EXAMPLE PROJECT DESIGN FEATURES

The following document is meant to serve as an example of the types of design features that are often used for projects such as the proposed Hanna Flats GNA project. The Hanna Flats GNA project will include features such as those presented below. However, it is currently too early in the planning and analysis process for the Hanna Flats project to know exactly what design features are needed for that project. Therefore, this is meant to serve as an example and the actual design features that are eventually selected for the Hanna Flats project will vary somewhat from the features described below. The features below were copied from the Deer Creek project on the Bonners Ferry Ranger District.

Appendix C – Measures Designed to Avoid, Minimize, or Mitigate Adverse Effects

The IDT developed design features to minimize or avoid adverse effects that could have otherwise occurred as a result of implementing the action alternatives. The design features are based on forest plan direction and policy, best available science and site-specific evaluations. Should one of the action alternatives be selected, all of these features would be used (except where exceptions are stated) during the project implementation.

Project implementation includes the physical on-the-ground design of the project completed by layout crews; timber sale contract administration; and reforestation activities such as site preparation and planting. Design features are applied on the ground through physical design as instructed in silvicultural prescriptions, marking guides, and cruise plans. Some features address conditions found on-the-ground during project activities, and are applied through the timber sale contract, which includes both standard and site specific provisions.

Design Measures

The following specific features would be applied during project implementation. The purpose of these measures is to completely avoid, or to the fullest extent possible, minimize the potential for adverse environmental impacts. The effects analysis assumes their implementation.

Aquatics

The Deer Creek project will use Best Management Practices (BMPs) as part of the project design and implementation (contract). Many of the BMPs are general (e.g. timing issues) whereas others are site specific (e.g. graveling over predetermined stream crossings). Based on past unbiased implementation monitoring (IDL 2011), it is anticipated that the Forest Service will adhere to all BMPs as prescribed. The following list summarizes the project design features required to help reduce the potential impacts to hydrologic resources in the Deer Creek Project area. More detailed discussion of the effects of measures can be found in the analysis in the discussion for Environmental Consequences associated with the action alternatives.
The following listing of design features responds to specific comments received from the public during scoping as well as concerns raised by the project Hydrologist. The scoping comments focused on protecting domestic water supplies, effects of transportation system on aquatic resources and reducing sediment delivery. The design features are common to all action alternatives. The intent is that this work is accomplished as part of the larger project and the work is not required to be completed prior to timber hauling.

Roads and Culverts

Road Decommissioning: Unless circumstances change during implementation that would extend the duration of time a road is needed, roads would be decommissioned within the following timeframes:

Temporary roads or existing road segments proposed for decommissioning that are not needed for post-cutting activities (e.g. fuel treatment) would be decommissioned the same season following cutting activities or no later than the following season. Effectiveness is Moderate to High (Foltz et al 2007)

Other road segments proposed for decommissioning that are needed for post-cutting activities, such as prescribed burning, would be decommissioned within two to five years of cutting activities.

Dust Abatement: Dust abatement would occur regularly during log haul along road segments that are within 100 feet of live water for distances exceeding ¼ of a mile OR as needed to prevent excessive dust from entering streams/lakes.

Adding Relief culverts: Relief culverts, would be installed just upslope on roads draining into stream crossings. The cross drains would be used in specific locations where existing drainage ditches exceed 300 feet between the nearest cross drain and the stream (IDAPA, Title 38, ch. 13.040, sect. 02d. and Johansen et al. 1997). The intent of this design criterion is to reduce the delivery of sediment via a ditchline to a stream.

Clearing of culverts and ditchlines: All culverts and ditch lines associated with haul routes would be cleared and improved, if needed, prior to and after using roads to haul timber. Except in very limited instances, ditchlines would not be scraped, but rather ditchline vegetation would be removed without exposing the soils in the ditch line. If ditches require scraping, BMPs (such as ditch blocks), must be in place to prevent sediment delivery to any potentially affected stream. Effectiveness is HIGH based on IPNF Forest monitoring (see Forest website for past monitoring reports), State BMP audits, for greater than 95 percent compliance by federal agencies (IDEQ 2008; IDL 2011).

Replacing undersized and/or failing and/or damaged culverts: Undersized and/or failing or damaged stream crossing culverts would be replaced prior to using a road for timber hauling. An example of a damaged culvert that needs to be replaced is a ditch relief culvert on Road 435 T63N, T3E, Section 31 above Skin Creek. Effectiveness is HIGH based on IPNF Forest monitoring (see Forest website for past monitoring reports), State BMP audits, for greater than 95 percent compliance by federal agencies (IDEQ 2008; IDL 2011).
Portions of system Roads 2224 and 2225 would be stored as part of the project under various action alternatives. The prescription for each of these roads would be to remove all culverts, deeply rip the road prism, construct deep water bars to facilitate drainage (Luce 1997) and use limited recontouring as prescribed by the hydrologist and wildlife biologist. All stream crossings on these roads would be physically removed from NFS lands. Each crossing would be recontoured and stabilized using native materials such as slash, rock and logs. Disturbed soils would be mulched with native slash and seeded with a botanist approved seed mix. All earth disturbances would be completed when soils are the driest such as in later summer or early fall.

Non-system roads within the project area were addressed under the Transportation Analysis Process (TAPS). Each of the system roads will be assessed by a hydrologist to determine what level of treatment is needed for closure. If a road is brushed closed and has no culverts, no further treatment may be needed. However, if a non-system road has culverts, then that road prescription for closure may include machinery to treat the road prism and remove the culverts. IDAPA (Title 38, Chpt 38, Rule 040.04.03.g) requires that on “abandoned” roads, “all drainage structures must be removed and roadway sections treated so that erosion and landsliding are minimized.”

