Tumbledown Fuels Reduction Project

Noxious Weeds Report

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Introduction

This report discusses the environmental effects of implementation of the Tumbledown Hazardous Fuels Reduction Project on noxious weeds.

The Forest Service Handbook (FSH 3409) defines a strategy for managing pests, including noxious weeds, as “a decision-making and action process incorporating biological, economic and environmental evaluation of pest-host systems to manage pest populations” (FSH 3409.11, 6/86). This strategy is termed Integrated Pest Management (IPM).

The overall IPNF strategy is to contain weeds in currently infested areas and to prevent the spread of weeds to susceptible but generally uninfested areas. The 1989 IPNF Weed Pest Management EIS describes the strategy.

Weed management activities in the district are guided by the Sandpoint Noxious Weed Control Project FEIS (USDA 1998). The decision to treat noxious weeds on roads in the project area was made with the Sandpoint Noxious Weed Control Project FEIS Record of Decision (ROD).

Noxious weeds are those plant species that have been officially designated as such by federal, State or county officials. In Weeds of the West by Whitson et al. (1991), a weed is defined as “a plant that interferes with management objectives for a given area of land at a given point in time.” The federal Noxious Weed Act of 1974 defines a noxious weed as “a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock or the fish and wildlife resources of the United States or the public health” (P.L. 93-629).

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

Both federal and state laws define weeds primarily in terms of interference with commodity uses of the land. However, the impacts of noxious weeds on non-commodity resources such as water quality, wildlife, and natural diversity are of increasing concern.

Regulatory Framework

Federal legislation, regulations, policy, and direction that require development and coordination of programs for the control of noxious weeds and evaluation of noxious weeds in the planning process include the following:

- National Forest Management Act (NFMA) (1976)
- National Environmental Policy Act (NEPA) (1969)
- Forest Service Manual (Chapter 2080, as amended) (2001)
- Executive Order #13112 (1999)
- IPNF Forest Plan (1987)
- IPNF Weed Pest Management EIS (1989)
- Sandpoint Ranger District Noxious Weed Control Project EIS (1998)

Existing Condition

Methodology

Information on current weed infestations and results of weed management in the project area is derived from records of previous weed treatments and from observations during field surveys for rare plants.

Documented Weed Infestations

Weed infestation levels in the project area after several years of weed treatment (see Current Weed Management Efforts below) are as follows: spotted knapweed (moderate), goatweed (moderate), oxeye daisy (low-moderate), common tansy (low), sulfur cinquefoil (low), meadow and orange hawkweed (low), bull thistle (very low) and Canada thistle (low). See the project file for definitions of weed infestation levels.

Weed inventory and treatment in the project area were sporadic from 1989 to 1993. Infestations of spotted knapweed, meadow and orange hawkweed had been treated using biological and chemical control methods. Infestations of goatweed, common tansy and oxeye daisy had been noted but not treated.

Because spotted knapweed and goatweed occur off-road in areas proposed for treatment, they are of greater concern than roadside infestations that are being actively controlled. These two species will be discussed in more detail.

Spotted Knapweed (*Centaurea maculosa* Lam.) - Spotted knapweed is native to Eastern Europe. It was introduced to North America, probably as a contaminant in alfalfa seed and/or ships' ballast, in the late 1800s (Maddox 1979, Ochsmann 2001, Roche et al. 1986). In 1920, its distribution was limited to the San Juan Islands in Washington. By 1980, it had spread to 48 counties in the Pacific Northwest, and by 1998 its known range included every county in Washington, Idaho, Montana and Wyoming (Sheley et al. 1998).

Spotted knapweed is a perennial species that reproduces almost entirely from seed, although some plants extend lateral shoots below the soil surface that form new rosettes. It establishes and dominates on dry, disturbed sites, especially along roads (Roche et al. 1986). It also invades relatively undisturbed perennial native plant communities in the northern intermountain region (DiTomaso 2000).

Most studies of spotted knapweed to date have focused on its dominance of native grasslands and/or prairies (Tyser and Key 1988, LeJeune and Seastedt 2001, Ridenour and Callaway 2001). Much of spotted knapweed's dominance over native species in those habitats may be attributed in part to root allelopathy (Ridenour and Callaway 2001). Increased availability of nitrogen in what were historically nitrogen-limited habitats that favored native grass species, and the resulting creation of phosphorus and other resource limitations in grassland soils, may also be a factor in spotted knapweed's success in grassland habitats (LeJeune and Seastedt 2001). LeJeune and Seastedt (2001) hypothesize that manipulation of soil resource availability with traditional techniques such as fire can affect the dominance of invasive species such as *Centaurea* in grassland habitats.

