

TECHNICAL MEMORANDUM

DATE: January 12, 2016

TO: Joseph Gibbens, PE – U.S. Forest Service Region 6 – Washington On-Scene Coordinator

FROM: Ryan Tobias, Cascade Earth Sciences

**SUBJECT: 2015 Biological Monitoring Report
Monte Cristo Mining Area Removal Action
Mt. Baker-Snoqualmie National Forest, Snohomish County, Washington**

Cascade Earth Sciences (CES) is pleased to provide this summary of the 2015 biological monitoring completed during the Removal Action conducted at the U.S. Forest Service (Forest Service) Monte Cristo Mining Area (MCMA; Site) located in the Mt. Baker-Snoqualmie National Forest, Snohomish County, Washington. Monitoring was performed in accordance with the Biological Monitoring Plan (Plan) submitted to the Forest Service as Appendix E of the *Removal Action Work Plan and Design Drawings* (CES, 2015).

BACKGROUND

Performance of the Non-Time-Critical Removal Action (RA) at the Site required development of a low-volume access route from the Mountain Loop Highway (MLH) to the MCMA Townsite. The access route was developed during the 2013 and 2014 field seasons, which necessitated Section 7 Consultation under the Endangered Species Act (ESA). Consequently, the U.S. Fish and Wildlife Service (USFWS) prepared a Biological Opinion (BO) to address potential effects of construction on the northern spotted owl (*Strix occidentalis caurina*); marbled murrelet (*Brachyramphus marmoratus*); bull trout (*Salvelinus confluentus*); and designated critical habitat.

Terms and conditions (T&Cs) of the BO included monitoring for noise, turbidity, and refuse during access route development. Noise monitoring was required due to potential increased levels of sound and human activity in the project area that may cause disturbance to marbled murrelets (murrelets). Turbidity monitoring was stipulated to assess impacts to three tributaries of the South Fork Sauk River (SFSR), which were crossed with log stringer bridges in 2014. Refuse monitoring was required due to the potential to attract corvids (i.e., crows and ravens) to the Site, which could increase the possibility of predation on nesting murrelets and/or juveniles. A Terrestrial Conservation Measure was also incorporated in the BO, which recommended activities using heavy equipment and other noise-generating equipment transpire outside a two-hour window after sunrise and before sunset between April 1 and September 15.

CES conducted biological monitoring in accordance with the T&Cs for the access route development in 2013 and 2014. The RA in 2015 was largely performed outside mapped critical habitat for the northern spotted owl and murrelet. However, large equipment operated and moved through late successional reserve (LSR) 115 to access the Site, log the repository, and provide access upgrades. In addition, a helicopter landing zone (HLZ) was established inside the LSR at Station 13+00 along the access route to accommodate remote operations in the Henry M. Jackson (HMJ) Wilderness. Moreover, a log deck was developed in the LSR at Station 27+00, about 0.25 miles south of the intersection of the access route with MLH. Furthermore, a temporary bridge was installed over Glacier Creek within bull trout habitat to access mine features for the RA (Figure 1).

Based on the requisites for the RA, the Forest Service requested re-initiation of formal Section 7 Consultation. On June 29, 2015, the USFWS provided an amended Incidental Take Statement for the RA, and an additional T&C for murrelet habitat monitoring, fulfilling the requirement for re-initiation of formal consultation. On September 1, 2015, the USFWS also provided a modification to the Incidental Take Statement for the Monte Cristo CERCLA Project. The modification stipulated removal of the Glacier Creek crossing no later than September 15, 2015 and restoration of the Glacier Creek channel to its pre-project contours, with removal of all foreign fill material (Appendix A).

REMOTE CAMPS

The initial phase of the RA included logging approximately 2.9 acres for preparation of the repository. Repository logging necessitated the establishment of a remote camp for Site workers at Perry Creek, approximately four miles west of Barlow Pass along the MLH. The camp was situated well outside the footprint of MCMA and access route alignment. Thus, the campsite was not subject to T&Cs outlined in the BO.

Following logging operations, CES, subcontractors, and Forest Service personnel relocated to the Monte Cristo Campground to prepare the repository for waste consolidation (Appendix B, Photograph 1). This camp was approximately 500 feet from the SFSR, which provides critical habitat for bull trout. However, there were no impacts to the river from the campsite. In addition, the camp was situated outside murrelet and spotted owl suitable habitat. Therefore, the campsite was not subject to T&Cs outlined in the BO.

An ancillary remote camp was established from September 4–16, 2015 to support removal of waste rock at the Pride of the Woods Mine in the HMJ Wilderness (Appendix B, Photograph 2). The camp was positioned outside mapped murrelet and spotted owl suitable habitat. In addition, the headwaters section of Glacier Creek nearest the camp does not support bull trout. As such, the ancillary campsite was not subject to T&Cs outlined in the BO.

NOISE MONITORING

A T&C of the BO requires noise levels be measured in suitable murrelet habitat at a distance of 45 yards while heavy machinery is operating until the end of the murrelet nesting season (September 15). Noise levels of 92 decibels (dB) or greater can result in negative effects to murrelets by causing an adult to flush from its nest during food delivery, resulting in a missed feeding opportunity for a fledgling (USFWS, 2011). CES staff monitored noise with a handheld digital sound level meter in the field during heavy equipment use to the September 15 cutoff date.

Noise Level Results

Results of the noise monitoring are presented in Table 1. The lowest noise level recorded by equipment was 58 dB (Whisperwatt 590746 generator) on July 20, 2015 from a distance of 45 yards. The highest noise level was recorded on September 6, 2015 (97.4 dB) from a Columbia Vertol 107-II helicopter, while hovering (Appendix B, Photograph 3). A noise level of 95.9 dB was also recorded from the helicopter on September 5, 2015 during a landing at the HLZ. All remaining noise level readings (e.g., chainsaws, heavy equipment, all-terrain vehicles, etc.) were between 65 and 89 dB.

Suitable Murrelet Habitat

Consultation re-initiation in 2015 resulted in an additional T&C, which required quantification of suitable murrelet habitat acres within 100 meters of noise and human activity (particularly operation of heavy machinery) and the quantity suitable murrelet habitat acres within 265 meters of helicopter operations at the HLZ.

The quantity of suitable murrelet habitat described from the USFWS re-initiation was 131 acres within 100 meters of noise and human activity and 25 acres within 265 meters of the HLZ. Based on a review of aerial photographs and mapped habitat in the LSR, 131 acres within 100 meters of noise and human activity is considered a reliable estimate. Suitable habitat within 265 meters of the HLZ was conservatively estimated at about 33 acres.

Noise Discussion

Based on the previously-described noise readings for the Columbia Vertol 107-II, it should be expected all takeoff, landing, and hovering operations between September 5-15, 2015 exceeded the 92 dB threshold at the HLZ. Helicopter rotors in motion at the HLZ, while grounded, measured 85.1 dB (Appendix B, Photograph 4). As such, exceedances of the noise threshold were likely short in duration. Moreover, the helicopter only operated in the LSR or near suitable habitat from September 5-15, a period when 95% of the murrelets in Western Washington were fledged (USFWS, 2012). Furthermore, the glide path utilized by the Vertol 107-II was through an open avalanche chute, which is not considered viable murrelet habitat (Figure 2) (Appendix B, Photograph 5). Therefore, any temporary disturbance within occupied murrelet habitat from the Vertol 107-II helicopter is expected to have been minimal.

With regard to human induced noise activity within 100 meters of the access route, the majority of heavy equipment use was associated with moving machinery from the MLH to the borrow area or repository. Periodic chainsaw use was required when removing trees and brush from the HLZ. However, none of the noise level readings from those activities exceeded 92 dB. Based on the limited duration of these noise generating activities and readings below 92 dB, impacts from noise to nesting murrelets along the access route are anticipated to have been negligible.

EQUIPMENT OPERATING TIMES

Heavy equipment was initially transported to the Site on April 28, 2015 for logging operations at the repository. As discussed, the majority of heavy equipment use occurred outside suitable nesting habitat, with periodic transport of machinery from the MLH, through suitable nesting habitat to the borrow area (Figure 3).

Limited Operating Periods

Murrelets are primarily crepuscular, with the majority of feeding activity occurring during low light hours near dawn and dusk (Hamer and Nelson, 1995). Peak landward movements are usually near first light and peak seaward movements are usually around sunrise (Cooper et al, 2003). Therefore, a Terrestrial Conservation Measure was incorporated in the BO, which recommended activities using heavy equipment and other noise-generating equipment transpire outside a two-hour window after sunrise and before sunset between April 1 and September 15 (USFWS, 2011). However, elimination of all noise is impractical, since the access route adjoins the MLH north of Mowich Camp, and ranges in distance from approximately 500 feet to approximately 1,200 feet west of the route at Barlow Pass. Proximate recreational uses include vehicles, all-terrain vehicles, chainsaws, and firearms, which are often utilized before, during, and after limited operating periods (LOPs).

In general, LOPs were maintained during the murrelet nesting season (Table 2). During the 142-day construction period that encompassed the murrelet nesting season, no work or heavy equipment movement occurred through murrelet habitat on 92 days. As such, no heavy equipment activity occurred in murrelet suitable nesting habitat for 65% of the construction period. Of the 50 days when heavy equipment operated within murrelet habitat, 25 days included equipment moving from the gate to the borrow area, all-terrain vehicle use for refuse removal, or other temporary access with heavy equipment in suitable nesting habitat. The remaining 25 days comprised stationary activities such as access route improvements, log hauling and decking, chainsaw use to remove trees/shrubs, or helicopter operations.

LOPs were not recognized on 11 occasions. Each is discussed below:

- April 29, 2105 – A CAT 325D excavator was dropped off inside the gate at 7:45, which was 11 minutes before the LOP. Since this limited, temporary activity occurred along a busy highway and only occurred 11 minutes outside the LOP, the deviation is considered negligible.
- June 15, 2015 – The rock sorter was delayed during transport from the gate to the borrow area. The sorter had difficulty managing the corner at Bridge #2. The crew mobilized to move the sorter off to the side of the road and finished at 20:05, which was 56 minutes outside the LOP. The divergence was unanticipated, and likely did not result in an exceedance of the 92 dB threshold. Based on this, the temporary exceedance is not considered a probable impact to nesting murrelets.
- July 19, 2015 – An excavator was walked toward the HLZ at 7:30, which is one minute before the sunrise LOP. The minor divergence from the LOP is not considered significant, since it represents a brief period of time (one minute) and the excavators exhibited noise level readings ranging from 65-89 dB, which is below the 92 dB threshold for the Site.
- July 22, 2015 – Surfacing material was placed on the Python Road section of the access route beginning at 7:15, which is 20 minutes prior to the sunrise LOP. The divergence from the LOP is not considered substantial, since the brief periods unloading rock measured about 72.5 dB, well below the 92 dB threshold for the Site.
- July 23, 2015 – A pickup and trailer with lime was unable to proceed up the hill south of the log deck. A haul truck was deployed at 21:30 to assist and transport personnel to camp. The divergence was 155 minutes beyond the LOP, but was brief, since it only involved moving through the LSR to assist and transport personnel back to camp. Since equipment was not stationary, any exposure to nesting murrelets would be temporary. Based on this, it does not likely represent a potential adverse threat to murrelet nesting behavior at the Site.
- August 17, 2015 – A Waste Management truck arrived at the gate at 6:50, 78 minutes prior to the sunrise LOP. The truck drove to the Concentrator to remove 12 cubic yards of hazardous waste for offsite disposal. Although the truck arrived early, equipment was not stationary, and any exposure to nesting murrelets would be temporary. Thus, the temporary disturbance was not likely substantial, since it advanced through the LSR without stopping and the noise was probably below the 92 dB threshold.
- August 24, 2015 – The D6 dozer moved to the gate to assist with track dump truck transport offsite. Operations at the gate were near highway traffic along the MLH. In addition, dozer operations measured about 70.5 dB at the Site. Therefore, the divergence from the sunrise LOP is not considered significant.
- September 7, 2015 – The helicopter landed one minute outside the sunset LOP at 17:39. The amended Incidental Take Statement for the Monte Cristo CERCLA Project (Appendix A) discusses contingencies that may occur during operations, resulting in the helicopter landing a little late in the day (after 2 hours before sunset). This was an anticipated exception versus operating procedure. Moreover, as discussed above, 95% of the murrelets in Western Washington have fledged by this date. Therefore, this deviation is considered negligible.
- September 14, 2015 - The helicopter landed one minute outside the sunset LOP at 17:25. The contingency that resulted in the helicopter landing shortly after the LOP was an anticipated exception versus operating procedure. Moreover, as discussed above, 95% of the murrelets in Western Washington have fledged by this date. Therefore, this deviation is considered negligible.
- September 15, 2015 - The helicopter exited the HLZ 29 minutes outside the sunrise LOP at 8:18 and landed 39 minutes before the sunset LOP at 18:01. Considering this is the final day of the nesting

season and 95% of the murrelets in Western Washington have fledged by this date, these divergences do not likely represent a substantial threat to murrelet nesting behavior.

CES employed additional noise limitation activities during the two-hour diurnal windows, which included:

- Cessation of chainsaw use.
- Minimization of equipment idling, and shutting off equipment when not in use.

Approximate start and stop times relative to official sunrise and sunset for equipment use is presented in Table 2. As shown, the average start time was 44.89 minutes after the official LOPs. The average stop time was 81.09 minutes prior to the end of the LOPs.

TURBIDITY

The USFWS concluded the level of anticipated take had a low probability of jeopardizing bull trout or resulting in the destruction or adverse modification of critical habitat for bull trout (USFWS, 2011). However, in order to be exempt from prohibitions of Section 9 of the ESA, the Forest Service was required comply with a T&C for turbidity monitoring in Glacier Creek at the temporary crossing at an ‘interim’ distance from the crossing that is less than the full extent of take. The interim distance is 300 feet below the temporary crossing over Glacier Creek.

CES monitored turbidity in Glacier Creek from July 2 – September 29, 2015. Two turbidity measurement methodologies were used:

1. A total of two Campbell Scientific OBS-3+ submersible turbidity probes and CR200x dataloggers were deployed to monitor continuous in-situ turbidity. The downstream turbidimeter was placed approximately 300 feet downstream of the crossing at the interim distance. The upstream turbidimeter was deployed upstream of the Rainy Mine to obtain true background measurements at 15-minute intervals (Appendix B, Photographs 6 and 7). The log of in-situ recording is provided in Appendix C.
2. Discrete samples were collected from July 16 – September 14, 2015 with the Oakton T-100 handheld turbidimeter. Sampling was conducted approximately 100 feet downstream and 50 feet upstream of the temporary crossing on a daily basis, or when a noticeable change in turbidity was observed (Figure 4). The meter was calibrated prior to daily observations using standards of 0.02, 20, 100 and 800 nephelometric turbidity units (NTU). Sample containers were wiped with a lint-free cloth and placed in the turbidimeter chamber for analysis. Grab samples were generally collected at the sample locations on a daily basis and/or during precipitation/sediment-generating events (Table 3).