Road activities that repair or remove drainage structures in perennial streams would take place after July 15th and prior to October 15th when the soil moisture and stream flow tends to be lowest. Appropriate BMPs, including the use of sediment traps during replacements, would be followed to reduce potential impacts of sediment to these streams. Effectiveness is HIGH (Burroughs and King 1985, Seyedbagheri 1996, USDA Forest Service Monitoring Reports 1995 – 2011, Grace and Clinton 2007).

Where tractors access units from existing roads, limit the number of tractor crossings over ditches. Where crossings over existing ditch lines are necessary, the use of temporary culverts or “crossing logs” would be preferred to limit damage to drainage ditches.

If winter hauling is conducted, the following efforts will be required:

- All plowed roads would have drainage openings in the berms every 300 feet or as needed for satisfactory surface drainage.
- No snow would be plowed into stream crossings.
- All ditchlines would be kept operational.
- All culverts on haul routes would be kept open and functioning.

**Vegetation Treatments**

All appropriate RHCA buffers, as described in the forest plan would be maintained in the project area. Effectiveness is HIGH based on field observations in 2012 and IPNF Forest Monitoring see Forest website for past monitoring reports.

All action alternatives include precommercial thinning. This noncommercial harvest would be allowed to occur in the riparian habitat conservation area of several project area streams. The following design feature is prescribed for these units:
Sawyers on foot and using chainsaws would be allowed to precommercially thin trees within the riparian habitat conservation areas. Cut trees would be left on the ground and allowed to contribute to the organic composition of the soils in the area. No mechanical equipment (i.e. excavator, harvester, skid steer) would be allowed in the designated riparian habitat conservation areas.

Fire Activities

As practical, fire lines on slopes in excess of 30 percent would have water bars constructed every 150 to 200 feet to divert water off of slopes and onto the forest floor (IDAPA, Title 38, ch. 13.030, sect. 05.a). Fire lines would not be constructed within RHCAs. (IDAPA, Title 38, ch. 13.030, sect. 04.a). There would be no direct ignition of fuels in the RHCA buffers, however, fire would be allowed to back into the RHCA buffers. Ignition must occur outside the RHCA boundary. The purpose of allowing fire to back into the RHCA is to avoid construction of firelines which deliver sediment to streams. Allowing fire to creep into the RHCA would reduce fuels and not increase sediment delivery to the streams. (IDAPA, Title 38, ch. 13.030, sect. 07.e.ii).

Burning across draws flowing into domestic water sources would be avoided (IDAPA, Title 38, ch. 13.030, sect. 07.f).

Water sources used during fires would be cleared with an Aquatic Specialist prior to use. Screens may be required by Fish Biologist. Effectiveness is HIGH based on field observations in 2012 and IPNF Forest Monitoring see Forest website for past monitoring reports.

Protecting Domestic Water Sources

To avoid potential impacts to domestic water sources, all state recognized domestic water sources as well as water sources discovered during normal timber sale operations would be buffered from treatment. In accordance with the State of Idaho Forest Practices Act, streams contributing to domestic water sources are considered Class 1 streams for 1,320 feet upstream of the point of diversion (IDAPA 20.02.01 Rules Pertaining to the Idaho Forest Practices Act; IDL 2004). Water sources will be buffered at least 100 feet around the intake or well head and for 1,320 feet upstream. The 100 foot buffer around a surface water source or well exceeds the required IDAPA buffer of 75 feet. In some instances, the buffer widths may be increased to account for site-specific characteristics such as topographic breaks, benches, ridges, and riparian vegetation.

Burning across draws flowing into domestic water sources would be avoided (IDAPA, Title 38, ch. 13.030, sect. 07.f).

Cultural Resources

Cultural resources (including any newly encountered historic or pre-historic cultural sites) including buildings, trails, mining or logging camps and chutes, and properties would be protected by avoiding, buffering, or mitigating impacts to the sites. This includes caves, sinkholes, vertical shafts, and related features protected by the Federal Cave Resources Act of 1988. Site specific measures for known cultural resource sites would be incorporated into special provision C6.24# or required by the cultural resources report. The decision to avoid, protect or mitigate impacts to these sites would be in accordance with the National Historic Preservation Act.
Estimated Effectiveness: High; contract provisions for protection of cultural resource are utilized in all contracts and have been effective in protecting cultural resources.

Fuels

Commercial timber harvest creates surface fuels in addition to what is on the ground at the time of the activity, thus there is an increased fire hazard immediately following harvest. Depending on the intensity of the cutting, this additional material can be continuous and can contribute to high surface flame lengths and be an avenue for rapid fire spread through the stand and beyond in the case of a fire (intense surface fire can be just as severe as crown fire). In order to mitigate the hazard in the short-term, a method to reduce surface fuels will be utilized in all commercial harvest units. There are several methods that can be used to accomplish this:

- Grapple-piling followed by pile burning;
- Prescribed underburning;
- Biomass utilization or whole tree yarding (recommended in combination with one of the above);

Fireline would be constructed when necessary to contain prescribed burns. Topographic and vegetative features of the landscape may also be used for containment of prescribed fires when possible.

Estimated Effectiveness: High. Harvest and thinning operations which include a method of utilizing or reducing activity created surface fuels are effective at accomplishing fuels reduction objectives (Graham et al. 1999). Overwintering will help compact fuels as snow and ice settles on them – compacted fuel will burn with a lower rate and intensity versus those which are not because of the supply of air and increased fuel moistures under the compacted material.

Where PCT is proposed, activity created fuels will only be mechanically treated (mastication or grapple-piled and burned) on select units due to site and resource constraints (slope and soils disturbance).

For the PCT units that will not be piled or masticated, there will be a short-term (5-7 years) increase in fire hazard associated with the slash. Recommendations to treat the slash and minimize the fire hazard during this timeframe include the following:

- Directional felling (into the interior of the unit) would be used to minimize the amount of activity fuels along unit boundaries;
- Concurrent with saw work, lopping and scattering in high risk areas (for example, adjacent to untreated fuels or along roads) and in all areas the cut material would be left as compacted as possible and horizontal to the ground (<18” fuel depth);

Staggered timing of PCT-only units:

a. If immediately adjacent to a proposed harvest unit, PCT-only will occur after post-harvest fuels reduction activities have occurred (underburning or grapple-piling) in that adjacent harvest unit.

