

Twin Metals Minnesota Hydrogeological Study Special Use Permit

Kawishiwi Ranger District, Superior National Forest

Appendix G – Biological Evaluation of Regional Forester Sensitive Species

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INTRODUCTION

This Biological Evaluation (BE) documents the potential effects from issuance of a Special Use Authorization Permit (SUP) to Twin Metals Minnesota LLC (Twin Metals) may have on Region 9 Regional Forester Sensitive Species (*hereafter* RFSS - U.S. Department of Agriculture (USDA) Forest Service Manual sections 2670.3, 2670.5 (3), 2672.4). The species evaluated in this report include all terrestrial species on the current Region 9 sensitive species list (USDA Forest Service 2011). The federally threatened Canada lynx (*Lynx canadensis*), the gray wolf (*Canis lupis*), and the northern long-eared bat (*Myotis septentrionalis*) recently proposed for listing as endangered throughout its range are covered in a separate Biological Assessment (BA).

The BE is the tool used to consider the effects of a project on RFSS. Determinations in a BE address the question of how project actions and/or alternatives affect species viability at the local level, and resulting implications for species viability and distribution throughout their range. The analysis of effects results in one of the following determinations:

- *No impacts* – used when no effect is expected.
- *Beneficial effects* – used when the proposed alternative is expected to be wholly beneficial without potential negative impacts.
- *May impact individuals but is not likely to cause a trend to federal listing or loss of viability* – used when effects are expected to be insignificant (unmeasurable) or discountable (extremely unlikely).
- *Likely to result in a trend to federal listing or loss of viability* – used when effects are expected to be detrimental and substantial.

The management objective is to maintain a viable and well-distributed representation of all native species that occur on the Superior National Forest (SNF; National Forest Management Act Regulation 219.19 and 219.26, Secretary of Agriculture Regulation 9500-4, USDA Forest Service Manual 2670.12, 2670.22, and 2670.32, and Forest Plan p. 3-4). Working definitions for “viability” and “well-distributed” are taken from Iverson and René (1997):

- *Viability* – the likelihood that habitat conditions will support persistent and well-distributed populations over time.
- *Well-distributed* – species and habitat distribution are based on the current and historic natural distribution and dispersal capabilities of individual species, and dispersal includes the concepts of metapopulation dynamics and gene flow.

This BE tiers to the Superior National Forest’s Programmatic Biological Evaluation for the 2004 Forest Plan Revision (USDA Forest Service 2004a) and provides information regarding site-specific effects that the special use project may have on RFSS.

PROJECT DESCRIPTION

Twin Metals is currently conducting a prefeasibility study in connection with the potential development of copper, nickel, and platinum group mineral deposits located in St. Louis and Lake Counties in northern Minnesota. Related to the prefeasibility study, Twin Metals has requested a special use authorization to access National Forest System lands within the SNF to collect baseline hydrogeologic (i.e., ground water) environmental data. This baseline environmental data would be used to understand existing conditions and processes help in the design of any mine elements, develop mitigation strategies, and understand potential environmental effects of a mine. This data and information would be part of an Environmental Impact Statement if any future mining proposal is submitted by Twin Metals. Parts of which may be located within the SNF. No mine is proposed as part of the SUP application.

Specifically, Twin Metals requests that the SNF issue SUPs for construction of up to 13 hydrogeologic monitoring well pad sites: 12 large sites 150 x 150 feet and 1 small site 50 x 50 feet. There would be connected activities associated with the issuance of the SUP which may include mechanically drilling wells on the pads, the construction of temporary access roads to the well pads, testing of the wells, and periodic maintenance throughout the life of the permit.

Project area

This project is located near Birch Lake and the Kawishiwi River approximately 7 miles southeast of Ely, MN on the Kawishiwi Ranger District (legal descriptions can be found in the Environmental Assessment (EA), Chapter 2 (USDA Forest Service 2015). Vicinity maps, detailed site maps and the full Twin Metals proposal can be viewed on the SNF webpage at: <http://www.fs.usda.gov/project/?project=40756>.

Alternatives

The EA considers three alternatives, which are described in full in the EA (USDA Forest Service 2015). Below is a summary of the two action alternatives (Alternative C is the no action):

Alternative A

Under this alternative, the Forest Service would issue special use permits and road use permits to conduct a hydrogeological study as described below and in table 1:

- Construction of up to 13 hydrogeologic well pads and installation of:
 - Up to 40 mechanically drilled hydrogeologic monitoring wells on those pads; and
 - 13 hand-driven monitoring wells adjacent to those pads and in other select areas;
 - Hydrogeologic testing of the wells, and access to those wells for such testing, for an anticipated period of approximately 20 years;
- Access to the 13 well pads and access across National Forest System lands to other well pad sites on State, Private or BLM jurisdiction (approximately 3.63 miles), including:
 - Construction of about 1.52 miles (3.68 acres) of temporary access roads; and
 - Use of existing Forest Service classified system roads and trails; and

- Use of about 0.66 mile of private roads across National Forest System lands; and
- Use of other State, county, or local public roads;
- Periodic maintenance and repair of the hydrogeologic wells, well pads, and temporary access roads over the next 20 years.

