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Final Environmental Impact Statement

Resurrection Creek Phase II: Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations

Forest Service	Chugach National Forest	Seward Ranger District	R10-MB-789 March 2015

Final Environmental Impact Statement
Resurrection Creek Phase II Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations
Seward Ranger District, Chugach National Forest
Kenai Peninsula Borough, Alaska

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Abstract: The lower six miles of Resurrection Creek near the town of Hope, Alaska was adversely impacted by early 20th-Century hydraulic placer mining, which left large mining tailings piles along the banks and straightened the stream channel, resulting in poor aquatic and riparian habitat conditions. The Forest Service completed Phase I of the Resurrection Creek Stream Restoration Project between 2005 and 2006, restoring a 1-mile section of Resurrection Creek about 5 miles upstream of Hope, Alaska.

Hope Mining Company owns federal mining claims along Resurrection Creek, located about 2 to 4 miles upstream of the community of Hope. The Forest Service and Hope Mining Company reached agreement in 2007 on how similar restoration could occur on the claims in conjunction with current and future mining plans. Hope Mining submitted a proposed plan of operations in 2007 for additional areas for mechanical mining operations with connected actions to support restoration activities.

The purpose of this project is to analyze Hope Mining Company's proposed mining plan of operations and allow authorization of placer mining operations including any modifications of the terms and conditions of the plan of operations with requirements for surface resource protection. A secondary purpose is to restore the degraded stream channel, floodplains, and habitat conditions along this 2.2-mile segment of Resurrection Creek.

Three alternatives are analyzed in this Final Environmental Impact Statement. Alternative 1 (Existing Approved Mining - No Action) describes existing conditions in the project area including the existing approved mining operations. Hope Mining Company has a statutory right to explore and develop their claims for minerals under the General Mining Act of May 10, 1872, as amended (30 USC 22 et seq), and the Forest Service has a regulatory obligation to approve (36 CFR 228.5) and may require modification of the terms and conditions of a proposed plan of operations to minimize adverse environmental impacts (36 CFR 228.1). Alternative 1 is displayed in this document for baseline comparison purposes only and may not be selected as it does not meet legal and regulatory requirements. Alternative 2 (Proposed Mining and Stream Restoration - Proposed Action) would allow authorization of mining operations on 274 acres and associated infrastructure outside of a restoration corridor. Restoration would lengthen Resurrection Creek's channel from 2.2 miles to 2.7 miles by adding sinuosity to the channel, restore floodplain, and encourage growth of streamside vegetation within a 74 acre, two-mile long restoration corridor. Alternative 3 (Proposed Mining Only) would allow authorization of mining operations on 285 acres and associated infrastructure but does not include restoration of any portion of Resurrection Creek.

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Preface

The document is organized as follows:

- **Summary:** This section provides a summary of all the chapters in the EIS.
- **Chapter 1. Purpose and Need for Action:** This chapter includes information on the history of the project proposal, the purpose and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- **Chapter 2. Alternatives, including the Proposed Action:** This chapter provides a more detailed description of the proposal and as well as alternative methods for achieving the stated purpose. This chapter also includes a discussion on measures taken to minimize adverse environmental impacts. Finally, this section provides a summary of the environmental consequences associated with the proposal and each alternative.
- **Chapter 3. Affected Environment and Environmental Consequences:** This chapter describes the environmental effects of implementing the proposal and other alternatives. This analysis is organized by resource area.
- **Chapter 4. Consultation and Coordination:** This chapter provides a list of preparers and agencies consulted during the development of the EIS.
- **References:** This section lists the various literature and other references cited in the EIS.
- **Glossary:** The glossary provides definitions to terms commonly used in this EIS.
- **Appendices:** The appendices provide additional detailed information, including maps, to support the analyses presented in the EIS.
- **Index:** The index provides page numbers by document topic.

Additional documentation, including detailed analyses of project area resources, may be located in the project planning record located at the Seward Ranger District.

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Summary

Chapter 1

The project area includes 418 acres of National Forest System lands on either side of Resurrection Creek near the town of Hope, Alaska. The project area encompasses 2.2 miles of Resurrection Creek channel approximately 2 miles south of the outlet of the creek at Turnagain Arm. Both anadromous and resident fish utilize Resurrection Creek. All five species of anadromous salmonids are present in Resurrection Creek; pink (*Oncorhynchus gorbuscha*), chum (*O. keta*), coho (*O. kisutch*), Chinook (*O. tshawytscha*), and sockeye salmon (*O. nerka*).

Portions of the project area have been extensively mined since the early 1900s and historic mining has contributed most of the known cultural resources in and near the project area. The Hope Mining Company Historic Mining District, covering 138 acres, is located in the project area and has been properly documented and is eligible for inclusion on the National Register of Historic Places.

Hope Mining Company owns 28 federal placer mining claims throughout the project area and is currently approved for mining operations on 97 acres within the project area. Existing mining operations consist of mechanical mining with heavy equipment, hand mining, and suction dredging to process placer gravels for recovering gold. Reclamation requirements are specified in the individual plans of operations and generally include recontouring mined areas to natural contours, spreading any stockpiled soil, spreading large woody debris and boulders, filling and contouring any ponds or ditches not needed for future operations, and removal of mining equipment/infrastructure not identified in other approved mining operations.

Historic placer mining from the early 1900s through 1942 adversely impacted fish and wildlife habitat and soil productivity within the project area by washing away most of the soil, straightening the creek, and producing mine tailings that occupy the majority of the valley floor in the project area. The mine tailings essentially function as dikes that confine the creek and cut off flood flows from the original floodplain, creating a nearly continuous riffle habitat for fish. Water velocities accelerate as they are compressed through the constricted channel concentrating the stream’s energy on the streambed, simplifying substrate and degrading the channel. Sediment and nutrients are transported through the project area, depriving riparian areas of soil and nutrients, which in turn slow the recovery and natural succession of disturbed areas.

The aquatic habitat such as pools, side channels, beaver ponds and large woody debris are very limited within the project area compared to an unmined section of creek several miles upstream. Because of the dominant riffle habitat and the confined nature of the floodplain, the project area is very limited in spawning habitat; the ditch-like geometry of the existing stream channel generates substrate sizes that are too large for trout or salmon spawning. In addition, vital Chinook salmon and coho salmon rearing habitat such as pools, side channels and beaver ponds are either buried or cut off by existing tailings piles. Natural hydrologic processes in Resurrection Creek have not substantially altered the condition of the tailing piles over the last century.

Historic mining practices and current mining activities also affect soil productivity. About half of the project area has been mined, is currently approved for mining, or has mining infrastructure currently in place and being utilized. An estimated 25 percent detrimental soil disturbance exists across the project area from historic and current mining activities. Historic tailings are composed of extremely well-drained large cobbles and very little topsoil. Growth of vascular plants and the development of a duff layer and soil formation have been inhibited by soil disturbance. Slow regeneration of vegetation has affected wildlife habitat availability for a variety of species.

Phase I of the Resurrection Creek Stream and Riparian Project was completed between 2005 and 2006 consisting of a one-mile section of Resurrection Creek about 5 miles upstream of Hope. The stream segment was restored to a more natural condition and greatly improved stream channel and aquatic habitat conditions. After completion of Phase I restoration, the Forest Service began collaborations with Hope Mining Company to develop a framework for additional restoration on Resurrection Creek through the segment that has federal mining claims owned by Hope Mining Company. The Forest Service and Hope Mining Company reached agreement in December of 2007 on the elements of proposed restoration in conjunction with future mining plans (appendix E, page 265) and Hope Mining Company submitted their proposed plan of operations.

The proposed action includes the following elements:

- Analyzing Hope Mining Company's proposed plan of operations for approval of mechanical placer mining, hand mining, and dredging operations on 274 acres and construction and maintenance of mining related infrastructure with appropriate mitigation measures to minimize surface disturbance.
- Restoring the stream channel, riparian areas, and fish and wildlife habitat of a 2.2-mile segment of Resurrection Creek, within a designated 74 acre restoration corridor.
- Allowing approval of a supplement to the existing mining plans of operations which would be submitted by Hope Mining Company prior to implementation of restoration, eliminating most existing approved mining activities from the restoration corridor.

The Forest Service has a regulatory obligation to approve a plan of operations (36 CFR 228.5). Based on the analysis of the proposed mining plan, the Forest Service can require modifications to the terms and conditions of the permit, and require additional surface resource protection measures (36 CFR 228.1).

A Notice of Intent was published in the Federal Register on January 28, 2008, and public scoping occurred between January 4, 2008 and June 13, 2009. Comments from the public and other agencies were analyzed and two unresolved issues were identified: the potential of restoration and mining activities to 1) increase the turbidity of Resurrection Creek affecting water quality and 2) harm salmon populations. These two issues were included in the Draft Environmental Impact Statement released for public comment on July23, 2010.

Interdisciplinary discussion and site analysis in the project area since June of 2010 resulted in modifications to the issues. The issue of potential harm to salmon populations was recognized as a result of potentially lower water quality in Resurrection Creek and is considered part of the water quality issue. Further site analysis by the soil scientist led the interdisciplinary team to add soil productivity as an issue. The issues are now described as follows:

1. **Water Quality:** Restoration implementation has the potential to substantially increase turbidity in Resurrection Creek for short durations during the diversions of flow into the newly constructed sections of channels. Other instream restoration activities such as modifications of the channel cross-section, logjam construction, side channel construction, equipment crossings, and bridge construction may also cause increases in turbidity.

2. **Soil productivity**: Proposed mining and restoration activities will result in detrimental soil disturbance of varying levels as observed from past mining practices in the area and from the implementation of the previous Phase I restoration project.

The Forest Service developed an alternative to the proposed action which includes proposed mining operations only (alternative 3) and developed mitigation measures for both alternatives to reduce the effects from these issues (pages 38 to 47).

The Chugach Forest Supervisor is the Deciding Official and will decide on:

1. What modifications to the proposed mining plan of operations are necessary, if any, to minimize adverse environmental impacts on National Forest surface resources;
2. Whether to undertake restoration activities on Resurrection Creek, and if so, the nature, magnitude, and extent of those activities;
3. What mitigation measures and monitoring requirements will be required, if any, for restoration activities and/or mining operations

Chapter 2

Hope Mining Company is currently approved for mining operations on 97 acres as is described under alternative 1 (Existing Approved Mining - No Action). Alternative 1 describes baseline conditions for comparison with the action alternatives. The Forest Service has a regulatory requirement to act on the proposed mining plan of operation; therefore alternative 1 may not be selected because taking no action would not fulfill this statutory requirement.

Alternative 2 (Proposed Mining and Stream Restoration - Proposed Action) allows authorization of Hope Mining Company's proposed plan of operations including mechanical placer mining, hand mining, and dredging on an additional 274 acres and construction and maintenance of mining related infrastructure. Authorization of the plan of operations may include requiring modifications such as those listed in mitigation measures. This alternative includes terms and conditions for the approval of a supplement to the existing mining plans of operations, submitted by Hope Mining Company prior to implementation of restoration activities, which would exclude most existing, approved mining activities from within a designated 74 acre restoration corridor. This alternative also includes restoration of the stream channel, riparian areas, and fish and wildlife habitat of a 2.2-mile segment of Resurrection Creek within the restoration corridor.

Alternative 3 (Proposed Mining Only) would allow authorization of mechanical placer mining, hand mining and dredging on an additional 285 acres and construction and maintenance of mining related infrastructure. This alternative would not establish a restoration corridor and no portions of Resurrection Creek would be restored. Approximately 2740 feet of Resurrection Creek channel would be relocated for mining purposes.

The Forest Service Interdisciplinary Team developed 29 mitigation measures to mitigate adverse effects of the activities proposed in alternatives 2 and 3 and 11 monitoring activities during project implementation.

This chapter also contains information about four other alternatives that were considered but eliminated from detailed study.

Chapter 3

Major conclusions from the effects analysis include the following:

1) **Water Quality**: Heavy equipment used during restoration (May 15 to July 15 for up to 4 years pending funding), would likely cause 6 to 10 short, controlled turbidity events of over 300 nephelometric turbidity units in alternative 2. Turbidity, measured in Nephelometric Turbidity Units (NTU), is a measure of the cloudiness of water, typically the result of the transport of suspended sediment. Up to 10 turbidity pulses per day of up to 150 NTU could also occur while operating equipment in the channel during log jam construction, shaping banks, and side channel construction. In alternative 3, relocation of channel segments with use of heavy equipment in preparation for mining (May 15 to July 15) would be expected to generate 2 to 4 turbidity events of over 300 NTU; there is potential for continued increased turbidity levels from the channel relocations. Minimal impacts from effects of turbidity would be expected to occur from mining equipment crossings in both alternatives. The minimal 20-foot wide, vegetated buffer zone along either side of the creek in both alternative 1 and 3 poses a higher risk to water quality of the creek due to the close proximity of sediment laden settling ponds and ditches during high flow events and natural channel movement.

2) **Channel Structure**: Hydrologic function of the stream channel would be restored to more natural conditions under alternative 2 including adding 7 acres of wetlands to the existing 19 acres and improving the quality of the existing wetland areas. Functional floodplains would promote growth of riparian vegetation and bank stabilization. The restored corridor would provide an adequate buffer between the riparian area and mining infrastructure. In alternatives 1 and 3, the stream channel would remain an impaired, confined channel with few pools and a disconnected floodplain. Relocated channel segments in alternative 3 would be similar to the existing condition, but with decreased stability for the first few years due to minimal design features of a naturally stable channel during relocation and the time needed for vegetation on the bank to reestablish. Alternative 1 would have 19 acres of lower quality wetlands and alternative 3 would increase in wetlands acreage to 21 acres but would remain as lower quality wetlands.

3) **Aquatic Habitat**: Salmon habitat would be greatly improved by the addition of pools, side channels, off-channel ponds, additions of large woody debris jams, and reduced stream velocities under alternative 2. Improved aquatic habitat would promote aquatic population productivity. No improvement to aquatic habitat or population productivity would occur under alternatives 1 and 3 and pools, woody debris, spawning areas, and off-channel habitat would continue to be very limited.

4) **Aquatic Species**: Direct mortality of aquatic species could occur at equipment crossings and during channel construction throughout the entire project area under alternative 2. Indirect mortality of aquatic species would be possible from high turbidities downstream up to 2 miles from where the creek is diverted into new channel segments in alternative 2. In alternatives 1 and 3, direct mortality of aquatic species could occur at equipment crossings and during channel relocation in alternative 3. Indirect mortality of aquatic species would be possible from high turbidities in lower third of creek within the project area and up to two miles downstream during channel relocation in alternative 3.