Bridge Installation

Installation of the temporary bridge was completed on July 16, 2015 during low-flow conditions (Appendix B, Photographs 8-10). The crossing was placed across a southern meander of Glacier Creek, which allowed the abutments to be set without diversion of the channel (Figure 4). In-situ turbidity measurements for this day ranged from 0.516 to 1.05 NTU downstream from the bridge crossing. Discrete turbidity measurements conducted during installation indicated turbidity did not exceed 2.4 NTU downstream from the crossing (Appendix B). As such, the 12.1 NTU threshold was not exceeded, and additional monitoring was not needed over the full extent of take downstream of the sediment generating activities. Appendix B, Photograph 11 shows Glacier Creek downstream from the bridge after installation.

August 29 – September 4 Storm Event

The CES weather station recorded 7.41 inches of precipitation between August 29 and September 4, 2015 (Appendix B). In-situ turbidity measurements collected during the storm indicated the upstream and downstream probes moved as the streamflow increased, and likely became lodged under cobbles. As a result, artificially high readings (up to 1,260.058 NTU) were recorded in the upstream probe. The highest turbidity measurement of 1,298.382 was recorded in the downstream probe (Appendix C). The probes were discovered lodged under cobbles on September 2, 2015. They were subsequently removed and redeployed, after which, the upstream turbidity measured 1.61 to 2.09 NTU, and the downstream probe recorded turbidity at concentrations ranging from 3.22 to 9.31 NTU.

Discrete sampling conducted during the rain event indicated turbidity peaked on August 30, 2015 at 8:30, measuring 7.22 NTU. Therefore, the 12.1 NTU benchmark was not exceeded, and additional monitoring was not needed over the full extent of take downstream of the temporary crossing. Appendix B, Photograph 12 depicts the high flow conditions at the Glacier Creek crossing.

September 6 Storm Event

Moderate rainfall was noted at the Site on September 4, 2015, when the CES weather station recorded 0.46 inches of precipitation. Upstream turbidity measurements ranged from 0.72 to 1.61 NTU. The downstream in-situ turbidimeter recorded measurements ranging from 0.887 to 2.77 NTU. Grab sampling downstream of the bridge identified a turbidity measurement of 0.06 NTUs. Thus, the 12.1 NTU threshold was not exceeded and additional monitoring was not performed over the full extent of take.

Bridge Removal

The modification to the Incidental Take Statement for the Monte Cristo CERCLA Project stipulated removal of the temporary crossing over Glacier Creek by September 15, 2015 (Appendix A). Removal of the temporary bridge was completed on September 14, 2015 (Appendix B, Photograph 13). In-situ turbidity measurements for this day ranged from 1.14 to 2.85 NTU upstream and 3.86 to 14.5 NTU downstream from the bridge crossing. The 14.5 NTU measurement at 17:30 was the only exceedance of the 12.1 NTU threshold. Measurements dropped to 3.9 NTUs at 17:35 and remained below 5 NTUs the remainder of the day.

Discrete turbidity measurements downstream from the crossing during bridge removal indicated turbidity reached 23.1 NTUs at 13:49, dropping to 13.2 NTUs at 13:50, and 6.5 NTUs at 13:51. As such, the 12.1 NTU threshold was exceeded for two minutes. However, in-situ measurements at the full extent of take indicate turbidity did not exceed 4.08 NTUs during this timeframe. Therefore, compliance was achieved following the two-minute exceedance of the 12.1 NTU criterion.

REFUSE MONITORING

The BO requires monitoring and removal of refuse as a T&C. Monitoring/removal must occur during the seasonal fieldwork period and for 2 years after, at least once every 45 days during the snow-free period of the murrelet nesting season. Based on the suitable nesting habitat mapping data provided in the Biological Assessment (Forest Service, 2010), the extent of refuse removal and monitoring spans from the MLH to about Silvertip Campground (Figure 3).

CES and our subcontractors employed regular solid waste removal practices throughout the RA. Refuse was managed and removed from the entire project Site, including areas outside murrelet suitable nesting habitat. On-site personnel included a discussion of refuse removal and management with the contractor during all health and safety meetings. In addition, CES supervised the contractors to ensure effective sanitation practices for proper

disposal of food and refuse that could attract corvids (i.e., crows and ravens) and increase the possibility of predation on nesting murrelets and/or juveniles.

CES personnel performed seven refuse removal events from April 30 – September 3, 2015 (Table 4). Refuse collected was recorded in the field notebook when removed. CES also removed refuse from dispersed campsites not associated with the access route to further ensure corvids were not attracted to the work zone (Appendix B, Photographs 14 and 15).

CONCLUSIONS

Biological monitoring was completed in general accordance with the T&Cs and Terrestrial Conservation Measures outlined in the BO.

- Noise monitoring was conducted to fulfill the requirements outlined in the T&Cs of the BO. Results of the noise monitoring indicated the helicopter was the only equipment used in critical murrelet habitat that exceeded the established 92 dB threshold for the murrelet nesting season.
 - The Columbia Vertol 107-II helicopter was the only equipment to exceed the 92 dB threshold when hovering, landing, and at takeoff. However, rotors in motion at the HLZ, while grounded, measured 85.1 dB. As such, exceedances of the noise threshold were likely short in duration. Moreover, the helicopter only operated in or near suitable nesting habitat from September 5-15, a period when 95% of the murrelets in Western Washington have fledged. Furthermore, the glide path utilized by the Vertol 107-II was through an open avalanche chute, which is not considered viable murrelet habitat. Therefore, any temporary disturbance within occupied murrelet habitat from the Vertol 107-II helicopter is expected to have been minimal. A review of aerial photographs and mapped habitat in the LSR indicated suitable murrelet habitat within 265 meters of the HLZ is about 33 acres.
 - During the 142-day construction period that encompassed the murrelet nesting season, no work or heavy equipment movement occurred through murrelet habitat on 92 days (65% of the construction period). Of the 50 days when heavy equipment operated within murrelet habitat, 25 days included equipment moving from the gate to the borrow area, all-terrain vehicle use for refuse removal, or other temporary access with heavy equipment in the LSR. The remaining 25 days comprised stationary activities such as access route improvements, log hauling and decking, chainsaw use to remove trees/shrubs, or helicopter operations.
 - Limited equipment operation occurred beyond LOPs outlined in the BO. Elimination of noise at the Site is considered impractical due to proximate recreational uses along the MLH (e.g., vehicles, all-terrain vehicles, chainsaws, and firearms). However, the LOPs were observed during all but 11 of the work days during the 2015 season. These exceptions are considered minor, and unlikely to have adversely impacted murrelet nesting behavior.
 - CES employed additional noise limiting activities during the two-hour diurnal windows as follows:
 - Prohibition of chainsaw use.
 - Minimization of equipment idling, and equipment shut down when not in use.
- Turbidity measurements were collected in accordance with the T&Cs of the BO. In-situ and discrete sampling identified turbidity measurements in excess of the 12.1 NTU benchmark on September 14, 2015, when the temporary bridge was removed.
 - The exceedances were noted for two minutes in discrete samples, after which, turbidity stabilized below the 12.1 NTU criterion.

- No mitigation measures were employed since it was a brief exceedance, followed by turbidity stabilization, and the sediment generating activities were complete.
- Refuse monitoring was completed during seven events in the LSR from April 30, 2015 to September 3, 2015. Garbage removal was documented in the field notebook and is summarized in Table 4.

REFERENCES

CES, 2015. Removal Action Work Plan and Design Drawings. Monte Cristo Mining Area, Mt. Baker-Snoqualmie National Forest, Snohomish County, Washington. Cascade Earth Sciences, Spokane, Washington.

Cooper, B.A, M.G. Raphael, and D.E. Mack, 2003. Refining a Landscape-Scale Habitat Model and Inland Monitoring Program for Marbled Murrelets in the Olympic Peninsula. ABR-Inc, Environmental Research Services, Forest Grove, Oregon and USFS Pacific Northwest Research Station. Olympia, Washington.

Forest Service, 2010. Biological Assessment, Monte Cristo Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Removal Action to be Conducted at the Monte Cristo Mining Area. Darrington Ranger District, Mt. Baker-Snoqualmie National Forest. Darrington, Washington.

Hamer, T.E., and S.K. Nelson, 1995. Nesting Biology and Behavior of the Marbled Murrelet. USDA Forest Service General Technical Report. PSW-152. Pacific Southwest Research Station. Albany, California.

USFWS, 2011. Endangered Species Act Section 7 Consultation; Biological Opinion, Monte Cristo CERCLA Project. U.S. Fish and Wildlife Service Reference: 13410-2011-F-0067. Washington Fish and Wildlife Office. Lacey, Washington.

USFWS, 2012. Marbled Murrelet Nesting Season and Analytical Framework for Section 7 Consultation in Washington. U.S. Fish and Wildlife Service Washington Fish and Wildlife Office (WFWO) Lacey, Washington.

RMT/sjr

Att: Table 1. Noise Monitoring
Table 2. Approximate Start and Stop Time Summary
Table 3. Discrete Turbidity Monitoring Summary
Table 4. Refuse Monitoring Summary
Figure 1. Site Layout Map of Monte Cristo Mining Area
Figure 2. Helicopter Landing Zone and 265 Meter Radius
Figure 3. Critical Murrelet Habitat
Figure 4. Temporary Glacier Creek Crossing and Turbidity Monitoring Stations
App A. U.S. Fish and Wildlife Service Documentation
App B. Photographs
App C. Continuous In-Situ Turbidity Documentation
Doc: 2015230017 MCMA Biological Monitoring Rpt.docx

TABLES

Table 1. Noise Monitoring

Table 2. Approximate Start and Stop Time Summary

Table 3. Discrete Turbidity Monitoring Summary

Table 4. Refuse Monitoring Summary

Table 1. Noise Monitoring

Date	Construction Location	Time	Noise Level	Equipment
			dB	
6/24/2015	Repository (outside murrelet habitat)	16:00	89	350 LC excavator, piling slash with backup alarm
6/24/2015	Repository (outside murrelet habitat)	16:00	73	350 LC excavator, while grabbing slash material
6/25/2015	Not recorded	8:15	77.5	Cat 329 excavator
6/25/2015	Not recorded	8:15	76	Chainsaw
6/25/2015	Not recorded	8:15	77.5	Chainsaw, haul truck, large excavators working simultaneously
6/26/2015	Not recorded	14:10	77.5	Excavator
6/27/2015	Not recorded	8:00	80	CAT excavator
6/27/2015	Not recorded	8:00	72.5	Deere dump truck
6/27/2015	Borrow area (outside murrelet habitat)	12:00	77.5	Excavator unloading running log truck
6/29/2015	Repository (outside murrelet habitat)	9:15	70.5	D6k dozer and CAT 329E excavator running simultaneously
6/29/2015	Repository (outside murrelet habitat)	9:15	76	329E excavator hitting a log to move it
6/29/2015	Repository (outside murrelet habitat)	14:00	67.5	CAT 329E excavator loading Deere 300D haul truck
6/29/2015	Road at repository entrance – approximately 200-250 feet away from equipment activity (outside murrelet habitat)	14:05	65	No equipment – mainly background of SFSR
7/2/2015	Monte Cristo Campground (outside murrelet habitat)	10:00	65	Whisperwatt 590746 generator
7/2/2015	MW-3R (outside murrelet habitat)	15:19	73.1	Portable generator for Rediflow pump
7/2/2015	Not recorded	15:19	65	CAT 329 excavator + dump truck
7/15/2015	Not recorded	16:30	78	Moving rail car bridge spans through murrelet habitat
7/19/2015	Culvert between Bridge #2 and #3	8:40	81	Repair and cover damaged culvert with CAT 325 excavator
7/19/2015	Helicopter landing zone	10:45	68	Chainsaw
7/19/2015	Helicopter landing zone	10:45	80	Chainsaw + 325 excavator
7/20/2015	Monte Cristo Campground (outside murrelet habitat)	18:08	58	Whisperwatt 590746 generator
9/3/2015	Bridge #2	10:15	60.1	ATV
9/5/2015	Helicopter landing zone	9:30	71.8	Chainsaw
9/5/2015	Helicopter landing zone	10:50	95.9	Columbia Vertol 107-II during landing
9/5/2015	Helicopter landing zone	10:50	85.1	Columbia Vertol 107-II, landed with rotors in motion
9/6/2015	Rainy Mine (outside murrelet habitat)	9:37	97.4	Columbia Vertol 107-II, during waste rock drop with self-dumping bin
Noise Level Threshold at 45 Yards			92	
Maximum Noise Level Recorded at 45 Yards			97.4	
Minimum Noise Level Recorded at 45 Yards			58	
Average Noise Level at 45 Yards			75.30	

NOTES:

All measurements taken at 45 yards or less from the source.

Abbreviations: dB = decibels, MLH = Mountain Loop Highway, SFSR = South Fork Sauk River.

Bold indicates the noise threshold outlined in the Biological Monitoring Plan was exceeded; Highlighted cells indicate which standard was exceeded.

