File Reference: EM.11.0071

BIOLOGICAL OPINION
FOR THE
POTENTIAL EFFECTS OF MANAGING THE PAYETTE NATIONAL FOREST IN THE BROWNLEE RESERVOIR WATERSHED

2009-F-0066

May 2009

FISH AND WILDLIFE SERVICE
SNAKE RIVER FISH AND WILDLIFE OFFICE
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Table of Contents

1.0 BACKGROUND AND INFORMAL CONSULTATION 1
1.1. Introduction 1
1.2. Scope of the Consultation 2
1.3 Consultation History 3
1.4 Informal Consultations 4
1.4.1 Miscellaneous Forest Products 4
1.4.2 Mistletoe Control and Pre-commercial Thinning 5
1.4.3 Fire Management Actions 6
1.4.4 Fish Habitat and Riparian Sampling 6
1.4.5 Watershed and Fish Habitat Improvements and Maintenance 7
1.4.6 Noxious Weed Control 8
1.4.7 Outfitters and Guides 8
1.4.8 Grazing 9
1.4.9 Description of Water Diversion Special Use Permits 10
1.4.10 Travel Plan, Road Management, and Trail and Administrative Site Operations 12
1.4.11 Power and Communication Lines 12
2.0 BIOLOGICAL OPINION 13
2.1 Purpose and Organization of this Biological Opinion 13
2.2 Description of Proposed Actions 14
2.2.1 Travel Plan, Road Management, and Trail and Administrative Site Operations 14
2.2.2 Noxious Weed Control 23
2.2.3 Grazing 32
2.3 Status of the Species 33
2.3.1 General Description of the Brownlee Reservoir Watershed 33
2.3.2 Bull Trout 33
2.3.3 Northern Idaho Ground Squirrel 40
2.4 Environmental Baseline 46
2.4.1 Bull Trout 46
2.4.2 Northern Idaho Ground Squirrel 47
2.5 Effects of the Action 47
2.5.1 Travel Plan, Road Management, and Trails and Administrative Site Operation 48

2.5.2 Noxious Weed Management 58
2.5.3 Grazing 69
2.6 Cumulative Effects 71
2.6.1 Bull Trout 71
2.6.2 Northern Idaho Ground Squirrel 72
2.6.3 Summary of Effects 73
2.7 Conclusion 74
2.7.1 Travel Plan, Road Management, and Trail and Administrative Site Operation 74
2.7.2 Noxious Weeds 75
2.7.3 Grazing 76
2.8 Incidental Take Statement 76
2.8.1 Travel Plan, Road Management, and Trail and Administrative Site Operation 77
2.8.2 Noxious Weeds 81
2.8.3 Grazing 83
2.9 Reporting Requirements 83
2.10 Conservation Recommendations 85
2.11 Reinitiation Notice 85
3.0 LITERATURE CITED 87

List of Tables

Table 1. Summary of effects determinations for all actions in the Brownlee Reservoir watershed 2
Table 2. Summary of effects determinations for grazing allotments in the Brownlee Reservoir Watershed. Page numbers refer to the Biological Assessment chapters for aquatics (A) or wildlife (W) 10
Table 3. A description of the proposed water special use permits in the Brownlee Reservoir Watershed 11
Table 4. Comparison of existing and proposed travel opportunities on the Payette National Forest 15
Table 5. Trail maintenance activities (Forest Service Handbook 2309.18) 22
Table 6. Weed treatment prioritization and objectives used for noxious weed control on Forest Service lands 24
Table 7. Annual noxious weed control program for the Payette National Forest (includes Wilderness) 24
Table 8. Common herbicides used by the Payette National Forest, trade name, and typical application rates 26
Table 9. Toxicology profile of herbicides used or proposed for use on the Forest 60
Table 10. Aquatic level of concern assessment for forest herbicides 62

Table of Figures

Figure 1. Trails under Payette National Forest jurisdiction with motorized use 17

Figure 2. Roads under Payette National Forest jurisdiction with motorized use..... 18

Figure 3. The Brownlee Reservoir Watershed on the Payette National Forest 39

Figure 4. Northern Idaho Ground Squirrel probable historic distribution and identified metapopulation sites..... 45

Figure 5. Modeled potential habitat for northern Idaho ground squirrels and known colonies in the Brownlee Reservoir Watershed 49

Figure 6. Roads and trails proposed for motorized use on the Payette National Forest and Northern Idaho ground squirrel colonies (note: no new routes would occur in occupied NIDGS sites)..... 56

1.0 BACKGROUND AND INFORMAL CONSULTATION

1.1. Introduction

The Endangered Species Act of 1973, as amended (Act) establishes a national program to conserve threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the Act requires Federal agencies, such as the Payette National Forest (Forest), to consult with the Fish and Wildlife Service (Service), National Marine Fisheries Service (NMFS), or both, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. Section 7(b)(4) requires the provision of an incidental take statement that specifies the impact of any incidental taking and includes Reasonable and Prudent Measures (RPMs) to minimize such impacts.

This document is the Service's Biological Opinion (Opinion) of the effects of the proposed implementation of individual and ongoing actions on the Forest in the Brownlee Reservoir Watershed. Actions supersede all those in previous consultations within the boundaries of this watershed on the Forest and are assumed to fall within the guidance and direction provided in the 2003 Land Resource Management Plan (LRMP).

This document includes actions involving both formal and informal consultation. Table 1 below summarizes the effects determinations for all actions in this watershed by listed species. Please note that effects from Forest actions in the Deep Creek Watershed (Reference #14420-2009-F-0065) on wildlife species are included in the Brownlee Reservoir watershed Opinion, and the Service did not receive a separate wildlife Assessment for the Deep Creek Watershed. Please note that the details on the analysis of effects to wildlife species seen here include effects assumed in the Deep Creek Watershed Assessment although the Deep Creek Watershed is not mentioned specifically here or in the biological assessment (Assessment).

Table 1. Summary of effects determinations for all actions in the Brownlee Reservoir watershed

Federal Action	Listed Species		
	Bull Trout	Northern Idaho Ground Squirrel	Canada Lynx
Miscellaneous forest products	NLAA	NLAA	NLAA
Mistletoe control and precommercial Thinning	NLAA	NLAA	NLAA
Fire management activities	NLAA	NLAA	NLAA
Fish habitat and riparian sampling	NLAA	NE	NE
Watershed and fish habitat improvement and maintenance	NLAA	NLAA	NE
Noxious weed management	LAA	NLAA	NLAA
Road management Trails, recreation and administrative site Operation and maintenance Travel plan	LAA	LAA	NLAA
Grazing			
Mill Creek C & H	NLAA	NLAA	NLAA
All other grazing allotments	NLAA	LAA	NLAA
Other Actions			
Power and communication lines	NLAA	NLAA	NLAA
Water special uses	NLAA	NE	NE
Outfitter and guides	NLAA	NE	NE

Note: LAA = Likely to adversely affect; NLAA = Not likely to adversely affect; NE = No effect

1.2. Scope of the Consultation

The Forest has been analyzing effects of actions across the Forest by watershed for aquatic species for over a decade. This comprehensive, watershed-scale analysis has recently been applied to wildlife species on the Forest. Now all species with Federal status are assessed at a watershed scale, rather than by an individual project area. This overview is very useful in determining how all Forest actions are cumulatively affecting species and their habitat. Because the effort to do consultation work at a large scale is much greater than doing projects individually, the term of this consultation is ten years. During this ten-year period, new individual projects will be addressed in the watershed Assessment format by updating a given watershed document (including both wildlife and aquatics).

The watershed scale of analysis is one piece of the Forest's commitment to completing the Framework agreed to during Forest planning. In order to finish the Forest's commitments to Framework, the Forest must also complete a comprehensive list of Forest priorities by species. This action plan should list activities intended to recover and conserve listed species and their habitat. A target timeline for each task should also be included with this action plan. The Forest has committed to completing the action plan after receipt of this Opinion.

1.3 Consultation History

The following correspondence and meetings have taken place between the Forest and the Service prior to the issuance of this Opinion.

April 13, 2006	The Service received the draft Biological Assessments for the Potential Effects of Managing the Payette National Forest in all section 7 Watersheds.
May 24, 2006 June 13, 2006 July 11, 2006 July 25–26, 2006 August 7–10, 2006 August 22–23, 2006 September 26–27, 2006 October 19, 2006 November 28, 2006 December 19–20, 2006 January 9–10, 2007 and January 23–24, 2007	The Forest Level 1 team met to discuss portions of the draft ongoing Assessment package.
March 26, 2007	The Forest Level 1 and Level 2 teams met via conference call to discuss a potential 7d determination for the Forest's Travel Plan action.
November 16, 2007	The Forest Level 1 team met and discussed the status of the wildlife consultations and travel plan proposed action.
April 1, 2008	The Forest Level 1 team met to review the most recent travel plan proposed action, to review travel plan maps, and preview the interactive biological assessment CD.
April 22, 2008	A final consultation package was received by the Service.
April 30, 2008	The Forest Level 1 team met and discussed proposed timelines for completion of the subject consultation, and agreed to amendment several actions in the Assessments.
May 21, 2008	The Forest Level 1 team met to discuss the status of the subject consultation and progress of the analysis.

June 30, 2008	The Level 1 Team met to discuss amendments to three grazing actions contained within the watershed Assessments and travel plan analysis progress.
July 11, 2008	The Service participated in a field review of the South Fork Salmon River watershed, including Hamilton Bar.
July 28, 2008	The Level 1 wildlife team met in the field to review areas of the travel plan with potential to affect northern Idaho ground squirrels in the Little Salmon River watershed.
August 28, 2008	The Level 1 team participated in a conference call to discuss the travel analysis.
October 10, 2008	The Service received a final consultation package from the Forest including four amended actions.
February 10, 2009	The Forest was given a draft of this Opinion for review.
March 23, 2009	The Service received the Forest's comments on this Opinion.

1.4 Informal Consultations

1.4.1 Miscellaneous Forest Products

This action programmatically guides the public harvest of miscellaneous Forest products such as firewood, posts and poles, Christmas trees, small volumes of timber (less than 70 acres of green harvest, or 250 acres of salvage in any analysis area annually), mushrooms and other plants and seeds for use by permitted Forest users until December 31, 2018. Certain conditions must be met to harvest trees under the guise of this action. These conditions, along with conservation measures included as part of the action to protect listed species are detailed in the Assessment.

The Service concurs with your determination that the Miscellaneous Forest Products ongoing action may affect, but is not likely to adversely affect the Canada lynx (*Lynx canadensis*) , bull trout (*Salvelinus confluentus*), and northern Idaho ground squirrel (*Spermophilus brunneus brunneus*) (NIDGS). Our concurrence is based on the following rationales.

1) Sediment deposition in streams as a result of this action is expected to be negligible because LRMP stream buffers will be applied to reduce the chances of damage to riparian areas where bull trout are present. Sediment effects to bull trout habitat are therefore considered insignificant.

2) Miscellaneous Forest product collection is expected to result in negligible effects to bull trout and their habitat because required mitigation measures address fuel handling and preclude actions in Riparian Conservation Areas (RCAs) unless both a journey level hydrologist and fisheries biologist agree that required mitigations are met.

3) Impacts to NIDGS are expected to be negligible because standing and down timber would not be removed at NIDGS sites. Skidding by tractors may increase soil

compaction, but this activity will not be allowed in occupied habitat. In addition, log haul through occupied NIDGS habitat would be restricted to after August 15 and prior to reemergence of squirrels in spring.

4) Tree harvest in lynx habitat could temporarily disturb lynx that are using the area, although such use is highly unlikely because lynx are considered rare on the Forest. Tree harvest collection occurs mainly during daylight hours and temporal segregation likely minimizes any impact that disturbance would have on lynx. Areas within lynx habitat will only be designated for cutting when removal of these trees does not increase unsuitable habitat above 30 percent of potential. Therefore, effects to lynx habitat are expected to be insignificant.

1.4.2 Mistletoe Control and Pre-commercial Thinning

Mistletoe control and pre-commercial thinning occur as follow up activities to previous timber harvest, or in other tree stands where stand density is too great to meet management objectives. Mistletoe control can involve the removal of any size tree infested with mistletoe, but treatment generally focuses on large overstory trees. Previously harvested stands are pre-commercially thinned 15 to 25 years after a timber sale to reduce the stand density. Most stands to be thinned are plantations. Pre-commercial thinning will not occur in RCAs except to improve habitat, as identified in the LRMP, which will be agreed to by a journey-level fisheries biologist and hydrologist. An annual list of pre-commercial thinning projects within RCAs will be provided to the Level 1 Team for informal review by May 1 each year.

These activities will not occur within RCAs except where agreed to by both a hydrologist and journey-level fisheries biologist. Conservation measures to conserve listed fish and wildlife species are also included as part of the proposed action and detailed in the Assessment.

The Service concurs with your determination that the mistletoe control and pre-commercial thinning action may affect, but is not likely to adversely affect the Canada lynx, bull trout, and northern Idaho ground squirrel. Our concurrence is based on the following rationales.

1) These activities are expected to yield negligible effects to bull trout and/or their habitat because activities that fit under the scope of this action are small in scale, and required mitigation measures address fuel handling, and preclude actions in RCAs unless both a hydrologist and fisheries biologist agree that watershed condition indicators (WCIs) can be reasonably expected to improve and that required mitigations are met. Therefore, direct effects to bull trout and indirect effects to habitat will be insignificant.

2) Timber stand improvement would only occur in occupied habitat when NIDGSs are dormant to avoid direct effects. Thinning of overstory may improve the herbaceous component that NIDGSs prefer and provide for corridors to facilitate immigration and emigration. Therefore, effects from this action are expected to be insignificant.

3) Effects to lynx from this action are expected to be insignificant because the majority of mistletoe control and pre-commercial thinning projects on the Forest occur in ponderosa pine and mixed conifer stands and are outside potential lynx habitat. For projects inside of potential lynx habitat, pre-commercial thinning will be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have

eliminated snowshoe hare cover and forage availability during winter conditions with average snow pack).

1.4.3 Fire Management Actions

The fire management proposed action includes application of appropriate measures to control unwanted wildfires as well as activities that strive to meet land management objectives through a combination of management ignited prescribed fire and management of natural ignitions for resource benefit. The latter action is referred to as "Wildland Fire Use." Detailed mitigation measures related to camp locations, helicopter landing sites, operational facility locations, fire line construction, water drafting, invasive species control, fire mop-up, wildland fire use, fire management plans, prescribed fires, fire management in drainages with listed fishes and suppression rehabilitation are described in the Assessment. This consultation only covers activities which meet these criteria.

The Service concurs with your determination that the Fire Management ongoing action may affect, but is not likely to adversely affect the Canada lynx, bull trout, and northern Idaho ground squirrel. Our concurrence is based on the following rationales.

1) Effects to bull trout are considered insignificant because of conservation measures such as screening pumps, not dropping retardant in RCAs or streams, containing fuel, proper handling and use of chemicals, not removing RCA trees unless they present a hazard, and rehabilitating disturbed areas (e.g., fireline, helispots, camps). This action is expected to have only negligible effects due to implementation of mitigation measures and guidelines, continued education of fire personnel, and use of resource advisors.

2) Effects to NIDGSs from this action are expected to be beneficial in part and insignificant in part. Prescribed burning, timed and designed to maintain and promote preferred forage species, will improve habitat for NIDGSs in the long-term. Discretionary fire suppression activities, such as fire camp location, helicopter landing pads, and retardant drops, will not occur in occupied NIDGS habitat. Effects will be considered insignificant assuming that all criteria for NIDGS conservation are met.

3) Effects to lynx from fire activities on the Forest are expected to be insignificant and discountable. Wildfire itself will affect potential lynx habitat but the discretionary action of suppressing the wildfire has few mechanisms of effects to lynx habitat. Felling trees and backburning will only occur in lynx habitat if standards in the LRMP for suitable lynx habitat are met. Because of infrequent historical occurrence of lynx on the Forest, direct disturbance effects from fire related activities are expected to be discountable.

1.4.4 Fish Habitat and Riparian Sampling

The Payette National Forest's LRMP specifies that monitoring of aquatic species and habitats will occur to evaluate implementation of standards and the effectiveness of these standards in achieving WCIs.

Some streams will be surveyed to produce quantitative assessments of fish habitat. Survey methods are similar to those described in Overton et al. (1997), Heitke et al. (2007), and Burton et al. (1992). Habitat surveys involve walking and snorkeling within stream channels, measuring

channel and habitat dimensions and qualities, using stadia rods, measuring tapes, or surface fines grids. Methods to measure substrate composition and quality that may be used include determination of cobble embeddedness, percent surface fines, free matrix measures, and core sampling.

Measurements of cobble embeddedness involves removing cobble-sized rocks from the stream bottom. The cobbles are returned to the site after measurements are taken. Percent surface fines determination is a visual estimate that involves no disturbance other than that caused by the presence of the crews in the stream channel. Determination of free matrix counts involves randomly placing a sampling hoop and counting the number of embedded and nonembedded rocks within the hoop; as with cobble embeddedness, this action requires disturbing all loose rocks within the hoop. Core sampling requires removing from the stream all substrate within the sample, which may be taken from any part of the habitat. Most core samples will be done with a hollow core sampler through some freeze core sampling may occur. Aquatic invertebrate sampling will occur on some streams. Invertebrates will be sampled with a Hess sampler, Surber sampler, or kick nets. Conservation measures such as crew training and redd avoidance are included as part of the proposed action and detailed in the Assessment.

The Service concurs with your determination that the fish sampling ongoing action may affect, but is not likely to adversely affect bull trout. We acknowledge your no effect determinations for NIDGSs and Canada lynx. Our concurrence is based on the following rationale.

1) Bull trout displacements due to personnel presence are judged to be biologically negligible because of the extremely short duration of disturbance. Sediment that is generated due to sampling is expected to settle out within the prescribed buffer distance (one stream width or within one habitat unit of any redd). Buffers are also judged to be effective in eliminating any potential harassment of adjacent fish.

1.4.5 Watershed and Fish Habitat Improvements and Maintenance

These projects include such things as gully stabilization, road obliteration, vegetation and structure placement, using gabions, trees, wooden grids, and soil cementing techniques to stabilize slopes. Structures have been, and will be, placed on slopes that are actively eroding to help stabilize and vegetate these slopes. Structures are generally used in combination with other techniques such as the planting of trees and shrubs, and the use of matting materials. This action includes mining reclamation (less than 10 acres) including re-contouring to restore hydrologic function, clean up of existing facilities and other previously mentioned activities. This action includes the clean up of small toxic spills and dumps. This action does not include clean up when the volume of substance invokes the Clean Water Act, Resource Conservation Act, Comprehensive Environmental Response Compensation and Liability Act or Oil Pollution Act. Emergency consultation will occur if adherence to any of the aforementioned Acts is necessary. Fish habitat improvements include stream/riparian area improvements, woody debris management, stream bank stabilization and vegetation, fine sediment removal, boulder cluster placement, anchored whole-tree revetments, log weirs, and fish barrier removal.

Extensive conservation measures are included as part of the proposed action and are described in the Assessment.

The Service concurs with your determination that the Watershed and Fish Habitat Improvement ongoing action may affect, but is not likely to adversely affect bull trout and northern Idaho

ground squirrel. We acknowledge your no effect determinations for Canada lynx. Our concurrence is based on the following rationales.

1) Conservation measures described in the Assessment will insure that any temporary degrading effects to bull trout or their habitat are negligible. Restrictions on use of mechanized equipment within RCA buffers will insure that any soil, streambank, or streambed disturbance and associated sediment delivery to the stream channel is temporary and minimal so that effects to bull trout are negligible. Furthermore, a journey level fisheries biologist will insure that activities do not proceed if there is potential for more than negligible effects to individual bull trout, or their eggs.

2) Effects from watershed improvement activities on NIDGSs are expected to be insignificant. This action generally occurs in riparian areas outside of known NIDGS habitat, but may occasionally occur in upland areas of less than 10 acres in size or on roadbeds identified for obliteration. Such ground disturbing activities near NIDGS sites must be coordinated with a journey level wildlife biologist to avoid adverse effects.

1.4.6 Noxious Weed Control

This action is described in detail below. Effects of this action on bull trout are expected to be adverse and are addressed in the biological opinion that follows. Effects to NIDGSs and Canada lynx, however, are expected to be insignificant. The Service concurs with your determination that the noxious weed control action may affect, but is not likely to adversely affect Canada lynx and northern Idaho ground squirrel. Our concurrence is based on the following rationales.

1) Control and eradication of noxious weeds will help maintain or improve NIDGS habitat. Of the chemicals proposed for use on the Forest, 2,4-D has the highest potential to directly affect mammals. The Forest is proposing to use 2,4-D only in locations where NIDGSs are not present. Therefore, effects from direct spray of additional herbicides proposed are anticipated to be insignificant. See the Assessment for a thorough discussion of effects from active and inactive herbicide ingredients.

2) Like NIDGSs, control and eradication of noxious weeds will help maintain or improve lynx habitat. Therefore, the Noxious Weed Control program may benefit lynx. Such benefits are expected to be minor due to the low likelihood that lynx occur on the Forest and the small amount of acres treated each year (generally less that a few hundred acres).

3) Effects to lynx are also expected to be insignificantly negative. The chances of small mammal prey of lynx accumulating enough herbicides to affect lynx are insignificant. Based on the analysis of effects of the noxious weed program on NIDGS, it is extremely unlikely that small mammals would concentrate herbicides to any extent to cause 1) harm to the small mammal and 2) result in secondary poisoning of lynx that may prey upon the small mammals.

1.4.7 Outfitters and Guides

The Forest is proposing to authorize one Outfitter Guide Permit in this watershed. Seven Devil's Lodge permits activities include horseback riding, fishing, photographic trips, viewing wildlife,

moving cattle, ranch work, snowmobiling, and cross country skiing. There are no designated campsites. Overnight camping would require Forest Service authorization. Note that the Heaven's Gate permit is discussed in the Little Salmon River Watershed Opinion.

The Service concurs with your determination that authorization of this permit may affect, but is not likely to adversely affect bull trout. We acknowledge your no effect determination for Canada lynx and the NIDGS. The rationale for our concurrence is as follows.

Because mitigation measures avoid negative effects of sediment delivery, riparian disturbance, and pollution, outfitter and guide actions are considered to have negligible effects on bull trout and its habitat.

1.4.8 Grazing

Table 2 below displays allotments in this watershed, the effects determination for each species, and descriptions of the proposed action and effects by reference. Effects of most of the grazing actions in this watershed on NIDGSs are expected to be adverse and are addressed in the biological opinion that follows. Effects to Canada lynx, and bull trout however, are expected to be insignificant. The Service concurs with your determination that the grazing action may affect, but is not likely to adversely affect bull trout and Canada lynx. Our concurrence is based on the following rationales.

1) Livestock grazing was determined to be consistent with the Lynx Conservation Assessment and Strategy (LCAS) if grazing does not impede vegetation moving towards or meeting the desired vegetative status described in the LCAS. On the Forest, management of allotments within Lynx Analysis Units (LAUs) maintains habitat for lynx prey. Specifically, grazing is excluded in timber harvest or fire areas when it would delay successful vegetation regeneration, and grazing is managed to protect riparian areas. In addition, as part of permit administration, permittees are given instructions about the protected status of lynx. Effects to lynx on the Forest from livestock grazing are expected be negligible.

2) Studies on the Forest have shown that in areas where livestock do not have access to spawning habitat, effects from grazing are insignificant. By incorporating utilization standards and rest-rotation systems, reduced sedimentation and streambank protection are achieved. Therefore, effects to bull trout from this action are expected to remain insignificant.

3) The effects of the Mill Creek Cattle and Horse allotment on the NIDGS are considered insignificant because the species is not known to exist within the boundaries of the permitted grazing.

Table 2. Summary of effects determinations for grazing allotments in the Brownlee Reservoir Watershed. Page numbers refer to the Biological Assessment chapters for aquatics (A) or wildlife (W).

Project	Watershed	Determination for			Federal Action Description	Rationale for Effects Determination
		Bull Trout	NIDGSs	Canada Lynx		
Bear Creek C&H	Brownlee	NLAA	LAA	NLAA	A. Vol. 7 (p 53; 56–57); W Vol.2 (p 22; 24–26)	Vol. 7 (p91–92); W Vol. 2 (p54–56)
Lick Creek C&H	Brownlee	NLAA	LAA	NLAA	Vol. 7 (p 53; 56–57); W Vol. 2 (p21–22; 24–26)	Vol. 7 (p88; 91–92); W Vol. 2 (p54–56)
Wildhorse/crooked River C&H	Brownlee	NLAA	LAA	NLAA	Vol. 7 (p 53; 56–57); W Vol. 2 (p 22; 24–26)	Vol. 7 (p93–94); W Vol. 2 (p54–56)
Crooked River on/off C&H	Brownlee	NLAA	LAA	NLAA	Vol. 7 (p 53; 56–57); W Vol. 2 (p 22; 24–26)	Vol. 7 (p93–94); W Vol. 2 (p54–56)
Mill Creek C&H	Brownlee/Weiser	NLAA	NLAA	NLAA	Vol. 7 (p 53; 56–57); W Vol. 2 (p 22; 24–26);	Vol. 7 (p93–94); W Vol. 2 (p54–56)
Smith Mountain S&G	Brownlee	NLAA	LAA	NLAA	Vol. 7 (p 54; 56–57); W Vol. 2 (p 22; 24–26)	Vol. 7 (p88; 91–92); W Vol. 2 (p54–56)
Steves Creek C&H	Brownlee	NE	LAA	NLAA	W Vol. 2 (p23; 24–26)	W Vol. 2 (p54–56)

Note: LAA = Likely to adversely affect; NLAA = Not likely to adversely affect; NE = No effect

1.4.9 Description of Water Diversion Special Use Permits

This action includes the administration of existing permits allowing operation, maintenance, and repair of existing water diversions for domestic, irrigation, and hydroelectric purposes. Table 3 below summarizes the water special use permits (SUPs) in this watershed. All water diversion actions in this watershed are expected to have insignificant effects on species listed under the Act.

Table 3. A description of the proposed water special use permits in the Brownlee Reservoir Watershed

Permit Holder/status	Effects Determination	Stream	Location	Purpose	Amount
Hedges	NLAA	Dick Ross Creek	T18N, R03W, Section 14, T18N, R03W, Section 23	domestic	0.05 cfs
Green	NLAA	Indian Creek	T20N, R03W, Section 10	Domestic,	0.03 cfs

Note: LAA = Likely to adversely affect; NLAA = Not likely to adversely affect; NE = No effect

Hedges domestic water SUP takes water from a developed spring and transports it 2500 feet to private users through a 2-inch pipe. The water right allows for up to 0.05 cubic feet per (cfs) second to be diverted. The spring is a tributary to Dick Ross Creek, which is a tributary to Crooked River where bull trout have been found. A few bull trout were found below the confluence of Dick Ross Creek, but none within Dick Ross Creek itself. Basic maintenance of the development would occur.