Additional clarification on alternative A with relevance to Regional Foresters Sensitive Species:

- No sumps would be used for drilling for the SUP wells.
- Mechanical drilling (roto-sonic/vibratory and reverse circulation) at site MN-509 will be limited to when the campground is not open (October 2 through April 30).
- Well pad MN-508 location has been adjusted away from existing bat boxes and mechanical drilling will be restricted to when they are not occupied by bats (September 1 through May 1).
- Drilling at well pad site EISV-504 would be limited to low recreational use periods from October 1 to April 30.
- The locations of the well pads and roads may be adjusted up to 500 feet, with no more than an additional 1.5 acres of disturbance.
- On each well pad, up to two vibratory (sonic) wells may be drilled, in addition to one reverse-circulation well, if the hand-dug well cannot be successfully completed.
- Hand-dug wells may require use of a hammer drill and a small portable generator.

The duration of the initial hydrowell installation program for the SUP wells is estimated to be 6 to 18 months (SUP Application page 10). For this analysis, it is assumed that it would take 18 months to complete the majority of the wells; however additional wells may be drilled within the SUP term (10 years). The wells may take a few hours (hand-driven wells), one week (sonic-drilled wells) to 2 to 4 weeks (reverse circulation drilling) to complete (SUP Application page 56, USDA Forest Service 2015).

Table 1. Description of the Proposed Action

Well Identification	Pad Size (acres)	New temp road (acres)	Existing access (miles)	Alt A: Season of tree clearing and drilling	Alt B: Season of tree clearing and drilling
BLN-502	0.5	0.18	N/A	Any season	Any season
BLN-505	0.5	N/A	0.10	Any season	Any season
BLN-510	0.5	N/A	0.24	Any season	Any season
EISV-500	0.5	N/A	0.24	Any season	Any season
EISV-501	0.5	0.10	N/A	Any season	Any season
EISV-502	0.06	0.24	0.61	Any season	Any season
EISV-504	0.5	N/A	0.85	October 1 – April 30	Spring (March 15 – May 1) or Fall (October 15 – December 15)
EISV-514	0.5	N/A	0.36	Any season	Any season
EISV-525	0.5	0.02	N/A	Any season	Any season
MN-508	0.5	N/A	N/A	September 1 – May 1	September 1 – May 1
MN-509	0.5	N/A	N/A	October 2 – April 30 th	October 2 – April 30
SR-502	0.5	0.05	N/A	Any season	Spring (March 15 – May 1) or Fall (October 15 – December 15)
SR-503	0.5	N/A	N/A	Any season	Spring (March 15 – May 1) or Fall (October 15 – December 15)
ADDITIONAL ACRES*	1.5	1.5	0	Any season	Any season
TOTAL	8.15	8.15			

*An additional 1.5 acres of surface disturbance beyond that specifically identified in the proposed action is analyzed, allowing the Forest Service to authorize adjustments up to 500 feet for well pads, wells, and access roads to ensure the collection of adequate data to evaluate the hydrogeology in the study area.

Alternative B

Under this alternative, the Forest Service would issue special use permits and road use permits to conduct a hydrogeological study as in Alternative A with the following Seasonal and Operational Adjustments:

- Set a threshold for sound emitted by drill rigs at the Boundary Waters Canoe Area Wilderness boundary of:
 - L10 sound level of 35 dBA
 - L50 sound level of 30 dBA
- Timing limitations of drilling:
 - Seasonal – spring (March 15th – May 1st) or fall (October 15th – December 15th) only at three sites (EISV-504, SR-502, SR-503) to avoid or reduce impacts. If Twin Metals decides to operate during spring road closure (spring breakup), they would need to improve roads to avoid rutting.
- Use of sound reduction technology at all drill rigs to reduce sound emissions by at least 10 dBA at 100 feet from the drill rig, compared to the sound level emitted at 100 feet from an unmitigated rig.

Mitigations and Permit Stipulations important for Species Protection

Appendix D of the EA contains all permit stipulations¹ describing the permit requirements as well as mitigations needed to reduce impacts. They include resource-based mitigations, standard SUP requirements, drilling requirements, and other procedures. The stipulations for the regional forester’s sensitive species and other species are designed to meet the Forest Plan objective to maintain, protect, or improve habitat for sensitive species through site-level management strategies (O-WL-18): addressing species’ needs by managing specifically for high quality habitat or known locations of sensitive species. The stipulations reflect management approaches and protective measures that are either Forest Plan standards or guidelines or methods that SNF biologists have applied and found to protect each particular species depending on the species’ habitat requirements and distribution, individual site conditions, and expected management impacts (G-WL-12). Other stipulations or operating conditions may be derived from species conservation agreements, such as the National Bald Eagle Management Guidelines or be developed as a result of individual resources analysis. The purpose of these mitigations is to ensure resource protection and safe operations during activities. The following list of Forest Plan guidelines is the basis for some stipulations in Appendix D that are important for Species Protection:

- Forest Plan G-WL-11 – Avoid or minimize negative impacts to known occurrences of sensitive species using buffers of 10 to 660 feet (1/8 miles). Site conditions such as topography and vegetation cover maybe used by a SNF biologist to refine site-specific distance.
- Forest Plan G-WL-12 – Minimize negative impacts to known sensitive species from management activities that may disturb pairs in their breeding habitat during critical

¹ Additional stipulations for threatened or endangered species may be added as a result of consultation with USDI Fish and Wildlife Service.

breeding season (varies by species) using buffers of 10 to 660 feet (1/8 mile). Site conditions such as topography and vegetation cover may be used by a SNF biologist to refine site-specific distance.