In contrast, the Tumbledown project area is dominated by mesic to dry forested habitats with a high shrub component. Dry habitats comprise only about 25 percent of the project area (see Vegetation section). While the behavior of spotted knapweed in open grassland inclusions in

these dry habitats may be mostly influenced by the above biotic factors, in forested habitats tree and shrub layer canopy cover is likely a major limiting factor.

Knapweed seeds are able to germinate under full canopy, but mature plants are uncommon in shaded areas (Watson and Renney 1974); it is typically found in open canopies, sometimes up to 20 percent but most often under canopy cover of five percent or less (Allen and Hansen 1999). Both tree and shrub canopy cover have been observed to affect the abundance of spotted knapweed in forested habitats (Hammet personal observations 1999-2005).

One study considered the effects of spotted and diffuse knapweed on the growth of confer seedlings in a montane forest in southern interior British Columbia (Powell et al. 1997). The results of the study were that abundant knapweed growth did not negatively impact conifer growth and survival during the three-year study period. While Powell et al. (1997) concluded that the lack of effects to conifer seedling growth was likely due to abundant moisture levels during the study period, only the interaction between conifer seedlings and knapweed was measured - all other vegetation had been removed from the site and was cleared every season (Powell et al. 1997). Other site variables such as availability of light were therefore not considered.

The habitats in which spotted knapweed now occurs had historical fire regimes of relatively frequent, low-severity surface fires to mixed-severity fires. Spotted knapweed established in most of these habitats after fire exclusion began, so it is unclear how historical fire regimes might affect spotted knapweed or how spotted knapweed may affect these fire regimes (Fire Effects Information System 2006).

Low-severity fire typically does not kill spotted knapweed plants or seeds (Sheley and Roche 1982). According to LeJeune and Seastedt (2001), low-severity fires in grasslands may increase the availability of nutrients that would allow native species to successfully compete with spotted knapweed. Although severe burns may reduce germination of spotted knapweed seeds (Abella and MacDonald 2000), severe wildfire would probably favor expansion of knapweed by creating widespread areas of bare soil and increasing the amount of sunlight that reaches the ground surface (Arno 1999, Sheley et al. 1999).

Spotted knapweed infestations have been associated with reductions in forage production (Harris and Cranston 1979), plant species richness and diversity (Tyser 1990), soil fertility (Harvey and Nowierski 1989, Olson 1999) and wildlife habitat (Bedunah and Carpenter 1989), as well as increases in surface water runoff and stream sedimentation (Lacey et al. 1989).

Goatweed (*Hypericum perforatum* L.) - Goatweed (also known as St. Johnswort) is native to Europe, western Asia and north Africa. It was likely introduced to North America multiple times (Maron et al. 2004). The first recorded occurrence of the species in North America was from Pennsylvania in 1793; by the early 1900s it was established in many western states (Sampson and Parker 1930). Goatweed population levels were dramatically reduced following a successful biological control program begun in the 1940s in heavily infested regions of the western United States (Tisdale 1976).

Goatweed is a perennial species that reproduces both by seed and by often extensive lateral root growth that produces additional aerial crowns. In forested areas, it is commonly associated with disturbances such as roads, logging, grazing and fire. Where it occurs in forest zones in Idaho, it is abundant only in small, localized areas in naturally open ponderosa pine stands or where tree cover has been greatly reduced by logging, fire or other disturbance (Tisdale et al. 1959). Several studies suggest that goatweed requires abundant light for best development. In one study, plants

subjected to 50 percent of full daylight almost all died after 15 days (Sampson and Parker 1930). More recent studies corroborate those findings (Parendes and Jones 2000). Both tree and shrub canopy cover have been observed to affect the abundance of goatweed in forested habitats (Hammet personal observations 1999-2005).

The historic fire regimes of habitats in which goatweed occurs range from relatively infrequent, high-severity fires in wet forest types to high-frequency, low-severity fires in ponderosa pine forests. The species established in most of these habitats after fire exclusion began, so it is unclear how historical fire regimes might affect goatweed or how goatweed may affect these fire regimes (Fire Effects Information System 2006).

While it is generally purported that fire encourages establishment, vegetative spread and increased density of goatweed patches (Campbell and Delfosse 1984), the variation in the species' response to fire from study to study may reflect differences in plant community type, fire size and severity and/or season of burning. One 1975 study in north Idaho did not show any obvious changes in goatweed infestations following spring burning of brush-covered slopes and seeding with non-native herbaceous species. Goatweed seedlings are susceptible to competition from other species; multiple stresses such as defoliation by biological control agents and fire may also cause reductions in crown density of mature plants (Briese 1997).

