directed at individual plants. No boom mounted sprayers or other similar devices are allowed.

Source Water Protection Areas.

- Herbicide use will be excluded from established Source Water Protection Areas for public drinking water. In most cases, this would include the areas delineated for Zone 1 and Zone 2 of the Source Protection Plan.

- Application of pesticides within Zone 3 (3-year ground water travel time distance) of Source Water Protection Areas will require a Use Waiver from the Utah Division of Drinking Water. To qualify for a Use Waiver, pesticides cannot have been used, stored, transported, disposed of, or manufactured within Zone 3 within the past 5 years.

- Treatment in municipal and domestic watersheds will only be conducted after attaining a Use Waiver and notifying the system managers (and the Forest Service, if done by a cooperator) of planned treatment locations, times, and application rates. Prior notice will allow the system managers to object to or do additional water quality monitoring if they so desire. A list of active water systems in each county can be accessed at the following web address: http://www.epa.gov/safewater/dwinfo/ut.htm. A map of current sites that have established Source Water Protection Areas in or within 3,000 feet of the Fishlake National Forest is included in Appendix I.

- Herbicide mixing, storing, and filling areas will be located outside surface and culinary water buffer zones.

- Herbicides identified as having high leaching potential and high mobility (picloram, metsulfuron, chlorsulfuron, dicamba, clopyralid) will not be used over identified sensitive aquifers.

- 2,4-D and glysophate will not be used within 1/2 mile of any culinary water source.

Important Native & Recreational Fisheries Protection.

Chemical treatment will not occur within 300 feet of the perennial portions of the streams listed in the following table to further reduce the probability of affecting native Bonneville and Colorado River Cutthroat trout populations. Chemical treatment will also be avoided within 150 feet of intermittent channels and within 50 feet of ephemeral (dry) channels that are part of the stream network in these watersheds. This list will be updated as native cutthroat reintroductions expand existing occupied habitats. A current map of the critical stream sections is included in Appendix I.

Stream / Lake / Watershed Name	District	Type of Fisheries
Pole Creek	Fillmore	Bonneville Cutthroat
Sam Stowe	Fillmore	Bonneville Cutthroat
UM Creek	Loa	Colorado Rivr Cutthroat
Sand Creek	Loa	Colorado Rivr Cutthroat
Pine Creek	Beaver	Bonneville Cutthroat
N. Fork North Ck	Beaver	Bonneville Cutthroat
Briggs Creek	Beaver	Bonneville Cutthroat
Birch Ck West	Beaver	Bonneville Cutthroat
Birch Ck East	Beaver	Bonneville Cutthroat
Tenmile Creek	Beaver	Bonneville Cutthroat
Manning Res. and Manning Ck	Richfield	Bonneville Cutthroat

Extra caution should also be taken when applying chemicals in the watersheds listed below that support recreational fisheries that are unique and especially important to the Forest.

Stream / Watershed Name	Ranger District	Type of Fisheries
Corn Creek	Fillmore	Recreational
Sevenmile Creek	Loa	Recreational
Fish Lake	Loa	Recreational
Beaver River	Beaver	Recreational

Shallow Water Tables and Wetlands.

Treatment must not be applied where the water table is high, where leaching or surface runoff is likely, except when using chemicals for the target species that are EPA approved for aquatic applications.

Applications on roads and trails or within 300 feet of channels (wet or dry) will not be applied when the National Weather Service predicts a strong likelihood of moisture within the next 24 hours (50 percent or more chance of precipitation with amounts of 0.1 inches or more within the next 24 hours).

Off-Road Application with Mechanized Equipment

Use of mechanized off-road equipment for spraying will be consistent with the Forest Travel Plan Map. Deviations will require District Ranger approval prior to implementation. Off-road vehicular application will not be allowed on soils rated as severe and/or unsuited on the ATV suitability map (Appendix I), and will be used judiciously on soils with moderate ratings.

In all cases, any ruts or noticeably compacted areas caused by off-road application equipment will be stabilized as necessary to prevent erosion and restore long-term productivity.

Off-road spray equipment and vehicles will be washed prior to moving to and from treatment areas to prevent the spread of noxious weeds to new areas, and to prevent introducing new noxious weeds to already infested sites.

Labeling Restrictions related to Soil pH.

The labeling on chemicals such as Ally/Escort and Glean/Telar indicate that they should not be used on soils with a pH above 7.9 and 7.5, respectively. The soils pH map (Appendix I) will be used to identify where use of pH restricted chemicals are appropriate and where they will not be applied. If the label identifies pH values that fall in more than one of the classes shown on the map, then on-site soil pH testing will be done before applying pH restricted chemicals to make sure that label instructions will be adhered to.

Hazardous Spill Prevention.

Chemical treatments will be applied by a licensed commercial applicator and in accordance with label instructions.

Each spray crew will be required to have spill kits immediately available to them and the personnel must be trained how to properly use the kits. The kits should contain materials appropriate for the amount and types of chemicals being used.

Chemicals and fuel will not be stored within 300 feet of channels (wet or dry). All excess chemicals and waste products will be collected and transported to proper disposal facilities outside of public lands as described by the product label. In case of unauthorized release of hazard materials, the applicators must:

a. Stop continuing spills,
b. Contain material,
c. Notify the authorities listed in the chemical products spill protection plan, and
d. Collect, remove and dispose of the spilled material.

A chemical products spill protection plan will be required. This intent of this requirement is to minimize the response time to and potential consequences from accidental spills and is a standard requirement for pesticide treatments.

Aquatic Nuisance Species.

Water used for mixing chemicals or cleaning equipment will not be drafted from whirling disease positive streams (see whirling disease maps in Appendix I).

Monitoring.

The Forest Service will maintain maps showing the actual locations, timing, and application rates for the areas treated. Cooperators should supply these data to the Forest as well. These data are needed to implement an integrated control strategy, and for implementation and effects monitoring. These data can also be used to reduce or prevent the potential for cumulative and synergistic chemical effects.

FEATURES COMMON TO ACTION ALTERNATIVES

Adaptive Management Strategy

An adaptive management strategy offers an avenue to describe and evaluate the consequences of changing invasive plant infestations. Weed infestations constantly change and evolve, making it difficult to keep a proposal and eventual decision current. The most complete inventory will never cover the entire potentially infested area. It is certain that not all infestations can and will be mapped. Even under the assumption that an inventory is 100% complete, by the time the inventory is finished infestation size and number will already be changing in areas inventoried early in the survey. A single plant can produce more than 100,000 seeds. Three plants can expand to ½ an acre in a single growing season; ½ an acre can expand to ten acres during the same period. The same difficulty applies to itemizing individual weed species. The most accurate surveys will only include the species and the locations found at the time of the survey. New infestations and new species are usually the highest priority for treatment. Decisions that are specific to

location and species do not allow for treatment of these areas that were unknown at the time of the decision. The time necessary to complete new and or additional analysis can be lengthy—six months to a year. During this waiting period, huge expansions of these new populations can occur. Cost of treatment can increase vastly or the opportunity of containing the populations can be lost.

Adaptive management practices will be used in the decision-making processes of the completed EA. Adaptive Management refers to the concept of allowing decisions, which are focused on desired outcomes, to be made with the best information available and to be adjusted during implementation to achieve desired conditions. Decision-making is expected to proceed using the best information available commensurate with the decision being made, and monitoring and evaluation is to be used to assess the effects of those decisions and to identify new information which may become available. Decisions are then adapted, as needed, to respond to new information.

Forest Service risk assessments are reviewed for adequacy on a continuing basis. The Forest Service monitors the Environmental Protection Agency (EPA) activities in registration or re-registration notifications to chemical manufacturers when additional studies may be required for continued registration. New EPA Health Advisory Notices for the pesticides used by the Forest Service are regularly obtained. Monitoring of the manufacturers to determine if new formulations of pesticides are entering the marketplace is also performed on a continuing basis. If significant new information is identified, it is carefully evaluated to determine the need to update the existing risk assessment. In general, the Forest Service (at the national level) completes new risk assessments on a specific herbicide on about a 10-year cycle, especially if sufficient new studies of "credible scientific evidence" have been completed since the last risk assessment was prepared.

The principles of Adaptive Management to be applied to this project include the following:

1. Treatment of infestations of noxious weeds that may become established but which are not currently identified on the species list of known noxious weeds occurring on the Forest. This includes treatment of weed species that may be identified on county noxious weed lists and which may not be designated on the Federal Noxious weed list.
2. The use of approved herbicides, with attendant risk assessments, that may not be specifically listed in the Proposed Action.
3. The application of new research on the use of biological control, suitable herbicides, vegetative competition, and ecosystem information on vulnerability to invasion.
4. If prescribed management fails to result in the desired outcome, alternative strategies will be developed, and management will be "adapted" until the desired outcome is achieved.
5. Cooperation in a Coordinated Weed Management Area (CWMA) and with other agencies and landowners may require adaptation to different treatment priorities, new teatment methods, new weed species, and innovative strategies.

COMPARISON OF ALTERNATIVES

Table 2-3 Comparison of Alternatives—Purpose and Need			
Component	**Alternative 1 The Proposed Action--IWM**	**Alternative 2 Continue Current Control Strategies**	**Alternative 3 No Action**
Complies with Law and E.O.	Yes - The Proposed Action complies with the Noxious Weed Act of 1974, USDA Policy 9500-10 as revised, the National Strategy for Invasive Plant Management (Pulling Together), FS Strategy for Noxious Weed and Nonnative Invasive Plant Management (Stemming The Invasive Tide), Intermountain Region Strategy For Noxious Weed Management, and the 1999 Invasive Species E.O.	No – This alternative would not provide for emphasis or prioritization to stop the invasion and spread of noxious weeds. There is limited provision for implementation of weed prevention practices.	No - This alternative does not comply with noxious weed laws, policies, strategies, or the 1999 Executive Order to aggressively manage for the control and eradication of noxious weeds.
Complies with Forest Plan	Yes - The Proposed Action implements an Integrated Weed Management program (LRMP, IV-49) and it prescribes priorities for controlling existing and new populations (LRMP, IV-23). The Proposed Action would gradually move the status of noxious weeds towards the desired condition in the LRMP.	Yes – This alternative continues an Integrated Weed Management program (LRMP, IV-49) and it prescribes priorities for controlling existing and new populations (LRMP, IV-23). This alternative, however, with limited weed prevention practices, is not aggressive enough to move the status of noxious weeds towards the desired condition in the LRMP.	No - This alternative would not implement a prioritized program for noxious weed control as prescribed in the Forest Plan (LRMP, IV-23). It would not move infested forestlands toward the desired condition in the LRMP. Forest Plan desired conditions cannot be met if native communities are invaded by, or replaced by, invasive exotic plants.
Complies with NEPA/NFMA	Yes – This EA is tiered to the 1986 R4 FEIS and incorporates a Forest Plan Amendment for weed prevention practices.	Although this alternative is supported by a 1987 EA that is tiered to the 1986 R4 FEIS, it is no longer NEPA-sufficient.	No – NFMA requires that actions be taken to assure the concepts of multiple use and sustained yield.

Table 2-4 Comparison of Alternatives--Issues			
Component	**Alternative 1 The Proposed Action--IWM**	**Alternative 2 Continue Current Control Strategies**	**Alternative 3 No Action**
Environmental Effects of Herbicides	Minimal effects on non-targeted species. Some health risks to Forest workers.	Minimal effects on non-targeted species. Some health risks to Forest workers.	None
Landowner Cooperation	Recommends the development of a Coordinated Weed Management Area.	Informal cooperation with State and County agencies and some adjacent landowners.	Non-compliant with State laws for landowner control of noxious weds.
Control Priorities	Control priorities determined by treatment strategy, including implementation of weed prevention practices.	Implements a weed control treatment strategy.	No Control
Cost	$100/acre treated with emphasis on 5 % eradication per year.	$70/acre treated at a maintenance level of 7,600 affected acres controlled in perpetuity.	The spread of noxious weeds would likely result in a negative cost-return figure. Costs associated with ecological damages would escalate.
Effectiveness	Moderate to High	Low to Moderate	None
Impact of Weed Prevention Measures	Moderate to High	Limited	None

Table 2-5 Comparison of Alternatives—Environmental Effects			
Resource	**Alternative 1 The Proposed Action--IWM**	**Alternative 2 Continue Current Control Strategies**	**Alternative 3 No Action**
Air Quality	Virtually no change from existing environment.	Generally good to excellent.	Minor probability of airborne allergens from some noxious weed species.
Soils	No significant change. Some persistence of herbicides in soils, more likely in arid areas. Some off-road applications using vehicles could cause some soil disturbance.	In good condition except for minor areas needing improvement. No significant change in the short term. As infestations enlarge, potential for increased soil erosion increases. Some persistence of herbicides in soils, more likely in arid areas.	Noxious weeds may increase soil erosion. Infiltration may be reduced and runoff increased on sites dominated by noxious weeds. Noxious weeds contribute less organic matter to the soil. Many noxious weeds deplete soil nutrient reserves to very low levels. Most noxious weeds have secondary compounds that may affect soil microorganisms.
Water Resources	Most of the prescribed treatments are non-ground disturbing. Some detectable levels of herbicides may enter streams from drift; short-term impact may result from spraying dry stream channels; overall impact to water resource is insignificant; no impact to groundwater expected.	Generally no detectable levels of herbicides in streams and groundwater. Prescribed treatments are managed to reduce or prevent the potential for creating erosion.	Increased water runoff and sediment yield may result from infested sites. There will be no risk of contamination.
Vegetation	Increased production of grasses, some loss of individual non-target plants. Native plant communities essentially remain intact. Continued spread from established infestation	Current treatment programs are producing control in some areas; there is continuing spread of noxious weed in other areas.	Uncontrolled spread of weeds on the Fishlake NF and adjacent private land and other lands. Noxious weeds may affect the structure of ecosystems by altering the composition of plant communities. Noxious weeds reduce native plant community productivity, species diversity, and species richness.
Livestock/ MIS Wildlife	Non-target vegetation may be killed or damaged. This could be a significant impact on treatment sites of 100 acres or more, especially big game winter range. There would be beneficial effects for livestock and big game where weeds are replaced by desirable vegetation. Doses of herbicides planned for use would not affect wildlife.	In weed-infested areas, noxious weeds reduce forage production for some livestock and certain wildlife species, mainly big game. Weed spread is not significantly affecting wildlife populations.	Livestock and wildlife avoid areas with heavy infestations of noxious weeds. In weed producing areas, production would be reduced for livestock and certain wildlife species, mainly big game. No major effects on populations. Potentially significant impact by noxious weeds on individual big game winter ranges if infestations become severe. Most grassland-dependent wildlife species would suffer from the decrease in forage and hiding cover on heavily infested sites.
Aquatic MIS	There is a low probability of effects from herbicide application. Riparian vegetation would be improved through the control and/or eradication of noxious weeds, thereby improving streamside cover, streambank stability, and stream channel characteristics.	Most habitat in fair to satisfactory condition.	Fish populations would remain unchanged in the short term. In the long term, riparian habitat may be invaded by noxious weeds, thereby reducing shade and increasing streambank instability that would have negative effects on fish populations and other aquatic life.
TEPS/MIS Plants	Non-target TEPS plants within a noxious weed area could inadvertently be killed by herbicide applications. Control of noxious weeds would protect TEPS plant habitats and native biodiversity.	There is occupied habitat for 3 T&E plants and 16 Sensitive plant species on the Fishlake National Forest.	TEPS plant habitats would be subject to invasion by noxious weeds and there is the potential for loss of habitats.
TEPS Fish	There is a low probability of effects from herbicide application. Riparian vegetation would be improved through the control and/or eradication of noxious weeds, thereby improving streamside cover, streambank stability, and stream channel characteristics.	There is occupied habitat for Bonneville cutthroat trout, and Colorado River cutthroat trout.	Fish populations would remain unchanged in the short term. In the long term, riparian habitat may be invaded by noxious weeds, thereby reducing shade and increasing streambank instability that would have negative effects on fish populations and other aquatic life.

Table 2-6 Comparison of Alternatives—Environmental Effects			
Resource	**Alternative 1 The Proposed Action—IWM**	**Alternative 2 Continue Current Control Strategies**	**Alternative 3 No Action**
TEPCS Wildlife	These species have limited exposure to noxious weed treatment areas. Most herbicide applications within the vicinity of Utah prairie dog colonies may temporarily affect foraging habitat, but will not likely contribute toward loss of viability to any population or species. Increases in health and vigor of upland and riparian areas would subsequently benefit TEPCS wildlife habitats.	There is occupied habitat for the northern goshawk, peregrine falcon, Utah prairie dog, three-toed woodpecker , flammulated owl, and bald eagle. There is potential habitat for the Mexican spotted owl, spotted bat, Townsend's big-eared bat, and western yellow-billed cuckoo.	The potential exists for untreated infestations to negatively affect riparian and upland habitats that provide food and cover for some TEPCS species or their prey. TEPCS wildlife populations would remain unchanged in the short term.
Cultural Resources	No effect. Cultural resource surveys required for all ground-disturbing activities.	No effect. Cultural resource surveys required for all ground-disturbing activities.	No effect.
Visual Resources And Recreation	Low probability of scenic degradation. Enhancement of native biodiversity would provide benefits to visual resources. Decrease in presence of stickers, thorns, burrs, and irritants of noxious weeds would increase visitor use.	Continued control of target plants in recreation areas. Some loss of scenic values on uncontrolled areas.	Adverse impacts by target plants. Reduced visitor use.
Economic Conditions	Maximum beneficial impact to local economies. Grazing capacities would be sustained. Wildlife habitats would be improved, resulting in increased wildlife-associated recreational revenues. Implementation of weed prevention measures will increase costs of some forest operations.	Currently, due to the generally limited expansion of noxious weeds on the Fishlake NF, noxious weed infestations have minimal economic impacts on local economies. The increasing expansion will eventually result in reduced forage availability that, in turn, will result in reduced livestock numbers.	Increased spread of noxious weeds would result in reduced income from lower grazing capacities, lost livestock sales, and reduced grazing land values. Changes in wildlife habitat and reduced big game populations would have adverse effects on wildlife-associated recreation expenditures. The spread of infestations from the Forest onto adjacent private lands would result in negative economic impacts due to increased weed control costs, reduced agricultural production, as well as economic benefits foregone due to the continued presence of noxious weeds.
Social Environment	Unacceptable to those who oppose herbicide control measures. Positive response from the ecological and agricultural communities. Implementation of weed prevention measures will impact Forest users and activities.	Local, State, and Federal agencies are alarmed at the potential environmental harm of noxious weed invasions. The general public is concerned about maintaining biodiversity and native species. Southern Utah is largely agriculturally dependent. Maintaining lifestyles, depending on forest resources, and improving recreational opportunities are important to these publics.	If left untreated, the continued spread of noxious weeds will ultimately have a negative impact on all activities on the Forest.
Human Health	No adverse impacts expected from use of proposed herbicides. Low probability of increased cancer risk.	No known adverse impacts from use of proposed herbicides. Current treatment methods present negligible hazards to human health and the safety of Forest visitors or workers.	No risk of adverse impacts from use of proposed herbicides. Some noxious weeds have subtle direct effects on humans including significant allergens and minor skin irritations. Some species, such as thistles, cause minor scrapes and irritations,

CHAPTER 3: AFFECTED ENVIRONMENT

A. INTRODUCTION

In this chapter, we describe the existing condition of the environment that may be affected by the alternatives. This description of current resource conditions provides the basis for assessing the projected environmental effects of the alternatives discussed in Chapter 4 (Environmental Consequences). It also provides the context for assessing how the alternatives respond to the issues identified in Chapter 2; environmental effects of herbicides, cooperation with owners of adjacent lands, priorities for control, economic impacts of noxious weed spread, effectiveness of weed control strategies, and impact of weed prevention measures on Forest users.

B. PROJECT AREA

The proposed noxious weed management strategies will apply to all National Forest System lands within the 1.5 million-acre area of the Fishlake National Forest on the Fillmore, Beaver, Richfield, and Loa Ranger Districts. The Richfield and Loa Districts lie within the High Plateaus section of the Colorado Plateaus Physiographic Province. The Fillmore and Beaver Districts are located in the Basin and Range Province.

Elevations range from 5200' in Sevier Valley (5500' in Pahvant Valley) to over 10,000' on Monroe Mountain, the Tushars, the Pahvant Range, Musina Peak, Old Woman Plateau, and Hilgard Mountain. Vegetation types range from desert salt shrub in the Sevier Valley and pinyon-juniper and sagebrush in other valley floors to mountain brush, aspen, ponderosa pine, mixed conifer, alpine-forb communities on the Tushars, Mt. Terrill, and Gunison Valley. Riparian ecosystems may occur within any or all of these types. Alpine riparian areas occur on Lake Peak and in the heads of North Creek on the Beaver Ranger District. Noxious weeds have infested nearly 7,600 acres within these major vegetative communities. Major forage producing areas are being invaded by noxious weeds and invasive exotic plants. This may reduce grazing capacity for livestock and wildlife.

Several important regional aquifers underlie the Fishlake National Forest. The depth to groundwater is variable, and many shallow perched water tables exist. Springs and late season stream base flow are the surface expression of many shallow water tables. In general, the water quality of groundwater and springs is excellent. The quality of water from forest streams typically meets all State Water Quality standards. With few exceptions, all streams on the Forest are classified by the State of Utah as High Quality Waters (Utah DEQ). High quality waters must be maintained at their existing high quality, and non-point source impacts will be controlled through the use of required design criteria (see Chapter 2). Some streams and lakes on the Fishlake National Forest are on the Utah 303(d) list of impaired waters (Utah DEQ). They are summarized in the following table (Table 3-1). Herbicides and other chemical constituents have not caused any Forest water body to be included on the 303(d) list.

Table 3-1
2000 & 2002 303(d) Water Quality Limited Streams, Lakes, Reservoirs* in or Near the Fishlake National Forest

Waterbody Name	Cause of Impairment	Spatial Extent
Sevier River and tributaries	Total Phosphorous Sediment Habitat Alteration	From Circleville Irrigation Diversion upstream to Horse Valley Diversion
Sevier River and tributaries	Total Phosphorous Sediment Habitat Alteration Total Dissolved Solids	From Yuba Dam upstream to the confluence with Salina Creek
Sevier River and tributaries	Total Dissolved Solids	East side tributaries of Sevier River from Rocky Ford Reservoir upstream to Annabelle Diversion and below USFS boundary
Otter Creek and tributaries	Total Phosphorous Sediment Habitat Alteration	From Koosharem Reservoir to headwaters
Greenwitch Creek and tributaries	Total Phosphorous Sediment Habitat Alteration	From confluence with Otter Creek to headwaters
Box Creek and tributaries	Total Phosphorous Sediment Habitat Alteration	From confluence with Otter Creek to headwaters

Table 3-1 (Continued) 2000 & 2002 303(d) Water Quality Limited Streams, Lakes, Reservoirs* in or Near the Fishlake National Forest		
Waterbody Name	Cause of Impairment	Spatial Extent
East Fork Sevier River and tributaries	Total Phosphorous	From confluence with Sevier River upstream to Antimony Creek confluence, excluding Otter Creek and tributaries
Salina Creek and tributaries	Total Dissolved Solids	From confluence with Sevier River to USFS boundary
Lost Creek and tributaries	Total Dissolved Solids	From confluence with Sevier River upstream ~ 6 miles
Middle Muddy and tributaries	Total Dissolved Solids	From Quitchupah Creek confluence to U-10 crossing
Lower Quitchupah Creek and tributaries	Total Dissolved Solids	From confluence of Ivie Creek to U-10 crossing
Lower Ivie Creek and tributaries	Total Dissolved Solids	From confluence with Muddy River to U-10 highway
Piute Reservoir	Total Phosphorous Temperature	-
Koosharem Reservoir	Total Phosphorous	-
Lower Box Creek Reservoir	Total Phosphorous	-
Manning Meadow Reservoir	Total Phosphorous Dissolved Oxygen	-

* This list does not include impaired waters that have an approved TMDL in place – the 2000 303(d) list was used for streams and lakes not covered by the 2002 303(d) report. See the States 2000 and 2002 reports for addition and more specific listing information at http://www.waterquality.utah.gov/documents/approved_2000_303d.pdf, http://waterquality.utah.gov/documents/2002303final08-30-02.pdf and http://oaspub.epa.gov/waters/state_rept.control?p_state=UT.