5) Acres of Detrimental Soil Disturbance: The existing detrimental soil disturbance is estimated at 25 percent (approximately 105 acres) of the 418 acre project area. Alternative 2 would result in less detrimental soil disturbance (58 acres or 17 percent of the 348 acre restoration and mining area) than alternative 3 (75 acres or 26 percent of the 285 acre mining area) or alternative 1 (80 acres or 19 percent of the project area) after all mining reclamation occurs.

6) **Effects to nearby private landowners:** Mining equipment is expected to produce levels of noise in the range of 55 – 68 decibels (dB) at active mining sites with spikes to 80 dB under alternatives 1, 2 and 3. Persistent equipment noises may impact private landowners within 1 mile of mining operations on Hope Mining Company claims during the months of March through October over 20 years of operation. Noise levels generated by heavy equipment during restoration under alternative 2 would be identical in nature and level to that of mining operations and are expected to mask each other rather than detectably increase noise levels. Private landowners living adjacent to the project area will experience a reduction in scenic integrity associated with mining activity under both alternative 2 and 3 due to the proximity of mining activities to private land. The scenic integrity would fall to an Unacceptably Low level during mining, but with reclamation, the mining areas will change to a Very Low scenic integrity until vegetation becomes reestablished again post-mining. Due to noise, proposed roads, and lowered scenic quality from mining in alternatives 2 and 3, private landowners may see a decrease in adjacent private property values.

7) **Wildlife Habitat Affected by Mining and Restoration Activities**: Mining operations would cause short- and long-term habitat loss of conifer, hardwood and riparian forest types on up to 97 acres over an estimated 15 year period under alternative 1, 274 acres spread out over a 20 year time period under alternative 2 and on 285 acres under alternative 3. Mature forest composition and structure with larger trees important for wildlife use by various species may be delayed in developing due to loss of soil productivity. Similar habitat loss and disturbance would occur within the 74 acre restoration corridor during restoration in alternative 2 until restoration was completed and riparian vegetation reestablished. Limited riparian vegetation would exist adjacent to Resurrection Creek in alternatives 1 and 3 resulting in limited wildlife habitat over a longer period of time.

8) **Wildlife Habitat Restored**: Restoration of 51 acres of floodplain, riparian vegetation, and development of 8,000 feet of new side channels within the 74 acre restoration corridor would create new habitat which favored species that feed on spawning or rearing salmon, breed or forage in side channels, den or nest in riparian vegetation, or forage for vegetation or for prey species in riparian areas under alternative 2. No habitat restoration would occur along Resurrection Creek under alternatives 1 and 3.

9) **Wildlife Disturbance by Mining and Restoration:** Disturbance to wildlife from noise, people, and machinery may cause habitat abandonment or avoidance in restoration corridor in alternative 2 (short term - up to 4 year period (pending funding availability for restoration) on 74 acres) and mining areas (long term - 20 years) and up to one mile away from the project area under alternatives 1, 2, and 3. Direct mortality to individuals of a variety of birds and small mammals is possible from mining or restoration. Noise due to mechanized equipment used for mining or restoration has the potential to disturb wildlife in the project area at levels from 65 to 80 dB and up to one mile at levels up to 55 dB.

10) **Historic Property Affected by Mining and Restoration**: The project area has one historic property that is eligible for inclusion in the National Register of Historic Places, the Hope Mining Company Historic Mining District. Historic mine tailings, a contributing feature of this property, will be destroyed as a result of mining under alternatives 1, 2 and 3 and restoration activities under alternative 2. The Forest Service consulted with the State Historic Preservation Officer and executed a Memorandum of Agreement in 2009 addressing adverse effects of mining and restoration on the affected tailings (Alaska Department of Natural Resources 2009). The Memorandum of Agreement addresses the development of an interpretive area which will be located on the south end of the project, affording public access near Resurrection Creek Road, in which a representative section of intact historic mine

tailings will be interpreted. The Forest Service will continue to work in partnership with Hope Mining Company in developing the interpretive area and interpretive signing.

Chapter 4

Chapter 4 contains list of Forest Service employees who participated in the preparation of the Environmental Impact Statement, a list of agencies who will receive the Final Environmental Impact Statement, References, and Glossary.

Chapter 1.
Purpose and Need for Action

The Chugach National Forest has prepared this environmental impact statement in compliance with the National Environmental Policy Act and other relevant Federal and State laws and regulations. This environmental impact statement discloses the direct, indirect, and cumulative environmental effects that could have impacts on the human environment as a result of the Forest Service's regulatory requirement to process Hope Mining Company's proposed plan of operations and the Forest Service proposal to implement restoration activities along Resurrection Creek, and modifications or alternatives to those proposals.

Location of the Project

The project area is located along Resurrection Creek on the northern end of the Kenai Peninsula, on the Seward Ranger District of the Chugach National Forest. The town of Hope, Alaska lies adjacent to the mouth of Resurrection Creek on Turnagain Arm (figure 1). The project area is located in Sections 4, 9, and 16 of T. 9 N., R. 2 W. on the Seward Meridian. The project area begins at river mile 2.1 (upstream from tidewater) and extends upstream to river mile 4.0. Figure 2 shows the land ownership near the project area and the town of Hope. The project area lies within Hope Mining Company's block of federal mining claims (figure 3).