- Forest Plan G-WL-12 b – If a new nest is found for bald eagle, osprey, goshawk, boreal owl, or great gray owl, or roost tree for sensitive bat species during project implementation, activities would be temporarily halted in the area. The District Biologist would be consulted and appropriate mitigation measure would be promptly designed and carried out prior to restarting.
- Forest Plan D-WL-3d and D-WL-3 – Because all listed plant locations or nest, roost and/or den sites are not known, survey needs shall be determined by a SNF biologist, using approved protocols in suitable habitat, to determine occupancy in the areas where exploration activities are planned. The suite of species in need of surveys may change as the sensitive species list is updated or new information on species or survey protocol warrants.

Additional species-specific mitigations are considered below in the effects analysis.

AFFECTED SPECIES

The animal species included in this analysis are based on the RFSS list (last updated February 6, 2012, USDA Forest Service 2012a) located in the project file (excluding the northern long-eared bat and the gray wolf) which is evaluated in the BA for this permit application).

ANAYSIS METHODOLOGY

General Approach

No specific terrestrial wildlife surveys were conducted for this permit application although project personnel visited each of the thirteen proposed pad sites and the alignment of the proposed access routes prior to analysis. Documentation for these site visits is located in the project file.

Existing reports and databases developed by SNF biologists and the Minnesota Department of Natural Resources Natural Heritage Program database of element occurrences (MNDNR 2012) were reviewed for species occurrence records within the analysis areas. Information was incorporated from the published research literature where appropriate. These data, along with Management Indicator Habitat (MIH) data modeled for the year 2014 were examined using a geographic information system (GIS) to determine if suitable habitat or known occurrences were documented for the analysis area defined above.

Assumptions

To facilitate quantitative analysis of the direct, indirect, and cumulative effects of the issuance of the SUP, certain geospatial assumptions were required. These assumptions include:

1. The well pad point location features provided to the SNF (data source: Barr_URS_Monitoring_Well_Locations_20130701) contain the coordinates of the center of the well pad.
2. Discrepancies in the number of affected acres between the written application [6.8 acres] and the well pad polygon features provided to the SNF (data source: Barr_URS_Monitoring_Well_Pads_20130701) [5.1 acres] were remedied as follows:
 - a. For the 12 large pads, impacts were evaluated by centering a 150 foot x 150 foot square polygon on the point locations described in item #1 above.
 - b. For the single small pad, impacts were evaluated by centering a 50 foot x 50 foot square polygon on the point location described in item #1 above.
 - c. These dimensions and the estimated area affected by the pad footprint are taken directly from the Twin Metals application (July 12, 2013; section 3.4.2, page 49).

The SUP application requested that an additional 1.5 acres of surface disturbance be analyzed to cover adjustments to the location of well pads, wells, and/or access roads needed to avoid any adverse resource impacts identified during implementation. The following assumptions were made to facilitate meaningful analysis of this additional disturbance:

1. The nature of the disturbance to the 1.5 acres would be similar to the disturbance expected for the 13 proposed well pads and associated access routes.
2. Disturbance to the 1.5 acres could include clearing for additional well pads and/or access routes.
3. The forest vegetation composition and structure impacted (i.e., cleared) on the 1.5 acres would occur in proportion to the overall forest impacts from the 13 proposed well pads and associated access roads.
4. Similar to the Prospecting Permit EIS, Twin Metals would be required to submit a final operating plan for the activities describing the exact locations of the roads and well pads and a resource review would be conducted to identify and site-specific conflicts.

For the purposes of this analysis, it is assumed that the reverse circulation well drilling would take 3 weeks to complete. Pump tests would generally take 2 to 4 hours; however, some pump tests could last up to 30 days.

EFFECTS ANALYSIS

Terrestrial Wildlife

The analysis for the SUP application applied coarse- and fine-filter approaches to evaluate effects to RFSS; similar to the process used in the Forest Plan BE (USDA Forest Service 2004a). The coarse-filter approach looked at broad-scale measures of habitat called Management Indicator Habitats (MIH; USDA Forest Service 2004b) and Area of Audibility (USDA Forest Service 2015). The fine-filter approach (i.e., site-level) assessed species needs by considering high-quality habitats with potential or known occupancy by sensitive species, seasonality of project activities, and direct impacts of noise disturbance to species present. While no specific sensitive terrestrial wildlife surveys were conducted for this BE, surveys were conducted for recently completed vegetation management projects in the vicinity of this project (USDA Forest Service 2011 and USDA Forest Service 2012b). Table 2 displays the results of the coarse and fine filter assessment. Only those species known to occur or likely to occur within the analysis area and/or having suitable habitat in the area were analyzed in detail in the environmental consequences section. For all other RFSS, *no impacts* are expected.