Goatweed is well known for its medicinal and other commodity uses. However, hypericin, a chemical constituent of goatweed, causes photosensitization in animals that consume it; the effects of poisoning can lead indirectly to death. Its impact on native plant communities may not be as great as earlier literature seems to indicate, perhaps due to the moderate success of biological control efforts over the last 60 years (Fire Effects Information System 2006). The most commonly described impacts are loss of forage production and carrying capacity on rangelands and losses from livestock poisoning (Ruggiero et al. 1991).

Current Weed Management Efforts

Spotted knapweed, goatweed and common tansy are widely established and are considered naturalized in the project area. Management of these species will emphasize reducing infestation levels and slowing their rate of spread. Canada thistle, bull thistle, dalmatian toadflax, oxeye daisy, orange hawkweed, meadow hawkweed, sulfur cinquefoil and rush skeletonweed are currently established but not considered naturalized in the project area. Infestations will be monitored and contained, with eradication where feasible.

Of major concern are potential new invaders (see project file) not yet documented in the project area. In accordance with guidelines in the Northern Region Overview (USDA 1999), management priorities emphasize identification and eradication of tansy ragwort, leafy spurge and yellow starthistle. Some additional weed species listed as noxious in Bonner County and recorded as occurring there have not yet been documented in the project area. These species would be a high priority for eradication if any individuals were observed during operations or monitoring in the project area.

Two sites within the project area have been treated under the Sandpoint Noxious Weed Control Project FEIS (site numbers are as listed in that EIS). They include Road 278 (portion of site # 38) and Bonneville Power Administration and Avista powerline rights-of-way (portion of site # 39). Rush skeletonweed infestations in these sites were designated a high priority for eradication. Road 278 was chemically treated in the fall of 2000 and 2001, with follow-up application of desired species seed and fertilizer. These roads have had annual follow-up treatments, and weed infestations have been dramatically reduced in the areas treated (Hammet personal observations

1999-2005). Other roads in the project area have been treated under the Sandpoint Noxious Weed Control FEIS adaptive strategy (USDA 1998). Documentation of weed treatments from 2000-2004 in the project area is in the project file.

Biological control agents for knapweed (*Metzneria paucipunctella*, *Urophora affinis* and *U. quadrifasciata*) are established in Idaho (Rees et al. 1996) and have been identified in the project area. The goatweed biological control agent *Chrysolina quadrigemina* was first released in the United States in 1946 and is now well-established in Idaho (Rees et al. 1996); it has been identified in the project area. *Larinus minutus*, *Cyphocleonus achates* and *Agapeta zoegana* have been released in offroad knapweed infestations in the project area. Additional biological control agents for goatweed and knapweed may be released in the project area as appropriate.

Funding levels for prevention, monitoring and treatment of noxious weeds and the inclusion of weed treatment and prevention practices in timber sale contracts since 1998 have increased the likelihood of success in containing and reducing weed infestations throughout the district. Funding levels for noxious weeds on the Kaniksu portion of the IPNF have increased from $34,000 in 1998 to $154,000 in 2006 (see project file). This does not include funding for native seed collection, seeding, fertilizing, mulching, weed treatment and permanent vegetation monitoring as part of the Myrtle Fire Burned Area Emergency Rehabilitation (BAER) project on the Bonners Ferry Ranger District.

Environmental Consequences

Methodology

Analysis was conducted using current distribution of weed species in habitats similar to those found in the proposed treatment areas, and types of proposed project activities. The estimation of risk of weed spread and introduction of new weed invaders from the proposed activity is based on peer-reviewed literature, experience in the project area and on similar sites in the IPNF, and professional judgment.

Effects of the proposed action on noxious weed spread are based on the amount of canopy removal and predicted amount of soil and/or understory vegetation disturbance. Analysis of effects to noxious weeds of various activities relies on the following assumptions:

- Skyline harvest carries less risk of weed spread than tractor logging. Cut-to-length methods carry more risk of weed spread than skyline logging but less than tractor logging.
- Selective harvest under the proposed action would not be expected to reduce overall tree canopy cover in treated stands below approximately 50 percent. This would allow for increased understory vegetation growth, including some noxious weeds. Goatweed and knapweed would be less likely to establish in stands with at least 50 percent tree canopy cover (see the above discussion under Documented Weed Infestations).
- Regeneration treatments would result in residual tree canopy cover of from five to 40 percent. This type of harvest carries a greater risk of the spread of goatweed and knapweed than selective harvest, particularly when in proximity to existing infestations.
- Even in the absence of soil or vegetation disturbance, some weed species may invade if tree or shrub canopy cover is significantly reduced.