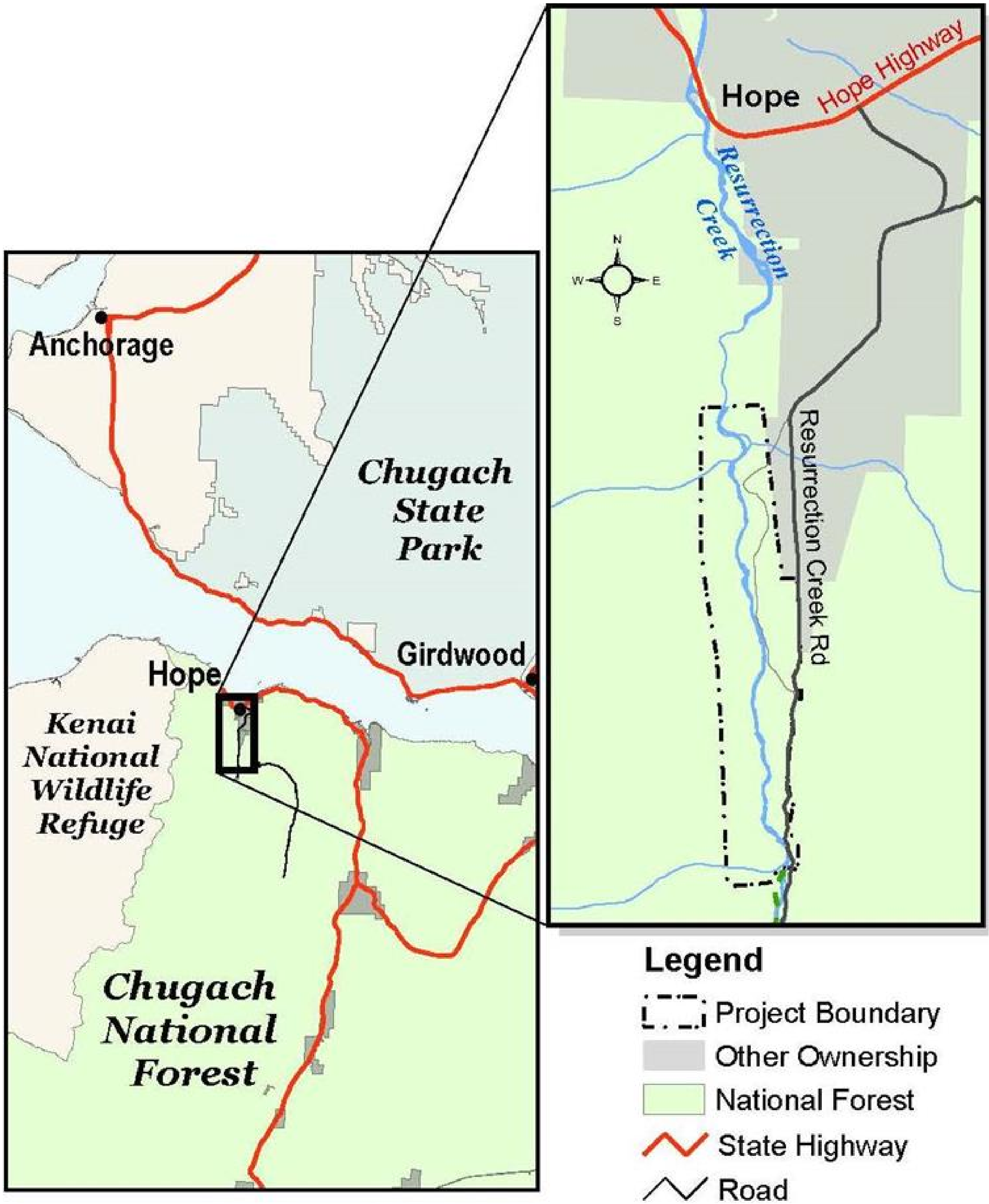

Figure 1. Location of the project area

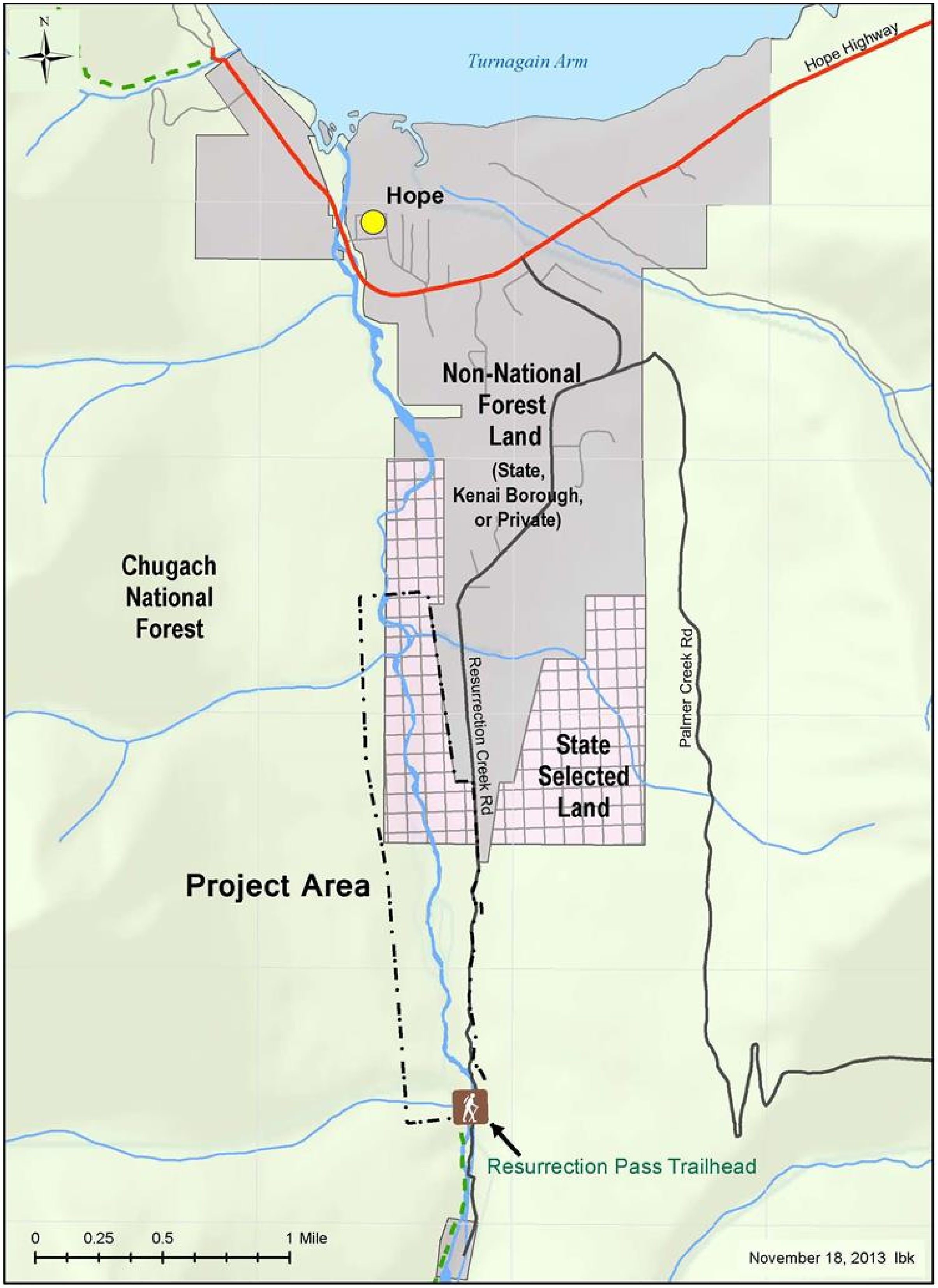

Figure 2. Land ownership map of the Hope area

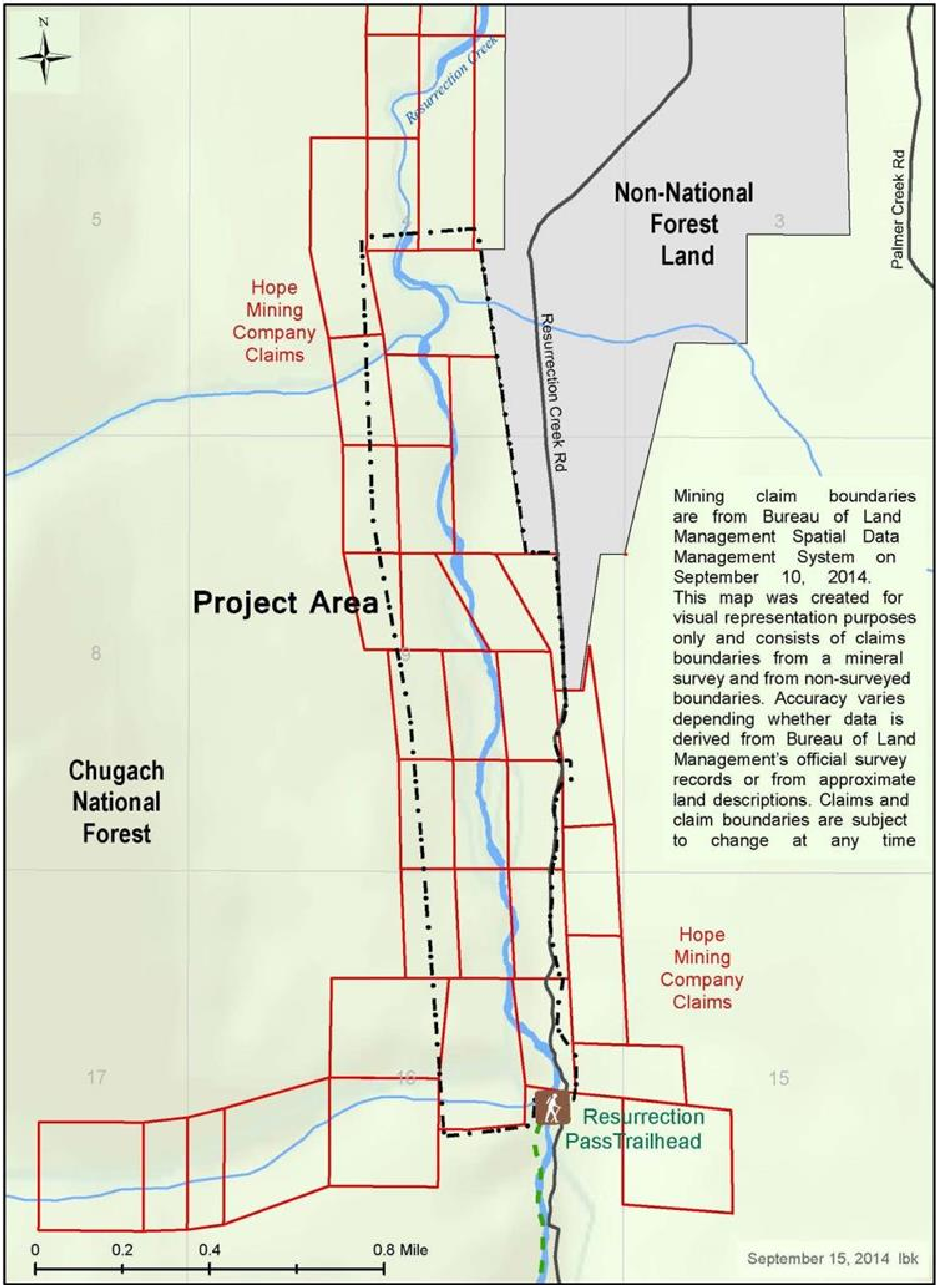

Figure 3. Hope Mining Company claims within and near project area

Background

Changes in Resurrection Creek from Historic Mining

Resurrection Creek was one of Alaska's first gold rushes over a century ago. From the early 1900s through 1942, hydraulic and heavy equipment placer mining impacted six miles of Resurrection Creek upstream from Turnagain Arm. The historic mining methods resulted in loss of soil and changed the complex of stream channels and wetlands. Mine tailings entrenched the stream and eliminated its access to the historic floodplain. The direct impact of disturbance and loss of the stream's ability to access the floodplain have adversely altered aquatic habitat and riparian vegetation composition (Bair et al. 2002). Natural hydrologic processes in Resurrection Creek have not substantially altered the condition of the tailing piles over the last century (figure 4).

Figure 4. Historic tailing piles along Resurrection Creek

Resurrection Creek Fisheries

Anadromous fish are found from the mouth of Resurrection Creek to river mile 19. The lower 6 miles are identified as having the highest production potential and spawning and rearing habitat for coho (*Oncorhynchus kisutch)*, chum (*O. keta)*, pink (*O. gorbuscha)* and Chinook salmon (*O. tshawytscha)* (Hart Crowser Inc. 2002). Sockeye salmon (*O. nerka)* have also been documented within Resurrection Creek however it is unknown whether they are comprised of a rearing population within Resurrection Creek or are strays from other Kenai Peninsula river populations.

Deep pools and off-channel habitats such as side channels and beaver ponds are extremely important during the freshwater or juvenile life history stages of Chinook and coho salmon. Most populations of Chinook and coho on the Kenai Peninsula spend the first two to three years of their lives rearing in their natal streams. During the summer months when food is abundant, Chinook and coho juveniles depend on deep pools for foraging and log jams for hiding from predators. During the winter months off-channel habitats such as side channels and beaver ponds become critical to juvenile Chinook and coho survival. The juvenile salmon use side channels and beaver ponds in the winter months to escape the main stem stream channel as it freezes, and to avoid ice dam burst and peak flows during the spring thaw.

From 1990 to 1992 an evaluation of the Resurrection Creek fisheries was conducted. The study evaluated juvenile salmon distributions, smolt out-migrations, and inventoried stream habitat. The results of the study were compared to three other stream systems on the Kenai Peninsula; Hidden, Moose, and Quartz Creek. The results showed that Resurrection Creek coho smolts were considerably smaller by age class (about 30 percent) than on the other streams. In addition, virtually all Resurrection Creek coho smolts were emigrating at age one; however 90 percent of coho smolts on the other streams emigrated at age two and three (Blanchet and Wenger 1993).

The lack of growth and early age at which coho smolts emigrate from the watershed give a very strong indication that rearing within the system is severely limited. The tailings piles within the placer mined reaches have disconnected the stream from the historic floodplains and side channel habitat. The side channels and alcoves within the now isolated or buried floodplains historically provided the flood flow refugia and over wintering habitat which were critical to salmonids, especially coho.

Resurrection Creek Landscape Analysis (2002)

The Chugach National Forest completed a landscape analysis for the Resurrection Creek watershed in 2002 to document conditions and uses of the watershed and its resources (Hart Crowser, Inc. 2002). The three main restoration and management components outlined in the analysis were aquatic habitat restoration, vegetation restoration and management, and management of heritage resources/human uses. Phase I restoration, completed in 2005-2006, and the proposed Phase II restoration are among several projects identified in this analysis. Both projects are consistent with the Chugach National Forest Revised Land and Resource Management Plan goals and objectives, desired future conditions, and are listed as potential projects (USDA Forest Service, Chugach National Forest 2002a, pages 3-5; 3-15, C-6).

Existing Mining Operations

The project area includes all or portions of 28 federal placer mining claims, 20 to 40 acres in size. The earliest claims were located in the late 1800s and the most recent in 2014. Seven mining claims in the project area were located prior to 1955 but do not have surface rights per the Multiple Surface Use Act of July 23, 1955 (P.L. 84-167), a 1960 A.L.J. Decision, and a 1961Surface Rights Determination Final Decision. The Multiple Surface Use Act provided for the right of the United States to manage and dispose of surface resources on mining claims. Hope Mining Company is the current claimant for all claims within the project area.

Hope Mining Company acts as a leasing company working with multiple third party lessees that conduct the actual mining operations. Hope Mining Company owns and maintains the claims as required by Bureau of Land Management (43 CFR 3800) and maintains the basic durable mining infrastructure (roads, ditch/pond systems, camps, storage sheds, etc.) regulated by Forest Service surface management regulations (36 CFR 228A). Operational flexibility is an important business consideration for Hope Mining Company to allow for the dynamic needs of various operators, equipment capabilities, experience, rate of production, and living quarters.

Hope Mining Company conducted exploration and leasing of areas for heavy equipment and hand mining operations along Resurrection Creek in 1975 after purchasing a number of the mining claims. Hope Mining Company first submitted a plan of operations to the Forest Service and was approved for test holes drilling and digging test pits in three areas (areas 1 to 3) on 19 acres in 1985 (appendix B – existing conditions map). Mining plans of operations were submitted annually through 1991 which increased the area approved for mining operations to about 33 acres and increased the scope of mechanized mining operations (areas 1 to 10, 17; Sourant’s mining area).

From 1988 through 1999, the Forest Service processed a plan of operations which approved an additional 44 acres for mining (areas 11 to 16). Construction of a new bridge over Resurrection Creek, relocation of 1000 feet of Resurrection Creek to a new channel through area 15, and defined specific reclamation requirements in each area were approved in this 1999 plan of operations. The 1999 plan of operations also refers to activities approved in the 1986, 1991, and the 1989 Hale and Harty plans of operations. A bridge has not been built to date nor has the creek been relocated. The Forest Service approved a plan of operations on 20.6 acres (areas 5A, 19, 20A) for heavy equipment and hand mining in 2010.

The total area approved for existing mining operations within the project area is 97 acres (appendix B - existing conditions map). From 1968 to 1985, about 28 acres were mechanically mined within the project area. About 45 acres of the 97 acres currently approved have been mined since 1985.

The approved mining operations from 1986 to the present have included mechanical mining with heavy equipment, hand mining, and suction dredging. Preparation of the ground for mechanical mining involves clearing brush and overburden (trees and stumps) and stockpiling any topsoil. The placer gravels (deposit of gravel containing eroded particles of gold) are then excavated and processed by gravity separation through a wash plant. One common method of mechanical placer mining is excavating consecutive strips (commonly around 500 feet in length, approximately 50 feet wide and ranging in depth from 10 to 25 feet). A stationary wash plant is also used where excavated placer gravels are transported short distances to the plant for processing (figure 5).

Hand mining operations include the use of hand tools (gold pans, picks and shovels, sluice boxes, highbankers, and small water pumps) for mining placer gravels. Mechanized equipment may be used to remove overburden, stockpiling soil, and completing reclamation of the hand mining areas.

A suction dredge is operated in a constructed pond and utilizes a high pressure water pump to suck up water, gravel, and gold. The material is classified with a screen and smaller material containing any gold particles washes through a sluice where the denser gold particles are gravity captured. Gravel tailings are expelled behind the dredge, filling the pond as the dredge is advanced. A cutter head is sometimes used on the dredge to loosen the underwater material to facilitate suction. Suction dredging may occur within Resurrection Creek (per Alaska Department of Fish and Game Title 16 Habitat Permit for working within anadromous water). Dredge sizes currently approved are 4 to 12 inch intake nozzle diameter.

Figure 5. Mechanical placer mining equipment

Settling pond/ditch systems are currently located on both sides of Resurrection Creek to support the mining operations. Settling ponds/ditch systems provide water to be pumped to the wash plant and for retention of process waters allowing additional time for suspended sediment to settle. The pond/ditch systems are currently being operated as a zero discharge facility per Alaska Department of Environmental Conservation standards under requirements of the Clean Water Act. A zero discharge facility means that no processed water from mining ditches and ponds is flowing directly into Resurrection Creek or into other surface water.

Current reclamation requirements are specified in the individual plans of operations and vary depending on the specific operation, area, and site conditions. Reclamation generally includes recontouring mined areas to natural contours, spreading any stockpiled soil, spreading large woody debris and boulders, filling and contouring any ponds or ditches not needed for future operations, and removal of mining equipment/infrastructure not identified in other approved mining operations. Reclamation requirements also include financial assurance (bonding) to ensure reclamation work would be accomplished by the Forest Service if the mining claimant/operator was not able to perform the work. Approximately 28 acres of the 45 acres mined have been reclaimed to date. The remaining acres are still being mined or will be reclaimed during the upcoming mining season.

A typical mining season includes the following activities and approximate time periods:

- March to April: Removal of vegetation from mining areas with heavy equipment and repairing mining equipment within camps in preparation of active mining season. While typically done in spring months prior to ground thawing, these activities could occur any time of the year.
- May to October: Active processing of placer gravels with heavy equipment begins when ground thaws in the spring and ends when ground freezes in the fall; reclamation activities can occur anytime during this period.
- October to November: Winterizing equipment and mining areas (including soil erosion measures)

Currently there are ten temporary camp areas (about 4 total acres) that are approved and include uses incidental to mining such as equipment storage and maintenance, concentrate processing, and lessee accommodations. Nine of the ten camps are located adjacent to the existing mining areas and one camp is within an existing mining area. A network of internal mining roads are approved under various plans including two equipment fords, two hand trams across Resurrection Creek and a location approved for a bridge.

Hope Mining Company is currently authorized to use the Resurrection Pass Trail bridge with ATVs to access mining claims on the west side of Resurrection Creek until such time as a bridge is built by Hope Mining Company under a plan of operations or temporarily installed by Forest Service for restoration implementation access and monitoring.

Patent Application

Hope Mining Company submitted a patent application to the Bureau of Land Management in March 1993 for 42 claims; 27 of these claims are located within the project area. A patented mining claim is one in which the Federal Government has transferred fee-simple title to all minerals and surface resources (i.e. private land) to the claimant. The requirements for patenting a mining claim are given in detail in Title 43, Code of Federal Regulation, Part 3860.

In 1994 the Interior and Related Agencies Appropriation Act authorized a moratorium on spending appropriated funds for the acceptance of new mineral patent applications or processing of mineral patent applications that have not yet received the First Half of the Mineral Entry Final Certificate. Hope Mining Company's patent application did not achieve First Half of the Mineral Entry Final Certificate and therefore remains unprocessed as long as the moratorium is in place.

Settlement Agreement and Stipulation of Dismissal (2004)

In June of 1999, Hope Mining Company submitted plans to use a cutting dredge with a 15 inch intake in existing approved areas. In August 1999, the Forest Service responded by stating a new environmental analysis would need to be prepared. All ground disturbing activities and occupancy of structures were halted in 2000 until either a new plan or a modified plan was approved. In August 2001, the Forest Service required Hope Mining Company to modify their 1999 plan of operations per 36 CFR 228.4(e). Hope Mining Company appealed the 2001 decision and the Regional Forester upheld the decision (April 2002). Hope Mining Company filed a civil suit in July 2002 with the U.S. District Court of Alaska and a petition for the court to review an Agency Order by the Forest Service on April 29, 2002 (Regional Forester Appeal Decision). In March, 2004, a "Settlement Agreement and Stipulation of Dismissal" was signed by a Department of Justice attorney and a Hope Mining Company attorney with the following stipulations:

- August 10, 2001 Forest Supervisor decision and April 29, 2002 decision by Regional Forester are both withdrawn.
- Forest Service shall not require pursuant to 36 CFR 228.4(e) (2002) any modification to the Plan of Operations approved in January 1999 based on any disturbance of surface resources allegedly due to any operations of Hope Mining Company conducted prior to April 29, 2002.
- Nothing in the agreement shall limit any duties, obligations, or rights of either Hope Mining Company or Forest Service under any laws and regulations of the United States.
- The settlement is entered into in compromise and shall not serve as precedent for any other litigation, and shall not be deemed to be an admission by any party hereto for any purpose.

The Forest Service continues to administer mining operations (74.6 acres total) approved under the 1999 plan of operations with the above stipulations. The 1999 plan of operations currently limits the dredge intake to 12 inch size.

Stream Restoration Phase I (2005-2006)

The Environmental Impact Statement for the Resurrection Creek Phase I Stream Restoration Project (USDA Forest Service, Chugach National Forest 2004) was completed in November of 2004 and a Record of Decision signed November 4, 2004 for restoration efforts on a one-mile historic mining-impacted portion of Resurrection Creek about 5 miles upstream of Hope (figure 6). The proposed action for the Phase I project included reconstructing the main channel with increased sinuosity, installing large woody debris within the new stream channel, constructing side channels and ponds, and reestablishing vegetation in the riparian area. The Phase I project differs from the proposed project in that the Phase I project is located on National Forest System lands that were acquired from the State of Alaska by deed dated April 13, 1971. Acquired lands are withdrawn from mineral entry which means that location of mining claims is not allowed.