Table 2. Approximate Start and Stop Time Summary

Date	Sunrise ¹	2 Hours After Sunrise	Approximate Start Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Started 2 Hours After Sunrise	Sunset ¹	2 Hours Before Sunset	Approximate Stop Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Ended 2 Hours Before Sunrise	Comments
	time		minutes	minutes	time		minutes	minutes			
4/28/2015	5:59	7:59	8:20	+ 21	Yes	20:16	18:16	13:20	- 294	Yes	Unloaded ATV at helicopter landing zone
4/29/2015	5:56	7:56	7:45	- 11	No	20:19	18:19	16:56	- 83	Yes	Dropped off CAT 325D excavator inside gate and departed
4/30/2015	5:54	7:54	8:30	+ 36	Yes	20:20	18:20	17:00	- 80	Yes	Chainsaw work at 9:00 to widen corner at Helicopter landing zone
5/1/2015	5:52	7:52	8:15	+ 22	Yes	20:21	18:21	14:51	- 210	Yes	Dump rock at Bridge #3 at 8:15
5/2/2015	5:51	7:51	11:55	+ 244	Yes	20:23	18:23	12:30	- 353	Yes	
5/3/2015	5:49	7:49	--	--	Yes	20:24	18:24	--	--	Yes	No equipment working at site
5/4/2015	5:48	7:48	8:30	+ 43	Yes	20:26	18:26	17:51	- 35	Yes	Mobilize from gate on ATV at 8:30
5/5/2015	5:46	7:46	8:06	+ 20	Yes	20:27	18:27	18:23	- 4	Yes	Equipment trailer mobilized to borrow area at 8:06
5/6/2015	5:45	7:45	--	--	Yes	20:28	18:28	--	--	Yes	No work in murrelet habitat
5/7/2015	5:43	7:43	--	--	Yes	20:30	18:30	--	--	Yes	No work in murrelet habitat
5/8/2015	5:42	7:43	--	--	Yes	20:31	18:31	--	--	Yes	Crew offsite
5/9/2015	5:40	7:40	--	--	Yes	20:32	18:32	--	--	Yes	Crew offsite
5/10/2015	5:39	7:49	--	--	Yes	20:34	18:34	--	--	Yes	Crew offsite
5/11/2015	5:37	7:37	--	--	Yes	20:35	18:35	--	--	Yes	Crew offsite
5/12/2015	5:36	7:36	--	--	Yes	20:36	18:36	--	--	Yes	Crew offsite
5/13/2015	5:35	7:35	--	--	Yes	20:38	18:38	--	--	Yes	Logging at repository, no equipment use in murrelet habitat
5/14/2015	5:33	7:33	--	--	Yes	20:39	18:39	--	--	Yes	Logging at repository, no equipment use in murrelet habitat
5/15/2015	5:32	7:32	--	--	Yes	20:40	18:40	--	--	Yes	Logging at repository, no equipment use in murrelet habitat
5/16/2015	5:31	7:31	--	--	Yes	20:41	18:41	--	--	Yes	Logging at repository, no equipment use in murrelet habitat
5/17/2015	5:30	7:30	--	--	Yes	20:43	18:43	--	--	Yes	Crew offsite
5/18/2015	5:29	7:29	--	--	Yes	20:44	18:44	--	--	Yes	325 Excavator down; no equipment working at site
5/19/2015	5:27	7:27	--	--	Yes	20:45	18:45	--	--	Yes	325 excavator repairs; no equipment working at site
5/20/2015	5:26	7:26	--	--	Yes	20:46	18:46	--	--	Yes	Hauled logs to borrow area; no work in murrelet habitat
5/21/2015	5:25	7:25	--	--	Yes	20:48	18:48	--	--	Yes	Hauled logs to borrow area; no work in murrelet habitat
5/22/2015	5:24	7:24	--	--	Yes	20:49	18:49	--	--	Yes	Hauled logs to borrow area; no work in murrelet habitat
5/23/2015	5:23	7:23	--	--	Yes	20:50	18:50	--	--	Yes	Crew offsite
5/24/2015	5:22	7:22	--	--	Yes	20:51	18:51	--	--	Yes	Crew offsite
5/25/2015	5:21	7:21	--	--	Yes	20:52	18:52	--	--	Yes	Crew offsite
5/26/2015	5:20	7:20	--	--	Yes	20:54	18:54	--	--	Yes	Crew offsite
5/27/2015	5:20	7:20	--	--	Yes	20:54	18:54	--	--	Yes	No work in murrelet habitat
5/28/2015	5:19	7:19	--	--	Yes	20:55	18:55	--	--	Yes	No equipment working at site
5/29/2015	5:18	7:18	--	--	Yes	20:56	18:56	--	--	Yes	No equipment working at site
5/30/2015	5:17	7:17	--	--	Yes	20:57	18:57	--	--	Yes	No equipment working at site
5/31/2015	5:16	7:16	--	--	Yes	20:58	18:58	--	--	Yes	No equipment working at site
6/1/2015	5:16	7:16	8:00	+ 44	Yes	20:59	18:59	--	--	Yes	Began hauling logs to decking area; only 4 loads moved due to mud
6/2/2015	5:15	7:15	8:15	+ 60	Yes	21:00	19:00	18:33	- 27	Yes	Widening south of Bridge #2 at 8:15
6/3/2015	5:15	7:15	7:15	0	Yes	21:01	19:01	18:00	- 61	Yes	Upgrades to access route
6/4/2015	5:14	7:14	7:15	+ 1	Yes	21:02	19:02	18:00	- 62	Yes	Upgrades to access route; hauled 3 loads of logs to decking area
6/5/2015	5:14	7:14	--	--	Yes	21:03	19:03	--	--	Yes	No equipment work in murrelet habitat. Conditions to muddy for hauling logs
6/6/2015	5:13	7:13	--	--	Yes	21:03	19:03	--	--	Yes	Crew offsite
6/7/2015	5:13	7:13	--	--	Yes	21:04	19:04	--	--	Yes	Crew offsite
6/8/2015	5:12	7:12	--	--	Yes	21:05	19:05	--	--	Yes	Crew offsite

Table 2. Approximate Start and Stop Time Summary

Date	Sunrise ¹	2 Hours After Sunrise	Approximate Start Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Started 2 Hours After Sunrise	Sunset ¹	2 Hours Before Sunset	Approximate Stop Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Ended 2 Hours Before Sunrise	Comments
	time			minutes		time			minutes		
6/9/2015	5:12	7:12	--	--	Yes	21:06	19:06	--	--	Yes	<i>Crew offsite</i>
6/10/2015	5:12	7:12	7:15	+ 3	Yes	21:06	19:06	18:00	- 66	Yes	Hauled logs to decking area
6/11/2015	5:12	7:12	7:15	+ 3	Yes	21:07	19:07	18:00	- 67	Yes	Hauled logs to decking area
6/12/2015	5:11	7:11	7:15	+ 4	Yes	21:07	19:07	18:00	- 67	Yes	Hauled logs to decking area
6/13/2015	5:11	7:11	7:15	+ 4	Yes	21:08	19:08	18:00	- 68	Yes	Hauled logs to decking area
6/14/2015	5:11	7:11	--	--	Yes	21:08	19:08	19:00	- 8	Yes	ATV moved from gate to MC Campground
6/15/2015	5:11	7:11	--	--	Yes	21:09	19:09	20:05	+ 56	No	Rock sorter pulled to turnout on Python Road. Difficulty with equipment making the corner at Bridge #2 resulted in a delay. Needed to move equipment off the road to provide access for RV behind the sorter.
6/16/2015	5:11	7:11	7:15	+ 4	Yes	21:09	19:09	18:20	- 49	Yes	Moved rock sorter to borrow area at 7:15. Cascade Drilling departed site at 18:20
6/17/2015	5:11	7:11	7:44	+ 33	Yes	21:10	19:10	18:15	- 55	Yes	CAT 329E excavator moved from gate to repository at 7:44. Cascade Drilling offsite at 18:15.
6/18/2015	5:11	7:11	--	--	Yes	21:10	19:10	17:30	- 100	Yes	Cascade Drilling skid steer mobilized through murrelet habitat at 17:30
6/19/2015	5:11	7:11	--	--	Yes	21:10	19:10	17:00	- 130	Yes	D6 dozer tracked through murrelet habitat to repository at 17:00
6/20/2015	5:11	7:11	8:15	+ 64	Yes	21:11	19:11	--	--	Yes	ATV accessed Python Logging Road/County Road intersection to turn back hikers at 8:15
6/21/2015	5:12	7:12	8:00	+ 48	Yes	21:11	19:11	17:00	- 131	Yes	Morning mobilization included obtaining wood platforms from log deck area. RV trailer pulled into MC campground at 17:00
6/22/2015	5:12	7:12	9:20	+ 128	Yes	21:11	19:11	17:30	- 151	Yes	Moved 329E excavator from log deck to borrow area at 9:20. Small trees removed enroute. Compactor at gate at 17:30
6/23/2015	5:12	7:12	--	--	Yes	21:11	19:11	--	--	Yes	<i>No work in murrelet habitat</i>
6/24/2015	5:12	7:12	--	--	Yes	21:11	19:11	16:00	- 191	Yes	Drive ATV to Python/County Road intersection at 16:00
6/25/2015	5:13	7:13	--	--	Yes	21:11	19:11	--	--	Yes	<i>No work in murrelet habitat</i>
6/26/2015	5:13	7:13	--	--	Yes	21:11	19:11	--	--	Yes	<i>No work in murrelet habitat</i>
6/27/2015	5:14	7:14	--	--	Yes	21:11	19:11	18:10	-51	Yes	ATV used for refuse removal in murrelet habitat until 18:10
6/28/2015	5:14	7:14	--	--	Yes	21:11	19:11	--	--	Yes	<i>No work in murrelet habitat</i>
6/29/2015	5:14	7:14	--	--	Yes	21:11	19:11	16:30	- 161	Yes	ATV used for refuse removal in murrelet habitat until 16:30
6/30/2015	5:15	7:15	--	--	Yes	21:11	19:11	--	--	Yes	<i>No work in murrelet habitat</i>
7/1/2015	5:16	7:16	--	--	Yes	21:11	19:11	--	--	Yes	<i>No work in murrelet habitat</i>
7/2/2015	5:15	7:16	--	--	Yes	21:10	19:10	--	--	Yes	<i>No work in murrelet habitat</i>
7/3/2015	5:17	7:17	--	--	Yes	21:10	19:10	--	--	Yes	<i>No work in murrelet habitat</i>
7/4/2015	5:18	7:18	--	--	Yes	21:10	19:10	--	--	Yes	<i>No work in murrelet habitat</i>
7/5/2015	5:18	7:18	--	--	Yes	21:09	19:09	--	--	Yes	<i>No work in murrelet habitat</i>
7/6/2015	5:19	7:19	--	--	Yes	21:09	19:09	--	--	Yes	<i>No work in murrelet habitat</i>
7/7/2015	5:20	7:20	--	--	Yes	21:08	19:08	--	--	Yes	<i>No work in murrelet habitat</i>
7/8/2015	5:21	7:21	--	--	Yes	21:08	19:08	--	--	Yes	<i>No work in murrelet habitat</i>
7/9/2015	5:21	7:21	--	--	Yes	21:07	19:07	--	--	Yes	<i>No work in murrelet habitat</i>
7/10/2015	5:22	7:22	--	--	Yes	21:07	19:07	--	--	Yes	<i>No work in murrelet habitat</i>
7/11/2015	5:23	7:23	--	--	Yes	21:06	19:06	--	--	Yes	<i>No work in murrelet habitat</i>
7/12/2015	5:24	7:24	--	--	Yes	21:05	19:05	--	--	Yes	<i>No work in murrelet habitat</i>
7/13/2015	5:25	7:25	--	--	Yes	21:05	19:05	--	--	Yes	<i>No work in murrelet habitat</i>
7/14/2015	5:26	7:26	--	--	Yes	21:04	19:04	--	--	Yes	<i>No work in murrelet habitat</i>
7/15/2015	5:27	7:27	--	--	Yes	21:03	19:03	16:30	- 153	Yes	Moved temporary bridge through murrelet habitat at 16:30
7/16/2015	5:28	7:28	--	--	Yes	21:02	19:02	--	--	Yes	<i>No work in murrelet habitat</i>
7/17/2015	5:29	7:29	--	--	Yes	21:01	19:01	19:00	- 1	Yes	Grader arrived at gate at 19:00

Table 2. Approximate Start and Stop Time Summary

Date	Sunrise ¹	2 Hours After Sunrise	Approximate Start Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Started 2 Hours After Sunrise	Sunset ¹	2 Hours Before Sunset	Approximate Stop Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Ended 2 Hours Before Sunrise	Comments
	time			minutes		time			minutes		
7/18/2015	5:30	7:30	--	--	Yes	21:01	19:01	--	--	Yes	No work in murrelet habitat
7/19/2015	5:31	7:31	7:30	- 1	No	21:00	19:00	17:00	-120	Yes	Excavator walked toward helicopter landing zone beginning at 7:30
7/20/2015	5:32	7:32	--	--	Yes	20:59	18:59	16:38	- 141	Yes	Used ATV to access County Road/Python Road intersection to post a sign at 16:38
7/21/2015	5:33	7:33	--	--	Yes	20:58	18:58	--	--	Yes	No work in murrelet habitat
7/22/2015	5:35	7:35	7:15	- 20	No	20:56	18:56	18:00	- 56	Yes	Place 3"-minus rock on Python Road beginning at 7:15; finish smoothing and water road at 18:00
7/23/2015	5:36	7:36	--	--	Yes	20:55	18:55	21:30	+ 155	No	Pickup and trailer with lime unable to move beyond log deck. Haul truck deployed at 21:30 to assist.
7/24/2015	5:37	7:37	--	--	Yes	20:54	18:54	17:10	- 154	Yes	Komatsu spin dump trucks arrived at repository at 17:10
7/25/2015	5:38	7:38	--	--	Yes	20:53	18:53	--	--	Yes	No work in murrelet habitat
7/26/2015	5:39	7:39	--	--	Yes	20:52	18:52	--	--	Yes	No work in murrelet habitat
7/27/2015	5:40	7:40	--	--	Yes	20:51	18:51	--	--	Yes	No work in murrelet habitat
7/28/2015	5:42	7:42	--	--	Yes	20:49	18:49	--	--	Yes	No work in murrelet habitat
7/29/2015	5:43	7:43	--	--	Yes	20:48	18:48	--	--	Yes	No work in murrelet habitat
7/30/2015	5:44	7:44	--	--	Yes	20:47	18:47	--	--	Yes	No work in murrelet habitat
7/31/2015	5:45	7:45	--	--	Yes	20:45	18:45	--	--	Yes	No work in murrelet habitat
8/1/2015	5:47	7:47	--	--	Yes	20:44	18:44	--	--	Yes	No work in murrelet habitat
8/2/2015	5:48	7:48	--	--	Yes	20:43	18:43	--	--	Yes	No work in murrelet habitat
8/3/2015	5:49	7:49	--	--	Yes	20:41	18:41	--	--	Yes	No work in murrelet habitat
8/4/2015	5:50	7:50	--	--	Yes	20:40	18:40	--	--	Yes	No work in murrelet habitat
8/5/2015	5:52	7:52	--	--	Yes	20:38	18:38	--	--	Yes	No work in murrelet habitat
8/6/2015	5:53	7:53	--	--	Yes	20:37	18:37	--	--	Yes	No work in murrelet habitat
8/7/2015	5:54	7:54	--	--	Yes	20:35	18:35	--	--	Yes	No work in murrelet habitat
8/8/2015	5:56	7:56	--	--	Yes	20:33	18:33	--	--	Yes	No work in murrelet habitat
8/9/2015	5:57	7:57	--	--	Yes	20:32	18:32	--	--	Yes	No work in murrelet habitat
8/10/2015	5:58	7:58	--	--	Yes	20:30	18:30	--	--	Yes	No work in murrelet habitat
8/11/2015	6:00	8:00	--	--	Yes	20:29	18:29	--	--	Yes	No work in murrelet habitat
8/12/2015	6:01	8:01	--	--	Yes	20:27	18:27	14:23	- 244	Yes	CAT 312 Excavator moved from gate to repository
8/13/2015	6:02	8:02	--	--	Yes	20:25	18:25	--	--	Yes	No work in murrelet habitat
8/14/2015	6:04	8:04	--	--	Yes	20:24	18:24	--	--	Yes	No work in murrelet habitat
8/15/2015	6:05	8:05	--	--	Yes	20:22	18:22	--	--	Yes	Rain - No equipment working at site
8/16/2015	6:06	8:06	--	--	Yes	20:20	18:20	--	--	Yes	Rain - No equipment working at site
8/17/2015	6:08	8:08	6:50	- 78	No	20:18	18:18	--	--	Yes	Waste Management truck onsite at 6:50 to remove hazardous waste containers
8/18/2015	6:09	8:09	--	--	Yes	20:17	18:17	--	--	Yes	No work in murrelet habitat
8/19/2015	6:10	8:10	--	--	Yes	20:15	18:15	--	--	Yes	No work in murrelet habitat
8/20/2015	6:12	8:12	--	--	Yes	20:13	18:13	--	--	Yes	No work in murrelet habitat
8/21/2015	6:13	8:13	--	--	Yes	20:11	18:11	--	--	Yes	No work in murrelet habitat
8/22/2015	6:14	8:14	--	--	Yes	20:09	18:09	--	--	Yes	No work in murrelet habitat
8/23/2015	6:16	8:16	--	--	Yes	20:07	18:07	--	--	Yes	No work in murrelet habitat
8/24/2015	6:17	8:17	7:00	-77	No	20:06	18:06	--	--	Yes	D6 dozer operated near gate starting at 7:00; track trucks moved offsite.
8/25/2015	6:18	8:18	12:00	+ 222	Yes	20:04	18:04	--	--	Yes	Krambo wood shredder walked to repository from gate at 12:00
8/26/2015	6:20	8:20	--	--	Yes	20:02	18:02	--	--	Yes	No work in murrelet habitat
8/27/2015	6:21	8:21	--	--	Yes	20:00	18:00	--	--	Yes	No work in murrelet habitat