The cumulative effects analysis area describes the area beyond which effects of the proposed project cannot be detected. Determination of the cumulative effects area for weeds considered

the extent of currently documented weed infestations and likely seed dispersal distances. While patterns of dispersal are not known with certainty for many plant species, in studies of *Botrychium virginianum* most spores fell within three meters of the source plant (Peck et al. 1990). Noxious weed species' seeds that are heavier than *Botrychium* spores might be assumed to have similar if not more restricted dispersal patterns. Occasional transport over long distances (such as on vehicles) is possible. However, it would be difficult to predict the extent of such long-distance dispersal. It is likely that most seeds of noxious weeds would fall close to the parent plant.

In addition, road systems and lands adjacent to the project area have noxious weed infestations similar in composition and distribution to those in the project area, so transport of weed seeds between these lands and the project area would have little or no measurable impact. For these reasons, the cumulative effects analysis area for noxious weeds is the project area.

Effects with regard to noxious weeds from proposed activities are qualitatively described as very low, low, moderate or high, with the following definitions:

- **very low** = no measurable effect on existing weed infestations or susceptible habitat
- **low** = existing weed infestations and/or susceptible habitat not likely affected
- **moderate** = existing weed infestations or susceptible habitat affected, with the potential for expansion into uninfested areas and/or establishment of new invaders
- **high** =weed infestations and/or susceptible habitat affected, with a high likelihood of expansion into uninfested areas and/or establishment of new invaders

The period for measuring short-term cumulative effects to rare plants and suitable rare habitat is ten years following completion of harvest and other restoration projects, or, in the event of implementation of no action, ten years after the date of the signing of the Decision Memo. Beyond ten years, the likelihood of events or activities affecting rare plants and suitable habitat would be difficult to predict.

Mitigation and Monitoring

Required Mitigation

Noxious weed treatment would be conducted according to guidelines and priorities established in the Sandpoint Noxious Weed Control Project FEIS (USDA 1998). Methods of control may include biological, chemical, mechanical and cultural. Follow-up treatments and monitoring would be conducted as needed.

Gravel or borrow pits to be used during road construction or reconstruction would be free of new weed invader species (as defined by the IPNF Weed Specialist). A list of weed species considered to be potential new invaders is included in the project file.

Any priority weed species (as defined by the IPNF Weed Specialist) identified during road maintenance would be reported to the District Weed Specialist. A list of priority weed species is included in the project file.

Weed treatment of all haul routes and service landings on National Forest lands would occur prior to ground disturbing activities where feasible. If the timing of ground disturbing activities would not allow weed treatment to occur when it would be most effective, it would occur in the next treatment season following the disturbance.

All timber sale contracts would require cleaning of off-road equipment prior to entry onto National Forest lands. If operations occur in areas infested with new invaders (as defined by the IPNF Weed Specialist), all equipment would be cleaned prior to leaving the site.

All newly constructed roads, skid trails, landings, fuel breaks or other areas of disturbance (including maintenance on existing roads) would be seeded with a weed-free native and desired non-native seed mix and fertilized as necessary. Areas that are underburned would be evaluated after the burn and seeded and fertilized as necessary.

All straw or hay used for mulching or watershed restoration activities would be certified weed-free.

Road segments identified for weed treatment under the Sandpoint Noxious Weed Control Project FEIS adaptive strategy (USDA 1998) and proposed for decommissioning would be treated prior to decommissioning.

Estimated Effectiveness:

The above mitigation measures are accepted weed prevention practices developed by public land management agencies and university cooperative extension offices and promoted by weed management organizations across the nation (e.g. Sheley et al. 2002, Drlik et al. 1998, USDA 2001). The above measures include those required in Forest Service Manual (FSM) 2080 for activities related to timber harvest and roads. They are described in FSM 2981.2- 1a and FSM 2081.2 - 6a, respectively (see project file). Also included are weed prevention practices recommended but not required (see project file).

For new weed invaders, the estimated effectiveness of the above measures is high; the measures are expected to be very effective at preventing establishment of new invaders. According to current research (Hobbs and Humphries 1995), early detection and treatment of infestations before explosive spread occurs can significantly reduce the social cost of weed invasions.

For existing infestations that occur along road rights-of-way, estimated effectiveness is moderate; the measures are expected to be somewhat effective at reducing the spread of these in the project area. For existing infestations that have spread off the road, estimated effectiveness is low. Effectiveness of treatments on National Forest lands could be reduced if adjacent landowners do not treat their weed infestations. Existing weeds and new invaders are also spread by wildlife, winds, water and hikers – the mitigation measures would have no effect on these sources of weed spread.

Required Monitoring

In addition to the above design features, the proposal contains required monitoring.