Affected Environment

Analysis Area

The analysis area for direct and indirect effects to terrestrial RFSS wildlife is the access roads and a 0.25 mile radius of the drill pad locations. The spatial boundary for the cumulative effects analysis for each species includes lands of all ownerships and cumulative actions that are planned to occur within the analysis area described above. This is appropriate because 1) all anticipated change to suitable habitats as a result of this project (drill sites and access roads) would occur within this buffer 2) any impacts of sound occurring from drilling activities and pump tests on wildlife would most likely occur within this distance (see analysis indicators for more details).

Analysis Time frame

The temporal boundaries used for the analysis of direct, indirect, and cumulative effects are 20 years after the special use permit is issued. This timeframe was chosen because it is reasonable to assume that all proposed activities would be implemented within this timeframe, all reclamation, and expected effects will have occurred. It should be noted that the majority of the impacts from habitat removal and drilling would likely occur in the first 18 months. Twenty years is an appropriate time scale for cumulative effects. It allows for the most realistic prediction of reasonably foreseeable future projects. Past actions are taken into account in the existing condition and noted in the cumulative effects discussion where relevant. Present and foreseeable future actions are described in Appendix B of the EA.

Analysis Indicators

The following indicators were developed to address all species' risk factors in at least one way were identified:

Indicator 1) Acres of habitat removed

Acres of habitat removed is a good indicator because it evaluates changes to habitat important to terrestrial RFSS. This can be used to evaluate effects whether sensitive species, and their habitat, remain viable. Forest disturbance such as wind storms and fire frequently create small patches of young forest within both same-age or mixed-age forest canopy on the SNF. Although the openings created by this project would not have all the features of natural disturbances, for example, they will not include tip-up mounds from uprooted trees; canopy closure will be used for evaluating impacts to forest vegetation since it is the most obvious change to forest structure. Another difference is that forest gaps created through natural disturbance generally re-vegetate within a year or two of the disturbance. In the case of this project, habitat removal would occur within approximately 18 months of the decision and drill sites would be maintained in an open condition up to 20 years.

Indicator 2) Noise Disturbance

Noise disturbance is a good indicator because it evaluates the type and duration of sound likely to cause an impact to terrestrial species. It can be used to determine whether project activities will impact normal wildlife behavior. Many studies have shown acoustical cues play a dominant role in sexual communication, territory defense, habitat quality assessment, and predator-prey relationships. In many cases, these auditory signals play an even larger role in a species' life than visual cues (Barber et al. 2009). The planned activities have the potential to mask these important cues and cause a significant species response. Animal responses to noise are highly variable including fleeing, avoidance, immune response, startle responses, reduced feeding, increased vigilance, amplitude, and/or temporal communication shifts to avoid noise conflict, and adaptation (Turina and Barber 2011, Barber et al. 2009, 2010, Pijanowski et al. 2011) Several studies (Ruddock and Whitfield 2007) found a buffer of 400 meters or 0.25 mile to be an appropriate distance to mitigate noise disturbance for terrestrial species. This buffer was determined using logging and air traffic disturbance as a base, however other studies (Blickley et al. 2012a) suggest that intermittent noise such as traffic is in fact more detrimental than constant/consistent noise associated with drilling. Using this research, it was determined 0.25 mile is reasonable distance to evaluate impacts to species. These figures were input into a GIS to create the maps displaying the noise disturbance buffer (see Figure 1).

Table 2. Regional Forester Sensitive Terrestrial Species Coarse and fine filter assessment

Species	Coarse filter: Management Indicator Habitat (MIH) and Age Class	Fine filter: MIH Related Microhabitats and known occurrences	Drill sites of issue to species
*Little brown myotis or bat	MIH 1 Upland forest all ages	Hibernacula. Abundance of suitable roost trees. Two known maternity roosts near sites EISV-500 and EISV-525	All sites
*Tri-colored bat	MIH 1 Upland forest all ages; MIH 2 Upland deciduous mature +	Hibernacula. Abundance of suitable roost trees.	All sites
Heather vole	MIH 8 Jack pine all ages	<i>Vaccinium</i> sp.	none
*Bald Eagle	MIH 7 Red and white pine mature +	Large diameter white pine. Mature white pine within ½ mile of fish-bearing waters. One nest located 0.31mile from EIVS-500	EIVS-500
*Northern goshawk	MIH 1 Upland forest mature + ; MIH 13 Mature upland patches	High canopy cover, large diameter trees. Mature upland patches greater than 100 acres	All sites
*Boreal owl	MIH 4 Aspen-birch mature+; MIH 9 Lowland conifer all ages	Large diameter hardwoods with cavities. Lowland patches greater than 500 acres	EIVS-504, SR-205, SR-503
Olive-sided flycatcher	MIH 9 Lowland conifer all ages	Snags	none
*Bay-breasted warbler	MIH 6 Upland spruce-fir mature+; MIH 9 Lowland conifer mature +	Spruce budworm outbreaks. Mature upland and lowland conifer patches greater than 50 acres.	EIVS-501, EIVS-502, MN-509,
Connecticut warbler	MIH 9 Lowland conifer mature + MIH 8 Jack Pine mature +;	Lowland conifer habitat within a matrix of large patches of lowland and upland conifer habitat.	none
American three-toed woodpecker	MIH 6 Upland spruce-fir mature +; MIH 8 Jack pine mature +; MIH 9 Lowland conifer mature +	Insects; snags for nesting; fire; large lowland patches	none
*Great gray owl	MIH 1 Upland forest young and mature + and young; MIH 4 -Aspen-birch mature + and young; MIH 9 Lowland conifer young	Large diameter snags for nesting; open areas for foraging. Large lowland patches	BLN-502, BLN-505, BLN-510, EISV-502, EISV-504, EIVS-525, MN-509, SR-502, and SR-503
Taiga alpine butterfly	MIH 9 Lowland conifer all ages	Sedges	none