For PCT-only units a staged approach for implementation is recommended to further mitigate fire hazard across the landscape. For example, recommend pre-commercially thinning no more than half of the PCT-only acres in year zero and not treating the remaining acres until the fuels from the first half are mitigated (approximately 5-7
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years as determined by fire management personnel). This will break up the continuity of slash fuels occurring on the landscape at any one time.

Heavy snow loads are expected to contribute to compaction of the material further mitigating the fire risk associated with not treating the slash fuels in the PCT-only units. In the long-run (after 5-7 years post treatment) the slash from the PCT units will be part of the natural fuels profile and the hazard is expected to be mitigated.

Estimated Effectiveness: Moderate-High. Empirical data from across the north zone of the Idaho Panhandle National Forests suggests slash fuels from PCT thinning activities are mitigated in generally 5-7 years, especially with the aforementioned treatments.

**Harvest Operations**

No harvesting activities, including hauling from the sale area, would be permitted on weekends or holidays, to avoid conflicts with the recreating public.

Estimated effectiveness: High. This protective measures are often used in timber sale contracts for similar projects with success.

**Invasive Species**

Features Designed to Prevent Invasive Species (Weeds) Introduction and Spread

Gravel or borrow pits to be used during road construction or reconstruction would be free of new weed invader species (as defined by the IPNF NZ Botanist.) A list of suitable borrow pits (those which either are State-certified as “weed free” or those National Forest System (NFS) borrow pits which are routinely treated for weed control) is included in the project file. A list of weed species considered to be potential new invaders is also included in the project file.

Road segments identified for weed treatment and proposed for decommissioning or storage would be treated prior to decommissioning or closure.

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

All timber sale and/or public works contracts would require cleaning of off-road equipment prior to entry onto NFS lands. If operations occur in areas infested with new invaders (as defined by the IPNF NZ Botanist), all equipment would also be cleaned prior to moving to new sites.

All newly constructed roads, skid trails, landings, fuel breaks or other areas of disturbance (including cut/fill slopes, as well as maintenance and reconstruction of existing roads) would be seeded with the most current IPNF native, moist site, locally-adapted, certified, weed-free seed mix upon activity completion. (Lists available from the NZ Botanist.) Areas would also be fertilized and/or mulched if deemed necessary by the Soil Scientist or NZ Botanist. Revegetation species utilized should be source-identified, site-appropriate, and genetically-adapted to the project area, when feasible, to comply with FSM 2070. Areas that are underburned would be evaluated by the North Zone Botanist or Forest Soil Scientist after the burn and seeded/revegetated, mulched, and/or fertilized as necessary.
When reseeding is necessary, seeding would occur during an appropriate season (spring or fall) or weather conditions (at least 2 weeks prior to forecasted cooler, wetter weather) to ensure the most effective germination/establishment.

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

Efforts to help reduce potential spread within proposed treatment units already identified as having widespread, abundant weeds (particularly unit 60, 31, and 33) could include the following: perform winter harvest operations (where soil disturbance is less likely), modify treatment prescriptions to facilitate less overstory canopy removal, and modify slash disposal treatments to exclude fire (particularly broadcast fire) and instead treat fuels through on-site mastication. (Also, see associated mitigation measures below to help reduce weed populations in these areas.)

All noxious weed treatment would be conducted according to guidelines and priorities established in the Bonners Ferry Noxious Weed Control Project FEIS (USDA 1995), or in accordance with methods described in the Deer Creek Project proposed action. Methods of control may include biological, chemical, mechanical and cultural. Follow-up treatments and monitoring would be conducted as needed.

Any priority weed species (as defined by the IPNF NZ Botanist) identified during road maintenance or timber harvest would be reported to the District Weed Specialist to aid in monitoring and expedite treatment. A list of priority or "new invader" weed species is included in the project file.

Certain areas within the Deer Creek project, especially proposed units 60, 31, 33, 62, and 63, are infested by invasive plants. Meadow hawkweed is abundant throughout old skid trails. As a result, preferably one year prior to any proposed timber harvest or fuels activities being conducted in these areas, weed treatments should be conducted within the proposed timber harvest areas in an effort to contain and potentially reduce the existing weed populations. Monitoring of these proposed weed treatment units would be necessary to determine long-term efficacy.

Estimated Effectiveness: The design features and first two mitigation measures (described above) are accepted weed prevention and treatment practices developed by public land management agencies and university cooperative extension offices and promoted by weed management organizations across the nation (e.g. Sheley et al. 2002, Drlik et al. 1998, USDA Forest Service 2001). The above measures include those required in Forest Service Manual (FSM) 2900 for activities related to timber harvest and roads. They are described in FSM 2981.2-1a and FSM 2081.2-6a, respectively (see project file). For new weed invaders, the estimated effectiveness of the above measures is high; the measures are expected to be very effective at preventing establishment of new invaders. According to current research (Hobbs and Humphries 1995), early detection and treatment of infestations before explosive spread occurs can significantly reduce the social cost of weed invasions.

For existing infestations that occur along road rights-of-way, estimated effectiveness is moderate; the measures are expected to be somewhat effective at reducing the spread of these in the project area. For existing infestations that have spread off the road, estimated effectiveness is low. Effectiveness of treatments on National Forest System lands could be reduced if adjacent landowners do not treat their weed infestations. Existing weeds and new invaders are also spread by wildlife, winds, water and hikers – the mitigation measures would have no effect on these sources of weed spread.
For the last mitigation measure, this is an unproven method for long-term effectiveness in reducing overall weed spread beyond existing weed populations. As stated above, monitoring will help provide efficacy results from such treatment.