Green domestic water SUP takes water from a developed spring in and transports it 500 feet to private land through 4-inch and 1½ -inch pipes. The water right allows for up to 0.03 cfs to be diverted. The spring is a tributary to Hitchcock Gulch, which is a tributary to Indian Creek where bull trout have been found. Bull trout have been found upstream, about four miles above Hitchcock Gulch, but could be using this area as a migration route. Basic maintenance of the development would occur.

The Service concurs with your determination that the water special use permits described above may affect, but are not likely to adversely affect bull trout. We acknowledge your no effect determinations for other species listed under the Act for this action. Our concurrence for bull trout is based on the following rationales.

1) The chances of direct disturbance of bull trout due to entrainment are considered insignificant because all pipes and/or ditches are screened with 3/32 inch mesh. This screening has been shown to mitigate effects to salmonids and it is assumed that the same applies to bull trout. In addition, bull trout are not present in some of the diverted streams.

2) The existence, maintenance, and/or reconstruction of diversion equipment could cause erosion of streambanks due to ground disturbance. Erosion could also occur due to leakage or washout of diversion equipment. The streambank erosion could result in sediment deposition downstream of diversions. However, these effects are reduced by requirements for erosion control during maintenance and construction of diversion equipment, and for diversions being maintained in proper working order. The action as described only authorizes hand-maintenance (i.e., no use of equipment is being proposed).

3) Another potential effect is the reduction of habitat area for bull trout and eggs due to removal of water from affected streams. For bull trout, modeled (see the Assessment) effects are expected to be negligible because the amount of flow withdrawn by

diversions is negligible, compared to the amount of water and habitat in the affected stream.

1.4.10 Travel Plan, Road Management, and Trail and Administrative Site Operations

This action is described in detail below. Effects of this action on bull trout and NIDGSs are expected to be adverse and are addressed in the biological opinion that follows. Effects to Canada lynx, however, are expected to be insignificant. The Service concurs with your determination that the Travel Plan may affect, but is not likely to adversely affect the Canada lynx in this watershed. Our concurrence is based on the following rationales.

1) Effects to lynx from winter travel and recreation are well documented, but no winter travel changes are being implemented with this action (i.e., no section 7 coverage is being provided for winter travel through this consultation).
2) Construction of new roads in lynx habitat is not being proposed in this watershed.
3) All other potential effects to lynx in this watershed through authorization of travel management (e.g., road-side brushing, fragmentation, or vehicular collisions) are considered insignificant or discountable.

1.4.11 Power and Communication Lines

This action includes maintenance of existing electric power and telecommunication lines across Forest lands in the watershed. They are Cuprum-Bear Underground , Big Bar-Silver King, McCall-Oxbow, and Cuprum-Bear Exchange. When the power and telephone lines were installed, all trees along the easements were removed to prevent blow-downs from affecting the wires. Periodic maintenance, which now occurs, involves mowing in order to prevent tree growth. This action does not include development of new power or communication lines.

The Service concurs with your determination that maintenance of the power and communication lines described above may affect, but is not likely to adversely affect bull trout, the NIDGS and Canada lynx. Our concurrence for Canada lynx, bull trout, and NIDGSs is based on the following rationales.

1) Maintenance of existing power and telephone lines may include ground disturbing activities, but any performed near NIDGS sites will be coordinated with a Forest wildlife biologist to avoid adverse effects. Because the power line maintenance roads and underground cable routes were likely not surveyed for NIDGS at the time of construction, field surveys may be required to determine the presence of NIDGS in the activity area.
2) This action has the potential to have minimal effects on lynx habitat through brush and vegetation removal in powerline corridors. Because this action does not include development of new corridors, maintenance will have negligible effects on lynx habitat compared to the current, baseline conditions.
3) Negligible sediment effects on bull trout or its habitat are expected because falling trees and brushing powerline corridors will yield little ground disturbance to riparian conservation areas.

2.0 BIOLOGICAL OPINION

2.1 Purpose and Organization of this Biological Opinion

Because the Forest has determined that its proposal to continue several ongoing actions in the Brownlee Reservoir watershed is likely to adversely affect the threatened bull trout and northern Idaho ground squirrel, the Forest requested formal consultation with the Service. Formal consultation culminates in the Service issuing a Biological Opinion as to whether the proposed actions are likely to jeopardize the continued existence of the subject listed species. The requirement for all Federal actions to avoid jeopardy is described in section 7(a)(2) of the Act. The regulatory definition of jeopardy and a description of the formal consultation process is provided at 50 CFR[1] 402.02 and 402.14, respectively.

The jeopardy analysis relies on the following four components: (1) the *Status of the Species*, which in this case evaluates the two species' range-wide conditions, the factors responsible for those conditions, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the bull trout and the NIDGS in the action area, the factors responsible for those conditions, and the role of the action area in the species' survival and recovery; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal actions and the effects of any interrelated or interdependent activities on the bull trout and northern Idaho ground squirrel; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with the implementing regulations for section 7 and Service policy, the jeopardy determination is made in the following manner: the effects of the proposed Federal action are evaluated with the aggregate effects of everything that has led to the species' current status and, for non-Federal activities in the action area, those actions likely to affect the species in the future, to determine if, given the aggregate of all of these effects, implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the bull trout and NIDGS in the wild.

If during the analysis, the Service finds that the action is not likely to jeopardize the bull trout or NIDGS but anticipates that it is likely to cause incidental take of the species, then the Service must identify that take and exempt it from the prohibitions against such take under section 9 of the Act through an Incidental Take Statement.

To assist the reader in understanding how this Biological Opinion is organized, a list of section headings and a brief explanation of their content is presented below.

2.2 Description of the Proposed Action: describes what action(s) the Federal agency proposes to undertake.

2.3 Status of the Species: describes the legal status and general information about NIDGS and bull trout life history and condition at the rangewide scale.

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1 CFR represents the Code of Federal Regulations which is a codification of the general and permanent rules published in the Federal Register by Executive departments and agencies of the Federal Government. It is published by the Office of the Federal Register National Archives and Records Administration. More information can be found at http://www.gpoaccess.gov/cfr/index.html (Last Accessed 11/19/2008).

2.4 Environmental Baseline: describes the environmental setting, historical impact of past actions and condition of the species at the action area scale.

2.5 Effects of the Actions: describes how each of the proposed actions is likely to impact the bull trout and NIDGS for the proposed Travel Plan, noxious weeds action, and grazing.

2.6 Cumulative Effects: describes the effects of future, non-Federal actions likely to occur in the action area.

2.7 Conclusion: contains the Service's conclusion as to whether the effects of the proposed Federal actions, taken together with any cumulative effects, are likely to jeopardize the bull trout.

2.8 Incidental Take Statement for the travel plan, noxious weeds, and grazing actions, respectively: discusses the amount or extent of any anticipated incidental take of the bull trout and the NIDGS likely to be caused by this proposed action and any non-discretionary reasonable and prudent measures that may be necessary to minimize the impacts of that taking.

2.9 Reporting Requirements: identifies verbal and written reporting requirements from the Forest.

2.10 Conservation Recommendations: identifies the Services' non-binding suggestions to minimize or avoid adverse effects of a proposed action, develop new information on listed or proposed species or how the agency can assist species conservation.

2.11 Reinitiation Notice: outlines four general conditions that can trigger the need for the action agency to reconsult on the action considered in the biological opinion.

3.0 Literature Cited: identifies the scientific or commercial data used in the development of the biological opinion.

2.2 Description of Proposed Actions

2.2.1 Travel Plan, Road Management, and Trail and Administrative Site Operations

The three discrete actions of the Travel Plan, Road Management, and Trail and Administrative Site Operation are all interrelated to each other and combined in this Opinion and in the aquatics portion of the Assessment. It is too difficult and in many cases, redundant, to analyze these actions separately because of the inherent overlap, even for wildlife species. The project description, combined effects, and incidental take statement for these three actions is below. It should also be noted that the project description and associated quantitative details below represent the proposed action on the entire Forest. At this time, we have incomplete information to describe this action at the watershed level. However, any of these activities described below could occur in this watershed, and regardless of whether there is significant or minimal road-related management in the Brownlee Reservoir Watershed, the range of the proposed action across the Forest is proportional to the conditions on the ground (i.e., in watersheds with fewer roads and trails, less action will occur on the ground compared to watersheds with more roads and trails)

2.2.1.1 Travel Plan

The proposed action would revise the current Travel Management Plan (see Table 4) by designating a site-specific travel system for snow-free (summer) travel on the Payette National Forest.

The travel system for summer would include:

- 1,121 miles of open designated National Forest Service (NFS) roads
- 498 miles of seasonally open designated NFS roads
- 100 miles of NFS trail open to ATVs (All Terrain Vehicles)
- 8.8 miles of NFS trail open to OHVs (Off-Highway Vehicles)
- 539 miles of NFS trail open to 2-wheel motorized use
- 520 miles of NFS trail open to non-motorized travel

Table 4. Comparison of existing and proposed travel opportunities on the Payette National Forest

	Existing Conditions	Proposed Action
Motorized cross-country travel (acres)	510,930	0
Two-wheel motorized trail (miles)	589	539
ATV trail (miles)	75	100
OHV trail (miles)	2.8	8.8
Non-motorized trail (miles)	505	520
NFS open road (miles)	1,132	1,121
NFS seasonally open road (miles)	502	498

Designated roads (open and seasonally open) available for full size vehicles will decrease by approximately 14.5 miles across the Forest. All unauthorized/non-designated roads will be restricted to non-motorized travel, and they will remain on the landscape pending formal plans to convert or decommission them. No areas will be open to cross-country motor vehicle use, but limited motorized access for dispersed camping will be permissible within 300 feet of designated roads and 100 feet of designated motorized trails as long as it does not result in resource damage. Exceptions to this include the Krassel Ranger District, the Lake Creek corridor on the McCall Ranger District, areas where camping access is limited due to topography and cultural resources protection needs, and across the Forest in occupied NIDGS habitat. These locations only allow use in designated areas; all other areas off designated roads are closed to motorized use. See Figures 1 and 2 for a depiction of all designated roads and trails on the Forest.

Summer motorized travel will be limited to designated roads, trails, and dispersed camping and trailhead parking areas. This is a change from activities that were permitted during the 2001 consultation because many parts of the Forest were open to cross-country motorized travel. Travel on foot and riding horses is permitted Forest-wide. Mountain bike access will continue to be permitted Forest-wide except in the Frank Church River of No Return Wilderness.

Motorized use on roads and trails is limited to those so designated by the Forest and for 300 and 100 feet, respectively, off the travel-way in order to facilitate camping. Under this proposed action, degradation of some watersheds would occur in the long term because of anticipated increases in motorized use on roads and trails over time. The proposal is consistent with the

Forest Plan because activities (such as closure of areas to cross-country motor vehicle use) would reduce the rate of degradation over current conditions. The proposed action makes no direct changes to travel by horse or foot, but such travel will likely decrease in those areas where trails are not receiving maintenance and becoming overgrown. Off-road or off-trail use of motorized vehicles has changed substantially with this proposal. Site specific changes that are proposed with this action are detailed in the Final Environmental Impact Statement (FEIS) and the Assessment.

In addition to revision of the Travel Plan for designated roads and trails, as described in the Travel Plan FEIS, the action as described in the Assessment includes the ongoing activity of dispersed recreation during snow-free seasons. Hiking, bird watching, fishing, berry picking, hunting, and camping are just a few of the many types of dispersed recreation activities that occur on the Payette National Forest. The vast majority of these activities occur within a short distance of existing roads and trails and during snow-free times of year. Winter camping, snowmobiling, backcountry skiing, and snowshoeing are types of activities that occur when snow is present, but only the winter travel activity of over-snow motor vehicle use (i.e., snowmobiling) is specifically addressed in the Travel Plan FEIS. The winter travel activity of over-snow motor vehicle use will be analyzed using a separate consultation process and document. No Record of Decision (ROD) for winter travel will be issued until this separate consultation process is completed.

The interdependent actions of "Road Management" and "Trails, Recreation, and Administrative Site Operation and Maintenance" reduce effects of authorizing travel on roads and trails on the Forest; see the description of those activities (analyzed as part of this proposed action) and their effects below. The Travel Plan action has specific mitigation measures and Project Design Features including Best Management Practices (BMPs), standard operating procedures, identified design features, and Forest Plan Management Requirements that must be included to protect listed species. This action has the following features in the Brownlee Reservoir watershed incorporated in the action as project design features.

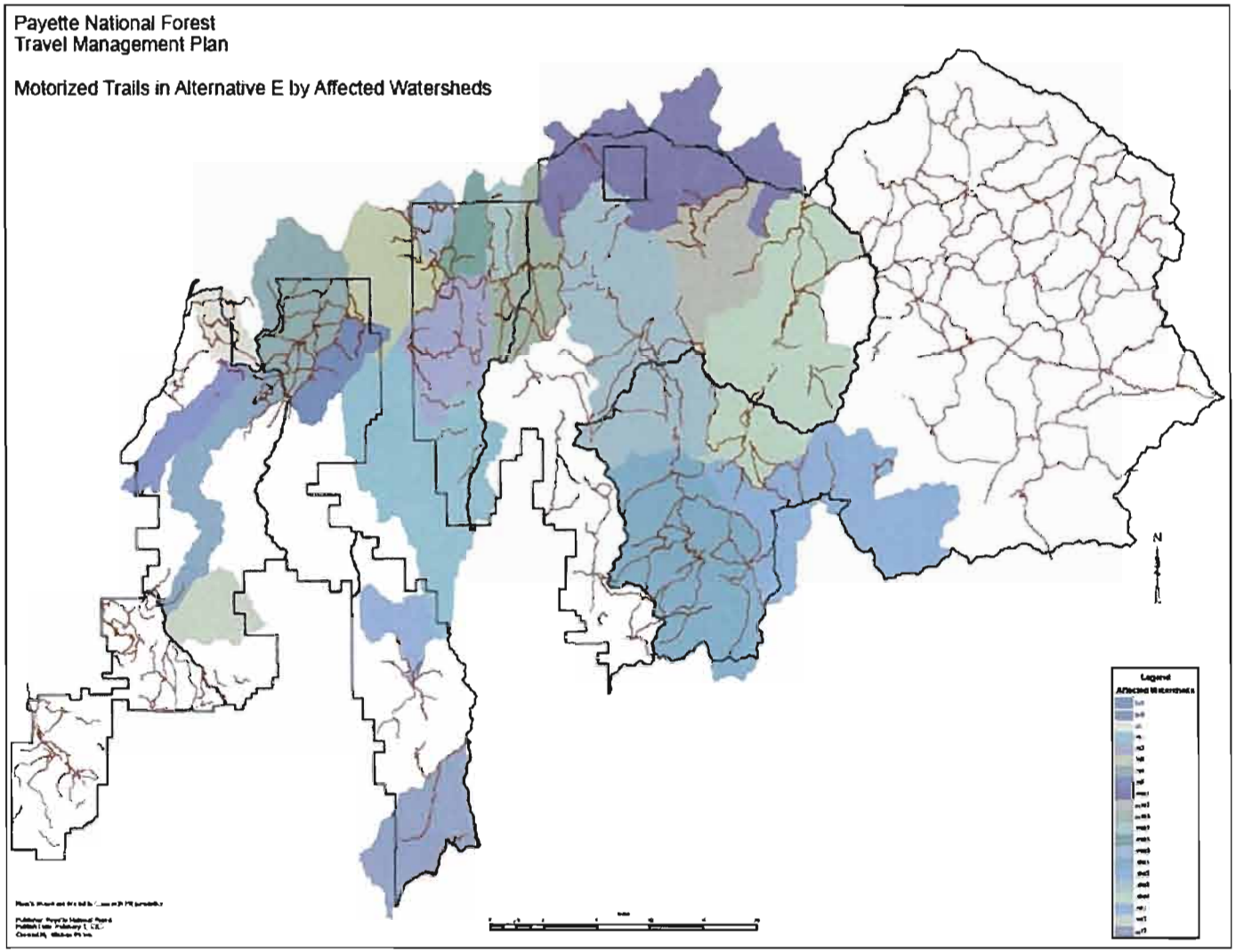

Figure 1. Trails under Payette National Forest jurisdiction with motorized use

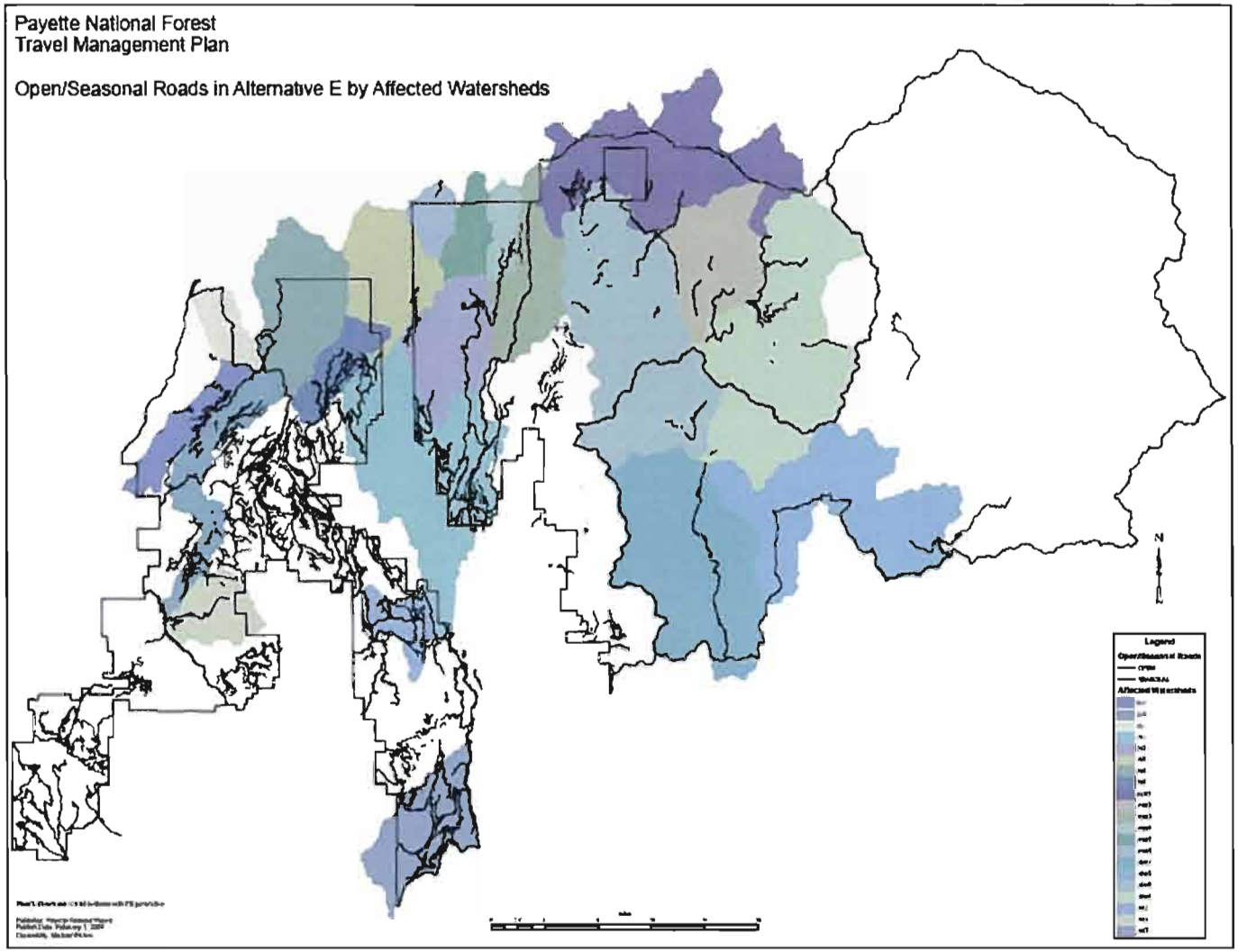

Figure 2. Roads under Payette National Forest jurisdiction with motorized use

2.2.1.1.1 Project Design Features

- The Forest would continue to support programs and publications that provide information, education, and training on travel access.
- The Forest would follow national direction for signing and maps. The Forest plans to follow a standard national format for motor vehicle use maps. These maps will be available at local Forest Service offices and, as soon as practicable, on Forest Service web sites. The Forest plans to issue additional travel management guidance in its sign standards handbook to ensure consistent messages and use of standard interagency symbols.
- Before a new or reconstructed route is made available for use a hydrologist or soil scientist would complete an ATV Trail Condition Assessment to identify problems and to establish a baseline for future monitoring.
- Trails will be rerouted where water management structures cannot function or be properly maintained, or where trails cross soils and sites poorly suited for motorized use.
- Abandoned trails will be physically closed. In addition, installation of water management structures, de-compacting the abandoned travelway, and pulling of available slash onto the abandoned trail will all occur.
- Construct and maintain water management features (such as waterbars, grade dips, rolling dips, culverts, sheet drains, check dams, ditches or bridges) as determined by a hydrologist and /or fisheries biologist.
- When rerouting of a poorly located trail is not feasible, improve the trail surfaces so they will support use without unacceptable resource impacts. Improvement techniques include replacing or capping unsuitable soils including fills with geotextiles, gravel, corduroy, wood matrix, puncheon, porous pavement panels, or matting.
- Include measures to prevent the spread of noxious weeds such as: uses of weed-free gravel or soil, use of weed-free hay or straw, and prompt re-vegetation of areas of disturbed soil.

Specific mitigation measures for wildlife were added to this action in the project description in the Assessment. These include the following.

- No off-road travel (including travel to dispersed campsites) will be allowed in occupied NIDGS habitat.
- NIDGS sites will be monitored for illegal off-road travel and, if necessary, these sites will be closed by barricades, fences, or by other means to reduce potential negative impacts to NIDGS habitat.
- The Level 1 Team and NIDGS technical team will work together to identify opportunities to close and/or relocate NFS roads that occur in or adjacent to occupied NIDGS sites.
- Information signs will be posted along roads that occur in or adjacent to occupied NIDGS sites to caution the public to drive slowly and avoid impacting NIDGS (note that this is superseded by the terms and conditions below).

- Manage recreational activities to maintain lynx habitat and connectivity (LRMP TEOB30).
- Over the next few years, Forest wildlife biologists will analyze the projected main wildlife travel corridors and propose actions, if necessary, to promote their viability for use for lynx, wolverine, and other forest carnivores.

2.2.1.2 Road Management

Road management has several major components including, road maintenance, administration of easements, rights of way and permits, and physical closures of various types related to reducing resource impacts. Road maintenance that is part of mining operating plans is the sole road maintenance activity that is not part of this federal action; operating plans require separate consultation where they may affect listed species and/or critical habitat. Road management and the travel plan Federal action are interdependent actions; therefore, they will be discussed collectively in this Opinion. Maintenance can be summarized as routine road surface blading, culvert repair and cleaning, brushing on roadways (top of the cut to the bottom of the fill) and road ditch cleaning.

Road maintenance includes replacing existing facilities (e.g. road, culvert, bridge, retaining wall, etc.) and resurfacing roads with pre-existing materials. Culvert or bridge replacement activities are not included in the effects discussion of this Opinion because those with resource benefits are covered under the Forest Service's Region 4, Stream Crossing Structure Replacement Programmatic and associated Service Opinion (Reference# 2006-F-0206). New culverts or bridges and new road construction will require separate consultation. Road surfaces may be upgraded to reduce erosion and sedimentation so long as cut and fill-slopes are not enlarged or disturbed; for example, a native surface road may be upgraded to pit-run gravel, crushed aggregate or asphalt. This action includes replacement of facilities normally maintained by the Forest where they are obliterated (severely damaged, or eroded) for up to 500 feet of full prism by flood, fire or other "acts of God" if a journey level fisheries biologist agrees that the effects are within the scope of this Opinion. However, most repairs due to "acts of God" will fall under emergency consultation. Within funding constraints, the maintenance level assigned to a road dictates the frequency and extent of maintenance work performed on a particular road, or section of road. Roads assigned a higher maintenance level are traveled more often and therefore are maintained more frequently (for further detail refer to the Assessment). Maintenance levels also provide a way to classify Forest roads according to their assigned use, so that the road will perform as planned. A description of the various road maintenance levels is provided in the Assessment. Routine road maintenance activities, snow plowing, and road dust abatement will be conducted to prevent resource damage. Road plowing will follow standards described in the Land and Resource Management Plan. These standards are designed to reduce the potential for damage to the road from snow plowing activities and thereby reduce sediment delivery to streams.

Maps indicating maintenance levels of Forest roads can also be found in the Assessment. The maps depict the most current information available, but could be subject to adaptive management.

Road maintenance includes any activity that takes place on an existing classified or unclassified road for the expressed purpose of maintaining the road or road system in a safe and properly

functioning condition for the user and level of use identified by the road use objective and maintenance level. This activity would be further defined by the following sub-categories.

2.2.1.2.1 Rote or Routine Road Maintenance

Examples include, anticipated/planned maintenance on a repeated/yearly basis, such as surface blading, brushing, culvert and bridge clearing, cleaning and repair, surface clearing, and deadfall removal. Slide and slough removal, ditch clearing and cleaning, and rock raking, and dust abatement applications may occur.

2.2.1.2.2 Normal or Frequent Road Maintenance

Examples in this category of road maintenance include, road resurfacing, gravel placement (new or resurface), and infrequent (not annual) pavement patching and sealing. Culvert installations, including replacements, upgrades, and extensions can occur under this category of road maintenance, and, as mentioned above, are covered under the Forest's Stream Crossing Programmatic consultation (note that new installations are not covered).

2.2.1.2.3 Extreme or Very Infrequent Road Maintenance

An example of very infrequent road maintenance is road re-alignments. Realignment is defined as road maintenance because the road exists and is part of an existing road system, and the local road network accesses a portion of the Forest maintaining the system's function. Road re-alignment could occur if the Ranger, through the input of fisheries biologists, hydrologists, and others, has determined that listed species or designated critical habitat would benefit by road re-alignment, and biologists have determined effects of the activity are within the scope of this Opinion.

The Assessment details myriad conservation measures, included as part of the action to protect both fish and wildlife resources on the Forest.

2.2.1.3 Trails, Recreation, and Administrative Site Operation and Maintenance

Operation and maintenance of recreation and administrative facilities on the Payette National Forest would include the following activities.