Species	Coarse filter: Management Indicator Habitat (MIH) and Age Class	Fine filter: MIH Related Microhabitats and known occurrences	Drill sites of issue to species
Nabokov's (or Northern) blue butterfly	MIH 8 -Jack pine	Presence of dwarf bilberry; fire	none
Freija's grizzled skipper	No MIH association	Upland acidic meadow, scrubby willow, barrens	none
Wood turtle	MIH 2 mature +; MIH 10	Riparian habitats with open sandy areas for nesting	none

* Indicates this species is analyzed further for BE

Environmental Consequences

Quantified impacts to terrestrial RFSS are based on assumptions related to potential future land use identified Twin Metals (see Project Description and *Assumptions* above). Based on the coarse and fine filter assessment the following species were brought forward for analysis: Little Brown Bat, Tri-color Bat, Bald Eagle, Northern Goshawk, Great Gray Owl, Boreal Owl, Bay-breasted Warbler. The effects to these species are analyzed for habitat (indicator 1) that would be impacted and if there is a likelihood that individuals may be affected by sound (indicator 2) as a result of project activities.

It was determined that all other project components (including traffic on special uses roads, lights associated with drilling, and basic maintenance of sites) would have no effect on these species because 1) traffic to sites will be at slow enough speeds to avoid collisions; 2) there are no known occurrences of nocturnal RFSS that would be disturbed by extra lights and mitigations are in place should a species roost, nest or den be found; and 3) once well pad sites are constructed, no disturbance is expected in excess of what was already analyzed.

Direct and Indirect Effects

The action alternatives (alternatives A & B) include project activities that have the potential to cause direct effects to individuals if they occur in occupied habitat. These effects can range from minor disturbance to physical harm to individuals. To minimize the risk of disturbance or harm, mitigations and permit stipulations important for species protection have been included in this project where there are known occurrences of RFSS species. In the case where there are known locations of Little Brown Bat, Tri-color Bat, Bald Eagle, Northern Goshawk, Great Gray Owl, Boreal Owl, Bay-breasted Warbler the following Forest Plan standards and guidelines and USDI Fish and Wildlife Service Management Guidelines will be followed through the application of stipulations identified in appendix D of the EA:

- National Bald Eagle Management Guidelines (USDI Fish and Wildlife Service 2007) – Maintain a buffer of 660 feet (between the activities and the nest (including active and alternate nests) from January 15 – July 31. This equates to No Surface Occupancy in the timeframe and location given.

- National Bald Eagle Management Guidelines (USDI Fish and Wildlife Service 2007) – Avoid cutting or removal of overstory trees within 330 of the nest at any time.
- Forest Plan S-WL-6 – Prohibit management activities within 300 feet of known boreal owl nest sites. This equates to No Surface Occupancy in the location given.
- Forest Plan G-WL-14 – Prohibit management activities within 660 feet of known great gray owl nest sites. This equates to No Surface Occupancy in the location given.
- Forest Plan S-WL-10 – At northern goshawk nest sites with an existing nest structure, prohibit or minimize, to the extent practical, activities that may disturb nesting pairs in an area of 50 acres minimum (860 ft. radius) during critical nesting season (March 1 – August 30).
- Forest Plan S-WL-10 – At northern goshawk nest sites in an area of 50 acres minimum (860 ft. radius), to the extent practical, allow only those activities that protect, maintain, or enhance high quality habitat conditions: 100% mature forest (>50 years old) with continuous forest canopy (>90% canopy closure) and large trees with large branches capable of supporting nests.
- Forest Plan G-WL-22 – Within northern goshawk post-fledging areas, as determined by a SNF biologist, minimize activities, to the extent practical, that may disturb nesting pairs during critical nesting season (March 1 – August 30) and, to the extent practical, within a 500 acre area encompassing all known nest areas within the territory.