**Rare Plants**

A qualified botanist would assist with project layout as necessary to ensure protection of documented rare plant populations and microsites of highly suitable habitat. Any changes to the selected alternative that may occur during layout would be reviewed by the North Zone Botanist, and rare plant surveys conducted as necessary prior to project implementation. Newly documented occurrences would be evaluated, with specific protection measures implemented to protect population viability. Such measures could include the following:

- Microsites of highly suitable rare plant habitat that occur within proposed treatment units, including seeps, springs and other seasonally or perennially wet areas, would be protected from all project activities by site-specific buffers established by a qualified botanist.

Any changes to the proposed action that may occur during layout would be reviewed by a qualified botanist, and rare plant surveys would be conducted as necessary prior to project implementation. Newly documented occurrences would be evaluated, with specific protection measures implemented to protect population viability. Such measures could include the following:

b. Dropping units from harvest activity;
   - Modifying unit boundaries to provide adequate buffers around documented occurrences, as determined by a qualified botanist and based on topography, extent of contiguous suitable habitat for documented occurrences and the type of treatment proposed;
   - Modifying harvest methods, fuels treatment or logging systems to protect rare plants and their habitats; and/or
   - Implementing, if necessary, Timber Sale Contract provisions B6.24, Protection Measures Needed for Plants, Animals, Cultural Resources, and Cave Resources; C6.24#- Site Specific Special Protection Measures; and B8.33, Contract Suspension and Modification.

All documented rare plant occurrences would be protected from timber harvest activities by site-specific buffers established by a qualified botanist. Specifically, several R1 Sensitive Plants or IPNF Forest Species of Concern were found, including occurrences of multiple moonwort species (Botrychium species), ground pine (Lycopodium dendroides) and pine broomrape (Orobanchepinorum) were located within proposed activity areas. As a result, most plant locations were dropped from this proposal or will be appropriately buffered from any planned activities.

One rare plant location (Botrychiumlanceolatum, a G5S3 sensitive species) was found on an open, drivable road, FSR2586B. Although the road will not be closed, nor excluded from use by the timber sale, some road maintenance activities may require modification to avoid damaging the plant. For instance, although brushing, blading, spot graveling can occur along this road, actual road blading should not occur in the immediate vicinity of the plant. If blading is necessary for public safety, blading will occur after July 31, to ensure adequate sporulation season.
Estimated Effectiveness: High. The design features measures described above would protect documented occurrences of the sensitive species which were found within and/or adjacent to proposed harvest areas. These measures would be considered moderately effective at protecting currently undocumented occurrences of rare plants within the moist forest habitat guild.

Native Plant Species of Interest

Because huckleberry stands throughout much of the Deer Creek project area are highly-productive and heavily-used by local tribes, area residents and wildlife, some proposed treatments may require timing modifications. Although increased light to the forest floor resulting from timber harvest (and even burning) may actually help long-term huckleberry production in the area, burning activities also reset the huckleberries, and huckleberry stands often need 10-15 years following burning to resume good berry production. In an effort to reduce effects to overall berry crops, burning (either prescribed, broadcast burning or slash burning within planned timber harvest areas) should be staggered. This “staggered” burning will strive to burn no more than a third of the overall planned burn acres within any 3-4 year period, so that huckleberry production is not completely eliminated in the proposed activity areas for 10-15 years. Using this method, at least one-third of the potentially-impacted berry stands will be capable of berry production in any given year, with years 6-8 being the lowest productivity years, and by year 9-12 that ratio will begin increasing again. By year 19-24, all the potentially-impacted acres should be back into maximum huckleberry production.

Estimated effectiveness: High. This design feature is a suggested management practice in many highly-productive huckleberry stands throughout the northwest (Stark and Baker, 1992, Minore et al 1979).

Recreation

Developed Sites (Meadow Creek Campground, Solomon Lake, Perkins Lake, Keno Drainage)

1. Reduce dust on Solomon Lake road by using dust abatement. Establish signs along roads prior to the start of any harvesting activity. Provide project information at all developed sites.

Trail Maintenance and protection

2. Ridge top burn between Goat Mountain and Line Point: No slashing within 100 yards of the trail. Do not use ATVs for access to burning activities. Do not parallel trail with fireline or create fireline off switchbacks. If the fire happens to burn across trail #44, the trail would be re-established. It is a ridge trail and currently difficult to follow at points. Establish signs at Canuck, Keno, Goat Mtn. and trailheads on the Kootenai before any burning activity. Notify outfitters that have a special use permit for the area. Protect trailhead at Skin Creek (for harvest and burn activities) Do not use as a landing area, turnaround or site for equipment parking. Retain roadless characteristics throughout Buckhorn area.
Deer creek road is used to haul, coordinate with the snow groomers by contacting the project recreation specialist. If roads are being plowed, make sure there is a turnaround where the plowing ends.

The new parking area proposed for construction along the Deer Creek road for snowmobilers and other winter recreation use, will be designed and constructed in a way that does not interfere with any access needs of the private residents in that area.

**Dispersed Sites**

3. Dispersed sites off FS road 211: Pre-commercial thinning near Eileen dam access could create the opportunity for increased off road ATV and full size vehicle access. Signing is unlikely to help but should be put in place to keep motorized traffic on the primary access road. Private land should be clearly identified. If possible, thinning could be “designed” along the access road and the railroad to prevent motorized intrusion. That could include debris left in place, a slightly tighter forest along the road, (possibly clumps of trees left rather than consistent thinning).

Sites identified for pit development are currently used as campsites. Establish signs several weeks before work begins so that recreationists avoid camping in those places.

Estimated Effectiveness: high; contract provisions for protection of recreation trails, developed recreation sites and dispersed sites are utilized in contracts and have been effective in protecting recreation resources.

**Scenic Quality**

**Unit Marking**

Use cut tree (as opposed to leave tree) marking in visually sensitive areas.

Utilize species designation where appropriate to minimize the amount of necessary marking.