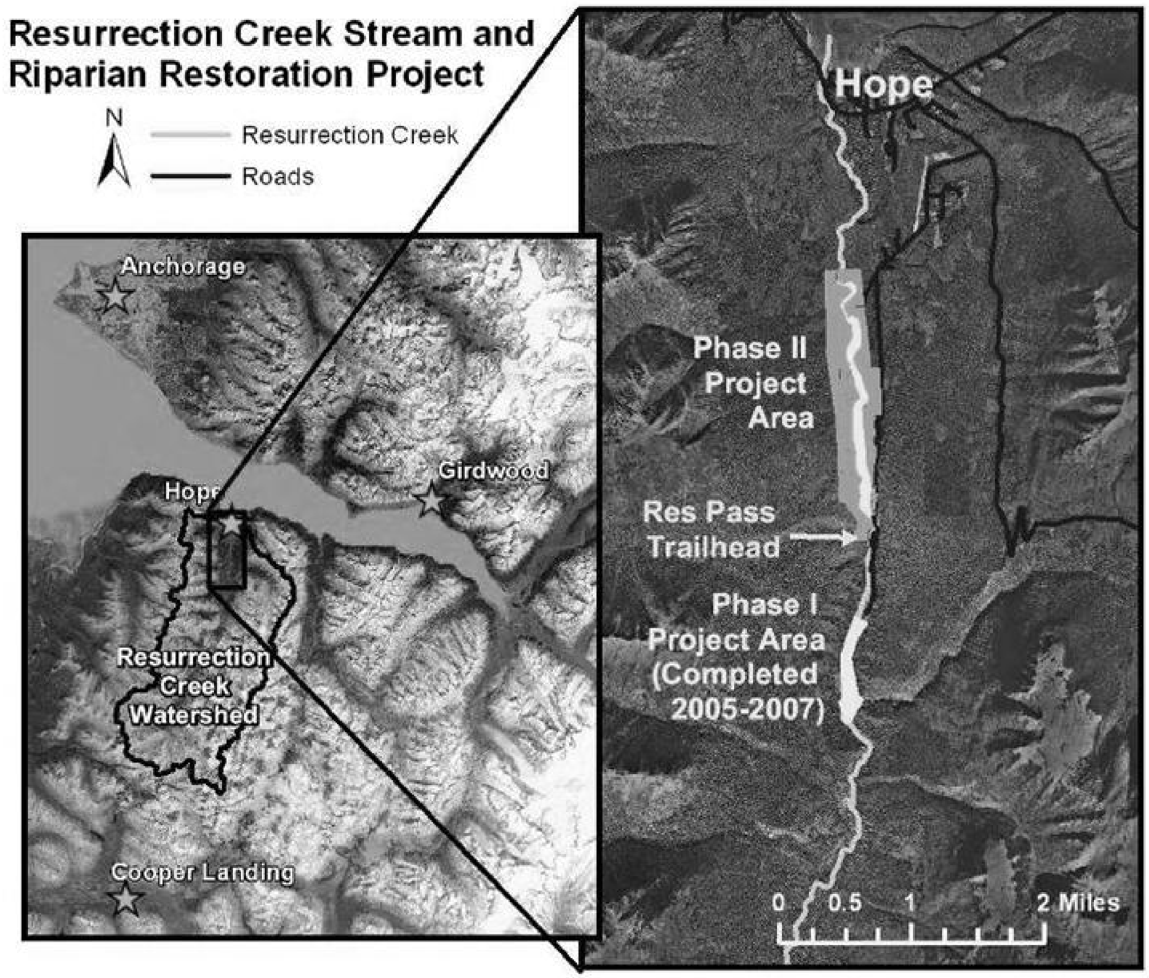

Figure 6. Location of the Phase I Restoration Project and the Phase II Project Area

Between 2005 and 2006, the Forest Service implemented Phase I project. Monitoring since 2007 indicates restoration activities are resulting in a more complex stream channel structure, connectivity with the floodplain and improvement of aquatic and riparian habitat (MacFarlane et al. 2009), and a dramatic increase in salmon spawning for all species (chum, pink, coho and Chinook) and juvenile rearing for coho and Chinook salmon and resident Dolly Varden and rainbow trout within the restored section (USDA Forest Service, Chugach National Forest 2014 unpublished data).

Framework for Phase II Restoration

The Forest Service began discussions with Hope Mining Company in 2006 to determine if restoration through Hope Mining Company claims were feasible after the implementation of the Phase I restoration project upstream had been completed. Over the next two years, the Forest Service and Hope Mining Company discussed alternatives that would provide mutual benefits such as improving fish and wildlife habitat along the creek and ensuring access for Hope Mining Company's ongoing and future mining operations. Discussions included the need to establish a restoration corridor located in the lowest value sections of the mining claims, access needs for restoration and mining, replacement of existing mining infrastructure that would be obliterated in the restoration corridor, sequencing existing mining operations within the proposed corridor area prior to restoration implementation, and future mining plans.

On December 3, 2007 the Forest Service and Hope Mining Company reached agreement on a framework for proceeding with the environmental analysis of the proposed restoration of Resurrection Creek (Phase II) and future mining operations; hereby referred to as 2007 Agreement (appendix E). The points of agreement included a designated restoration corridor, procedures for replacing existing settling ponds and mining roads that would be obliterated by restoration, the need for and use of a temporary bridge over Resurrection Creek, and identification of areas outside of the restoration corridor that would be suitable as a source for restoration materials. Hope Mining Company proposed a supplement to their 1999 mining plan of operations that would exclude all mining operations from the restoration corridor with the exception of survey line maintenance, survey monument maintenance, water extraction to replenish settling ponds, bridge and equipment crossings, and operations associated with the patenting process(if moratorium were lifted or repealed). The supplement would enable the Forest Service to be in compliance with the March 22, 2004 "Settlement Agreement and Stipulation of Dismissal" during implementation of restoration activities on mining areas approved under the 1999 plan of operations located within the restoration corridor.

Hope Mining Company submitted a plan of operations for proposed mining activities in December of 2007 that aligns with restoration activities as described in the December 3, 2007 agreement. The Forest Service is herein analyzing this proposed plan of operations concurrently with the stream restoration proposal since it has connected actions (see figure 7 and maps 2 and 3 in appendix B).

Purpose and Need for Action

The purpose of this project is twofold: 1) process Hope Mining Company's proposed plan of operations, and 2) create a more natural and complex stream channel structure, restoring floodplain connectivity with the stream, and improving aquatic and riparian habitat along 2.2 miles of Resurrection Creek.

The need to act on the proposed mining plan of operation arises from the statutory right of a mining claimant to enter upon public lands to prospect, develop and mine valuable minerals conveyed by the General Mining Act of 1872, as amended, which states: "… all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, shall be free and open to exploration…" (17 Stat. 91; 30 U.S.C. §§ 21 et seq.). The Forest Service has a regulatory obligation to approve (36 CFR 228.5) and may require modification to the terms and conditions for any proposed plan for additional requirements for surface resource protection (36 CFR 228.1).

Hope Mining Company lessees have actively mined portions of the 97 acres identified in existing plans of operations (approvals in 1986, 1991, 1999, 2010) leaving less approved acreage available for future leasing thus resulting in less operational flexibility for Hope Mining Company. Hope Mining

Company developed its 2007 plan of operations in conjunction with the proposed restoration activities during discussions with the Forest Service, and has supplemented its 2007 proposed operating plan in the intervening years due to changes in mining operations and methodologies. Coordination and collaboration with Hope Mining Company has been and will continue to be essential because restoration activities in the project area would occur adjacent to mining operations.

Restoration actions are needed because historic mining activities from the early 1900s have significantly altered the natural stream channel processes and the aquatic habitat within the project area. Mine tailings generated nearly a century ago, are essentially functioning as levees, and confining all flood flows to a single channel. Without mechanical intervention, adversely affected habitat will limit fish and wildlife biological production within the project area conceivably for centuries. Key elements of the existing condition that do not meet desired conditions are as follows:

1. Flood-prone to bank-full channel width ratios were reduced from 7:1 prior to mining to the current condition of 1:1. The confinement of the stream channel has severely impacted both fish and wildlife habitat.
2. Historic mine tailings have confined and caused a straightened stream channel, which has increased the channel slope by almost 30 percent, from 0.12 to 0.15. The increase in channel slope has homogenized the creek, creating a nearly continuous riffle that has severely impacted salmonid habitat. Compared to reference conditions, the project area per river mile contains:
    - 75 percent fewer pools with greater than three feet residual pool depth
    - 90 percent less spawning substrate
    - 95 percent fewer side channels
    - 95 percent fewer pieces of in to stream large woody material
3. The historic mine tailings occupy approximately 50 percent of the historic floodplain and are composed primarily of cobble and boulders with very little soil, which is preventing natural recovery of riparian vegetation composition and structure.
4. The elevations and orientation of historic mine tailings prevent fine sediment and organics carried by floods from being deposited on the floodplain. Detachment of the stream channel from the historic floodplain prevents the natural fertilization and soil augmentation mechanisms needed to reestablish vigorous riparian plant communities.
5. Poor habitat conditions will be persistent without regeneration of riparian vegetation. Although the majority of disturbance occurred nearly a century ago, riparian vegetation and wildlife habitat have not recovered at a natural rate of succession; small diameter trees, snags, and large wood on the ground are nearly nonexistent.

Restoration of the stream corridor would restore natural stream channel processes and aquatic habitat which can lead to increased aquatic rearing habitat, larger and more robust juvenile Chinook and coho salmon, and potentially improve populations of fish.

Existing mining infrastructure and mining areas are located in close proximity to Resurrection Creek. Creating a restoration corridor would buffer the stream channel from mining activities; limiting the risk of turbid surface and subsurface flows from settling ponds and ditches entering creek; and reducing the potential of creek encroachment on settling ponds, ditches, and roads from natural creek channel movement.

Chugach National Forest Revised Land and Resource Management Plan (2002)

The purpose and need for this project is found within the Chugach National Forest Revised Land and Resource Management Plan (Forest Plan) (USDA Forest Service, Chugach National Forest 2002a) which provides management direction for lands and resources on the Chugach National Forest.

First, processing Hope Mining Company's proposed plan of operation works towards achieving the Forest Plan goal of providing opportunities to develop minerals for commercial uses and meets the objective of providing exploration and development opportunities in areas with moderate to high locatable mineral potential (USDA Forest Service, Chugach National Forest 2002a, page 3-6).

Second, the restoration activities will restore this portion of Resurrection Creek to work toward achieving the Forest Plan goal of reestablishing proper functioning streams and riparian areas (USDA Forest Service, Chugach National Forest 2002a, page 3-2) by returning the stream system and riparian area towards the historic range of variability. Stream restoration will help achieve the Forest Plan goal of maintaining and restoring water quality (USDA Forest Service, Chugach National Forest 2002a, page 3-3) by reconnecting a more natural, complex channel to a functioning, restored flood plain reducing erosive energy of high flow events and providing a buffer between mining operations and infrastructure and the stream channel.

Part of improving the stream riparian area includes reestablishing top soil in the restoration corridor which will meet Forest Plan goals of improving soil conditions where degradation has occurred (USDA Forest Service, Chugach National Forest 2002a, page 3-2) and restoring ecological processes and flora native to the area (USDA Forest Service, Chugach National Forest 2002a, page 3-3) in shorter time periods than what would occur without intervention.

With the return of a more natural ecological system within the corridor, fish and wildlife habitat will improve which meets the Forest Plan goal of maintaining habitat to produce and sustain fish and wildlife populations (USDA Forest Service, Chugach National Forest 2002a, page 3-4).

This project falls within the Forest Restoration Management Area in the Forest Plan and restoration activities meet the management intent of restoring plant communities (USDA Forest Service, Chugach National Forest 2002a, page 4-68) and meet the guidelines for vegetation restoration priorities to occur within 100 feet either side of streams and lake riparian zones (USDA Forest Service, Chugach National Forest 2002a, page 4-71).

Legal and Regulatory Framework

General Mining Act of May 10, 1872, as amended

The General Mining Act of 1872, as amended, confers a statutory right upon a mining claimant to enter upon public lands to prospect, develop and mine valuable minerals. By location and entry, a claimant acquires certain rights against other citizens and against the United States. A mining claim creates a possessory interest in the locatable mineral estate which may be bartered, sold, mortgaged, or transferred by law in whole or in part as any other real property when the locator has complied with the applicable Federal and State laws. Federal mining claims exist throughout all of the project area, and care must be taken to respect the claimant's property by avoiding claim corner markers, excavations, and mining equipment. The claimant shall be provided reasonable access in order to carry out mining operations.

Organic Administration Act of 1897

The Organic Administration Act authorizes the Secretary of Agriculture to establish regulations to govern the occupancy and use of National Forests and to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows. It also requires the Forest Service, as the land manager, to minimize environmental impacts without materially interfering with a mining claimant's rights under the General Mining Act of May 10, 1872, as amended.

Multiple Surface Use Act of 1955

The Multiple Surface Use Act of 1955 removed common varieties of mineral materials from location under the General Mining Act of 1872, placed limitations on mining claimants' surface rights, and gave authority to the Forest Service to manage surface uses, provided, however, that any use of the surface of any such mining claim by the United States, its permittees or licensees, shall be such as not to endanger or materially interfere with prospecting, mining or processing operations or uses reasonably incident thereto. In addition, the Multiple Surface Use Act requires that mining claimants shall not use claims for any purpose other than prospecting, mining, or processing operations and uses reasonably incident thereto, and restricts mining operators to using reasonable methods of surface disturbance that are appropriate to their stage of operation.

The Multiple-Use Sustained-Yield Act (1960)

The Multiple Use-Sustained Yield Act authorizes and directs the Secretary of Agriculture to develop and administer the renewable resources of timber, range, water, recreation and wildlife on the national forests for multiple use and sustained yield of the products and services.

The National Historic Preservation Act (1966)

The National Historic Preservation Act requires federal agencies having jurisdiction over proposed federal or federally assisted projects in any state or ability to authorize or permit undertakings are required to analyze the effect of that project on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. Determinations of effects are reached in consultation with the State Historic Preservation Officer and/or the Advisory Council on Historic Preservation, as defined in 36 CFR part 800.

The National Environmental Policy Act (1970)

The National Environmental Policy Act requires federal agencies to utilize a systematic and interdisciplinary approach which will insure the use of the natural and social sciences to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.

Clean Air Act (1970, as amended 1977, 1990, 2004)

The Clean Air Act is the comprehensive federal law that regulates air emissions from stationary and mobile sources. Among other things, this law authorizes Environmental Protection Agency to establish National Ambient Air Quality Standards to protect public health and public welfare and to regulate emissions of hazardous air pollutants.