Table 2. Approximate Start and Stop Time Summary

Date	Sunrise ¹	2 Hours After Sunrise	Approximate Start Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Started 2 Hours After Sunrise	Sunset ¹	2 Hours Before Sunset	Approximate Stop Time (Saws, Heavy Equipment)	Deviation from 2-Hour Diurnal Window	Work Ended 2 Hours Before Sunrise	Comments
	time			minutes		time			minutes		
8/28/2015	6:22	8:22	--	--	Yes	19:58	17:58	--	--	Yes	<i>No work in murrelet habitat</i>
8/29/2015	6:24	8:24	--	--	Yes	19:56	17:56	--	--	Yes	<i>Heavy rain - No equipment working at site</i>
8/30/2015	6:25	8:25	--	--	Yes	19:54	17:54	--	--	Yes	<i>Heavy rain - No equipment working at site</i>
8/31/2015	6:26	8:26	--	--	Yes	19:52	17:52	--	--	Yes	<i>No work in murrelet habitat</i>
9/1/2015	6:28	8:28	--	--	Yes	19:50	17:50	--	--	Yes	<i>Rain - No equipment working at site</i>
9/2/2015	6:29	8:29	--	--	Yes	19:48	17:48	--	--	Yes	<i>No work in murrelet habitat</i>
9/3/2015	6:30	8:30	8:50	+ 20	Yes	19:46	17:46	--	--	Yes	ATV access to murrelet habitat for refuse removal/monitoring
9/4/2015	6:32	8:32	--	--	Yes	19:44	17:44	--	--	Yes	<i>Rain - No equipment working at site</i>
9/5/2015 ²	6:33	8:33	9:30	+57	Yes	19:42	17:42	17:30	-12	Yes	ATV Accessed helicopter landing zone at 9:30; Helicopter arrived at 10:50, returned to landing zone at 17:30
9/6/2015	6:34	8:34	8:59	+ 25	Yes	19:40	17:40	9:40	- 420	Yes	Helicopter take off at 8:59; Returned to landing zone at 9:40 due to rain
9/7/2015	6:36	8:36	15:23	+ 327	Yes	19:38	17:38	17:39	+ 1	No	Helicopter take off at 13:23 due to repairs to speed trim; Returned to landing zone at 17:30
9/8/2015	6:37	8:37	8:48	+ 10	Yes	19:36	17:36	17:33	-3	Yes	Helicopter take off at 8:48; Returned to landing zone at 17:33
9/9/2015	6:38	8:38	9:13	+ 35	Yes	19:34	17:34	17:31	-3	Yes	Helicopter take off at 9:13; Returned to landing zone at 17:31
9/10/2015	6:40	8:40	8:40	0	Yes	19:32	17:32	17:27	- 5	Yes	Helicopter take off at 8:40; Returned to landing zone at 17:27
9/11/2015	6:41	8:41	10:44	+ 123	Yes	19:30	17:30	17:30	0	Yes	Helicopter take off at 10:44 due to repairs/replacement of drive shaft; Returned to landing zone at 17:30
9/12/2015	6:42	8:42	8:52	+ 10	Yes	19:28	17:28	17:26	- 2	Yes	Helicopter takeoff at 8:52; Returned to landing zone at 17:26
9/13/2015	6:44	8:44	10:24	+ 100	Yes	19:26	17:26	17:24	- 2	Yes	Helicopter take off at 10:24 due to fog; Returned to landing zone at 17:24
9/14/2015	6:45	8:45	11:31	+ 166	Yes	19:24	17:24	17:25	+ 1	No	Helicopter take off at 11:31 due to fog; Returned to landing zone at 17:25
9/15/2015	6:47	8:47	8:18	- 29	No	19:22	17:22	18:01	+ 39	No	Helicopter takeoff at 8:18; Returned to landing zone at 18:01
Average Time	5:42	7:42	8:41			20:38	18:38	17:13			
Average Deviation³				+44.89					-81.09		

NOTES:

¹ Sunrise and sunset data were derived from the Seattle, Washington sun and moon calendar from timeanddate.com.

² Work after September 4 should be considered within the context that 95% of the murrelets in Western Washington have fledged by that date (USFWS, 2012).

-- Deviation does not include dates where heavy equipment was not used within murrelet habitat; shown in *italics*.

Bold indicates work was completed within the 2 hour time restriction

Table 3. Discrete Turbidity Monitoring Summary

Date	Time	Temporary Bridge Turbidity at Glacier Creek Crossing		Comments
		Upstream	Downstream	
		NTU		
7/16/2015	13:20	0.70	--	Turbidity measured during installation of Glacier Creek crossing
	13:40	--	0.65	
	14:08	--	2.40	
	14:33	--	0.90	First abutment set
	15:03	--	0.80	Second abutment set
7/25/2015	18:00	--	0.00	
7/26/2015	14:05	--	0.00	
7/28/2015	16:45	0.00	--	Oakton T-100 calibration check: 0.02 = 0.03, 20 = 19.97, 100 = 99.7, 800 = 796
	16:50	--	0.00	
7/30/2015	13:10	0.00	--	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 19.92, 100 = 99.8, 800 = 789
	13:15	--	0.26	
7/31/2015	16:50	0.36	--	Oakton T-100 calibration check: 0.02 = 0.03, 20 = 19.95, 100 = 99.8, 800 = 801
	16:55	--	0.00	
8/1/2015	17:40	0.00	--	Oakton T-100 calibration check: 0.02 = 0.02, 20 = 19.97, 100 = 99.8, 800 = 797
	17:45	--	0.00	
8/2/2015	12:40	0.18	--	Oakton T-100 calibration check: 0.02 = 0.01, 20 = 19.98, 100 = 99.99, 800 = 795
	12:45	--	0.38	
8/3/2015	15:10	0.00	--	Oakton T-100 calibration check: 0.02 = 0.02, 20 = 20.3, 100 = 101, 800 = 819
	15:15	--	0.00	Water truck pump inlet in stream
8/4/2015	18:00	--	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 20.2, 100 = 101, 800 = 810
	18:05	0.00	--	
8/5/2015	16:13	--	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 20.9, 100 = 104, 800 = 852
	16:16	0.00	--	0.28 inches of precipitation
8/6/2015	16:16	--	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 20.5, 100 = 102
	16:18	0.00	--	
8/7/2015	7:00	0.00	0.00	
8/8/2015	10:00	--	0.00	Hauling stockpiled waste rock to repository
8/9/2015	12:05	--	0.00	Hauling concentrator tailings to repository, and cover soil to ore collector
8/10/2015	17:50	--	0.00	Hauling cover soil from repository to ore collector
8/11/2015	14:00	--	0.05	
8/12/2015	14:40	--	0.07	
8/13/2015	13:00	--	0.00	Hauling tailings from concentrator to repository
8/14/2015	13:25	--	0.00	Hauling tailings from concentrator to repository
8/15/2015	14:41	--	0.06	0.97 inches of precipitation
8/16/2015	13:38	--	0.07	No hauling over Glacier Creek crossing
8/17/2015	14:37	--	0.00	No hauling over Glacier Creek crossing
8/18/2015	13:30	--	0.08	Hauling waste rock from comet terminal stockpile to repository
8/19/2015	11:45	--	0.04	Hauling tailings from upper concentrator to repository
8/20/2015	13:57	--	0.00	Hauling cover soil to concentrator
8/21/2015	11:00	--	0.00	Hauling tailings from concentrator to repository
8/22/2015	11:28	--	0.00	Hauling tailings from concentrator to repository
8/23/2015	10:19	--	0.00	Hauling cover soil to concentrator
8/24/2015	17:39	--	0.30	Hauling cover soil to concentrator
8/25/2015	10:00	--	0.07	Hauling tailings from concentrator to repository
8/26/2015	10:03	--	0.00	Hauling cover soil to concentrator
8/27/2015	10:30	0.12	0.03	Oakton T-100 calibration check: 20 = 19.96, 100 = 100
8/27/2015	15:00	--	0.17	
	15:05	0.23	--	Hauling tailings from concentrator to repository
8/28/2015	10:30	--	0.02	
	10:35	0.13	--	0.01 inches of precipitation

Table 3. Discrete Turbidity Monitoring Summary

Date	Time	Temporary Bridge Turbidity at Glacier Creek Crossing		Comments
		Upstream	Downstream	
		NTU		
8/29/2015	9:05	--	0.25	1.56 inches of precipitation
8/30/2015	8:30	--	7.22	2.02 inches of precipitation
8/31/2015	13:50	--	4.08	1.8 inches of precipitation
9/1/2015	13:45	1.94	--	
	13:55	--	1.62	1.04 inches of precipitation
9/2/2015	8:30	--	1.55	
	8:35	1.94	--	
	11:55	--	1.72	
	12:00	3.48	--	
	17:00	--	0.86	
	17:05	1.29	--	0.73 inches of precipitation
9/3/2015	7:40	--	0.63	
	7:45	0.57	--	
	10:40	0.28	0.33	
	13:45	0.01	0.33	
	16:40	0.02	0.14	0.11 inches of precipitation
9/4/2015	7:30	--	0.05	Oakton T-100 calibration check: 20 = 20.1, 800 = 799
	7:35	0.23	--	
	12:30	0.05	0.22	
	14:30	0.10	0.05	
	18:00	0.41	0.19	0.14 inches of precipitation
9/5/2015	7:45	0.15	0.05	
	18:05	0.00	0.00	0.01 inches of precipitation
9/6/2015	8:10	0.00	0.06	Oakton T-100 calibration check: 20 = 19.94, 800 = 804 0.46 inches of precipitation
9/7/2015	8:40	--	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 19.7, 100 = 102, 800 = 809
9/7/2015	8:45	0.00		0.01 inches of precipitation
9/8/2015	13:40	0.00	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 19.36, 100 = 100, 800 = 800
9/9/2015	13:05	0.00	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 19.41, 100 = 101, 800 = 799 0.01 inches of precipitation
9/10/2015	15:15	0.00	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 19.94, 100 = 98.7, 800 = 778
9/11/2015	18:13	0.00	0.00	Oakton T-100 calibration check: 0.02 = 0.00, 20 = 19.94, 100 = 98.7, 800 = 778
9/12/2015	10:05	--	0.00	
9/14/2015	11:38	--	0.00	Removal of Glacier Creek crossing
	12:57	--	0.00	Oakton T-100 calibration check: 20 = 20.1
	13:47	--	11.59	0.22 inches of precipitation
	13:49	--	23.10	Exceeded 12.1 NTU threshold. No work stoppage (only exceeded for 2 minutes)
	13:50	--	13.20	Exceeded 12.1 NTU threshold. No work stoppage (only exceeded for 2 minutes)
	13:51	--	6.50	<i>Below 12.1 NTU threshold</i>

NOTES:

Turbidity was measured with an Oakton T-100 handheld turbidimeter.

Abbreviations: -- = no reading, NTU = nephelometric turbidity units.

Bold indicates one or more of the turbidity thresholds outlined in the Biological Monitoring Plan were exceeded.

Italics describes compliance measures.

Table 4. Refuse Monitoring Summary

Date	Location(s)	Time	Notes
4/30/2015	Gate area (connection with MLH)	8:56	Garbage picked up near gate area.
5/7/2015	Borrow area (outside murrelet habitat)	8:01	Picked up garbage near borrow area.
6/15/2015	MLH to Borrow area	16:15	Picked up broken mirror near Haps Hill.
6/27/2015	MLH to borrow area	16:55	Filled two Ziploc bags with flagging, broken survey sticks, small pieces of road fabric, plastic band, and plastic piece of barricade.
6/29/2015	MLH to borrow area	16:30	Filled Ziploc bag with survey flagging and a lug nut. Survey stake removed from center of road.
7/20/2015	County Road/Python Road intersection and dispersed campground adjacent to SFSR	10:00	Removed beer cans/bottles, garbage, deflated sleeping pad at dispersed camp adjacent to SFSR. Filled large Hefty bag with garbage from campers.
9/3/2015	MLH to borrow area	8:50	Removed Cheetos bag, beer cans, water bottles, styrofoam, and deflated balloon. Majority of refuse removed at MLH intersection.

NOTE:

Abbreviations: MLH = Mountain Loop Highway, SFSR = South Fork Sauk River.

FIGURES

- Figure 1. Site Layout Map of Monte Cristo Mining Area**
- Figure 2. Helicopter Landing Zone and 265 Meter Radius**
- Figure 3. Critical Murrelet Habitat**
- Figure 4. Temporary Glacier Creek Crossing and Turbidity Monitoring Stations**

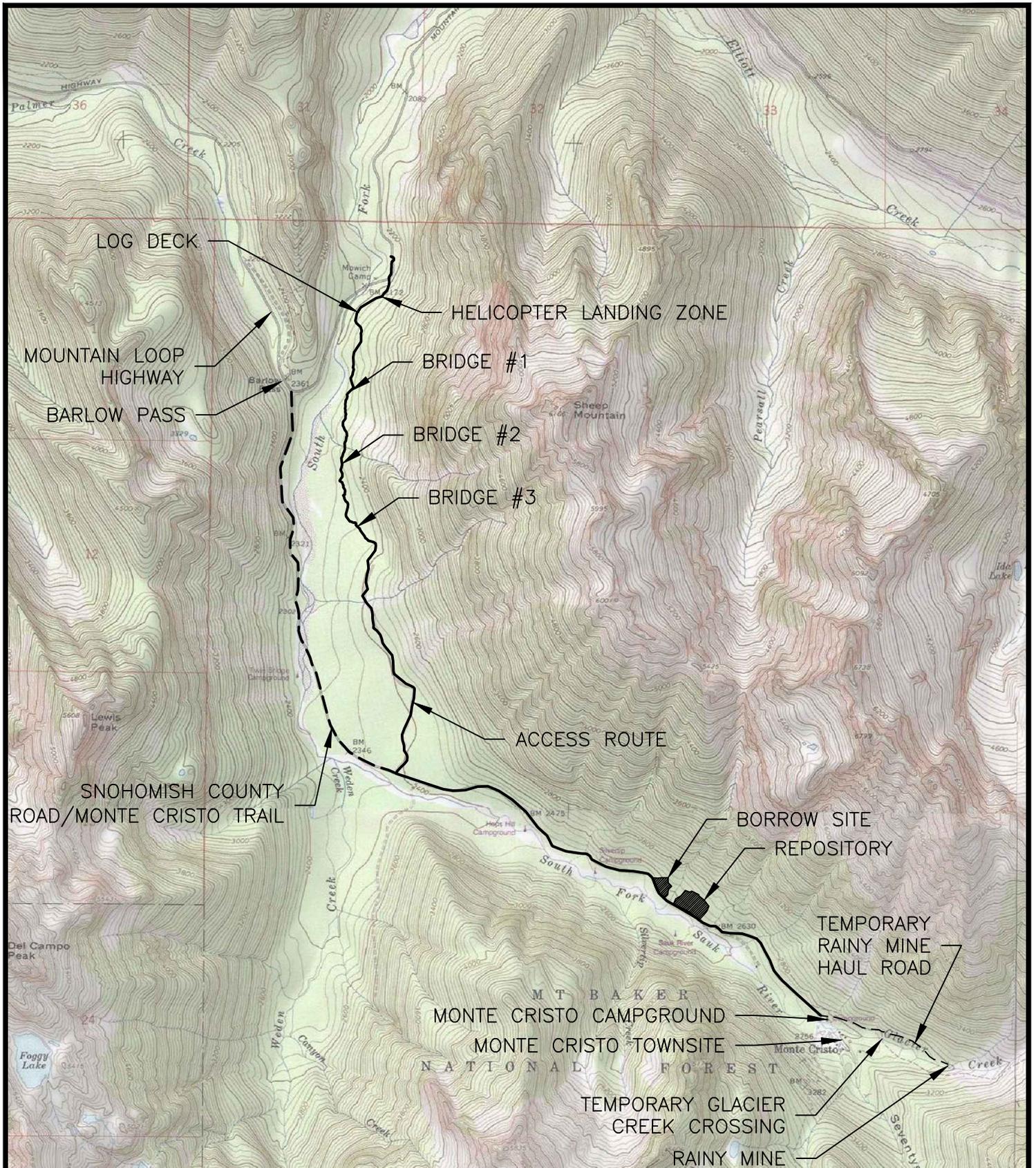
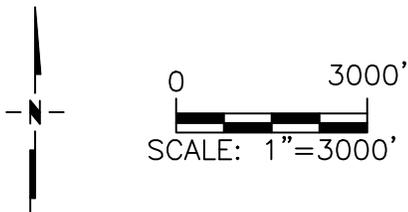