Anticipated Effectiveness: The goal is to minimize the visibility of tree markings post treatment, and through careful application of marking trees in areas with high foreground concern levels these methods are helpful visually.

**Shape, Edges and Structure of Individual Units**

Units would be shaped and feathered to reduce unnaturally shaped openings and the shadow-effect caused by hard edges. This would help units not appear as man-made features on the landscape.

Where the unit interfaces with an opening, the percent of thinning will be progressively increased toward the outside edge of the unit. Where unit interfaces with denser forest the thinning would be decreased toward the outside edge. In addition, this transition zone should avoid being uniform in size and should vary in width.

Treatment boundaries should extend up and over ridgelines to avoid a row of remnant trees along ridge lines that draw attention to created openings and are inconsistent with patterns created by fire or other natural disturbances. This is especially important along ridgelines silhouetted against the sky.

Created openings and treatment units should not be symmetrical in shape.
Straight lines and right angles would be avoided.

Created openings should resemble the size and shape of those found in the surrounding natural landscape.

Treatments should follow natural topographic breaks and changes in vegetation. Utilize natural breaks in topography and vegetation type to delineate treatment edges.

Along roadways, vary unit sizes, widths, shapes and distance from the center line.

Anticipated Effectiveness: The goal is natural appearing openings when viewed individually and a natural appearing mosaic when viewed within the broader landscape. Although application of these design measures would greatly lessen the overall visual impact from the management activity, they would not completely conceal the fact that the treatments were carried out mechanically from foreground and middlegroundviewsheds.

**Prescribed burning**

Reduce road and trail-frontage areas burned in combination with “leave-islands” in a variety of shape and sizes with irregular spacing. Leave islands should be achieved via small hand-constructed fire lines, approved clear fire retardant chemical, and/or “wet” line applications to avoid a strong edge effect. Avoid scorching of woodland specimens in leave areas and edges. Low-intensity backing fires can be used to modify vegetation and fuel accumulation with minimal bole scorch or crown damage. Vary fire intensity and method throughout unit being treated to aid in a more natural appearing opening.

Anticipated Effectiveness: The goal is to foster enhanced sprouting vigor so the treated landscape may recover more quickly and limit the impacts to the public of adverse visual effects. If these guidelines are adhered to, adverse visual effects may only last a few months to no more than 1 to 3 years.

**Road, Skid Trail, and Landing Construction**

Roads and landings within or adjacent to harvest units that are within sensitive viewing corridors should be located at breaks in topography, such as benches and ridgetops, or behind existing tree groupings, when feasible.

Spur roads should be curved, where possible, to prevent observers from looking directly into the unit.

Where feasible, retain screening trees one tree-height below roads and landings (including cable landings) when viewed from below.

Avoid creating a straight edge of trees by saving clumps of trees and single trees with varied spacing.

Where new access roads and skid trails meet a primary travel route, they should intersect at a right angle and, where feasible, curve after the junction to minimize the length of route seen from the primary travel route.
Anticipated Effectiveness: The goal is to reduce form, line and color contrast by taking advantage of natural topographic features and vegetation. By locating roads and landings in breaks in the topography or behind existing tree groupings, cut and fill slopes can be greatly minimized and the appearance of the road on the landscape can be greatly minimized.

**Skyline Yarding**

Location of skyline corridors and skid trails would be designed to minimize visual impact and should be designed so that the edges of the unit emulate natural edge patterns with a minimum of geometric lines.

If yader must set up on road with in topography requiring fan-shaped settings in a sensitive viewshed, the converging corridors at the landing may resemble the appearance of a small clearcut. In this situation, the yader should be located behind the road, making the convergence of corridors not as pronounced.

Avoid widely spaced trees that are silhouetted along the skyline.

Minimize the number of skyline corridors in visually sensitive areas

Selecting skyline systems with lateral yarding capabilities would be preferred

Anticipated Effectiveness: The goal is to reduce visual impacts caused by yarding equipment and log removal methods. The introduction of line and color can be minimized greatly with careful design and planning of tree removal and yarding techniques.

**Screening**

Where feasible, in areas with highly utilized recreation corridors, keep trees within a 50-100 foot buffer to screen harvest activity from public recreating

Anticipated Effectiveness: The goal is to screen views into cut units where sensitive travel routes occur within the project area. Retaining up to 100' feet of trees and vegetation would effectively reduce visual impacts depending on steepness or the terrain and health of the vegetation being retained.

**Slash Treatment**

Slash, root wads, and other debris will be removed, burned, chipped or lopped in sensitive viewsheds.

Anticipated Effectiveness: The goal is to reduce the remnants of timber management and overall visual impact to the natural character of the landscape surrounding treated units within highly sensitive travel routes. Cutting stumps low and reducing remnants of the management will greatly lessen the overall man-made appearance of the openings and help the site appear more natural within the near and midterm time periods.

**Soils**

The following design features are required to ensure compliance with the regulatory framework for this resource and/or to reduce the risk of adverse impacts to this resource. A description is provided as to when, where and how the design feature should be applied and/or what conditions would trigger the need to apply the design feature.
To reduce the impacts to soils and soil productivity, the proposed action would utilize Soil and Conservation Practices as described in the Soil and Water Conservation Practices (SWCP) Handbook. Following is a list of features that would be incorporated into the timber sale contract to protect soils to minimize soil disturbance:

**Soil productivity and nutrient cycling**

Fine organic matter and large woody debris would be retained on the ground for sustained nutrient cycling in harvest units, consistent with Graham et al (1994).

Slash should be left to over-winter nutrients back into the soil in most cases until fuel reduction treatments occur. This design feature does not apply to those units in which whole tree yarding is to occur or in units with fire concerns related to private property.

Anticipated Effectiveness: Highly effective as has been shown in research done by Garrison and Moore (1998).

Prescribed burning and pile burning would occur only when the upper surface inch of mineral soil has a moisture content of 25 percent by weight, or when duff moisture exceeds 60 percent, or when other monitoring or modeling indicates that soil productivity will be protected.