1. Administrative Facilities—Operation, maintenance and repair of the administrative facilities includes hazard tree removal, water system repair, structural repair of fences, structural repair of buildings and barns, painting, and maintaining current septic systems. This action would also include the replacement, maintenance, improvement, and installation of structures at recreation and administrative sites such as outhouses, fences, water tanks, signs, septic systems, parking areas, etc. for the purposes of maintaining site function, to serve site users, and to provide for user's health and safety and for resource protection, etc.
2. Airstrips—Leveling, smoothing, removing surface hazards, protecting surface from erosion, watering, mowing, raking rocks, applying fill dirt, re-seeding, and felling of encroaching trees will all occur on Forest airstrips.
3. Trails—This activity includes conducting trail maintenance on National Forest Systems trails to keep them in a condition suitable for use and to minimize resource impacts (Table 5). Trail characteristics and use levels vary with the location and destination of the trail. Maintenance on these trails is performed after maintenance

needs have been identified from condition and prescription surveys and an Annual Maintenance Plan is developed (within funding constraints).

Table 5. Trail maintenance activities (Forest Service Handbook 2309.18)

Activity	Level of Maintenance	Concern
Loose rock removal	Routine	Tread maintenance
Rock & root removal	Routine	Tread maintenance
Slough & berm removal	Routine, intense	Tread erosion water management
Slide maintenance	Routine, intense	Tread erosion slope stabilization
Borrow (fill)	Routine, intense	Tread maintenance
Drainage maintenance	Routine, intense	Erosion
Maintain waterbars	Routine, intense	Erosion
Maintain culverts	Routine, intense	Erosion
Maintain stream fords	Routine, intense	Erosion
Maintain gully crossings	Routine, intense	Erosion
Maintain drainage dips	Routine, intense	Erosion
Fallen tree removal	Routine	Trailway
Brush cutting	Routine	Trailway
Slope re-vegetation	Intense	Trailway, erosion
Maintain rock/log retaining wall/barriers	Intense	Erosion, trailway,structure maintenance
Construct rock/lock retaining wall or barrier	Intense	Erosion, trailway, structure maintenance
Bridge maintenance	Intense	Erosion, structure maintenance

Details of activities included in the trail maintenance program can be found in the Assessment. Details of conservation measures, included as part of the action, to protect listed species can also be found in the Assessment and are summarized below.

2.2.1.4 General Conservation measures

- Ground disturbing activities within LRMP RCAs will be fully mitigated by applying a "high" level of soil erosion mitigation measures which can include water control devices such as silt fence or straw bales, erosion control matting, seed, mulch, fertilizer and placement of woody debris.
- Both a journey level hydrologist and fisheries biologist must agree with the decision to replace or relocate more than 500 feet of trail if the action has the potential to affect stream channels at the new location.
- Seeding will be done with certified weed free native seed mixes.
- Bridge construction or other ground disturbing activities will all follow the Region 4 Stream Crossing Programmatic guidance (Reference# 2006-F-0206).
- Planned trail, recreation and administrative site work will be presented to the level one team annually.
- All treated wood used shall be produced and used in compliance with "Best Management Practices for the use of wood in aquatic and other sensitive environments."
- Maintenance and new ground disturbing activities near NIDGS sites will be coordinated with a journey level wildlife biologist. New disturbance will not occur if disturbance to NIDGS is anticipated.

2.2.2 Noxious Weed Control

This action covers all activities involved with the noxious weed management program. Noxious weed management activities include herbicide application, mechanical controls (e.g., hand pulling or digging), biological treatments, and rehabilitation (i.e. seeding, plantings). Herbicide treatment occurs annually from April through September. The noxious weed management activities on the Forest include: awareness/education, prevention/early detection, inventory, an array of weed treatment practices, monitoring, and rehabilitation. Noxious weed management measures depend on the area being considered and the particular weed situation; management objectives may range from containment to control and eventually to eradication. Introduced noxious weeds and non-native species are found in many plant community types and at many locations. Weed management efforts may be necessary on rangelands, in timber harvest areas, along roads and road rights-of-way, along trail routes, at dispersed recreation sites, on developed recreation sites, and at other disturbed sites (i.e. fires, flood events). Noxious weeds are plant species that have been designated "noxious" by law. In addition to noxious weeds, additional plant species may be identified and treated over the course of the consultation. The word "noxious" simply means deleterious by definition. Examples of noxious weeds and other weedy species that may require control measures within the analysis area are (**bold** indicates priority target species for the Forest):

- **Hoary Cress** (whitetop) ***Cardaria draba***
- Musk Thistle *Cardus nutans*
- Canada Thistle *Cirsium arvense*
- **Diffuse Knapweed *Centaurea diffusa***
- **Spotted Knapweed *Centaurea maculosa beibersteinii***
- **Yellow Starthistle *Centaurea solsititialis***
- **Rush Skeletonweed *Chondrilla juncea***
- Field Bindweed *Convolvulus arvensis*
- **Leafy Spurge *Euphorbia esula***
- Dyers Woad *Isatis tinctoria*
- Perennial Pepperweed *Lepidium latifolium*
- **Dalmation Toadflax *Linaria genistifolia***
- Yellow Toadflax *Linaria vulgaris*
- Purple Loosestrife *Lythrum salicaria*
- **Scotch Thistle *Onopordum acanthium***
- Tansy Ragwort *Senecia jacobaea*
- Johnsongrass *Sorghum halepense*
- Chicory *Cichorium intybus*

- Hound's Tongue *Cynoglossum officianale*
- St. John's Wort *Hypericum perforatum*
- Sulfur Cinquefoil *Potentilla recta*
- Mediterranean Sage *Salvia aethiopis*
- Medusahead Rye *Taeiathrum caput-medusae*
- Common Tansy *Tanacetum vulgare*

The noxious weed program on Forest Service lands is based on weed management objectives and priorities that are influenced by weed infestations and site susceptibility. These criteria provide focus and direction for the noxious weed program and allow for site specific and adaptive decision-making. Table 6 identifies the objective and priority system used on Forest lands, and Table 7 displays the Forest's proposed acres to be treated with each weed treatment method. The intent of containment is to prevent the spread of the weed beyond the existing infestation perimeter. The control objective is to reduce the infestation through time; some level of infestation may be tolerated. The eradication objective is total elimination of all weeds.

Table 6. Weed treatment prioritization and objectives used for noxious weed control on Forest Service lands

Operational Objectives	Operational Priorities
Eradicate: The weed is treated to the extent that no viable seed is produced over the entire infestation and all plants (above ground portions) have been eliminated during the current field season. **Control:** Portions of the infestation or outbreak are treated to the extent that overall infestation area diminishes because no viable seed is produced and/or plants have been eliminated. **Contain:** Portions of the infestations are treated to the extent that the weed is not expanding beyond the established treatment zones. The main body of the infestations may be left untreated. **Reduce:** The infestation is treated to the extent that densities and/or rate of spread are reduced to an acceptable level.	**Critical:** This category includes urgent actions due to a combination of outside funds and/or invasive weeds found in susceptible and relatively intact habitats. **High:** This category includes important actions associated with outbreaks of invasive weeds along key spread-vectors and/or linked to a combination of treatment strategies. **Moderate**: Moderately important actions are included in this category and are associated with invasive weeds in somewhat susceptible but disturbed habitats. **Low:** This category includes actions associated with non-invasive weeds or in areas of low susceptibility where rapid spread is unlikely. These infestations may not need immediate (current year) attention.

Table 7. Annual noxious weed control program for the Payette National Forest (includes Wilderness)

Type of Noxious Weed Control Activity	Acres
Mechanical/Manual Control	5–25 (about 5 acres per watershed)
Biological Control No. Site Releases	0–5
Chemical Ground Based Application	100–1000 (100–500 per watershed)
Restoration, Seedings, and Plantings	0–200 (about 10 acres per watershed)
Cooperative Weed Management Areas	4

2.2.2.1 Control Methods

All vegetation treatments conducted for control of noxious weeds are done in accordance with established Forest policy, regulations, and product labels. Forest policy requires the use of specific design features when in close proximity to sensitive areas to insure vegetation treatments do not have an adverse impact on non-target plants or animals. For example, design features for herbicide application include: use of aquatic-approved herbicide where there is a probability that the herbicide may enter the water; buffers adjacent to live waters; and spot-spraying or manual control only of target species in sensitive areas (see Effects section and "Required Mitigation", below).

2.2.2.1.1 Chemical Control

Generally, less than 200 acres will be annually treated with herbicide in the Brownlee Reservoir watershed although areas of weed infestation are much greater. Herbicide treatments would be conducted in accordance with Forest procedures described in the Assessment. The chemicals can be applied by many different methods (see below), and the selected technique depends on a number of variables, including: 1) the treatment objective (removal or reduction); 2) the accessibility, topography, and size of the treatment area; 3) the characteristics of the target species and the desired vegetation; 4) the location of sensitive areas in the immediate vicinity (potential environmental impacts); 5) the anticipated costs and equipment limitations; and 6) the meteorological and vegetative conditions of the treatment area at the time of treatment. Herbicide applications are scheduled and designed to minimize potential impacts to non-target plants and animals, while remaining consistent with the objectives of the vegetation treatment program. The rates of application (i.e., pounds of active ingredient per acre) depend on the target species, the presence and condition of non-target vegetation, soil type, depth to the water table, presence of other water sources, riparian areas, special status plants, and the requirements of the herbicide label. The majority of treatments will be in travel corridors.

Herbicides that could potentially be used that are approved by the Forest, have completed risk assessments, and are Environmental Protection Agency (EPA)-registered and approved, include the following: 2,4-D amine (Weedar® 64, Amine 4); glyphosate (Rodeo®); picloram (Tordon™); clopyralid (Transline®); metsulfuron methyl (Escort®); dicamba (Banvel®); and imazapic (Plateau®). These herbicides, further described in the following text (including application rates in Table 8), would be the primary chemicals used in the Federal action of treating weeds through herbicide application. The Forest will continue to evaluate new chemicals and amend this consultation to include them where they meet the following conditions: 1) any chemicals appearing on the Forest Service's list of herbicides approved for use on National Forests; and 2) any new or updated chemicals, registered and approved by the EPA, added to the Forest Service's list of herbicides approved for use, and accompanied by complete risk assessments.

Selection of an herbicide for site-specific application would depend on its chemical effectiveness on a particular weed species, success in previous similar applications, habitat types, soil types, proximity of the weed infestation to water, and the presence or absence of listed fish species. All herbicide applications would follow label instructions, specifications, and precautions as well as applicable Forest Service policy. Characteristics and properties of herbicides are discussed further below.

Table 8. Common herbicides used by the Payette National Forest, trade name, and typical application rates

Common Name	Trade Name	Typical Rates
Clopyralid	Transline®	0.1–0.5 lb/ac
Picloram	Tordon™	0.25–1.0 lb/ac
Glyphosate	Rodeo®, Roundup®, Accord®	0.5–2.0 lb/ac
Metsulfuron Methyl	Escort®	0.5–2.0 oz/ac
2,4–D	Amine 4, Weedar®	64 0.5–2.0 lb/ac
Dicamba	Banvel®	0.25–4.0 lb/ac
Imazapic	Plateau®	0.06–0.75 lb/ac

Carriers, Dyes, and Adjuvants

Carriers are gases, solids, or liquids used to dilute or suspend herbicides during application and allow for proper placement of the herbicide, whether it is to the soil or on foliage. Water is the only carrier that is proposed for use and addressed in this document.

Non-hazardous indicator dye will be used with herbicides. The presence of dye makes it easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked. Dye makes it easier to detect missed spots and to avoid spraying a plant or area more than once. Adjuvants are not being proposed for use within this watershed.

Application Methods

Ground-based application for treatment of noxious weed infested areas would utilize vehicle-mounted or ATV sprayers (spot-gun) (most common method); spot-spraying with hand-held spray nozzles either mounted on a vehicle (slip tank) or attached to a backpack system (very common method); hand-spreading granular formulations (least common method); and wicking, wiping, dripping, painting, or injecting target weeds (uncommon method). All application methods may be used for each herbicide and herbicide combination. Most of the herbicides that may be used are liquid formulations applied to the foliage of the target vegetation, although soils also may be a major receptor for these chemicals. Only herbicides approved for use adjacent to water bodies (glyphosate - Rodeo®) will be used within 50 feet of streams and wetlands.

Included Conservation Measures

- The Forest would have a certified herbicide applicator overseeing all spray projects.
- A spill cleanup kit would be available whenever herbicides are transported or stored.
- A spill contingency plan would be developed prior to all herbicide applications. Individuals involved in herbicide handling or application would be instructed on the spill contingency plan and spill control, containment, and cleanup procedures.
- Herbicide applications would only treat the minimum area necessary for the control of noxious weeds.
- Trained personnel would monitor weather conditions at spray sites during application.
- All herbicide labels would be strictly enforced.
- No spraying would occur when wind velocity exceeds 8 miles per hour (mph).

- No spraying would occur if precipitation is occurring or is imminent (within 3 hours) (this measure is considered to be effective at reducing herbicide delivery from ditches into streams).
- No carrier other than water would be used in sub-watersheds occupied by bull trout.
- No use of 2,4-D ester formulations would be authorized.
- The Weed Coordinator will map and identify buffers, methods of application, and herbicide restrictions that may be required for the project, and will make a pre-project review of all spray projects to provide to the Level 1 Team by April 1, annually.
- Equipment would be designed to deliver a median droplet diameter of 200- to 800-microns. This droplet size is large enough to avoid excessive drift while providing adequate coverage of target vegetation.
- Equipment used for transportation, storage, or application of chemicals shall be maintained in a leak proof condition.
- All vehicles carrying herbicides shall have a standard spill kit.
- No herbicide storage, mixing or post-application cleaning would be authorized within RCAs (100 feet of any live waters). Mixing and loading operations must take place in an area where an accidental spill would not contaminate a stream or body of water before it could be contained.
- Only very low risk, or "aquatic-approved" chemicals (glyphosate-Rodeo®) could be used within 50 feet of open water, where riparian or hydrophilic plants are present, and/or where surface material is obvious recent deposition of sediment of any diameter(s), and these would be applied with hand spraying or wiping only.
- No more than one application of picloram would be made on a given site in any given year to reduce the potential for picloram accumulation in the soil.
- Manual control (e.g. hand pulling, grubbing, cutting, etc.) is authorized in all areas, and may be used in sensitive areas to avoid adverse effects to non-target species or water quality. All noxious weed disposals would be in accord with proper disposal methods. Noxious weeds that have developed seeds would be bagged and burned.
- Only the amount of herbicides that are planned to be used daily would be transported in vehicles.
- Equip drafting equipment for filling spray tanks with back siphoning prevention devices.
- Non-hazardous indicator dye is required to be used with herbicides based on direction from the NMFS BO (2007). The presence of dye makes it easier to see where the herbicide has been applied and where or whether it has dripped, spilled, or leaked. Dye makes it easier to detect missed spots and to avoid spraying a plant or area more than once.

Spill Plan

Procedures for mixing, loading, and disposing of herbicides will comply with Forest Manual guidance. The following procedures for mixing, loading, and disposal of herbicides and spill prevention plan will accompany all herbicide spraying operations:

- All mixing of herbicides will occur at least 100 feet from surface waters or wellheads.
- All hoses used to add dilution water to spray containers will be equipped with a device to prevent back-siphoning.
- Applicators will mix only those quantities of herbicides that can be reasonably used in a day.
- During mixing, mixers will wear a hard hat, goggles or face shield, rubber gloves, rubber boots, and protective overalls.
- All empty containers will be triple rinsed and disposed of by spraying near the treatment site at rates that do not exceed those on the treatment site.
- All unused herbicides will be stored in a locked building in accordance with herbicide storage regulations contained in FSM 2109.14.
- All empty and rinsed herbicide containers will be punctured and either burned or disposed of in a sanitary landfill.
- Any additional herbicide label requirements will be strictly followed during the mixing, loading, and disposal of herbicides.
- A reportable herbicide spill is one pint of concentrate of herbicide and/or five gallons of mixed herbicide, even if these amounts can be contained and recovered by the weed field crew. Spills that can be contained and recovered will thereafter be applied in the field according to the label requirements for the herbicide. If an herbicide spill occurs, the field crew will radio the Ranger District they are working in, and report the spill. The receptionist on duty will use a pre-designed form to gather information. The information will then be forwarded to the appropriate District Safety Officer and to the FS/Bureau of Land Management Interagency Hazardous Materials coordinator for appropriate action. The National Poison Control Center will be contacted as necessary. If there is a spill, it will be reported on approved forms. At a minimum, the following equipment and materials will be available with vehicles or pack stock used to transport herbicides: 1) A shovel; 2) absorbent material or the equivalent; 3) plastic garbage bags or buckets; 4) rubber gloves and boots; 5) safety goggles; 6) protective clothing; and, 7) applicable Material Safety Data Sheets.

2.2.2.1.2 Manual Control

Hand-operated power tools and hand tools are used in manual vegetation treatment to cut, clear, mow, or prune herbaceous and woody species. In manual treatments, workers would: cut plants above ground level; pull, grub, or dig out plant root systems to prevent subsequent sprouting and growth; scalp at ground level or remove competing plants around desired vegetation; or place mulch around desired vegetation to limit the growth of competing vegetation. Hand tools such as the handsaw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of axe and grubbing hoe), brush hook, and hand clippers are used in manual treatments. Axes, shovels,

grubbing hoes, and mattocks can dig up and cut below the surface to remove the main root of plants that would otherwise resprout in response to surface cutting or clearing. Workers also may use power tools such as chain saws, power brush saws, and line trimmers (i.e. weed eaters). A less common method that may be used is mowing of weeds, and typically involves hand/motor-powered mowers or tractor mowers. The manual method of vegetation treatment is labor intensive and costly when compared to herbicide application. However, it can be extremely species selective and can be used in areas of sensitive habitats. Manual control may occur in a variety of areas and is often used in sensitive areas to avoid adverse effects to non-target species or water quality. All noxious weed disposals would be in accord with proper disposal methods. Noxious weeds that have developed seeds would be bagged and burned.

2.2.2.1.3 Biological Control

Biological control would include the use of insects, pathogens, or some combination of the two. Biological methods of vegetation treatment use living organisms to selectively suppress, inhibit, or control herbaceous and woody vegetation. This method is viewed as one of the more natural processes because it requires the proper management of plant-eating organisms and may be used in combination with other control methods within a general area, such as chemical and mechanical treatments. Biological weed control activities include the release of insect agents which are parasitic and "host specific" to target noxious weeds. This activity includes the collection of beetles/insects, development of colonies for collection, transplanting parasitic beetles/insects, and supplemental stocking of populations.

Insects and pathogens would be used as biological control methods generally in conjunction with other control methods (i.e. herbicides), although at the present these methods can control few plant species. Insects are the main natural plant enemies being used at the present time. Other natural enemies include mites, nematodes, and pathogens. This treatment method would not eradicate the target plant species but merely reduces the target plant densities to more tolerable levels. This method also reduces competition with the desired plant species for space, water, and nutrients. This treatment method would be used on larger sites where the target plant has become established and is strongly competitive (e.g., yellow star thistle) or remote locations.

Particular insects, pathogens, or combinations of these biological control agents may also be introduced into an area of competing or undesired vegetation to selectively feed upon or infect those target plants and eventually reduce the target plant density to the desired level of control. Therefore in most situations, a complex of biological control agents is needed to reduce the target plant density to a desirable level. But even with a complex of biological control agents, often 15 to 20 years are needed to bring about an economic control level. In most circumstances, biological control agents would not control weeds. They are only creating stresses on the weeds, which is not the same as control.

2.2.2.1.4 Cultural Control

Cultural control would include preventing weed introduction and/or minimizing rate of spread by requiring the following actions on public lands.

- Clean all ground disturbing equipment prior to moving into and out of weed-infested areas before and after use (applies to both USFS and contract equipment) (see Forest Plan Non-Native Plant Standard 03 (NPST03).

- Use only certified, noxious weed-free grains, hay, or pellets for feeding domestic animals and wildlife.
- Use only certified noxious weed-free seed, along with hay, straw, mulch, or other vegetation material for site stability and revegetation projects.
- Use only noxious weed-free gravel and fill material from inspected sites.
- Vegetate disturbed areas as soon as practical; use temporary fencing if required assuring new seedling establishment.
- Evaluate current and proposed vegetation management practices (i.e., livestock grazing, prescribed burning, and seeding), and implement practices to restore desired plant communities.

Rehabilitation, Seeding, and Plantings

Noxious weeds commonly invade areas that have vegetation that can't compete with aggressive invader species. Consequently, after weeds are controlled on a site it is beneficial to establish desirable native vegetation that would compete with noxious weeds, restrict or prevent additional infestations, and help prevent soil erosion and further soil nutrient loss. These treatments may involve ground or aerial application of seeds.

Adaptive Management

The noxious weed control program is a long-term endeavor to control weeds where/when practical. However, because there are areas of scientific and management uncertainty, management actions would need to be refined over time to meet the basic objective of noxious weed control activities systematically reducing weed abundance, extent and spread throughout the Forest. Annual site-specific monitoring would assess the effectiveness of specific control measures on weed species relative to application rate/method and area. Management actions may require refinement or change over time as data from specific effectiveness monitoring is analyzed.

Landscape level management would be reevaluated if consultation were reinitiated. Information from weed inventories and results from treatments will be mapped spatially and the Forest will use this information to assess the noxious weed program objectives and can use this information to build a current baseline for future consultations.

Additional Conservation Measures for Wildlife

- Noxious weed removal by hand or mechanical treatment is preferred to chemical treatment in and adjacent to occupied NIDGS sites.
- Chemical treatments in and near NIDGS sites are limited to the following chemicals: Metsulfuron Methyl, Glyphosphate, Clopyralid, or Picloram. The chemical 2-4 D will not be used in occupied NIDGS sites.
- A buffer for excluding the use of 2-4 D in occupied habitat will be implemented on a site-by-site basis and will be determined based on current and projected habitat use, including projected immigration/emigration patterns.
- All noxious weed treatments in or near occupied NIDGS sites are coordinated with a journey level wildlife biologist.

- Treatments will be preformed in a manner that maintains or improves meadows and NIDGS dispersal corridors.
- Only spot spraying will occur in occupied NIDGS habitat.
- Efforts will be made to only use herbicide when NIDGS are underground in the early spring, inactive during the day, or in hibernacula.

2.2.2.2 Monitoring

The Forest will monitor the effectiveness of the noxious weed program on both a site-specific treatment level and on a landscape level. Site-specific treatment level monitoring would involve assessing the effectiveness of the treatment agent or control method on a specific patch of noxious weeds. Follow-up treatments would occur as staffing and funding allow. Monitoring may involve multiple years to determine effectiveness. Monitoring of physical, cultural, and chemical control methods would be conducted on randomly selected sites (approximately one site per section 7 watershed) within one to two months of treatment through visual observation of target species' relative abundance/site dominance compared to pre-treatment conditions. Sequential monitoring of these sites would occur in subsequent years.

Landscape level effectiveness monitoring would be accomplished over the consultation period of the Assessment by tracking noxious weed occurrence through Geographic Information System (GIS) mapping across the Forest. Noxious weed infestations would be inventoried, mapped, and tracked through GIS to monitor the amount of the Forest land base with noxious weeds and how the control program has worked over the consultation period. Landscape level inventory and monitoring is expected to reveal new populations of noxious weeds, which would be mapped and evaluated for control or eradication. Management of these newly discovered sites would occur under the guidelines as described in the preceding proposed action.

2.2.2.3 Program Reporting and Evaluation

Project proposals (with methods, objectives of treatment, location, map of treatment area, acreage, proposed dates to be started and completed, sensitive areas, and special mitigation) for noxious weed control activities involving herbicides will be prepared annually by Weed Coordinators and submitted by April 1 of each year, for review by Forest biologists. Project proposals would be reviewed for compliance with this Assessment. The Forest biologists (Level 1) would provide a list of project descriptions and maps annually (or as identified) for informal review and approval by NMFS and the Service Level 1 team members before the projects are implemented. All projects would be reviewed and approved by the NMFS and the Service before herbicide application occurs.

Annually, a project summary of treatments would be prepared for land treatments that took place during the past year. The report would document treatments that took place, methods used, location, map, acreage, evaluation of achievement of objectives, brief summary of environmental effects, and evaluation of compliance with the Assessment.

Based on annual treatment evaluations and with the likely development of new control methods and technology, changes in existing or use of new noxious weed treatments may be authorized and warranted. Any changes to the proposed action, as described in the Assessment, would be analyzed for impacts to listed/proposed species and critical habitat, and consultation would be reinitiated as appropriate.

2.2.2.4 Partnership and Cooperative Weed Management Areas

The Payette National Forest is a partner in four Cooperative Weed Management Areas (CWMAs). The partnerships undertaken in these CWMAs make individual and combined treatment efforts more effective. Partners include Federal, State, County, private organizations, and private landowners. The CWMAs include: 1) Adams; 2) Frank Church Wilderness; 3) Lower Weiser River; and, 4) Upper Payette River.

The CWMAs provide an opportunity for coordinating weed control efforts within a specific project area and provide a more efficient method of control, restoration, and monitoring. When a federal agency is a cooperator in CWMAs, it does not necessarily mean the Forest is the action agency for non-federal lands. However, it does provide the Forest the opportunity of identifying potential private land concerns and issues under the Act and recommending noxious weed control BMPs that would reduce risk to listed species and their habitats. It is recognized that the Federal listing of species requires the Forest to ensure that all actions authorized or funded by the Forest are not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat of listed species. The Service acknowledges your efforts under section 7 a(1) of the Act.

2.2.3 Grazing

All allotments in the Brownlee Reservoir Watershed (see Table 2) are described in the Assessment supporting documents. The standards for utilization in these allotments are all the same. None of these occur near bull trout spawning habitat, and those portions of the allotments near occupied NIDGS habitat have the following regulations enforced.

All allotments on occupied NIDGS sites have utilization standards and monitoring associated with them. On the Forest, site-specific utilization standards will be written into the Annual Operating Instructions (AOIs) for cattle and sheep allotments in an effort to maximize available forage for ground squirrels. For cattle allotments at NIDGS sites in early August, use will be no greater than 40 percent. On sheep allotments, use of 40 percent or less will be maintained by requiring once over grazing. To avoid concentrated use on NIDGS sites, sheep herders will be advised of the location of NIDGS sites and will be instructed to not bed sheep on those sites. On all allotments, placement of salt must be a minimum of ¼ mile from NIDGS sites. These measures will be monitored and enforced. Results of monitoring will be presented at the yearly Level 1 coordination meeting. Currently, monitoring for seedhead counts and utilization does not occur at a standardized time. Seedhead counts will be added for the two new NIDGS sites discovered at higher elevations in the Smith Mountain and Lick Creek lookout areas on the Brownlee Watershed. Seedhead counts will take place in late July or early August to monitor the amount of seed heads remaining prior to NIDGS hibernation. Utilization levels will be monitored by wildlife biologists and/or range technicians at NIDGS sites during the first two weeks of August to ensure utilization levels are at or below 40 percent.