IPNF Forest Plan Monitoring

According to the Forest Plan, “many noxious weed species (knapweed, goatweed, thistle, tansy, etc.) are widespread, and…major programs to eradicate such species are not possible within expected budget levels”. IPNF direction is to give priority to small infestations of “species new to an area, where moderate control actions have a good chance of preventing the establishment of new problems”. Noxious weed control will be based on an integrated pest management approach.

Project Monitoring

Pretreatment of roads and equipment as proposed would be documented on sale inspection reports. The effectiveness of seeding disturbed areas would be evaluated upon completion of the activity. Treated areas would be surveyed and monitored according to treatment priorities established in the Sandpoint Noxious Weed Control Project FEIS.

Effects Common to Implementing and not Implementing the Proposed Action

Cumulative Effects

This section describes cumulative effects that are expected whether or not the proposed action is implemented.

Existing Infestations

Cumulative effects with regard to existing weed infestations are expected to be low to moderate whether or not the proposed action is implemented, considering the following:

Past Activities and Events - Past large-scale wildfires, grazing, timber harvest, road construction and powerline right-of-way clearing provided areas of disturbance of soil, vegetation and canopy cover for invasion by non-native plant species, including noxious weeds. Because of inadequate past weed prevention and control practices, the effects of these activities on noxious weed spread are still evident. However, observations show that recent weed control efforts have greatly reduced infestations along roads in the project area (Hammet personal observations 1999-2005).

The loss of tree canopy cover from past timber harvest may have been a factor affecting weed spread in the area. As the tree canopy in open stands closes, shade-intolerant weeds will, over the long term, be displaced. This process could take another 20-30 years or more. In areas with a high shrub component, recovery of the shrub canopy layer has been much quicker and has already begun to affect the density of offroad noxious weed infestations in the project area (Hammet personal observations 1999-2005).

Current and Ongoing Activities - Road maintenance activities may result in ground disturbance that would be conducive to new weed invaders becoming established, and to the spread of existing weed populations. Preventive seeding with desired species and regular monitoring for weeds would reduce but would not eliminate this risk.

Powerline right-of-way maintenance would perpetuate an open canopy condition conducive to noxious weed spread. A large scale, cooperative weed management effort including biological, cultural and chemical control is needed to reduce the incidence of noxious weeds in the powerline right-of-way.

Hunting, firewood gathering, and vehicle use on roads in the project area would carry a risk of spreading weeds within the project area. In general, existing weeds can be spread by wildlife, wind, water, and hikers. With no action, these sources of weed spread would still be present in the project area. There would be no new road construction if the proposed action were not implemented. Under the proposed action, all new temporary roads would be decommissioned. Therefore, the risk of weed spread from hunting, firewood gathering and vehicle use on roads would be the same either with or without implementation of the proposed action.

Reasonably Foreseeable Actions - Noxious weed treatment and monitoring activities would follow guidelines established in the Sandpoint Noxious Weeds Control Project EIS (USDA 1998). Under the proposed action, mitigation measures to reduce the risk of weed spread in the project area as a result of project activities would protect recent investments in weed management on Forest road 278. With failure to implement the proposed action, weed treatment would likely continue in order to protect previous investments. The impacts of noxious weed invasions on existing weed infestations and the effectiveness and impacts of different weed treatment methods are discussed in detail in the Sandpoint Noxious Weed Control Project Environmental Impact Statement (USDA 1998), hereby incorporated by reference. A site-specific summary follows:

Weed treatment activities would be successful in controlling goatweed and spotted knapweed along road prisms, but in the short-term would not have a significant effect on these species where they occur away from Forest roads. These two species are considered naturalized in the project area, and would not be eradicated by weed treatment efforts.

The short-term management goal for goatweed and spotted knapweed is to reduce the risk of seed and plant parts being transported out of the project area. The long-term goal is to reduce the size of infestations and slow the rate of spread within the project area. Based on past monitoring (see project file) and the observed success of recent weed treatment efforts (Hammet personal observations 1999-2005), continued treatment of existing infestations on roads in the project area would greatly reduce the risk of transporting these species off-site.

Should funding allow, biological control agents for knapweed and goatweed may be released in off-road infestations and would over time reduce the incidence of those species. Treatment of other weed species, which are mostly confined to road prisms, would be moderately to highly effective in reducing their spread within the project area.

Timber stand improvement (thinning and pruning in plantations) would create no new soil disturbance and minimal tree canopy reduction. No increased risk to weed spread is expected from this activity.

Seeding with native and desired non-native species would reduce the risk of weed spread in the project area.