When prescribed fire is utilized, post-burn conditions would result in no more than 25 to 30 percent bare soils (excluding natural conditions) within an activity area (burn unit). On sensitive soils or slopes at or greater than 40 percent, no more than 20 percent of bare soils (excluding natural conditions) would be exposed within the activity area.

The desired prescribed fire outcome includes retention of organic matter (generally not much less than ¼ of an inch) that protects the soil from rain splash impacts, erosion, a decrease in soil moisture holding capacity, and increased solar surface heating, especially on south-facing slopes.

Anticipated Effectiveness: Moderate to high. Fire is a very useful tool for managers, but many variables exist in the natural environment that can complicate fire management. These design features attempt to limit the variables and forest plan monitoring has shown this to be effective when properly implemented.

**Tractor Yarding**

Ground-based yarding will operate on slopes up to 40 percent. All new skid trails would be designated and laid out to take advantage of topography and minimize disruption of natural drainage patterns. Where terrain is conducive, trails would be spaced at least 100 feet or more apart. Mechanized felling and skidding would allow skid patterns to be closer provided slash mats are being utilized. Post-harvest, ground disturbance associated with skid trails will be covered with randomly placed logs (on the contour) and seeded with the latest seed mix recommended at time of implementation to help increase the microtopography needed to reduce runoff.

Anticipated Effectiveness: Forest plan monitoring data shows this to be highly effective.

Heavily impacted skid trails may be required to be decompacted following all ground based activities in order to reduce compaction and erosion potential. Decompaction activities should avoid mixing the soil layers or disrupting their orientation. Determination of trails that need this treatment will be done by the Timber Sale Administrator or the Forest Soil Scientist.
Anticipated Effectiveness: Low to high. Many soil characteristics and operating decisions affect the outcomes of this feature. Forest plan monitoring has shown a 30-60 percent reduction in compaction as measured by bulk density of the soil.

All scheduling of harvest activities in tractor and forwarder units would occur when the soil profile is dry to reduce the effects from compaction (Poff, 1996, p. 482). In general, these conditions occur during summer and into fall prior to fire season ending rains.

Anticipated Effectiveness: Forest plan monitoring has shown this to be highly effective.

**Skyline Yarding**

The leading end of logs will be suspended during skyline yarding. No yarding across designated RHCA’s would occur with this project.

Anticipated Effectiveness: Forest plan monitoring has shown this to be highly effective.

**Protection during Grapple Piling Operations**

Any ground-based piling of slash (grapple-piling) will operate on slopes up to 40 percent, will utilize existing skid trails where possible and operate on slash mats. Burn piles should be small and numerous rather than large and few.

Anticipated Effectiveness: Forest plan monitoring has shown this to be highly effective.

**Log Landings**

Existing roads will be utilized as landings where appropriate in order to maintain acceptable soil compaction levels. All landings other than existing system roads utilized will be decompacted and covered with residual slash (within guidelines provided by Graham et al. 1994 for coarse-woody debris by habitat type), and seeded upon completion of the sale.

Anticipated Effectiveness: Forest plan monitoring has shown this to be highly effective.

**Winter Harvest Operations**

For any units harvested in the winter, equipment will operate on ground frozen to a minimum depth of four inches, or on 12 inches of settled snow and a slash mat. Snow may be removed, prior to operations, from trails to facilitate freezing into the soil profile.

For units requiring mandatory winter harvest for soil protection, a forwarder will be utilized to help preserve the slash mat in order to be effective. Use of a slash mat on frozen ground can protect the trail from prematurely beginning to thaw due to sun exposure. Pivoting machinery on snow should be avoided to prevent break thru of frozen ground.

Suspend operations under wet or thawing conditions. Harvesting during winter conditions requires extra vigilance in monitoring ground conditions in order to recognize the appropriate time to cease operations. Conditions can change rapidly throughout the day, especially in early and late winter. Operations utilizing this design feature are still bound by contract provision B6.6 Erosion Protection and Control.

Suspend operations under wet or thawing conditions.

Anticipated Effectiveness: Forest plan monitoring has shown this to be highly effective.
Applicable to all Ground Based Harvest Operations

Heavily impacted skid trails may be required to be decompacted or scarified following ground based harvest and fuel reduction activities in order to reduce compaction and potential for erosion. Decompaction activities should go no deeper than 14 inches and should avoid mixing the soil layers or disrupting their orientation. The purpose of this activity is to disrupt the compacted layers to help restore soil function. These activities will be conducted when the soil is dry. In general, operations typically occur July 1 – October 15, but may vary by year, depending on local weather conditions. The timber sale administrator, in conjunction with the forest soil scientist or a qualified specialist will determine those areas that need to be decompacted.

Vegetation


A combination of artificial regeneration with desirable species (blister-rust resistant white pine, western larch and ponderosa pine) from site-adapted seed sources in combination with natural regeneration would be used to restock regenerated areas.

To reduce residual stand damage, log length skidding and yarding would be required in units designated for intermediate harvest, unless otherwise approved by the sale administrator in consultation with the district silviculturist.

The layout for implementation of treatment units would account for any suitability limitations encountered on a site-by-site basis. Harvest and site preparation treatments would consider the short and long-term potential negative effects (including blow down, fire mortality, etc.) of proposed activities on adjacent trees and stands with site-by-site prescription modifications, such as changes in unit boundaries and modification of fuel treatment prescriptions.

All vegetative treatments would have silvicultural prescriptions approved by a certified silviculturist prior to implementation. These prescriptions would consider site-specific factors such as physical site, soils, climate, habitat type, current and future vegetative composition and conditions, interdisciplinary team objectives, NEPA decisions, other regulatory guidance, and Forest Plan goals, objectives and standards.

Site preparation, fuels treatment, and planting activities would occur within five years following timber harvest in regeneration units. Site preparation and/or fuels treatment may include a combination of prescribed burning, grapple piling, and hand piling, depending on post-cutting conditions.