Additional measures will be used in management of livestock allotments to minimize potential effects to NIDGS. Off-road vehicle use by permittees will only be allowed on authorized travel routes. In addition, for all cattle and sheep allotments that contain NIDGS sites, language will be incorporated into the AOIs that identify the NIDGS as a threatened species under the ESA. The language will indicate that known sites and populations of NIDGS are located on the grazing allotment. The permittee will be required to avoid concentrating livestock on these sites.

2.3 Status of the Species

2.3.1 General Description of the Brownlee Reservoir Watershed

The Idaho portion of the Brownlee Reservoir watershed is an area of extremely high relief, ranging in elevation from 8,151 feet (2,484 meters[m]) at Echols No 2 in the Seven Devils Mountains to about 1,500 feet (457 m) on the Snake River at Hells Canyon Dam. Because of this, potential natural vegetation varies greatly with elevation, aspect, and slope. Low lying areas, such as the canyon of the Snake River, typically comprise grassland and shrub steppe communities of native and introduced grasses including bluebunch wheatgrass (*Agropyron spicatum*), Idaho fescue (*Festuca idahoensis*), and cheatgrass (*Bromus tectorum*), among others, with big sagebrush (*Atremesia tridentata*) co-dominant in the shrub steppes. Middle to high elevations such as in the Seven Devils mountains and on the insular formations of Cuddy Mountain (7,867 feet [2,398 m]) and Sturgill Peak (7,589 feet [2,311 m]) support stands of conifer Forest composed of varying proportions of Ponderosa pine (*Pinus ponderosa*), Douglas Fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*) and lodgepole pine (*P. contorta*). Northerly aspects are often well Forested, while southerly aspects may be predominantly grassland with Forests occupying shaded valley positions. There are also large plateau areas, dissected by deep canyons, such as those of the Wildhorse River watershed with grassy tablelands on top and Forest vegetation in the canyons; these tablelands are important grazing lands for cattle. Riparian vegetation can be diverse and includes alders (*Alnus* spp.), red-osier dogwood (*Cornus stolonifera*), syringa (*Philadelphus lewisi*) and, occasionally, water birch (*Betula occidentalis*) and cottonwoods (*Populus* spp.).

2.3.2 Bull Trout

2.3.2.1 Listing Status

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon and in the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound and east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Cavender 1978, Bond 1992, Brewin and Brewin 1997, Leary and Allendorf 1997).

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation and alterations associated with: dewatering, road construction and maintenance, mining, and grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (64 FR 58910).

The bull trout was initially listed as three separate Distinct Population Units (DPSs) (63 FR 31647, 64 FR 17110). The preamble to the final listing rule for the United States coterminous population of the bull trout discusses the consolidation of these DPSs, plus two other population segments, into one listed taxon and the application of the jeopardy standard under section 7 of the Act relative to this species (64 FR 58930):

Although this rule consolidates the five bull trout DPSs into one listed taxon, based on conformance with the DPS policy for purposes of consultation under section 7 of the Act, we intend to retain recognition of each DPS in light of available scientific information relating to their uniqueness and significance. Under this approach, these DPSs will be treated as interim recovery units with respect to application of the jeopardy standard until an approved recovery plan is developed. Formal establishment of bull trout recovery units will occur during the recovery planning process.

Please note that consideration of the above recovery units for purposes of the jeopardy analysis is done within the context of making the jeopardy determination at the scale of the entire listed species in accordance with Service policy.

2.3.2.2 Species Description

Bull trout, a member of the family Salmonidae, are char native to the Pacific Northwest and western Canada. Bull trout historically occurred in major river drainages in the Pacific Northwest from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978; Bond 1992). To the west, bull trout range includes Puget Sound, coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992). Bull trout are widespread throughout the Columbia River basin, including its headwaters in Montana and Canada and also occur in the Klamath River basin of south central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and the MacKenzie River system in Alberta and British Columbia (Cavender 1978; Brewin and Brewin 1997).

Bull trout were first described as *Salmo spectabilis* by Girard in 1856 from a specimen collected on the lower Columbia River, and subsequently described under a number of names such as *Salmo confluentus* and *Salvelinus malma* (Cavender 1978). Bull trout and Dolly Varden (*Salvelinus malma*) were previously considered a single species (Cavender 1978; Bond 1992). Cavender (1978) presented morphometric (measurement), meristic (geometrical relation), osteological (bone structure), and distributional evidence to document specific distinctions between Dolly Varden and bull trout. The American Fisheries Society formally recognized bull trout and Dolly Varden as separate species in 1980 (Robins et al. 1980).

2.3.2.3 Life History

Bull trout exhibit resident and migratory life history strategies through much of the current range (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the streams where they spawn and rear. Migratory bull trout spawn and rear in streams for one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas, to saltwater (anadromous), where they reach maturity (Fraley and Shepard 1989; Goetz 1989). Resident and migratory forms often occur together, and it is suspected that individual bull trout may give rise to offspring exhibiting both resident and migratory behavior (Rieman and McIntyre 1993).

Bull trout have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide habitat requirements for bull trout to successfully spawn and rear, and that the characteristics are not necessarily ubiquitous throughout these watersheds.

Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993), the fish should not be expected to simultaneously occupy all available habitats (Rieman et al. 1997).

Bull trout are found primarily in colder streams, although individual fish are migratory in larger, warmer river systems throughout the Columbia River basin (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman et al. 1997). Water temperature above 15°C (59°F) is believed to limit bull trout distribution, which may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989; Rieman and McIntyre 1995). Spawning areas are often associated with cold water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993; Rieman et al. 1997). Goetz (1989) suggested optimum water temperatures for rearing of about 7 to 8°C (44 to 46°F) and optimum water temperatures for egg incubation of 2 to 4°C (35 to 39°F). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a plunge pool, 8 to 9°C (46 to 48°F) within a temperature gradient of 8 to 15°C (46 to 60°F).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Oliver 1979; Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Pratt 1992; Thomas 1992; Rich 1996; Sexauer and James 1997; Watson and Hillman 1997). Jakober (1995) observed bull trout overwintering in deep beaver ponds or pools containing large woody debris in the Bitterroot River drainage, Montana, and suggested that suitable winter habitat may be more restrictive than summer habitat. Bull trout prefer relatively stable channel and water flow conditions (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997).

Preferred spawning habitat consists of low gradient streams with loose, clean gravel (Fraley and Shepard 1989) and water temperatures of 5 to 9°C (41 to 48°F) in late summer to early fall (Goetz 1989). High juvenile densities were observed in Swan River, Montana, and tributaries with diverse cobble substrate and low percentages of fine sediments (Shepard et al. 1984). Pratt (1992) indicated that increases in fine sediments reduce egg survival and emergence.

The size and age of bull trout at maturity depends upon life history strategy. Growth of resident fish is generally slower than migratory fish; resident fish tend to be smaller at maturity and less fecund (Fraley and Shepard 1989; Goetz 1989). Bull trout normally reach sexual maturity in four to seven years and live as long as 12 years. Repeat and alternate year spawning has been reported, although repeat spawning frequency and post spawning mortality are not well known (Leathe and Graham 1982; Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1996).

Bull trout typically spawn from August to November during periods of decreasing water temperatures. Spawning primarily occurs during September in the North Fork Clearwater basin (CBBTTAT 1998), and similar dates are expected for the Salmon River basin. However, migratory bull trout frequently begin spawning migrations as early as April, and have been known to move upstream as far as 250 kilometers (155 miles) to spawning grounds (Fraley and Shepard 1989). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence may exceed 200 days. Fry normally emerge from early April through May

depending upon water temperatures and increasing stream flows (Pratt 1992; Ratliff and Howell 1992).

Bull trout are opportunistic feeders with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro zooplankton and small fish (Boag 1987; Goetz 1989; Donald and Alger 1993). Adult migratory bull trout are primarily piscivores, known to feed on various fish species (Fraley and Shepard 1989; Donald and Alger 1993).

2.3.2.4 Population Dynamics

Migratory corridors link seasonal habitats for all bull trout life history forms. For example, in Montana, migratory bull trout make extensive migrations in the Flathead River system (Fraley and Shepard 1989) and resident bull trout move to overwinter in downstream pools in tributaries of the Bitterroot River (Jakober 1995). The ability to migrate is important to the persistence of local bull trout subpopulations (Rieman and McIntyre 1993; M. Gilpin, University of California, in litt. 1997; Rieman et. al. 1997). Migrations facilitate gene flow among local subpopulations because individuals from different subpopulations interbreed when some stray and return to non natal streams. Subpopulations that are extirpated by catastrophic events may also become reestablished in this manner.

Metapopulation concepts of conservation biology theory are applicable to the distribution and characteristics of bull trout (Rieman and McIntyre 1993). A metapopulation is an interacting network of local subpopulations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994). Local subpopulations may become extinct, but can be reestablished by individuals from other subpopulations. Metapopulations provide a mechanism for reducing the risk of extirpation because the simultaneous loss of all subpopulations is unlikely. Habitat alteration, primarily through the construction of impoundments, dams, and water diversions that create unsuitable conditions, has fragmented habitats, eliminated migratory corridors, and isolated bull trout often in the headwaters of tributaries (Rieman et al. 1997).

2.3.2.5 Status and Distribution

Though wide ranging in parts of Oregon, Washington, Idaho and Montana, bull trout in the interior Columbia River basin presently occur in only about 44 to 45 percent of the historical range (Quigley and Arbelbide 1997; Rieman et al. 1997). Declining trends and associated habitat loss and fragmentation have been documented rangewide (Bond 1992; Schill 1992; Thomas 1992; Ziller 1992; Rieman and McIntyre 1993; Newton and Pribyl 1994; Idaho Department of Fish and Game (IDFG), in litt. 1995). Several local extirpations have been reported, beginning in the 1950s (Rode 1990; Ratliff and Howell 1992; Donald and Alger 1993; Goetz 1994; Newton and Pribyl 1994; Berg and Priest 1995; Light et al. 1996; Buchanan and Gregory 1997; Washington Department of Fish and Wildlife 1997).

2.3.2.5.1 Columbia River Distinct Population Segment

The Columbia River DPS includes bull trout residing in portions of Oregon, Washington, Idaho, and Montana. Bull trout are estimated to have occupied about 60 percent of the Columbia River Basin, and presently occur in 45 percent of the estimated historical range (Quigley and Arbelbide 1997). The Columbia River DPS has declined in overall range and numbers of fish. The population segment is composed of 141 subpopulations indicating habitat fragmentation, isolation, and barriers limit bull trout distribution and migration within the basin. Although some

strongholds still exist, bull trout generally occur as isolated subpopulations in headwater lakes or tributaries where migratory fish have been lost. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin. In Idaho, for example, bull trout have been extirpated from 119 reaches in 28 streams (IDFG in litt. 1995).

2.3.2.5.2 Snake River Geographical Area

Bull trout occupy portions of 14 major tributaries in the Snake River basin of Idaho, Oregon, and Washington. The Service identified 34 bull trout subpopulations in the Snake River basin. Downstream of Hell's Canyon Dam, major tributaries that support bull trout include (number of subpopulations) Tucannon River (2), Clearwater River (3), Asotin Creek (2), Grande Ronde River (1), Imnaha River (4), and Salmon River (2). Upstream of Hells Canyon Dam, major tributaries that support bull trout include Pine Creek (4), Powder River (3), Malheur River (2), Payette River (4), Weiser River (2), and Boise River (2). Although bull trout distribution upstream of Hell's Canyon Dam is limited primarily to the basin downstream of Shoshone Falls in southern Idaho, three geographically isolated bull trout subpopulations occur upstream of Shoshone Falls in the Little Lost River drainage. Bull trout subpopulations upstream of Hell's Canyon Dam are generally low in abundance, fragmented, and isolated. Numerous impassable dams and large expanses of unsuitable habitat have isolated subpopulations. Isolation is most prominent upstream of Hell's Canyon Dam in southwest Idaho and southeast Oregon.

The basin downstream of Hell's Canyon Dam is relatively intact, and connectivity among bull trout subpopulations may still occur there. The species occupies large areas of contiguous habitat in the Snake River basin downstream of Hell's Canyon Dam, such as in the Clearwater River and Salmon River basins. High numbers of bull trout have been observed in the Tucannon River, Imnaha River, Clearwater River, Salmon River, and Malheur River subpopulations, however, trends in abundance are largely unknown or declining.

2.3.2.5.3 Brownlee Reservoir Watershed

Figure 3 depicts the the Brownlee Reservoir Watershed. Bull trout are known to exist in Upper Indian Creek, Bear Creek, Crooked River, and Camp Creek, a small tributary to Indian Creek. The population may have an adfluvial component since migratory individuals have been collected in an Idaho Power weir near the mouth of Indian Creek. Two bull trout were trapped on October 29, 1999, which measured 234 and 271 millimeter (mm) total length. Brook trout are present and hybridization with bull trout has taken place. A flood event occurred in the summer of 2003, which has altered the quality of the habitat where bull trout were known to occur. During the summer of 2004, bull trout were collected below the impassable culvert on Road 50105 near Landore and moved above the culvert. As of 2005, densities of fish appear to be lower than pre-flood conditions, but distribution appears to be similar to pre-flood conditions.

2.3.2.6 Conservation Needs

Recovery for bull trout will entail reducing threats to the long-term persistence of populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to them that allow for the expression of various life-history forms (Service 2002). The draft Bull Trout Recovery Plan identifies the following tasks needed for achieving recovery: (1) protect, restore, and maintain suitable habitat conditions for bull trout; (2) prevent and reduce negative effects of nonnative fishes, such as brook trout (*Salvelinus*

fontinalis), and other nonnative taxa on bull trout; (3) establish fisheries management goals and objectives compatible with bull trout recovery; (4) characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout; (5) conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks; (6) use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats; and (7) assess the implementation of bull trout recovery by management units, and revise management unit plans based on evaluations.

The conservation needs of the bull trout are often expressed as the four Cs: cold, clean, complex, and connected. Cold stream temperatures, clean water quality that is relatively free of small grains of sediment and contaminants, complex channel characteristics (including abundant large wood and undercut banks), and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout at multiple scales ranging from the species scale to local populations. The recovery planning process for the bull trout (Service 2002) has also identified the following conservation needs for the bull trout: (1) maintain and restore multiple, interconnected populations in diverse habitats across the range of each interim recovery unit; (2) preserve the diversity of life-history strategies; (3) maintain genetic and phenotypic diversity across the range of each interim recovery unit; and (4) establish a positive population trend.

Another potential threat now facing bull trout is warming temperature regimes associated with global climate change. Because air temperature affects water temperature, species at the southern margin of their range that are associated with cold water patches, such as bull trout, may become restricted to smaller, more disjunct patches or become extirpated as the climate warms (Rieman et al. 2007). Rieman et al. (2007) conclude that climate is a primary determining factor in bull trout distribution. Some populations at high risk already, such as the Jarbidge, may require "aggressive measures in habitat conservation or restoration" to persist (Rieman et al. 2007).

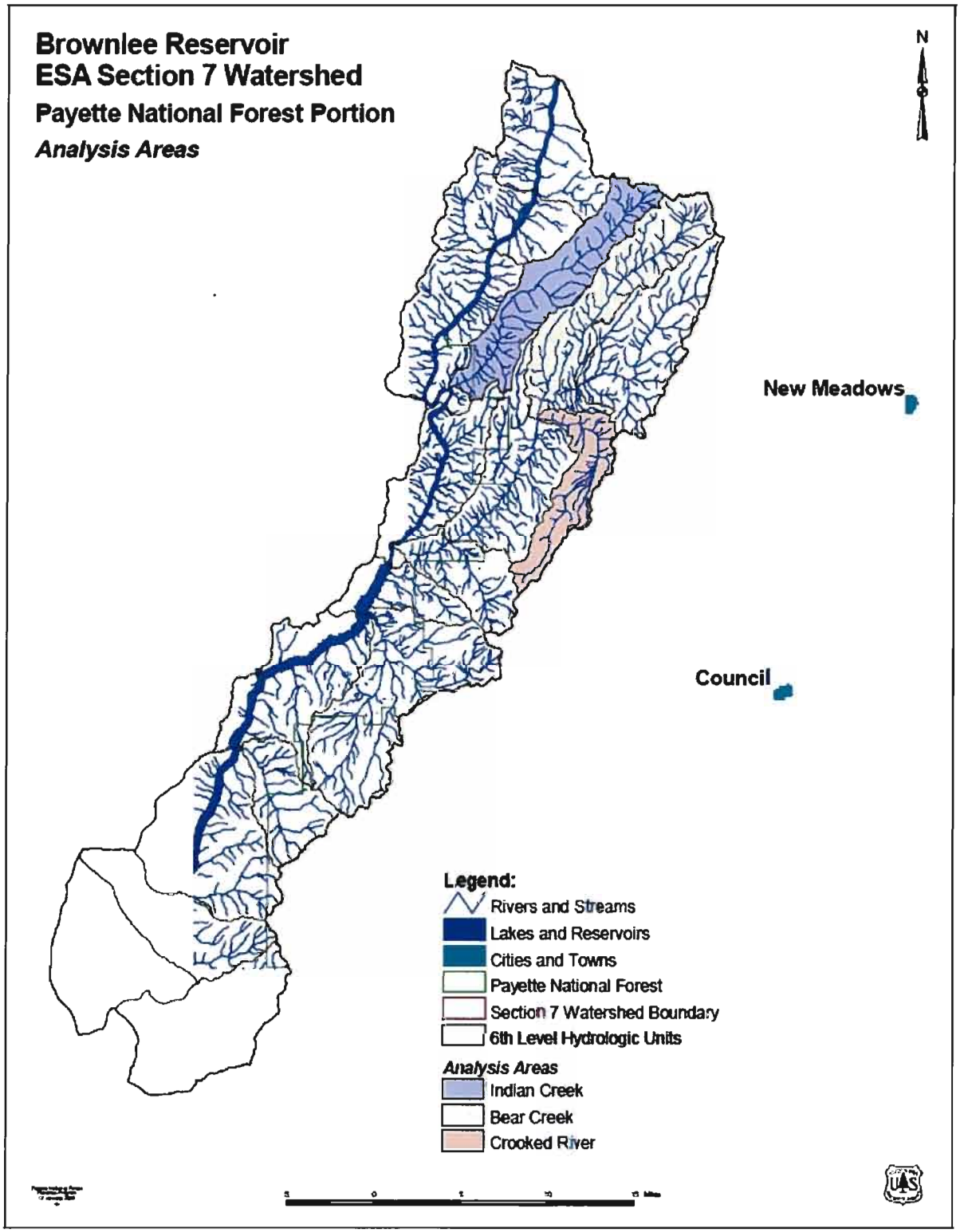

Figure 3. The Brownlee Reservoir Watershed on the Payette National Forest

2.3.2.7 Consulted-on Effects Rangewide

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a biological opinion. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to bull trout, we analyzed all of the biological opinions received by the Region 1 and Region 6 Service Offices, from the time of listing until August 2003; this summed to 137 biological opinions. Of these, 124 biological opinions (91 percent) applied to activities affecting bull trout in the Columbia Basin distinct population segment, 12 biological opinions (nine percent) applied to activities affecting bull trout in the Coastal-Puget Sound distinct population segment, seven biological opinions (five percent) applied to activities affecting bull trout in the Klamath Basin population segment, and one biological opinion (less than one percent) applied to activities affecting the Jarbidge and St. Mary-Belly distinct population segments (Note: these percentages do not add to 100, because several biological opinions applied to more than one distinct population segment). The geographic scale of these consultations varied from individual actions (e.g., construction of a bridge or pipeline) within one basin to multiple-project actions occurring across several basins.

Our analysis showed that we consulted on a wide array of actions that had varying levels of effect. Many of the actions resulted in only short-term adverse effects—some with long-term beneficial effects. Some of the actions resulted in long-term adverse effects. No actions that have undergone consultation were found to appreciably reduce the likelihood of survival and recovery of the bull trout. Furthermore, no actions that have undergone consultation were anticipated to result in the loss of local populations of bull trout.

2.3.3 Northern Idaho Ground Squirrel

The northern Idaho ground squirrel was listed as Threatened on April 5, 2000 (65 Federal Register 17779–17786). On July 28, 2003, the Service approved a Recovery Plan for this species (Service 2003) that provides direction for recovery of the species, including population sizes and criteria for a minimum number of viable metapopulations.

The recovery area covers 12 primary and five secondary existing and potential metapopulation sites. Land ownership defines which category (primary or secondary) each site is in, but the exact boundaries of these sites will be determined and are expected to change as new information becomes available (Service 2003). Primary metapopulation sites are typically on lands administered by the Forest Service with some State of Idaho and private lands included. Secondary metapopulation sites are primarily on private lands that could be useful in the recovery of the subspecies if landowners are willing to participate in this conservation effort. To date, one Habitat Conservation Plan with a private landowner for this species was completed in November 2007 (Service 2007).

Consultation under section 7 of the Act is required for activities on Federal, State, county, or private lands that may impact the survival and recovery of the northern Idaho ground squirrel, if such activities are funded, authorized, carried out, or permitted by Federal agencies. The Forest is listed by the Service as one of the agencies involved with this species under section 7 of the Act.

2.3.3.1 Species Description

The northern Idaho ground squirrel belongs to the small-eared group of true ground squirrels. Yensen (1991) described the northern Idaho ground squirrel as taxonomically distinct from the southern Idaho subspecies (*Spermophilus brunneus endemicus*) based on morphology, fur, and apparent life-history differences, including biogeographical evidence of separation. The northern Idaho subspecies occurs only in west-central Idaho in Adams and Valley Counties. It has a reddish brown back with faint light spots and a cream-colored belly. The back of the legs, top of the nose, and underside of the base of the tail are all reddish brown. Ear pinnae project slightly above the crown of the head (Sherman and Runge 2002). The northern Idaho ground squirrel can be distinguished from the other subspecies, the southern Idaho ground squirrel, and other small-eared ground squirrels, by its smaller size and rustier fur color.

2.3.3.2 Life History

The northern Idaho ground squirrel occupies dry (or xeric) meadows surrounded by ponderosa pine or Douglas-fir Forests (Yensen 1991). Xeric meadows have shallow soils (Dyni and Yensen 1996). However northern Idaho ground squirrel sites need to be deep enough to accommodate nest burrows greater than 1 meter (3.3 feet) deep (Yensen et al. 1991, Sherman and Gavin 1997); dry vegetation sites with shallow soils of less than 50 centimeters (19.5 inches) depth above bedrock are used for auxiliary burrow systems (Yensen et al. 1991). Northern Idaho ground squirrels often dig burrows under logs, rocks, or other objects.

Although Columbian ground squirrels overlap in distribution with the northern Idaho ground squirrel (Dyni and Yensen 1996), Columbian ground squirrels prefer moister areas with deeper soils. Sherman and Yensen (1994) reported that the segregation of the two species is due to competitive exclusion as opposed to differing habitat requirements.

The northern Idaho ground squirrel emerges in late March or early April and is active above ground until July or early August (Yensen 1991). Emergence during this period begins with adult males, followed by adult females, and then yearlings. The northern Idaho ground squirrel becomes reproductively active within the first two weeks of emergence (Yensen 1991). Females and males are sexually mature the first spring after birth. Females produce one litter per year of between two and seven pups, depending on fitness. Males and females do not live together or near their mates, and females do not cooperate with close kin to defend burrows or rear young (Yensen and Sherman 1997). Females that survive the first winter live, on average, nearly twice as long as males (3.2 years for females and 1.7 years for males). Estimates of maximum longevity indicate that males may live up to 5 years and females up to or greater than 7 years (Sherman and Runge 2002). Males normally die at a younger age, typically from mortality associated with reproductive behavior. During the mating period, males move considerable distances in search of receptive females and often fight with other males for copulations, thereby exposing themselves to predation by raptors, such as prairie falcons (*Falco mexicanus*), goshawks (*Accipiter gentilis*), and red-tailed hawks (*Buteo jamaicensis*). Significantly more males die or disappear during the two week mating period than during the rest of the 12 to 14 week period of above-ground activity (Sherman and Yensen 1994). Seasonal torpor or hibernation generally occurs in early to mid-July for adult males and females, and late July to early August for juveniles (Sherman and Yensen 1997).

2.3.3.3 Population Dynamics

As a result of the factors described in the Life History and Ecology section, and due to the small sizes of the remaining population sites, the northern Idaho ground squirrel may have little resilience to naturally occurring events. Small populations are often vulnerable to climatic fluctuations and catastrophic events (Mangel and Tier 1994). In 1993, Gavin et al. (1999) developed a computer population viability simulation program using recruitment and death values recorded over eight years from an intensively studied northern Idaho ground squirrel population site. Variables in the model included no natural immigration, and began the population viability analysis using 50 individuals, a figure that was 30 individuals lower than the actual population size of 80 individuals (Sherman and Yensen 1994). This model determined that all but 1 of 100 population sites could become extinct in less than 20 years. In 1999, the Service contracted with the U.S. Geological Survey-Patuxent Wildlife Research Center, to further develop a population model for the northern Idaho ground squirrel. The model was designed to allow the user to develop population projections for a population site or population complex using data collected about the demographic structure over 3 or more years. Using the assumptions of a closed population and overwintering survival of the female and pups, this model predicted that existing populations could become extinct within seven years using current demographic trends if no conservation measures are taken.

In a metapopulation system such as that of NIDGS, the extinction and re-colonization of local populations is perceived to be a natural occurrence (Smith 1996). Some local populations may be larger and more robust than others because of the availability of suitable resources such as well drained soils, above-ground structure for cover, and diverse and nutritious food sources. These productive sites are often referred to as "source populations." Areas that harbor less resource value may support small populations during periods of ideal climatic conditions but may not remain viable when climatic conditions further reduce the resource value. These sites are referred to as "sink populations" in that most of the animals that occur there arrive via dispersal from source sites (Meffe and Carroll 1994).

In general, larger local populations have a greater ability to persist through intermittent fluctuations in climate and food resources and can serve as source populations, through dispersal, for less viable populations or can re-colonize local populations that have gone extinct (Meffe and Carroll 1994). A necessity for this process to work is the connectivity among local populations, a characteristic that is now lacking across substantial portions of the NIDGS range. Sink populations, although potentially intermittently occupied, are valuable to the metapopulation as well. They can contribute genetic diversity and can serve as a bridge between other source populations that would otherwise lack connection.

For several years, population sites with the largest numbers of NIDGS have been closely monitored by researchers. These sites occur within the Payette National Forest (Slaughter Gulch campground) and the privately-owned OX Ranch. The two population sites on the OX Ranch (Squirrel Manor and Squirrel Valley) have been monitored for the longest period of time. Sherman and Gavin (1997, 1999) and Sherman and Runge (2002) documented the decline of the Squirrel Valley population from 120 individuals in 1987 to 10 in 1999. The Squirrel Manor had a population decline from 250 individuals in 1996 to fewer than 50 individuals in 1999. Each of four other population sites monitored between 1998 and 1999 declined markedly. The declines in 1999 may have been largely due to cold, spring conditions (Sherman and Gavin 1999), whereas the longer-term declines may be related to declining habitat conditions. In 2008, the

population at Squirrel Manor was estimated to be 149 individuals (Evans Mack and Bond 2008). It is worth noting that the two largest populations exist in close proximity to human habitation and a popular campground, and population declines here have not been attributed primarily to human activity.