Executive Order 11593 - Protection and Enhancement of the Cultural Environment (1971)

Under this executive order, federal agencies will provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation by: 1) administering the cultural properties under their control in a spirit of stewardship and trusteeship for future generations; 2) initiating measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the people; and 3) in consultation with the Advisory Council on Historic Preservation , instituting procedures to assure that Federal plans and programs contribute to the preservation and enhancement of sites, structures and objects of historical, architectural or archaeological significance not owned by the federal government.

Clean Water Act (1972)

The Clean Water Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The Clean Water Act made it unlawful to discharge any pollutant from a point source (discrete conveyances such as pipes or man-made ditches) into navigable waters, unless a permit was obtained. The Alaska Department of Environmental Conservation has full authority to administer the wastewater discharge permitting and compliance program in Alaska. This project falls under the regulations of Section 404 of the Clean Water Act for dredge and fill within wetlands.

Endangered Species Act (1973)

The Endangered Species Act provides for the conservation of threatened and endangered plants and animals and the critical habitats in which they are found. The law requires federal agencies, in consultation with the U.S. Fish and Wildlife Service and/or the National Oceanic and Atmospheric Administration to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Environmental analysis for fish, wildlife, and vegetation for all action alternatives for this project includes an evaluation as to the existence of any threatened and endangered species within the project area and if so, effects to the animals and plants and their habitats.

The National Forest Management Act (1976)

The National Forest Management Act reorganized, expanded and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974 for the management of renewable resources on National Forest System lands. The National Forest Management Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of national forests.

Alaska National Interest Lands Conservation Act (1980)

Section 810 of the Alaska National Interest Lands Conservation Act requires that federal agencies with jurisdiction over lands in Alaska evaluate the potential effects of proposed land use activities on subsistence uses and needs. This Act defines subsistence uses as the “customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption such as food, shelter, fuel, clothing, tools; for transportation; for the making and selling of handicraft articles out of fish or wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade.”

Safe Drinking Water Act of 1974, as amended (1986, 1996)

The Safe Drinking Water Act is the main federal law that ensures the quality of Americans' drinking water. This Act was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. The Forest Service is required to protect source watersheds and Resurrection Creek has been identified as a source watershed for one business in Hope which has a public water system and has been determined by Alaska Department of Environmental Conservation to be using groundwater under the direct influence of surface water from Resurrection Creek.

Magnuson-Stevens Fishery Conservation and Management Act (1976, as amended through 1996)

The Magnuson-Stevens Act provides for the conservation and management of the nation’s fishery resources through the preparation and implementation of fishery management plans. The Magnuson-Stevens Act also mandates that National Oceanic and Atmospheric Administration National Marine Fisheries Service coordinate with and provide information to federal agencies to further the conservation and enhancement of essential fish habitat. Federal agencies must consult with National Marine Fisheries Service on any action that might adversely affect essential fish habitat. When National Marine Fisheries Service finds that a federal or state action would adversely affect essential fish habitat, it is required to provide conservation recommendations.

Executive Order 11988 - Floodplain Management (1977)

Federal agencies will provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing. and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities. As required by this Order, the effects of the proposed activities on floodplains have been evaluated and have been documented relative to the purpose of this order.

Executive Order 11990 - Protection of Wetlands (1977)

Federal agencies will provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities. As required by this Order, the effects of the proposed activities on wetlands have been evaluated and have been documented relative to the purpose of this order.

Executive Order 12962 - Recreational Fisheries (1995)

Federal agencies are required, to the extent permitted by law and where practicable, and in cooperation with States and Tribes, to improve the quantity, function, sustainable productivity, and distribution of United States aquatic resources for increased recreational fishing opportunities. As required by this Order, the effects of the proposed activities on aquatic systems and recreational fisheries have been evaluated and the effects have been documented relative to the purpose of this order.

Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994)

The Executive Order 12898 directs federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. The order is also intended to promote nondiscrimination in federal programs that affect human health and the environment, as well as provide minority and low-income communities' access to public information and public participation.

Executive Order 13112 - Invasive Species (1999)

The Executive Order 13112 for invasive species was enacted to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. Each Federal agency whose actions may affect the status of invasive species is responsible, to the extent practicable and permitted by law, identify such actions; prevent the introduction of invasive species; detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; monitor invasive species populations accurately and reliably; and provide for restoration of native species and habitat conditions in ecosystems that have been invaded. Invasive species have been found within the project area and analysis has been conducted to determine the effects of all action alternatives on the potential introduction and spread of invasive plants.

Alaska Water Quality Standards (18 AAC 70)

The Forest Service is required to maintain water quality consistent with Alaska Water Quality Standards (18 AAC 70) and the Federal Clean Water Act. Water quality refers to the physical, chemical and biological components of a given stream and its assigned beneficial use classes. In Alaska, beneficial use classes are referred to as protected water use classes. The designated protected water use classes for Resurrection Creek are growth and propagation of fish, shellfish, other aquatic life, and wildlife as well as water supply for drinking, culinary, and food processing.

Proposed Action

The proposed action has two primary components: proposed mining and stream restoration.

The Forest Service received a proposed mining plan of operations from Hope Mining Company on December 12, 2007 (and subsequent supplements) that is connected to and supports the proposed restoration activities along Resurrection Creek. The proposed plan of operations includes:

1. Placer mining on 274 acres located outside the restoration corridor boundary. Mining operations would include mechanized mining, hand mining, and dredging over an expected 20 year time period. Mechanical mining activities generally include the use of heavy equipment, such as bulldozers, excavators, front end loaders, and wash plants. Reclamation requirements would be specified in the individual plans of operations and vary depending on the specific operation, ground to be mined, and site specific conditions. Average annual area to be actively mined would be estimated at approximately 14 acres, although the actual area mined on any given year may be

higher or lower depending on economic factors; operator production capabilities; mining infrastructure capacities; and environmental constraints. Multiple mining operations can be expected during any given season.

2. Construction of new and use of existing mining infrastructure needed for mining activities such as access routes, mining camps, settling ponds and ditches; all located outside the restoration corridor boundary. New infrastructure includes roads, ditches and ponds relocated outside the restoration corridor boundary and new infrastructure needed for mining new areas that is not currently in existence. Table 5 on pages 35 to 38 indicates the amount and types of new infrastructure proposed.

A more detailed description of the proposed mining activities is in chapter 2. Processing the proposed plan of operations meets the regulatory obligation to approve or require modification to the terms and conditions for any proposed plan for additional requirements for surface resource protection (36 CFR 228.5).

The action proposed by the Forest Service to meet the purpose and need for restoration includes the following activities:

1. Construction of a meandering river channel approximately 2.7 miles in length and adjacent side channels that mimic natural conditions which would reestablish a self-sustaining riparian ecosystem within the 74 acre restoration corridor.
2. Install a temporary bridge over Resurrection Creek for access to the west side of the creek during restoration activities.
3. Mechanical manipulation and grading of up to approximately 220,000 cubic yards of mine tailings to recover floodplain width and elevations.
4. Selective removal of beetle killed spruce and cottonwood trees to be used for stream bank protection, creating and improving habitat, and floodplain stabilization.
5. Placement of nutrient-rich, weed-free soils and organics on the newly constructed floodplains and riparian areas to improve growing conditions for native plant communities.
6. Natural revegetation and planting of native plant species on constructed floodplains and riparian areas.

The final element of the proposed action is Hope Mining Company providing a supplement to the 1999 approved plans of operations to exclude most mining activities on 38 acres of mining areas located within the restoration corridor. The remaining 59 acres of existing mining areas outside the restoration corridor are not part of the 274 acres of proposed mining.

See figure 7 for a map of the components of the proposed action. A more detailed description of the proposed action is in chapter 2.

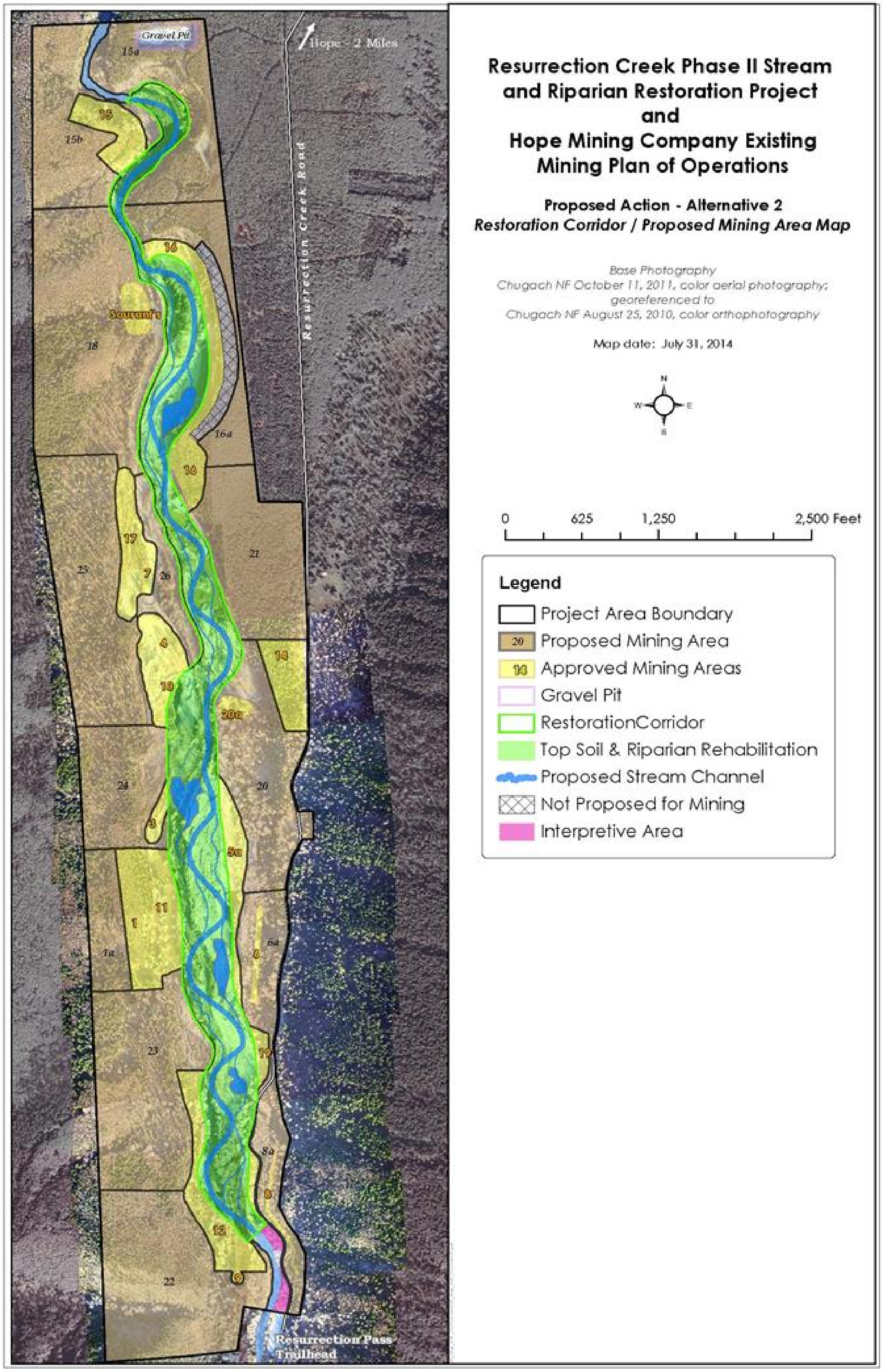

Figure 7. Proposed action – proposed mining and stream restoration

Decision Framework

The Chugach Forest Supervisor as the Deciding Official will review the proposed action, the other alternatives, the environmental consequences, and will consider the purpose and need for the project in order to make the following decisions:

1. What modifications to the proposed mining plan of operations are necessary, if any, to minimize adverse environmental impacts on National Forest surface resources;
2. Whether to undertake restoration activities on Resurrection Creek, and if so, the nature, magnitude, and extent of those activities;
3. What mitigation measures and monitoring requirements will be required, if any, for restoration and/or mining activities

Public Involvement

The Notice of Intent was published in the Federal Register on January 28, 2008. A scoping letter was sent to the public on January 4, 2008, and public comments were accepted until February 21, 2008. The Forest Service received 13 written comments. Public meetings were held on February 12, 2008 in Hope, Alaska with nine community members attending and on February 13, 2008 in Anchorage, Alaska with seven Anchorage residents attending. A public meeting was held on June 13, 2009 in Hope, Alaska with a site visit to the project area in which 18 members of the public attended. The public comments, other agencies comments, and the interdisciplinary team comments were used to develop a list of concerns (potential issues as defined by the National Environmental Policy Act).

Per request by Alaska Center for the Environment, the Forest Service met with one of their employees and with a local resident on August 14, 2009 to discuss the completed Phase I restoration work and the proposed project. The group visited the Phase I project area and then met with Hope Mining Company to look at existing mining and the proposed restoration corridor.

The Forest Service had frequent meetings with Hope Mining Company to discuss specific elements of the proposed mining activities, quarterly project status update meetings between Hope Mining Company and the Forest Service, and work sessions between Hope Mining Company and the Interdisciplinary Team leaders to update the proposed mining plan of operations as changes occurred in their proposed mining plans.

The Draft Environmental Impact Statement was released to the public on July 23, 2010 for a 45 day comment period. The Forest Service received 12 comment letters from members of the public, 2 comment letters from organizations, and 3 comment letters from other federal agencies. Hope Mining Company also submitted comments on the Draft Environmental Impact Statement. The responses to these comments are located in appendix D (pages 217 to 265).

The Forest Service met with a representative from Alaska Center for the Environment and two private landowners on the project area on August 10, 2010 to discuss proposed mining activities and potential effects to adjacent private property. That evening the Forest Service held a public meeting in Hope to discuss the project and summarize key points within the Draft Environmental Impact Statement. Four people attended the meeting.

The Forest Service held a meeting on August 11, 2010 at the Residence Inn in Anchorage to discuss the Draft Environmental Impact Statement. Five people attended the meeting.

A letter was sent out to interested members of the public and other agencies on June 15, 2012 to notify the public of a meeting on June 29, 2012 in Hope, Alaska, to update interested members of the public on the status of the project and answer any further questions. Six people attended the June 29th meeting.

Issues

Issues serve to highlight effects or unintended consequences that may occur from the proposed action, giving opportunities during the analysis to reduce adverse effects by creating alternatives and mitigation measures and compare tradeoffs.

After the scoping period ended in February of 2008, concerns from the public and Forest Service specialists were analyzed and two unresolved issues were identified: the potential of restoration and mining activities to 1) increase the turbidity of Resurrection Creek affecting water quality and 2) to harm salmon populations. These two issues were included in the Draft Environmental Impact Statement released for public comment in July 2010.