While no vegetative treatments are being proposed in stands meeting old growth definitions, marking guidelines and silvicultural prescriptions would specify that any groups of large old would be retained if they are encountered.

In addition to the retention of individual trees needed to provide seed and/or shelter for regeneration, leave areas of diverse shapes and sizes would be retained both within, and between regeneration harvest units. These leave areas would not be limited to riparian habitat conservation areas. They would be centered on existing concentrations of large trees, large course woody debris, snags, seeps, rock outcroppings, wetlands, landslide-prone areas or other unique structural and/or habitat features. These areas would range in size from one quarter to five acres and would take the form of pockets, stringers and islands. This design element could result in up to thirty percent of a given proposed treatment area being unharvested.

Silvicultural prescriptions and marking guides would specify the retention of hardwood trees. It is expected that species such as aspen, cottonwood, alder and birch would become re-
established in some areas of regeneration harvest and contribute to within-stand compositional variability. Broadcast burning (both alone, and following harvest) would further act to rejuvenate fire-adapted, dependent or opportunistic shrub and hardwood species (Arno and Keane 2000, Smith and Fischer 1997, Clark and Sampson 1995). Harvest utilizing site-appropriate equipment in periods of favorable soil conditions would limit both detrimental soil disturbance and physical damage to huckleberry plants. The amount of huckleberry root crown dieback resulting from prescribed burns would tempered by implementing burns when conditions would result in moderate to low severity fire.

Estimated Effectiveness (all items) – High. The use of marking and layout guides, implementation check procedures and timber sale contract provisions has been effective in obtaining these desirable features.

Wildlife

Grizzly Bear – Use of Road 2536 that exceeds administrative use levels, and reconstruction/use of non-system roads connecting to this road system, would be scheduled so that the Keno BMU remains compliant with standards of the Motorized Access Management Direction for the IPNF. This may include creation of core habitat elsewhere in the BMU, and placing timing constraints on project activities to accommodate ongoing activities (both on the IPNF and on the Kootenai National Forest) elsewhere in the BMU without exceeding maximum open motorized route density (OMRD) standards.

Estimated Effectiveness - High. This provision will be built into timber harvest contracts and implemented by the sale administrator.

Grizzly Bear – No timber harvest, hauling on restricted roads, road reconstruction, road decommissioning and storage, grapple piling and slashing activities would take place between April 1 and June 15 within the Keno BMU.

Estimated Effectiveness - High. Since spring is the most sensitive time period for grizzly bears, limiting operations during this season would greatly reduce potential effects. This provision will be built into timber harvest contracts and implemented by the sale administrator.

Grizzly Bear – Burning of burn-only units within the Keno BMU (“Burn 1-4”) would be accomplished in fall (rather than spring) to the maximum extent practicable.

Estimated Effectiveness - Moderate; spring is the most sensitive time period for grizzly bears when their fat reserves have been severely depleted and foraging to rebuild energy reserves is their primary focus (U.S, Fish and Wildlife Service 2011b). Limiting project activities during this season greatly reduces the potential for effects to grizzly bear from disturbance or displacement from foraging habitat. It is the intent of the District to burn the proposed units in as few entries as practicable. Nevertheless, unforeseen circumstances (weather, etc.) may hinder this process to the extent that helicopter use over a number of days and years would be required. The preferred method is to burn the units during the fall months if acceptable burning windows are available. However, given the limitations on fall burning in North Idaho (typically driven by air quality constraints), it may be necessary to burn whole units or portions of units during the spring (when air quality poses less of an issue).
Grizzly Bear Management and Protection Plan/Food Storage Order – Forest Service personnel, contractors and subcontractors would be given a copy of the Grizzly Bear Management and Protection Plan and the IPNF Food Storage Order. The NFS lands within the proposed action areas are covered by the IPNF Food Storage Order. The order would be included in all contracts. Compliance with the provisions of the IPNF Food Storage Order is mandatory.

Estimated Effectiveness – High; Improperly stored food and garbage is identified as a principle cause of grizzly bear mortality and following established food and garbage storage guidelines has been shown to substantially reduce or eliminate conflicts between humans and wildlife, particularly bears (Wakkinen and Kasworm 2004, U.S. Fish and Wildlife Service 1993, Harms 1977).

Big Game – No project activities would take place on roads restricted for big game security on Dawson Ridge during the time period these roads are closed to public motorized traffic (October 7 – October 31). This affects smallwood thinning units 74, 75 and 77.

Estimated Effectiveness - High. This restriction would preserve big game security and maintain a quality hunting area during the modern firearm elk season on Dawson Ridge. This provision will be built into timber harvest contracts and implemented by the sale administrator.

Other Threatened, Endangered, and Sensitive (TES) Wildlife Species Management – If any TES species is located during project layout or implementation, alter timber harvest and associated activities, as necessary, so that proper protection measures are taken. Timber sale contract clause B(T)6.25, Protection of Threatened, Endangered And Sensitive Species, would be included in any timber sale contract.

Estimated Effectiveness – High. Contract provisions for protection of TES habitats and locations are utilized in all contracts and have been effective in protecting these resources (see Forest Plan Monitoring and Evaluation reports).

Gray Wolf – Any gray wolf den or rendezvous sites identified in or adjacent to proposed activity areas will be spatially and/or temporally buffered as appropriate. No project activities (excluding maintenance and hauling on year-round open road systems) would be allowed within one (1) mile of occupied sites, from April 1-July 1 for den sites and from July 1-August 15 for rendezvous sites. Upon review by the District Wildlife Biologist, these distances could decrease based on topographical characteristics at each site.

Estimated Effectiveness – High. The U.S. Fish and Wildlife Service has determined that “there is little, if any, need for land-use restrictions to protect wolves in most situations, with the possible exception of temporary restrictions around active den sites on federally managed lands,” and that restricting activity around sensitive sites during the denning period effectively limits potential disturbance to wolf pups (USDI Fish and Wildlife Service 2003).