C. LONG-TERM MANAGEMENT OBJECTIVES

The long-term management objective of the Forest would have an absence of any new invasive noxious weed species. A significant reduction of established invasive noxious weeds is desired in areas receiving heavy human use and areas with special management objectives. These Ares include: roadways, gravel and borrow pits, livestock grazing allotments (especially abandoned agricultural use areas, riparian areas, and meadows), recreation sites (including campgrounds, dispersed campsites, and trailheads, and semi-primitive recreation areas), Research Natural Areas (RNAs), plantations, general forest areas (especially areas disturbed by dramatic incidences of wildfire), special wildlife habitats, and administrative sites.

The management objective of roadsides is establishment of perennial grasses on road cut and fill slopes. Perennial grasses offer the greatest protection against erosion, the greatest sight distance, the best defense against noxious weed invasion and spread, and provide the best source of organic matter soil input for site recovery.

Gravel pits and material borrow sites are an especially important concern because they serve as a host area with the potential to accelerate the spread of weeds. The management objective of these sites is to maintain a weed-free condition and to provide a vegetation buffer free of noxious weeds and to prevent incidental contamination of material from external sources.

Because of past management activities, usually prior to acquisition as National Forest System lands, many old homestead pastures and meadows are no longer dominated by native species. Some remain in a disturbed condition. The management objective of National Forest rangelands used for domestic livestock grazing is to provide an adequate quality and quantity of forage to sustain the number of animal units allowed in grazing allotment management plans.

Management objectives of recreation sites is driven by type of activity, timing of use and site conditions. The focus of vegetation management in campgrounds and at trailheads is public safety, erosion control, a healthy variety of vegetative species, visual quality, and quality of experience. Noxious weeds are particularly prone to spread by human activity; therefore, weed control in high-use areas is especially emphasized.

Trailheads would be managed to provide for vegetative diversity, but should be kept in a weed-free condition to avoid spreading weeds into non-contaminated areas. Vegetation in campgrounds would be managed to provide visual and sound buffers as well as to have an ability to withstand intense human use. A healthy shrub and grass component is important for buffers in campgrounds, and vital for erosion control in dispersed campsites along riparian areas.

Research Natural Areas (RNAs) are established to provide opportunities for research in ecosystems influenced only by natural processes. They are selected because they contain examples of typical natural ecosystems or unique kinds of vegetation, animals, and land. The management objective of RNAs is the maintenance of natural native species and the suppression of noxious weed species.

General forest areas are managed for diversity, wildlife habitat, visual qualities, and to meet economic resource needs. The management objective is vegetative and

structural diversity. The management objective of plantations is reforestation with prescribed species. Administrative sites would be kept free of noxious weeds in order to prevent spread off-site.

Wildlife needs would be met by maintaining the vegetative historic range of variability in order to provide the quality and quantity of habitat to provide for species viability as prescribed by the Forest Plan. Habitat for threatened, endangered, and sensitive species would be managed by the Forest Service in consultation with the U.S. Fish and Wildlife Service.

D. DESCRIPTION OF AFFECTED ENVIRONMENT – ENVIRONMENTAL EFFECTS OF HERBICIDES

Environmental resource features, as described in the FEIS, are described in the following bullets. No resource features were identified by the public through scoping for this EA as needing additional evaluation. The FEIS does state that site-specific evaluations would be provided for threatened and endangered species. No other evaluations in the FEIS were considered overly broad and not sufficiently addressing the affected resources. Therefore, in this EA, only additional analysis of direct, indirect, and cumulative effects of threatened, endangered, proposed, and sensitive species are included. Likewise, since the FEIS determined that "It is unlikely that threatened or endangered plants will be affected by manual control techniques" but that "They could, however, be affected by the use of herbicidal methods" (FEIS 4-10), further analysis will be limited primarily to the effects of the use of herbicides on TEPS species.

- **Wildlife:** Biological and manual methods should not adversely affect wildlife. Under standard application procedures, no animals are likely to receive toxic or fatal doses of herbicides (FEIS 4-8).
- **Air Quality:** Major impacts on air quality are not anticipated (FEIS 4-1).
- **Soils:** Impacts to soils will be relatively minor and short-lived due to the small magnitude of chemical treatment and minor soil disturbing nature of the Proposed Actions (FEIS 4-1).
- **Water Resources:** Impacts to water resources will be minor and short lived due to the small size of treatment areas, the wide geographic distribution of the treatment areas, and the small amount of surface disturbance proposed (FEIS 4-2).
- **Vegetation:** Terrestrial vegetation is the environmental component that would be most affected by the proposed plant control program. Treatment of noxious weeds could affect both target and non-target vegetation. The extent of any non-target vegetation injury would depend on closeness of desirable species to treated weeds, method and rate of herbicide application, formulation of the herbicide, and herbicide used (FEIS 4-6).
- **Fish:** Impacts on fish and fish habitat from herbicide treatment would be slight and short lived because treatment sites are relatively small, scattered over a wide geographic area, only a small amount of surface disturbance is proposed, only insignificant amounts of herbicides would enter streams, and mitigation measures would be extensively used (see required design criteria in Chapter 2 and Appendix I Maps) (FEIS 4-7).
- **Threatened, Endangered, and Sensitive Species:** It is unlikely that any of these alternative noxious weed and poisonous plant control methods would adversely affect any threatened or endangered species because of the small size of most treatment sites. The Fish and Wildlife Service concurred with the 1986 FEIS determination that the Proposed Action would have "no effect" on federally listed species. This conclusion is based on the fact that site-specific evaluations would be conducted at the National Forest level (FEIS 4-9).
- **Livestock:** Chemical treatments are generally applied in a form or at such low rates that they do not affect livestock (FEIS 4-10).
- **Cultural resources:** Manual control measures could disturb or destroy cultural resources on or near the ground surface…Cultural resource surveys, however, would precede management actions that could damage cultural resources (FEIS 4-13).
- **Visual resources and recreation:** Treatments, such as herbicides, may cause visual impacts mainly by creating color contrasts between treated areas and surrounding vegetation. Applying herbicides reduces vegetation variety and can prevent the occurrence of seasonal changes within treated areas. These short-term impacts, however, would be offset in the long term by the growth of desirable plants on the site (FEIS 4-13).

Threatened, Endangered, Proposed, Candidate, Sensitive (TEPCS) Species and Management Indicator Species (MIS)

Information concerning life histories, suitable habitats, threats, ecology, status, and trend of threatened, endangered, candidate, sensitive and management indicator species that are known or suspected to occur on the Fishlake National Forest can be found within *Life History and Analysis of Endangered, Threatened, Candidate, Sensitive and Management Indicator Species of the Fishlake National Forest, Version 2.0* (Rodriguez 2002). This paper is located in the project file. For more information regarding the present status of TEPCS species on the Fishlake National Forest, refer to the Biological Assessment and Evaluations prepared for this project.

1. Threatened (T), Endangered (E), Proposed (P), and Candidate (C) Wildlife Species

There are no proposed wildlife species known to occur on the Fishlake National Forest. Threatened, endangered, and candidate wildlife species known or suspected to occur on the Fishlake National Forest include: bald eagle (T), Utah

prairie dog (T), Mexican spotted owl (T), and western yellow-billed cuckoo (C). During the informal consultation process the U.S. Fish and Wildlife Service concurred that the proposed action (Alternative 1) may affect but is not likely to adversely affect these species or their critical habitats.

2. Sensitive and Management Indicator (MIS) Wildlife Species

Sensitive species, which may be affected by noxious weed control activities, that are known or suspected to occur on the Fishlake National Forest include: peregrine falcon, northern goshawk, spotted bat, Townsend's big-eared bat, flammulated owl, and three-toed woodpecker.

Management indicator wildlife species for the Fishlake National Forest include elk, mule deer, northern goshawk, cavity nesters (hairy woodpecker, western and mountain bluebirds), sage nesters (Brewer's sparrow and Vesper sparrow), and riparian dependent guild (Lincoln's sparrow, yellow warbler, and song sparrow).

-There are about 1.5 million acres of potentially suitable habitat for elk on the Fishlake National Forest. Elk numbers, Forest-wide, have doubled since 1986 (Rodriguez 2002). Presently, the population trend for elk across the Forest are stable to slightly up in trend and viable. (Rodriguez 2002).

-There are slightly over 1.5 million acres of potentially suitable summer and winter mule deer habitats on the Fishlake National Forest. The data shows a decline in the number of deer in the entire southern region of Utah, however many of the herd units have met their objectives and active management is in the process of reducing total numbers (Rodriguez 2002). Mule deer populations and trends on the Fishlake National Forest appear to be stable and viable with increases in the total number of mature bucks (3 point or larger), and an increase in buck to doe ratios (Rodriguez 2002).

-There are over 420,000 acres of potentially suitable goshawk habitat on the Fishlake National Forest. The 27 goshawk territories across the Forest have experienced a decline in nesting activity, however occupied territories have been commonly observed (Rodriguez 2002). The population of nesting goshawks on the Forest is experiencing a downward trend, however the viability of this population is still under review (Rodriguez 2002).

-Cavity nesters include the hairy woodpecker, western and mountain bluebirds. Breeding Bird Survey, NatureServe, and Forest data are analyzed in Rodriguez (2002). As a result of this analysis, Rodriguez (2002) concludes that populations for these three species are stable and viable on the Fishlake National Forest.

-Sage nesters include Brewer's and Vesper sparrows. Breeding Bird Survey, NatureServe, and Forest data are analyzed in Rodriguez (2002). As a result of this analysis, Rodriguez (2002) concludes that populations for these three species are stable, or in a slight downward trend, and viable on the Fishlake National Forest.

-Riparian dependent guild includes Lincoln's sparrow, song sparrow, and yellow warbler. Breeding Bird Survey, NatureServe, and Forest data are analyzed in Rodriguez (2002). As a result of this analysis, Rodriguez (2002) concludes that populations of Lincoln's sparrow are stable and viable, song sparrow is stable (or slightly downward in trend) and viable, and yellow warbler is upward in trend and viable on the Fishlake National Forest.

3. Sensitive Fish Species and Aquatic Management Indicator Species (MIS)

Sensitive fish species include Bonneville cutthroat trout and Colorado cutthroat trout. There are three known populations of pure strain Colorado cutthroat trout on the Fishlake National Forest inhabiting approximately 8 miles of stream habitat (Rodriguez 2002).

The Fishlake National Forest has five known populations of pure strain Bonneville cutthroat trout inhabiting approximately 38 miles of stream habitat. These known populations occur on the Beaver, Fillmore, and Richfield Ranger Districts (Rodriguez 2002).

Aquatic management indicator species for the Fishlake National Forest include Bonneville cutthroat trout, resident trout (brown, brook, cutthroat, rainbow, and lake), and macroinvertebrates.

-For Bonneville cutthroat trout, the total number of miles of occupied habitat on the Fishlake National Forest has increased from 13 miles to 38 miles since 1986. Throughout the southern region of Utah, Bonneville cutthroat trout populations are increasing. This species is experiencing an upward trend and is viable on the Fishlake National Forest (Rodriguez 2002).

-Rodriguez (2002) reports that there are approximately 1,053 miles of potentially occupied stream habitat and 4,680 acres of lake habitat for brown, brook, cutthroat, and rainbow trout. The population trend for these four trout species is stable and viable on the Fishlake National Forest (Rodriguez 2002).

-Lake trout populations have been present on the Fishlake National Forest since the early 1940's. Occupied lake trout habitat occurs in Fish Lake on the Loa Ranger District. Lake trout numbers have remained relatively stable, however larger trophy lake trout numbers have declined in Fish Lake (Rodriguez 2002).

-Macroinvertebrate status and trend on the Fishlake National Forest is determined by macroinvertebrate sampling and Biotic Condition Index (BCI) data. The overall trend on the Fishlake National Forest is down

slightly after peaking in the late 1980's, with static trend since the early 1990's (Rodriguez 2002).

4. Threatened, Endangered, Proposed, Sensitive (TEPS) and Management Indicator (MIS) Plant Species

There are no proposed plant species known to occur on the Fishlake National Forest. Consideration for TES/MIS plant species on the Fishlake National Forest has three parts: 1) those species officially listed by the Fish and Wildlife Service (FWS) as threatened and endangered; 2) those species officially listed on the Regional Forester's R4 Sensitive Species List and 3) those species listed in the Forest Plan as management indicator species.

San Rafael cactus (endangered), Last Chance townsendia (threatened), and Maguire daisy (threatened) are the only three federally listed species known to occur on the Fishlake National Forest.

A "final draft" (1998) Interagency Conservation Agreement and Strategy covers both San Rafael cactus and Winkler cactus. The FWS prepared a recovery plan for Last Chance townsendia in 1993. Also, two Interagency Conservation Agreements and Strategies give sensitive species direction for Arizona willow (1995) and wonderland alice-flower (1996) and their habitats.

There are sixteen sensitive plants and one management indicator (MIS) plant that are known or suspected to occur on the Fishlake National Forest. A few of these plants are known to occur within proximity of known noxious weed populations. Existing sensitive/MIS plant habitats could be invaded by noxious weeds and may require selective spot treatments. Rydberg's milkvetch is the only MIS plant species on the Fishlake National Forest and is known from 20 populations on the Beaver, Loa, and Richfield Ranger Districts. These populations are estimated to contain 95,000+ individuals which make this species stable and viable across the Forest (Rodriguez 2002). No Rydberg's milkvetch populations are located near noxious weed populations on the Fishlake National Forest.

E. DESCRIPTION OF AFFECTED ENVIRONMENT – COOPERATION WITH OWNERS OF ADJACENT LANDS

Portions of Sevier, Millard, Juab, Piute, Wayne, Garfield, Beaver, and Iron Counties are found within the Project Area. Richfield, Beaver, Fillmore, Loa, Bicknell, Salina, Scipio, Delta, Junction, Circleville, Marysvale, Kanosh, Elsinore, Joseph, Monroe, Koosharem, and Holden are cities/towns adjacent to the Project Area.

The Forest contains summer home subdivisions at Fishlake, Kent's Lake, Big Lake, Accord Lakes, Monroe Meadows, Manning Meadows, and LaBaron Reservoir. Numerous isolated private cabins are scattered across the Forest.

Guidelines proposed through the Forest Plan Amendment include:

- Work with all potential cooperators, including County and State governments, private landowners, university extension, research, and other Federal agencies to develop cooperative noxious weed control programs.
- Compatible and accessible inventory, data, mapping, and monitoring standards should be developed with all partners.
- Memorandums of Understanding (MOUs) or agreements for pooling funds with public or private landowners for the most efficient use of resources in noxious weed management should continue to be developed and implemented as needed to progress toward meeting goals and objectives.
- Actively participate on local weed boards and interagency noxious weed programs as needed to ensure meeting goals and objectives.
- Cooperation with Federal, State, and local road and highway departments should be used to integrate cooperative control across all ownerships.

F. DESCRIPTION OF AFFECTED ENVIRONMENT – PRIORITIES FOR CONTROL

The Fishlake National Forest is a regional destination for dispersed and developed recreation. Scenic Byways are found within the Project Area, including: Utah State Highway #24 from Loa through Capitol Reef National Park Utah State Highway #25 through Fishlake Basin and Fremont River drainage and Utah State Highway #153 from Beaver through Beaver Canyon, by Elk Meadows, to Puffer Lake. Popular travel ways found within the Project Area include: Skyline National Recreation Trail on the Beaver Ranger District, Piute ATV Trail which is found on the Fillmore, Richfield, and Beaver Ranger Districts, and the Great Western Trail which goes from Salina Canyon through Niotche Creek on the Richfield Ranger District onto UM Plateau, and Thousand Lake Mountain on the Loa Ranger District. Developed campgrounds, within the Project Area include Elkhorn, Anderson Meadow, City Creek, Copley's Cove, and Shingle Mill. Unfenced campgrounds include Sunglow, Pistol Rock, Buckskin Charlie, Little Reservoir, Kent's Lake, and Tushar. As travel and transportation continue to increase and access to the Fishlake National Forest expands, so does the potential for establishing new invasive exotic plant species. High probability places for new establishments include: major highways, ATV and saddle and pack trails, trailheads, and campsites.

Selection and application of weed control techniques depends on the specific circumstances for each portion of the management unit. Noxious weeds are highly competitive and persistent. Their control requires integrating a number of methods. Depending on site conditions, a combination of herbicide, biological control agents, and grazing management can reduce weed

populations and weed seed production. A key component of any integrated weed management program is sustained effort, constant evaluation, and the adoption of improved strategies.

Selection of a proper control program will depend on the 1) weed species, 2) effectiveness of the control technique, 3) availability of control agents, 4) use of the land, 5) length of time required for control, 6) environmental considerations, and 7) relative cost of the control techniques. Research on chemical applications, biological control agents, cultural control techniques, and other IPM control strategies provides the noxious weed manager with state-of-the-art information on the most appropriate method or combination of methods to use for any particular weed species.

A number of variables may be considered when determining priority for treatment, including vulnerability to expansion, ease of control or eradication, size of infestation, cost/benefit ratios, cost-sharing and partnerships, etc. As a general rule, musk thistle and Scotch thistle infestations will continue to receive priority treatment. The average musk thistle or Scotch thistle plant produces as many as 20,000 seeds and under favorable conditions may produce 120,000 seeds, 90 percent of which are viable and may germinate in the first two years. Seeds survive in the soil for a decade or more. These infestations must be treated annually to prevent any increase in size. If left untreated for just one year, infestations could greatly expand. Likewise, spotted knapweed is a prolific producer of seeds, with each plant producing up to 40,000 seeds. Spotted knapweed is very aggressive and can infest large areas quickly. The proposed Noxious Weed Management and Control Strategy (Table 2-1) considers the small acreages of musk thistle on three infestation sites and places a priority for eradication on these areas. The second priority for containment and control treatment are larger infested areas of Scotch thistle. The third priority is for eradication of weeds with limited extent of infestation, including areas of less than 10 acres of Canada thistle, dalmation toadflax, spotted knapweed, Russian knapweed, and whitetop. The fourth priority is to keep established weed populations contained and to reduce their acreages.

G. DESCRIPTION OF AFFECTED ENVIRONMENT – ECONOMIC IMPACT OF NOXIOUS WEED SPREAD

The subject to be considered in this section is the economic effect that would be expected if noxious weed infestations would significantly limit commodity or amenity values on the Fishlake National Forest. The Affected Environment of this analysis is the five county area of south-central Utah consisting of Beaver, Millard, Sevier, Piute, and Wayne Counties.

The region influenced by the Forest includes a diverse human population. Federal lands occupy 78 % of the five-county area, which emphasizes the importance to local residents of Federal lands in maintaining viable local economies, lifestyles, and ways of life. Only 2.8% (40,906) of Utah's population lives within the south-central five-county area. Most (66 percent) of Utah farmers and ranchers are 55 years of age or older with 37% over age 65. Within the five-county area the median age of 30.9 is among the oldest in the state, being 3.3 years older than the state's median age of 27.6 *(Utah 1997-2000).*

Most of the five-county residents are descendants of the first settlers in the area and are strongly anchored in the agricultural industries. Local economies are supported by a variety of income sources, including agriculture, timber production and processing, and recreational activities. Twelve percent of the five-county area's total employment is engaged in agricultural industries and 53 % of the five-county personal income is derived from agricultural wages (Utah 1997-2000). Recreation and tourism related expenditures are rapidly expanding in the five-county area of the Forest.

Intertwined with the economic aspects of agricultural-based enterprises are the lifestyles and culture that have co-evolved with Western ranching. Rural social values and lifestyles, in conjunction with the long heritage of ranching and farming continued to this day from the earliest pioneers in Utah, have shaped the communities and enterprises that make up much of southern Utah. The rural Western lifestyle also contributes to tourism in the area, presenting to travelers a flavor of the West through tourist oriented goods and services, scheduled events, even with tourists photographing sheep bands or cattle in the pastoral setting of the forest.

A changing social and economic environment is partially responsible for the increase of noxious weeds on the Fishlake National Forest. The changes are assumed to be the result of increased Forest access by OHV's and ATV's, increased recreational touring and camping, and increased subdivision development. The rural setting and quality of life, accessible recreation, and relatively low cost of land have attracted young and old to the area in recent years. Natural resource amenity values attract people to this region, even when employment opportunities are limited. Earnings are lower here, compared to other parts of the country, reflecting a "quality of life" premium that people are willing to pay to live in this region. Hunting, fishing, and outdoor recreation are all amenities that are part of this quality of life premium. The visual and environmental character of the Forest is a major part of the communities and quality of life enjoyed by the residents of the area.

H. DESCRIPTION OF AFFECTED ENVIRONMENT – EFFECTIVENESS OF WEED CONTROL STRATEGIES

The size and location of the infested areas determine the most cost-effective method of managing noxious weeds.

Small patches may be permanently eliminated with persistent herbicide and/or cultural management programs. However, an IWM approach that uses all methods may be more appropriate for large infestations. The deliberate use of natural enemies (parasites, predators, pathogens) to reduce weed densities may be appropriate where control or containment, rather than eradication, is the goal. Effective management must also include full cooperation and coordination of all parties involved in a management unit: private landowners, public land users, and government agencies

Integrated control methods include: 1) cultural weed management, 2) biological weed control, 3) ground-based chemical weed control, and 4) physical and mechanical control. Each of these control methods has certain strengths and weaknesses that can be complemented by alternate methods. The effect of IPM is to take advantage of a combination of methods that prove to be effective on the targeted weeds. Economics and efficiency are also considered when selecting a control method. For example, although herbicides and hand pulling are both effective controls on musk thistle, the use of herbicides allows much more area to be treated at a much cheaper cost. When the weed is an aggressive, prolific seed producer, like musk thistle, the objective is to stop the production of seed on as many plants as possible. Weed prevention mitigation practices will be employed to address issues with the sources of weed invasion, including livestock grazing, roads, and recreational pack stock use of weed-free hay.

- Cultural methods of noxious weed management are generally aimed at enhancing desirable vegetation to minimize weed invasion. Plant competition, grazing management, and fertilization can favor desired species. Revegetation with desirable plants may be the best long-term alternative for controlling weeds on sites without an understory of desirable species. Establishing competitive grasses can minimize the re-invasion of rangeland weeds and provide excellent forage production.

- Physical weed control methods can be effective on small infestations. Hand pulling, hoeing, tilling, mulching, burning, and mowing are all commonly used to control noxious weeds. Manual treatment consists of hand pulling or grubbing with hand tools and, therefore, is very labor intensive. Cost of manual control is much higher per acre than herbicide methods; therefore fewer acres can be treated with equal funding. Hand pulling and hoeing are most successful under conditions where complete crown removal can be obtained. Shallow-rooted weeds can be removed by hand pulling where the soil is loose or moist.

- Classical biological control involves the introduction and management of selected natural enemies of a weed. To be successful, an introduced biological control agent need not kill its weedy host outright. If the insect can stress the plant and reduce its competitive advantage, more desirable vegetation can displace the weed. Biological control is slower than other weed control methods. When using biological control agents (BCAs), a residual level of the weed populations must be expected; the survival of the agents is dependent on the density of their host weeds. After populations of the host weeds decrease, populations of BCAs will correspondingly decrease. Therefore a resurgence of weed populations may occur due to seed reserves in the soil, missed plants, and lagging populations of BCAs. Biological control will not eradicate noxious weeds.

The development of weed control strategies must be based on the biology and ecology of individual noxious weed species and their interactions within forest and rangeland ecosystems. General guidelines, such as the plants potential impact, growth and reproductive characteristics, population dynamics, succession, competitive relationships that exist between native and exotic plant species, climatic characteristics associated with endemic populations, a plant's history in other countries, plant life cycles, seed banks, superior species performance, and spread potential may provide some indication of effective management strategies and priorities.

The following noxious weed monographs include photographs and descriptions illustrating the noxious weed species currently known to occur on the Fishlake National Forest. Included in the descriptive write-ups are recommendations for best management practices for effective control.