New Invaders

Whether or not the proposed action is implemented, cumulative effects with regard to new invaders are expected to be low when combined with all of the above past, current, ongoing, and reasonably foreseeable actions. With failure to implement the proposed action, because no new disturbance would occur, and because current treatment and monitoring would continue, no new invaders would be expected to become established. Under the proposed action, because of mitigation measures designed to detect and eradicate new invaders, no new invaders are expected to become established.

Effects of Not Implementing the Proposed Action

Direct and Indirect Effects

If the proposed action were not implemented, there would be no direct impacts on the risk or rate of weed spread, since management practices would not change from current conditions. Treatment of existing weed infestations and monitoring for new invaders would be dependent on District priorities and the availability of appropriated funding. It is likely that monitoring and treatment of Forest Road 278 and its spurs would continue as needed to protect the investments

made in previous years. Treatment needs are expected to continue to decrease as more desirable species establish along those roads.

If the proposed action were not implemented, seeds from any weeds on Forest roads in the drainage may still be transported within and out of the area by vehicles, people, birds, and wildlife. Goatweed and knapweed populations established under the powerline right of way would continue to expand within the drainage unless broad scale biological control efforts are undertaken. Indirectly, the continued increase in fuel loading could increase the risk of weed spread in the context of a higher risk of stand-replacing fires.

Cumulative Effects

When combined with the following past, current and ongoing activities and events, failure to implement the proposed action has potential cumulative effects on the spread of noxious weeds that differ from those of the proposed action, as discussed below. All other cumulative effects associated with not implementing the proposed action are described above under Cumulative Effects Common to Implementing or Not Implementing the Proposed Action.

Past Activities and Events

Past wildfire suppression in the project area has increased the risk of severe, stand-replacing fires. Failure to implement the proposed action would not address these accumulated fuels in the project area. The risk of severe, stand replacing fires would be higher than under the proposed action. There would therefore be a higher risk of widespread vegetation and/or soil disturbance, which would cause an increased risk of weed spread and introduction across the project area.

Ongoing Activities

Ongoing wildfire suppression in the project area would increase the probability of severe stand-replacing fires. Not implementing the proposed action would contribute to the continued accumulation of fuels in the project area. As fuels continue to accumulate, the probability of severe stand-replacing fires, and the resulting widespread vegetation and/or soil disturbance, would lead to an increased risk of weed spread and introduction across the project area.

Reasonably Foreseeable Actions

Noxious weed treatment and monitoring would follow guidelines established in the Sandpoint Noxious Weeds Control Project EIS (USDA 1998). The risk of new invaders becoming established would be low. Treatment of Forest roads in the project area would be given a high priority to protect recent investments in weed management on those roads. However, no Knutsen-Vandenberg (KV) funding would be available for weed treatment. Assuming that appropriated funding is available, treatment of Forest roads would likely continue to protect previous investments. Noxious weed infestations along Forest roads in the project area would be expected to continue to decline over time.

Determination of Cumulative Effects

In the short term, not implementing the proposed action would contribute a low level of cumulative effects to the risk of weed spread. Over the long term, not implementing the proposed action would further increase the risk of severe stand-replacing fires. Should such a fire occur, it would likely cause existing infestations to spread to previously uninfested areas. However, the occurrence and intensity of a future wildfire in the project area is difficult to predict.

Proposed Action

Direct and Indirect Effects

Implementation of the proposed action would increase the risk of weed spread to varying degrees. Approximately 73 acres would be treated with irregular shelterwood (ISW) prescriptions, which would result in greater canopy opening than with the proposed 18 acres of commercial thinning (CT), the 527 acres of combined ISW and CT, the 25 acres of liberation cut prescriptions or the 11 acres of proposed fuel breaks. Approximately 287 acres would be harvested using tractor logging, which would create more ground disturbance conducive to weed spread than the 164 acres of skyline logging or the 208 acres of cut-to-length. In addition, more vegetation disturbance would occur on the 272 acres of proposed underburning than the 388 acres of grapple piling or the 11 acres of hand piling. Weed prevention measures would reduce but would not eliminate the risk of weed spread from these activities.

Construction less than one mile of new temporary roads would create disturbance conducive to weed introduction and spread. All new temporary roads would be decommissioned following completion of project activities. With the proposed preventive seeding, monitoring and treatment after decommissioning, the risk of weed spread from these roads would be expected to decrease over time to current levels or below.

Existing Weed Infestations Confined to Roads in the Project Area

Oxeye daisy in particular tends to increase with expansion of canopy openings (Hammet and Klarich 1996 personal observation). However, because it occurs at low levels in the project area, is largely confined to road rights-of-way and is being actively controlled (see above), potential for spread of this species from project activities associated with tree canopy removal would be low under the proposed action. Given the required mitigation described above, the roadside infestations of rush skeletonweed, sulfur cinquefoil, Canada thistle, bull thistle, dalmatian toadflax, common tansy and hawkweeds that are being actively controlled would also not be expected to spread.