Fuels Treatment – In areas where grapple piling is prescribed for fuel reduction, leave approximately one slash pile per five acres unburned where consistent with fuels reduction objectives to provide habitat for small forest animals (e.g., snowshoe hares).

Estimated Effectiveness – High. Timber sale and brush disposal contracts allow for effective control of operations and have the flexibility to meet this criteria.
Wildlife Tree Retention – All merchantable snags greater than 14 inches in diameter would be retained to the maximum extent possible. Retain smaller snags if they do not contribute to excessive understory congestion, and retention is consistent with unit management objectives. Large snags that are felled for safety reasons should remain on site to provide for wildlife habitat and long-term site productivity.

Estimated Effectiveness – Moderate. This measure would be implemented using project layout, contract provisions, compliance monitoring and fuels treatment, and would have a moderate chance of avoiding and/or reducing adverse effects on snag dependent wildlife. It would not be the intent of this project to willfully remove the high hazard snags, and snags in the advanced stages of decay (“soft” snags). Some of these “soft” snags would survive and remain standing during the life of the project. Due to Occupational Health and Safety Administration (OSHA) guidelines, most contractors will remove snags deemed to pose a safety risk to ground crews. Consequently, group selection portions of the prescription will generally result in higher levels of snag retention since portions of units will be left untreated and contractor exposure to hazardous snags subsequently reduced. In addition, the “hard” snags preferred by the District for their ability to remain longer on the landscape are less likely to be felled as hazards than softer snags.

Personal experience has demonstrated that tree harvesting and subsequent burning removes a portion of existing snags, especially the “soft snags.” However, through the strategic placement of leave patches or clumps, snags within these areas will be protected. In addition, prescribed underburning will recruit some “new” snags where residual green trees are inadvertently fire-killed.

Goshawk Nest Site Protection – A no activity area of 40-acres would be placed around any known or newly discovered goshawk nest, or any other nest that has been active in the past five years (Brewer et al. 2009). If the nest tree is not roughly centered within the 40-acre no activity area, an additional no activity distance of up to 745 feet (the radius of a 40-acre circle) may be implemented between the nest tree and harvest units to reduce impacts to habitat around the nest site from project activities. The District Wildlife Biologist would determine if this additional no activity distance would be implemented based on factors such as topography, the location of the nest tree within the 40-acre nest area and the distance of the nest tree from existing disturbances (e.g. roads).

No mechanized project activities (with the exception of hauling on open road systems) would be allowed within up to ½ mile of active nest areas from April 15 to August 15 to promote nesting success and provide forage opportunities for adults and fledgling goshawks during the fledgling dependency period. Activity restrictions may be removed after June 30 if the District Wildlife Biologist determines the nest site is inactive or unsuccessful (Maj 1996).

Estimated Effectiveness – Moderate to High. Protection measures would allow continued nesting and successful rearing during and after project implementation (Reynolds et al. 1992). The 40-acre no-activity area has been shown to provide an adequate post-harvest nest stand for goshawks. Seasonal restrictions are likely to minimize disturbance to active nests, particularly if ground-based systems are not being used within ½ mile.

Protection of Wetlands, Seeps, Bogs, Wallows and Springs – All known or discovered wetlands, seeps, bogs, elk wallows and springs less than one acre in size would buffered according to Inland Native Fish Strategy (INFS) guidelines.
Estimated Effectiveness – High. This practice would be incorporated into project design and unit layout, and implemented by the sale administrator.

Mitigation Measures

Mitigation measures are additional site-specific actions developed to minimize effects to resources that may occur despite design features. The action alternatives were designed with input from all resource specialists and were created to reduce or eliminate effects to resources. After establishing a comprehensive list of design features and then analyzing the potential effects of the action alternatives, it was determined that no additional measures were necessary.

Monitoring Activities

Monitoring is the process of periodically and systematically gathering and analyzing data to understand trends over time. The most common monitoring is related to implementation (did we do what we said we were going to do?) and effectiveness (did we achieve our desired results?).

Project-level monitoring: If an action alternative is selected for implementation, standard timber sale contract provisions will be used to direct how sale activities are conducted. Other activities performed under contract (such as watershed restoration and road work), are monitored by a contracting officer’s representative (COR) to ensure activities are implemented as designed. For example, sale administrators and other contracting representatives would monitor all timber sales to ensure that activities are conducted in accordance with contract specifications (that activities occur where and when they should to protect resources such as soils and wildlife, that yarding is accomplished as planned and specified in the contract to protect soils, that seedlings are planted at the appropriate spacing, etc.). Some aspects of the project, such as regeneration harvests, are monitored for years after implementation to ensure objectives are met for reforestation. Monitoring of all haul routes and service landings on NFS lands would occur during project implementation, with treatment of identified weed infestations as needed. In addition, the project interdisciplinary team members may periodically review implementation of activities.

In addition, best management practices (BMPs) would be incorporated into many different phases of the project. The district hydrologist and engineering representative would review the location of all proposed temporary roads and all road maintenance to assure compliance with BMPs, and would monitor all temporary and reconstructed roads to ensure that they were built or restored to specifications. A sale administrator would visit each active cutting unit at a frequency necessary to assure compliance with the BMPs and the timber sale contract. Minor contract changes or contract modifications would be agreed upon and enacted, when necessary, to meet objectives and standards on the ground. Monitoring of BMPs has determined that recent projects on the IPNF have been implemented as designed and have achieved the desired objectives (PF Doc. HY-01 through 06).

Forest Plan monitoring: The Forest Plan documents a system to monitor and evaluate Forest activities, addressing the most critical components for informed management of the Forest’s resources within the financial and technical capability of the agency. Monitoring is conducted over the entire Forest on a periodic basis, and the monitoring results are used to guide future projects. The Deer Creek project would be consistent with monitoring requirements identified by the Forest Plan.