Figure 1. Site Layout Map of Monte Cristo Mining Area



(Source: USGS 7.5 min Topographic Map ©2015 National Geographic Society, i-cubed)

PROJECT NUMBER: 2015230017	Monte Cristo Mining Area Removal Action – Biological Monitoring Report
DATE: 12/18/2015	USDA Forest Service Mt. Baker–Snoqualmie National Forest Snohomish County, Washington
DWG NO: 2015230017 F1 BM.dwg	 CASCADE EARTH SCIENCES A Valmont Industries Company
DWG BY: PROJECT MANAGER: 6RKB 1RMT	
REVISED:	

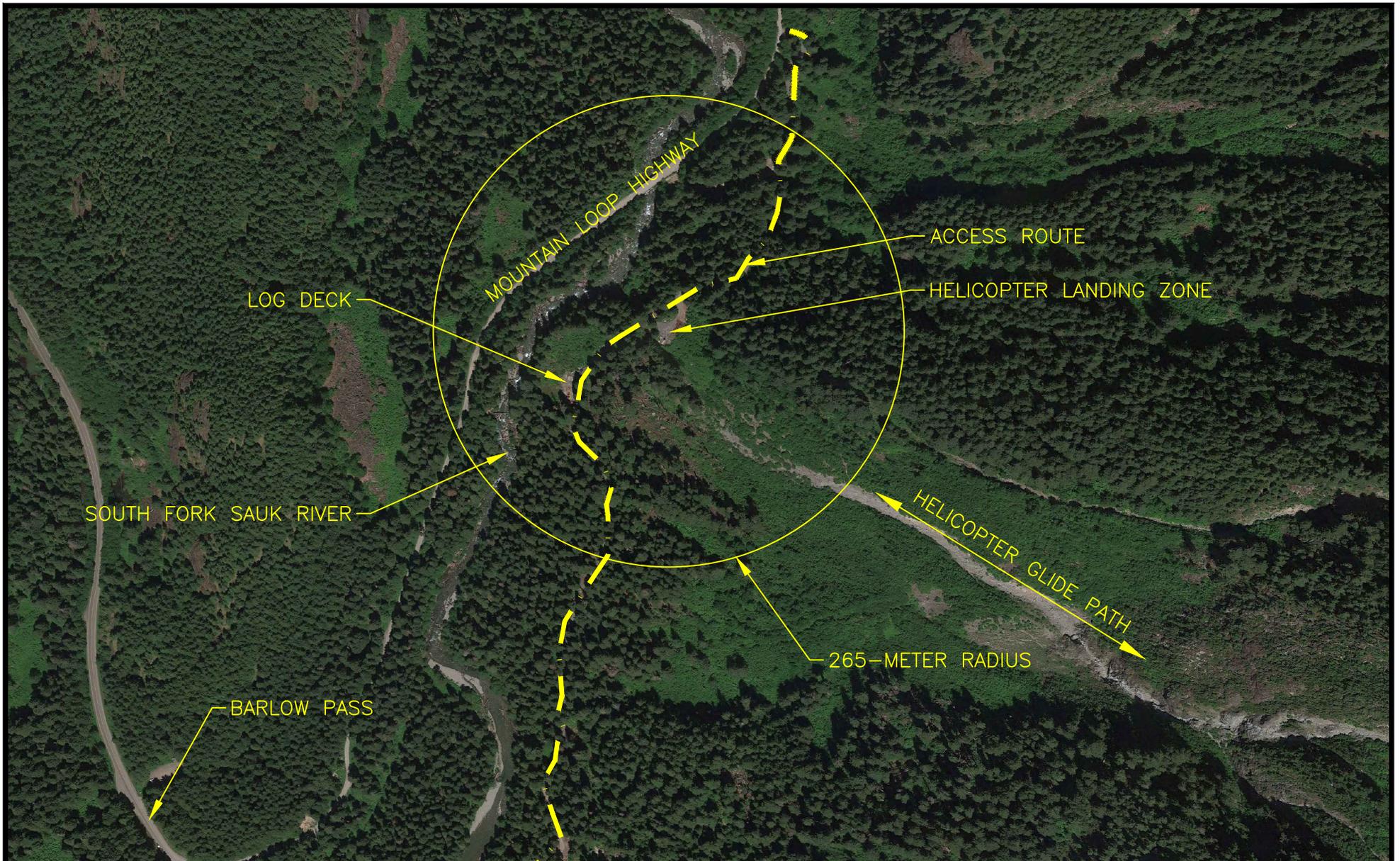
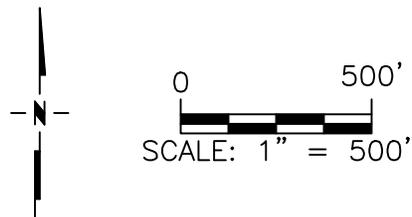
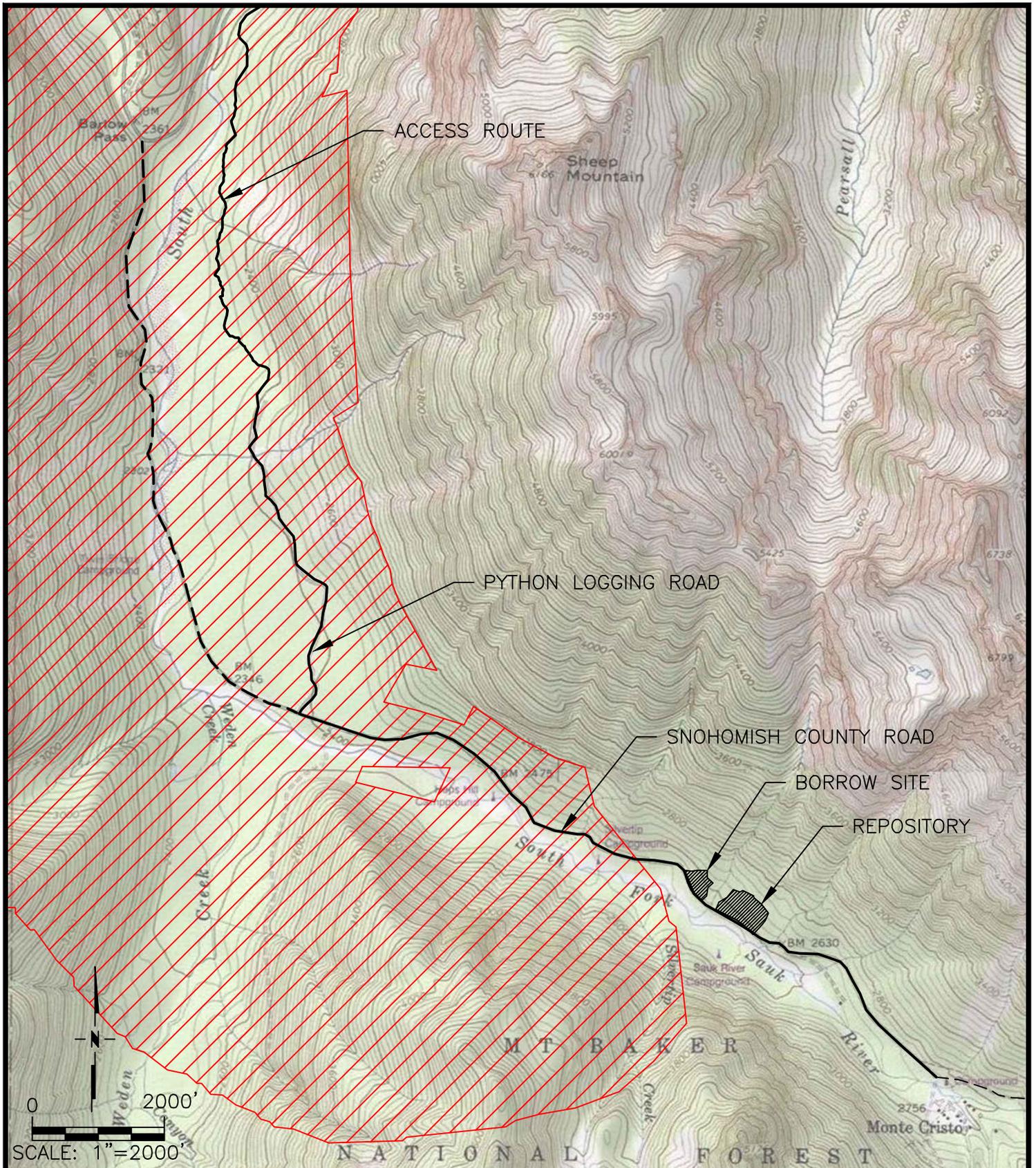


Figure 2. Helicopter Landing Zone and 265 Meter Radius



(SOURCE: Google Earth Pro Image June 2015, ©2015 Google)

PROJECT NUMBER: 2015230017	Monte Cristo Mining Area
DATE: 12/18/2015	Removal Action – Biological Monitoring Report
DWG NO: 2015230017 F2 BM.dwg	USDA Forest Service
DWG BY: 6JTP	Mt. Baker–Snoqualmie National Forest
PROJECT MANAGER: 1RMT	Snohomish County, Washington
REVISED:	CES CASCADE EARTH SCIENCES A Valmont Industries Company



EXPLANATION:

 MARBLED MURRELET CRITICAL HABITAT (LSR-116)

Figure 3. Critical Murrelet Habitat

PROJECT NUMBER: 2015230017	Monte Cristo Mining Area Removal Action – Biological Monitoring Report
DATE: 12/18/2015	USDA Forest Service
DWG NO: 2015230017 F3 BM.dwg	Mt. Baker–Snoqualmie National Forest Snohomish County, Washington
DWG BY: PROJECT MANAGER: 6RKB 1RMT	 CASCAD EARTH SCIENCES A Valmont Industries Company
REVISED:	

(Source: USGS 7.5 min Topographic Map ©2015 National Geographic Society, i-cubed and U.S. Fish and Wildlife Service Marbled Murrelet habitat October 4, 2011)

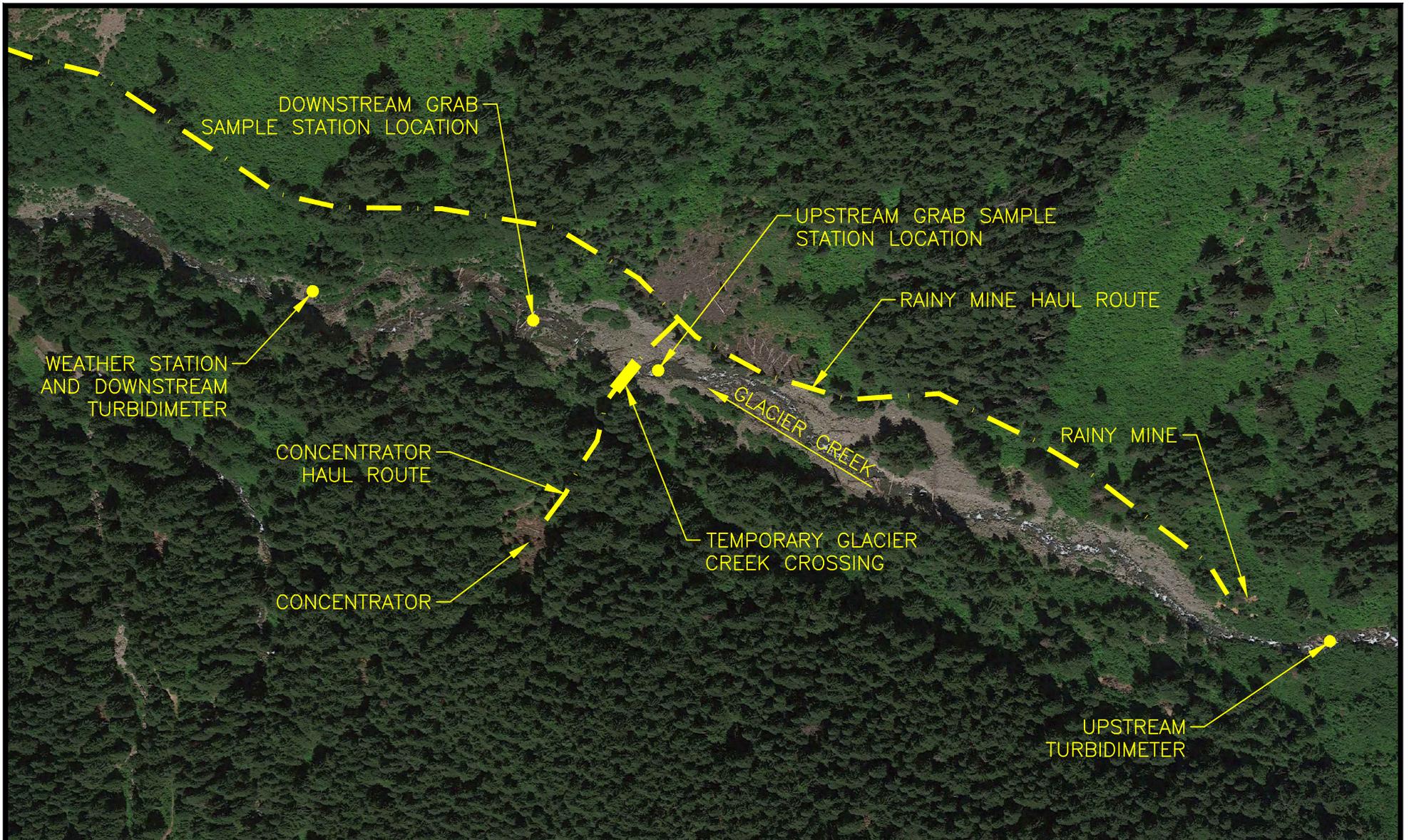
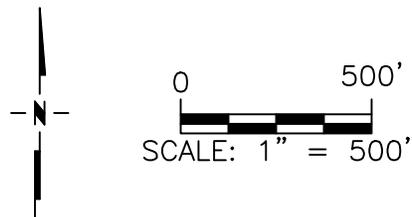


Figure 4. Temporary Glacier Creek Crossing and Turbidity Monitoring Stations



(SOURCE: Google Earth Pro Image June 2015, ©2015 Google)

PROJECT NUMBER: 2015230017	Monte Cristo Mining Area
DATE: 12/18/2015	Removal Action – Biological Monitoring Report
DWG NO: 2015230017 F4 BM.dwg	USDA Forest Service
DWG BY: 6JTP	Mt. Baker–Snoqualmie National Forest
PROJECT MANAGER: 1RMT	Snohomish County, Washington
REVISED:	CES CASCADE EARTH SCIENCES A Valmont Industries Company

APPENDICES

Appendix A.	U.S. Fish and Wildlife Service Documentation
Appendix B.	Photographs
Appendix C.	Continuous In-Situ Turbidity Documentation (Electronic)

Appendix A.