Existing Weed Infestations Occurring Off-Road in the Project Area

There would be a temporary increase in the risk of weed spread following decommissioning of the new temporary roads and reopened road under the proposed action. Mitigation measures described above would reduce but would not eliminate the risk of weed spread on decommissioned roads.

The risk of weed spread in areas proposed for underburning would vary for different plant communities. Dry areas dominated by shrubs may be at lower risk, while dry grass and forb-dominated communities may be at higher risk for weed invasion, depending on the season and severity of the burn in each community type. For example, ninebark sprouts vigorously after a fire and has been found to be more abundant on burned than unburned locations (Noste and Bushey 1987). Oceanspray also usually responds to a low-intensity burn by root crown and rhizome sprouting (Young 1983). Recovery of the shrub component would eventually shade out many weed species, especially goatweed (Fire Effects Information System 2006).

Goatweed and spotted knapweed occur in the project area in both previously disturbed and undisturbed habitats. Both may increase, at least temporarily, in some areas following harvest and fuels treatment activities. This may be due not to invasion from adjacent infestations but to germination from seed already present in the soil (Fire Effects Information System 2006). Harris and Gill (1997) suggest that when a pine plantation (or forest) reaches stand closure, goatweed

may disappear from aboveground vegetation, but remain as seed in the soil seed bank. When fire or other disturbance occurs in such sites, the species may establish from seed as part of the initial postfire community.

Experimental evidence suggests that spotted knapweed gains dominance in part by its ability to outcompete native grasses for nutrients (Fire Effects Information System 2006, LeJeune and Seastedt 2001). Other evidence suggests that as succession proceeds and nutrients become less available, the competitive advantage shifts back to native plants such as bluebunch wheatgrass (*Pseudoregneria spicata*) (Fire Effects Information System 2006).

Season of burning may affect these species' response to fire. In one study of goatweed's response to burning, the native grass and forb component remained dominant in prescribed burn areas following a fall burn, because goatweed seedlings are poor competitors (Briese 1996). In a study of fall burning versus spring burning on spotted knapweed in western Montana, the knapweed volume doubled two years following a fall burn but was not recorded before or after a spring burn of lesser intensity on an adjacent site (Noste 1982).

While both species are considered naturalized in the western states and are not likely to be eradicated, their effects on other resources can be reduced by integrated practices such as biological and chemical control. The reestablishment of desired species following disturbance can also reduce the spread of goatweed and knapweed. As stated above, goatweed seedlings are poor competitors; spotted knapweed is also outcompeted by some desired non-native and native cultivar species such as "Durar" hard fescue (*Festuca trachyphylla*) and "Covar" sheep fescue (*Festuca ovina*) (Harrison et al. 1996).

Summary of Expected Direct and Indirect Effects

Based on past monitoring (see project file), successful weed treatment would remove the majority of new seed source for existing weed infestations, which occurs on roadsides, and would slow the spread of existing weed infestations within the project area. Preventive seeding of native and desired non-native species in areas of new disturbance would reduce the risk of weed spread. Treatment of existing weeds along haul routes on National Forest lands would also reduce the risk of weed spread. Contract requirements to clean off-road harvest equipment prior to entry into the sale area would further reduce the risk of introduction of weeds. The risk of introduction and establishment of new weed invaders to the project area is expected to be low with implementation of the required mitigation.

Weed prevention and treatment measures would reduce but not eliminate the potential for spread of existing infestations of goatweed and knapweed within the project area.

Cumulative Effects

This section describes the cumulative effects that are expected with implementation the proposed action. All other cumulative effects associated with the proposed action are described under Cumulative Effects Common to Implementing or Not Implementing the Proposed Action.

Proposed Action

Short-term cumulative effects regarding susceptibility to weeds would be associated with ground disturbing activities under the proposed action. Proposed mitigation (see above) would reduce but not eliminate the risk. Longer term risks are associated with the loss of tree canopy cover. As tree canopy closes, susceptibility of areas proposed for harvest and/or underburning would decrease. This process could take 40-50 years. In areas with a high shrub component, recovery of the shrub canopy layer would be much quicker. For example, Merrill (1982) found that twig

densities on ninebark increased through the third postfire growing season and that shrub heights on burned and unburned sites were equal by the fourth season.

Proposed treatment of existing infestations on haul routes with approved herbicides and preventive seeding and monitoring on skid trails (see above), would greatly reduce the risk of transporting goatweed and spotted knapweed off-site.