There may be unknown occurrences of Little Brown Bat, Tri-color Bat, Bald Eagle, Northern Goshawk, Great Gray Owl, Boreal Owl, Bay-breasted Warbler in the analysis area. In these cases, Twin Metals would be required to apply stipulations where new locations of these species are discovered. However, there would still remain a risk of direct impacts to unknown individuals from project activities occurring in suitable habitat.

Indicator 1 – Acres of habitat removal

Alternatives A and B

The effects of habitat removal are the same for alternatives A and B. Creation and use of drill pads will impact a wide variety of habitat types within the project area (MIH 1, 2, 4, 5, 6, 10) (USDA 2004a) creating canopy gaps and long-term opening in currently forested habitats. Nearly seventeen acres will be cleared for construction of the drill pads in small opening ranging from one-half acres to less than one-tenth of an acre in size. In addition, 0.59 acre of habitat would be cleared for the construction of temporary roads to access new drill sites.

In the short term, tree clearing may result in temporary, localized changes in tree composition as drill pads and temporary roads are maintained for 20 years for well monitoring. In the long term, the forest age class is expected to remain the same (0-9) over time at any well pad site or temporary road. When well pad sites and temporary roads are allowed to re-vegetate, these areas are expected to retain their pre-disturbance MIH habitat type since natural regeneration will be used, no planting would take place.

Little Brown Bat, Tri-color Bat: Young and mature upland forest (MIH 1) is found on every proposed well pad site and new temporary access roads. Though the 5.98 acres in gaps from one-half to less than one-tenth acres in size removed may remove suitable roosting habitat it would not be a meaningful change to habitat availability on a landscape scale. Under Alternative A this removal has the potential to impact suitable roost trees, however seasonal restrictions at sites EISV-504, MN-508, and MN-509 would ensure project activities do not take place during maternity season.

There are two known little brown bat maternity roosts near project activities; 1 at site EISV-500 and one at site EISV-525. As neither of these sites have seasonal restrictions in place, mitigations will need to be initiated to insure the safety of those roost sites. If clearing of these two sites is conducted outside of the maternity season, September through May, project activities will not affect the bats.

Goshawks: Mature upland forest (MIH 1) is found on all sites except EISV-514. Though the removal of 3.95 acres in gaps from one-half to less than one-tenth acres in size may remove suitable roosting habitat it would not be a meaningful change to habitat availability on a landscape scale. Under Alternative A this removal has the potential to impact suitable nest trees and foraging and post fledging habitat, however, seasonal restrictions at sites EISV-504, MN-508, and MN-509 would ensure project activities do not take place during critical nesting season. Under Alternative B, the same seasonal restrictions would be in effect for MN-508, and MN-509.

Great gray and Boreal owl: A total of 4.03 acres of nesting habitat (MIH 4) is found on 11 of the 13 drill sites and 0.49 new temporary roads. Proximity to large areas of lowland conifer for foraging is necessary for boreal owl presence. Only three out of the 13 have this combination for potential habitat: EISV-504, SR-502, and SR-503. Under both alternatives A & B, habitat on EISV-504 would not be disturbed during nesting season. Of the eight sites with potential great gray owl habitat on and surrounding the site (BLN-502, BLN-505, BLN-510, EISV-502, EISV-504, EISV-525, SR-502, and SR-503) tree clearing in the nesting period. Nesting for both owl species occurs mid-March through the end April. Assuming all project activities occur during the summer outside of the seasonal restrictions, clearing of these sites and additional temp road construction will have no impact on nesting individuals. After this critical nesting season, fledging begins. At this point, while owls may still be in the nest, they are capable of moving away from potential disturbance of clearing activities. In addition, it should be noted that these owls are opportunistic nesters and nesting habitat is not the limiting factor in the vicinity of drill sites and new temporary access roads.

Bay-breasted Warbler: Potential nesting habitat (MIH 6 mature) occurs on only three sites for this species: EISV-501, EISV-502, MN-509. These three sites have a total of 1.46 acres that would be impacted by site clearing and temp road construction. Site MN-509 has seasonal restrictions; therefore it is unlikely that this species would be negatively

impacted in any significant way. Assuming all project activities occur during the summer outside of the seasonal restrictions, clearing of these sites has the potential to impact nesting individuals. However, this species needs large patches of spruce budworm to forage. Since no outbreaks over a large enough area for the birds are known to occur in the area, it is unlikely that project activities will impact individuals.

Indicator 2 – Noise Disturbance

Noise associated with tree clearing or drilling activities may cause disturbance to wildlife of many species that occur there. In many cases the individuals can leave the activity area and find alternate habitat nearby. However, in cases where individuals are not mobile, or nests or other non-mobile features are present, or the disturbance occurs during a critical time of year, such activities can cause harm to individuals. For example, the removal of an occupied bat roost tree has the potential to kill individuals, particularly if non-volant pups are present. Ongoing disturbance can cause breeding birds to abandon their nest.

The effects of noise disturbance will vary slightly in volume between alternatives A and B. Noise from the creation and use of drill pads will impact a wide variety of habitat types within the project area, potentially disturbing roughly 1,633 acres based on the 0.25-mile sound buffer. This disturbance may result in temporary localized changes species population as well pads are drilled and temporary roads are constructed.