Over the last few years, state and federal employees, as well as private landowners have cooperated in demographic research, rehabilitation of local populations and potential corridors between local populations, and translocation efforts. In addition, a captive breeding program has been implemented at the Zoo Boise in Boise, Idaho using *S. b. endemicus* and with the intention of also having a breeding population of NIDGS once the techniques are refined. The objectives of these efforts are focused on increasing the population size of the NIDGS and re-establishing the connectivity among local populations so delisting of this species can occur.

2.3.3.4 Status and Distribution

2.3.3.4.1 Historic and Current Distribution

The northern Idaho ground squirrel is found only in Adams and Valley counties of western Idaho. It has the smallest geographic range of any squirrel subspecies and one of the smallest mammal ranges in North America (Gill and Yensen 1992). Its present range is north of Council, Idaho, with one location in Round Valley, and covers an area of about 230,000 acres. Within this extent, northern Idaho ground squirrels are known to occur at 47 isolated sites within an elevation range of 400 to 2,300 meters (1,312 to 7,565 feet) (Evans Mack and Bond 2008). Historically, its range probably was much larger and extended southeast to Round Valley near Cascade, Idaho.

2.3.3.4.2 Factors Affecting Species Environment

The NIDGS is primarily threatened by habitat loss due to Forest encroachment into former suitable meadow habitat. Forest encroachment results in habitat fragmentation, eliminates potential dispersal corridors, and confines the species populations into small isolated habitat islands. The subspecies is also threatened by land use changes, recreational shooting, poisoning, genetic isolation and genetic drift, random naturally occurring events (stochastic events), and competition from the larger Columbian ground squirrel (Service 2003).

2.3.3.5 Consulted-on Effects Rangewide

The Service has conducted numerous informal and formal section 7 consultations with the Forest Service and other Federal agencies, in addition to the Forest Plan revision consultation. The majority of these consultations were on site-specific actions such as timber sales, vegetation management actions, road maintenance and construction, and livestock grazing. To date, only one consultation authorizing incidental take has been issued (Council to Cuprum Road Construction). Due to the nature of the consultations completed to date (individually and in aggregate), these have not compromised the survival and recovery of the NIDGS. Land management on the Payette and Boise National Forests is considered critically important to the species and its habitat because these Forests constitute the primary Federal action agency with the potential to affect its survival and assist in recovery under section 7(a)(1) of the Act (Service 2003). In summary, the Service's 2003 Biological Opinion for the LRMP developed the following assumptions with regards to Forest Plan implementation and NIDGS to avoid a jeopardy determination. The Service assumes that: 1) all actions proposed under this Forest Plan

will benefit the recovery of the NIDGS, and 2) any adverse effects to the NIDGS will be short-term and off-set by long-term benefits.

2.3.3.6 Conservation Needs

A final Recovery Plan (Plan) for NIDGS was developed and released by the Service on July 28, 2003 (Service 2003). The goal of this Plan is to increase the population size and establish a sufficient number of viable metapopulations of the NIDGS so the subspecies can be delisted. According to the Plan, due to the restricted geographic range and low numbers, the populations of NIDGS must be increased and stabilized. The only historical population level recorded was in 1985 when it was estimated to be approximately 5,000 individuals (Yensen 1985). This estimate was made for populations judged to be in decline; hence, the recovery target needs to be higher than this historical estimate. The plan states that the recovery target for the species is based on an effective population size (Ne) greater than 5,000 individuals among a minimum of 10 metapopulations. Delisting may be considered when the following four recovery criteria have been met.

1) Of the 17 potential metapopulations (Figure 4) that have been identified within the probable historical distribution, there must be at least 10 metapopulations, each maintaining an average effective population size of greater than 500 individuals for 5 consecutive years.

2) The area occupied by a minimum of 10 potential metapopulations must be protected. In order for an area to be deemed protected, it must be: (a) owned or managed by a government agency with appropriate management standards in place; (b) managed by a conservation organization that identifies maintenance of the subspecies as the primary objective for the area; or, (c) on private lands with a long-term conservation easement or covenant that commits present and future landowners to the perpetuation of the subspecies.

3) Site-specific management plans have been completed for the continued ecological management of habitats for a minimum of 10 potential metapopulation sites.

4) A post-delisting monitoring plan covering a minimum of 10 potential metapopulation sites has been completed and is ready for implementation.

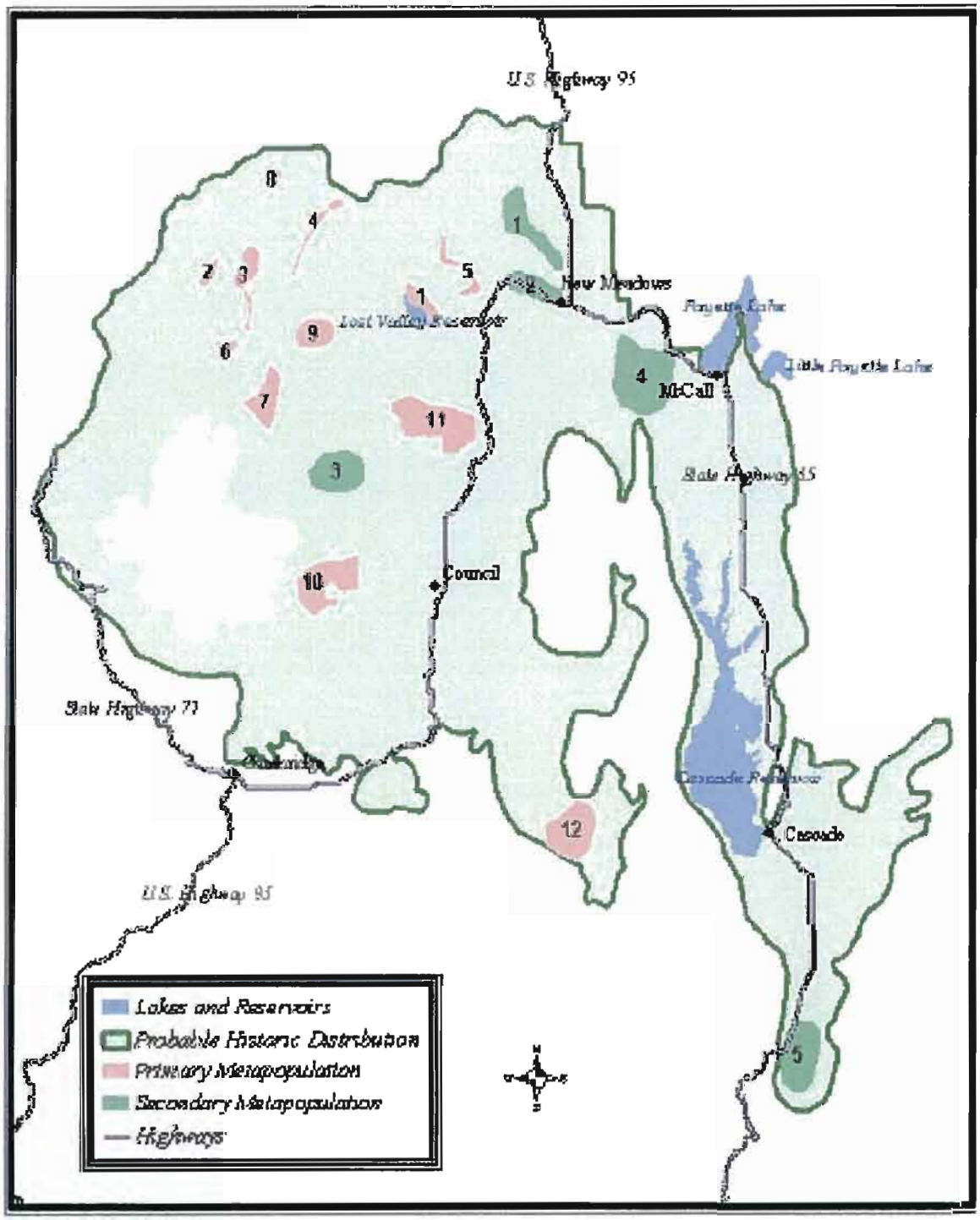

Figure 4. Northern Idaho Ground Squirrel probable historic distribution and identified metapopulation sites

2.4 Environmental Baseline

The Environmental baseline is defined as the past and present impacts on bull trout and NIDGSs of all Federal, state or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone section 7 consultation, and the impacts of State or private actions that are contemporaneous with the consultation in process. As noted above, the action area includes all NIDGS colonies in this watershed on Federal and non-federal land because of the potential for indirect effects of actions taken by the Forest impacting species on adjacent lands. For all practical purposes, the Status of the Species and baseline conditions are the same, as this narrow endemic occurs only in the west central portion of Idaho and overlaps the entire Brownlee Reservoir Basin.

2.4.1 Bull Trout

2.4.1.1 Status of the Species Within the Action Area

With the exception of the Snake River itself, the historic and current distribution of bull trout on the Idaho side of the subbasin is largely unknown. One documented bull trout population exists, probably the resident "life history" form, in the upper reaches of Indian Creek (Reid 1979). This population may be restricted to the area by water temperatures and perhaps competition from brook trout found downstream; however, downstream migrants, possibly originating in upper Indian Creek, have been collected in weirs near the mouth of Indian Creek (Chandler et al 2001). A correlation between area of connected aquatic habitat above 5,249 feet (1,600 m) has been suggested (Rieman and McIntyre 1995); the Forest used this probable relationship to determine where bull trout were likely or not likely to be found in the Brownlee Reservoir watershed where limited evidence existed. The Indian Creek population roughly corresponds to this presumed relationship, and was used to help determine where additional surveys should be conducted. More extensive surveys were then conducted in Bear Creek and Crooked River, where they were considered likely and were found, and in Lick Creek, where they were considered unlikely but possible, and were not found (Williams and Veach 1999). Bull trout are considered by Idaho Department of Fish and Game to have been extirpated from the Snake River in the Brownlee Reservoir subbasin above Brownlee Dam (Idaho Department of Fish and Game 1997), though they have been found in Hells Canyon Reservoir on the Snake River (Buchanan et al. 1997). Fluvial fish in the reservoir may use Indian Creek and the lowest reaches of Kinney Creek, where large reservoir-dwelling salmonids have been seen. Because of the large waterfall on Bear Creek, it is unlikely that Bear Creek acts as a migratory corridor for fish in Oxbow Reservoir or its tailwaters, though bull trout in Bear Creek may go downstream. On the other hand, Crooked River is accessible and at least one bull trout of 9.5 inches (242 mm) was collected from Crooked River in 1999 (Williams and Veach 1999); however, but bull trout have yet to be firmly identified in the Oxbow reach of the Snake River and downstream migrants have not been collected in the Idaho Power weir at the mouth of the Wildhorse River (Chandler et al 2000).

2.4.1.2 Factors Affecting Species Environment Within the Action Area

The Brownlee Reservoir watershed has been managed for a variety of uses, and habitat conditions with respect to the needs of bull trout have undoubtedly been degraded. There is little

information about conditions prior to anthropogenic activity in the watershed, however, so it's difficult to discern how much change has occurred. In the past several years, much of the management activity has been improved to reduce the likelihood of potentially adverse effects, but the Forest has little control over activities on private inholdings and developed private property low in the watershed.

The most obvious limiting factor in the watershed as a whole is the extent of habitat innately suitable for supporting bull trout populations. Fragmentation in the Snake River has reduced potential connectivity among headwaters populations, and concurrent reduction in the available pool of migrants has certainly reduced reproductive potential. Bull trout are now mainly restricted to use small headwaters populations and the amount of habitat available to them is small.

Another probable limiting factor is stream temperature, particularly near the mouths of the major streams and in some middle elevation valley bottom settings. these situations are discussed in detail for the individual analysis areas, but inspection of the stream temperatures for the Wildhorse River just upstream from the Forest boundary illustrate the situation at lower elevations, where we have actually recorded July temperatures as high as 79.2°F (18.5°C).

2.4.2 Northern Idaho Ground Squirrel

2.4.2.1 Status of the Species Within the Action Area

Currently, this species is known to occur within three Management Areas on the Payette National Forest (MAs 2, 3, and 5), on the Council and New Meadows Ranger Districts. There are occupied and recently extirpated squirrel colonies on private, State, and county lands adjacent to Forest land where actions carried out under the revised LRMP may indirectly affect the species. The species is believed to have historically occurred on two Management Areas (17 and 18) on the Boise National Forest. Within the three Payette National Forest Management Areas and adjacent lands, the northern Idaho ground squirrel is present in 25 small meadow areas. These areas occur in a larger polygon (species range) of approximately 1,000 acres. Most of this habitat is not used for nesting burrows by the ground squirrels; rather it is used to move between colonies. The squirrel is known to occur in 47 locations at this time, and the current population estimate of 1,512 adults and yearlings is slightly higher than the estimates in 2006 (Evans Mack and Bond 2008). For purposes of this Opinion, our effects analysis focuses on the species range on the Brownlee Reservoir Watershed. Figure 5 depicts known colonies and potential NIDGS habitat.

2.5 Effects of the Action

Effects of the action means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Effects of the action that reduce the ability of a listed species to meet its biological requirements may increase the likelihood that the proposed action will result in jeopardy to that listed species or in destruction or adverse modification of a designated critical habitat.

2.5.1 Travel Plan, Road Management, and Trails and Administrative Site Operation

The range of effects described below and the Incidental Take Statement which follows, are reflective of the analysis for the entire Forest. Regardless of whether a small or large amount of management occurs in the Brownlee Reservoir Watershed, the breadth of effects and associated jeopardy analysis are the same in any given watershed. Thus, while our analysis is not capable of addressing the scope and magnitude of activities specifically associated with the Brownlee Reservoir Watershed, potential effects related to this action across the Forest adequately describe and address effects to bull trout in each watershed. Under the umbrella of this action, myriad activities are proposed by the Forest and described above in the Proposed Action section and in the Assessment. Unless specifically mentioned below, the reader should assume that effects from these activities are not likely to adversely affect the relevant species. There are too many minor action components and mechanisms for effects to discuss here, so this analysis focuses on those components from which we anticipate adverse effects.

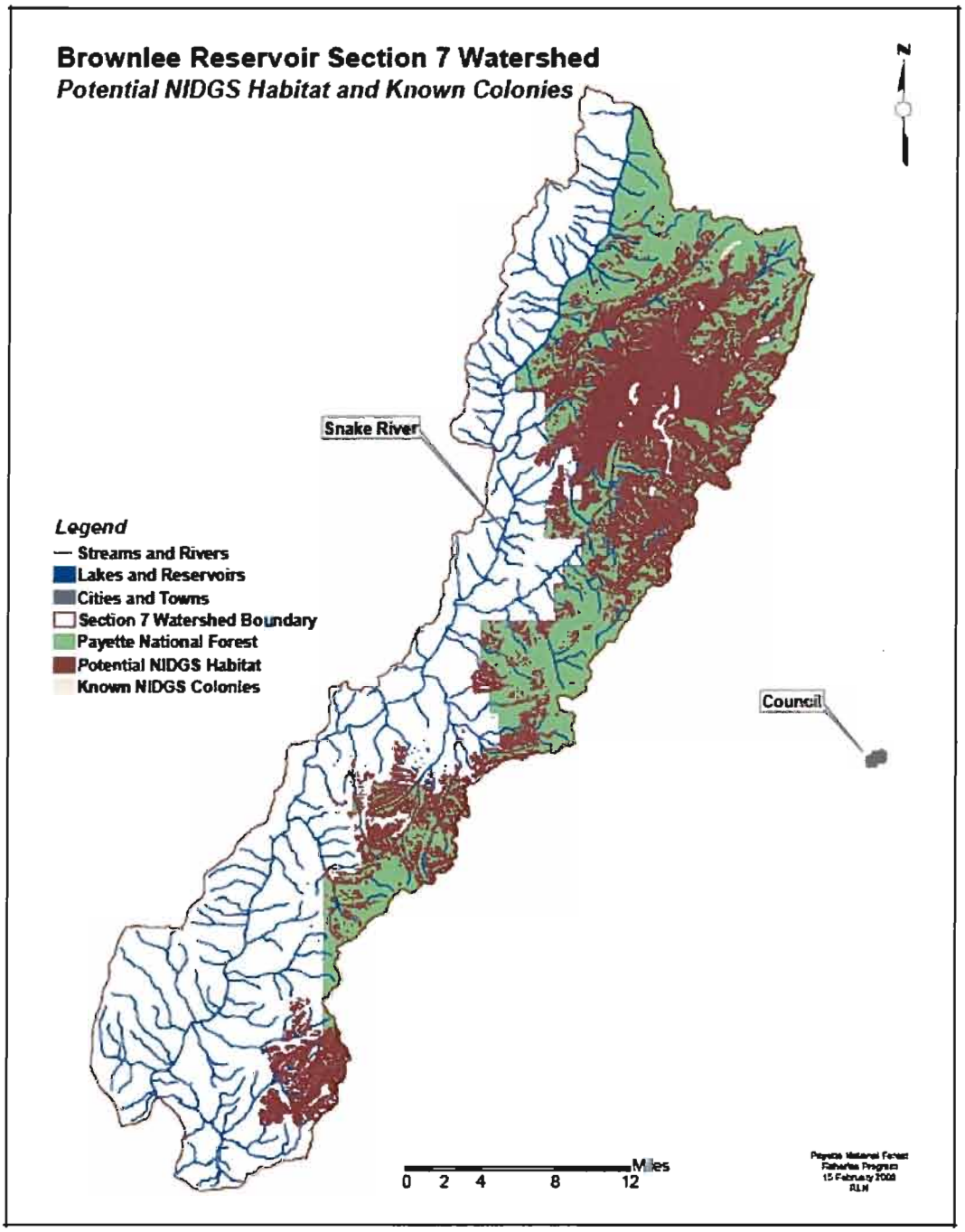

Figure 5. Modeled potential habitat for northern Idaho ground squirrels and known colonies in the Brownlee Reservoir Watershed

2.5.1.1 Bull Trout

Direct effects of travel plan implementation were analyzed for the portion of the watershed on National Forest System lands. Direct effects to listed fish species from travel management are expected to be adverse. Adverse effects occur due to erosion and sediment generated by road and trail facilities and other uses, including motorized travel off roads and trails. Adverse effects occur due to stream instability caused at road and trail crossings, and direct effects to bull trout at fords. General effects of road crossings on stream bank condition are described by Furniss et al. (1991). On the Payette National Forest, Nelson et al (2004) documented a variety of effects to fish habitat that indicate as miles of access increase, the greater the degree of effect to fish habitat. Nelson et al. (2004) described that the amount of road was inversely related to fish habitat quality on the Forest. Adams and Zurstadt (2005) also demonstrated that fish passage barriers were directly related to the number of roads, because most road culverts on the Forest do not pass all life stages of all fish species. Roads and trails paralleling streams can interfere with large wood reaching the stream and cause increased erosion and decreased stream bank condition.

Measures included during the 2001 consultation have not been effective at avoiding all take, especially at fords crossing streams in spawning habitats. Bull trout population viability and trends on the Payette National Forest have been documented by Burns et al. (2005) and were used to complete this analysis. A variety of factors were used to assess viability including the number of life histories present, the degree of population fragmentation, the amount of road and other variables. Bull trout population viability varies across the Forest; the Brownlee Reservoir and other westerly portions of the Forest are considered the least viable due to decreasing populations. Population fragmentation and lower population viability are associated with the highest road densities.

While some roads may be closed to use, the travel plan will not remove any roads or trails from the landscape through decommissioning and recontouring of the roadbed. Because these closed roads will still exist and because they will not be maintained, effects will still continue to occur as a result of their presence on the landscape. Road density has a strong association with substrate embeddedness and stream bank condition. Because the number of roads and trails on the landscape does not change, only marginal changes are shown in the indicators used (see Appendix A in the Assessment). Roads and trails which remain open with this action are expected to have increased use over time and increased effects.

2.5.1.1.1 Redd Effects

Travel Plan

The proposed action eliminates all cross-country motorized travel. Although cross-country motorized vehicle travel is no longer allowed with the new travel plan proposed action, individuals are still authorized to travel cross country on foot or horseback. This use, although not as significant as motorized use, is still expected to cause resource damage. One mechanism of effect expected from non-motorized cross-country travel is redd trampling by travelling through fords or swimming and angling in spawning areas. Fish often spawn in habitats appealing to humans as river crossing areas. Because many of the existing river crossings on the Forest associated with non-motorized travel do not have bridges or hardened surfaces to keep individuals out of fords or to discourage spawning, respectively, opportunities for inadvertent redd trampling are presented.

Mortality of bull trout eggs can occur should redds be driven over by vehicles and/or ATVs. As mentioned above, redd trampling is also likely to occur from fording streams on foot, horseback, or other non-motorized travel. Trampling can occur due to any foot or horse use in streams, including use from anglers, swimmers, people hiking, and similar activities. There are numerous road and trail crossings in occupied bull trout habitat, of which an unknown number are fords. About 90 percent of the trail crossings on the Forest are assumed to be fords (Clem Pope, Recreation Manager, Payette National Forest, McCall, Idaho). Roberts and White (1992) found that twice-daily wading throughout trout egg development killed up to 96 percent of trout eggs and pre-emergent fry, while a single wading just before hatching killed up to 43 percent of eggs.

Similar to foot and horseback fording, vehicular fords are most likely to occur in flatter stream segments with smaller substrate, areas that often provides suitable spawning habitat for bull trout. Therefore, fording of streams has the potential to result in the crushing of redds. The Forest has not completed an inventory of fords across the Forest, and although they are aware of most of these ford locations, there is no system in place to prioritize those where vehicular fording may occur in conflict with habitat suitable for bull trout spawning.

Trail and Administrative Site Operation

Because use of trails on the Forest is interrelated and interdependent to the Forest's Travel Plan, effects to bull trout redds from use of trails on the Forest are discussed above. Effects from maintenance of the Forest's trail system, separate from their use for travel, is expected to have insignificant effects on bull trout. This action does not include construction of new trails, but does include reroutes as necessary to decrease resource damage. Details of this action and conservation measures to reduce effects can be found above and in the Assessment.

2.5.1.1.2 Sediment Effects

Travel Plan

In addition to redd trampling, sediment is expected to increase over time with implementation of the Travel Plan. As human populations grow, increased road use is expected. In addition, roads no longer authorized for travel but remaining on the landscape are expected to contribute sediment to streams because they will no longer be maintained by the Forest. Regular road maintenance is needed to keep roads in good condition and to quickly identify and correct issues (Furniss et al. 1991; Yee and Roelofs 1980). Improperly maintained roads can transport fine sediment to streams. Road maintenance activities are expected to reduce the potential effects of any existing roads on fish and their habitat. Carrying out road maintenance will reduce the amount of fine sediment reaching streams, although the maintenance itself is likely to have some minor adverse effects on bull trout and their habitat. A watershed indicator likely to be affected negatively by increased sediment introductions is substrate embeddedness.

Under the proposed action, the condition of substrate embeddedness in some watersheds is expected to degrade in the short and long term, but the rates would be lower than by making no change. The reduced rate would be due to the large areas closed to cross-country motor vehicle use. Some continued degradation is expected due to increased erosion over time from motorized use on designated roads and trails and the motorized travel allowed for parking and dispersed camping within 300 feet of designated roads and 100 feet of motorized trails. The increased erosion is expected to result in increased substrate embeddedness in fish habitat. Under the proposed action, the condition of substrate embeddedness in some watersheds is expected to

improve because motorized vehicles would be limited to designated roads and trails and parking areas. No indiscriminate motorized travel would be allowed in a 300-foot area off designated roads and 100 feet off designated trails.

Road Management Activities

Road maintenance work will likely deliver temporary pulses (minutes to hours) of sediment, although the majority of this sediment would not be delivered until subsequent rain events. Quantifying turbidity levels and their effect on bull trout and their habitat is complicated by several factors. First, turbidity from an activity will typically decrease as distance from the activity increases. The time needed to attenuate these levels depends on the quantity of material in suspension (e.g., mass or volume), particle size, the amount and velocity of ambient water (dilution factor), and the physical/chemical properties of the sediments. Second, the impact of turbidity on fish is not only related to the turbidity levels but also to the particle size of the suspended sediments.

Fish present downstream from road maintenance activities are expected to be able to avoid or reduce their exposure to turbidity by swimming to adjacent, less turbid habitat (i.e., behavioral response only). These effects are still considered adverse, because turbid conditions will disrupt normal bull trout behavior. Adverse effects to juveniles are also likely to occur as a result of increased turbidity, as exposure of juveniles to predators will likely increase as they seek alternate rearing habitat. Adult bull trout are not at risk of increased predation due to increased turbidity, and it's unlikely they will abandon a redd even if they temporarily move out of turbid conditions. Therefore, adverse effects to adult bull trout from road maintenance activities are expected to be short-term in nature.

Snowplowing of roads near streams can have adverse effects on bull trout and their habitat. If an unpaved road is plowed to its bare surface, fine sediment and rocks can be side cast into streams or deposited at road-stream crossings. If large amounts of snow are deposited at road/stream crossings, temporary blockages of the streams can form, flooding the road and causing subsequent deposition of fine sediment in the stream. Roadside vegetation can be disturbed if the plow wanders off the road prism. The Forest proposed minimization measures such as leaving a snow base on unpaved roads, not undercutting slopes or damaging riparian vegetation, and removal of snow and slides on the travelway in a manner that will keep drainage channels and culverts clear of debris and functioning to avoid these potential adverse effects. Therefore, insignificant effects to bull trout from snowplowing activities are expected.

2.5.1.2 Northern Idaho Ground Squirrel

2.5.1.2.1 General Effects

The travel plan, road maintenance, and trail and administrative site operations have been combined in this analysis to be consistent with the fisheries analysis and because of the interdependent nature of these actions. In general, road and trail maintenance may require ground disturbing activities which would have effects on NIDGSs if the activity occurs in potential or occupied habitat. A wildlife biologist or NIDGSs specialist will oversee any ground disturbing activities in this watershed in order to reduce effects assumed on the species. Therefore, insignificant effects are expected on NIDGSs as a result of road and trail maintenance activities.