U.S. Fish and Wildlife Service Documentation



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JUN 29 2015

In Reply Refer To:

01EWF00-2011-F-0067-R002

X ref: 13410-2011-F-0067-R001

13410-2011-F-0067

Jennifer Eberlien
Mt. Baker-Snoqualmie National Forest
2930 Wetmore Avenue, Suite 3A
Everett, Washington 98021

Dear Ms. Eberlien:

Subject: Monte Cristo CERCLA Project

This letter transmits the amended Incidental Take Statement for the Monte Cristo CERCLA Project and fulfills the requirement for reinitiation of formal consultation under section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA).

The Mt. Baker-Snoqualmie National Forest (Forest) submitted changes to the project description and indicated that the determination of “likely to adversely affect” for northern spotted owl (*Strix occidentalis caurina*) (spotted owl), marbled murrelet (*Brachyramphus marmoratus*) (murrelet), bull trout (*Salvelinus confluentus*), and designated critical habitat for these three species remains unchanged, and the determination of “not likely to adversely affect” for gray wolf (*Canis lupus*) and grizzly bear (*Ursus arctos horribilis*) also remains unchanged. Your May 28, 2015 request for reinitiation was received in our office on June 1, 2015.

Consultation History

The U.S. Fish and Wildlife Service (Service) completed formal consultation on the Monte Cristo CERCLA Project on September 16, 2011. Information concerning the status of the spotted owl, murrelet and bull trout, the environmental baseline, the effects of proposed action, and the cumulative effects were analyzed in the 2011 Biological Opinion (USFWS 2011, Service reference number 13410-2011-F-0067). The statuses of these species, the environmental baseline, and the cumulative effects have not substantially changed since 2011 and are still adequately described in that biological opinion. That consultation also included our concurrence that the proposed project is not likely to adversely affect gray wolves and grizzly bears.

The Monte Cristo CERCLA Project was reinitiated due to a Final Rule (77 FR 71876) for new locations of spotted owl critical habitat on January 9, 2013. Formal consultation was concluded on January 18, 2013 (USFWS 2013a, Service reference number 13410-2011-F-0067-R001), with the conclusion that the proposed project was not likely to destroy or adversely modify critical habitat for the spotted owl.

The Forest requested reinitiation of formal consultation for the Monte Cristo CERCLA project by letter dated May 28, 2015, and received in our office on June 1, 2015. Formal consultation was therefore initiated on June 1, 2015. The Service received additional information from the Forest by email on June 4, 2015.

Summary of the Proposed Action

The majority of the project description remains unchanged, and is included in the 2011 biological opinion. The following is a summary of the changes that occurred during project implementation since 2011, and then a summary of the changes that the Forest proposed in their May 28 letter.

The Forest made several adjustments to the proposed action as the access route was designed and constructed. Presumably since the adjustments were similar to the plan that was originally consulted on but of lesser magnitude, the Forest did not reinitiate consultation. Changes implemented since 2011 included but were not limited to: 1) a shift in road design from a Maintenance Level 2 Forest Service specified road to a route that is narrower and incorporates steeper grades (resulting in fewer large diameter trees removed than anticipated), and 2) road alignment shifts with more of the constructed route following an existing road segment at Haps Hill.

The Forest is proposing changes to previously consulted-on operations to complete the Monte Cristo CERCLA Project. Proposed changes include the following:

- Helicopter landing – The location of the helicopter landing and refueling site would shift from the Monte Cristo town site to the first opening along the access route (Station 13+00).
- Slash disposal – The primary disposal of slash at the repository site would be by mechanical chipping; however any tree waste material not conducive to chipping would be disposed of by piling and burning.
- New log decking location – The logs resulting from the repository clearing would be decked primarily at the second opening (open rock area) along the access route approximately 0.25 mile from the Mt. Loop Scenic By-way (USFS 2015, p. 5).
- Time extension – There would be an extension of the time frame for project operations from two years to three years.

Helicopter Landing

The Forest evaluated various helicopters for lift capabilities to ensure efficient operations in the clean-up operations at the Monte Cristo town site and in the wilderness. They determined that a 10,000 lb lift machine was the best choice for efficient removal of waste rock from Pride of the Woods to the Repository. Therefore, the use of a Columbia Vertol 107-II (10,000 lb payload capacity), or equivalent load-capacity helicopter, would need a tanker sized refueling truck. However, during first year operations, there was the decision for a design change in the new road construction (section from the Mt. Loop Scenic By-way to the Monte Cristo work site) which shifted the access road from a Level 2 road to a narrower route. This new route does not accommodate the size of a fuel truck needed for the large helicopter operations projected to be in the Monte Cristo town site. Therefore, the first opening along the new access route (Station 13+00, where the campsite was located during the 2013/2014 season) was selected for the helicopter re-fueling location. A Columbia Vertol 107-II would likely be used to complete the work. The Forest may still need to switch to a larger helicopter (Chinook 47d), and would like the Service to consult on the effects of the larger helicopter on listed species.

Modifications to the first opening for safe helicopter operations would include the removal of eight live trees in an isolated island with diameters ranging from 9.5 inches to 36.7 inches diameter at breast height. These trees were field reviewed on March 26, 2015, and no limbs of sufficient size or character for nesting murrelets and no cavities for nesting spotted owls were identified. The trees were isolated from the surrounding forest, with trees having an open canopy.

The 40-foot by 40-foot landing pad area will not require any additional excavation and fill. An area approximately 10-foot by 15-foot on the northwest corner of the clearing will be graded to provide safer vehicle access around what is currently a very tight corner. Vegetation in this area is limited to low brush and vine maple.

Helicopter flight operations would be restricted to occur from 2 hours after sunrise and 2 hours before sunset. Helicopter work is scheduled for approximately a month with 12 hour work days. Contingencies may occur during operations at the Monte Cristo work site, resulting in the helicopter landing a little late in the day (after 2 hours before sunset), but this would be the exception versus operating procedure. Work around the landed helicopter (pre-flight check, fueling, etc.) may occur before 2 hours after sunrise and after 2 hours after sunset. The flight path for the helicopter when taking off and landing would utilize the open avalanche chute area adjacent to the landing zone. Helicopter flights (outside of take-off and landing) would be at least 500 feet above the canopy.

Slash Disposal

The biological assessment (USFS 2011) identified the need to clear trees from up to 3 acres of land at the repository site. The clearing of the repository site would entail cutting trees, moving trees to deck sites, and clean-up of the branches or resulting slash material from felling. The primary method for slash disposal would be through mechanical chipping of the tree waste material; however, material not conducive to chipping would be piled for burning in the

repository location. Any pile burning would occur after September 23, outside of the murrelet and spotted owl breeding season. The chipping, slash piles, and burning would be located outside of critical habitat for the spotted owl and murrelet.

New Log Decking Location

The roadway plans used in the preparation of the biological assessment (USFS 2011) displayed open areas along the access route that would be “staging areas,” used for equipment, support operations, and log decks. However, due to the implemented change in the access route to utilize more of the previous ground-disturbed route, the access road now crosses a natural rock opening (referred to as the second opening where the saw mill operated during the 2014 season). This area, along with the first opening, were used as “staging areas” and are now proposed for the helicopter re-fueling site and log deck area. Other openings along the road (shown as staging areas in the roadway plans) (USFS 2015, p. 5) would also be considered for decking logs if so needed. The use of the second opening as the primary log deck area would not result in the need for additional clearing of trees.

Time Extension

The Monte Cristo CERCLA Project was originally proposed to be completed in two years. Unforeseen delays prevented the Forest from completing the project within two years, and therefore the Forest is now proposing to operate in a third year to complete the proposed action. Many of the aspects of the proposed action will still only occur a single time (e.g., tree felling, bridge construction, mine reclamation, etc.) but certain activities to complete those aspects (e.g., trucks driving in the action area, presence of workers, operation of heavy equipment, etc.) would occur for an additional year (specifically, one summer/fall work season longer than originally anticipated).

Effects to Spotted Owls

The following is an analysis of the anticipated effects resulting from changes to the proposed action.

Effects from Helicopter Landing

In the 2011 biological opinion, the Service concluded that 80 acres of suitable habitat for spotted owls would be exposed to disturbance from vehicles and heavy equipment (USFWS 2011, p. 20). The proposed new helicopter landing may affect spotted owls by creating loud noise and rotor wash at the landing site and along the flight path between the landing site and the mine reclamation areas. The Forest estimated that the helicopter work would expose 25 acres of suitable habitat to noise greater than 92 decibels (A-weighted) (dBA) and 2.75 acres of suitable habitat to rotor wash (USFS 2015, p. 3; Reed, *in litt.* 2015). In previous consultations, we have analyzed the effects of disturbance on spotted owls, and concluded that adverse effects may occur when noise and human activity causes a spotted owl to flush from a nest during the early nesting season (USFWS 2013b, p. 86) or when large helicopters (e.g., Chinook 47d) fly within 265 yards of known occupied spotted owl nest tree or suitable nest trees in unsurveyed nesting

habitat (USFWS 2013b, p. 82). We have also analyzed the effects of rotor wash on spotted owls, and concluded that adverse effects may occur when a hovering Chinook 47d helicopter is within 100 yards of known occupied spotted owl nest trees or suitable nest trees in unsurveyed nesting habitat (USFWS 2013b, p. 82). However, the 2011 biological opinion also considered that the nearest spotted owl activity center is 0.5 mile away from the road that would be used for the project and that there are no known potential spotted owl nest trees near that road. The actual road alignment as it was built is still 0.5 mile away from the nearest spotted owl activity center and there are no known potential spotted owl nest trees near the road. With those considerations, the determination in the 2011 biological opinion was that human activity and project activities that create noise greater than 92 dBA were extremely unlikely to flush a spotted owl from a nest because a spotted owl nest was extremely unlikely to be present (USFWS 2011, p. 20). We anticipate that, even with the additional area that would be disturbed by the new helicopter landing, nesting spotted owls are still unlikely to be present and exposed to project activities during the early nesting season. Similarly, we anticipate that rotor wash at the proposed helicopter landing is extremely unlikely to affect a spotted owl nest.

The Forest is proposing to remove eight trees to create a safe helicopter landing. Since these trees occur in a small isolated patch and none of the trees have structural characteristics sufficient for spotted owl nesting, we anticipated that effects to spotted owls from clearing them for the helicopter landing would be insignificant.

Effects from Slash Disposal

Slash disposal by chipping, piling, and burning may affect spotted owls by exposing them to smoke. However, the Forest's proposed action includes a conservation measure that would delay any slash pile burning until after September 1. At that time of year, adult spotted owls and recently fledged spotted owls would easily move away from the effects of smoke. Therefore, disruptions to normal spotted owl behaviors would be insignificant.

Effects from New Log Decking Location

Log removal from the repository and log decking at the first or second opening would not cause effects to spotted owls that were not considered in the 2011 biological opinion.

Effects from Time Extension

Construction/reclamation activities would occur for a duration one year longer than originally analyzed in the 2011 biological opinion. The increased duration of the action would not increase the habitat modification component of the proposed project, but it would increase the potential for disturbance from noise and human presence. In the 2011 biological opinion, we concluded that human activity and project activities were extremely unlikely to flush a spotted owl from a nest because a spotted owl nest is extremely unlikely to be present (USFWS 2011, p. 20). We anticipate that a third year of project duration would not significantly increase the probability of exposure, and therefore that the noise and human activities associated with the proposed activities would still be extremely unlikely to affect spotted owls.

Effects to Marbled Murrelets

The following is an analysis of the anticipated effects resulting from changes to the proposed action.

Effects from Helicopter Landing

As described above, the Forest is proposing to use the first opening along the new access route to operate as a helicopter landing for a ship as large as a Chinook 47d helicopter. The 2011 biological opinion did not address the effects of helicopter landing because at that time helicopter use and landing was only proposed for areas outside of suitable habitat for murrelets (high elevation areas). The proposed new helicopter landing may affect murrelets by creating loud noise and rotor wash at the landing site and by creating loud noise along the flight path between landing site and mine reclamation areas. Flights would occur at least twice daily for multiple weeks during the 2015 summer work season. The new helicopter landing may also affect murrelets as a result of tree removal.

Disturbance

In previous consultations, we have analyzed the effects of disturbance on murrelets, and concluded that adverse effects may occur when project noise or activity causes a murrelet to become so agitated that it flushes away from a nest or perch within the vicinity of a nest site (including delay or avoidance in nest establishment), or aborts or delays a feeding attempt during incubation or brooding of nestlings (USFWS 2013b, p. 101). These responses are considered significant disruptions of normal behaviors that result in a likelihood of injury to murrelets. A flush from a nest site includes movement out of an actual nest, off of the nest branch, and away from a branch of a tree within suitable habitat during the nesting season. Such events are considered significant because they have the potential to result in reduced hatching success, fitness, or survival of juveniles and adults.

Specifically, we previously concluded that the extent of significant disturbance caused by a Chinook 47d helicopter when landing, hovering, and taking off is likely to have radius of 265 yards (based on the 92 dBA contour) (Newman et al. 1984, *in* USFWS 2013b, p. 103). Additionally, we anticipated that murrelets may be adversely affected by rotor-wash within a 100-yard radius of a Chinook 47d helicopter when landing, hovering, or taking off (USFWS 2013b, p. 103). However, when Chinook 47d helicopters were flying overhead, Newman and others (1984, Appendix A) measured lower maximum noise levels than when the same helicopter was landing, hovering, and taking off. Using the same methodology we used to calculate the extent of disturbance for landing, hovering, and taking off (USFWS 2009, pp. 46-48; USFS 2009), we calculated the 92 dBA contour for Chinook 47d overflights and concluded that the extent of significant disturbance was likely to have a radius of 324 feet (Appendix A).