Graphic Information Systems (GIS) produced maps attached in Appendix H display the locations of known infestations by noxious weed species on each of the Ranger Districts. Digitized acreages of infestations by species are also displayed.

Black Henbane *(Hyosycamus niger)*

Black henbane is a native of Europe and has been cultivated as an ornamental. It has spread throughout the United States and is a common weed of pastures, fencerows, roadsides, and waste areas. Black henbane contains hyoscyamine and other alkaloids that have caused occasional livestock poisoning. However, the plant is usually not grazed by animals and is consumed only when more palatable forage is not available. Henbane alkaloids have been used in the past, and are currently used, as medicines at controlled dosages. It is considered a poisonous plant to humans.

Black henbane, a member of the nightshade family, has both annual and biennial varieties. With the *annual variety,* the stem is almost unbranched, smaller and less downy than in the *biennial* form, the leaves shorter and less hairy and the flowers often yellow, without any purple markings. The annual plant also flowers in July or August, the biennial in May and June. The annual and biennial forms spring indifferently from the same crop of seed, the former growing during summer to a height of from 1 to 2 feet, and flowering and perfecting seed, the latter producing the first season only a tuft of radical leaves, which disappear in winter, leaving underground a thick, fleshy root, from the crown of which arises in spring a branched, flowering stem, usually much taller and more vigorous than the flowering stems of the annual plants.

The leaves of the biennial plant spread out flat on all sides from the crown of the root like a rosette; they are oblong and egg-shaped, with acute points, stalked and more or less sharply toothed, often more than a foot in length, of a grayish-green color and covered with sticky hairs. These leaves perish at the appearance of winter. The flowering stem pushes up from the root-crown in the following spring, ultimately reaching from 3 to 4 feet in height, and as it grows, becoming branched and furnished with alternate, oblong, unequally lobed, stalkless leaves, which are stem-clasping and vary considerably in size, but seldom exceed 9 or 10 inches in length. These leaves are pale green in color, with a broad conspicuous mid-rib, and are furnished on both sides (but particularly on the veins on the under surface) with soft, glandular hairs, which secrete a resinous substance that causes the fresh leaves to feel unpleasantly clammy and sticky. Similar hairs occur on the sub-cylindrical branches.

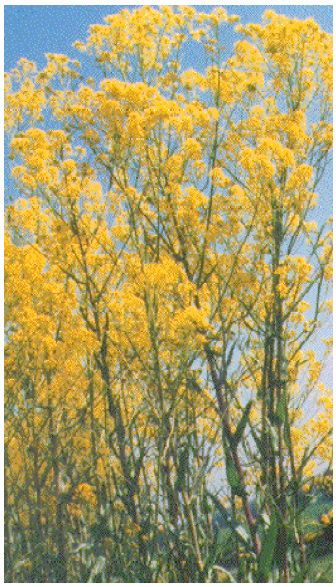
The flowers are shortly stalked, the lower ones growing in the fork of the branches, the upper ones stalkless, crowded together in one-sided, leafy spikes, which are rolled back at the top before flowering, the hairy, leafy, coarsely-toothed bracts becoming smaller upwards. The flowers have a hairy, pitcher-shaped calyx, which remains around the fruit and is strongly veined, with five stiff, broad, almost prickly lobes. The corollas are obliquely funnel-shaped, upwards of an inch across, of a dingy yellow or buff, marked with a close network of lurid purple veins. A variety sometimes occurs in which the corolla is not marked with these purple veins. The seed-capsule opens transversely by a convex lid and contains numerous small seeds.

No biological control agents are available for control of Black henbane, but herbicides can provide excellent control.

Dyers Woad *(Isatis tinctoria)*

A native of southeastern Russia, dyer's woad was introduced to the eastern United States as a textile dye crop during the colonial period. Dyer's woad poses a real threat to rangelands, forests, and pastures of the intermountain West because of its ability to dominate plant communities. It does well in the absence of disturbance and is capable of encroaching upon and increasing its density on well-vegetated range sites that have not been grazed or disturbed for decades. A healthy, dense stand of grass or other perennials deters the spread of dyer's woad, but will not stop and invasion.

Dyer's woad is a member of the mustard family and has blue-green leaves and numerous bright yellow flowers in an umbrella-shaped inflorescence, making it easy to identify. It normally grows 1 to 3 feet tall, but may reach over 5 feet. Typically it has a 3 to 5 foot-long taproot and some lateral roots in the upper 12 inches of soil. The leaves are alternate, simple, petiolate, bluish-green with a whitish vein on the upper surface of the blade. The flower has a flat top with yellow petals. The fruit is a purplish-brown pod containing one seed.



Dyer's woad behaves as a winter annual, biennial, or short-lived perennial. It may germinate in the spring or fall. Typically it remains a rosette of basal leaves during the following summer and winter, flowers in April and May of the second year, and seeds ripen in June and July. It thrives on rocky soil with limited water-holding capacity. Prolific seed production enables dyer's woad to spread at a rapid rate. Plants may produce 350 to 500 seeds each, but selected plants have been known to produce more than 10,000 seeds in one year.

Dyer's woad is relatively easy to control both with herbicides and by good farming practices. Integrated control methods are the most effective way to attack an infestation of Dyer's woad in the majority of its settings. One of the most important methods of containment or control is hand pulling, especially in those areas that are only lightly infested. It may be the only practical control method in difficult or sensitive terrain. Breaking or cutting off the flowering stalks does not kill dyer's woad but will encourage it to develop new stems and produce seeds later in the season. Cultivation, early in the spring, is important to keep plants from getting started. Metsulfuron in combination with 2,4-D are the herbicides found to be most effective in control efforts. Excellent control can be obtained by spraying with 2,4-D in the rosette stage. As the plant enters bud and blossom stages, 2,4-D often does not kill it quickly enough to prevent seed production. However, chlorsulfuron or metsulfuron completely prevents viable seed production when applied during the bloom stage. Combining 2,4-D with other herbicides shows more promise to immediately stop dyer's woad growth and seed production.

The native rust pathogen, Puccinia thlaspeos, has been very effective in stopping the advance of dyer's woad. Plants usually become infected in the spring and summer, though fall infections are also possible. Initial symptoms appear as stunting, leaf distortion, and chlorosis. Fruit and seed production are almost completely prevented on almost all infected plants.

Leafy Spurge *(Euphorba esula)*

Leafy spurge, a member of the Spurge family, is a long-lived, deep-rooted perennial that reproduces vegetatively and by seeds. It grows as clusters of upright stems, 1 to 3 feet high, which are pale green and unbranched except for flower clusters. The stems are erect, tough and woody, and frequently have many non-flowering branches. In its native Eurasia, leafy spurge is widespread and adapted to many sites and habitat types ranging from riparian to dry hillsides.

Leafy spurge is identified by narrow leaves that are 1 to 4 inches long. Also, the flowers are arranged in clusters with yellow petals and green bracts. The most distinguishable part of leafy spurge is a milky, latex fluid found in every part of the plant. This fluid is poisonous to cattle and can have ill effects when it comes into contact with humans. Each flowering stem produces an average of 140 seeds. When the plant matures, the seed capsule explodes and launches the seeds up to 15 feet. Seed production, which ranges from 25 to 4,000 pounds per acre depending on plant density and site productivity, is usually completed by mid-August. Seeds can remain viable for 8 years or longer; the deeper they are buried, the longer they tend to remain viable and dormant. Leafy spurge is an extremely difficult plant to control because of its extensive, sprouting root system, which may be 30-35 feet in length. Large numbers of buds are found on each root to depths of 10 feet. Each bud is capable of producing a new, independent plant. Root systems of well-established older plants can regenerate from fragments even if roots are removed to a depth of three feet. Shoots emerge in late March. Leafy spurge is most easily recognized by its yellow-green bracts that exist from May to the end of July. Seed development continues for up to six weeks. This species usually ceases to grow during the hottest and driest weeks of July and August.

Successful management of leafy spurge requires a long-term, extensive management plan using various combinations of management methods (IWM). Plateau, 2,4-D, Banvel or Tordon 22k systemic herbicides have been found to be effective if applied in June, when the flowers and seeds are developing, or in early to mid-September when the plants are moving nutrients downward into the roots. There has been success using six biological control agents imported from Europe. These include a stem and root-boring beetle (Oberea erythrocephala), four root-mining flea beetles (Aphthona spp.), and a shoot-tip gall midge (Spurgia esulae). Grazing by sheep or goats can be a very effective tool for controlling leafy spurge populations. Leafy spurge is not toxic, and in fact, is very nutritious, providing good forage. No mechanical methods have been found to work effectively. Fire, cultivation, obscuring sunlight, and mowing have not been successful. Burning, alone, is ineffective for reducing leafy spurge infestations, and it stimulates sprouting of established plants, increasing plant density. Hand pulling, digging, and tilling are only successful if the entire root system can be excavated, and may increase the number of plants if any remnants remain in the soil. Initial reseeding with grasses followed by eventual revegetation with forbs and shrubs may contribute to long-term suppression of leafy spurge. Competitive grasses include: Russian wild rye, pubescent wheatgrass, smooth brome, and western wheatgrass.

Purple Loosestrife *(Lythrum salicaria)*

Purple loosestrife comes from European and Asian centers of distribution. It was first introduced into North America in the early 1800's. Although noted for the beauty of its late-summer flowers, which also provide a nectar source for bees, loosestrife has few other redeeming qualities. Its invasion into a wetland system results in suppression of the native plant community and the eventual alteration of the wetland's structure and function. Loosestrife crowds out native vegetation and eventually becomes a virtual monoculture. Infestations appear to follow a pattern of establishment, maintenance at low numbers, and then dramatic population increases when conditions are optimal.

Purple loosestrife is a stout, erect perennial aquatic and wetland plant usually associated with moist and marshy areas. The plants range in height from 1.5 to over 10 feet. The leaves are lance shaped, entire, and are whorled. The magenta-colored flowers, which have five to seven petals, are arranged on long racemes. It flowers from early July to early September. Seed set begins in mid to late July and continues through late summer. A single, mature plant can produce more than 2.5 million seeds annually. The seeds can remain viable even after 20 months of submergence in water. Seed dispersal is mainly by water, but seeds can also be transported on the feet and bodies of waterfowl and other birds, as well as numerous wetland animals. Purple loosestrife also spreads vegetatively. Root or stem segments can form new flowering stems. Muskrat cuttings and mechanical clipping can therefore contribute to rapid spread by floating in riverine and lacustrine systems. A strong rootstock serves as a storage organ, providing resources for growth in spring and regrowth if the aboveground shoots are cut, burned, or killed by application of foliar herbicides.

Since purple loosestrife is a popular ornamental plant, commonly referred to as "lythrum", the public education is an important part of any control program. They need to know that they should not cultivate purple loosestrife or any of the horticultural varieties of lythrum. The most promising control measure for purple loosestrife is the application of Biological Control Agents. Five beetle species have been screened as potential control agents and are being studied, through field research, for distribution and establishment in the United States. However, currently, only mechanical and chemical means of control are available. Areas of individual younger plants and clusters of up to 100 younger plants can be hand-pulled, if done before flowering. Older plants, especially those in bogs or in deep organic soils, can be dug out. Roots of older plants can be "teased" loose with a hand cultivator. Follow-up treatments are recommended for three years after the plants are removed. Spot application of a glyphosate herbicide to individual purple loosestrife plants is recommended treatment where hand pulling is not feasible. Glyphosate application is most effective when plants have just begun flowering. Timing is crucial, because seed-set can occur if plants are in mid-late flower. Where feasible, the flower heads should be cut, bagged, and removed from the site before application to prevent seed set. Since purple loosestrife is usually taller than the surrounding vegetation, application to the tops of the plants alone can be very effective and limit exposure of nontarget species.

Whitetop *(Cardaria draba)*

Whitetop, or hoary cress, is part of the mustard family. It is a native of Central Europe and Western Asia, introduced to the U.S. in 1889 with imported grass seed. It is now found throughout North America as a common noxious weed on cultivated lands, along roadsides, in pastures, rangelands, and other non-crop areas. It is an aggressive competitor with desirable forage grasses. It grows in waste places, cultivated fields, and pastures, and is capable of vigorous growth on the irrigated, alkaline soils of the West.

Hoary cress is a creeping perennial that reproduces by seed and creeping roots. The extensive root system spreads horizontally and vertically with frequent shoots arising from the rootstock. Lateral roots eventually turn down to become vertical roots that often reach greater depths than the parent roots. Both the vertical and lateral roots produce adventitious buds, which develop into rhizomes and shoots. The deep root system and the weed's ability to reproduce vegetatively make these weeds very difficult to control.

Whitetop grows erect from 10 to 18 inches high and has a white color. The non-flowering part of the plant is a gray-white color. Whitetop has basal and stem leaves. Basal leaves taper to a short stalk that attaches to the crown near the ground. Stem leaves are grayish-green, arrowhead-shaped, and have smooth or occasionally finely toothed edges. All leaves have a covering of fine, white hairs. They range from ¾ inch to 3 inches long, with blunt ends, and are arranged alternately along the stem. Dense blooming stands resemble patches of late-melting snow. Whitetop has 4 flower petals and 6 stems. The flowers are white, 1/8 inch across, and numerous in compact flattop clusters which give the plant its name. There is no color in the middle of the flower when it is in bloom. Each heart-shaped seedpod contains two oval, finely pitted, red-brown seeds each about 1/12 inch long.

Hoary cress is one of the earliest perennial weeds to emerge in the spring. Flowers are produced in late April and May and begin producing seeds about a month later. After blooming, the plants continue to grow until frost. If conditions remain suitable, they will flower and produce a second crop of seeds late in the summer. A single plant can produce from 1,200 to 4,800 seeds each year. Buried seeds remain viable for about three years.

Biological control practices have not been successfully developed to control this weed. Manual, mechanical, and cultural control practices have provided little success. To date, certain herbicide control methods have proven to be extremely successful in controlling spread. The best selective broad-leaf herbicide is Telar® by Dupont at rates of one ounce per acre. 2,4-D amine at 4 pounds active ingredient per acre applied at bud to early bloom stage is also effective. After chemical treatment, plant either tall wheatgrass or robust needlegrass. Both perennial grasses can out-compete whitetop if managed properly. Proper livestock grazing is essential to maintain competitive grass plants that will slow or prevent whitetop encroachment. The population of white top can be rapidly reduced by successive treatments and proper management.

Canada Thistle (Cirsium arvense)

Canada thistle, a member of the sunflower family, was first introduced to this continent from Europe, probably in the 1600s via contaminated grain seed, hay, and ship's ballast. It is now common throughout most of the United States north of 35° N latitude into Canada. Canada thistle is an aggressive, adaptable perennial weed that infests arable and nonarable lands. It is usually found in open areas with moderate or medium moisture conditions. It is found most frequently in colonies along roadsides and railroad rights-of-way, and on rangeland, forestland, cropland, and abandoned fields. It is also found on stream banks, lakeshores, and other riparian areas. Canada thistle is probably the most widespread of all thistle species, and thus is considered by many to be the most difficult to control.

Canada thistle is a creeping perennial that reproduces by seeds and fleshy, horizontal roots. The erect stem is hollow, smooth and slightly hairy, 1 to 5 feet tall, simple, and branched at the top. The leaves are set close on the stem, slightly clasping, and dark green. Leaf shape varies widely from oblong to lance-shaped. The leaves are generally oblong, the length 3 to 5 times the width, usually deeply lobed. Sharp spines are numerous on the outer edges of the leaves and on the branches and main stem of the plant. Upper leaves are much smaller than lower leaves, and have a narrow base that continues down the stem beyond the point of leaf attachment, giving the impression of a spiny stem. Flowering occurs during July and August. Flowering heads form in clusters on the ends of the branches. The flowers are small and compact, about ¾ inch or less in diameter, and light pink to rose-purple in color, occasionally white. The seeds are oblong, flattened; dark brown, and approximately ⅛ inch long. A Canada thistle shoot can produce as many as 100 heads in a season, with each head containing as many as 100 seeds. Horizontal root growth can extend more than 19 feet in one season and may eventually penetrate into the soil as deep as 22 feet. Left undisturbed, a Canada thistle plant can produce 26 adventitious shoots, 154 adventitious root buds, and 364 feet of roots after 18 weeks of growth.

Canada thistle is extremely difficult to control because its extensive root system allows it to recover from singular control methods. Cultivation or other manual control measures serve to increase the number of thistle plants. Hand pulling or grubbing is not considered to be an economically effective means of controlling an established stand of Canada thistle. Because of its extensive root system and carbohydrate reserves, Canada thistle can survive grubbing once or twice a month for many years before its root reserves are depleted. Biological control agents have not provided an adequate reduction of thistle infestations. Single herbicide applications do not provide long-term control due to the difficulty in killing the root system, which can survive even though the shoots have been killed. It is more effective to combine control methods (IWM). In most instances, the most effective method for control is to combine two or three mowing operations with a fall application of 2,4-D, dicamba, clopyralid, metsuluron, picloram, glyphosate, or Telar®. Mowing operations stimulate vegetative growth, which weakens the plants food supplies, and the fall herbicide application continues to weaken the plant. Due to the aggressive biology of Canada thistle, re-treatments are necessary.

Musk Thistle *(Carduus nutaans)*

Musk thistle is a member of the Aster family, thistle tribe. It was introduced into the United States over 100 years ago from Europe. It has increased, unchecked, until it now is a serious problem in 12% of the counties of the United States. Musk thistle germination and establishment is favored in open areas. It inhabits all types of land except deserts, dense forests, high mountains, and newly cultivated fields.

It is biennial, winter annual, or annual. Typically a 1 to 8 feet biennial, but it may complete its life cycle as a winter annual. Musk thistle spends approximately 90% of its life cycle as a rosette then bolts, flowers, produces seed, and dies. The first year's growth is a large, compact rosette from a large, fleshy, corky taproot. The second year stem is erect, spiny, 2 to 6 feet tall and branched at the top. The leaves are alternate, deeply cut or lobed with five points per lobe, very spiny, 3 to 6 inches long and extend (clasp) down the stem. The waxy leaves are dark green with a light green midrib and mostly white margins. The large (½ the size of a tennis ball) and showy flowers are terminal, flat, nodding, 1½ to 2½ inches broad, purple, rarely white, and surrounded by numerous, lance-shaped, spine-tipped bracts that resemble a pinecone. Blooms appear in late May and June and set seed in June or July. Seeds are straw-colored and oblong.

Musk thistle is dependent on seed production for reproduction and spread. The average plant produces as many as 20,000 seeds and under favorable conditions may produce 120,000 seeds, 90% of which are viable and may germinate in the first two years. Seeds survive in the soil for a decade or more. Musk thistle germination is favored on poorly vegetated sites; seedlings establish only on bare soils. Abundant red light reaches bare ground on poorly vegetated sites and stimulates musk thistle germination, although red light is not necessary. Seeds may survive in the soil a decade or more, and it may take 15 years to decrease germination of buried musk thistle seeds.

When attempting to control musk thistle, it is imperative to prevent seed production. Musk thistle produces only by seed and is effectively controlled by several herbicides. When musk thistle is in the rosette stage, clopyralid, dicamba, picloram, or 2,4-D are the best choices, but after bolting begins, metsulfuron or chlorsulfuron should be used. Musk thistle susceptibility to dicamba, picloram, and 2,4-D decreases after the weed begins to bolt. Fall is a good time to control biennial thistles with herbicides because all live plants will be seedlings or rosettes. Cool or dry weather conditions commonly associated with autumn may decrease biennial thistle control from 2,4-D or dicamba, but not from picloram. Because it is a simple tap rooted annual or biennial and does not reproduce vegetatively, mowing, grubbing, or hoeing are effective treatments. In areas where there are only two or three plants, the taproot can be severed below the soil surface with a shovel, which effectively kills the plant. In areas where there is a larger infestation, tillage or continual mowing can successfully eliminate the plant as long as it is done before seeds are produced. Several insects are showing effective biological control. The seed head weevil Rhinocyllus conicus limits musk thistle seed production; Trichosirocalus horridus weevil larvae feed on the growing points of rosettes and developing shoots, which decrease s plant vigor and flowering.

Scotch thistle (Onopordum acanthium)

Scotch thistle is a member of the Aster (sunflower) family, thistle tribe. It is a native to Europe and Asia and was introduced into the eastern U.S. in the late 1800's. It infests wet meadows and pastures, as well as more arid big sagebrush sites. Scotch thistle is often associated with waste places, as well as rivers, streams, canals, or other waterways. It can also be abundant in dry pastures, fields, and rangeland.

A biennial, propagating from seed, the first year's growth is a large rosette of spiny leaves. The second year the weed transforms into an enormous, coarse branching plant and can reach heights well in excess of 8 feet and 6 feet in width. Main stems may be up to 4 inches wide at the base. Stems have vertical rows of prominent, spiny, ribbon-like leaf material or "wings" that extend to the base of the flower heads. Leaves, which are armed with sharp, yellow spines, are up to 2 feet long and 1 foot wide. Upper and lower leaf surfaces are covered with a thick mat of cotton-like or woolly hairs, which give the foliage a gray-green appearance. Plants flower in mid-summer. The globe-shaped flower heads are borne in groups of 2 or 3 on branch tips. Flower heads remain upright, rather than nodding as Musk thistle flowers do. Flower heads are up to 2 inches in diameter, with long, stiff, needle-like bracts at the base. Flowers range from dark pink to lavender. Seeds are smooth, slender, and plumed. Stalks supporting the flowers are leafy. It reproduces and spreads solely from seed and the key to its management is to prevent seed production. Plants produce 8,400 to 40,000 seeds annually, which may remain viable in the soil up to 20+ years. Approximately 85 to 90% of Scotch thistle seeds display innate dormancy upon maturity that assures a soil seed reserve and perpetuation of the population.

When attempting to control Scotch thistle, it is imperative to prevent seed production. Scotch thistle produces only by seed and is effectively controlled by several herbicides. When Scotch thistle is in the rosette stage, clopyralid, dicamba, picloram, or 2,4-D are the best choices, but after bolting begins, metsulfuron or chlorsulfuron should be used. Scotch thistle susceptibility to dicamba, picloram, and 2,4-D decreases after the weed begins to bolt. Fall is a good time to control biennial thistles with herbicides because all live plants will be seedlings or rosettes. Cool or dry weather conditions commonly associated with autumn may decrease biennial thistle control from 2,4-D or dicamba, but not from picloram. Scotch thistle is a simple taprooted annual or biennial and does not reproduce vegetatively, but mowing, grubbing, or hoeing has limited effectiveness. It usually only prevents seed production if done either immediately prior to flowering or when plants are just starting to flower. When mowing is conducted too early, it may only delay flowering. However, when plants are cut too late in the flowering process, viable seed may still develop in the capitula following cutting. Because there can be a wide variety in the maturity of plants, a single mowing is unlikely to provide satisfactory control. Plant competition is an effective way to prevent the invasion of musk thistle. Proper management of perennial grasses and seeding of disturbed areas with competitive grasses will discourage the establishment of this weed. No biological controls are currently available in the United States. Australia has released several biocontrol insects, but some of them have failed host specificity tests in the U.S. Additional insects are being evaluated for release in the U.S.

Dalmation Toadflax *(Linaria genistifolia ssp. Dalmatica)*

Dalmation toadflax is a member of the Figwort family. It was introduced as an ornamental from Europe, and is now rapidly invading dry rangeland at elevations from 5,000 feet to 6,500 feet. Dalmation toadflax is especially well adapted to arid sites and can spread rapidly once established. It is highly competitive where summer moisture is limited.

Dalmation toadflax is a creeping perennial that closely resembles yellow toadflax, but is taller and can grow 2 to 4 feet in height, and the leaves are heart-shaped, clasping the stem. It is a deep-rooted (6 feet +), short-lived perennial that reproduces by seeds and by vegetative buds on the roots. A single dalmation plant can produce up to 500,000 seeds, beginning in late June and continuing until September or early October. Seed production can begin on lower portions of the stems while upper portions are still in various stages of bloom. Dried floral stalks can remain standing for two years, retaining some seeds but dispersing most during the first year. Some dalmation toadflax seed germination occurs in the fall, but most occurs the following spring, with peaks in April and May. Germination rates are as high as 75%, and seeds can remain dormant at least 10 years. These dormant seeds can rapidy reinfest a site following control applications, even when pre-emergent herbicides are used, because only a portion of the seeds will germinate in any given year.