Interdisciplinary discussion and site analysis in the project area since July of 2010 resulted in modifications to the issues. The issue of potential harm to salmon populations was recognized as a result of potentially lower water quality in Resurrection Creek and is considered part of the water quality issue. Further site analysis by the soil scientist led the interdisciplinary team to add soil productivity as an issue. The issues are now described as follows:

1. **Water Quality:** Restoration implementation activities, including diversion of flow into newly constructed channel segments, logjam construction, side channel construction, bridge construction, and use of equipment crossings, have the potential to substantially increase turbidity in Resurrection Creek for short durations. Turbidity, measured in Nephelometric Turbidity Units (NTU), is a measure of the cloudiness of water, typically the result of the transport of suspended sediment. Turbidity and sediment deposition can negatively affect aquatic organisms such as salmon and other fish species.

   The magnitude (level of turbidity measured in NTUs) and the duration (hours of increased turbidity) are variables used to measure the potential impacts turbidity has on water quality and aquatic organisms within Resurrection Creek. Mitigation measures 1, 2, 5, 25, and 27 (pages 39, 39, 40, 45, 46) were developed to reduce the turbidity during activities and monitoring activity 3 (page 49) was developed to monitor NTUs while actions are being implemented.

2. **Soil productivity:** Proposed mining and restoration will result in detrimental soil disturbance of varying levels as observed from past mining practices in the area and from the implementation of the Phase I restoration project. Placer mining involves removing all vegetation and soil layers to mine the gold from the underlying gravel. Removal of soil results in detrimental effects to soil productivity. Restoration activities are designed to improve overall condition of the Resurrection Creek riparian area including soil productivity but in reconstructing the main channel and side channels, some detrimental soil disturbance is anticipated. Design criteria and mitigation measures were developed using Best Management Practices (USDA Forest Service Alaska Region 2006; USDA Forest Service 2012) for construction and maintenance of roads, the bridge, mining ditches and ponds; requiring specific reclamation measures for mining areas and infrastructure; and burying glacial clay material during mining reclamation and restoration activities (mitigation measure 15, page 43). While effects from mining activities are not required to stay within the soil disturbance standards for renewable resources governed by the National Forest Management Act of 1976, the same threshold of 15 percent detrimental soil disturbance

will be used to disclose when anticipated detrimental soil disturbance would become a significant adverse impact.

During scoping in 2008 and the comment period on the Draft Environmental Impact Statement on July23, 2010, other concerns were identified by the public including general and specific ways mining could impact scenery, heritage resources, adjacent private landowners, and the economy of the community of Hope, and also included concerns of the cost of restoration activities, impacts to the community with potential increases in sport fishing, suggestions of eliminating mining or creating buffers along private land and Resurrection Creek road, and introduction of invasive plant species. Each concern was analyzed and a determination made whether the concern was beyond the scope of the project, already addressed by existing policy, law, or regulation, incorporated into the design or mitigation measures applicable to all action alternatives, or brought forward for analysis as an unresolved issue. Only the two issues above were determined to be unresolved issues. All comments submitted during the comment period on the Draft Environmental Impact Statement are addressed in the Response to Comments section in appendix D (page 217).

Table 1. Permits, licenses, and other entitlements

Activity for which permit is required	Permit/Authorization/License	Element requiring authorization	Authority
Mining (Alternative 2 and 3)	Alaska Pollutant Discharge Elimination System Permit	Mineral operators within the State of Alaska are required to obtain an Alaska Pollutant Discharge Elimination System Permit to control quantity of turbid water entering surface/groundwater systems from mining activities. Alaska Pollutant Discharge Elimination System permits include a Stormwater Pollution Prevention Plan.	State of Alaska, Department of Environmental Conservation granted authority in 2010 under the Environmental Protection Agency Clean Water Act Section 402.
Restoration (Alternative 2) Mining (Alternative 2 and 3)	Alaska Department of Fish and Game Title 16 Fish Habitat Permit	Alaska Department of Fish and Game Division of Habitat requires prior notification and permit approval to "construct a hydraulic project, or use, divert, obstruct, pollute, or change the natural flow or bed" of a specified waterbody. Bridge or culvert installation and maintenance activities in fish-bearing waterbodies require a Fish Habitat Permit. All stream diversions, instream work, and stream crossings for mining and restoration activities will require a Title 16 permit and may be required to occur within the May 15 to July 15 construction window.	State of Alaska, Department of Fish and Game, Division of Habitat under Alaska Statute 16.05.871 (Anadromous Fish Act)
Restoration (Alternative 2) Mining (Alternative 3 only)	Section 404 Permit - Dredge and Fill Section 401 Permit - Water Quality	This project falls under the regulations of Section 404 of the Clean Water Act for dredge and fill within wetlands. Project construction would need to follow U.S. Army Corps of Engineers practices for minimizing impacts to wetland areas. This Section 404 permitting process requires approval of a Section 401 (Water Quality) permit from the Alaska Department of Conservation. Both Alaska Department of Environmental Conservation and U.S. Army Corps of Engineers will need to review proposed practices for the project to assure minimization of project impacts to water quality. Realignment of the stream channel by mining operator in alternative 3 would also require obtaining these permits.	U.S. Army Corps of Engineers, Regulatory Division; Clean Water Act, Section 404. Alaska Department of Conservation; Clean Water Act, Section 401
Mining (Alternative 2 and 3)	Spill Prevention, Containment, and Countermeasures Plan.	A Spill Prevention Control and Countermeasure Plan is required by the Alaska Department of Environmental Conservation for aggregate aboveground storage capacity of 1,320 gallons or more and minimum container size of 55 gallons of petroleum products. State of Alaska regulations require notification to Alaska Department of Environmental Conservation of fuel spills greater than 55 gallons within 5 hours, 10 to 55 gallons within 24 hours, and less than 10 gallons within 7 days.	U.S. Environmental Protection Agency; Clean Water Act, Regulation 40 CFR 112: Oil Pollution Prevention

Activity for which permit is required	Permit/Authorization/License	Element requiring authorization	Authority
Restoration (Alternative 2) Mining (Alternative 2 and 3)	Alaska Department of Natural Resources Temporary Water Use Permit	Alaska Department of Natural Resources, Division of Mining, Land, and Water oversee applications for water rights and temporary water use permits for use or diversion of the waters of the State of Alaska. Proposed diversions of Resurrection Creek for restoration purposes will need to be reviewed by the Division of Water and may require a temporary water use permit. Mining activities that utilize surface water may require a temporary water use permit.	Alaska Water Use Act (AS 46.15)
Mining (Alternative 2 and 3)	Mining License	Any mining activity in Alaska requires this mining license including activities on federal lands.	Alaska Department of Revenue (AS 43.65.010 - Mining License Tax)
Mining (Alternative 2 and 3)	Small and Medium Suction Dredge, Mechanical Placer Permit	Owners and operators of facilities engaged in the processing of placer gold by suction dredging are authorized to discharge to water of the United States in accordance with effluent limitations and monitoring requirements	Alaska Department of Environmental Conservation (AS 46.03.100)
Mining (Alternative 2 and 3)	Regional General Permit/Individual Permit (more than 10 Acres)	Regional General Permit (RGP 2006-1944-M1) for placer mining activity when surface disturbance is 10 acres or less and stream diversions less than 2000 feet in length. An individual permit is required and must be applied for separately for operations greater than 10 acres	U.S. Army Corps of Engineers (33 CFR 330)

Chapter 2.
Alternatives, Including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the Hope Mining Company Proposed Plan of Operations and the Resurrection Creek Phase II Stream and Riparian Restoration Project. A description of each alternative considered is presented and in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker. Some of the information used to compare the alternatives is based upon the design of the alternative (e.g., the length of stream to be restored and the associated amount of material to be mechanically manipulated) and the environmental, social and economic effects of implementing each alternative.

Reclamation and restoration, although similar, have different standards. Reclamation is required rehabilitation of mine sites to prevent or control onsite and off-site damage. Reclamation techniques may include, where practicable (36 CFR 228.8(g)):

1. Control of erosion and landslides;
2. Control of water runoff;
3. Isolation, removal or control of toxic materials;
4. Reshaping and revegetation of disturbed areas, where reasonably practicable; and
5. Rehabilitation of fisheries and wildlife habitat.

Mine operators are required to reclaim surface disturbed in operations in the manner authorized in their approved plan of operations. Mine reclamation on placer operations such as those at Hope Mining Company would require the following reclamation activities: filling and recontouring mined areas; redistributing stockpiled soil and overburden (when available); backfilling unneeded ponds, ditches, and other excavations; seeding overly steepened slopes to minimize soil erosion; decompacting and recontouring any decommissioned roads and camp areas, and removal of any unnecessary equipment from the site.

Restoration can include a variety of treatments intended to bring a damaged site back to functional or improved condition. The proposed restoration activities along Resurrection Creek would improve conditions in the riparian area that were impacted by historic mining practices.

Alternatives Considered in Detail

The Forest Service developed three alternatives:

- Alternative 1 - Existing Approved Mining (No Action)
- Alternative 2 - Proposed Mining and Stream Restoration (Proposed Action)
- Alternative 3 – Proposed Mining Only

A comparison of the alternatives is presented in table 5 (page 36), and maps of the alternatives are located within appendix B (page 197). Alternative 2 and 3 have three maps each; one showing basic features such as existing mining areas, proposed mining subunits (i.e. 1a, 6a, 15, 24) and restoration features (alternative 2 only), one map showing existing and proposed mining infrastructure such as mining access routes, camps, ponds, and ditches, and a third map showing the inventoried roadless area overlay.

Alternative 1 – Existing Approved Mining (No Action)

The project area is approximately 418 acres in size and is located on both sides of Resurrection Creek. Alternative 1 includes only the existing approved mining activities within the project area. Under the current approved plans of operations, mining would continue to occur on 97 acres in areas 1 – 12, 14 – 17, 19, 20a, and on Sourant's Area and as described in chapter 1 under Existing Mining section (pages 6 to 9) and as shown on map 1 in appendix B (page 199). No new areas would be analyzed for mining nor would any restoration activities occur along the creek. Mining would continue to occur in the existing approved areas until the extraction of gold was completed, estimated at 10 to 15 years. All mining areas and infrastructure (roads, ditches/ponds, and camps) would be reclaimed. Table 2 contains the estimated acres of the various elements of alternative 1.

Table 2. Alternative 1 - acres

Components of Project Area – Alternative 1	Estimated Acres
Existing mining areas approved in plans of operations (2010, 1999, 1986)	97
Resurrection Creek plus 20 foot buffer	28
Gravel Pit	2
Mining Interpretive Area	2
Resurrection Creek Road	2
Remaining project area[a]	384
Total Project Area	**418**

a - The remaining project area is not specifically approved for gold extraction but does include approved mining infrastructure such as mining access roads, settling ponds, and camps

The Forest Service has a regulatory obligation to approve or require modifications to any proposed plan of operations (36 CFR 228.5). Because of this, alternative 1 cannot be selected because taking no action would not fulfill this regulatory requirement. However, a no-action alternative is required by the National Environmental Policy Act and is used in this analysis for the purpose of comparing other alternatives with the existing conditions.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Table 3 contains the estimated acres of the various elements of alternative 2.

Table 3. Alternative 2 - acres

Features within Project Area – Alternative 2	Estimated Acres
Existing mining areas approved in plans of operations (2010, 1999, 1986)	59
Proposed Mining Areas	274
Restoration Corridor – Resurrection Creek	23
Restoration Corridor - Riparian areas	51
Resurrection Creek (not within restoration corridor)	2
Steep Slopes not proposed for mining	4
Gravel Pit	2
Mining Interpretive Area	1
Resurrection Creek Road	2
Total Project Area	**418**

Proposed Mining Operations

Hope Mining Company's proposed plan of operations would occur on new mining areas totaling 274 acres outside the restoration corridor boundary. The restoration corridor would eliminate 38 acres of existing mining areas approved under previous plans of operations. Mining on the 59 acres of remaining existing mining areas outside the corridor would continue as approved in previous plans of operations. The mining activities proposed on the 274 acres would be conducted with the same type of equipment and process as what is described for existing mining operations in chapter 1(pages 6 to 9). Hope Mining Company supplemented their 2007 proposed plan of operations by eliminating mining on the steep slope in area 16a after discussion with Forest Service Soil Scientist regarding risk of erosion on the slope if mining were to occur. The 4 acres of steep slope have been eliminated and are not part of the 274 acres. Refer to map 2 and map 3 in appendix B (pages 201 and 203) for locations of mining areas, mining infrastructure, and the restoration corridor.

The following is a summary of the proposed operations.

Types of Mining

Placer mining methods includes use of heavy equipment, hand equipment, and dredges up to and including 15 inch nozzle intake size to sort and extract gold from placer gravels.

Durable Mining Infrastructure

Durable mining infrastructure refers ponds, ditches, roads, and camps that Hope Mining Company requires for periods of longer than one mining season. Forest Service would replace in-kind any existing durable mining infrastructure removed as a result of the restoration. New mining infrastructure would be integrated into approved plan of operations and Hope Mining Company would maintain all mining infrastructure and would be responsible for reclamation of infrastructure when no longer necessary for mining operations.

Camps: The term "camp" broadly refers to operational areas that include camping areas, fuel storage, equipment maintenance; repair; and storage. The proposed action includes the use of the ten existing approved camp areas (approximately 3.6 acres total area); camp 5 would be increased to 2 acres and would expand in scope of the facilities to support operations on west side of Resurrection Creek. The approval of camp areas and support systems would be commensurate and incidental to the size and type of mining operations approved. Fuel is proposed to be stored at camp 5 and would continue to be stored at camp 2. Camps are not necessarily assigned to specific mining areas or operations and some camps may support more than one operation.

Settling pond/ditch systems: New drainage ditches and/or ponds would be established where necessary to allow opportunity for settling of suspended sediment from process water. All new and existing settling ponds and ditches require maintenance for them to remain efficient. Hope Mining Company could also set up pipe and withdraw water from Resurrection Creek in various places within the restoration corridor if needed to fill ponds located outside the corridor.

All ditches and ponds on the west side of Resurrection Creek would be connected (on the bench and valley floor) from area 22 downstream to area 15b. All ponds and ditches on the east side of Resurrection Creek would be connected from area 8 downstream to area 16. Locations of new ponds and ditches are conceptual and would be field-fit in the most logical location for the topography and for proper gradient and located away from the new stream channel (minimum of 20 feet but farther away where feasible) to minimize the potential for flooding during high water flow events.