The proposed helicopter work may disturb murrelets within 265 yards of the new landing site. Since the proposed helicopter flights (outside of take-off and landing) would occur at least 500 feet above the canopy (Reed, *in litt.* 2015), we conclude that noise from the helicopter would not significantly affect nesting murrelets. The flight path for the helicopter when taking off and

landing would utilize the open avalanche chute area adjacent to the landing zone, so not all habitats within the helicopter glide path or operating radius are suitable nesting habitat for murrelets. Based on aerial photograph and review of habitat within 265 yards of the helicopter fueling site, the Forest estimated that there would be a potential for noise disturbance within 25 acres of mature to old forest adjacent to the helicopter landing (USFS 2015, p. 3). We agree that any murrelets within these 25 acres of mature to old forest are reasonably certain to be disturbed by helicopter operations.

The Forest has a proposed conservation measure limiting most helicopter flights to the period of time between 2 hours after sunrise and 2 hours before sunset. Unavoidable contingencies (technical difficulties, unanticipated weather, etc.) may result in some helicopter flights during restricted hours. Given the complicated nature of CERCLA cleanups in wilderness areas, we anticipate that at least one unavoidable contingency is reasonably certain to occur. We are therefore considering the adverse effects of some helicopter flights during restricted hours in this analysis. However, even when the proposed helicopter work adheres to the period of time between 2 hours after sunrise and 2 hours before sunset, this conservation measure would reduce but not eliminate the probability of interrupting feeding of nestlings (USFWS 2013b, Appendix A).

The Forest has proposed on-the-ground work around the landed helicopter (pre-flight check, fueling, etc.) that may occur earlier or later than the period of time between 2 hours after sunrise and 2 hours before sunset. However, we do not anticipate that work at this one location would significantly increase the risk of exposure described above because the proposed helicopter landing is located outside of immediate suitable murrelet habitat (over 35 yards to suitable nesting trees), much of the vicinity (within 100 meters) is an avalanche chute, and much of the vicinity is already within 100 meters of the Mountain Loop Highway (a high-use open road).

Rotor Wash

As described above, murrelets may be adversely affected (injury or mortality) by rotor-wash within a 100-yard radius of a Chinook 47d helicopter when landing, hovering, or taking off (USFWS 2013b, p. 103). Rotor wash is a column of high velocity air forced downward by a helicopter's blade rotation (Slijepcevic and Fogarty 1998, p. 1). Helicopter rotor wash can cause saplings, decaying trees, and loose debris from tree tops to fall, and can create hazardous conditions from dust and flying debris underneath the ship (WCB 2005, p. 19). The Forest estimated that 2.75 acres of suitable habitat for murrelets would be exposed to significant rotor wash during the nesting season in 2015 (Reed, *in litt.* 2015). Because murrelets occupy Washington State forests at a very low density, we cannot be reasonably certain that murrelets would be exposed to these adverse effects in only 2.75 acres of suitable habitat.

Tree Removal

The Forest is proposing to remove eight trees to create a safe helicopter landing. Since these trees occur in a small isolated patch, none of the trees have structural characteristics sufficient for murrelet nesting, none of these trees have intermingled branches with other trees that have structural characteristics sufficient for murrelet nesting, and edge effects to other forest stands would not occur, we anticipate that effects to murrelets from clearing these trees would be insignificant.

Effects from Slash Disposal

Slash disposal by chipping, piling, then burning may affect murrelets by exposing them to smoke. However, the Forest proposed to limit slash pile burning until after September 1. We anticipate that murrelets in the action area are extremely unlikely to be exposed to smoke from burning slash piles after September 1 because: 1) Slash piles would be burned only during approved atmospheric conditions that lead to vertical smoke movement and quick smoke dissipation (pursuant to Washington State Department of Natural Resources smoke permit approval), and 2) we assume that approximately 95 percent of the expected murrelet nestlings would have previously fledged (USFWS 2013b, Appendix A). Therefore, we anticipate that murrelets are extremely unlikely to be exposed to smoke from burning slash piles and the effects of slash treatment on murrelets would be discountable.

Effects from New Log Decking Location

Log removal from the repository and log decking at the first or second opening are not anticipated to cause effects on murrelets that were not considered in the 2011 biological opinion.

Effects from Time Extension

Construction/reclamation activities would occur for one year longer than originally analyzed in the 2011 biological opinion. The increased duration of the action would not increase the habitat modification component of the proposed project, but it would increase the potential for disturbance from noise and human presence. In the 2011 biological opinion, the Service concluded that 43 acres of suitable habitat for murrelets would be exposed to disturbance from vehicles and heavy equipment for two years (USFWS 2011, p. 40).

Since the 2011 biological opinion was signed for the Monte Cristo CERCLA project, the Service has revised the analyses that were used to describe the potential adverse effects to murrelets from noise and human presence, specifically the operation of heavy equipment. Reconsideration of the best available science led the Service to conclude that significant behavioral responses of murrelets to noise and human activity could occur at distances up to 100 meters during the nesting season (USFWS 2013b, Appendix H). Accordingly, we are revising the analysis for disturbance to evaluate a greater area of exposure and a longer duration of exposure. The Forest estimated that there are 106 acres of suitable murrelet habitat within 100 meters of the new road alignment (Reed, *in litt.* 2015). Those acres have been affected by the project for the past two years and are proposed to be affected for a third year.

In the 2011 biological opinion, the Service concluded that the combination of increased numbers of corvids along the road corridor and disturbance from project activities could result in the loss of a single murrelet nesting attempt due to predation of the egg or young (USFWS 2011, p. 40). This affect was anticipated to occur within a 43-acre area (USFWS 2011, p. 40). Even though the area in which disturbance may occur is now believed to be 106 acres, and the duration of noise and human presence is now 3 years, we still anticipate that the proposed action would lead to the loss of a single murrelet nesting attempt because murrelets occupy Washington State forest at a very low densities.

Summary of New Effects to Marbled Murrelets

The effects of changes associated with slash disposal, the new decking location, tree removal at the helicopter landing, and helicopter overflights on murrelets are anticipated to be insignificant or not reasonably certain to result in significant disruptions of normal behavior or death/injury of murrelets. The proposed relocation of the helicopter landing and the extended duration of the proposed activities would be reasonably certain to significantly disrupt the normal behavior of murrelets associated with 131 acres of suitable habitat (106 acres along the road, and 25 acres at the helicopter landing, with some overlap). The anticipated rotor wash may injure or kill nesting murrelets within 2.75 acres of suitable habitat, but we do not consider injure or death of murrelets to be reasonably certain to occur in this case. These effects would occur during the additional 2015 work season.

Effects to Bull Trout and Bull Trout Critical Habitat

The new helicopter landing site, the new method of slash disposal, and the new log decking location would not affect bull trout or bull trout critical habitat. Since the proposed time extension would not increase the number of stream crossings built or removed or the number of fish salvage operations, we anticipate that the effects of the proposed would not be altered, other than occurring in 2015 instead of 2014. Therefore, the analysis in the biological opinion for effects to bull trout and bull trout critical habitat remains accurate and the take statement need not be amended.

Effects to Spotted Owl Critical Habitat

The Service published a final revised critical habitat designation for the spotted owl on December 4, 2012 (77 FR 71875); the rule became effective on January 3, 2013. The primary constituent elements (PCEs) are the specific characteristics that make habitat areas suitable for nesting, roosting, foraging, or dispersal (77 FR 71876:71884). The PCEs identified in the revised spotted owl critical habitat rule include 1) forest types in early-, mid-, or late-seral stages that support the spotted owl across its geographic range; 2) nesting and roosting habitat; 3) foraging habitat; and 4) dispersal habitat (77 FR71876:72051-72052). The Project is located within Unit 04: West Cascades North: WCN1 of designated critical habitat for the spotted owl. The subunit contains 438,255 acres of critical habitat in Whatcom, Skagit, and Snohomish Counties, Washington, and comprises lands managed by the USFS and the State of Washington.

The only new effect to spotted owl critical habitat from the proposed Monte Cristo CERCLA project that was not previously considered is the removal of eight trees for the safe helicopter landing at the first opening along the new access route. Removal of those eight trees would occur in critical habitat for spotted owls. The portion of the project area where the additional tree removal would occur is within a larger matrix of forest patches that meet the definition of PCE 1, and some forest patches in vicinity are considered suitable habitat (PCEs 2 or 3). However the individual trees to be removed occur in a small isolated patch of non-suitable habitat and none of the trees have structural characteristics sufficient for spotted owl nesting. We therefore anticipate that effects to spotted owl critical habitat from clearing these eight trees for the helicopter landing would be insignificant to PCE 1 and would have no effect on PCEs 2, 3, or 4.

All other effects of the proposed action on spotted owl critical habitat, including adverse effects, were described and analyzed in the first reinitiation of the 2011 biological opinion (Service reference number 13410-2011-F-0067-R001).

Effects to Marbled Murrelet Critical Habitat

In the 2011 revised Final Rule designating critical habitat for the murrelet (76 FR 61599:61607 [October 5, 2011]), the Service identified PCEs essential to provide and support suitable nesting habitat for successful reproduction of the murrelet, and thus its conservation. These are 1) individual trees with potential nesting platforms (PCE 1), and 2) forested areas within 0.5 mile of individual trees with potential nesting platforms, and with a canopy height of at least one half the site-potential tree height (PCE 2).¹ Areas with just PCE 1, or both PCE 1 and 2, are considered to be critical habitat by definition. Also, activities that occur within or adjacent to lands designated as critical habitat may still have an effect on PCEs, depending on the particular aspects of the Federal action involved.

The only new effect to murrelet critical habitat from the proposed Monte Cristo CERCLA project that was not previously considered is the removal of eight trees for safety at the helicopter landing at the first opening along the new access route. Removal of those eight trees would occur in critical habitat for murrelets. The trees proposed to be removed do not have structural characteristics sufficient for murrelet nesting, and are therefore not PCE 1s. These trees are, however, likely to be within 0.5 mile of a PCE 1 and some of these eight trees are at least one half the canopy height of a site-potential tree, and therefore meet the definition of PCE 2. We anticipate that the effects of removing up to eight PCE 2s in an isolated patch of murrelet critical habitat would be insignificant, given the very small number of trees to be removed and the minimal support function that these trees provide when not connected to a contiguous closed-canopy forest. Removal of these trees would expand the size of a natural opening and not significantly degrade the function of murrelet critical habitat at the site scale or any larger scale.

¹ *The Washington Fish and Wildlife Office has enumerated these as discrete PCEs for convenience; the Federal Registers (1996 and 2011) do not identify these PCEs with discrete numbers.*

All other effects of the proposed action on murrelet critical habitat, including adverse effects, were previously addressed in the 2011 biological opinion.

Conclusion

After reviewing the current status of bull trout, spotted owl, and murrelet, the environmental baseline for the action area, the effects of the proposed Monte Cristo CERCLA Project and the cumulative effects on bull trout, spotted owl, and murrelet and their critical habitat, it is the Service's Opinion that the action, as proposed, is not likely to jeopardize the continued existence of these species and is not likely to destroy or adversely modify designated critical habitats.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. *Harm* is defined by the Service as an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). *Harass* is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the (agency) so that they become binding conditions of any grant or permit issued to the (applicant), as appropriate, for the exemption in section 7(o)(2) to apply. The (agency) has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Forest 1) fails to assume and implement the terms and conditions or 2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest must report the progress of the action and its impact on the species to the Service as specified in this Incidental Take Statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The anticipated incidental take for bull trout has not changed from the 2011 biological opinion, other than the year in which it occurs. Incidental take of spotted owls was not anticipated in the 2011 biological opinion and is still not anticipated as a result of the proposed changes to the action. Therefore, this revised take statement only applies to murrelets. Two years of project activities have already occurred; therefore this incidental take statement is for the third year of activities that the Forest has proposed to conduct.

Incidental take of murrelets is difficult to detect because the species is cryptic and murrelet nests are located rarely. However, based on the documented history of murrelet occupancy behaviors in the South Fork Sauk River watershed, and adjacent watersheds, suitable murrelet nesting habitat in the project area is reasonably certain to be occupied. Therefore the amount of nesting habitat that would be exposed to actions that would result in take provides a reasonable surrogate measure for this species.

In this revised take statement, we determined that noise and activity associated with use of motorized equipment and helicopters in the action area during this third year of construction and clean-up period (2015), coupled with increases in densities of corvids, will result in the incidental take of murrelets nesting within the 131 acres of suitable habitat in proximity to the new road and helicopter landing site. This take is in the form of harassment through significant disruption of normal nesting behaviors that creates a likelihood of injury due to decreased fitness of chicks from missed feedings for a third year and the increased possibility of predation by corvids in perpetuity (which was described in the 2011 biological opinion).

EFFECT OF THE TAKE

In the 2011 biological opinion and this revised take statement, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The conservation measures negotiated in cooperation with the Service and included as part of the proposed action constitute all of the reasonable measures necessary to minimize the impacts of incidental take. On that basis, no Reasonable and Prudent Measures (RPMs) except for monitoring and reporting requirements are included in this Incidental Take Statement. This RPM is a revision of RPM 2 for murrelets in the 2011 biological opinion. RPM 1 for murrelets remains unchanged.

RPM 2: Monitor the nature and extent of activities that are likely to result in incidental take of murrelets. Report the results of such monitoring.

TERMS AND CONDITIONS

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

The following term and condition is required for implementation of RPM 2.

1. In order to monitor the impacts of the proposed action and the implementation of the RPMs, the Forest shall prepare a report describing the progress of the proposed action, including implementation of the associated terms and conditions, and impacts to the murrelet. The report shall be submitted to the consulting biologist or branch manager of the Washington State Office on or before January 31, annually until project completion. Electronic correspondence is acceptable for the reporting. The monitoring report shall include the following:
 - a) The quantity of suitable murrelet habitat acres that are within 100 meters of noise and human activity (particularly operation of heavy machinery) and the quantity suitable murrelet habitat acres that are within 265 meters of helicopter operations at the landing site shall be reported.

The Service believes that murrelets associated with no more than 131 acres of suitable habitat will be incidentally taken as a result of the proposed action. The reasonable and prudent measure, with its implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

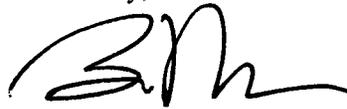
The Service is to be notified within three working days upon locating a dead, injured or sick endangered or threatened species specimen. Initial notification must be made to the nearest U.S. Fish and Wildlife Service Law Enforcement Office. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information. Care should be taken in handling sick or injured specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Contact the U.S. Fish and Wildlife Service Law Enforcement Office at (425) 883-8122, or the Service's Washington Fish and Wildlife Office at (360) 753-9440.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the reinitiation request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding the Opinion, the amended take statement, or our shared responsibilities under the ESA, please contact Zach Radmer at 360-753-4325 or Carolyn Scafidi at 360-753-4068.