The extreme competiveness of established toadflax infestations is partly due to early spring regeneration from vegetative buds on rootstock. These vegetative shoots are not particularly dependent on soil moisture and are not vulnerable to competition from other plants. They are highly efficient in competing for available soil moisture and consequently moisture is seldom a limiting factor in vegetative regrowth. Because they usually emerge before desirable species in the spring and use existing moisture so efficiently, vegetative shoots are extremely competitive even on rangelands in excellent condition. The toadflaxes are easily distinguished from other range weeds by the distinctive shape of the bright yellow and orange flowers. Flowers are similar to the domestic snapdragon; toadflax is distinguished from ornamental species by the presence of a long spur, or tail, at the end of the toadflax blossom and by its perennial nature.

Because of its deep, extensive root system, waxy leaf, and heavy seed production, this plant is difficult to manage. Pulling toadflax by hand, and following lateral roots to their ends, can be effective for small infestations, especially in sandy soils or when soils are moist. Both mowing and burning are not recommended, since they do not affect root reserves or buried seeds. Effects of herbicide applications are inconsistent. The waxy leaf surface provides a protective barrier that hinders herbicide uptake. Fall applications of picloram at a rate of 1 pound active ingredient per acre have had some success, but long-term control may not be achieved and reinvasion may occur. Although biological control agents have some degree of impact on individual plants or on seed production, it is too soon to know what cumulative effects BCAs will have on the toadflax management program.

Yellow Toadflax (Linaria vulgaris)

Yellow toadflax, sometimes called common toadflax, wild snapdragon, or butter and eggs, resembles the snapdragon in appearance and is a member of the Figwort family. It was introduced from Europe as an ornamental. It has now become a serious problem to higher elevation rangelands and mountain meadows from elevations of 5,000 feet to over 10,000 feet.

Yellow toadflax is a creeping perennial that closely resembles dalmation toadflax, but is shorter, growing only 12 to 30 inches tall, and the leaves are linear to linear-lanceolate rather than heart-shaped. Generally yellow toadflax is found on moister, more fertile sites than dalmation toadflax. It is a deep-rooted (3 feet +), short-lived perennial that reproduces by seeds and by vegetative buds on the roots. The extreme competiveness of established toadflax infestations is partly due to early spring regeneration from vegetative buds on rootstock. These vegetative shoots are not particularly dependent on soil moisture and are not vulnerable to competition from other plants. They are highly efficient in competing for available soil moisture and consequently moisture is seldom a limiting factor in vegetative regrowth. Because they usually emerge before desirable species in the spring and use existing moisture so efficiently, vegetative shoots are extremely competitive even on rangelands in excellent condition.

The toadflaxes are easily distinguished from other range weeds by the distinctive shape of the bright yellow and orange flowers. Before flowering, yellow toadflax can resemble leafy spurge. It can be distinguished by snapping the stem. The absence of a milky substance in the stem will determine that the plant is a toadflax. Flowers are similar to the domestic snapdragon; toadflax is distinguished from ornamental species by the presence of a long spur, or tail, at the end of the toadflax blossom and by its perennial nature. Yellow toadflax leaves are pale green, alternate, narrow, and pointed at both ends. Flowers are bright yellow with orange markings and elongate spurs and occur in simple racemes on the stems. The flowers are about an inch long and blossom in dense clusters along the stem as it lengthens and grows. Flowering occurs from mid-summer to early fall. Flowers produce capsules containing 10 to 40 seeds each. The fruit is round, about ¼ inch in diameter and brown. A single plant may produce 15,000 to 30,000 seeds. Seed germination rates are usually low, often below 10%.

Because of its deep, extensive root system, narrow leaves, and effective seed dispersal methods, this plant is difficult to manage. Because established infestations of yellow toadflax spread mainly by roots, physical removal (especially around perimeters) can limit spread. Both mowing and burning are not recommended, since they do not affect root reserves or buried seeds. Low viability of yellow toadflax seeds can make competition by desirable species an even more effective strategy for this species. Fall applications of picloram give partial control. Dicamba + 2,4-D, chlorosufuron, or metsulfuron methyl + 2,4-D gives good control when applied before the bloom stage. 2,4-D alone can be effective, but will likely require repeated applications. Although biological control agents have some degree of impact on individual plants or on seed production, it is too soon to know what cumulative effects they will have.

Russian Knapweed *(Centaurea repens)*

Russian knapweed is a member of the Aster family, Thistle tribe and is a creeping perennial. It is a native of Europe and Asia, introduced in 1898 from Turkestan as a contaminant in alfalfa seed. Russian knapweed is a serious noxious weed and is very difficult to control or eradicate once it becomes established. It grows in cultivated fields, along ditch banks, fence rows, roadsides, and in waste places. It invades open, disturbed ground, suppresses growth of surrounding plants and once established, forms a single species stand. It is considered a noxious weed in 412 counties within 21 western states. It is a serious habitat invader because of its aggressive nature and allelopathic properties. It is very poisonous to horses. It is especially prevalent from 4,500 to 7,500 feet.

Russian knapweed is much like spotted knapweed in its appearance and flower color, except Russian knapweed has pale egg-shaped flower head bracts. Unlike spotted knapweed, Russian knapweed is a creeping perennial that forms dense colonies and is much more lush in appearance.

The ridged stems are erect, rather stiff, branched, and one to three feet high. Young stems are covered with soft gray hairs or nap. At the seedling stage, the leaves are toothed with a covering of fine hair and are colored a bluish-green. The upper leaves are small and narrow with broken edges. Leaves attached midway up the stem have slightly toothed margins, while basal leaves are deeply notched. Every branch ends with a pink to purple flower with a rounded base. The flowers are thistle-like, solitary, terminal, 1/3 to ½ inch in diameter and lavender to white. The plant flowers in June to August and seed is produced in later summer to early fall. A single plant may produce 1,200 seeds, which remain viable two to three years.

Although Russian knapweed produces seeds, it does not reproduce extensively from seed. Infestations increase primarily vegetatively through adventitious buds on a creeping root system. Roots, which are both vertical and horizontal in the soil, may or may not be black with a scaly appearance. Roots grow 6 to 8 feet deep the first season and 16 to 23 feet deep in the second season.

Russian knapweed requires a combination of mechanical, chemical and cultural control or a mechanical and cultural control combination. Whichever method is chosen, it is imperative to continually stress the plant because it does not do well under stressful conditions. The most preferred method of control is to mow the area of Russian knapweed once a month during the spring and summer months, then follow up with an application of Tordon or 2,4-D in the fall. Chemicals are not always necessary if the plant is stressed by mechanical methods and proper cultural techniques are applied. Long-term reductions must include planting competitive plant species to occupy bare ground once infested by the weed, due to Russian knapweed's allelopathic qualities. Biological control agents available or being studied for release include the gall-forming nematode Subanguina picridis, the gall-forming mite Aceria acroptiloni, a wasp (Aulacida acroptilonica), a stem gall-forming insect, and the rust fungus Puccinia acroptili that infects the foliage.

Spotted Knapweed *(Centaurea biebersteinii)*

It is a native of central Europe, central Russia, and western Siberia. It arrived in the U.S. as a contaminant in alfalfa seed. The species also occurs along roads and railroads, including cut and fill slopes, in gravel pits, pastures, and forest clearings. The knapweeds have shown that they may be alleopathic—they produce their own herbicide to reduce the vegetative growth of other plants. This eventually results in a monoculture of knapweeds.

Spotted knapweed is a biennial or short-lived perennial varying from eight inches to 4 feet tall with a stout taproot. The stout taproot, pink flowers tipped with white, and noticeable dark spots on the bud are what makes spotted knapweed different from the creeping-root form of Russian knapweed. Spotted knapweed stems are hairy and rough with a somewhat woolly appearance. The leaves, which are once or twice divided into lobes on each side of the center vein, are blue-gray in color. The over-wintering rosettes bolt in early summer, producing 1-15 stems. The stem leaves, which have a few lobes or are linear, become smaller toward the top of the plant.

Flowers are similar to those of Canada thistle, both of which are shaped like a small, lavender dandelion blossom. The flower head is thistle-like with a scaly head. Flowers are pink to purple, rarely white and occur in egg-shaped to oblong heads, which are solitary at the ends of clustered branches. The bracts of the flower heads have obvious veins, with a black spot on the tip. The lower and middle bracts are egg-shaped, and green to brown below the tip. The tip and upper bract margin have a soft spine-like fringe, with the center spine being shorter than the others. White-flowered plants usually lack the dark spot on the bract tip. The plant flowers from June to October, producing black to brown, oval seeds with pale lengthwise lines, and a ring of slender, chaffy bristles. Each plant can produce 400 or more seeds per flower stalk and up to 40,000 seeds per plant. Most seeds fall within a 3-4 foot radius of the parent plant. Seeds are viable for 7 years and germinate throughout the growing season.

Spotted knapweed reproduces and spreads solely from seed and the key to its management is to prevent seed production. The most effective method of control is to combine cultural and chemical controls. The reason for combining the two methods is that spotted knapweed will re-enter an area if cultural practices are not utilized and field conditions continue to remain the same. An application of Banvel plus 2,4-D, Tordon plus 2,4-D, clopyralid plus 2,4-D or Banvel plus Tordon will control spotted knapweed. Tordon is often chosen because the residual activity of this herbicide provides long-term suppression. For cultural controls, desired grasses should be planted during the fall to maximize establishment success. Established stands may be reduced by hot, prescribed burns. For biological controls; sheep, goats and cattle will consume spotted knapweed without any adverse effects. Generally this can be an effective method if it coincides with cultural practices and proper grazing management practices are used. Several biological controls exist, including two root-mining moths, a flower moth, and a root-mining beetle. These have met with varying degrees of success. Most promising are the two seed-head attacking flies *Urophora affinis* and *U. quadrifasciata*.

Squarrose Knapweed *(Centaura virgata Lam. Var. squarrosa)*

Squarrose knapweed is a member of the thistle tribe (Cynareae) in the sunflower family (Asteraceae). It is a competitive rangeland weed native to Bulgaria, Lebanon, northern Iraq, Iran, Afghanistan, and Turkestan. A long-lived perennial with deep roots and a stout crown, squarrose knapweed can endure drought at either end of the temperature extreme, and does not depend on annual seed production or frequent seedling success to maintain its populations. Rosettes may grow slowly for years before flowering, constituting a vegetative equivalent to a seed bank. In Utah, most squarrose knapweed grows on big sagebrush-bunchgrass rangeland, but it also extends up into the juniper-dominated rangeland and down into the salt desert shrub range, particularly in sandy or gravelly washes. Wildfires create the ideal conditions for rapid expansion. Squarrose knapweed's fire and drought tolerance, excellent seed dispersal, and rapid response to soil resources released by fire nearly guarantee spread into burned closed-canopy juniper sites with little understory.

Squarrose knapweed is a perennial having a woody crown consisting of one or more clusters of rosette leaves produced on a stout taproot. Several to may profusely branched stems grow 1 to 3 feet tall from each crown. Stems are branched, with deeply dissected lower leaves and bract-like upper leaves. The stalked, deeply lobed basal leaves often wither by flowering time. Stem leaves are not stalked, and have fewer lobes progressively up the stems. Upper-most leaves are bract-like. Bract tips are recurved or spreading, with the terminal spine linger than lateral spines on each bract. Squarrose knapweed flowers from June to August, and then disperses seeds from August through the winter. Flower heads are borne singly or in pairs at the tips of the branches. The heads are ¼ to ⅜ inch wide, each containing only four to eight rose-purple or pink flowers, usually developing no more that 3 to 4 seed per head. The seed heads are highly deciduous, falling off the stems soon after seeds mature. Seeds are up to ¼ inch long, including the whitish plume, which varies from one-third the length of the seed body to entirely absent. Seeds are golden to dark brown with faint linear stripes and an oblique scar where they detach from the head.

Several herbicides are registered for control of knapweeds on rangeland, with varying degrees of residual activity for control of later germinants. An application of Banvel plus 2,4-D, Tordon plus 2,4-D, clopyralid plus 2,4-D or Banvel plus Tordon will control squarrose knapweed. Tordon is often chosen because the residual activity of this herbicide provides long-term suppression. When cultivation or grubbing are used for control, the root should be cut at least 8 inches below the soil surface to minimize forming new shoots from broken-off taproots. Six insects introduced for biological control of diffuse and spotted knapweed have accepted squarrose knapweed as a host plant. IWM following wildfire includes applying picloram or clopyralid to kill the knapweed; then broadcast seeding of desired grass species two to four weeks later, followed by chaining to incorporate the seed in the soil surface. Seeding is delayed to minimize contact with the herbicide and to prevent fall germination. Early spring germination maximizes seedling establishment prior to summer drought.

I. DESCRIPTION OF AFFECTED ENVIRONMENT – IMPACT OF WEED PREVENTION MEASURES ON FOREST USERS

Noxious weeds are a human-caused problem. We brought the weed seeds here, some by purposeful importation for specific purposes, prior to having the full knowledge of the potential for management problems. We've constructed roads across all landscapes, creating ideal habitats for those weeds to flourish across nearly every plain and valley, every forest and mountain. Weed seeds get stuck on the bottoms of cars, trucks, and off-road vehicles (OHVs), and they spread up and down the roads and trails almost as fast as the machines that drive there. We transport seeds when we harvest crops or hay in one region and transport them to others. We are constantly on the move, and we carry weed seeds with us almost everywhere we go. Prevention today involves placing responsibilities, requirements, and restrictions on forest uses and users.

The use and mis-use of land and land resources provides opportunity for noxious weeds to invade an area. Knowledge of sites and uses that can contribute to weed invasions can aid in the decision process for management of land and resources.

FOREST ROADS AND TRAILS ARE WEED TRANSPORTATION CORRIDORS. Rights-of-way comprise the single most important point of noxious weed invasion, and should always be given priority attention in any kind of noxious weed program. Roads and trails provide a means for weed vectors (things that move weeds) to travel and transport seed and plant parts great distances from the source. Areas disturbed by construction, maintenance, or use of roads provide favorable seedbeds for germination of seed being carried or moved by vehicles. Delay in revegetating disturbed areas following construction, reconstruction, or maintenance gives weeds an opportunity to establish. Construction of roads through rocky or steep terrain often leaves cutbanks and fill areas that are often bare rock or strewn with boulders that prohibit managed revegetation and is highly susceptible to secondary succession by weedy invaders. Trails and trailheads provide channels for weeds to migrate to remote areas of forest and rangelands. Livestock that have been feeding on infested feed prior to use on forest and rangeland trails, deposit undigested seed as the animal defecates along the trail. Once the weed has gained entrance into the forest, further transport along the trail occurs by other trail users (*Callihan et. al., 1992*).

BORROW PITS AND ROCK QUARRIES. The vegetation is removed from these sites, topsoil is removed, and underlying gravel or rock material is extracted for use in road construction or similar use. These are prime sites for noxious weeds to establish safely, because often the site is too rough for negotiation by weed control equipment. Once weeds are established in an operating borrow pit, they are often transported with fill material to new locations for reestablishment.

DISTURBED LANDS. Any areas that have had the native vegetation removed without replacement becomes a candidate area for weed invasions. Land subdivided for home or commercial development, borrow pits, road cuts, temporary roads, utility corridors, livestock holding pens, timber sales, and some fire-burned-over areas are examples.

TIMBER PRODUCTION AND MANAGEMENT. Areas disturbed by logging operations are major infestation sites for weeds to invade forestlands. Logging operations are primary causes of noxious weed seed movement from weed-infested areas to the logging site areas. Road building and log moving equipment associated with timber harvest leaves extensive areas of heavily disturbed soil. The soils of skid roads and trails, landings, log deck areas and haul roads are usually compacted, native vegetation is destroyed, and weed seeds are brought in on the equipment, and the surface soil is left loose after the job is over. All this is made to order for noxious weed infestations. Weeds compete with tree seedlings for sunlight, moisture, and nutrients, and provide a haven for gophers and mice that inflict heavy damage to young trees. Weeds harbor insects and diseases detrimental to trees. Tree mortality caused directly or indirectly by weeds reduces stocking and increases planting cost. The annual wood fiber production from the plantation is diminished and it takes longer to produce a harvestable product. This increases cost, retards recovery of esthetic effects, and reduces net economic gain (*Callihan et. al., 1992*).

LIVESTOCK GRAZING. Nearly all livestock ranges and pastures contain certain over-used areas. Livestock tend to concentrate at watering facilities, fence corners, gates, shade areas, and similar sites. Overuse of rangeland removes protective vegetative cover that can curtail establishment of invaders. Scarification of soil by livestock can also provide a desirable seedbed for invaders. Movement of livestock from infested range can transport weed seeds and plant parts to uninfested areas. Ingestion of seeds and by livestock may result in stratification of the seeds and rapid germination as it is deposited on a new site. Once a weed species has invaded a site, livestock disperse them. The range's carrying capacity is reduced whenever weeds displace palatable and more productive vegetation. Inefficient utilization of forage resources may necessitate restricted grazing programs. Delay in spring use, early removal of livestock and changes in class of livestock to utilize the weeds or prevent poisoning are examples of restricted use. Fencing may be required to restrict access to toxic and poisonous weeds. (*Callihan et. al., 1992*).

DEVELOPED AND UNDEVELOPED RECREATION AREAS. Visitors to weed-infested recreation areas generally are not aware that alien plant species have invaded the area. Vehicles used in recreation pursuits often are carriers of the seed or plant part that causes the weed invasion. Seeds or plant parts may be brought from home in mud, slush, or other substances adhering to the vehicle. Seeds may be lodged in the tracks of wheels of

recreation vehicles to be deposited elsewhere. There are many ways weed seeds can be carried and deposited in recreation use areas. Once established they become a management problem. Recreational pack and saddle stock that have been feeding on infested feed prior to use on forest and rangeland trails deposit undigested seed as the animal defecates along the trail. Once the weed has gained entrance to the land unit, further transport along the trail occurs by other trail users. (*Callihan et. al., 1992*).

AQUATIC RECREATION AREAS. Weeds are often moved by recreational activities from one body of water to another by watercraft and associated equipment such as boats, motors, oars, boat trailers, nets, and fishing equipment. These weeds are often deposited at loading and launch areas. Material falling from vehicles parked in recreation areas often includes seed or plant parts acquired from infested areas. Riparian areas are essential habitats for multitudes of wildlife and fish. Loss of desirable plants from these areas reduces the ability to provide feed and cover and habitat is reduced or lost. Invading weeds in fisheries reduces fish spawning habitat, increases water temperature, increases organic material in water which reduces dissolved oxygen available to fish, resulting in habitat degradation. Animals, birds, and fish that are dependent on native plants for food and cover must either adapt to the change in vegetation, look elsewhere for their needs, or be lost to the ecosystem (*Callihan et. al., 1992*).

FOREST STREAMS ARE A CONDUIT FOR THE SPREAD OF NOXIOUS WEEDS. The potential for weeds to affect resources along waterways is due largely to the vast area through which water passes as it flows to the ocean. Invading weeds along forest streams provides seeds that can spread downstream to agricultural lands and water impoundments (*Callihan et. al., 1992*).

WILDLIFE (INCLUDING WATERFOWL, OTHER BIRDS, RODENTS, ETC). Overuse of forage by wildlife can create weed-susceptible conditions similar to areas used by livestock, although not generally as severe. Areas where wildlife concentrate in the winter and spring are subject to overuse and soil scarification. Wildlife moving from infested areas transport seed and plant parts to uninfested areas. Ingestion of seed by wildlife may result in scarification and rapid germination as it is deposited on a new site. (*Callihan et. al., 1992*).

Although the State of Utah places the responsibility for control of noxious weeds on the landowner, federal land managers work under the authority of laws and regulations that require contractors, permittees, and resource users to control noxious weeds on Federal lands under their jurisdiction.

For authorized uses by contractors, loggers, grazing permittees, special use permittees, etc. Federal land managers must provide for inspection and appropriate control measures to ensure compliance with noxious weed prevention practices. In general, forest visitors are not informed about noxious weeds or techniques for prevention of new invaders. The Federal land manager is responsible for providing information and education programs to provide public notice of weed problems, involve forest users in control programs, and enlist their aid in prevention of new invasions.

The noxious weed prevention practices provided in the Proposed Action include the following guidelines to enlist forest users in controlling the invasion and spread of noxious weeds. Implementation of these practices will change how forest users make use of natural resources on federal lands.

Two weed prevention practices are required by Forest Service policy:

- For forested vegetation management operations, use equipment cleaning contract provisions (WO-C/CT 6.36).
- Post and enforce weed-free feed orders, where they exist (FSM 2081.03).

All other noxious weed prevention practices are provided as guidelines and do not add any new requirements or regulations. These measures identify weed prevention practices that can be applied to specific site-disturbing projects and that may also be applicable for maintenance activities. Resource activities for which appropriate specific mitigation practices are provided include:

- Land Use Planning and Implementation
- Ground Disturbance and Revegetation
- Gravel Pits and Borrow Sources
- Road Maintenance
- Roadway Obliteration
- Recreation and Roadless Areas
- Cultural Resources
- Wildlife and Fisheries
- Grazing Allotment Management
- Timber Harvest
- Post Timber Harvest
- Mining and Minerals Exploration
- Soil and Water
- Lands and Special Uses
- Pre-fire, Pre-incident Training
- Wildfire
- Prescribed Fire
- Fire Rehabilitation
- Administration/General

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

This chapter evaluates the potential environmental consequences of the Proposed Action (Integrated Weed Management), Continuance of Current Control Strategies, and No Action alternatives. The purpose of this analysis is to comply with and supplement the parent FEIS with any new local issues and concerns not already cited in the FEIS, site specific descriptions (current infestation sites, species, and any information on the affected environment). Site-specific analysis is intended to address the local characteristics of the particular control projects that are too detailed to have been specifically analyzed in the FEIS (FEIS, 2-12).

It is not a purpose of this document to re-analyze alternatives to Integrated Weed Management control methods or to re-analyze environmental consequences that are already assessed in the FEIS.

It is the purpose of this analysis to consider significant aspects of site-specific environmental impacts of the Proposed Action and to inform the public that environmental concerns have been considered in the decision-making process. It is the intention of this analysis to provide sufficient evaluation to the Deciding Officer to make an informed decision regarding management of invasive noxious weeds on the Fishlake National Forest.

B. PROBABLE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Each of the Proposed Action and No Action alternatives contemplated under this EA has environmental impacts that cannot be avoided. Herbicide applications, for example, are likely to affect some non-target plants. Although mitigation measures would probably prevent environmentally significant concentrations of herbicide from reaching surface water or groundwater, it is possible that minute amounts of herbicide could migrate from the site. Under reasonably foreseeable circumstances this would not have a significant environmental impact.

The adoption of the No Action alternative would not immediately result in unavoidable environmental impacts. However, it is clear that alternatives which allow the continued spread of noxious weeds and the continued development of dense woodlands on these dry sites would eventually result in unavoidable environmental effects to various resources described in this chapter.

C. POSSIBLE CONFLICTS WITH THE PLANS AND POLICIES OF OTHER JURISDICTIONS

The Utah Noxious Weed Act [4-17-7(2,3) U.C. 87-88] states that "If the county weed control board determines that particular property within the county requires prompt and definite attention to prevent or control noxious weeds, it shall serve the owner or the person in possession of the property…a notice specifying when and what action should be taken on the property…An owner or person in possession of property who fails to take action to control or prevent the spread of noxious weeds as specified in this notice is maintaining a public nuisance" (*Utah, 1987*).

The Forest Service has the lead responsibility for noxious weed coordination for the U.S. Department of Agriculture under the authority contained in the Noxious Weed Act of 1974 and USDA Policy 9500-10. Under this authority, the FS developed the USDA Policy in 1990 and policy direction for the FS in 1991. FS policy was revised in 1995 (FSM 2080) to include new standards and refined direction for integrated weed management (IWM). In February 1999 President Clinton signed the 1999 Invasive Species Executive Order to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts which invasive species cause.