Roads/Trails/Bridges to access mining areas: Proposed mining operations in areas 15b, 16a, 18, 20, 21, 22, 23, 24, and 25 would require access routes be established for truck and equipment access. The remaining proposed mining areas have existing road and trail access but these routes may require brushing and leveling of the travel surfaces. Hope Mining Company would construct approximately 2.5 miles of new mining roads which will generally be 16 feet wide with a 4 foot vegetative clearing limit on either side of the road. The surfacing substrate would be with material (cobble/gravel) located within the project area. The Forest Service and the mining operator would layout proposed roads and use design criteria that fit the specific location with appropriate erosion control measures (as specified in mitigation measures 1, 4, 5, and 6; pages 39 to 40). Routes into mining areas would be used for access by mining equipment (dozers, excavators, and loaders), pickup trucks, and ATVs. The two main roads from Resurrection Creek Road are gated to prevent unauthorized motorized access. The new road leading into area 21 from Resurrection Road and a new road leading from camp 1 into area 20 would be gated to prevent unauthorized motorized access. Hope Mining Company would maintain routes by brushing, surface grading, filling potholes, culvert maintenance, and resurfacing roads with onsite materials. Hope Mining Company would also utilize two existing equipment fords, seek authorization from Alaska Department of Fish and Game for two new equipment fords across Resurrection Creek as shown on the map 3 for alternative 2 (appendix B, page 203), and reestablish two hand trams.

Per the 2007 Agreement, the Forest Service has agreed that Hope Mining Company could use the temporary bridge that would be constructed for restoration (location shown in appendix B, map 3, page 203). Use of the temporary bridge would be described and authorized in any new plans of operations and would need to be authorized for each operation. The Forest Service would conduct routine bridge inspections to evaluate bridge safety. When the temporary bridge is no longer needed for restoration and associated monitoring, the Forest Service would remove the bridge.

Transient Mining Infrastructure and Equipment

Hope Mining Company and lessees would utilize infrastructure and equipment for each mining season that is temporary in nature. Examples are camping trailers, storage units for seasonal operations, and equipment on short-term leases.

Mining Reclamation

After mining operations have been completed, mined areas, and any ponds and ditches not needed for future operations, would be recontoured to match slopes and features of the surrounding landscape. Stable slopes and soil surfaces would be attained, and stockpiled organic material (including vegetation, topsoil, and overburden) would be spread over the recontoured areas to hold moisture and promote natural plant growth. All temporary roads and other compacted surfaces that are not needed in foreseeable future operations would be reclaimed by breaking up the surface layers and covered with stockpiled top soil and organic material.

Approval of Mining Operations

The requirements for submission of a proposed plan of operations are located at 36 CFR 228.4 and include the following: 1) The name and legal mailing address of the operators (and claimants if they are not the operators) and their lessees, assigns, or designees; 2) A map or sketch showing information sufficient to locate the proposed area of operations on the ground, existing and/or proposed roads or access routes to be used in connection with the operations, and the approximate location and size of areas where surface resources will be disturbed; and 3) Information sufficient to describe or identify the type of operations proposed and how they would be conducted, the type and standard of existing and proposed roads or access routes, the means of transportation used or to be used, the period during which the proposed activity will take place, and measures to be taken to meet the requirements for environmental protection.

Hope Mining Company is the mining claimant and acts as a leasing company to makes their claims available to operators. Since the name and mailing address and other operational details were not available at the time of submission of the 2007 plan of operations, the 2007 plan of operations is considered an initial plan of operations as described in 36 CFR 228.4 (d):

> The plan of operations shall cover the requirements set forth in paragraph (c) of this section, as foreseen for the entire operation for the full estimated period of activity: *Provided however,* That if the development of a plan for an entire operation is not possible at the time of preparation of a plan, the operator shall file an initial plan setting forth his proposed operation to the degree reasonably foreseeable at that time, and shall thereafter file a supplemental plan or plans whenever it is proposed to undertake any significant disturbance not covered by the initial plan.

At such time when a lessee is identified, Hope Mining Company would submit a supplemental plan of operations describing the details of the operation. A reclamation bond (36 CFR 228.13 Bonds; Forest Service Manual 2800, Chapter 2810; Section 2817.24 - Bonds) would be required for that operation and the operation would be approved once the bond is posted.

Stream Restoration

Alternative 2 includes full restoration of the Resurrection Creek stream channel, floodplain, and riparian areas within an approximate 200 to 500-foot wide restoration corridor for about a two mile distance. The 74-acre restoration corridor is described in the 2007 Agreement between the Forest Service and Hope Mining Company (see appendix E, page 265) which outlines the framework for proposed restoration.

Restoration would include the following components:

1. About 220,000 cubic yards of historic placer mine tailings in the floodplain would be recontoured by pushing with a bulldozer to recover the original floodplain elevations and width. These actions would increase average flood prone width to bankfull width ratios from 1:1 to 4:1 and would allow flood flows access to an additional 51 acres of the historic floodplain and off-channel fish habitat within the corridor boundary.
2. Floodplains and riparian areas would be revegetated, either through planting native species or by natural revegetation, to create a mosaic of vegetation of different species and ages. Topsoil and fine alluvial sediments washed away during historic placer mining operations would be replaced on more than 80 percent of the restored floodplain surface (51 acres) to enhance revegetation efforts. Replaced soil would come from proposed mining areas within the project area that have adequate soil depths to ensure enough soil would remain onsite for mining reclamation. Coarse woody material would be increased from 16 to about 120 pieces per acre in the floodplains. Riparian tree species would be planted, seeded, and/or natural recruitment encouraged, to represent reference conditions in an undisturbed section of creek located approximately 2 miles upstream. The long-term riparian restoration objective for species composition at and beyond 20 years after implementation is 30 to 50 percent spruce, 40 to 60 percent cottonwood, and 10 to 30 percent birch/hemlock/aspen with a grass (*calamagrostis*) understory. During the 20 year period after implementation, some thinning of existing overstocked riparian sapling spruce and cottonwood stands adjacent to Resurrection Creek may occur. Long-term restoration objectives

(100 to 150 years) include a riparian stand structure typical of a low gradient flood plain riparian area as follows:

- 10 to 20 percent large trees (greater than 16 inches diameter)
- 15 to 25 percent small trees (9 to 16 inches in diameter)
- 20 to 30 percent poles (5 to 9 inches in diameter)
- 30 to 40 percent seedling/saplings (0 to 5 inches diameter)
- about 40 snags per acre

3. Tracked excavators and dozers would be used to construct a new meandering pool and riffle channel to mimic a naturally formed channel. Segments of the existing channel would be used as part of the final channel wherever feasible. New channel segments would be constructed to final grade "in the dry" before diverting water into the new segment. After new channel segments are constructed, "push-up" dams composed of native boulders and substrate would be constructed to divert water quickly into the newly constructed channels.
4. By creating a new meandering channel, stream channel length would be increased by approximately 2,640 feet (from 2.2 miles to a total stream channel length of 2.7 miles), channel gradient would be decreased from about 1.5 percent to 1.3 percent, and channel sinuosity would be increased from about 1.1 to 1.3. Due to active mining outside of the restoration corridor about half of the historic floodplain would be available for restoration and therefore channel sinuosity cannot be increased to the full extent (1.7) found at the reference section of creek. The following aquatic habitat features would be constructed in the restored channels:
    - Residual pools (increase from less than 3 pools per mile to 7 pools per mile)
    - Rock structures
    - Rock and log structures (increase large instream woody debris from 12 pieces per river mile to about 340 pieces per river mile)
    - Constructed logjams
    - Spawning areas consisting of shallow gravel beds (increase aerial extent from 600 to 3,600 square yards)
    - Approximately 8,000 feet of new side channels and ponds would be constructed in floodplains and in some of the abandoned sections of the existing channel constructed for off-channel habitat. Side channels, wetland complexes, and off-channel rearing ponds would be designed and constructed to maintain between 5 percent and 20 percent of the perennial flow.

The majority (greater than 90 percent) of the channel and floodplain construction would occur before flowing water is diverted into the new channel.

Source of Materials for Restoration Activities

Restoration materials such as boulders for construction of the restored channel, trees for logjam construction, and soil for spreading on restored floodplain areas to enhance revegetation efforts would be obtained from the restoration corridor and adjacent mining areas within the project area, as described in the 2007 Agreement between the Forest Service and Hope Mining Company. Up to 2,000 trees, with and without rootwads, would be used for bank and floodplain stabilization on the new stream channel and floodplain and would be harvested from the project area.

Restoration Access

A temporary bridge over Resurrection Creek could be constructed near the middle of the project area for use during implementation of restoration activities (location shown in appendix B, map 3, page 203). The bridge would be designed to pass fuel and repair trucks and would be rated to pass 40,000 pounds. The Forest Service anticipates a need to keep the bridge in place for five years after implementation of the restoration for monitoring and for any necessary adjustments to the new stream channel. Aquatic habitat such as side channels, rearing ponds and log jams could be maintained for five years or more after restoration. The Forest Service would remove the bridge once its use is no longer deemed necessary for restoration activities. All heavy equipment would utilize fords rather than the bridge.

Hope Mining Company currently has access routes developed on both sides of Resurrection Creek for accessing different parts of their claims. The Forest Service would use the established mining access routes during construction in the restoration corridor. Use of these routes would be coordinated between the restoration contractor(s), Hope Mining Company, and the Forest Service.

Mining roads and ATV trails currently located within the restoration corridor boundary would be relocated outside of the corridor by the Forest Service, as outlined in the 2007 Agreement. Replacement roads and trails would be of equal quality so that Hope Mining Company can maintain motorized access to their claims. About 1.8 miles of replacement road construction would be required to relocate existing sections of mining roads out of the restoration corridor.

Existing Mining Settling Ponds within the Restoration Corridor

Hope Mining Company has a number of settling ponds adjacent to Resurrection Creek. Settling ponds within the restoration corridor would be decommissioned during restoration. The Forest Service would construct replacement ponds outside the restoration corridor on a water volume for water volume basis, as outlined in the 2007 agreement. Some of the abandoned segments of the Resurrection Creek channel outside of the restoration corridor would be utilized for replacement settling ponds. Ponds would be constructed to an elevation equivalent to a 10 year flood event to minimize the potential that future flood water could capture the ponds.

Future Mining Activities within the Restoration Corridor

As outlined in the 2007 Agreement, Hope Mining Company would submit a supplement to the 1999 mining plan of operations that would exclude most mining activities (mechanical placer operations, dredging, and hand mining) from the restoration corridor prior to the Forest Service implementing restoration. Hope Mining Company would still need access to the restoration corridor for the following activities:

- maintain survey lines and monuments
- extract water to replenish settling ponds
- utilize bridge, equipment crossings, and trams
- conduct operations associated with the patenting process

Implementing restoration in the corridor cannot preclude future mining within the restored area. Any future mining activities proposed within the corridor, other than those approved in the supplemented 1999 plan of operations, would require submittal of a new plan of operations, and submittal of a bond which would provide financial assurance that reclamation activities would occur to bring the corridor area back to the restored conditions. The restoration corridor is located in areas determined by Hope

Mining Company to be of lowest value for gold recovery (i.e. areas that have been previously mined several times) to minimize the potential for mining in the future.

Timing of Project Implementation

Mining and subsequent reclamation would occur sequentially over a period of approximately 20 years, and would generally be conducted between March and October of each year. Hope Mining Company would work with the lessee-operators and the Forest Service to define specific operations (area to be mined, equipment, reclamation bonding) as required by Forest Service surface management regulations. The Forest Service minerals administrator would conduct compliance inspections of surface uses pertaining to mining activities.

Operational flexibility is an important business consideration for Hope Mining Company to allow for the dynamic needs of various operators' equipment capabilities, experience, rate of material processing, and camp quarters. Annually or as requested if more frequent, new, detailed plans of operations would be approved and existing plans supplemented within the scope of the alternative, mitigations, and monitoring as decided by the Deciding Official and within the context of the environmental effects disclosed herein.

Implementation of restoration would be completed as funding becomes available. Instream channel work would be conducted between May 15 and July 15 of each construction season to minimize the impacts on fish populations; revegetation of the restoration corridor would occur in June of the year following completion of construction in each area. Restoration work would occur first in sections of the corridor that Hope Mining Company has already completed mining operations and would continue in other sections of the restoration corridor as existing approved mining operations are completed.

Alternative 3 – Proposed Mining Only

The Forest Service has a regulatory obligation to approve (36 CFR 228.5) and may require modifications to the terms and conditions of the proposed plan of operations submitted by Hope Mining Company (36 CFR 228.1); irrespective of whether any restoration of Resurrection Creek occurs. Alternative 3 was developed to analyze the effects of proposed mining operations without restoration. Table 4 contains the estimated acres of the various features of alternative 3.

Table 4. Alternative 3 - acres

Features within Project Area – Alternative 3	Estimated Acres
Existing mining areas approved in plans of operations (2010, 1999, 1986) minus new creek alignment (3 acres) through area 16	94
Proposed Mining Areas	285
Resurrection Creek plus 20 foot buffer	28
Steep Slopes/riparian areas not proposed for mining	5
Gravel Pit	2
Mining Interpretive Area	2
Resurrection Creek Road	2
Total Project Area	418

Proposed Mining Operations

Under alternative 3, mining and reclamation would occur over 285 acres (in addition to the 94 acres of existing approved mining), over a period of approximately 20 years, and would be conducted between March and October of each year. Similar to alternative 2, operational flexibility is an important business consideration for Hope Mining Company to allow for the dynamic needs of various operators equipment capabilities, experience, rate of material processing, and camp quarters. Annually or as requested if more frequent, new, detailed plans of operations would be approved and existing plans supplemented within the scope of the alternative, mitigations, and monitoring as decided by the Responsible Official and within the context of the environmental effects disclosed herein.

A restoration corridor would not be established under this alternative; mining operations would continue to occur adjacent to Resurrection Creek in approved areas except in a 20-foot wide vegetative buffer which would be required to be maintained along the edge of the creek as has been required in previous approved plans of operations.

Alternative 3 has a greater number of acres for proposed mining than alternative 2 because there is no restoration corridor along the creek. The Forest Service developed this alternative with Hope Mining Company input to disclose how their proposed mining operations would change with no restoration corridor.

Types of Mining

Placer mining methods includes use of heavy equipment, hand equipment, and dredges up to and including 15 inch nozzle intake size to sort and extract gold from placer gravels.

Durable Mining Infrastructure and Equipment

Mining Camps: The camps would be the same as those described in alternative 2.

Ponds/Ditches: The existing drainage ditches and settling ponds located on either side of Resurrection Creek would mostly be kept intact. Some existing ponds would need to be expanded for greater capacity for settling of suspended sediment from process waters. New settling ponds and ditches would be needed for some of the proposed mining areas. All new and existing settling ponds and ditches would be maintained over time until no longer needed for mining operations.

Ditches and ponds on the west side of Resurrection Creek would be connected in one system from area 22 downstream to area 15b. All ponds and ditches on the east side of Resurrection Creek would be part of one system from area 8 downstream to area 16. Locations of new ponds and ditches are conceptual and would be field-fit in the most logical location for the topography and for proper drainage. Properly located and maintained drainage systems would prevent turbid, sediment laden water from entering Resurrection Creek.