Sincerely,



pm Eric V. Rickerson, State Supervisor
Washington Fish and Wildlife Office

cc:

Mt. Baker National Forest, Everett, WA (J. Plumage)

Mt. Baker National Forest, Everett, WA (L. Everest)

Mt. Baker National Forest, Everett, WA (P. Reed)

LITERATURE CITED

- Newman, J.S., E.J. Rickley, T.L. Bland, and K.R. Beattie. 1984. Noise measurement flight test for Boeing Vertol 234/Chinook 47-d. FAA-EE-84-7. Federal Aviation Administration, Washington D.C., September 1984, 180 pp.
- Slijepcevic, A., and Fogarty, L. 1998. Reducing the influence of helicopter rotor wash on fire behavior. Fire Technology Transfer Note Number 16 February 1998. New Zealand Forest Research Institute. 12 pp.
- U.S. Forest Service (USFS). 2008. Sound measurements of helicopters during logging operations. R.T. Harrison, R. Farve, and A. Horcher. USDA Forest Service San Dimas Technology & Development Center, San Dimas, CA. Online report at http://www.fs.fed.us/eng/techdev/IM/sound_measure/helo_index.shtml
- _____. 2011. Biological assessment for Monte Cristo Mining Area CERCLA cleanup activities. USDA Forest Service. Mt. Baker-Snoqualmie National Forest. Darrington Ranger District. March 1, 2011.
- _____. 2015. Proposed changes to wildlife habitat, Monte Cristo CERCLA Project. May 20, 2015- updated June 6, 2015. Mt. Baker-Snoqualmie National Forest. 6 pp.
- U.S. Fish and Wildlife Service (USFWS). 2009. Biological opinion and letter of concurrence for the Greenwater River restoration project. October 26, 2009. Service Reference Number 2009-F-0382. U.S. Fish and Wildlife Service, Lacey, Washington. 84 pp.
- _____. 2011. Biological Opinion for the Monte Cristo CERCLA Project. Mt. Baker-Snoqualmie National Forest. USDA Forest Service. U.S. Fish and Wildlife Service Reference: 13410-2011-F-0067. Washington Fish and Wildlife Office, Lacey, WA.
- _____. 2013a. Reinitiation of the biological opinion for the Monte Cristo CERCLA Project, due to the 2012 designation of revised critical habitat for the northern spotted owl. January 18, 2013. Service Reference Number 13410-2011-F-0067-R001. Washington Fish and Wildlife Office, Lacey, WA.
- _____. 2013b. Biological Opinion for Effects to Northern Spotted Owls, Critical Habitat for Northern Spotted Owls, Marbled Murrelets, Critical Habitat for Marbled Murrelets, Bull Trout, and Critical Habitat for Bull Trout from Selected Programmatic Forest Management Activities March 25, 2013 to December 31, 2023 on the Olympic National Forest, Washington. U.S. Fish and Wildlife Service Reference: 13410-2009-F-0388. Washington Fish and Wildlife Office, Lacey, WA.
- WCB 2005. Safe work practices for helicopters in the forest industry. Workers Compensation Board of British Columbia. www.worksafefbc.com. 34 pp.

***In Litteris* REFERENCES**

Reed, P. 2015. Wildlife Biologist/Environmental Coordinator, Mt. Baker-Snoqualmie National Forest, Darrington. Email to Zachary Radmer, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, Lacey. Topic: June 4, 2015, email transmitting clarifications to the changed proposed action for the Monte Cristo CERCLA Project.

APPENDIX A

In a previous biological opinion (USFWS 2009) we analyzed available data to determine the 92 dBA contour of a Chinook 47d helicopter. However, the previously analyzed sound recordings were taken during landing and take-off, and may not be comparable to the noise generated by a helicopter flying overhead. We used a more appropriate sound measurement from the same data set (Newman et al. 1984) to analyze the effects of helicopter overflights in the proposed action. Below, we describe how we followed the same methodology used in our previous biological opinion (USFWS 2009) but started with a different sound measurement.

The San Dimas Technology and Development Center, in San Dimas, California (San Dimas) was contracted by the Olympic National Forest to analyze sound levels of two helicopters often used for logging in Washington and Oregon. San Dimas measured sound levels of two different helicopters during a helicopter logging operation in Oregon. The study (USFS 2009) reported sound measurements of the Kaman KMAX, a helicopter with a 5,000 lb “on hook” lifting capacity, and the Boeing Vertol 107 (Chinook 46 military equivalent) helicopter with a lifting capacity (assuming an external hook and not internal load) of 10,000 lbs. The average maximum sound level readings of noise at different distances were determined. The data showed that the KMAX was below the target level of 92 dBA level at almost all distances. However, the Vertol 107 exceeded 92 dBA levels at some distances. San Dimas generated a power regression curve (where $R^2=0.8467$ and $Y=134.88X$) to predict the 92 dBA level threshold. The regression curves were consistent with the theoretical relationship of the decrease in sound pressure level as distance increases, specifically 6 dBAs with every doubling of distance over “soft” surfaces (i.e., grass fields or brush) (Piercy and Daigle 1991, p. 3.7). The USFS San Dimas Technical Development Centers study (Simonson 2009, Results Chapter, p. 7) reported an attenuation rate that more closely fell within 4 dBA to 6 dBAs with every doubling of distance between sound meter and helicopter. Since the study area was located in the forest setting during an active logging operation, this attenuation range should be appropriate for application to the proposed action.

San Dimas’ final figure for the Vertol 107 was 92 dBA at about 225 ft. Although this figure uses the 6 dBA attenuation model, sound measurements were close enough to the helicopter (less than 150 ft) that the difference between that and the 8 dBA attenuation model would be insignificant. San Dimas added two standard deviations to that figure to achieve a 97.5 percent confidence interval that resulted in a 92 dBA level at a distance of 450 feet.

This analysis focuses on a study conducted by the Federal Aviation Administration (Newman et al. 1984) that measured sound levels of a Chinook 47d helicopter. Measurements were taken during take-off and approach at different speeds, fly-overs, hovering, and idling on the ground. Noise was measured from various angles and distances from the helicopter. Both sound exposure levels (SEL) and dBA levels were recorded. However, the study occurred at an airport and the Chinook 47d was not hauling a load as was the case in the San Dimas study.

Sound Exposure Level is the total noise energy produced from a single noise event. The SEL is a metric used to describe the total sound energy measured in a specific time period and can be computed from measured dBA sound levels. It is an integration of all the acoustic energy

contained within an event. However, few studies concerning wildlife disturbance report findings in SEL, particularly those in the air environment. Our injury analyses were based on determining a level of sound and the threshold of its detection by murrelets, and not necessarily the accumulation of sound energy over time. Further, SEL maximums can exceed the highest dBA level recorded over an event. For this project, we are more interested in novel noise events in an otherwise natural setting and decided that maximum dBA sound levels are more appropriate as a metric for analysis.

We used the highest recorded noise level from an overflight in the study as a reasonable worst case scenario for our injury threshold distance calculations. The highest recorded noise for the helicopter overflight was at a speed of 135 knots and with a “military trim,” or a helicopter pitch of about 6 degrees from the horizon, apparently a more aggressive (and louder) angle of flight and therefore presumably less comfortable to passengers than a typical helicopter pitch of 3 degrees from the horizon. A microphone was positioned 492 feet from the helicopter and directly in line with the flight path. Other microphones were positioned to the right and left of the flyover also in line with the flight path.

The average dBA max measurement for these overflights was 86 dBA ($n = 4$, std. dev. = 1.2). To create a 97.7 percent confidence interval, we added 2 standard deviations to the average maximum dBA (following San Dimas 2008) for a value of 88.4 dBA. We next choose the attenuation rate of 6 dB per doubling of distance because we considered the action area a “soft” site. Our calculations resulted in the 92 dB injury threshold level reached at 324 feet (approximately 108 yards). Our calculations do not account for the noise level of a helicopter lifting a load. Little data exists for this difference in noise levels. We assumed that the 97.7 percent confidence interval would account for any increase in noise generated from a helicopter with a load.

LITERATURE CITED

Piercy, J.E. and G.A. Daigle. 1991. Sound propagation in the open air. Page 3.2-3.26. *In*: Harris, C.M. (ed). Handbook of acoustical measurements and noise control, 3 ed. McGraw Hill.

Simonson, B. 2009. Sound measurements of helicopters during logging operations. USDA Forest Service. <http://fsweb/programs/im/sound_measure/helo_index.shtml>. Accessed Apr-3-2009.

U.S. Forest Service (USFS). 2008. Sound measurements of helicopters during logging operations. R.T. Harrison, R. Farve, and A. Horcher. USDA Forest Service San Dimas Technology & Development Center, San Dimas, CA. Online report at http://www.fs.fed.us/eng/techdev/IM/sound_measure/helo_index.shtml

U.S. Fish and Wildlife Service (USFWS). 2009. Biological opinion and letter of concurrence for the Greenwater River restoration project. October 26, 2009. Service Reference Number 2009-F-0382. U.S. Fish and Wildlife Service, Lacey, Washington. 84 pp.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503



SEP - 1 2015

In Reply Refer To:

01EWF00-2011-F-0067-R002

X ref: 13410-2011-F-0067-R001
13410-2011-F-0067

Steve Kuennen
Mt. Baker-Snoqualmie National Forest
2930 Wetmore Avenue, Suite 3A
Everett, Washington 98021

Dear Mr. Kuennen:

Subject: Monte Cristo CERCLA Project

This letter transmits a modification to the Incidental Take Statement for the Monte Cristo CERCLA Project issued under section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA).

The Mt. Baker-Snoqualmie National Forest (Forest) notified the U.S. Fish and Wildlife Service (Service) on August 28, 2015, that the Forest would not be able to comply with Term and Condition # 8 that was issued with the Incidental Take Statement for the Monte Cristo CERCLA Project Biological Opinion signed on September 16, 2011.

Term and Condition # 8 originally read as follows:

T&C 8. The Forest shall fully remove the Glacier Creek crossing no later than August 31. The Forest shall restore the Glacier Creek channel to its pre-project contours, and shall remove all foreign fill material from the Glacier Creek crossing.

The Forest explained in the August 28, 2015, email (Everest *in litt.* 2015a) that the Forest and associated contractors were faithfully following the intent of the term and condition, but that extenuating circumstances out of their control slowed project implementation. Specifically, a significant portion of the work crew was dismissed for a week to protect their homes and combat wildfires in the Okanogan area. The Forest now estimates that work can be completed on the far side of Glacier Creek and the temporary crossing removed by September 15, 2015. Fish biologists with the Washington Department of Fish and Wildlife were consulted, and bull trout are not likely to begin spawning in the project area until after September 20, particularly in a warm low-water year like 2015 (Everest *in litt.* 2015b).

The Service is therefore modifying the Incidental Take Statement for the Monte Cristo CERCLA Project, and Term and Condition # 8 will now read as follows:

T&C 8. The Forest shall fully remove the Glacier Creek crossing no later than *September 15, 2015*. The Forest shall restore the Glacier Creek channel to its pre-project contours, and shall remove all foreign fill material from the Glacier Creek crossing.

The Forest's determination of "likely to adversely affect" for northern spotted owl (*Strix occidentalis caurina*) (spotted owl), marbled murrelet (*Brachyramphus marmoratus*) (murrelet), bull trout (*Salvelinus confluentus*), and designated critical habitat for these three species remains unchanged, and the determination of "not likely to adversely affect" for gray wolf (*Canis lupus*) and grizzly bear (*Ursus arctos horribilis*) also remains unchanged.

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding the Opinion, the modified take statement, or our shared responsibilities under the ESA, please contact Zach Radmer at 360-753-4325 or Carolyn Scaffidi at 360-753-4068.

Sincerely,



 Eric V. Rickerson, State Supervisor
Washington Fish and Wildlife Office

cc:

Mt. Baker National Forest, Everett, WA (J. Plumage)
Mt. Baker National Forest, Everett, WA (L. Everest)
Mt. Baker National Forest, Everett, WA (P. Reed)

LITERATURE CITED***In Litteris* REFERENCES**

Everest, L. 2015a. Fisheries Program Manager, Mt. Baker-Snoqualmie National Forest, U.S. Forest Service, Everett, Washington. Email to: Zachary Radmer, Fish and Wildlife Biologist, Washington Fish and Wildlife Office, U.S. Fish and Wildlife Service, Lacey, Washington. Topic: August 28, 2015, email discussing the circumstances that led to the Forest's inability to meet term and condition #8.

Everest, L. 2015b. Fisheries Program Manager, Mt. Baker-Snoqualmie National Forest, U.S. Forest Service, Everett, Washington. Email to: Zachary Radmer, Fish and Wildlife Biologist, Washington Fish and Wildlife Office, U.S. Fish and Wildlife Service, Lacey, Washington. Topic: August 28, 2015, email discussing the timing of bull trout spawning in the Upper South Fork Sauk River.

Appendix B.
Photographs



Photograph 1.

Remote camp at the Monte Cristo Campground.



Photograph 2.

Ancillary remote camp in the Henry M. Jackson Wilderness.



Photograph 3.

Columbia Vertol 107-II measured 97.4 decibels while hovering during a waste rock dump at the Rainy Mine.



Photograph 4.

Helicopter with rotors in motion on the ground at the landing zone measured 85.1 decibels.



Photograph 5.

Helicopter at takeoff with avalanche chute glide path in the background.



Photograph 6.

Upstream in-situ turbidity probe in Glacier Creek.



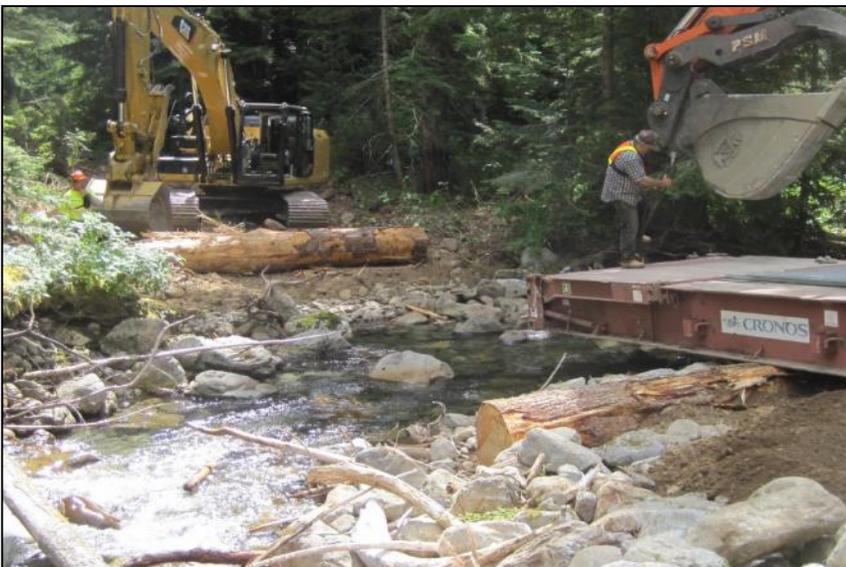
Photograph 7.

Downloading data from the upstream in-situ turbidity monitor.



Photograph 8.

Abutments set for the Glacier Creek crossing.



Photograph 9.

Sliding the rail car deck over the north abutment.



Photograph 10.

Bridge deck set on the abutments over Glacier Creek on July 16, 2015.



Photograph 11.

Looking downstream toward Glacier Creek from the temporary crossing.



Photograph 12.

Glacier Creek on September 4, 2015 just downstream from the Glacier Creek crossing.



Photograph 13

Removal of the Glacier Creek crossing on September 14, 2015.



Photograph 14

Garbage at dispersed campsite adjacent to the South Fork Sauk River.



Photograph 15

Bag of garbage removed from dispersed campsite in the late successional reserve on July 20, 2015.

Appendix C.

**Continuous In-Situ Turbidity Documentation
(Electronic)**