The Travel Plan will not increase roads or motorized trails in occupied NIDGS habitat and will restrict off-road travel. Off-road travel will only be allowed to access dispersed campsites within 300 feet of either side of a road and 100 feet on either side of a trail, but no off-road travel will be allowed for any reason in occupied NIDGS habitat. Cross-country motor vehicle use can detrimentally impact northern Idaho ground squirrel habitat through soil compaction and removal of vegetation and can physically harm northern Idaho ground squirrel individuals via collisions and illegal shooting resulting from additional access. Sites known to be occupied by NIDGS are currently closed to off-road travel, but by restricting all cross-country travel, the Travel Plan also protects suitable habitat that has not yet been found to be occupied. Conservation measures will require yearly monitoring of occupied NIDGS to ensure compliance with the off-road travel restrictions. If illegal off-road travel occurs in occupied habitat, measures will be taken to physically barricade the area to such travel. Monitoring will also be used to identify newly occupied NIDGS habitat—these areas will be added to the Forest's Motor Vehicle Use Map and closed to travel for dispersed camping. The Travel Plan includes use of 2.7 miles of NFS roads adjacent to occupied NIDGS habitat on the Council Ranger District portion of the Brownlee Reservoir Watershed. A map of these roads in relation to known colonies is included in the supporting documentation of the Assessment. There are also roads on the landscape in this watershed which may intersect NIDGS habitat but are not designated for public travel. These roads could have effects on the NIDGS which were not considered in the Forest's analysis. Even though travel on undesignated roads is not authorized, these roads may have effects on NIDGSs such as those listed above when public travel is uninhibited.

Forest roads in the watershed which occur near colonies, but do not bisect the colony, could still have negative impacts on NIDGSs. Roads that occur in the vicinity of NIDGS colonies can adversely affect squirrels primarily due to vehicle collisions. Access into NIDGS colonies also allows more opportunities for illegal shooting. To reduce the effects to NIDGS, the Payette National Forest will post road signs along the Lost Valley Reservoir road prior to the road entering the NIDGS site. The sign will provide information on the NIDGS and advise the public to travel slowly through the area to avoid impacts. Closure of the Lost Valley Reservoir road was not considered a viable option because it is a major access route onto the Forest. Realignment of the road was considered, but rejected because it would likely provide only temporary benefits; the area where the road could be moved is potential NIDGS habitat. In the future, closure of other roads in the watershed will be investigated by the Level 1 Team in conjunction with the NIDGS technical team. At this time, retaining these other roads in the proposed action for the Travel Plan will likely have minor effects to NIDGSs, because these roads are likely having relatively low levels of effects since they do not bisect the colony and total less than one mile in length. Based on the analysis and mitigation measures identified above, effects to NIDGS will be minimized, but would not be reduced to insignificant levels.

Non-motorized dispersed recreation is not expected to have more than negligible impacts on NIDGS. Dispersed recreation tends to occur near water and forested areas and not in the scabland habitats preferred by NIDGS. On the rare occasion that a person, horse, or mountain bike might travel through occupied habitat, it is reasonable to expect that the squirrels will be protected from any impacts simply by moving below ground. Such use is infrequent enough that no trailing or compaction is expected.

2.5.1.2.2 Increased Traffic Speed and Volume

Traffic volume and speed are expected to increase as a result of road maintenance or improvements. Data collected by the Forest in 1988 and 1992 indicate that traffic levels have been increasing 2.8 percent per year during holiday travel (between Memorial Day and Labor Day). It is expected that as population growth continues, travel on the Forest will steadily increase over time. This analysis is based on effects of roads and trails authorized on the Forest's Travel map (Figure 6). Some roads on the landscape are not considered authorized or designated, but the Forest is not proposing to decommission these travelways at this time. Roads and trails which access NIDGS habitat, whether they are "designated" or not, may be having effects on the NIDGS such as those discussed below, even though it is illegal for motorized vehicles to travel off of designated roads and trails.

Increased road kill of NIDGSs could result from increased traffic volume and speed in this watershed (Yensen 1997). See Figure 6 for areas where roads intersect NIDGS colonies. Increases in road kill of wildlife due to road improvements, and associated increases in traffic volume and speed are well documented. Gunther et al. (1998) concluded that vehicle speed was the primary factor leading to collisions of large mammals with vehicles in Yellowstone National Park. The highway on which the highest traffic speed occurred accounted for 41 percent of all large mammal road kill in the Park, although it consisted of only seven percent of the total road length. In Australia, Jones (2000) observed local extinction of eastern quolls (*Dasyurus viverrinus*) and an approximate halving of a population of Tasmanian devils (*Sarcophilius laniarius*) concurrent with a "dramatic" increase in road kill after a road was widened and paved in a national park. All elements of the NIDGS's life cycle could be affected by an increase in traffic volume and speed which is expected during the ten year timeframe of this consultation. There could be an increased incidence of automobiles killing ground squirrels at any life stage on roads in this watershed. Northern Idaho ground squirrels in populations directly adjacent to roads in this watershed could be killed by vehicles while foraging, searching for mates, engaging in agonistic behavior (e.g., aggressive encounters between males), and during dispersal.

Even though traffic volumes in this watershed are variable and unpredictable, a NIDGS crossing a road is probably unlikely to be killed by a vehicle, based on certain assumptions. To estimate the probability of a NIDGS being killed by an auto during a single crossing, we assumed:

- NIDGSs take fewer than 10 seconds to cross a road;
- Some drivers will attempt to avoid the squirrels;
- Most known occupied NIDGS sites are not transected by a road;
- Squirrels will successfully evade or avoid some cars.

Anecdotal information seems to indicate that the probability of a NIDGS being killed by a car while crossing a road is low, although anecdotal observations may be misleading and effects to

NIDGSs repeatedly crossing roads must be factored. There are only a handful of documented cased of NIDGSs being killed by motorized vehicles—near Mill Creek and Rocky Comfort Flat. Road killed NIDGSs are not likely to be observable for long after their death, however, which may greatly underestimate the magnitude of effect of road kill. Kline and Swann (1998), for example, noted that road killed cottontails (*Sylvilagus* sp.) at Saguaro National Park were often

scavenged within one hour of their first observation whereas unpalatable species (e.g., toads, *Bufo* sp.) remained visible for several days. Although dispersing NIDGSs may cross the road only once, as assumed above, NIDGSs whose home range includes roads may cross them several times per year, significantly increasing the likelihood that it will be killed by a vehicle. Therefore, impacts to mortality in populations along roads may be significant, especially when vehicular traffic is moving fast or in high concentrations (i.e., related to a construction site of timber sale). Dependent on the magnitude of this increased mortality and the demography of the affected animals, this mortality could affect the growth rate of these populations and, therefore, their probability of survival.

2.5.1.2.3 Fragmentation Effects on Northern Idaho Ground Squirrel

Increased traffic volume and speed could affect the survival and recovery of northern Idaho ground squirrels by decreasing connectivity among populations on different sides of roads. Because this travel plan action does not create new roads in occupied NIDGS sites, these effects are part of the baseline condition in this watershed. In addition to ensuring the survival of each existing population, reestablishing and maintaining connectedness and connectivity among populations of NIDGSs is crucial to the long-term survival and recovery of the species (Gavin et al. 1999). Dispersal helps to ensure the maintenance of genetic variation within populations (Mills and Allendorf 1996) and allows extinct populations to be "rescued" by emigrants from adjacent populations. Although dispersal distances in this species may approach one kilometer, Gavin et al. (1999) found, based on capture re-capture data, that dispersal distances are predominately less than 200 meters. Now, and in the future, especially if planned restoration activities become effective, dispersal will be of predominant importance within the groups targeted for recovery treatments, because dispersal among population groups may be limited by natural landscape features. Multiple population groups are affected or fragmented by roads in this watershed. Over time, it is expected that the landscape will be further fragmented or affected by increased traffic volumes, and these fragmentation effects are expected to impact NIDGS, although the extent is difficult to predict. Two migrants per generation may be sufficient to avoid the loss of genetic diversity within populations (Mills and Allendorf 1996).

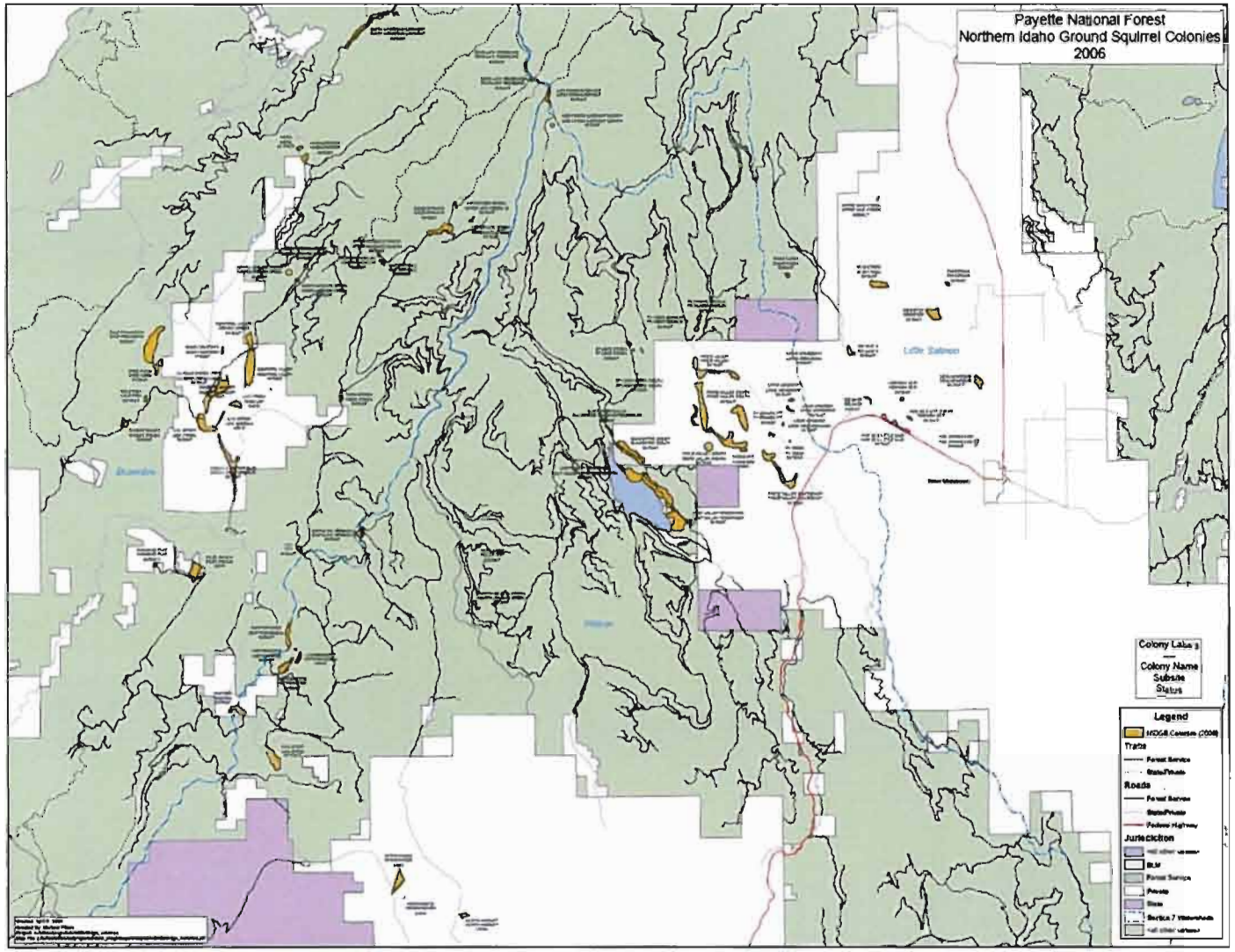

Figure 6. Roads and trails proposed for motorized use on the Payette National Forest and Northern Idaho ground squirrel colonies (note: no new routes would occur in occupied NIDGS sites)

Connectivity across roads could be expressed in terms of the proportion of NIDGSs that are killed while attempting to cross the road or the degree to which they are inhibited from crossing.

Emperical data are unavailable to estimate this connectivity, but we assume that it will decrease due to increased traffic volume and speed. The chances of a NIDGS being killed while crossing the road are small, unless a road is included in the species' home range. Even with a significant increase in traffic volume, each ground squirrel dispersing across the road is not likely to be killed by an automobile.

2.5.1.2.4 Effects on Survival of Populations Along Roads

Whereas connectivity across roads may be important to the long-term survival and recovery of NIDGSs, currently the survival of extant populations is crucial. Assuming that the total number of NIDGSs is currently at or near its lowest point and that numbers will increase as proposed habitat restoration actions take effect, short-term effects of travel are important regardless of the long-term effects. It appears that NIDGSs currently lack what could be called a single large population. The current population estimates indicate that the largest population in this watershed has greater than 100 individuals. Thus, stochastic or chronic events that reduce population numbers can impact the viability of individual populations.

Increased traffic may also affect time budgets of NIDGSs, but these behavioral effects would likely not affect survival. Plumpton and Lutz (1993), for example, found that traffic rate was positively correlated to the time burrowing owls (*Speotyto cunicularia*) spent in "alert" and "locomotion" behavior, but at the maximum traffic rate observed (64 vehicles per hour) the magnitude of behavioral changes were likely not biologically significant. An increase in vigilant behavior could reduce the amount of time spent feeding, but this is unlikely to affect survival. When exposed to a conspecific alarm call, Belding's ground squirrels (*S. beldingii*) that were deprived of food spent more time in feeding than in vigilant behavior in contrast to those that received as libitum diets (Bachman 1993). In other words, squirrels deprived of food appear to sacrifice vigilance in favor of obtaining needed food. Therefore, if feeding is especially important to individual NIDGSs, they may not reduce time spent feeding when disturbed by traffic. Assuming a current use of 150 vehicles/day, it would take a ten-fold increase in traffic volume to approximate the maximum traffic volume studied by Plumpton and Lutz (1993), which they found had a negligible danger in disrupting normal behavior of burrowing owls. Overall, we do expect adverse effects from the travel plan portion of this action. Although the chances of NIDGSs being killed by motorized travelers on the Forest are small, the potential cannot be discounted.

2.5.1.2.5 Duration of the Effects of the Action

The effects of road maintenance, trail and administrative site use, and continued travel on the Forest by both motorized and non-motorized transportation will continue into the long-term. It is expected that continued human population growth will correspond to a continued increase in Forest users over time. Impacts to NIDGSs through direct loss of habitat, disrupted connectivity among colonies, and mortality of individual squirrels being run over by vehicles will continue into the future.

2.5.2 Noxious Weed Management

2.5.2.1 Bull Trout

The effects analysis in this Opinion focuses on those elements of weed removal that have the potential to affect bull trout and their prey, or may affect hydrologic or riparian functions of the vegetative communities on which bull trout and their prey depend. The analysis is based primarily on toxic effects of herbicides (including surfactants, dyes, and other additives to chemical formulations) and secondarily on the physical effects of weed removal, including the non-chemical treatment effects. The Service anticipates that these non-chemical treatment methods will have effects not likely to adversely affect bull trout, however. Toxic effects may potentially harm listed fish by killing them outright, through sublethal changes in behavior or physiology, or indirectly through a reduction in the availability of prey (Scholz et al. 2005). Physical effects of weed removal, including unintended effects on non-target plant species, could potentially affect riparian functions such as shade, cover, debris recruitment, and sediment filtering.

Implementation of a successful eradication and prevention program for noxious weeds on the Forest should have beneficial effects on fish habitat by restoring native riparian vegetation, and thereby, restoring ecosystem and riparian functions. If successful, potential adverse effects should be short-term, localized, and should be offset by long-term benefits to riparian function, surface erosion, prey species production, and possibly other habitat features (NMFS 2005). For example, if weed species, which exclude native trees and other woody plants from the RCA by establishing monocultures, are eliminated, shade should increase as well as sources of large woody debris, while bank erosion should decline. The time lag in such situations may be a decade before riparian tree species function properly in the aquatic ecosystem.

The proposed action enhances the effectiveness of other Federal weed treatment actions by the Forest Service in the Frank Church River of No Return Wilderness and the Bureau of Land Management on lands managed by the Cottonwood, Salmon, and Challis Field Offices. The Forest Service also cooperates with state, county, municipal, and private weed control efforts, including their roles in the Adams, Frank Church Wilderness, Lower Weiser River, and Upper Payette River CWMAs. Without controlling the weeds on the Forest, additional weed control actions may be required in adjoining properties and downstream of lands managed by the Forest. Likewise, bull trout and their habitat on Forest Service managed lands may be exposed to chemical herbicide applications from upstream applicators. The effects of the seasonal chemical weed control efforts by the Forest are based on the assumption, which lacks scientific validation, that the employed BMPs, which include buffer strips and spraying restrictions, result in acute and chronic environmental exposures to fish that are below the maximum acceptable toxicant concentrations (MATCs) and perhaps, above the no-observable-effects limits (NOELs) set with the EPA risk assessment methodology. The risk assessments assume that the herbicide exposures to fish and their prey items are short-term and seasonal, and are tied to the spraying seasons which are typically from May through November (Assessment).

The analysis of the effects of herbicides on bull trout is evaluated in this Opinion by assessing the likelihood that listed fish and other aquatic organisms will be exposed to the herbicides, reviewing the toxicological effects of the chemicals on listed fish and other aquatic organisms, and qualitatively assessing the ecological risk based on the exposure risk and toxicity. See Table 9. The analysis considers: (1) The life history stages (and any associated vulnerabilities)

of the listed and proposed species present in the action area; (2) the known or suspected mechanisms of toxicity for the active ingredients; (3) BMPs, chemical application rates, amount of chemical use, location, application methods, and other factors that determine the likelihood of chemicals reaching the water; and (4) the possibility of additive or synergistic interactions with other chemicals that may enter surface waters as a result of parallel or upstream land use activities.

Under the proposed action, the risks to bull trout from herbicides are likely to occur primarily through the direct toxicological effects of the herbicides on the fish, rather than physical changes in fish habitat or effects on aquatic vegetation or prey species. However, both types of effects may occur. Herbicides may also affect terrestrial vegetation and watershed characteristics by killing or injuring plants in the short-term, but changes in terrestrial vegetation from the proposed action are not expected to appreciably affect the aquatic environment because of the small proportion of land proposed for treatment, restricted use of herbicides in riparian areas, and long-term beneficial regrowth of native vegetation in treated areas.

The ecological risks to aquatic species and toxicological effects to listed fish are not fully known for all of herbicides and formulations in the proposed action. Most available information on toxic effects of herbicides addresses toxicity of only the active ingredients in the herbicide formulations; the adjuvants themselves could have toxic effects that would not be apparent from available information used in this Opinion. There is ample information available to assess the risk of direct mortality from the active ingredients in the herbicide formulations in the proposed action. There is scant information available on the ecological effects of the herbicides and their formulations (including effects on the invertebrates on which fish feed), sublethal effects of the active ingredients on listed species, and lethal or sublethal effects of product formulations (mixtures of active and inert ingredients).

Table 9. Toxicology profile of herbicides used or proposed for use on the Forest

Active Ingredient	Product Name	Toxicology				
		Rainbow Trout (96 hr LC_{50}) (mg/L)	*Daphnia* (96 hr LC_{50}) (mg/L)	Bio-accumulates	Persistence in Soil[h]	Mobile in Soil
Clopyralid	Transline®[a]	103	232	No	40 Days (Moderate)	No
2,4-D	Weedar® 64[b] Amine 4	250	184	No	10 Days (Low)	Yes, but degrades quickly
Glyphosate	Rodeo®[c] Roundup® Accord®	>1,000	930	No	47 Days (Moderate)	No
Metsulfuron Methyl	Escort®[d]	>150	>12.5 (48 hr)	No	30 Days (1–4 Wks) (Low)	No
Picloram	Tordon 22K™[e]	5.5–19.3	68.3	No	90 Days (20–300) (Mod–High)	Yes
Imazapic	Plateau®[f]	>100	>100	No	7–150 Days (Low–High)	No
Dicamba	Banvel®[g]	28	100	No	7–42 days (Low–Mod)	Yes

[a] SERA 2003c. Clopyralid Risk Assessment—Final Report.

[b] SERA 1998. 2,4-Dichlorophenoxyacetic Acid Formulations Risk Assessment—Final Report.

[c] SERA 2003a. Glyphosate Risk Assessment.

[d] Ahrens 1994. Herbicide Handbook, Seventh Edition.

[e] SERA 2003b. Picloram Risk Assessment—Final Report.

[f] SERA 2004b. Imazapic Risk Assessment—Final Report.

[g] USDA. 1995: Dicamba Pesticide Fact Sheet. U.S. Forest Service 2001c: Sandpoint Ranger District FEIS.

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

2.5.2.1.1 Exposure Mechanisms

Quantitative estimates of fish exposure to herbicides under the proposed action were provided in the Assessment for generalized "worst-case" scenarios; site-specific estimates are not known since the exact treatment locations, the amount of chemicals that will be applied, and weather conditions are not known ahead of time.

In developing these "worst-case" scenarios, the Estimated Environmental Concentration (EEC) was derived from a direct application of the active ingredients to a one-acre pond (one-foot deep) using the maximum rate specified on the label. The EEC is an extreme level that is unlikely to occur during implementation and can therefore be viewed as a worst-case situation. A risk quotient was then developed for each herbicide in the Assessment to describe the worst-case situation involving lethal exposure (Table 10). As described by Urban and Cook (1986), a risk

quotient greater than 10 indicates a low likelihood of lethal effects; a quotient between one and 10 indicates a moderate likelihood of lethal effects; and a risk quotient less than one indicates a high likelihood of lethal effects. It is important to note that the Urban and Cook (1986) method does not predict the likelihood of sublethal effects. Although this analysis demonstrates that most herbicides proposed for use pose a low level of concern for lethal effects, it indicates a moderate level of concern for picloram.

Table 10. Aquatic level of concern assessment for forest herbicides

Active Ingredient	Product Name	Typical Application Rate (lb a.i./ac.)[a]	Max Label Application Rate (lb a.i./ac.)	EEC (ppm)[c]	Toxicity 96-hour LC_{50} (mg/L)[d]	Safety Factor 1/20 LC_{50} (mg/L)[e]	Species Tested	Risk Quotient & Level of Concern[f]
Clopyralid	Transline®	0.5	0.5	0.184	103	5.2	Rainbow Trout	28 Low
2,4-D amine	Weedar® 64 or Amine 4	1.0	3.0	1.103	250	12.5	Rainbow Trout	11 Low
Glyphosate	Rodeo®	1.0	3.75	1.379	>1,000	50	Rainbow Trout	36 Low
Metsulfuron-methyl	Escort®	0.094 (1.5 oz.)	2.0 oz	0.046	>150	7.5	Rainbow Trout	163 Low
Picloram[g]	Tordon 22K™	0.5	1.0[2]	0.368	5.5–19.3	0.965	Rainbow Trout	2 Mod
Dicamba	Banvel®	0.25–4.0	4.0	1.47	>1,000	50	Rainbow Trout	34 Low
Imazapic	Plateau®	0.06–0.2	0.75	0.276	>100	5.0	Rainbow Trout	18 Low

a The application rates are those commonly used on the Forest

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

[c] Estimated Environmental Concentration—Hazard Evaluation Division, Standard Evaluation Procedure – Ecological Risk Assessment (Urban and Cook 1986). Concentrations derived from Table 2 (page 16) of Urban and Cook (1986) based upon application rate (lbs. a.i./ac.) and 1 foot water depth.

[d] Rainbow Trout LC_{50} values from Herbicide Handbook, Seventh Edition (Ahrens 1994) and individual FS Pesticide Fact Sheets and Risk Assessments.

[e] Safety Factor – A divisor applied to the toxicity value to establish a concentration below which risk is acceptable (as determined by EPA). For endangered aquatic species, EPA uses 1/20 of the LC_{50} value.

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

[g] Risk Quotient values for picloram reflect the range of LC_{50} toxicity value of 5.5 to 19.3 mg/L identified by various observers. Level of Concern would be Moderate for LC_{50} values above 7.3 mg/L, including the midpoint value of 12.4 mg/L. Level of Concern would be high based upon LC_{50} values from 5.5 to 7.3 mg/L.

Herbicides can enter water through spray drift, wind-blown soils, surface water runoff, percolation, groundwater contamination, and direct application. The proposed action includes numerous BMPs intended to minimize or avoid water contamination from herbicides. The BMPs include stream and riparian buffers where chemical use is restricted or prohibited, limits on the amount of chemicals carried at a given time or applied to a given area, and rules governing application methods and timing. The likelihood of herbicides entering the water depends on the type of treatment and mode of transport.

Wind drift is a significant source of off-site herbicide transport with aerial applications and is largely dependent on droplet size, elevation of the spray nozzle, and wind speed (Rashin and Graber 1993). Drift may occur during any spraying activity, including aerial applications, boom spraying, and hand spraying. Wind drift is more likely to occur during aerial applications, and less likely to occur to a significant extent during ground-based spraying, unless sprays are directed into the air, or sprays are delivered in a fine mist. Water contamination from wind drift is primarily dependent upon the elevation of the spray nozzle, air movement, and droplet size. The smaller a droplet, the longer it stays aloft in the atmosphere, allowing it to travel farther. In still air, a droplet of pesticide the size of 100 microns (mist-size) takes 11 seconds to fall 10 feet. The same size droplet at a height of 10 feet travels 13.4 feet horizontally in a one mph wind, and 77 feet at five mph wind. Droplets released from spray equipment are not uniform in size, consequently, the indicated droplet size is the median diameter, with half the droplets smaller than the indicated diameter. During temperature inversions, little vertical air mixing occurs and drift can transport long distances. Low relative humidity and/or high temperature conditions will increase evaporation and the potential for drift. Since aerial application is not being proposed by the Forest, it is likely that spray drift will reach water only where chemicals are applied in riparian areas. Water contamination through wind drift is unlikely to be significant with ground-based application in the proposed action due to the short distance that a spray droplet is likely to travel as a result of the wind speed restrictions, or use of spot spraying, wiping, wicking, dipping, painting, and injecting near streams.

In the absence of aerial spraying, herbicide transport by surface runoff or percolation are the most likely mechanisms to cause water contamination with the proposed action, but the potential is minimized through timing spray activities to avoid precipitation. The 50-foot buffer for all non-aquatic approved herbicides reduces the potential for more toxic chemicals to reach streams from overland flows that might otherwise carry herbicides directly into a stream. The use of riparian buffers for interrupting overland flows is well-established as an effective mitigation technique for reducing sediment delivery to streams and the same mechanism would reduce delivery of herbicides from surface runoff. Overland flows occur when precipitation or snowmelt rates exceed the infiltration capacity of soils, which occurs infrequently in the action area. Overland flows are likely to occur briefly during intense thunder storms in summer, during the spring runoff period (at elevations where there is significant snow accumulation), or extended rainy periods. The proposed action includes provisions to suspend spraying when rain is likely to occur and reduces the likelihood of encountering rainfalls to a practical extent. However, summer thunderstorms are not entirely predictable and there is no practical way to ensure that rainfalls will not occur in herbicide treatment areas shortly after herbicides are applied.