In June 1986, the Intermountain Region, U.S. Forest Service, released for public review a Noxious Weed and Poisonous Plant Control Final Environmental Impact Statement (FEIS). This document covers control programs on National Forest System lands in Utah, Nevada, southern Idaho, western Wyoming, and portions of California and Colorado. The preferred control method addressed in detail in this impact statement is Integrated Weed Management. In February 1996, Forest Service Chief Jack Ward Thomas issued direction for each Forest Service Region to bring their noxious weed programs in line with national agency strategy. In March 1998, the Intermountain Region Strategy For Noxious Weed Management was completed. This strategy directs the Fishlake National Forest to develop a "strong prevention and eradication program…because on a regional scale, they have smaller infestations for management and eradication and large healthy areas to keep weed free…In Utah, there is an opportunity to eradicate the infestation on the Fishlake National Forest". Subsequent project planning efforts, including this EA, further this objective.

None of the alternatives would conflict with State and Federal water or air quality regulations or with U.S. Fish and Wildlife Service recovery plans for threatened and endangered species. A full disclosure of environmental effects resulting from the selected alternative will be included in the Biological Assessment prepared after the selection of an alternative.

D. THE RELATIONSHIP BETWEEN SHORT-TERM USES & LONG-TERM PRODUCTIVITY

The Proposed Action alternative is designed to improve the long-term productivity and sustainability of resources on the project area. The Proposed Action could also have short-term impacts on various resources, as described in this chapter. The Forest Service line officer charged with selecting the alternative to be implemented will weigh the possible short-term impacts against the long-term benefits of each alternative before making a decision.

D. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementation of the Proposed Action involves an irretrievable commitment of labor, fossil fuels, and economic resources. The No Action alternative would not involve such commitments, but could result in the unavoidable deterioration of the natural condition of the area.

E. REASONABLY FORESEEABLE FUTURE ACTIONS

Many on-going and future activities on the Forest are either directly or indirectly linked to potential transportation of weed seed or preparation of seed-beds through ground-disturbing activities. A comprehensive listing of these activities, along with mitigation measures are presented in Appendix F. Routine activities include timber harvesting; livestock grazing; recreational camping, hiking, and ATV use; mining and minerals exploration; road construction and maintenance; and wild fire and prescribed fire.

Past trends and the invasive nature of noxious weeds, coupled with continuing inventories, indicates that it is reasonably foreseeable that areas not currently occupied by noxious weeds may become infested and require treatment within the time period covered by this analysis. It is also reasonable to expect that there may be additional weed species, other than those identified as currently occupying sites on the Forest, which might become established. Concurrently, it is expected that chemical research will continue to produce new and more effective chemicals for use in treating noxious weeds. Reasonable foreseeable actions include 1) the expansion of treatment programs to include the detection and treatment of newly infested or previously unidentified sites, including treatment of noxious weeds different than those now known to occupy the Forest, 2) the use of approved herbicides which may not be specifically listed in the Proposed Action, and 3) the application of new research on the use of biological control, vegetative competition (cultural control), and ecosystem information on vulnerability to invasion. All such reasonably foreseeable actions would be in concert with mitigation measures, application procedures, non-target species protection provisions, and any necessary site modification requirements specified in this analysis.

F. GENERAL DIRECT AND INDIRECT EFFECTS ON THE ENVIRONMENT

Potential environmental effects as described in the FEIS and compared to site-specific analysis, considering the affected resource features, are displayed in the following table. No resource features were identified by the public through scoping for this EA as needing additional evaluation. The FEIS does state that site-specific evaluations would be provided for threatened and endangered species. No other evaluations in the FEIS were considered overly broad and not sufficiently addressing the affected resources. Therefore, in this EA, additional analysis of direct, indirect, and cumulative effects of only threatened, endangered, proposed, and sensitive species is included in this chapter. Likewise, since the FEIS determined that "It is unlikely that threatened or endangered plants will be affected by manual control techniques" but that "They could, however, be affected by the use of herbicidal methods" (FEIS 4-10), further analysis will be limited primarily to the effects of the use of herbicides on TEPS species.

Direct effects are caused by the action and occur at the same time or place. Indirect effects are caused by the action and are later in time or farther removed in distance but still reasonably foreseeable.

Table 4-1 -- SITE-SPECIFIC EVALUATION		
ACTION ALTERNATIVES		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
VEGETATION Grassland Meadow Riparian Sagebrush Shrubland Mixed Conifer Pinyon Juniper Aspen	The less selective of the herbicides used would result in the greatest chance of injury to non-target vegetation. For dicamba, picloram, 2,4-D, and other selective herbicides, broadleaf plants would be the main non-target group affected. Effect on non-target vegetation would mainly occur with broadcast applications that make up a small part of total herbicide treatments. Ecological conditions would be improved by reducing or eliminating competition from weed species and reducing the risk of weed spread to downstream agriculture (FEIS 4-6/7).	No variation: The cumulative effects of treatment are unlikely to impact the overall esthetics or impact industries that benefit from target vegetation. Since noxious weeds would be contained, controlled, or locally eradicated, there is reasonable assurance that the Forest Plan objective to strengthen noxious weed programs, with priority on controlling invasion of new species and infestations in new areas (LRMP, IV-23) would be met. **No additional site-specific evaluation is necessary.**
AQUATIC MIS Resident Trout (Brown, Rainbow, Brook, Cutthroat, and Lake), Bonneville cutthroat trout, Macroinvertebrates	Impacts on fish and fish habitat from herbicide treatment would be slight and short-lived because treatment sites are small in size, scattered over a wide geographic range, only a small amount of surface disturbance is proposed, only insignificant amounts of herbicides would enter streams, and mitigation measures would be extensively used. (FEIS 4-7)	Project administration and mitigation measures for herbicides applied next to live streams would reduce adverse impacts from herbicide applications. Since mitigation measures, buffer zones, and application methods would limit the amount of herbicides that would enter streams, there is reasonable assurance that the Forest Plan goal to protect aquatic habitats which are in good or excellent condition and improve habitats where ecological conditions are below biological potential (LRMP, IV-3) would be met. **A site-specific evaluation addressing effects to these aquatic MIS species is included in Chapter 4 of this Environmental Assessment.**
MIS WILDLIFE Mule deer Rocky Mountain Elk Northern goshawk Sage nesters Cavity nesters Riparian dependent guild	Treated noxious weeds may be replaced by native vegetation resulting in a positive impact by increasing forage value. Destruction of non-target vegetation would directly affect terrestrial wildlife habitat and indirectly affect specific wildlife species. Under standard application procedures, no animals are likely to receive toxic or fatal doses of herbicides (FEIS 4-8).	Typical treatment sites are scattered and less than 1/2 acre in size, thereby reducing the possibility of significant adverse effects to wildlife. The herbicides scheduled for use show low or no tendency to bioaccumulate and cumulative, long-term persistence in food chains and subsequent toxic effects on animals is not considered a problem. Noxious weed control could result in localized changes in vegetation diversity. These impacts are minimal and will not result in an overall loss of habitat for MIS species. Viability of MIS species will not be adversely affected. These actions will reduce the risk that noxious weeds will replace existing vegetation and result in the loss or modification of potential habitats. Since the possibility of significant adverse effects to wildlife is minimal and potential habitats would be preserved, there is reasonable assurance that the Forest Plan goal of improving or maintaining the quality of habitat on big game winter ranges (LRMP, IV-4) would be met. **A site-specific evaluation addressing effects to these MIS wildlife species is included in Chapter 4 of this Environmental Assessment.**

ACTION ALTERNATIVES		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
MIS PLANTS Rydberg's milkvetch	TEPS [or MIS] plants could be susceptible to any impacts described for terrestrial vegetation, Direct effects of injury or death to plants could immediately eliminate a species in all or a significant portion of its range (FEIS 4-9).	Site-specific inventories will determine whether any MIS plants are in the vicinity of a planned noxious weed control operation and requirements will be implemented to avoid adverse impacts to this MIS plant species. Since adverse impacts to MIS plants would be avoided, the Forest Plan goal of determining current status and monitoring trends in management indicator species and their habitat (LRMP, IV-4) would be met. **A site-specific evaluation addressing effects to this MIS plant species will be provided at the Forest-level within this Environmental Assessment.**
AIR QUALITY	Major impacts on air quality are not anticipated. Overall effects on air quality will be insignificant since project areas are small, not contiguous, and widely dispersed geographically (FEIS 4-1).	No variation: Mitigation measures for restricting application under windy conditions and restriction from aerial application limits effects on air quality. Cumulative effects would be insignificant and therefore, there is reasonable assurance that the Forest Plan objective of complying with State and Federal Air Quality Standards (LRMP, IV-49) would be met. **No additional site-specific evaluation is necessary.**
SOILS	Impacts to soils will be relatively minor and short-lived due to the small magnitude of chemical treatment and minor soil disturbing nature of the Proposed Actions. Removal of solid stands of noxious weeds by chemical treatment may result in short-term increases in surface erosion that would be mitigated as vegetation reoccupies the site (FEIS 4-1).	No variation. Mechanical control could result in localized soil disturbance, but the areas disturbed are expected to be so small as to have no long-term impacts to soil resources. Cultural and biological controls would have no effect on soils resources. Cumulative effects may result from repeated applications at a given site; however, all herbicides to be used are biodegradable over varying periods of time. Since the possibility of significant adverse effects to soils is minimal, there is reasonable assurance that the Forest Plan objective of maintaining soil productivity, minimizing man-caused soil erosion, and maintaining the integrity of associated ecosystems (LRMP, IV-42, IV-43) would be met. **No additional site-specific evaluation is necessary.**

ACTION ALTERNATIVES		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
WATER RESOURCES	Impacts to water resources will be minor and short lived due to the small size of treatment areas scattered over a wide geographic range, the small amount of surface disturbance proposed, and the use of mitigation measures. Any cumulative impacts are too insignificant to detect (FEIS 4-2-4-5).	No variation. Mechanical control could result in localized soil disturbance, but the areas disturbed are expected to be so small as to have no long-term impacts to water resources. Cultural and biological controls would have no effect on water resources. All standing or running water resources will be protected by a 200-foot buffer strip within which herbicides will not be used. This will result in minimum contamination of surface waters. Herbicides have the ability to impact water, human and aquatic health even if present in very small quantities. However, the likelihood of an herbicide impacting surface water, groundwater, or culinary sources may be greatly decreased through the use of mitigation measures (Chapter 2). The herbicides proposed for use, and their behavior in water and soil are briefly described in Appendix B, Herbicides and Their Properties. Since mitigation measures, buffer zones, and application methods would limit the amount of herbicides that would enter streams, there is reasonable assurance that the Forest Plan objective to use chemicals only when and where possible transport to surface water has a low probability of occurrence (LRMP, IV-36) would be met. **No additional site-specific evaluation is necessary.**
CULTURAL RESOURCES	Manual control measures and/or off-road vehicular applications could disturb or destroy cultural resources on or near the ground surface...Cultural resource surveys, however, would precede management actions that could damage cultural resources (FEIS 4-13).	No variation. Sites found within treatment areas will be protected in accordance with the National Historic Preservation Act of 1966 and Executive Order 11593, as stated in the Code of Federal Regulations (36 CFR 800). Since mechanical treatment projects would require a cultural resource survey, there is reasonable assurance that the Forest Plan objective of completing cultural resource surveys prior to any ground-disturbing activity (LRMP IV-12) would be met. **No additional site-specific evaluation is necessary.**
VISUAL RESOURCES AND RECREATION	Treatments, such as herbicides, may cause visual impacts mainly by creating color contrasts between treated areas and surrounding vegetation...applying herbicides reduces vegetation variety and can prevent the occurrence of seasonal changes within treated areas. These short-term impacts, however, would be offset in the long term by the growth of desirable plants on the site (FEIS 4-13).	No variation: CEs of noxious weed control in recreation areas would decrease visitor exposure to detrimental effects of stickers, burrs, and poisons of these plants. Visual resources will be enhanced by replacement of noxious weed infestations and disturbed sites with competitive native vegetation. Since recreation-visitor use would be enhanced by noxious weed control, there is reasonable assurance that Forest Plan objectives to provide for a pleasing visual landscape and opportunities for OHV use (LRMP, IV-12, IV-53, IV-59) would be met. **No additional site-specific evaluation is necessary.**

ACTION ALTERNATIVES		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
TEPCS SPECIES Bald eagle Utah prairie dog Mexican spotted owl Western yellow-billed cuckoo San Rafael cactus Maguire's daisy Lst Chance townsendia 6 sensitive WL species 2 sensitive fish species 16 sensitive plants species	It is unlikely that any of these alternative noxious weed and poisonous plant control methods would adversely affect any threatened or endangered species because of the small size of most treatment sites...The Fish and Wildlife Service concurred with the determination that the Proposed Action would have "no effect" on federally listed species. This conclusion is based on the fact that site-specific evaluations would be conducted at the National Forest level. TEPS plants could be susceptible to any impacts described for terrestrial vegetation, Direct effects of injury or death to plants could immediately eliminate a species in all or a significant portion of its range (FEIS 4-9).	Site-specific inventories will determine whether any TEPS plants are in the vicinity of a planned noxious weed control operation and requirements will be implemented to increase the certainty that there will be no impacts to threatened or endangered species. Since, in no instance, will a noxious weed control operation be undertaken where there is a reasonable likelihood of a threatened or endangered species being adversely affected, any cumulative effects would be positive benefits from protection of competition from invasive, exotic plants and the Forest Plan goal to identify and improve habitat for sensitive, threatened and endangered species including participation in recovery efforts for both plants and animals (LRMP, IV-4) would be met). **Site-specific evaluations will be provided at the Forest level. A Biological assessment and evaluation will be prepared to identify how TEPCS species might be affected by the proposed action.**
LIVESTOCK	Chemical treatments are generally applied in a form or at such low rates that they do not affect livestock (FEIS 4-10).	No variation. Cumulative effects may result from improved rangeland ecological conditions. Since noxious weed treatment would enhance forage productivity and have insignificant adverse effects on livestock, there is reasonable assurance that the Forest Plan objectives of providing forage to sustain the locally dependent livestock industry (LRMP, IV-21) would be met. **No additional site-specific evaluation is necessary.**
RNAs and SPECIAL AREAS Cove Proposed RNA, Ant Hill Proposed RNA	All weed control treatments applied on or near [RNAs and special areas] would incorporate features designed to avoid or mitigate impacts to special areas...Site-specific impacts to special areas will be addressed further in National Forest environmental analyses that will precede control of noxious weeds and poisonous plants (FEIS 4-14).	Impacts to RNAs and/or special areas would be relatively minor and short-lived due to the small magnitude of chemical treatment and minor soil disturbing nature of the proposed actions. Protection and maintenance of biodiversity and perpetuation of native species would be a cumulative effect of the Proposed Action. Since impacts to RNAs and special areas would be minor and protection of native species biodiversity would be maintained, there is reasonable assurance that Forest Plan emphasis to provide for the protection and perpetuation of essentially natural biophysical conditions (LRMP, IV-154) would be met. **No additional site-specific evaluation is necessary.**

ACTION ALTERNATIVES		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
ECONOMIC CONDITIONS	(FEIS 4-16) The Proposed Action provides increased opportunity for benefits by complying with State and Federal laws and by preventing: -Reduction in crop yields and increased operating costs for noxious weed control on adjacent private lands. -Reduction of desirable vegetation. -Reduced recreation opportunities. -Infestation of big game ranges. -Infestation of road rights-of-way. -Degradation of upland game bird cover. -Infestation of livestock grazing ranges.	No variation. Eradication of new or small infestations and containment of existing established infestations prevent exponential costs associated with uncontrolled expansion of noxious weeds. Since the uncontrolled spread of noxious weeds can have serious adverse impacts to agricultural economics as well as related recreational and wildlife related economies, control of noxious weeds will have positive effects on local economies and there is reasonable assurance that Forest Plan objectives of providing livestock forage (LRMP, IV-21, IV-109), optimizing wildlife habitat and numbers (LRMP, IV-18, IV-95) and managing fisheries to provide sustaining self-supporting trout populations (LRMP, IV-18, IV-85, IV-95), and providing opportunities for community stability (LRMP IV-5) would be met. **No additional site-specific evaluation is necessary.**
HUMAN HEALTH	The probability of a backpack worker developing cancer after spraying 2,4-D for 20 days (average dose, recommended protection) is 1 chance in 10 million. If the worker sprayed 20 days per year for 30 years, his additional cancer probability would be 5 chances in a million (FEIS H-134). An infant resident exposed near a large project has a cumulative cancer probability of about 8 chances in 100 million. If the infant were exposed to worst-case doses from 10 projects over a lifetime, his additional cancer probability would be about 8 chances in 10 million (FEIS H-135). As a point of comparison, and to further illustrate the reality of such small probabilities, the average American has a one-in-a-million chance of being killed by fire for every 13 days of living in the U.S. An automobile driver has a one-in-a-million chance of death every 1.5 days of living in the U.S. A person who smokes two cigarettes has increased his chance of cancer by one chance in a million. (FEIS H-135)	No variation. Noxious weed treatment may be by any approved herbicide suitable for use on the selected noxious weed species. Conventional herbicidal treatment for most broadleaf weeds has primarily relied on a standard mixture of the herbicides 2,4-D and Dicamba (Dicamba at .5-1 lb ai/ac with 2 lbs ae/ac of 2,4-D). Methods of application depend on the species, terrain, and size of the area to be treated. Since application of chemical herbicides would be made by a certified pesticide applicator under appropriate weather conditions and with prescribed protective clothing and probabilities of adverse effects to the general public are low, there is reasonable assurance that the Forest Plan objective of providing safe and enjoyable use of recreation opportunities (LRMP, IV-53, IV-60) would be met. **No additional site-specific evaluation is necessary. All project operations must be conducted under the umbrella of a health hazard analysis and safety plan (Appendix D). An in-depth human health risk analysis is provided in the Risk Assessment.**

NO ACTION		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
VEGETATION Grassland Meadow Riparian Sagebrush Shrubland Mixed Conifer Pinyon Juniper Aspen	Target plants will be allowed to spread unchecked and to contribute to a decline in ecological condition. Noxious weeds would increase, resulting in reduced forage production and degraded habitat for both livestock and some wildlife species. Weeds would spread to uninfested private land, resulting in a decline in agricultural productivity and increased economic burden on landowners (FEIS 4-7).	No variation. Cumulative effects would threaten biodiversity and ecosystem functions and lead to reduced habitat for native and endangered species, degraded riparian areas, soil erosion, fire hazards, elimination of more desirable and nutritious forage, and interference with recreational activities. **No additional site-specific evaluation is necessary.**
AQUATIC MIS Resident Trout (Brown, Rainbow, Brook, Cutthroat, and Lake), Bonneville cutthroat trout, Macroinvertebrates	No Action would not significantly influence fish, fish habitat, or other aquatic plants or animals (FEIS 4-7).	No variation. Cumulative effects would be insignificant. **No additional site-specific evaluation is necessary.**
MIS WILDLIFE Mule deer Rocky Mountain Elk Northern goshawk Sage nesters Cavity nesters Riparian dependent guild	Big game habitat would be reduced in weed-producing areas (FEIS 4-8).	No variation: Without treatment, noxious weeds will replace existing vegetation and is likely to adversely affect habitats for MIS species. No Action would result in a long-term loss of habitat capability for MIS species. Cumulative effects could result in loss of habitat, reduced herd populations, and reduced hunter-recreation opportunities. **No additional site-specific evaluation is necessary.**
MIS PLANTS Rydberg's milkvetch	Target plants will be allowed to spread unchecked and to contribute to a decline in ecological condition. Noxious weeds would increase, resulting in reduced forage production and degraded habitat for both livestock and some wildlife species. Weeds would spread to uninfested private land, resulting in a decline in agricultural productivity and increased economic burden on landowners (FEIS 4-7).	No variation. Cumulative effects would threaten biodiversity and ecosystem functions and lead to reduced habitat for native and endangered species, degraded riparian areas, soil erosion, fire hazards, elimination of more desirable and nutritious forage, and interference with recreational activities. **No additional site-specific evaluation is necessary.**
AIR QUALITY	No air quality impacts (FEIS 4-1).	No air quality impacts.
SOILS	Inferred that without soil disturbance or application of herbicides that impacts on soils would be non-existent (FEIS 4-1).	There would be no expected changes from existing conditions. If specific sensitive areas become dominated by exotic species that alter surface hydrology, localized increases in erosion and sediment production may occur, depending on the weed species. No detectable cumulative impacts associated with the No Action alternative are expected. Cumulative effects may result from persistent site degradation. **No additional site-specific evaluation is necessary.**
WATER RESOURCES	No Action will have no impact to the water resource (FEIS 4-2).	There would be no expected changes from existing conditions. Impacts on water resources are directly related to invasion of stream courses and stream channel degradation by invasive, non-native species. Infested watercourses will act as conduits for rapid and widespread infestation to downstream forest and agricultural lands. If specific sensitive areas become dominated by exotic species that alter surface hydrology, localized increases in erosion and sediment production may occur,

NO ACTION		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
		depending on the weed species. No detectable cumulative impacts associated with the No Action alternative are expected. **No additional site-specific evaluation is necessary.**
CULTURAL RESOURCES	Sites will be protected under all alternatives (FEIS 4-13)	No variation. **No additional site-specific evaluation is necessary.**
VISUAL RESOURCES AND RECREATION	No Action would adversely affect recreation areas infested with noxious weeds by increasing the exposure of visitors to the obnoxious characteristics of noxious weeds, such as: burrs, stickers, and irritants. Visitor use would likely decline (FEIS 4-14).	No variation. **No additional site-specific evaluation is necessary.**
TEPCS SPECIES Bald eagle Utah prairie dog Mexican spotted owl Western yellow-billed cuckoo San Rafael cactus Maguire's daisy Lst Chance townsendia 6 sensitive WL species 2 sensitive fish species 16 sensitive plants species	Any action that would contribute to the extinction of threatened or endangered species or to their threatened and endangered status would violate the Endangered Species Act of 1973, as amended (FEIS 4-10).	No Action, and the continued expansion of invasive, noxious weeds into TEPS Plant habitats, would have adverse impacts on the extent and quality of the TEPS Plant habitat. The competitive nature of noxious weed species could eliminate some TEPS plants. Cumulative effects could result in the listing of some sensitive species and/or the loss of some T&E plant species. No Action would have limited or insignificant impacts on TEPS Fish and Wildlife species. **No additional site-specific evaluation is necessary.**
LIVESTOCK	Impacts to livestock could result from direct ingestion of poisonous plants and toxic noxious weeds. No Action would result in a decline in desirable forage. Poisonous plants and noxious weeds would spread. No Action would take away an effective tool to protect livestock from poisoning (FEIS 4-10-13).	No variation. Cumulative effects may result from increasing decline in rangeland ecological conditions. **No additional site-specific evaluation is necessary.**
WILDERNESS AND SPECIAL AREAS	Cove Proposed RNA, Ant Hill Proposed RNA. No Action would allow noxious weed species to increase at the expense of native vegetation. Impacts related to treatment methods would be non-existent (FEIS 4-14).	No variation. **No additional site-specific evaluation is necessary.**
ECONOMIC CONDITIONS	Considering the potential for noxious weeds to spread onto previously uninfested acreage, it is likely that if left uncontrolled, noxious weeds could result in an irreversible loss of productive acreage. Weeds would spread to nonpublic land, contributing to a decline in productivity and economic loss (FEIS 4-16): -Reduction in crop yields and increased operating costs for noxious weed control on adjacent private lands. -Reduction of desirable vegetation. -Reduced recreation opportunities. -Infestation of big game ranges. -Infestation of road rights-of-way. -Degradation of upland game bird cover. -Infestation of livestock grazing ranges.	No variation. Cumulative effects could result in significant losses in range forage production and removal of some range allotments from permitted livestock grazing. Forage loss could similarly affect big game populations, and hunter-recreation revenues. Cumulative effects on private lands could result in complete economic loss of productive croplands. **No additional site-specific evaluation is necessary.**

NO ACTION		
RESOURCE	**1986 R4 FEIS DESCRIBED EFFECTS**	**PROJECT SITE-SPECIFIC EFFECTS**
HUMAN HEALTH	The potential for adverse impacts to human health through contact with or ingestion of noxious weeds or contact with target plants that exude an irritant sap would remain (FEIS 4-19).	No variation. Cumulative effects will result from expanding infestations, and the probability of adverse impacts to human health will increase. **No additional site-specific evaluation is necessary.**

H. CUMULATIVE EFFECTS

Cumulative effects are the incremental impacts, which result from the action when combined with other past, present, and reasonably foreseeable future actions regardless of which agency, or person undertakes such actions.