Alternatives A and B

In Alternative A, three of the thirteen sites have sound mitigations in the form of seasonal activity restrictions: EISV-504, MN-508 and MN-509. All other sites would have activities occurring during maternity and/or breeding. Alternative B includes these sites as well as SR-502 and SR-503. This alternative would have slightly less effects than alternative A. Alternative B has two fewer sites which would be active during critical seasons. In addition to these seasonal mitigations, sound mitigations will be placed at each site, decreasing the area of disturbance and volume of sound.

Table 3. Effects of sound on Terrestrial RFSS based on sound buffer and MIH overlap

Species	Sites and new temp road access with noise effects
Little Brown Bat	Alt A: BLN-502, BLN-505, BLN-510, EISV-500, EISV-501, EISV-502, EISV-514, EISV-525, SR-502, and SR-503 Alt B: BLN-502, BLN-505, BLN-510, EISV-500, EISV-501, EISV-502, EISV-514, EISV-525
Tri-color Bat,	Alt A: BLN-502, BLN-505, BLN-510, EISV-500, EISV-501, EISV-502, EISV-514, EISV-525, SR-502, and SR-503 Alt B: BLN-502, BLN-505, BLN-510, EISV-500, EISV-501, EISV-502, EISV-514, EISV-525
Bald Eagle,	EISV-500
Northern Goshawk,	Alt A: BLN-502, BLN-505, BLN-510, EISV-500, EISV-501, EISV-502, EISV-525, SR-502, and SR-503 Alt B: BLN-502, BLN-505, BLN-510, EISV-500, EISV-501, EISV-502, EISV-525
Great Gray Owl,	Alt A: BLN-502, BLN-505, BLN-510, EISV-502, EISV-525, SR-502, SR-503 Alt B: BLN-502, BLN-505, BLN-510, EISV-502, EISV-525
Boreal Owl,	Alt A: SR-502 and SR-503 Alt B: No sites
Bay-breasted Warbler	EISV-501, EISV-502

Little Brown Bat, Tri-color Bat: Potential impacts: disturbance to individuals at roost trees. If unknown roost tree is within .25 mile analysis area, noise may cause females to leave that particular roost site. Shirley et al. (2001) suggests that noise disturbance may impact the timing of emergence; however, there appeared to be no significant difference in the number of bats emerging each night. If pups are not old enough to fly, noise may cause significant irritation, including chronic physiological stress (Blickley et al. 2012b). Other studies suggest that noise disturbance causes avoidance by bat species while foraging (Shuab et al. 2008) and decreases foraging efficiency (Siemers and Schaub 2011 and Jones 2008).

For Alternative A, there are ten out of the thirteen sites that could potentially be active during the maternity season of these bats, while Alternative B has eight sites potentially in operation during this time. There are two known little brown bat maternity roosts near project activities; one at site EISV-500 and one at site EISV-525. As neither of these sites have seasonal restrictions in place, mitigations will need to be initiated to insure the safety of those roost sites. Under alternative B these sites with known roosts may not be impacted due to noise reducing technology; however unknown alternative roost sites could still be impacted.

Outside of those known sites, project activities are unlikely to negatively impact individuals. This is because 1) each site is such a small area, and timing of activities at the sites are likely to be broken up. All sites will not be active at once. 2) Even with

expected time to project completion being 6 to 18 months, project activity at individual sites is expected to take only 2 to 4 weeks.

Goshawks: Potential impacts: disturbance to nesting individuals. If an unknown nest site is within the .25 mile analysis area, noise could have several varying effects ranging from breeding failure (Ruddock and Whitfield 2007), nest abandonment, lost feeding opportunities, and many other issues related to adults fleeing disturbance (Richardson and Miller 1997). Under Alternative A, nine sites would be potentially active during nesting season. And Alternative B, seven sites have potential habitat that would be altered by project activities. Despite this, it is unlikely that project activities would negatively impact any nesting individuals because 1) there are no known occurrences in the project area, 2) same reasoning for bats, each site is so small an area, and unlikely that all would be active at once. And 3) Project activities on each site are likely to be shorter in duration than the project as a whole.

Great gray and Boreal owl: Potential impacts: disturbance to nesting individuals. If an unknown nest site is within the 0.25 mile analysis area, noise could have several varying effects ranging from nest abandonment to decreased foraging success. Under Alternative A there would be 7 sites potentially active during nesting season for great gray owl and 2 sites for boreal owls. Under Alternative B only 5 sites would be active for great grays, and no sites would overlap the nesting season for boreals.

The breeding season for these owls begins earlier than other RFSS birds (February). Sound from project activities could interfere with acoustic communication if conducted at this time. Nesting starts and ends earlier as well, meaning, by the time drilling begins in the summer season on sites with no restrictions fledglings should be old enough at this point to move away from noise disturbance. In addition to this reasoning, as with the bats: 1) each site is such a small area and activity at the sites is likely to be broken up. All sites will not be active at once. 2) Even with expected time to project completion being 6 to 18 months, project activity at individual sites is expected to take only 2 to 4 weeks.