Pretreatment of any weeds on new temporary roads and reopened road that would be decommissioned, followed by preventive seeding, would reduce the risk of weed spread over time to current levels. In addition, newly decommissioned roads would be monitored to detect new weed invaders and to assess the success of preventive measures. Without the recurring disturbance of road maintenance and use, and with increasing canopy coverage of desired species, the risk of weed spread on decommissioned roads would decline to below the level for open or gated roads.

Past Activities and Events

Past wildfire suppression in the project area has increased the risk of severe stand-replacing fires. The proposed action would reduce the current fuel loading in the treated areas.

Current and Ongoing Activities

While wildfire suppression in the project area would continue in order to protect multiple resource values, the proposed action would increase the ability to safely use prescribed fire and periodically reduce fuel loads and to suppress an unwanted wildfire. When combined with the proposed action, ongoing wildfire suppression would decrease the probability of severe, stand-replacing fires. There may be a lower risk of widespread, severe disturbance of vegetation, soil and tree canopy than if the proposed action were not implemented.

Reasonably Foreseeable Actions

Noxious weed treatment and monitoring would follow guidelines established in the Sandpoint Noxious Weeds Control Project EIS (USDA 1998). The risk of new invaders becoming established would be low. Mitigation measures to reduce the risk of weed spread from project activities would protect recent investments in weed management on Forest roads in the project area. In addition, Knutsen-Vandenberg (KV) funding from proceeds of the timber sale may be available to supplement appropriated funding for weed treatment. Assuming the availability of appropriated and KV funding, roadside weed infestation levels would be expected to continue to decline over time.

The impacts of noxious weed invasions and the effectiveness and impacts of different weed treatment methods are discussed in detail in the Sandpoint Noxious Weed Control Project EIS (USDA 1998), hereby incorporated by reference. See the site-specific summary above under Cumulative Effects Common to Implementing or Not Implementing the Proposed Action.

Determination of Cumulative Effects

When combined with all of the above activities, cumulative effects with regard to existing weed infestations are expected to be low for oxeye daisy, Canada thistle, bull thistle, sulfur cinquefoil, rush skeletonweed, dalmatian toadflax, orange and meadow hawkweed, and common tansy, based on their current levels of infestation and the observed success of recent weed treatment efforts (Hammet personal observations 1999-2005).

Cumulative effects for spotted knapweed and goatweed would likely be moderate, given their current levels of infestation. Off-road infestations of spotted knapweed and common goatweed would be expected to persist, since these species are considered to be naturalized in the project area. Treatment of off-road infestations with biological control agents may reduce the size of the infestations but would not eliminate them.

Extraordinary Circumstances

Based on the rationale discussed above and the determination of cumulative effects, there would be no extraordinary circumstances with relation to noxious weeds from implementation of the proposed action.

Compliance with the Forest Plan and Other Regulatory Direction

According to the Idaho Panhandle Forest Plan (USDA 1987) direction, infestations of many noxious weed species, including knapweed, goatweed and common tansy, are so widespread that control would require major programs that are not possible within expected budget levels (Forest Plan, p. II-7). Forest Plan direction is to "provide moderate control actions to prevent new weed species from becoming established". Not implementing the proposed action would meet Forest Plan direction by not creating disturbance conducive to new noxious weed invasions or spread of existing weed populations. The proposed action meets Forest Plan direction by providing moderate control actions through project design, as required by the Forest Plan, to prevent new weed species from becoming established.

It should be noted that, since the Forest Plan was implemented in 1987, the issue of weed infestations on national forest lands has evolved to encompass broader issues of native ecosystem integrity and the effects to non-commodity resources and ecosystem processes. Funding levels for noxious weeds prevention, monitoring and treatment since the mid-1990s have increased the likelihood of success of weed management efforts (see the project file). The forest plan revision process will consider the increased emphasis on weed management.

Mitigation measures described above to reduce the risk of weed spread are as required in Forest Service Manual Chapter 2080, as amended (2001). In addition, several recommended, but not required, practices related to roads and timber harvest activities are included (see above). FSM requirements and regulations related to noxious weeds are included in the project file.

According to Executive Order #13112 (1999), "Federal agencies whose actions may affect the status of invasive species, shall, to the extent practicable and permitted by law,

1. identify such actions;
2. subject to the availability of appropriations and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and
3. not authorize, fund or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species…unless…the agency has determined and made

> public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions."

At the project level, noxious weeds have been identified and weed prevention measures incorporated into the proposed action. The potential for weed spread was disclosed for the proposed action. In addition, the consequences of not implementing the proposed action with regard to the risk of widespread weed invasion in the aftermath of a severe, stand-replacing fire were analyzed.

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