The Cumulative Effects Area will include all lands on the Fishlake National Forest as well as other private, State, BLM, and National Parks which may be located within or adjacent to the boundaries of the Fishlake National Forest. This Cumulative Effects Area was chosen because it includes the reasonable home ranges of all the species occurring on the Fishlake National Forest, during a portion of their life cycles.

Due to the large cumulative effects area covered by these alternatives and the diversity of activities that occur within the area, this section will address activities and possible cumulative effects associated with these alternatives. These cumulative effects are common to several or all of the species and their habitats considered in this Environmental Assessment. These include past, present, and reasonably foreseeable actions in the cumulative effects area. This section is being created to reduce repetition within this document.

Timber Harvest and Thinning

Timber harvest, thinning, and associated activities occur on all four Ranger Districts of the Fishlake National Forest. Timber harvest activities and thinning operations can alter vegetation diversity that can result in effects on wildlife, plant, fish, and macroinvertebrate species. These activities can also result in the direct loss of wildlife, plant, fish, and macroinvertebrate habitat from road building, tree removal, and/or dramatic changes in vegetation structure, composition, and juxtaposition.

Timber harvest, thinning, associated activities, and effects (road building, skid trails, log decks, disturbed soil structure, erosion, compaction, increased runoff potential, watershed diversion and disruption, creation of open disturbed sites, destruction of native vegetation, increase of downed fuel loads, weed seed introduced by heavy equipment, tree planting, thinning, snag creation, opening the canopy) can pose serious problems as many of these activities can contribute to the establishment and proliferation of noxious weeds. Furthermore, weeds compete with tree seedlings and harbor insects and diseases that may hinder reforestation efforts. Displaced vegetation through timber harvest and thinning can alter natural succession, natural disturbance regimes, and vegetation structure, density, and composition. The no action alternative would support this disturbance regime by taking no steps to eliminate noxious weed invasion and proliferation. The action alternatives would reduce the risk of further noxious weed invasion, proliferation, and spread by timber harvest and thinning operation activities through the use of a ground-based weed management program that targets and eliminates specific noxious weed species.

A cumulative effect as a result of past, present, and reasonably foreseeable timber harvest and thinning operations and their associated activities combined with the action alternatives may include additional alteration and destruction of the native vegetation within the cumulative effects area. Non-target species may be affected by ground-based herbicide applications from spray drift or possible misidentification of noxious weeds during any of the treatment methods. This may further alter potentially suitable habitat of the species of concern in this Environmental Assessment. This cumulative effect would be minimized by the ground-based, site-specific spot applications of herbicide on targeted noxious weed species, as proposed in the action alternatives.

A cumulative effect may result from soil compaction by timber/thinning operations in combination with having vehicle-mounted boom sprayers, spot application backpack sprayers, and manual/mechanical control methods in the same areas year after year for the containment and eradication of tenacious noxious weed populations. Further soil compaction may disturb soil structure, increase erosion, runoff potential, and continue to propagate disturbed areas and alter vegetation communities found in the cumulative effects area. This cumulative effect would be minimized because the action alternatives would isolate target noxious weed species and focus control efforts using spot application methods.

Cumulative effects from cultural and biological control methods in combination with timber harvest and thinning activities may induce further disruption of natural vegetative succession by introducing disease or infestation (brought in by biocontrol agents) or introducing aggressive desired species (seeding, fertilization, grazing, etc.) that encourage competition. Some desired aggressive species may have the ability to overrun sites and cause diversity within the habitat to decline. Noxious weed species would also cause similar problems.

A cumulative effect that may benefit habitat for the species analyzed in this Environmental Assessment would result from the eradication of noxious weeds that occupy open spaces in disturbed open sites created by timber harvest and thinning. This noxious weed eradication resulting from the action alternatives, combined with the creation of disturbed open sites, would encourage displaced natural vegetation to re-colonize these open sites and compete with noxious weeds.

Livestock Grazing

Livestock grazing and associated rangeland developments (stock ponds, troughs, springs, salt blocks, staging areas, corrals, and fences) occur throughout the Fishlake National Forest on all four Districts. Livestock grazing has altered the vegetative composition and diversity across many landscapes on the Fishlake National Forest. This has changed vegetation patterns that have resulted in effects on wildlife, plant, fish, and macroinvertebrate species and their habitats. Livestock can also trample plant species or disturb wildlife while they use the allotments. Livestock grazing may also cause changes in wildlife use patterns or cause wildlife species to avoid using some habitats.

Livestock grazing can pose serious problems related to noxious weeds. Livestock operations and their associated activities can result in the spread of noxious weeds. Disturbance from livestock can create a seedbed for noxious weeds to colonize. Livestock may also transport noxious weed seeds from adjacent land ownerships onto the Fishlake National Forest, which may establish new weed infestations. Because livestock are sometimes transported long distances for various reasons, there is also an increased risk of introducing new noxious weeds into the area that do not currently exist on the Fishlake National Forest. Finally, livestock grazing may reduce the dominance of grass and forb species on rangelands that may reduce the competition to noxious weeds attempting to establish on the Fishlake National Forest. The no action alternative would support the spread of noxious weeds by taking no steps to eliminate them. The action alternatives would reduce the risk of further noxious weed invasion, proliferation, and spread by livestock grazing activities through the use of a ground-based weed management program that targets and eliminates specific noxious weed species.

A cumulative effect as a result of past, present, and reasonably foreseeable livestock grazing and their associated activities combined with the action alternatives may include the additional reduction of grass and forb species within the cumulative effects area. Non-target species may be affected by ground-based herbicide applications from spray drift or possible misidentification of noxious weeds during any of the treatment methods. This may further alter potentially suitable habitat of the species of concern in this Environmental Assessment. This cumulative effect would be minimized by the ground-based and site-specific spot applications of herbicide on targeted noxious weed species, as proposed in the action alternatives.

A cumulative effect may result from soil compaction by livestock combined with having vehicle-mounted boom sprayers, spot application backpack sprayers, and manual/mechanical control methods in the same areas year after year for the containment and eradication of tenacious noxious weed populations. Further soil compaction may disturb soil structure, increase erosion, runoff potential, and continue to propagate disturbed areas and alter vegetation communities found in the cumulative effects area. This cumulative effect would be minimized because the action alternatives isolate target noxious weed species and focus control efforts using spot application methods.

Cumulative effects from cultural and biological control methods in combination with livestock grazing may induce further disruption of natural vegetative succession by introducing disease or infestation (brought in by biocontrol agents) or introducing aggressive desired species (seeding, fertilization, grazing, etc.) that encourage competition. Some desired aggressive species may have the ability to overrun sites and cause diversity within the habitat to decline. Noxious weed species would also cause similar problems.

A cumulative effect that may benefit habitat for the species analyzed in this Environmental Assessment would result from the eradication of noxious weeds that occupy open spaces in disturbed open sites created by trampling and utilization by livestock. This noxious weed eradication resulting from the action alternatives, combined with the creation of open disturbed sites, would encourage displaced natural vegetation to re-colonize these open sites and compete with noxious weeds.

Management Ignited Fire

The Fishlake National Forest is planning and implementing an aggressive management ignited fire program to treat vegetation in order to recover many landscapes that are not in properly functioning condition. Management ignited fire can alter vegetation diversity and change patterns which can in turn result in effects on wildlife, plant, fish, and macroinvertebrate species and their habitats. Management ignited fire can also result in the direct loss of individual species and their habitats during implementation. There is also the high probability that individual animals are disturbed and/or displaced during implementation.

Management ignited fire can pose serious problems related to noxious weeds. Management ignited fires can create large areas of disturbed habitat, and result in the spread of noxious weeds. Noxious weed seeds are often introduced into burned-over sites by fire management control and suppression equipment. The seeds are then further propagated by short-term nutrient-rich ash covered soils and open areas with direct sunlight. These optimal

conditions may promote the establishment and proliferation of noxious weeds. The no action alternative would support the invasion and spread of noxious weeds on burned-over sites by taking no steps to eliminate them. The action alternatives would reduce the risk of further noxious weed invasion, proliferation, and spread by management ignited fire activities through the use of a ground-based weed management program that targets and eliminates specific noxious weed species.

A cumulative effect as a result of past, present, and reasonably foreseeable management ignited fires and their associated activities combined with the action alternatives may include additional alteration and destruction of the native vegetation within the cumulative effects area. Non-target species left in the wake of management ignited fire may be affected by ground-based herbicide applications from spray drift or possible misidentification of noxious weeds during any of the treatment methods. This may further alter potentially suitable habitat of the species of concern in this Environmental Assessment. This cumulative effect would be minimized by the ground-based and site-specific spot applications of herbicide on targeted noxious weed species, as proposed by the action alternatives.

Cumulative effects from cultural and biological control methods in combination with management ignited fire activities may induce further disruption of natural vegetative succession by introducing disease or infestation (brought in by biocontrol agents) or introducing aggressive desired species (seeding, fertilization, grazing, etc.) that encourage competition. Some desired aggressive species may have the ability to overrun sites and cause diversity within the habitat to decline. Noxious weed species would also cause similar problems.

A cumulative effect that may benefit habitat for the species analyzed in this Environmental Assessment would result from the eradication of noxious weeds that occupy open spaces in the disturbed open sites created by management ignited fire activities. This noxious weed eradication resulting from the action alternatives, combined with the creation of disturbed open sites, would encourage displaced natural vegetation to re-colonize these open sites and compete with noxious weeds.

Mining and Oil/Gas Exploration

Mining and oil/gas exploration occurs in isolated areas on the Fishlake National Forest. These activities can result in the isolated loss of habitats at individual mines and exploration sites as well as the road systems used to access those sites. These activities may also disturb or displace species near the operations.

Mining and oil/gas exploration and its associated activities can pose problems related to noxious weeds. These activities often create highly disturbed soils, erosion, and compaction from digging, heavy equipment operation, creation of tailings, and road building. These disturbed sites often result in the introduction and spread of noxious weeds. The no action alternative would support this disturbance regime by taking no steps to eliminate noxious weed invasion and proliferation on disturbed mining and exploration sites. The action alternatives would reduce the risk of further noxious weed invasion, proliferation, and spread by mining and oil/gas exploration activities through the use of a ground-based weed management program that targets and eliminates specific noxious weed species.

A cumulative effect may result from soil compaction by disturbing soils combined with having vehicle-mounted boom sprayers, spot application backpack sprayers, and manual/mechanical control methods in the same areas year after year for the containment and eradication of tenacious noxious weed populations. Further soil compaction may disturb soil structure, increase erosion, runoff potential, and continue to propagate disturbed areas and alter vegetation communities found in the cumulative effects area. This cumulative effect would be minimized because the action alternatives isolate target noxious weed species and focus control efforts using spot application methods.

A cumulative effect that may benefit habitat for the species analyzed in this Environmental Assessment would result from the eradication of noxious weeds that occupy open spaces in disturbed open sites created by mining and oil/gas exploration. This noxious weed eradication resulting from the action alternatives, in combination with the creation of open disturbed sites, would encourage displaced natural vegetation to re-colonize these open sites and compete with noxious weeds.

Recreation

Recreational use on the Fishlake National Forest has increased dramatically over the past 10 years. Activities such as hiking, ATV/ORV use, horseback riding, mountain biking, camping, hunting, fishing, and sight-seeing are some of the typical activities which occur on the Forest. A major impact that recreational use has on wildlife species is the disturbance and displacement of wildlife. Many of the activities identified above can result in wildlife being displaced to other areas and may result in wildlife using less than ideal or even suitable habitats. Recreational development can also result in the loss of some habitats either due to direct loss or due to the disturbance and/or displacement that may result following completion.

Recreational activities can pose serious problems related to noxious weeds. These activities can create habitat for and result in the spread of noxious weeds. With the increasing recreational use of National Forest System administered lands, there is a greater potential for weeds to be transported onto the Forest. Noxious weeds from areas outside of the cumulative effects area can be transported into the area on recreational vehicles, recreational animals, shoes, clothing, people, recreational equipment, tires, recreational road maintenance equipment, etc. Ground

disturbances from recreational vehicle use, hunting camps, campgrounds, trails, and around popular fishing lakes and streams can contribute to the introduction and proliferation of noxious weeds. The no action alternative would support noxious weed spread by taking no steps to eliminate noxious weed invasion and proliferation in recreational areas. The action alternatives would reduce the risk of further noxious weed invasion, proliferation, and spread by recreational activities through the use of a ground-based weed management program that targets and eliminates specific noxious weed species.

A cumulative effect may result from soil compaction by disturbing soils combined with having vehicle-mounted boom sprayers, spot application backpack sprayers, and manual/mechanical control methods in the same areas year after year for the containment and eradication of tenacious noxious weed populations. Further soil compaction may disturb soil structure, increase erosion, runoff potential, and continue to propagate disturbed areas and alter vegetation communities found in the cumulative effects area. This cumulative effect would be minimized because the action alternatives isolate target noxious weed species and focus control efforts using spot application methods.

A cumulative effect that may benefit habitat for the species analyzed in this Environmental Assessment would result from the eradication of noxious weeds that occupy open spaces in disturbed open sites created by recreational activities. This noxious weed eradication resulting from the action alternatives, in combination with the creation of open disturbed sites, would encourage displaced natural vegetation to re-colonize these open sites and compete with noxious weeds.

A cumulative effect of the proposed action combined with past, present, and reasonably foreseeable recreational activities may include the dissemination of educational information to raise awareness for the importance of noxious weed management and control. This increased public awareness will help to prevent the spread of noxious weeds that can result in effects on wildlife, plants, and their habitats.

Micro-site Activities

This section will address the cumulative effects that can result from other micro-site activities such as water developments, fences, small construction projects, fuelwood cutting, light-fuels removal or manipulation, seeding, planting, road closure, road maintenance, pesticide use, wildlife habitat improvement and other small-scale activities. These activities are generally localized in nature and, although they may result in the loss of potential wildlife, plant, fish, and macroinvertebrate habitats, they typically do not impact any sizeable acreages. These projects may also result in minor vegetation changes, soil disturbance, and surface erosion that may open sites up to the spread of noxious weeds. These micro-site disturbances may result in the displacement of some wildlife individuals. The no action alternative would support noxious weed spread by taking no steps to eliminate noxious weed invasion and proliferation resulting from small-scale projects. The action alternatives would reduce the risk of further noxious weed invasion, proliferation, and spread by small-scale project activities through the use of a ground-based weed management program that targets and eliminates specific noxious weed species.

A cumulative effect as a result of past, present, and reasonably foreseeable small-scale project activities combined with the action alternatives may include additional alteration and destruction of the native vegetation within the cumulative effects area. Non-target species may be affected by ground-based herbicide applications from spray drift or possible misidentification of noxious weeds during any of the treatment methods. This may further alter some suitable habitat of the species of concern in this Environmental Assessment. This cumulative effect would be minimized by the ground-based and site-specific spot applications of herbicide on targeted noxious weed species, as proposed in the action alternatives.

A cumulative effect may result from soil compaction by locally disturbing soils combined with having vehicle-mounted boom sprayers, spot application backpack sprayers, and manual/mechanical control methods in the same areas year after year for the containment and eradication of tenacious noxious weed populations. Further soil compaction may disturb soil structure, increase erosion, runoff potential, and continue to propagate disturbed areas and alter vegetation communities found in the cumulative effects area. This cumulative effect would be minimized because the action alternatives isolate target noxious weed species and focus control efforts using spot application methods.

Possible cumulative effects from cultural and biological control methods in combination with small-scale project activities may induce further disruption of natural vegetative succession by introducing disease or infestation (brought in by biocontrol agents) or introducing aggressive desired species (seeding, fertilization, grazing, etc.) that encourage competition. Some desired aggressive species may have the ability to overrun sites and cause diversity within the habitat to decline. Noxious weed species would also cause similar problems.

A cumulative effect that may benefit habitat for the species analyzed in this Environmental Assessment would result from the eradication of noxious weeds that occupy open spaces in disturbed open sites created by these small-scale activities. This noxious weed eradication resulting from the action alternatives, in combination with creating disturbed open sites, would encourage displaced natural vegetation to re-colonize these open sites and compete with noxious weeds.

Grasshopper/Mormon Cricket Control

Treating infestations of grasshopper/Mormon crickets on NFS lands through the use of carbaryl (1-napthyl N-menthyl carbamate) treated with bran, at a rate of about 10 pounds per acre in combination with these action alternatives may result in possible toxic effects to wildlife, plant, fish, and macroinvertebrate species if concentrations/applications become additive where the chemical methods of the action alternatives are implemented near grasshopper/cricket control areas. This cumulative effect would be minimized by the ground-based and site-specific spot applications of herbicides on targeted noxious weed species, as described in the action alternatives.

Private/Agricultural Lands

A portion of the cumulative effects area is comprised of private lands. These lands are used for residential, agricultural, recreational, and rangeland purposes. These activities can result in the loss or modification of potential habitats for species identified in this document. Development of these lands for residential, recreational, or industrial purposes may affect wildlife, plant, fish, and macroinvertebrate species and their habitats. One of the primary effects resulting from private/agricultural land development is the physical loss of potential or suitable habitats for wildlife, plant, fish, and macroinvertebrate species. Other activities associated with private agricultural lands include water diversion, irrigation project development, loss of vegetation diversity due to monoculture cultivation, and pesticide and herbicide application. These activities may have potential effects on wildlife, plant, fish, and macroinvertebrate species. However, some of these uses have also created new habitats or resulted in improved habitats for some wildlife species. Some general examples include range water developments that provide water for wildlife, water developments that provide water for wetland habitats, and improved foraging areas for species such as deer and elk. The no action alternative would support noxious weed spread by taking no steps to eliminate noxious weed invasion and proliferation resulting from private/agricultural land development. The action alternatives would reduce the risk of further noxious weed invasion, proliferation, and spread by private/agricultural land activities through the use of a ground-based weed management program that targets and eliminates specific noxious weed species.

A cumulative effect of agricultural pesticide and herbicide use in combination with action alternatives may result in possible toxic effects to wildlife, plant, fish, and macroinvertebrate species if applications become additive where the chemical methods of the action alternatives are implemented near agricultural lands. This cumulative effect would be minimized by the ground-based and site-specific spot applications of herbicides on targeted noxious weed species, as described in the action alternatives.

A cumulative effect as a result of past, present, and reasonably foreseeable private/agricultural land activities combined with the action alternatives may include additional alteration and destruction of the native vegetation within the cumulative effects area. Non-target species may be affected by ground-based herbicide applications from spray drift or possible misidentification of noxious weeds during any of the treatment methods. This may further alter suitable or potentially suitable habitat of the species of concern in this Environmental Assessment. This cumulative effect would be minimized by the ground-based and site-specific spot applications of herbicide on targeted noxious weed species, as proposed in the action alternatives.

A cumulative effect may result from soil compaction by agricultural/private development combined with having vehicle-mounted boom sprayers, spot application backpack sprayers, and manual/mechanical control methods in the same areas year after year for the containment and eradication of tenacious noxious weed populations. Further soil compaction may disturb soil structure, increase erosion, runoff potential, and continue to propagate disturbed areas and alter vegetation communities found in the cumulative effects area. This cumulative effect would be minimized because the action alternatives isolate target noxious weed species and focus control efforts using spot application methods.

Cumulative effects from cultural and biological control methods in combination with private/agricultural land development activities may induce further disruption of natural vegetative succession by introducing disease or infestation (brought in by biocontrol agents) or introducing aggressive desired species (seeding, fertilization, grazing, etc.) that encourage competition. Some desired aggressive species may have the ability to overrun sites and cause diversity within the habitat to decline. Noxious weed species would also cause similar problems.

A cumulative effect that may benefit habitat for the species analyzed in this Environmental Assessment would result from the eradication of noxious weeds that occupy open spaces in disturbed agricultural lands/private development sites. Yearly cultivation of agricultural lands invites the invasion and persistence of noxious weeds and other competing vegetation to these sites. Groundbreaking activities from private land development also create disturbed open sites for noxious weeds and competing vegetation to colonize. This noxious weed eradication resulting from the action alternatives, in combination with creating disturbed open sites, would encourage displaced natural vegetation to re-colonize these open sites and compete with noxious weeds.

I. EFFECTS ON THREATENED, ENDANGERED, PROPOSED, CANDIDATE, SENSITIVE (TEPCS) AND MANAGEMENT INDICATOR (MIS) WILDLIFE SPECIES

To determine the possible toxic effects of herbicides on animal species, a complete review was completed in the *Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 and on Bonneville Power Administration Sites* (USDA 1992). This assessment was completed to determine the effects of the use of a wide range of herbicides on resources including wildlife species. The assessment references a wide range of studies and documents the results of those studies. Methodology assessing effects and risk to surrogate wildlife and animal species is used and correlated to a range of representative wildlife species. The potential toxic effects (of a range of herbicides) on threatened, endangered, proposed, candidate, and sensitive species is based on this Risk Assessment (USDA 1992).

Acute oral toxicity expressed as LD50's (the dose at which 50% of a test population would die) for five of the herbicides in these alternatives are listed in Table 4-2. LD50's are expressed in mg of herbicide per kg of test animal body weight (mg/kg). These are the amounts of herbicide that would have to be fed to the test animals for a minimum of 21 days to kill half of a test population.

Table 4-2 -- LD50's for Rats and Mallards*

Herbicide	Rat (mg/kg)	Mallard (mg/kg)
Picloram	4,012	2,000
Clopyralid	4,300	No data
2,4-D	375	>2,000
Dicamba	375	2,510
Imazapic	>5,000	>2,150

* Source: Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4 and 10 and on EPA Administration Sites, 1992

In practice, pesticide active ingredients are sold as formulations that are often diluted with water. For example, when picloram is used for wildland invasive weed control, about ¼ pound is diluted in 35 gallons of water. An average two-year old child weighing 22 pounds would have to consume approximately 12 gallons of spray solution to equate to a potentially lethal dose. A comparable wildlife dose can be calculated by converting the body weight to that of a wildlife species.

Therefore, since picloram is typically applied at the rate of 1 to 1.5 pints in 2 gallons of water/acre, it would be extremely unlikely that any of the animals tested would come in contact with and consume enough of the herbicides proposed in these alternatives to approach LD50's.

None of the herbicides proposed in these alternatives are fat-soluble or bioaccumulate. They are quickly passed out of the bodies of animals that might ingest them. All herbicides proposed for use in these alternatives are either quickly metabolized and excreted, or just quickly excreted without any transformation.

Migratory Birds. Under the direction of Executive Order 13186 signed on January 10, 2001, Federal agencies are directed to evaluate effects of actions and agency plans on migratory birds, with emphasis on species of concern. The most recent list of migratory bird species of concern was delineated by the FWS in Birds of Conservation Concern 2002 (USFWS 2002). Alternatives 1, 2, and 3 of the Noxious Weed Management Program described in this environmental assessment will occur on lands administered by the Fishlake National Forest. In Birds of Conservation Concern 2002 (USFWS 2002), the migratory bird species of concern are delineated within separate Bird Conservation Regions (BCR's) in the United States. The lands administered by the Fishlake National Forest fall within 2 separate BCR's. These include BCR 9 (Great Basin) and BCR 16 (Southern Rockies/Colorado Plateau). Both species lists have been reviewed. The BCR 9 (Great Basin) and BCR 16 (Southern Rockies/Colorado Plateau) lists have 39 migratory bird species of concern. Five of these species have already been analyzed for effects within this environmental assessment (EA) and within the Biological Assessment (BA) and Biological Evaluation (BE) written for this project. These include the peregrine falcon, yellow-billed cuckoo, the flammulated owl, Brewer's sparrow, and sage sparrow. The effects of Alternatives 1, 2, and 3 described in this proposed action to the additional 34 migratory bird species of concern will be the same as the following effects disclosed for TEPCS and MIS wildlife species. Furthermore, the action alternatives within this EA (for controlling and eradicating noxious weeds on the Fishlake National Forest) are designed to sustain, maintain, and enhance habitats for migratory bird species.