Bay-breasted Warbler: Potential impacts: disturbance to nesting individuals. Under both alternatives, only two sites would potentially impact these birds during nesting season: EISV-501, EISV-502. However, disturbance is unlikely. This is because 1) there are no known occurrences. This species is correlated to large outbreaks of spruce budworm, and no such sites are recorded within the project area. And 2) potentially impacted habitat is so small the likelihood of nesting individuals be present during project activities is very slim.

Cumulative Effects

The cumulative effects of this project on RFSS terrestrial wildlife would be minor and would not differ much between action alternatives A & B. Only the past, present, and future actions from Appendix B of the EA that occur within the 0.25 mile analysis area contribute to these low levels of cumulative effects. The activities considered are: Twin Metals Maturi SW project and two additional well pad sites BLN-520 and BLN-521 because they would have additional impacts on Little brown myotis, Tri-colored bat, Northern goshawk, Great gray owl.

The Twin Metals Maturi SW project, located nearest to well pad site BLN-501 was started in 2012-13. This project included the drilling of 53 core holes, 4 wedge offsets, the construction of 8 acres of new access road, and a total pad construction disturbance of 2.41 acres on federal and State/private mineral leases. Additional drill sites BLN-520 and 521 are both within the analysis area of well pad site BLN-505 and may contribute to cumulative effects. These sites are both proposed to be large well pads at 150' x 150'.

As the Maturi Project has already been completed, no additional acres of habitat would need to be removed. However, as with projects in the direct and indirect effects, the drill site clearings will continue to be maintained for some time in the future. This is not expected to result in cumulative effects. Sites BLN-520 and 521 together would add a total of .0068 acres cleared to the 1.92 acres planned on site BLN-505. In total about 1.93 acres total would be added to the amount of habitat cleared. These sites impact MIH 1-6 in varying amounts, however impacts are not expected to vary from those described in the direct and indirect effects.

Drilling in the Maturi Project area was completed in 2013 and therefore would have no additional sound effect. A noise disturbance buffer of .25 miles added to sites BLN-520 and 521 would result in a 125.7 acres increase in habitat impacted by sound. The impacts of this additional disturbance are not expected to differ in impacts described in the direct and indirect effects above.

There would be no cumulative effects from the no-action alternative (C).

DETERMINATION OF EFFECTS

Terrestrial Wildlife

The no-action alternative (C) would have no impact to RFSS.

The action alternatives (A & B) may impact individuals of Little Brown Bat, Tri-color Bat, Bald Eagle, Northern Goshawk, Great Gray Owl, Boreal Owl, Bay-breasted Warbler species but is not likely to cause a loss of viability or a trend toward federal list of these species. A no trend towards listing determination is made for these terrestrial wildlife species based on the following reasons:

- Of all the species analyzed for potential negative impacts from project activities, there are only two known occurrences within the project area (two little brown bat maternity roosts).
- While habitat does exist for all species analyzed in the BE, the acreage of each is small and discountable.
- Project activities at each site will be relatively short in duration, or outside of critical points in species’ life history.

Alternative B will have slightly less impact because:

- Sound reduction technology will decrease the radius of the effect area, potentially removing the only known RFSS occurrences from consideration.
- More seasonal restrictions also decreases the impacts to all RFSS analyzed within the BE, including removing all potential impacts to boreal owls.

MONITORING and MITIGATIONS

There are two known little brown bat maternity roosts near project activities; one at site EISV-500 and one at site EISV-525. RFSS-21. As neither of these sites have seasonal restrictions in place, mitigations will need to be initiated to insure the safety of those roost sites. If clearing of these two sites is conducted outside of the maternity season, September through May, project activities will not affect the bats.

Bats	
RFSS-20 Stipulation CoA’s Well Site and Road Access	No drilling (sonic nor reverse-circulation) shall take place on the well site MN-508 when it is occupied by bats (May 1 to September 1). Hand drilling would be allowed.
Objective	To minimize noise impacts to bat habitat boxes near MN-508.
Source	SNF wildlife management
RFSS-21 Stipulation CoA’s Well Site and Road Access	No clearing of trees larger than 3 inches diameter at breast height may occur between June 1 and July 1 within 660 feet of a known bat roost.
Objective	To minimize direct impacts to individual bats.
Source	SNF wildlife management
Modification	If the known maternity roost needs to be removed between June 1 and July 1, then an emergence survey should be conducted by a SNF biologist the night prior to removal to ensure the roost is not occupied.

If any listed species or key habitat features for listed species (i.e. nest, den etc.) are found in or adjacent to the proposed activities at any time, the District Biologist will be contacted immediately as stated in stipulation RFSS-3 and an SNF biologist will determine the appropriate course of action, including applying the stipulations in appendix D. In addition, surveys of the final road and pad layout would be conducted (Stipulations RFSS-1, and RFSS-4). If new RFSS and key habitat features were identified, Stipulations RFSS-2 and RFSS-6 through RFSS-20 would address how Twin Metals will modify their activities to mitigate harm to those species.

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