Many of the weed infestations on the Forest are associated with roads, trails, paths, and other areas where the soil has been disturbed and/or compacted. Road prisms, road cuts, and road fills are runoff-dominated features, enhancing runoff by concentrating flows on compacted road

surfaces and in ditches, and in some cases by intercepting groundwater flow from cutslopes. Compacted, coarse-sized material with low organic matter used to create road fillslopes can also contribute to increased runoff. In general, weed-infested areas could increase overland runoff. Studies by Lacey at al. (1989) have reported a 50 percent increase in runoff at a knapweed-infested site compared to a non-infested site. The potential for the inadvertent introduction of herbicides to streams would be expected to occur primarily via surface runoff.

Introduction of herbicides into a stream through percolation occurs when herbicides dissolve in water and through gravity and capillary action, are transported through the soils into an aquifer connected to the stream channel. Water contamination through groundwater is a highly variable process and is not readily predictable. In general, the distance from the point where herbicides reach an aquifer to a stream likely affects the concentration of the herbicides reaching the particular stream. Herbicide concentrations in the aquifer are reduced through dilution with increasing discharge as the aquifer approaches the stream and greater amount of contact with soil particles that may absorb herbicide molecules. The vertical distance to the water table and soil types also affect herbicide transport through groundwater. Highly permeable soils with low organic content, such as alluvium and glacial till, provide little filtering or absorption and rapidly deliver pollutants. Soils with high amounts of clays can be virtually impermeable and large amounts of organic matter can bind herbicide molecules for long periods of time. Because the variables affecting transport of herbicides in groundwater are site-specific and highly variable, there is no particular buffer width that works equally well in all settings.

Pesticide movement ratings are derived from soil half-life, absorption in soil, and water solubility, and indicate the propensity for a pesticide to reach a stream through groundwater. As indicated by movement ratings, glyphosate is least likely to reach groundwater or move from the site, while chemicals such as picloram and dicamba are highly mobile and are likely to be transported by runoff or percolation. All of the herbicides proposed for use are susceptible to transport in groundwater or surface runoff, especially if applications are followed immediately by high rainfall events or if the water table is relatively shallow.

Although buffers can reduce the likelihood of water contamination from herbicides, there is no general rule to determine appropriate buffer widths. The buffer distances in the proposed action are based on the presumption that herbicides applied near water can more readily reach water than herbicides that are not applied near water, but the specific distances for ground-based spraying are based on practical weed control considerations and are not derived from scientifically-based calculations. The effectiveness of no-spray buffers for preventing water contamination through runoff or percolation is generally unknown, but the buffers provide some increment of additional protection due to filtering and absorption of herbicides that could otherwise reach the stream. Fish are most likely to be exposed to herbicides in occasional circumstances where wind gusts or unexpected precipitation carries chemicals into the water. Chemical contamination of water from the proposed ground-based treatments is unlikely to occur beyond occasional and localized circumstances given the small amounts of chemicals used, precautionary measures that minimize or avoid water contamination, and limited acreage treated within any given watershed. Water contamination is most likely to occur in situations where spraying occurs in riparian areas with coarse alluvial soils and when a significant rainfall occurs shortly after weed treatment.

2.5.2.1.2 Toxicological Effects of Noxious Weed Management via Herbicide Application

Although outright lethality is unlikely to occur from the proposed action, in circumstances where herbicides reach the water, bull trout may be harmed though sublethal effects or indirectly though toxic effects on other aquatic organisms. Sublethal effects from water contamination by herbicides cannot be discounted based on the available information. Water contamination by herbicides is likely to occur in occasional circumstances and sublethal effects of herbicides or their adjuvants can occur within the range of concentrations likely to occur under the proposed action. Of the particular herbicides proposed for use, little is known about their sublethal effects on bull trout, their effects on aquatic ecosystems, or threshold concentrations where these effects might occur. However, where sublethal assays have been reported for salmonids, harmful effects occur at concentrations as much as several magnitudes of order less than the lethal endpoints used by EPA to assess pesticide risk.

Most toxicological effects of the proposed action on bull trout are likely to be from sublethal exposure to herbicides, rather than outright mortality from herbicide exposure. Sublethal effects are expected to adversely affect bull trout and may actually kill or injure fish. The herbicide formulations proposed for use generally have not been tested to determine their effects on essential behavioral patterns or their underlying physiological processes. It is important to note that many sublethal toxicological endpoints or biomarkers may harm fish in ways that are not readily apparent. When small changes in the health (including endocrine effects) or performance of individual fish are observed (e.g. a small percentage change in the activity of a certain enzyme, an increase in oxygen consumption, the formation of pre-neoplastic hepatic lesions, etc.), it may not be possible to infer a significant loss of essential behavior patterns of fish in the wild, even in circumstances where a significant loss could occur. Where sublethal tests have been conducted, they are typically reported for individual test animals under laboratory conditions that lack predators, competitors, certain pathogens, and numerous other hazards found in the natural environment that affect the survival and reproductive potential of individual fish.

Weis et al. (2001) reviewed published literature on consequences of changes in behavior of fish from exposure to contaminants and noted studies reporting impaired growth and population declines from altered feeding behavior and impaired predator avoidance. Potential sublethal effects, such as those leading to a shortened lifespan, reduced reproductive output, or other deleterious biological outcomes are a potential threat to bull trout from the proposed action. Anadromous fish in the Snake River are exposed to multiple physiological sublethal stressors with apparent cumulative effects (e.g., Ebel et al. 1975; Matthews et al. 1986; Coutant 1999). Cumulative exposure to multiple sublethal stressors associated with the Snake River hydropower system has been attributed to delayed mortality in Snake River salmon (Budy et al. 2002). Mortality resulting from a history of multiple physiologically sublethal stressors is referred to as "ecological death" (Kruzynski et al. 1994; Kruzynski and Birtwell 1994). Cumulative effects of multiple stressors are thought to be the cause of declines in some fish populations, even though the effects of any single stressor appeared to be insignificant (Korman et al. 1994). Although exposure to pesticides is not a reported factor in delayed mortality of fish, one can reasonably assume that physiological stress created from sublethal exposure to herbicides would contribute to effects of other stressors attributed to delayed mortality in bull trout.

In occasional circumstances, herbicides could wash into streams from rainfalls shortly after herbicides are applied along road ditches or other surfaces that rapidly generate overland flows. Rainstorms are likely to occur in the action area before the herbicides have degraded. In such

instances, localized fish kills could occur, particularly in small tributary streams where the contaminated flows would not be readily diluted. However, outright mortality from herbicide exposure as a result of the proposed action is unlikely. On certain occasions when rainfalls occur after herbicide application, bull trout are likely to be exposed to herbicide concentrations where sublethal effects could occur. The toxicological endpoints identified below are possible for a variety of pesticides and are generally considered to be important for the fitness of salmonids and other fish species. They include:

- Direct mortality at any life history stage;
- An increase or decrease in growth;
- Changes in reproductive behavior;
- A reduction in the number of eggs produced, eggs fertilized, or eggs hatched;
- Developmental abnormalities, including behavioral deficits or physical deformities;
- Reduced ability to osmoregulate or adapt to salinity gradients;
- Reduced ability to tolerate shifts in other environmental variables (e.g. temperature or increased stress);
- An increased susceptibility to disease;
- An increased susceptibility to predation; and,
- Changes in migratory behavior.

Most of these endpoints have not been investigated for the herbicides used in the proposed action. Available information on lethal and sublethal effects is summarized for each herbicide in the Assessment.

In addition to effects of direct exposure on listed fish, indirect effects of pesticides can occur through their effects on the aquatic environment and non-target species. The likelihood of adverse indirect effects is dependent on environmental concentrations, bioavailability of the chemical, and persistence of the herbicide in bull trout habitat. For most pesticides, including the chemicals in the proposed action, there is little information available on environmental effects such as negative impacts on primary production, nutrient dynamics, or the trophic structure of macroinvertebrate communities. Most available information on potential environmental effects must be inferred from laboratory assays, although a few observations of environmental effects are reported in the literature. Due to the paucity of information, there are uncertainties associated with the following factors: (1) The fate of herbicides in streams; (2) the resiliency and recovery of aquatic communities; (3) the site-specific foraging habits of bull trout and the vulnerability of key prey taxa; (4) the effects of pesticide mixtures that include adjuvants or other ingredients that may affect species differently than the active ingredient; and (5) the mitigating or exacerbating effects of local environmental conditions. Where uncertainties cannot be resolved using the best available scientific literature, the benefit of the doubt should be given to the threatened or endangered species in question [H.R. Conf. Rep. No. 697, 96th Cong., 2nd Sess. 12 (1979)].

Indirect effects of contaminants on ecosystem structure and function are a key factor in determining a toxicant's cumulative risk to aquatic organisms (Preston 2002). Moreover, aquatic

plants and macroinvertebrates are generally more sensitive than fish to acute toxic effects of herbicides. Therefore, chemicals can potentially affect the structure of aquatic communities at concentrations below thresholds for direct impairment in salmonids. Because the integrity of the aquatic food chain is an essential biological requirement for salmonids, the possibility that herbicide applications will limit the productivity of streams and rivers is an unknown risk of the proposed action.

Factors affecting prey species are likely to affect the growth of bull trout, which is largely determined by the availability of prey in freshwater systems (Mundie 1974). Food supplementation studies (e.g., Mason 1976) have shown a clear relationship between food abundance and the growth rate and biomass yield of juvenile salmonids in streams. Therefore, herbicide applications that kill or otherwise reduce the abundance of macroinvertebrates in streams can also reduce the energetic efficiency for growth in salmonids. Less food can also induce density-dependent effects, such as increased competition among foragers as prey resources are reduced (Ricker 1976). These considerations are important because juvenile growth is a critical determinant of survival (Higgs et al. 1995). A study on size-selective mortality in Chinook salmon from the Snake River (Zabel and Williams 2002) found that naturally reared wild fish did not return to spawn if they were below a certain size threshold.

2.5.2.1.3 Summary of Herbicide Effects

The likelihood of toxic effects from the proposed action depends primarily on the duration and concentration of contaminant exposure, which may vary considerably among treatment areas, and with the various herbicides proposed for use. If herbicides enter water in an appreciable amount, they could adversely affect bull trout through lethal or sublethal effects of direct exposure, alteration of the food web, or loss of riparian vegetation from contact with herbicides. The action includes numerous features and safeguards that minimize the likelihood of appreciable water contamination, such as relatively small and scattered treatment areas for ground-based applications, low amounts of chemical application, and restrictions on application methods and types of herbicides. Available water quality monitoring by the Forest for past weed treatments are limited, but suggest that safeguards similar to those in the proposed action are likely limiting the occurrence of water contamination and the concentrations of chemicals when water contamination occurs (Berg 2004).

While the likelihood of water contamination from the proposed action is generally low, occasional circumstances are likely to occur where concentrations are high enough to cause adverse effects to bull trout from direct exposure or indirectly through alteration of the biotic community. In addition to adverse effects, herbicides may also have effects that are beneficial to salmonids through restoration of native vegetation or more naturally-functioning watershed processes no longer impaired by infestations of invasive weeds.

Given the localized presence of bull trout in the action area, the wide variety of soil types in the action area, chemicals proposed for use, rainfall patterns, and the low acreage proposed for spraying on an annual basis, it is likely that circumstances will arise where herbicide concentrations in water will reach levels where delayed mortality or reduced reproductive success could occur. Such circumstances would arise in isolated instances when various combinations of factors occur, such as: (1) Use of chemicals that persist in the environment for several months or longer; (2) conditions that allow chemicals to move rapidly through soils; when precipitation occurs before the chemicals break down, bind to soil particles, or get taken up

by plants; (3) where listed fish or redds are in the vicinity of a spray site; or (4) where the amount of chemical applied to an area is great enough to reach concentrations that could harm bull trout. Specific locations where harm is likely to occur from the proposed action cannot be identified at this time, since most of the above factors will not be known until spray sites are selected.

Changes in vegetation from weed spraying or other control methods can beneficially or adversely affect riparian and watershed functions, but beneficial effects are more likely than adverse effects. Adverse effects have been reported in instances where herbicides killed non-target plants, particularly riparian trees killed as a result of spray drift or uptake by roots. Beneficial effects to aquatic systems from noxious weed control are not well-documented, but could conceivably occur in circumstances where weed treatments kill exotic plants that would otherwise create a disclimax riparian plant community or displace native plants that provide shade, cover, habitat complexity, streambank stability, or recruitment of terrestrial invertebrate prey. In portions of the action area with high concentrations of exotic weeds, fire frequency, fire behavior, ground cover characteristics, and watershed hydrology are all likely to be altered by weeds, and effective weed control could reduce these adverse effects.

The proposed action includes the use of products within 50 feet of live water, where the toxicity of the active ingredient is known to harm listed fish. Where the toxicity of the inert ingredients are unknown, the action poses an unknown, but potentially meaningful risk of adverse effects.

2.5.2.1.4 Effects to Bull Trout Habitat

The proposed weed treatment areas are scattered in patches of various size across Forest lands. Potential effects of weed spraying on bull trout habitat will vary at each location depending on the size of the treatment area, the chemicals used, method of application, distance from water, and vegetative characteristics of the treatment areas. If chemicals were to reach the water in an appreciable amount, a variety of biological effects could occur, including harmful effects on bull trout or other aquatic organisms due to direct exposure to the chemicals or indirectly from changes in the biotic community. In general, most instream effects of herbicides are short-lived, discreet events associated with spills, drift, or runoff events. Following the events causing contamination, WCIs are likely to return to normal within a few hours to a few days. None of the chemicals proposed for use would result in long-term alteration of bull trout habitat through water contamination.

The use of herbicides can potentially affect physical watershed and stream functions through the removal of vegetation and exposing bare soil. With spot spraying, injecting, painting, dipping, and wicking, as proposed, the potential for significant increases in erosion or water yield is limited because treatments would consist of small, scattered areas, and vegetation would likely be reestablished within a few months to a year. The potential for non-target mortality of riparian plants is negligible with the proposed application methods.

Although the incidence of herbicides reaching water in an appreciable amount under the proposed action is likely to be infrequent, herbicides are capable of altering the biotic composition of aquatic species when they reach water. A notable concern is the potential for impacts on benthic algae. Benthic algae are important primary producers in aquatic habitats and are thought to be the principal source of energy in many mid-sized streams (Minshall 1978; Vannote et al. 1980; Murphy 1998). Herbicides can cause significant shifts in the composition of benthic algal communities at concentrations in the low parts per billion (Hoagland et al. 1996). Moreover, based on the data available, herbicides have a high potential to elicit

significant effects on aquatic microorganisms at concentrations that may occur with normal usage under the label instructions (DeLorenzo et al. 2001) that do not include many of the precautionary measures (such as buffers, wind restrictions, application methods, etc.) that are part of the proposed action. In most cases the sensitivities of algal species to herbicides and their response to herbicides are not known. Herbicides have the potential to decrease or increase algal production and, by extension, alter the trophic support for stream ecosystems. However, the community response to changes in the algal community is unpredictable. Limited information is available on the ecological effects of the herbicides in streams, making it difficult to predict the degree of ecological risk to bull trout from alteration of the biological community. In general, human activities that modify the physical or chemical characteristics of streams often lead to changes in the trophic system that ultimately reduce salmonid productivity (Bisson and Bilby 1998). Consequently, herbicides have the potential to affect bull trout productivity through their effects on the biotic community. However, the potential for alteration of the biotic community under the proposed action is limited due to precautionary measures intended to keep herbicides from the water.

Although changes in the biological community appear likely from herbicides that reach the water, adverse effects of herbicides on primary production and the invertebrate community are likely to be limited in size to stream reaches in the vicinity of application areas where herbicides may reach water in appreciable concentrations. The weed program includes numerous safeguards intended to eliminate or minimize water contamination and any water contamination from herbicides is not likely to persist due to the small amount of chemicals proposed for use at any given application site and the dispersed use of chemicals.

2.5.3 Grazing

2.5.3.1 Northern Idaho Ground Squirrel

The potential effects of livestock grazing on northern Idaho ground squirrel habitat are not well understood. No studies have been conducted on the effects of livestock grazing on the northern Idaho ground squirrel, but studies on other rodents, and particularly other ground squirrel species, provides insight into potential effects. The question of competition between livestock and ground-dwelling rodents has been considered for more than 100 years with numerous biases. In the mid-1900's, scientists noted: "Even though ground-squirrel populations are no longer as dense as in former years, they are still sufficiently numerous to be of major concern locally."

Fitch (1947 and 1948), studying the seasonal feeding habits of ground squirrels, found them to be highly selective in diet, feeding for part of the year exclusively on forage plants that Wagnon et al. (1942) had shown were also being grazed in that season by cattle. These studies showed that both the ground squirrels and the cattle began feeding on the new annual plants.

Recent studies have documented a variety of effects, depending on the location of the study, the degree of impact, and life histories of the plants and rodents present. Cattle grazing is associated with a decrease in rodent species diversity in arid environments, probably due to a decline in plant species diversity (Hanley and Page 1982 or to structural changes in vegetation (Rosenzweig and Winakur 1969). Other studies have found no detectable effects of grazing on other small mammal species (e.g., Roundy and Jordan 1988; Heske and Campbell 1991).

NIDGS literature has identified both positive and negative effects from livestock grazing, but these effects are generally based on observations and not rigorous studies. Sherman and

Yensen (1994) found in 1993, the unusually tall spring and summer vegetation may have been unfavorable for ground squirrel species. Results suggest the importance of keeping the grass height down by using large herbivores as "tools" to manage for ground squirrels. However, disturbance associated with grazing has also favored exotic annual grasses over native bunch grasses and forbs (Yensen et al 1992). NIDGS population declines in areas dominated by nonnative grasses may result from an inability to obtain sufficient fat and nutrient laden seeds by mid-July to survive the next eight months in hibernation (Sherman and Gavin 1997).

Recent data summaries at current NIDGS monitoring sites indicate six-year average utilization levels (2001–2006) of 7 to 25 percent. This level of utilization is considered very light. Light utilization is defined at 20 to 40 percent; low value (less desirable) herbaceous plants are not grazed, 60 to 80 percent of the current seed stalks or key herbaceous species remain intact, and most young plants are not grazed. Moderate utilization is defined by 40 to 60 percent utilization with 15 to 25 percent of key herbaceous species remaining intact; no more than 10 percent of the low value herbaceous forage plants are utilized.

Because livestock grazing and occupied NIDGS habitat overlap on the Forest, it is clear that livestock may alter the vegetative components of NIDGS habitat. Heavy or concentrated use may reduce vegetation that the squirrels require or prefer. It may also allow less palatable or nutritious species to become established on a site, or allow for the introduction of exotic weed species. Heavy or concentrated use may also reduce fine fuels required for successful habitat enhancements (i.e., prescribed fire).

Conversely, moderate to light use by cattle and sheep may transform tall, decadent vegetation into lower more palatable vegetation thus having a beneficial effect. Researchers have suggested that livestock grazing that manages for grass heights of a minimum of four inches with maximum seed head production would benefit ground squirrel nutrition and predator avoidance (Sherman and Yensen, 1994).

Given that livestock grazing can alter the vegetative component of ground squirrel habitat, insight into intensity and timing of grazing and the associated effects on the vegetation is needed. A study of small mammal populations in grazed and ungrazed riparian habitat in northeast Nevada found the most evident structural difference between grazed and ungrazed habitat was in the herbaceous layer where graminoid biomass and graminoid and forb height values were reduced on the grazed site (Medin and Clary 1989). Graminoid biomass on the grazed plot was only half that inside the exclosure. Five of the 11 species of mammals trapped were found only in the ungrazed habitat. Townsend's ground squirrel (*Spermophilus townsendii*) was one of them, and Golden-mantled ground squirrels (*Spermophilus lateralis*) were more abundant in the ungrazed site.

Another study by Oldemeyer and Allen-Johnson (1988) measured the effects of cattle grazing on small mammal microhabitat and abundance in northwest Nevada. The 17,183 acre allotment was grazed between mid-June through early August one year and early August through late October the next year, over a five year period. Total relative abundance of small mammals did not differ between year or area. Townsend's ground squirrels and golden-mantled ground squirrels were found on both grazed and ungrazed sites on alternate years. There was a general trend for cover of both grasses and forbs to be lower in the allotment than in the exclosure. However, the means did not differ significantly.

Comparing these two studies suggests that differing intensities and timing of livestock grazing can have a varied response on small mammals. There is some level of grazing that benefits habitat requirements. However, beyond a certain threshold level effects become detrimental to small mammals. In California, Fehmi et al (2005), found that California ground squirrels (*Spermophilus beecheyii* Richardson) when subjected to low to moderate levels of cattle grazing did not appear to have a strong effect on the population dynamics of California ground squirrels, and grazing may be compatible with maintenance of ground squirrel populations. Based on multivariate analysis of variance of 1994 data, live plant cover, native plant cover, and standing biomass were lower where the number of burrows was higher on grazed colonies but were little affected on ungrazed colonies. Management of livestock grazing also includes fence reconstruction and use of spring or pond developments. Maintenance of existing fences can cause ground disturbance when setting posts or braces. To avoid any impacts, prior to maintenance of existing fences and water developments in NIDGS habitat, the activity will be coordinated with a wildlife biologist. Action for new construction of fences or watering facilities is not considered ongoing. These actions are associated with a specific project and will be assessed for effects to NIDGS at that time.

Based on these studies, and the fact that livestock use on the Forest has been light with use levels showing no correlation with changes in NIDGS, one could infer that light amounts of livestock grazing is having only negligible effects on NIDGS populations at this time. However, because populations at all grazed sites are not intensively monitored and because there are many unknowns associated with NIDGS declines, we assume that adverse effects are likely. Until studies provide better data, light grazing and no concentrated livestock use are required at occupied NIDGS sites to reduce effects from livestock management. The Forest included a plethora of measures to monitor grazing use and reduce effects on NIDGSs. Based on limited available literature and professional judgment, the Service believes that these measures will in fact reduce effects. However, without a site specific study on how grazing induced vegetation changes may be adversely affecting NIDGSs, we cannot discount the potential for adverse effects. Where uncertainties cannot be resolved using the best available scientific literature, the benefit of the doubt should be given to the threatened or endangered species in question [H.R. Conf. Rep. No. 697, 96th Cong., 2nd Sess. 12 (1979)].

2.6 Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

2.6.1 Bull Trout

Cumulative effects to bull trout and proposed critical habitat that are reasonably certain to occur in the action area include: (1) reduced streamflows from water diversions for urban, agricultural and other purposes; (2) destruction or degradation of spawning and rearing habitat from logging, grazing, mining, farming and urban development on non-Federal lands; (3) degraded water quality as a result of polluted runoff from urban and rural areas; (4) migration barriers that result from dams, water diversions, and road crossings on non-Federal lands (not regulated by the

federal government); (5) introduced diseases, resource competition and gene pool dilution as a result of planting fish from private or state operated hatcheries; (6) mortality as a result of illegal harvest through incidental or intentional catch by anglers; (7) habitat degradation associated with non-Federal road building and maintenance; and (8) competition, predation and hybridization problems associated with non-native fish.

Private land timber harvest and related road construction activities are reasonably certain to occur within the next planning period. These activities are regulated by the Idaho Forestry Practices Act (IFPA) under the Idaho Department of Lands (IDL). The IFPA doesn't provide the level of protection and conservation for bull trout as the Forest Service provides on federally administered lands. The potential for reduced riparian buffers or other streamside effects are reasonably certain to occur when utilizing IFPA standard operating guides.

Within the action area there are numerous state, tribal, local, and private actions that potentially affect bull trout. Many of the categories of on-going activities with potential effects to bull trout and bull trout habitat were identified in the Status of the Species section of this Opinion. These activities include timber harvest and road building, grazing, water diversion, residential development, and agriculture.

City, county, and state transportation departments conduct annual herbicide spraying of right-of-ways in the action area with unknown concentrations of herbicides potentially delivered to bull trout streams. In addition, water withdrawals related to private inholdings surrounded by public land in the Brownlee Reservoir core area impact bull trout by reducing water flow (Service 2002).

Illegal and inadvertent harvest of bull trout is also considered a cumulative effect. Harvest can occur through both misidentification and deliberate catch. Schmetterling and Long (1999) found that only 44 percent of the anglers they interviewed in Montana could successfully identify bull trout. Being aggressive piscivores, bull trout readily take lures or bait (Ratliff and Howell 1992). Idaho Department of Fish and Game reported that 400 bull trout were caught and released in the regional (Clearwater administrative region) waters of the Salmon and Snake Rivers during the 2002 salmon and steelhead fishing seasons. In the Little Salmon River, 89 bull trout were caught and released during the same fishing seasons (Idaho Department of Fish and Game 2004). Spawning bull trout are particularly vulnerable to harvest because the fish are easily observed during autumn low flow conditions. Hooking mortality rates range from four percent for nonanadromous salmonids with the use of artificial lures and flies (Schill and Scarpella 1997) to a 60 percent worst case scenario for bull trout taken with bait (Cochnauer et. al. 2001). Thus, even in cases where bull trout are released after being caught some mortality can be expected.

2.6.2 Northern Idaho Ground Squirrel

Predominant ongoing activities on non-Federal lands that are reasonably certain to affect northern Idaho ground squirrels and their habitat include timber harvest, livestock grazing, road construction, recreation, fire suppression, and residential development. Land uses also include limited amounts of cultivation and irrigation of hay fields and pastures, water diversions and water-right allocations, and residential development.

State and private land timber harvest and related road construction activities within Idaho are regulated by the IFPA, under the IDL. The IFPA does not provide the same level of protection

and conservation for threatened and endangered as the Plan does for Forests administered lands. Activities that are requested by the IFPA that may not provide adequate protection for northern Idaho ground squirrels and their habitat include: road construction and maintenance, timber harvest, and fire management. Conversely, Forest management that reduces tree stocking and increases openings could have a beneficial effect on the species. There is one known NIDGS colony on State land and several private tracts where these actions are reasonably certain to directly or indirectly affect ground squirrels.

As noted above, there are pathways for both adverse and beneficial effects on ground squirrels from livestock grazing. State lands leased for grazing are currently operated under BMPs established under Grazing Management Plans, overseen by the IDL. Grazing BMPs as identified in the Idaho State Agricultural Pollution Abatement Plan (State Plan) are not mandatory but recommended for private lands. Because compliance with the State Plan is not required on private lands, no monitoring plan is in place to evaluate potential impacts to ESA listed species or designated critical habitat. The IDL does perform monitoring of larger tracts of leased lands to ensure compliance with established grazing management plans. However, smaller, more isolated blocks of leased land are often not monitored for compliance and managed according to lands surrounding them (private or federal). Grazing management plans as currently required by IDL are authorized for ten-year terms, leading to an inability to incorporate new and more ecologically friendly practices as these practices evolve. State management plan BMPs typically revolve around season of use and animal unit months (AUMs), not focusing on riparian area monitoring and protection. Given the limited controls on grazing under state oversight, it is unlikely that management would be carried out to assure adverse effects on ground squirrels would be avoided and minimized.