Alternatives 1 and 2: Action Alternatives.
Information concerning life histories, suitable habitats, threats, ecology, status, and trend (of threatened, endangered, proposed, candidate, sensitive, and management indicator species that are known or suspected to occur on the Fishlake National Forest) is used in the Biological Assessment (BA) and Evaluations (BE's) and in this Environmental Assessment. This information is primarily derived from a report on file at the Fishlake National Forest. This report is *Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest, Version 2.0* (Rodriguez 2002). This paper is located in the project file. In concurrence with the BA and BE, control and eradication of noxious weeds, along with compliance with conservation agreements and recovery plans will have the following results on TEPCS and MIS wildlife species:

1. For the listed species, bald eagle (T), Utah prairie dog (T), Mexican spotted owl (T), and western yellow-billed cuckoo (C) the determination is "may affect but is not likely to adversely affect". Controlled spot treatment of noxious weeds would not have any adverse effects on these species or their critical habitats. Such control methods will not result in an irreversible or irretrievable commitment of resources that would foreclose the

formulation or implementation of reasonable and prudent alternatives in the future.

2. For the six sensitive wildlife species known to occur on the Fishlake National Forest (peregrine falcon, northern goshawk, spotted bat, Townsend's big-eared bat, flammulated owl, and three-toed woodpecker), the determination of "may impact individuals or habitat but will not contribute to a trend toward federal listing or cause a loss of viability to these populations or species" was made.

3. The MIS wildlife species known to occur on the Fishlake National Forest are elk, mule deer, northern goshawk, cavity nesters, riparian dependent guild, and sage nesters. Although some MIS wildlife individuals or habitat may be affected by the action alternatives, these action alternatives would not adversely affect population numbers or the viability of these species.

There is no anticipated direct mortality to wildlife from contact with, or cumulative doses from, herbicides at the prescribed rates and environmental exposures as proposed for the action alternatives.

The Risk Assessment (USDA 1992) did not analyze potential effects of ground-based herbicide applications (at the typical and extreme case exposure rates described in the assessment) because it would have a very low potential to affect wildlife species. Analysis of risk and effects were assumed to involve broadcast applications from aircraft. Under the conditions (exclusion of aerial application methods) of which herbicides will be utilized in the action alternatives, there will be low risk of toxic effects to terrestrial wildlife species. The EPA assigned toxicity categories to each of the herbicides being considered for use under the action alternatives for rats and mallards - Table III-F-1 (USDA 1992). They all received acute oral toxicity ratings of Very Slightly Toxic or Slightly Toxic with the exception of the Acid version of 2,4-D. The Acid version of 2,4-D received a moderately toxic rating. The toxic effects of these herbicides would only impact wildlife species in the event of a spill of concentrated herbicide where there would be direct contact or ingestion of the herbicide by individuals. The toxicity ratings used were based on the amount of herbicide it takes to kill a bee. Severely toxic levels of herbicide would kill a bee. This toxicity of herbicides to bees would also indicate possible risks to pollinators. Therefore, the use of herbicides related to these action alternatives would not pose a highly toxic risk to pollinators and insect populations. Risk to nearly all terrestrial wildlife species received a low rating (for all herbicides analyzed in the Risk Assessment) for the typical case exposure rates under an aerial broadcast treatment. Risk from isolated ground-based spot treatments are assumed to have an even lower potential to affect wildlife species. However, ratings for proposed, threatened, and endangered species have more stringent rating requirements regarding toxicity risks (USDA 1992). In the typical case exposure rate under the aerial application method (which will not occur under these action alternatives), only 2,4-D and triclopyr may present an unacceptable risk to federally listed small herbivorous mammals (USDA 1992). The action alternatives limit the application of herbicides to the typical case or extreme case scenarios that show low risk for possible toxic effects on wildlife, fish or aquatic organisms as displayed in Tables III-H-2, III-H-3, and III-H-6 in the Risk Assessment (USDA 1992).

The Risk Assessment (USDA 1992) also documented that the herbicides being considered under these action alternatives showed little tendency to bioaccumulate in their human health exposure analysis section. Therefore, it was concluded that long-term persistence in food chains and subsequent toxic effects were not a problem and not examined in the Risk Assessment (USDA 1992). However, some herbicides did show a tendency to bio-concentrate in aquatic environments. The potential effects of this are minimized by the mitigation measure that addresses the use of herbicides within riparian areas.

The action alternatives have the highest predicted effectiveness at controlling noxious weeds, thereby preserving native plant community diversity. Inclusion of herbicide use would therefore increase the overall benefit of weed control efforts to wildlife habitat.

Proposed, endangered, threatened, candidate, sensitive, and management indicator wildlife species would benefit from noxious weed control and prevention strategies when such activities result in improved habitat conditions for these species or their prey. Infestations of certain noxious weeds in some habitats used by prey species may be feasible only with the use of chemical herbicides. Therefore, these Action Alternatives would have the potential for positive effects not possible with other alternatives.

For further information on the effects to threatened, endangered, candidate, and sensitive wildlife and plant species, resulting from the proposed action, please refer to the Biological Assessment and Biological Evaluation prepared for this analysis.

Alternative 3: No Action Alternative. Noxious weeds would continue to spread at current or accelerated rates under the no action alternative. Species of TEPCS/MIS wildlife known to inhabit certain areas of the Forest could be adversely affected by the no action alternative. The potential exists for untreated noxious weed infestations to negatively affect habitats that provide food or cover for some TEPCS/MIS species or their prey. Riparian or wetland habitats, diverse open upland habitats, and forest canopy openings within big game winter ranges all provide important foraging areas for TEPCS/MIS species (or their prey), and are particularly vulnerable to infestations of purple loosestrife, knapweed, Canada thistle, and other noxious weeds.

Untreated noxious 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 would diminish.

J. EFFECTS ON THREATENED, ENDANGERED, PROPOSED, SENSITIVE (TEPS), AND MANAGEMENT INDICATOR (MIS) PLANT SPECIES

San Rafael cactus (E), Last Chance townsendia (T), and Maguire daisy (T) are the only three federally listed plant species known to occur on the Fishlake National Forest.

A "final draft" (1998) Interagency Conservation Agreement and Strategy covers both San Rafael cactus and Winkler cactus. The FWS prepared a recovery plan for Last Chance townsendia in 1993. Also, two Interagency Conservation Agreements and Strategies give sensitive species direction for Arizona willow (1995) and wonderland alice-flower (1996) and their habitats.

Alternatives 1 and 2: Action Alternatives.
Information concerning life histories, suitable habitats, threats, ecology, status, and trend (of threatened, endangered, proposed, candidate, sensitive, and management indicator (MIS) species that are known to occur on the Fishlake National Forest) is used in the Biological Assessment (BA) and Evaluations (BE's) and in this Environmental Assessment. This information is primarily derived from a report on file at the Fishlake National Forest. This report is *Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest, Version 2.0* (Rodriguez 2002). Additional primary sources used included *Endangered, Threatened, & Sensitive Vascular Plants: Fishlake National Forest* (Madsen 2002), and *Utah - Threatened, Endangered, and Sensitive Plant Field Guide* (Atwood et al. 1991). In concurrence with the BA and BE, control and eradication of noxious weeds, along with compliance with conservation agreements and recovery plans will have the following results on TEPS/MIS plant species:

For the listed species San Rafael cactus (E), Maguire's Daisy (T), and Last Chance townsendia (T), the determination is "may affect but is not likely to adversely affect". Controlled spot treatment of noxious weeds would not have any adverse effects on these species or their critical habitats. Such control methods will not result in an irreversible or irretrievable commitment of resources that would foreclose the formulation or implementation of reasonable and prudent alternatives in the future.

For the 16 sensitive species known to occur on the Fishlake National Forest, the determination of "may impact individuals or habitat, but will not contribute to a trend towards federal listing or cause a loss of viability to these populations or species" was made. In addition, since micro- sites of known occurrences for these rare plant species will be buffered when spot-treating noxious weeds to minimize drift and adverse effects, potential threats from damaging these plants and their habitats would be reduced substantially.

The MIS plant species known to occur on the Fishlake National Forest is Rydberg's milkvetch. Although Rydberg's milkvetch individuals or habitat may be affected by the action alternatives, these action alternatives would not adversely affect population numbers or the viability of this species.

All known sensitive plant populations would be buffered from herbicide application. Herbicide spot-application, under conditions prescribed for control, would allow effective weed control with little or no impact to TEPS/MIS plant populations or habitat. For any TEPS/MIS plant species occurring within a project control area, modified treatment areas will be implemented. Modified treatment areas border sensitive sites and require controlled application procedures. The size, width, and extent of modified treatment areas will be identified and determined on a case-by-case basis considering factors such as proximity to habitations, TEPCS/MIS habitats, and the presence of water. The application of herbicides by vehicle-mounted boom sprayers will not be permitted in modified treatment areas. Target plants adjacent to streams, dwellings, or occupied TEPCS/MIS habitats will be treated to achieve effective control and minimize spread. In these areas, target plants will be controlled using spot treatments with herbicides or other suitable methods. Any herbicide used will be carefully selected to minimize drift and adverse effects to live water, human habitations, and/or TEPCS/MIS species.

Improperly selected herbicides, or failure to follow prescribed treatment measures, could result in negative impacts to TEPS/MIS plant species. Strict adherence to control measures would minimize any potential impacts to TEPS/MIS plant species that may exist in or near the treatment areas.

Herbicide treatment on future sites, under the adaptive strategy, could result in the direct loss of TEPS/MIS plant individuals, particularly those at the periphery of established noxious weed populations. Conversely, successfully eliminating or controlling a majority of weed populations would protect and enhance suitable habitat for TEPS/MIS plants.

For further information on effects to threatened, endangered, and sensitive plant species, resulting from the proposed action, please refer to the Biological Assessment and Biological Evaluation prepared for this analysis.

Alternative 3: No Action Alternative.
Existing noxious weed populations would continue to spread and new populations would become established under the No Action alternative. Some of these noxious weeds may threaten the vigor, establishment, ecological

balance, and/or the existence of some threatened, endangered, sensitive, and management indicator species plant populations.

The unchecked expansion of existing populations of noxious weeds could result in possible negative effects to threatened, endangered, sensitive, and management indicator plant species should future eradication efforts not be conducted. If noxious weeds are allowed to increase under this alternative, they may become intermingled with TES/MIS plant populations. Under these conditions, the eradication and/or control of those noxious weeds often become more difficult and expensive. Any future eradication efforts would likely require greater intensity of treatments, and more radical eradication efforts, resulting in greater potential risks to some TES/MIS plant populations.

Given the known occurrences of TES/MIS plant populations and the current condition of highly suitable habitat on the Fishlake National Forest, the No Action alternative will not adversely effect and is not expected to significantly reduce population viability or cause a trend to Federal Listing of any TES or MIS plant species within the next five to ten years.

K. EFFECTS ON THREATENED, ENDANGERED, PROPOSED, & SENSITIVE (TEPS) FISH SPECIES AND AQUATIC MANAGEMENT INDICATOR SPECIES (MIS)

There are two sensitive fish species that are known to occur on the Fishlake National Forest. These species include: Bonneville cutthroat trout and Colorado River cutthroat trout. Aquatic MIS species for the Fishlake National Forest include Bonneville cutthroat trout, resident trout (brown, rainbow, brook, cutthroat and lake), and macroinvertebrates. Habitats for all of these species are riparian and aquatic ecosystems. Impacts on riparian and aquatic habitat from herbicide treatment would be slight since only insignificant amounts of herbicides would enter streams or water bodies and mitigation measures would be closely followed. Most chemicals enter surface water through either direct application or drift of spray material to the water surface. Some chemicals may secondarily enter stream waters from treatment of dry channels and subsequent storm events that translocate chemicals in run-off. Terrain along most stream courses limits access by ground vehicle and, together with low water levels during the application period, provides a natural barrier zone between surface water and the vegetation being sprayed. At any rate, drift from ground vehicle application during appropriate weather is expected to be minimal; hand application produces little or no drift. Leaching of herbicides through the soil and into streams is not a significant process. The FEIS cites studies which indicate that "Even when runoff concentrations are measured at the edge of large application areas, maximum runoff concentrations...in stream water would be 0.1 mg/liter or less (FEIS, H-65).

Alternatives 1 and 2: Action Alternatives.
Information concerning sensitive fish species and aquatic management indicator species (MIS) that are known to occur on the Fishlake National Forest are used in the Biological Evaluation (BE) and in this Environmental Assessment. This information is primarily derived from a report on file at the Fishlake National Forest. This report is *Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest, Version 2.0* (Rodriguez 2002). In concurrence with the BE, control and eradication of noxious weeds, along with compliance with conservation agreements and recovery plans will have the following results on sensitive fish species and aquatic MIS species:

For the Bonneville cutthroat trout and the Colorado River cutthroat trout the determination is "may impact individuals or habitat, but will not contribute to a trend towards federal listing or cause a loss of viability to these populations or species.

Although aquatic MIS individuals or habitat may be affected by the action alternatives, these action alternatives would not adversely affect population numbers or the viability of these species.

EPA's (1986) ecological risk assessment analyzes potential risks to aquatic species by comparing the dose received by the animal, or the estimated environmental concentration (EEC), with the laboratory-determined LC-50 for the most closely related laboratory test species. Thus, the following risk categories were used to assess the herbicide control on non-target species: Low: EEC<1/10 LC-50; Moderate: EEC between 1/10 LC-50 and 1/2 LC-50; High: EEC>1/2 LC-50. EECs below the 1/10 LC-50 level are assumed to present a low or negligible risk.

Under the stream scenario risk assessment, typical water concentrations of dichlobenil, diuron, and simazine may present a moderate risk to trout. Triclopyr, trifluralin, diesel oil, and kerosene may present a high risk to trout. Typical water concentrations of amitrole, atrizine, and dichlobenil may present a moderate risk to aquatic invertebrates in streams while diuron, simazine, trifluralin, and diesel oil may present a high risk (USDA 1992). Extreme water concentrations of atrazine, bromacil, 2,4-D, dicamba, and picloram may present a moderate risk to trout while dichlobenil, diuron, prometon, simazine, triclopyr, trifulalin, diesel oil, and kerosene may present a high risk. For aquatic invertebrates in extreme water concentrations, clopyralid and dicamba may present a moderate risk and amitrole, atrazine, 2,4-D, dichlobenil, diuron, prometon, simizine, trifuralin, and diesel oil may present a high risk (USDA 1992). Under the lake scenario risk assessment, typical water concentrations of diuron, triclopyr, and limonene may present a moderate risk to trout in lakes while trifluralin, diesel oil, and kerosene may present a high risk. For aquatic invertebrates in lakes, atrazine, dichlobenil, diuron, simazine, and trifluralin may

present a moderate risk while diesel oil may present a high risk (USDA 1992). Extreme water concentrations of dichlobenil, diuron, and simazine may present a moderate risk to trout in lakes while triclopyr and kerosene may present a high risk. For aquatic invertebrates in extreme water concentrations, atrazine and trifluralin may present a moderate risk while diuron, simazine, and diesel oil may present a high risk (USDA 1992).

Chemicals listed in Table 4-3 and suggested for use in aquatic environments (amitrole, chlorsulfuron, clopyralid, 2,4-D, dicamba, glyphosate, metsulfuron, and picloram) present some risk to trout in streams and lakes. However, only 2,4-D and glyphosate pose a moderate risk of toxicity to aquatic species. These chemicals will not be applied within a 200-foot buffer of streams (see Appendix B). Typical water concentrations of amitrole may present a moderate risk to aquatic invertebrates in streams (Risk Assessment III-H-10). However, the risk criteria used to evaluate the effects of pesticide exposure on endangered and threatened species are more stringent; for aquatic species, EPA (1986) considers any EEC that exceeds 1/20 the LC-50 to present an unacceptable risk. In the typical case, none of the chemicals suggested for use in aquatic environments present an unacceptable risk to endangered or threatened cold-water fish in streams or lakes. Only amitrole and 2,4-D may present an unacceptable risk to endangered or threatened aquatic invertebrates (Risk Assessment, III-H-26-28).

If chemical treatment with 2,4-D and/or glyphosate is followed by short-duration, high-intensity precipitation and rapid runoff, fish populations may be exposed to toxic concentrations of herbicides. Requirements for a 200-foot buffer zone and restriction from treatment within 24 hours of predicted precipitation will mitigate possible adverse effects. In general, "cold water" fish, such as trout, are more sensitive to herbicides. Other aquatic organisms, which may be sources of fish food, may be more susceptible to exposure from concentrations of herbicides. The likelihood for significant impacts is low because the volume and rate of flowing water rapidly dilutes the chemical concentration. If exposures were to occur, concentrations would be of short duration.

To safeguard sensitive fish species (Colorado cutthroat and Bonneville cutthroat) from unacceptably high levels of pesticides, each species occupying habitat within the vicinity of control areas must be identified and its habitat delineated to identify appropriate protection measures. In many instances, the protection measures could involve simply the selection of herbicides that do not present an unacceptable risk to the endangered and threatened species for use on treatment areas near species' habitat. Presently there are no threatened or endangered aquatic fish species known or suspected to occur on the Fishlake National Forest. The toxicity of the herbicides recommended in this Environmental Assessment for aquatic environments is summarized below (Risk Assessment III-F-26-42):

Table 4-3

HERBICIDE	TOXICITY TO AQUATIC ORGANISMS
Amitrole	Low
Chlorosulfuron	Non Toxic
Clopyralid	Low
2,4-D	Moderate to High
Dicamba	Low
Glyphosate	Moderate
Metsulfuron	Low
Picloram	Low

Some specific toxic effects and risks to aquatic organisms of those herbicides listed in the Table above are characterized below.

Specific toxic effects of 2,4-D on rainbow trout included mortality, lethargy (unable to avoid capture), and disorientation in relation to the water current. Overall, the ester formulations of 2,4-D are more toxic to fish than the amine formulations (SERA 2001). Clopyralid has minimal potential to be transported to streams via groundwater because rapid degradation in the soil prevents leaching. Clopyralid also has a very low level of toxic risk to aquatic species (SERA 1999a). The risk assessment (SERA 1995) concludes dicamba presents ".. no plausible and substantial hazard to animals, either terrestrial or aquatic". Even in extreme exposure scenarios, such as accidental spills, the potential toxic levels of exposure appear to be marginal (SERA 1995). Under conditions in which applications are made according to standard procedures, concentrations of dicamba in water would be far below the effect levels, even for the more sensitive algal species (SERA 1995). Toxicity of glyphosphate to aquatic species is heavily dependent on water acidity. It is ten times more toxic in highly acidic water (pH 6 and lower) than in alkaline water (pH 10), thus lethal toxicity is variable (SERA 1996a). Glyphosphate concentrations in water are reduced rapidly by microbial degradation, dispertion, and binding to particulates (SERA 1996a). The risk assessment (SERA 2000) concludes that metsulfuron methyl has a low order of toxicity to fish. Mortality is not likely to occur in fish exposed to metsulfuron methyl concentrations less than or equal to 1000 mg/L. The risk assessment (SERA 1999c) concludes that the acute toxicity of picloram for several species of trout (96-hour LC50 values) is in the range of 4.8 mg/L to 19.3 mg/L. Fish appear to be more sensitive to picloram than aquatic invertebrates in acute and chronic studies (SERA 1999c).

Also the ground-based spot treatments, proposed for use in the action alternatives, and limited treatment size at any one time would provide protection to minimize effects. Implementation of requirements specified in Alternatives 1 and 2 should increase the certainty that there would be minimal impacts to sensitive fish species and aquatic MIS species.

Any treatment methods that cause disruption to vegetation, soil, or water resources, especially activity that increases sedimentation, may trigger effects on the aquatic system or fish populations. Increased erosion and sedimentation could inhibit fry emergence, reduce fish feeding success, or cause channel aggradation (rising of the bed surface due to deposition) leading to loss of pool habitat.

While first order streams (the smallest tributaries) may not be fish bearing, they are the most vulnerable to disturbance from noxious weed control treatments. These channels carry water, nutrients, and woody debris into the larger second and third order streams. Best management practices and other measures used to minimize erosion and sedimentation and protect riparian areas are expected to be effective in protecting aquatic habitat in all project areas. The implementation of preventative strategies would decrease the rate of new infestations, thereby further reducing the potential of adverse effects caused by the increased erosion and sedimentation that occur on sites infested with noxious weeds.

While neither of the sensitive fish species occurs on or near many of the noxious weed infested areas within the Forest, suitable habitat for these species may exist in areas infested with noxious weeds. Aquatic MIS species such as macroinvertebrates and resident trout do exist in some noxious weed areas of the Forest. Requirements specified in Alternatives 1 and 2 are designed to reduce adverse effects to these aquatic resources in riparian areas will minimize the potential to impact riparian areas. Increases in the health and vigor of upland and riparian vegetation from noxious weed removal may have a positive effect on fisheries and the biological condition of the aquatic environment.

For further information on effects to sensitive fish species, resulting from the proposed action, please refer to the Biological Evaluation prepared for this analysis.

Alternative 3: No Action Alternative.
Existing noxious weed populations would continue to spread and new populations would become established under the no action alternative. Riparian areas and floodplains are especially vulnerable to noxious weed infestations. These areas suffer from frequent natural disturbances. Healthy, intact riparian systems are important as habitat for fisheries/aquatic resources and play a vital role in water quality and quantity essential to viable populations of fish and macroinvertebrates. Establishment and expansion of noxious weeds may threaten the vigor, establishment, ecological balance, and/or the existence of viable sensitive fish and aquatic MIS populations.

Certain noxious weeds are particularly harmful to wetland habitat. Purple loosestrife is known to rapidly invade wetlands and adjacent watercourses, out-competing native vegetation. Over time, natural disturbance and subsequent purple loosestrife invasion can result in large areas dominated by purple loosestrife plants where a healthy diverse ecosystem of sedges, rushes, and/or cattails once existed. Canada thistle can also be problematic in riparian habitats.

Failure to control purple loosestrife, Canada thistle, or other noxious weeds under the no action alternative would eventually result in serious degradation of wetland habitat conditions on the Forest (and adjacent ownerships).

L. EFFECTS ON COOPERATION WITH OWNERS OF ADJACENT LANDS

Alternative 1: Proposed Action.
One of the greatest obstacles to effective weed control has been a lack of social organization or coordination between the numerous individuals and agencies working to control weeds. Many people have made valiant efforts to deal with the weed problem, but their efforts have been largely in vain when surrounding landowners, public or private, were not also involved with the cause. The Action Alternatives provide for direction to work with neighbors and public officials to increase awareness, define goals, and create a mutual understanding of who is responsible for what, so that someone is accountable for every parcel of land. This will allow for increased efficiencies and effectiveness of noxious weed management programs. Coordinated efforts may allow maximizing of control efforts (efficiency and effectiveness) and use of less herbicides.

Establishing a formal strategy for controlling noxious weeds, using integrated weed management, provides an opportunity to work cooperatively with Interagency, Tribal, State, local governments, universities, research, and private landowners in multi-jurisdictional noxious weed management plans. In many rural communities, the Forest Service is a valuable resource, providing the necessary scientific expertise and organizational skills to assist county weed boards, conservation districts, and other partners in developing weed control plans and applying for grants.