As with timber management and grazing, recreation and fire management on non-Federal lands does not come with assurances of protection of listed species. The general nature of impacts of these activities on ground squirrels is described above. It is reasonably certain that adverse effects on the species could result from these activities. A number of ground squirrel colonies are located on private lands that are presently managed for agricultural uses. There is potential from the development of parts of these properties for residential use, and loss of northern Idaho ground squirrel habitat.

The Act provides options for non-Federal entities to develop conservation agreements and Habitat Conservation Plans that address management and development effects on candidate, proposed, and listed species. Landowners in the general vicinity of the action area have been working with the Service to conserve other species, including southern Idaho ground squirrel. It is possible that in the future, northern Idaho ground squirrels may benefit from actions carried out under similar private/Federal agreements.

2.6.3 Summary of Effects

2.6.3.1 Bull Trout

Adverse effects to bull trout are anticipated in the Brownlee Reservoir watershed from the Travel Plan (including Trails and Administrative site operations) and the Forest's noxious weed program. The Service conducted the analysis of effects to bull trout for all proposed Forest actions for an entire watershed in order to get a comprehensive overview of how all of the proposed actions are affecting bull trout.

Although adverse effects are anticipated through myriad mechanisms, the collective range of effects is still considered small, primarily because of the conservation measures the Forest has proposed up-front to reduce effects. The Forest's LRMP and the Brownlee Reservoir Watershed Assessment address potential effects through avoidance, minimization, and actions to offset adverse impacts. While we anticipate some adverse effects may result from activities implemented under the proposed actions, components of the revised LRMPs and proposed mitigation measures in the Assessment assure that conditions in the action area for bull trout will be maintained or improved over the ten to 15 year implementation period.

2.6.3.2 Northern Idaho Ground Squirrel

Adverse effects to NIDGSs are anticipated in the Brownlee Reservoir watershed from the Travel Plan (including Trails and Administrative site operations) and the Forest's grazing program. The Service conducted the analysis of effects to NIDGSs for all proposed Forest actions for an entire watershed in order to get a comprehensive overview of how all of the proposed actions are affecting the species.

While the status of this species and environmental baseline are extremely precarious, it is the Service's Opinion that the proposed action will not cause adverse effects that would reduce the likelihood of survival and recovery on the northern Idaho ground squirrel. The proposed actions provide overall guidance for avoidance of direct and indirect threats to the habitat of the species. The restoration and maintenance of habitat and dispersal corridors are featured in the management intent of the LRMP and were considered in this analysis. The proposed actions do not authorize activities that would reduce reproduction, numbers, or distribution of the species.

2.7 Conclusion

2.7.1 Travel Plan, Road Management, and Trail and Administrative Site Operation

2.7.1.1 Bull Trout

After reviewing the status of the affected species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, the Service concludes that the action as proposed is not likely to jeopardize the continued existence of bull trout. This determination is based upon the following considerations:

- Take is expected to occur in the form of harm and harassment, and some lethal take is expected to result;
- Proposed conservation measures are designed to keep sediment and fuel/chemicals out of action area streams;
- Active road maintenance should reduce chronic sediment delivery to streams and result in a beneficial long-term effect;
- Activities will be of short duration in any given location, with projects spread across time, and across the entire roaded portion of the Forest. Consequently, only scattered portions of bull trout populations would be exposed to risks from this action at any given time; and

- The adverse effects of this action on habitat will likely result in small, localized, negative impacts on the conservation value of habitat. However, it is not likely that these localized effects will have a significant impact on the overall conservation value of bull trout habitat in the watershed as a whole. Immediately following project completion and into the long-term, the conservation value of affected habitats should realize a localized improvement through reduced sediment delivery.

2.7.1.2 Northern Idaho Ground Squirrel

After reviewing the status of the affected species, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, the Service concludes that the action as proposed is not likely to jeopardize the continued existence of the NIDGS. This determination is based upon the following considerations:

- Lethal take is expected but not at a level that would affect reproduction and population status of the species throughout the term of the consultation.
- Proposed conservation measures will reduce effects to NIDGS habitat.
- Reduced road use and off-road travel will protect individual NIDGSs.

2.7.2 Noxious Weeds

After reviewing the status of the affected species and their habitats, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, the Service concludes that the action as proposed is not likely to jeopardize the continued existence of bull trout. A very small number of fish are likely to be harmed or killed by the action due to dispersed use of chemicals in small amounts and numerous safeguards designed to prevent or minimize introduction of herbicides into streams.

In terrestrial areas, the proposed action is not likely to alter hydrologic processes or riparian vegetation to an extent that affects the stream environment. The proposed action would have localized short-term effects on riparian vegetation through the intentional eradication of weeds and any incidental mortality of desired riparian plants exposed to herbicides. In the long-term, weed control would help restore ecological functions of riparian communities where those functions have been impaired by invasion of exotic plants. Incidental losses of desired plants would be sporadic and localized in riparian areas since herbicides would be applied to individual plants, primarily by spot spraying. Any losses of non-target plants would generally involve only herbaceous species that could be reestablished within a few growing seasons.

A variety of sublethal effects on fish are reported for the herbicides evaluated in this Opinion, at concentrations that are likely to occur in the action area. However, it cannot be determined from the available information if the sublethal effects reported in laboratory assays are severe enough to "harm" listed fish through mortality at a later life stage or reduced reproductive output. Information is lacking or incomplete for most potential sublethal effects, but sublethal effects are reported at concentrations below those likely to occur on occasion in the action area. From this information, we can infer that the likelihood of harm occurring from sublethal effects of the herbicides cannot be discounted; however, the actual likelihood of harm occurring from the proposed action is unknown.

In spite of uncertainties regarding toxic effects of the herbicides, the likelihood of jeopardizing listed bull trout through harm from sublethal effects or outright mortality is highly improbable due to the following circumstances.

- Any harm that might occur from sublethal effects is expected to affect only a small portion of the action area.
- Significant water contamination is not expected to occur, except in very isolated cases of short duration (e.g. spikes in herbicide concentration following a rainfall), limiting the scope of any take that might occur.
- The areas where herbicides would be applied are widely scattered and the treatment areas do not involve large contiguous spray sites. Consequently, only scattered portions of listed bull trout populations would be exposed to risks from this action.

2.7.3 Grazing

2.7.3.1 Northern Idaho Ground Squirrel

After reviewing the current status of the NIDGS, the environmental baseline for the action area, the effects of the proposed action, and any cumulative effects, it is the Service's Biological Opinion that the Forest's authorization of cattle grazing in the Brownlee Reservoir watershed is not likely to jeopardize the continued existence of the northern Idaho ground squirrel.

- Although the proposed action may have some adverse effects on a small number of NIDGSs, these effects are not likely to cause a measurable response to NIDGS populations.
- Many of the NIDGSs within the Brownlee Reservoir watershed are not likely to be exposed to the effects of the proposed action because not all populations overlap with proposed grazing.
- The effects of the proposed action on the NIDGSs at the watershed scale are likely to be subtle because of the low detectability of competition caused by the proposed action.

2.8 Incidental Take Statement

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited

taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

2.8.1 Travel Plan, Road Management, and Trail and Administrative Site Operation

2.8.1.1 Bull Trout

2.8.1.1.1 Amount or Extent of Take Anticipated

The Service anticipates that take in the form of death or injury to individual fish, harassment of individual fish, and adverse effects to their habitat that result in harm to individual fish is reasonably certain to occur as a result of the proposed action. The following level of take of this species can be anticipated by using existing information documenting effects to bull trout and other salmonids, and the best professional judgment and visual observations of fisheries biologists in the action area.

The effects of the proposed action considered in this Opinion are expected to result in the death of some bull trout located within this watershed. Calculation of the amount of incidental take that may occur is complicated by the variation in the potential numbers of bull trout that may inhabit a particular ford or riparian area at the time of public use. While some fords may contain no bull trout, others may be inhabited by resident bull trout. Bull trout are known to spawn in fords, and fry may be located in ford bottom gravels.

It is not practicable to estimate a maximum number of individual bull trout that may be killed by public use of fords, nor is it possible to assess such potential take at a programmatic level. While use of public education, attempting to reroute or put bridges over existing fords, and conservation measures designed to protect bull trout in fords will minimize the amount of take that may occur, the chance for take within fords containing resident bull trout cannot be eliminated, particularly for small fish that may be stranded during low water times. As calculation of numbers of bull trout that may be lethally taken is not practicable, the Service provides take for mortality of all bull trout located in individual fords associated with Forest travel, following stringent application of all applicable conservation measures to avoid or minimize the lethal take of bull trout within these fords. All observed take will be reported to the Service in a timely manner as described in the Reporting Requirements section below.

Increased sediment production may also adversely affect habitat conditions for bull trout, particularly for juveniles. Increased substrate embeddedness may adversely affect habitat conditions for juvenile bull trout to the point that habitat becomes unsuitable. Over time, travel on all approved travelways will increase. Thus, sedimentation to waters occupied by bull trout will also increase over the 10-year consultation period. All juveniles within 600 feet downstream of a road maintenance project site may exhibit abandonment of that area, avoidance activities, or other behavioral responses. The Service recognizes that it is unlikely that all juvenile bull trout will experience these effects, and that these effects are not likely at all project sites, but it is not possible to determine the local, project specific effects with more precision at the programmatic level. Even given this imprecision, the Service concludes that the effects to juvenile bull trout would not impact overall survival or affect subpopulation characteristics.

Project implementation may temporarily block instream fish passage during road maintenance-associated structure installation projects. Passage obstruction is not expected to

exceed one week, with one day being more common. Since project activities will cover a relatively small area and will occur over a very short time, the effect of instream passage obstruction is considered to be minor. All resident bull trout that are present downstream of the project site may be denied access to upstream habitats while project work is occurring. This harassment effect is only expected at locations where the existing diversion structure did not represent a passage barrier already. Minor forms of injury may occur such as minor physiological stress associated with restricted movement to potentially more suitable habitats upstream. In the unknown number of cases where project activities will overlap with juvenile bull trout occurrence we anticipate short-term periods of increased juvenile predation. We only anticipate that these effects will rise to the level of take at a small number of project sites, and that effects associated with passage obstruction will only adversely affect a small number of fish at any given location. In many cases the effects associated with passage obstruction are not expected to rise to the level of take, or will not adversely affect bull trout.

To summarize elements considered in this Incidental Take Statement, take of bull trout is exempted under the following conditions for projects implemented over the ten year duration of this Program.

- Lethal take of all bull trout remaining in fords following stringent use of conservation measures to minimize take as described in the Assessment, including use of work windows and relocation of all detectable bull trout into the adjacent stream prior maintenance work.
- Lethal take of bull trout associated with short-term increased predation on juvenile bull trout from project-related effects.
- Sublethal take of bull trout for turbidity/suspended sediment levels beyond background levels visible within 600 feet downstream of the site-specific projects under the Travel Plan and Road and Trail Maintenance Program for two days following cessation of in-water work and two days following the first precipitation event. Background turbidity/sediment levels should be observed at least 200 feet upstream from the proposed work site.
- Sublethal take of bull trout from impeded fish passage from individual projects (not covered under the Region 4 Stream Crossing Programmatic) of up to one week in duration.

Take of bull trout beyond those conditions described above is not exempted by this Incidental Take Statement.

2.8.1.1.2 Effect of the Take

The Service has determined that the level of take anticipated as a result of the proposed action is not likely to jeopardize the Columbia River distinct population segment of bull trout. The proposed action is not expected to reduce the reproduction, status, and distribution of bull trout in the action area, and will not appreciably reduce the likelihood of survival and recovery of the Columbia River distinct population segment.

We do not anticipate appreciable changes in the numbers, distribution, or reproduction of bull trout in any of the core areas or local populations that occur in the action area. Over the long-term, the projects implemented under this programmatic consultation are expected to

contribute to the conservation and recovery of bull trout throughout the action area by eliminating travel in all areas undesignated, and improving the condition and reducing the number of roads.

2.8.1.2 Northern Idaho Ground Squirrel

2.8.1.2.1 Amount of Take

The Service anticipates that take in the form of death or injury to individual NIDGSs, harassment of individual squirrels, and adverse effects to their habitat that result in harm to individual squirrels are reasonably certain to occur as a result of the proposed action. The following level of take of this species can be anticipated by using existing information documenting effects to small mammals.

The effects of the proposed action considered in this Opinion are expected to result in the death of some NIDGSs located within this watershed. Calculation of the amount of incidental take that may occur is complicated by the variation in the potential numbers of NIDGSs that may inhabit an area adjacent to a Forest road at the time of public use. Because some areas approved for travel are located adjacent to known NIDGS colonies, it is reasonable to assume that collisions between NIDGSs and vehicles will occur. The Service expects that approximately five NIDGSs will be killed as a result of authorization of travel in the Brownlee Reservoir Watershed in the ten-year term of this consultation. The level of take due to road kill caused by increased traffic volume over time cannot be accurately anticipated, however, take above this number, given the small population size and limited extent of occupation, may unacceptably impact population numbers. Because off-road travel is not authorized in areas of NIDGS occupancy, the Service will assume enforcement of this decision associated with the Travel Plan Action. Therefore, we are not authorizing take in the form of habitat destruction and public trespass.

2.8.1.2.2 Effect of Take

The Service has determined that the level of take anticipated as a result of the proposed action is not likely to jeopardize the NIDGS. The proposed action is not expected to significantly reduce the reproduction, status, and distribution of NIDGSs in the action area, and will not appreciably reduce the likelihood of survival and recovery of the species.

We do not anticipate appreciable changes in the numbers, distribution, or reproduction of NIDGSs that occur in the action area. Over the long-term, the projects implemented under this programmatic consultation are expected to contribute to the conservation and recovery of NIDGSs throughout the action area, and the population segment within the Brownlee Reservoir Watershed, specifically, as off-road travel is eliminated and roads and dispersed camping are minimized in the action area.

2.8.1.3 Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of bull trout and NIDGSs.

1) The Forest Service shall implement actions to minimize the effect of the take anticipated to bull trout and NIDGS populations.

2) The Forest Service shall ensure completion of a monitoring and reporting program to confirm that the Program conservation measures are effective at avoiding and

minimizing incidental take associated with projects implemented under the Travel Plan and associated actions.

2.8.1.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and outlines required reporting/monitoring requirements. These terms and conditions are non-discretionary.

2.8.1.4.1 Bull Trout

1) Implement LRMP objective REOB18 by summarizing the results of the Forest's trail and non-system road inventories and identifying road and trail fords that are likely to occur in spawning habitat for bull trout, and establish a prioritization process to guide implementation of remedial efforts. Use LRMP standard REST05 to promote immediate closures where adverse effects to bull trout (e.g., fords in spawning areas, damage to habitat) are indicated.

2) Use existing Roads Analyses to identify roads deemed necessary for Forest management and prioritize remedial actions that will reduce the potential for adverse effects to bull trout by construction of bridges; routes not deemed essential should be prioritized with respect to potential for adverse effects and closed or obliterated as funding permits.

3) Use existing Roads Analyses and the Forest's culvert inventory to identify migration barriers to bull trout on authorized and unauthorized routes, and develop a process for upgrading them to allow for fish passage. Institute additional Roads Analyses and expand the culvert inventory as needed to provide information in areas of this watershed that have not been thoroughly surveyed.

4) For undesignated/unauthorized roads that will be retained on the landscape, either in the short term pending determination of proper future use of those routes or those already determined to be necessary for Forest management, determine which are most likely to cause adverse effects (either through unauthorized use or decreased maintenance) and place physical closures (e.g., gates) at their termini as a short-term measure to minimize the potential for adverse effects and perform appropriate road maintenance.

2.8.1.4.2 Northern Idaho Ground Squirrel

1) Work with the Level 1 team to identify and close roads in occupied NIDGS habitat where illegal activities (i.e., illegal shooting or off-road travel) or introduction of noxious weeds are likely to occur.

2) Post a warning sign (i.e., "wildlife area") and advisory speed plaque of 15 mph on road segments which intersect occupied NIDGS habitat where the Level 1 team has determined that vehicle speeds could easily exceed this speed. You shall begin with main arterial roads and complete posting all roads in this category by November 2011.

2.8.2 Noxious Weeds

2.8.2.1 Amount or Extent of Take Anticipated

The proposed action is likely to cause incidental take of bull trout. The Service is reasonably certain incidental take will occur because: (1) recent and historical surveys indicate that bull trout occur in the action area; and (2) the proposed action is likely to kill or harm individual listed bull trout through lethal or sublethal exposure to herbicides. These effects may occur as a result of accidental spills, failure of conservation measures to keep chemical concentrations below expected levels, unexpected toxic effects that have not been reported in the scientific literature, or additive or synergistic effects of herbicides from multiple sources in the action area. Herbicides sprayed by the Forest are typically unlikely to reach streams in concentrations that kill listed fish, and most take resulting from the action is likely to be sublethal effects that are harmful to fish.

Despite the use of best scientific and commercial data available, the Service cannot quantify the specific amount of incidental take of individual fish or incubating eggs for this action. The amount of take from the proposed action depends on the circumstances at the specific times and locations that weed treatments will occur, such as rainfall, wind, humidity, and proximity of weeds to individual fish or redds.

Similarly, it is difficult for the Service to quantify the extent of take for the action as proposed. However, the acreage where herbicides are applied within 100 feet of live water is a reasonable surrogate for describing the extent of take. Chemicals are most likely to reach streams when they are applied to riparian areas, road ditches, floodplains, or ephemeral drainage features in close proximity to water. Consequently, the acreage treated within 100 feet of live water is used to describe the extent of incidental take in this Take Statement, and it represents those areas where chemicals are most likely to reach the stream, and harm listed fish.

In many places where herbicides are applied within 100 feet of water, take is not anticipated to occur. The choice of the particular herbicides and the conservation measures in the proposed action are likely to minimize the frequency and severity of incidental take in those places where chemicals reach the stream. However, the conservation measures do not completely eliminate the potential for incidental take since herbicides will be used in sites where they are likely to reach water where listed fish are present. There is no practical alternative to using proximity to water and treatment acreage as a surrogate measure of take without knowing ahead of time the precise locations where herbicides will be used, and without consideration of weather following herbicide application, along with site-specific features affecting herbicide transport.

For purposes of this incidental take statement, and based on correspondence with Forest personnel, it is assumed that the Forest will chemically treat no more than 200 acres in the Brownlee Reservoir watershed annually, with approximately 10 percent of the treatment acreage occurring within 100 feet of live water. Based on a maximum annual treatment of 200 acres of weed infestations, up to 10 percent of which is likely to occur within 100 feet of live water, the extent of incidental take is limited to no more than 20 acres per watershed, per year, of herbicide application within the 100-foot zone.

The Service anticipates that incidental take will not occur in upland treatment sites or in the majority of instances where herbicides are applied within 100 feet of streams. Take is expected to occur in occasional circumstances where precipitation transports herbicides into water in

concentrations where sublethal or lethal effects are likely. Such circumstances are expected to occur only in sites where weeds are sprayed in the vicinity of roadside ditches or small stream channels that are occupied by listed fish, and showers or thunderstorms deliver a pulse of herbicides to the occupied stream channels.

2.8.2.2 Effect of the Take

The Service has determined that the level of take anticipated as a result of the proposed action is not likely to jeopardize the Columbia River distinct population segment of bull trout. The proposed action is not expected to reduce the reproduction, status, and distribution of bull trout in the action area, and will not appreciably reduce the likelihood of survival and recovery of the Columbia River distinct population segment.

We do not anticipate appreciable changes in the numbers, distribution, or reproduction of bull trout in any of the core areas or local populations that occur in the action area. Over the long-term, the projects implemented under this programmatic consultation are expected to contribute to the conservation and recovery of bull trout habitat throughout the action area by eliminating noxious weed infestations, and the Columbia River distinct population segment as habitats are improved.

2.8.2.3 Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of bull trout.

The Forest shall minimize incidental take by:

1) Minimizing the amount and extent of incidental take from use of herbicides by implementing precautionary measures that keep chemicals out of water.
2) Ensuring completion of an annual weed treatment monitoring program by January 31 following each of the annual spray seasons.

2.8.2.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions in areas occupied by bull trout in this watershed, which implement the reasonable and prudent measures described above and, outlines required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1) To implement Reasonable and Prudent Measure # 1, the Forest shall:
   a) Use added precaution when applying herbicides near streams or roadside ditches that drain directly into streams. Consider hand-pulling plants wherever possible to avoid introduction of chemicals into waterways.
   b) Ensure all chemical storage, chemical mixing, and post-application equipment cleaning is completed in such a manner as to prevent the potential contamination of any riparian area, perennial or intermittent waterway, unprotected ephemeral waterway, or wetland.
   c) Maintenance and calibration of spray equipment should occur regularly through the spray season to ensure proper application rates and droplet size.

2) To implement RPM #2, above, the Forest shall:

a) Specify in a monitoring plan the methodology used to assess effects of this program on herbaceous and woody riparian vegetation, including the effectiveness of reseeding or planting of woody species and adaptively adjust methodology to ensure objectives are met.

b) Coordinate and collaborate with other agencies and research facilities performing validation monitoring of the herbicide transport models, which are described in the Assessment.

2.8.3 Grazing

2.8.3.1 Northern Idaho Ground Squirrel

2.8.3.1.1 Amount or Extent of Take Anticipated

The Service expects that the proposed action may result in take of the NIDGS through harm, injury, and potentially death associated with competition between NIDGSs and livestock. However, such take is also likely to result from many unrelated Federal and non-Federal actions and environmental conditions as well, and it is not possible to specifically attribute some portion of that take to the Forest's action. Also, it is extremely difficult to detect such take and to attribute it to a specific cause because a complexity of factors influence the NIDGS and because we lack the ability to measure such harm, injury, and death to the species. Given these factors, it is not possible or reasonable for the Service to provide a quantitative description of incidental take that is reasonably likely to result from the proposed action. As such, we are not providing section 7(b)(4) or 7(o)(2) exemption from take prohibitions under section 9 of the Act in this Opinion.

2.8.3.1.2 Effect of Take

The Service has determined that the level of take anticipated as a result of the proposed action is not likely to jeopardize the NIDGS. The proposed action is not expected to reduce the reproduction, status, and distribution of squirrels in the action area, and will not appreciably reduce the likelihood of survival and recovery of the NIDGS population in this watershed.

Until further research is conducted, it is difficult to determine what type of effect livestock competition has on the species. Because we cannot reasonably assign take from this action, it is equally difficult to assess the effect of take. Because any take likely to occur would be in the form of competition and displacement (rather than burrow trampling), we do not anticipate appreciable changes in the numbers, distribution, or reproduction of NIDGSs.

2.8.3.1.3 Reasonable and Prudent Measures

Because no take of the NIDGS is specifically anticipated in this Opinion, no reasonable and prudent measures or terms and conditions are required.

2.9 Reporting Requirements

Continuous and timely communication between the Forest Service, National Marine Fisheries Service, and Fish and Wildlife Service will play a vital role in the successful completion of all projects within this watershed. The following reporting requirements are meant to ensure that

appropriate implementation occurs, terms and conditions are met, and that authorized take is not exceeded. Components of communication and project monitoring are as follows:

- Communication and project monitoring will consist of Forest Service's fishery biologists, wildlife biologist, or hydrologists notifying the Level 1 Team representatives of proposed annual activities prior to project implementation, including conveying that the proposed actions will meet conditions outlined in this Opinion and the supporting Assessment.
- If the Forest Service representative determines that minor modifications to the actions described in this Opinion are necessary for an individual project, the Forest Service will describe the requested modification and submit it to the Service's local Level 1 representative for approval. Implementation of modified projects will not occur until the Service's local Level 1 Team representative concurs that the modified project will fall within the range of effects described in this Opinion.
- Each herbicide applicator shall maintain a daily log of all weed treatments, and include the following information:
- The number of acres treated within 100 feet of live water and greater than 100 feet from live water. Identify treatment areas by 6th field hydrologic unit code (HUC).
- The product names and herbicide formulations.
- The herbicide application rate.
- The application method.
- Wind speed and air temperature at the time of application.
- Documentation of observations of take of bull trout or NIDGSs will be recorded by the Forest Service or their representatives. Activities shall cease, and the Forest will notify the Service of all incidental take observed immediately via phone or written correspondence.
- In addition, the Forest Service will notify the Level 1 Team representatives of completed projects in the winter (annually) after they are completed. This notification will include implementation of conservation measures and any effectiveness of projects on habitat and population conditions of species. The Forest will provide this information via written report or scheduled meeting to the Level 1 Team representatives for projects completed during the previous year.
- Communications between the Forest Service and the regulatory agencies will be informal in nature and will be primarily accomplished by telephone or email with Level 1 Team representatives. Efforts will be made to notify the regulatory agencies' Level 1 Team representatives of an upcoming project in a timely manner (at least three weeks in advance, if possible) prior to project implementation.
- Every ten years, the processes established in this consultation will be evaluated through reinitiation jointly by the Forest Service, the Service, and NOAA Fisheries to ensure that the implementation of the ongoing actions are being carried out in accordance with the Assessment and this Opinion, and to determine whether or not effects to bull trout and NIDGSs are being minimized as described in this Opinion.

- Copies of all records associated with the above reporting requirements will be retained in the Forest Service's files.

2.10 Conservation Recommendations

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. The following recommendations are discretionary measures that the Service believes are consistent with this obligation and therefore should be carried out by the Forest:

1) The Forest should survey all bridges proposed for replacement or repair on the Forest for bat activity prior to implementation.

2) Immediately begin implementation of the "Framework" process, which will include a strategy to address resource issues related to road management and implementation of the Travel Plan.

3) Limit all 18-wheeler traffic or regular vehicle trips (in excess of four round-trips per day) within the Forest's control (i.e., related to an individual Forest action or permitted activity) in or adjacent to occupied NIDGS habitat to time periods when NIDGSs are in hibernation.

4) The Forest should use herbicides with the least toxicity to listed fish and other non-target organisms whenever possible.

5) The Forest should continue to investigate the utility of alternative forms of weed control that do not involve the use of chemicals toxic to aquatic organisms. Examples of alternatives include substitution of vinegar or acetic acid formulations for spot-spraying weeds, and use of steam or other heat killing methods.

6) Minimize the use of combining herbicides where practicable, particularly the combination of picloram and 2-4, D, which when used in combination has been demonstrated to damage gills of catfish.

7) The Forest should carry-out (i.e., through funding) the grazing study investigating the effect of the Forest grazing program on NIDGSs recommended by the Service and other members of the NIDGS Technical Team.

Please notify the Service if any of these recommendations are implemented so that we will be kept informed of actions that minimize or avoid adverse effects, and those that benefit species or their habitats.

2.11 Reinitiation Notice

This concludes formal consultation on the Forest's proposal to continue ongoing actions as proposed above. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not

considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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