Participation in a Cooperative Weed Management Area (CWMA) is intended to bring together those responsible for weed management within the areas adjacent to and around the Fishlake National Forest to develop common management objectives, facilitate effective treatment and coordinate efforts along logical geographic boundaries. A CWMA would provide that cooperators would jointly:

- Establish control priorities
- Establish specific weed management objectives
- Create treatment zones
- Treat individual weed species and infestations
- Coordinate the use of resources and manpower
- Develop common inventory techniques and mapping
- Manage noxious weeds in an integrated approach

A CWMA fosters communication, cooperation, and teamwork among all landowners and managers. A myriad of equipment, expertise, labor, supplies, and ideas become available in the cooperative setting of CWMA's. Provision is made for the pooling of funding with public and private landowners for the most efficient use of funds and the most effective control of noxious weeds. Communities are more aware of noxious weed concerns. Many more eyes are taking note of noxious weeds during their normal daily activities. A sense of togetherness builds positive relationships, which replaces old animosities.

Alternative 2: IWM Without Weed Prevention Measures, Forest Plan Goals, Objectives, & Standards.
Under current weed control strategies, management efforts are not well coordinated. Different interests, regions and jurisdictions too often fail to cooperate in identifying targets and developing management plans. Different parties see weed problems from very different perspectives, and this leads to fragmented and ineffective management.

Alternative 3: No Action Alternative.
Current treatment programs with county agencies would be halted. Cooperation on control and prevention activities with adjacent public and private landowners would be halted. Only a small percentage of the lands infested with noxious weeds in Southern Utah is within the boundary of the Fishlake National Forest. However, this imbalance of noxious weed occurrence does not reduce the need for Forest Service cooperation to contain and control these plants in conjunction with State, County, and private land managers. Property lines are no barriers to the spread of weeds. The Utah Noxious Weed Act of 1971 requires landowners and managers to control and prevent the spread of noxious weeds. Non-compliance is considered to be an act of negligence (Utah, 1987). Failure to apply control adequate to prevent the spread of noxious weeds may result in enforcement action by state or county officials. In addition, non-control on Forest System lands creates a serious enforcement problem to State and County weed specialists on adjacent private properties. Forest Service policy at FSM 2259.03 is: "Forest officers should place noxious weed management emphasis on those areas where cooperative efforts are underway, such as organized weed control districts. Within budgetary constraints, the Forest Service shall control, to the extent practical, noxious farm weeds on all National Forest System lands" (*USDA FS, 1990*).

No Action would result in no coordination of weed management efforts between the Fishlake National Forest and adjacent landowners. There would be no coordination in education and awareness, prevention, or identifying targets and developing management plans. Without coordinated management efforts, regions and jurisdictions will have different interests; different parties will see weed problems from a very different perspective. This will lead to fragmented and ineffective management.

Without a comprehensive strategy for prioritizing and treating weed infestations on the Forest, opportunities for cooperative efforts with state and county agencies could occur but would be limited. Weed infestations that are not successfully treated would spread to adjacent lands under other ownership, compromising any weed control efforts on those lands.

When adjacent landowners diligently combat noxious weeds while the Forest Service does not, the noxious weed problem is exacerbated. Varying levels of interest, knowledge, skills, resources, and commitment are wasted while noxious weeds continue to expand. If noxious weed infestations are allowed to expand unchecked on the Forest, neighbors will become frustrated at the hopeless battle. Distrusting neighbors will point the finger of blame; others will give up in disgust. Congressional complaints will be likely.

M. EFFECTS OF ALTERNATIVES ON PRIORITIES FOR CONTROL

Alternative 1: Proposed Action.
Following national and Regional policies and the Intermountain Region's Record of Decision for weed management, education and prevention are the primary emphases of the Proposed Action. The second priority is eradication of new invaders. The third priority is management of established stands.

Preventing the introduction of noxious weeds is the most practical and cost-effective method for their management. The Proposed Action's prevention program includes the implementation of weed prevention mitigation measures and techniques aimed at minimizing the introduction of noxious weeds.

Regardless of the extent of available resources, noxious weed management activities will always be resource-limited; there will always be more species we want to control than that for which we have resources. This implies a need for prioritizing among potential targets. This is detailed in the discussion on "Effects on Efficiency of Weed Control Strategies" (Paragraph O).

Under the IWM program of the Proposed Action, prioritization of control methods (i.e. biological, chemical, manual, mechanical, and cultural methods) allows for flexibility in using methods that can be implemented frequently with high efficacy, as well as economic and environmental benefit.

For eradication of new invaders, herbicides are usually important components of an IWM program, while biological control is seldom a valid method to use. Where large plants are resistant to herbicides or where an infestation is isolated, manual treatment methods might be most effective.

For treatment of established invaders, the general use of herbicides is recommended. Noxious weed laws require compliance, and herbicide use is usually the only cost-effective means of complying in the case of established noxious weeds. Biological control is slower than other weed control methods. When using biological control agents (BCAs), a residual level of the weed populations must be expected; the survival of the agents is dependent on the density of their host weeds. After populations of the host weeds decrease, populations of BCAs will correspondingly decrease. Therefore a resurgence of weed populations may occur due to seed reserves in the soil, missed plants, and lagging populations of BCAs. Biological control will not eradicate noxious weeds.

Alternative 2: IWM Without Weed Prevention Measures, Forest Plan Goals, Objectives, & Standards.
Under this alternative no Forest Plan amendment would be developed to include revised goals and objectives for noxious weed control and management. No weed prevention mitigation measures would be emphasized for resource uses and activities. Aggressive control of weed infestations would not occur. There would be no adaptive strategy to plan for eradication of new invaders or to adjust treatment needs if site conditions in existing infestations change.

Proposed weed control efforts would likely be addressed on a project-by-project or site-by-site basis, but with no overall strategy or prioritization. New noxious weed invaders would be treated as they are detected and as funding permits. Under this alternative, most noxious weed species would be considered an established part of the ecosystem.

Alternative 3: No Action Alternative.
Under Alternative 3 there would be no noxious weed control activities on the Fishlake National Forest. No preventative measures would be implemented or required by other management programs to reduce the current spread of noxious weeds or the likelihood of new infestations. The noxious weeds, which currently exist on the Forest, would be allowed to continue to spread and no actions would be taken to reduce the risk of new invasions by other weeds. The No Action alternative would result in uncontrolled spread of noxious weeds to uninfested public and private lands. Without suppression or containment, weeds will continue to spread into susceptible areas not presently occupied by these plants. Many susceptible plant communities are rapidly becoming infested with undesirable weeds to the extent that native plant communities are irreversibly changed.

N. EFFECTS OF WEED CONTROL ALTERNATIVES ON SOCIO-ECONOMIC VALUES

Alternative 1: Proposed Action.
Under this alternative, use of herbicides would be included in the IWM activities. Herbicides would be used in addition to the non-herbicide treatments of IWM. The use of herbicides would increase the Forest Service's ability to control noxious weeds in the most efficient and cost-effective manner feasible. Expected total costs of implementing the control measures described for the Proposed Action is about $100 per acre per year for average control treatments. Funding for noxious weed control is appropriated as part of the Forest's overall operating budget. Expected funding to the Forest during the implementation period and into the next decade will cover annual treatment on only about 1,000 acres or approximately 13 % of the total acreage of 7,600 acres. Additional funding is available through the Knudsen-Vandenberg program, road maintenance funds collected from timber sale operators, grants, and partnership funding. However, it is unrealistic to expect that the Fishlake National Forest will ever be able to completely finance annual treatment for every acre of noxious weed-infested land.

Managing noxious weeds is a capital investment. Both costs and benefits of weed management occur over time. Noxious weed management on rangeland has both short-term (one year) and long-term economic implications. Possible short-term impacts, like the cost of treatment, are mostly negative. While short-term considerations are important, noxious weed management requires long-term planning. The protection of non-infested areas is a key element in determining the economic benefit of managing noxious weeds. If weed management is implemented when infestations are small, benefits include the value of desirable vegetation not lost, through a management strategy that prevents the spread of noxious weeds to uninfested areas.

The implementation of weed prevention measures would have additional impacts on amenity (outdoor recreation) and commodity (timber harvest, grazing, mining, etc) activities. Mitigation costs associated with implementing weed prevention practices would be an inconvenience for the visitor and an economic burden on the commodity user. The implementation of weed prevention measures would provide better control of existing and expected infestations and spread of noxious weeds.

Alternative 2: IWM Without Weed Prevention Measures, Forest Plan Goals, Objectives, & Standards.
Under this alternative, as in Alternative 1, the use of herbicides would be included in the IWM activities. The same socio-economic impacts would occur from implementation costs and effects of control and treatment.

However, this alternative does not provide for the implementation of weed prevention measures and would, therefore, have no additional impacts on amenity (outdoor recreation) and commodity (timber harvest, grazing, mining, etc) activities.

Without the implementation of weed prevention measures, current weed management funding may not be able to keep up with the continuing expansion of noxious weed

infestations. This would result in unchecked expansion of noxious weed infestations, loss of habitat, and other socio-economic impacts similar to those of the No Action alternative. Accompanying these expansions would be exponential increased costs of control.

Alternative 3: No Action Alternative.
Socio-economic values derived from the Forest include those associated with outdoor recreation (hunting, fishing, camping, etc.) as well as those associated with commodity production (grazing, timber harvest, harvest of special forest products, etc.). The No Action alternative would not result in immediate effects to recreational or scenic resources. Under this alternative, recreation visitors would be increasingly exposed to the irritating thistle stickers and visual impacts. Recreational use would likely decline in infested areas where access is hampered by thistles or where infestation is a nuisance. If noxious weed infestations are left untreated, the long-term disruption and continued loss of native ecosystems will ultimately have a negative impact on all recreational activities on the Forest.

The introduction of exotic plants influences wildlife by displacing forage species, modifying habitat structure, such as changing grassland to a forb-dominated community or changing how a species interacts within its environment. Most grassland-dependent wildlife species would suffer from the decrease in forage and hiding cover on heavily infested sites. Hunting opportunities will be reduced as the carrying capacity of big-game winter range and other habitats diminish. Fishing and boating at the Forest's many lakes and ponds will be impacted as shoreline access is diminished by weed species such as purple loosestrife and Canada thistle. Stream fishing opportunities will also be reduced as sedimentation and other changes to streams reduce fish habitat suitability.

Economic impacts caused by noxious weeds could include reduced income from lower grazing capacity, lost livestock sales, and reduced grazing land values. Untreated noxious weed infestations will ultimately reduce the amount of livestock grazing allowed on the Forest, and could adversely affect timber regeneration on some sites through competition for sunlight, moisture and/or soil nutrients, or even by chemically inhibiting establishment or growth of seedlings.

These same infestations will spread onto adjacent lands, resulting in negative economic impacts to those landowners due to increased noxious weed control costs, reduced agricultural production potentials, as well as lost opportunity costs. Opportunity costs include any economic benefits foregone due to the continued presence of noxious weeds, and are applicable to both private and public lands. Increased future costs of weed control resulting from failure to control present populations of noxious weeds would be considered an opportunity cost.

Under a "do nothing" scenario a mathematical calculation reveals the magnitude of the weed problem along I-70 (which traverses the north boundary of the Forest) from the Utah-Colorado border to the Eisenhower Tunnel:

Assumptions: 1) The starting point is 407 acres based on the 1998 Four-County I-70 Weed Inventory, 2) Total area of the I-70 rights-of-way in the four-county region is estimated at 5,640 acres (200 feet average width x 213 miles = 5,640 acres), 3) A conservative estimate of weed spread is 15% per year, 4) Treatment costs including equipment, personnel, and chemical are estimated at $100 per acre.

Year	Acres	Cost
0	407	$40,700
1	468	$46,800
2	538	$53,800
3	619	$61,900
4	712	$71,200
5	819	$81,900
10	1647	$164,700
15	3312	$331,200
19	5792	$579,200

In less than 19 years, the total area of the right-of-way will be infested with noxious weeds if no treatment is done. The cost to the state, in treatment alone, would be over a half million dollars.

Although some unsuspecting Forest visitors may be impressed by the visual display of flowering noxious weeds (i.e. purple loosestrife, knapweeds, thistles), the presence of noxious weeds on National Forest System lands more typically elicits negative reactions from the public, especially adjacent landowners and county weed boards. Other negative reactions to the presence of noxious weeds would likely be highest among those members of the public also having knowledge of the harmful ecological effects of noxious weed infestations.

The No Action alternative would present negligible hazards to human health and the safety of Forest visitors or workers. No implementation costs would occur with this alternative.

O. EFFECTS ON EFFICIENCY OF WEED CONTROL STRATEGIES

Alternatives 1: Proposed Action
Successful weed management requires a strategy that 1) controls invading weed species, and 2) minimizes potential for weed invasion. The Proposed Action focuses upon weed control through the IWM methods of biological, chemical, and mechanical treatment. These programs are reactive in the sense that they are directed toward plant introductions and invasions that are already in progress. The Proposed Action also would implement a detailed program of proactive weed prevention measures that address causes of initial introduction and subsequent

invasion, reduces opportunities for colonization, and minimizes disturbances that create safe sites for weeds.

The use of herbicides and mechanical, cultural, and biological methods would not result in the total elimination of noxious weeds from the Forest. However, this alternative would eradicate several weed populations, and would effectively reduce the size and rate of spread of other infestations. Where weed infestations are successfully eradicated, follow-up treatments and monitoring of treated infestations, along with revegetation with desired plant species, would reduce the likelihood of reinfestation.

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

The noxious weed management strategy of the Proposed Action is divided into seven areas:

1. Administration and Planning

a. Allocate sufficient funding for equipment, herbicides, and manpower resources to provide effective planning, inventory, prevention, control, and monitoring.
b. Develop and include minimum Forest Plan Goals, Objectives, Standards and Guidelines in the Forest Plan revision.
c. Establish direction for multi-resource funding of noxious weed control efforts.
d. Institutionalize consideration of noxious weeds in resource planning and project analyses.
e. Ensure that the Noxious Weed EA is current and sufficient. Determine what project-specific NEPA documentation is necessary to supplement the Forest EA. Update the current EA with current species inventories and acreages, the most current risk assessments, and the addition of new chemicals available and suitable for treatment.

2. Education and Awareness

a. Develop and deploy various educational and public awareness materials; including videotapes, printed brochures, school presentations, posters, etc. Conduct tours of infested sites.
b. Provide training for field-going personnel on weed identification, treatment methods, herbicide application, and monitoring.
c. Emphasize involvement of all employees in locating, inventorying, and reducing the spread of noxious weeds.

3. Prevention and Early Detection

a. Establish the Loa RD as the highest priority area for prevention, since the District is currently relatively free of weeds.
b. Identify and document newly introduced weed species in formerly uninfested areas. Early Detection Goal: Early detection must mean finding new invaders before infestations reach 1 acre in size. This target level size is low because the feasibility of removing the species is much greater both economically and logistically at this level. First response to a new exotic plant would be to stop all seed production. If the plants are found in the flowering and seed development stages, hand removal of the seeds are a must. If the plant population is small enough, hand pulling should be considered for the entire site. The seeds should be burned in a confined area that can be monitored for future seed germination. If the noxious weed is a perennial, measures should be taken to kill the root system. Digging and pulling may be effective if it has a taproot. If it has a rhizome-like root system, it most likely will need to be done with an herbicide.
c. Enforce FS Order #04-00-052, closing all NFS lands on the Fishlake NF to possessing or storing hay, straw, or mulch that has not been certified by any authorized State or County Officer.
d. Review, and modify where necessary, all activities authorized or conducted on the Forest for their potential to spread weeds or create conditions that are conducive to weed establishment. Implement Weed Prevention Practices (Appendix F) as appropriate.

4. Coordination and Cooperation

a. Develop cooperative relations with State, local, and other Federal agencies in the collection of inventory data, education and awareness, and control.
b. As appropriate, enter into cooperative agreements or MOU's to coordinate the management of noxious weeds on NFS lands in accordance with FSM 1580.
c. Continue participation in interagency coordination meetings.

5. Inventory and Mapping

a. Continue to gather baseline information important to decision making, including: a) weed species, b) locations of infestations, c) acreage infested, d) density of plants, e) general plant community, f) environmental conditions; e.g., soil conditions, exposure, level of disturbance, and g) current land-use activities (see Inventory Form).
b. Continue to use GPS and GIS technology to map infestations and track rate and extent of spread.
c. Complete an annual weed inventory report to record herbicides applied, application rates, and treatment locations.

6. Containment/Control/Eradication

a. First priority for **containment and control** treatment are areas infested by musk thistle and leafy spurge on the Fillmore, Beaver, and Richfield Ranger Districts and Scotch thistle on the Beaver and Fillmore Districts. These weed species spread much faster than

the other established species and produce seed that is viable for many years. These infestations **MUST** be treated annually to prevent any increase in size. If left untreated for just one year, infestations could greatly expand.

b. First priority for **eradication** treatment is noxious weed species with limited extent of infestation: Follow-up treatments at least twice a year for a minimum of 5 years.
c. Second priority for **containment and control** treatment are isolated **new infestations** of established invaders (invasive spread).
d. Develop strategies for control of noxious weeds where the use of herbicides may not be appropriate; i.e., riparian areas. Biological Control Agents may be appropriate treatments in these areas.

7. Monitoring

a. Monitoring and evaluation are the keys to determining when weed control strategy needs to be changed. Monitoring involves making observations, gathering data, and keeping records. Monitoring must be designed to detect changes in weed and desirable plants, biological control agents, as well as soil surface conditions including litter accumulation, exposed soil, erosion, and soil compaction. Management practices and climatic factors affecting vegetation health and status must also be monitored. Monitoring data must be compared to earlier years, and weed management programs must be adjusted according to the predetermined management objectives.
b. Annually complete the field data inventory form for each inventoried and/or new site to document effectiveness of treatment, growth rates, rates of spread, etc.

Alternative 2: IWM Without Weed Prevention Measures, Forest Plan Goals, Objectives, & Standards.
Alternative 2, using reactive IWM control methods, would have the effect of controlling some weed populations, but many infestations would continue to spread without implementation of weed prevention measures. Most weed populations would not be brought under control, either due to infestation size or unchecked weed seed dispersal and transportation vectors. Monitoring of past reactive control measures indicates that these methods, alone, have not been successful in controlling populations. At best, the long-term effect would be that changes in population size and distribution would not be noticeable for many years.

Established infestations would become more difficult to control as populations increase in size and distribution. In addition, new invaders, not successfully treated, would likely become naturalized into the ecosystem and, once established, would be difficult or impossible to eradicate.

Alternative 3: No Action Alternative.
Without a comprehensive strategy for prioritizing and treating weed infestations on the Forest, opportunities for cooperative efforts with state and county agencies could occur but would be limited.

The No Action alternative would be minimally effective in controlling existing populations. There would be no immediately apparent impact on vegetative communities. However, given the moderate to high susceptibility of most vegetative communities within the ecosystem to invasion by weed species, it would be expected that existing weed populations would continue to spread into new areas, in many cases with or without disturbance. Larger weed infestation sites would continue to spread throughout the Forest and would continue to serve as a significant source of noxious weed seed infestations into the surrounding landscape.
The long-term effect of implementation of the No Action alternative would be that, as weed infestations become larger and more widespread, the cost of control would increase, while the chance of success would diminish. New invaders, not successfully treated, would likely become naturalized into the ecosystem and, once established, would be difficult or impossible to eradicate.

All noxious weed problems require some level of management. Without suppression or containment, weeds will continue to spread into susceptible areas not presently occupied by these plants. Many susceptible plant communities would become infested with undesirable weeds to the extent that native plant communities would be irreversibly changed. All forest and rangelands should be surveyed, infestations of each noxious species mapped, and infestation acres determined, to establish a base line from which to measure changes in weeds, other vegetation, and other aspects of the environment. The "No Action" option must include monitoring in the same way and for the same reasons it is used for other alternatives.

P. EFFECTS OF IMPLEMENTATION OF WEED PREVENTION MEASURES

Alternative 1: Integrated Weed Management, Including Weed Prevention Measures.
Although states may place the responsibility for control of weeds on the landowner, federal land managers work under the authority of laws and regulations that require contractors, permittees, and resource users to control weeds on Federal lands under their jurisdiction. In September of 1994, the Chief of the forest Service directed that all ground-disturbing activities have the obligation and direction (FSM 2080) to assess the threat of invasion of noxious weeds into the disturbed areas created by the project. This includes any noxious weed mitigation costs associated with the project.

Under the Proposed Action, and in general, the public visitor and/or commodity user is included in preventing weed invasions and is responsible for ensuring compliance with weed prevention measures. All prevention techniques emphasize education and awareness programs to enhance cooperation and promote public involvement. The

objective is to develop an environmental ethic among the public, similar to that exemplified by "wildfire suppression", and to take immediate action on undesirable weeds wherever they are found.

The Proposed Action will cause some level of inconvenience to visitors and/or commodity users, but not to the extent that use would be precluded. The guideline to employ weed prevention measures is often authorized through "closure orders" which can be legally enforced.

Alternative 2: IWM Without Weed Prevention Measures and Alternative 3: No Action.

Neither of these two alternatives contains provisions for weed prevention mitigation measures. The proposed weed prevention measures are provided as "guidelines" or recommendations and currently are not strictly enforced. However, if no prevention measures are employed, either voluntarily or required, wide-spread invasion of noxious weeds will require future enforcement of even more restrictive provisions and closures. Some uses may not be allowed in critical areas.

CHAPTER 5: AGENCIES AND PERSONS CONSULTED

The purpose of this chapter is to list those agencies, organizations, and persons who were consulted in this environmental analysis process.

A. Interdisciplinary Team. The following individuals were members of the Interdisciplinary Team (IDT):

INTERDISCIPLINARY TEAM MEMBERS		
Name	**Title**	**Responsibility and Expertise**
Dave Grider	Fishlake and Dixie NF Forest Range Specialist	Project Team Leader, Noxious Weed Coordinator, Writer/Editor
Dale Deiter	Fishlake NF Forest Hydrologist	Review of Aquatics, Clean Water Act Compliance
Frank Fay	Fishlake NF Land Management Planner	NEPA Compliance
Mark Madsen	Fillmore /Beaver RD Zone Wildlife Biologist	TEPS Analysis, BE/BA

INDIVIDUALS CONSULTED		
Name	**Expertise**	**Contribution**
Ron Rodriguez	Dixie/Fishlake NF Wildlife Biologist	TEPS Analysis Review, BE/BA Support and Review
Henry Maddux	TEPS	US Fish & Wildlife Service review of BA
Max Reid	Fishlake NF Natural Resource Specialist	Review of Weed Prevention Measures
Ron Sanden	Fishlake NF Forester	Review of Weed Prevention Measures
Bob Campbell	Fishlake NF Ecologist	TEPS Plants Review
Bob Gardner	Fishlake NF Range Staff	Project Coordination and Review
Bob Tuttle	Richfield RD Range Specialist	Noxious Weed Inventory, Document Review Review of Weed Prevention Measures
Vince Pace	Richfield RD Range Specialist	Noxious Weed Inventory, Document Review Review of Weed Prevention Measures
Rob Hamilton	Loa RD Range Specialist	Noxious Weed Inventory, Document Review Review of Weed Prevention Measures
Del Barnhurst	Fillmore RD Range Specialist	Noxious Weed Inventory, Document Review Review of Weed Prevention Measures
Doug Sorensen	Beaver RD Range Specialist	Noxious Weed Inventory, Document Review Review of Weed Prevention Measures

B. Agencies

AGENCIES CONSULTED		
Name	**Agency**	**Contribution**
Henry Maddux	USF&WS	Review of BA and provisions for TEPCS
Elyana Sutin	Environmental Protection Agency	Review of EA

C. Other Contacts. On ovember 19, 2001 notice of availability of a scoping document was mailed to 136 interested publics; including special interest groups, other agencies, congressional offices, and interested citizens. Seven individuals responded to the invitation to receive a copy of the scoping document, and five provided comments. The list of contacts is contained in the project record.

CONTACTS PROVIDING REVIEW		
Name	**Organization**	**Contribution**
Craig Axford	Utah Environmental Congress	Provided comments
Jerold Jensen	Individual	Provided comments
John Keeler	Utah Farm Bureau	Provided comments
Gary Mason	Sevier County Commission	Povided Comments
Clenn Okerlund	Wayne County Commission	Provided Comments

APPENDIX A – LITERATURE CITED