Roads/Trails to Access Mining Areas: The existing access routes would continue to be used in this alternative. Some proposed mining operations in areas 15b, 16, 18, 20, 21, 22, 23, and 25 would require new access routes to be established for truck and equipment passage. The remaining areas have preexisting roads and trail access which may require brushing and leveling of the travel surface. A new road alignment would also be required in two areas where the creek channel would be relocated in area 15a and area 16 at the northern end of the project area. Approximately 2.6 miles of new mining roads would be constructed.

Access routes to mining areas would be used by mining equipment (dozers, excavators, and loaders), pickup trucks, and ATVs. There are two roads leading into mining areas from the Resurrection Creek Road. These two roads currently are gated to prevent unauthorized vehicular access, and would be maintained under this alternative. The new road leading into area 21 from Resurrection Road and a new road leading from camp 1 into area 20 would also be gated to prevent unauthorized motorized access. Hope Mining Company would maintain routes by keeping brush cleared, grading of surface, filling potholes, resurfacing roads with gravels from a gravel pit on claims on the north end of project area or from existing mining operations in approved areas, and keeping culverts clear and functional.

Hope Mining Company would build a bridge at the northern end of area 5 (approved under their 1999 plan of operations) and would utilize it to access proposed mining activities on the west side of Resurrection Creek as well as existing approved mining operations (location shown in appendix B, map 5, page 207). Hope Mining Company would also utilize two existing equipment fords and hand trams (at the same locations as the fords described under alternative 2) and seek authorization from Alaska Department of Fish and Game for two new equipment fords across Resurrection Creek as shown on the map 5 for alternative 3 (appendix B, page 207). The Forest Service may continue to authorize Hope Mining Company to utilize the Resurrection Pass National Recreation Trail pedestrian bridge across Resurrection Creek for ATV access until the bridge near area 5 is built.

Transient Mining Infrastructure and Equipment

Hope Mining Company operators would utilize some infrastructure and equipment for each mining season that is temporary in nature. Examples are camping trailers, storage units for seasonal operations, and equipment on short-term leases.

Mining Reclamation

After mining operations have been completed, mined areas, and any ponds and ditches not needed for future operations, would be recontoured to match slopes and features of the surrounding landscape. Stable slopes and soil surfaces would be attained, and stockpiled organic material (including vegetation, topsoil, and overburden) would be spread over the recontoured areas to hold moisture and promote natural plant growth. All temporary roads and other compacted surfaces that are not needed in foreseeable future operations would be reclaimed by breaking up the surface layers and covering with stockpiled top soil and organic material.

Approval of Mining Operations

Approval of mining operations would be the same as described in alternative 2.

Resurrection Creek Realignment

Hope Mining Company would move Resurrection Creek from its current alignment in two locations for an estimated total of 2,740 feet. About 1,890-foot long section of the stream channel between mining areas 16 and 18 would be moved east approximately 300 feet. The relocated channel would reenter the existing creek channel before the steeper walled valley near the Sourant’s Camp location in area 18. The abandoned stream channel would then be mined and utilized for part of the settling pond/ditch system on the west side of the valley. An estimated 850-foot long section of the stream channel between mining areas 15a and 15b would be moved 200 to 300 feet to the east. The relocated section of stream would enter the existing alignment where the channel narrows into a canyon to the north. The abandoned creek channel would be mined as part of area 15b.

Timing of Project Implementation

The proposed mining and subsequent reclamation would occur over a period of approximately 20 years. Most mining activities would be conducted between March and October of each year.

Comparison of Alternatives

Table 5 summarizes the elements of each alternative.

Table 5. Comparison of the alternatives [a]

Component	Alternative 1 Existing Mining (No Action)	Alternative 2 Proposed Mining and Restoration (Proposed Action)	Alternative 3 Proposed Mining Only
Total area of proposed new mining areas within 418 acre project area	0 acres	274 acres (outside of the restoration corridor)	285 acres
Total area of existing approved mining areas	97 acres	59 acres outside of restoration corridor Limited mining activities to occur within restoration corridor: ▪ maintain survey lines and monuments ▪ extract water to replenish settling ponds ▪ utilize bridge, equipment crossings, and trams ▪ conduct operations associated with the patenting process	94 acres (Same as alternative 1 minus 3 acres of new creek alignment through area 16)
Mining Roads	7.3 miles existing roads	4.8 miles existing roads (2.5 miles of existing roads decommissioned within restoration corridor) Forest Service constructs 1.8 miles of replacement roads Hope Mining Company constructs 2.5 miles of new mining roads 9.1 total miles of roads	7.3 miles of existing road Hope Mining Company constructs 2.6 miles of new mining roads 9.9 miles total roads
Bridge (same location for all alternatives)	Hope Mining Company approved to construct bridge – no bridge on site at present	Forest Service constructs and maintains temporary bridge for up to 5 years beyond end of restoration implementation; Hope Mining Company would utilize bridge for mining operations	Hope Mining Company approved to construct and maintain a bridge
Stream Crossings	2 equipment fords and 2 hand trams for mining access	4 equipment fords for restoration and mining access 2 hand trams for mining access	4 equipment fords and 2 hand trams for mining access

Component	Alternative 1 Existing Mining (No Action)	Alternative 2 Proposed Mining and Restoration (Proposed Action)	Alternative 3 Proposed Mining Only
Mining Infrastructure	10 camps covering 3.3 acres 27 settling ponds 1.8 miles of settling ponds and ditches	10 camps covering approx. 5 acres (Camp 5 expanded) Approximately 59 settling ponds 4.0 miles of settling ponds and ditches No infrastructure within restoration corridor except stream crossing features	10 camps covering 5 acres (Camp 5 expanded) Approximately 62 settling ponds 3.9 miles of settling ponds and ditches
Stream Restoration and /or Channel length within Project Area	2.2 miles of Resurrection Creek channel length – no restoration activities 19 acres of existing main channel wetlands	Reconstruct Resurrection Creek to a length of 2.7miles within a 74-acre restoration corridor Create 51 acres of new floodplain within the restoration corridor Harvest approximately 2,000 trees to construct log jams and floodplain structures 26 acres of main channel and off channel wetlands	No restoration activities 2.2 miles of Resurrection Creek channel length 2,740 feet of channel relocated for mining purposes 21 acres of main channel wetlands
Aquatic Habitat Enhancement	None	Increase sinuosity from 1.1 to 1.3 and stream length from 2.2 to 2.7 miles Decrease average channel slope from 1.5% to 1.3% Increase pool frequency from 3 pools per mile to approximately 7 Increasing the average flood prone width to average bankfull width ratio from 1:1 to 4:1 Construct approximately 8,000 feet of side channels and 4.3 acres of off-channel rearing ponds Increase large instream woody debris from 12 pieces per river mile to about 340 pieces per river mile	None

a - All numbers in this table are approximate (miles, acres, etc.)

Mitigation Measures

The Council on Environmental Quality defines mitigation as avoiding, minimizing, rectifying, and reducing or eliminating impacts and compensating for unavoidable impacts (40 CFR 1508.20). Table 6 presents the mitigation measures for alternatives 2 and 3. These mitigation and control measures generally address the significant issues identified during scoping. The mitigation measures will be incorporated in the approved plans of operations and/or restoration contract requirements. Mitigation measures for Alternative 1 - Existing Approved Mining (No Action) are not listed as these have been described in previous environmental analysis documents for existing approved mining operations.

Table 6. Mitigation measures

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
X	X	Water Quality Soil Productivity	1	All disturbed areas within the restoration corridor and mining areas (alternatives 2 and 3) such as stockpiled soil areas, reclaimed areas, roads, trails, camps and fueling areas must have an appropriate mechanism in place (i.e. berms, silt fences, ditching, mulch, seeding) as specified in restoration contract and plan of operations to limit erosion of soil from disturbed sites. Forest Service will work with restoration contractor or Hope Mining Company to determine best location for these features (field fit) and appropriate mechanism. Where feasible, mulch would include organic material from the site.	This mitigation measure will limit the amount of soil eroded into surface water and into Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum NTUs (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (chapter 3, page 101). This measure will also help limit detrimental soil disturbance by minimizing soil erosion (chapter 3, page 74) (USDA Forest Service, Alaska Region, 2006. Soil and Water Conservation Handbook, Best Management Practices 14.8, 17.5); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Min-4).
	X	Water Quality	2	Restoration-related stream crossings will be held to a minimum (no more than twice per day per piece of equipment where practicable) and will be limited to the designated equipment fords. Crossings will occur from May 15 to July 15 per Alaska Department of Fish and Game specifications.	Crossing Resurrection Creek with equipment causes small turbidity pulses and through limiting these crossings during restoration work, overall effects on water quality can be reduced and stay within State water quality standards (no more than 25 NTUs above background turbidity) (chapter 3, page 101).
X	X	Soil Productivity	3	After contouring disturbed areas, a minimum of 4 inches (where practicable) of top soil should be distributed across the disturbed area. If top soil is not available, use 3/4 inch minus size material or smaller, where available from mining operations, to cover disturbed areas and cover with a layer of organic debris (slash) that was stockpiled prior to mining. If excess soil is available, keep stockpiled for use in areas that are deficient in soil. Do not spread glacial clay on surface.	Covering the surface with top soil, or at a minimum, 3/4 inch minus size material or smaller and organic debris will reduce detrimental soil disturbance (chapter 3, page 74) (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.8, 17.5).

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
X		Water Quality Soil Productivity	4	Erosion control design features for mining access route construction and maintenance will be determined during field review and discussion between Forest Service and Hope Mining Company prior to the start of any new road construction. Design features may include one or more Best Management Practices identified in the Forest Service Soil and Water Conservation Handbook.	The purpose of this measure is for roads to maintain integrity through effective drainage of water and reduce adverse effects to water quality by limiting the amount of soil eroded into surface water and into Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum turbidity (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (chapter 3, page 101).. This measure will also help limit detrimental soil disturbance by minimizing soil erosion (chapter 3, page 74 ; (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.5, 14.7, 14.8, 14.9, 14.20); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-2, Road-3)
X	X	Water Quality	5	Design and install culverts, bridges or hardened fords across Resurrection Creek, constructed side channels, and mining ditch crossings capable of enduring expected traffic such as dozers, excavators, loaders, fuel trucks, highway vehicles, and ATVs and capable of passing expected 100 year peak flow discharges including 24 hour maximum precipitation events. Inlets and outlets of culverts and bridge abutments should be hardened with large rock to prevent scour and erosion. Fords should be armored with large rock to prevent streambed and stream bank deformity. Rock size will be determined by vehicle and equipment size and frequency of use; small cobble could be used for ATV crossings whereas large cobble and boulders should be used in areas where articulated rock trucks, excavators and bulldozers are crossing frequently.	This mitigation measure will help limit the amount of turbidity produced with daily equipment crossings and ensuring that crossings and bridge construction and placement will withstand higher flow events with limited erosion. With this measure in place, State water quality standards are expected to be met for maximum turbidity (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (chapter 3, page 101) (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.7); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-7).
X		Soil Productivity	6	As specified in mining operating plan, all temporary roads and other compacted surfaces that are not needed in foreseeable future operations will be reclaimed. Where applicable, reclaim by breaking up the surface layers and covering with top soil and organic material	This measure reclaims areas of soil compaction and will allow the old road bed to recover more quickly (chapter 3, page 74 (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.24; USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-6).

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
	X	Water Quality	7	The use of mechanized equipment within the ordinary high-water mark during restoration will only occur if work cannot be performed in the dry above the ordinary high water mark and will be accomplished under the supervision of the Forest Service construction engineer or representative. Approved equipment working within the ordinary high water will have biodegradable hydraulic fluid conversions. All equipment will be cleaned and free of leaks before use on the restoration implementation.	This measure will reduce the potential of petroleum products entering the surface and ground water in the project area. This mitigation measure follows the State of Alaska Department of Environmental Conservation's "Recommendations for General Construction Projects near a Public Water System" to limit the potential sources of contamination within 1,000 feet from the surface water source component of a known public water system using groundwater under the direct influence of surface water (chapter 3, page 101).
X	X	Water Quality	8	The minimum separation distance between the mean annual high water level of a lake, river, stream, spring, or slough, or the mean high water level of coastal waters, and a lift station, holding tank, septic tank, soil absorption system, seepage pit, pit privy, or other wastewater collection, treatment, or disposal system is 100 feet, measured horizontally.	This measure will reduce the potential of human waste or other waste water entering the surface water system from all camps utilized by restoration contractors and Hope Mining Company personnel and lessees. The measure meets the direction in the State of Alaska Department of Environmental Conservation's "Recommendations for General Construction Projects near a Public Water System" to limit the potential for contamination to enter the water source used by a known public water system (chapter 3, page 101) (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 12.15, 12.16); (USDA Forest Service 2012, National Best Management Practices for Water Quality Management on National Forest System Lands - Road-10);
	X	Air Quality	9	Dust abatement through the use of water trucks is required during dry conditions when making multiple daily trips on Resurrection Creek Road using large equipment or large trucks related to restoration. The Forest Service Contracting Officers Representative will determine the frequency of watering/dust abatement.	Reduction in air quality occurred during Phase I restoration project implementation due to dust suspended in air from frequent restoration truck traffic on Resurrection Creek road. Local residents brought up this concern for this project as well. Implementing this measure will keep air quality impacts to a minimum during restoration implementation (chapter 3, page 67).

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
X	X	Damage to archeological cultural resources	10	Although unlikely to be encountered, any and all human remains shall at all times be treated with dignity and respect. Should human remains or any prehistoric objects be encountered, work will be stopped at once in the locality to prevent further disturbance and the Forest Service will be immediately notified. If undocumented historic artifacts such as those commonly used in hydraulic placer mining are discovered during restoration or mining activities, these items may be set aside and restoration or mining activities may continue, and the Forest Service will be notified of these discoveries. The historic dragline located in area 16 is listed as a contributing feature of the Hope Mining Company Historic Mining District and would be moved by the Forest Service to a location within the boundaries of the Historic Mining District where it won't be damaged by restoration or mining activities.	Hydraulic mining operations occurred in all of the restoration corridor and parts of the proposed mining areas so it is likely that some artifacts from the hydraulic mining era may be discovered during implementation of these projects. Hope Mining Company has followed this measure during past mining operations and notified the Forest archeologist when mining related artifacts have been uncovered. This measure keeps the Forest Service informed of mining artifacts discovered without unduly delaying mining operations or restoration contract implementation. This measure also provides for the protection of the historic dragline (chapter 3, page 129).
X	X	Damage/ destruction of Historic Mining Features	11	Destruction of historic tailings from mining operations and restoration activities within the Hope Mining Company Historic District is unavoidable. The adverse effects were resolved through the execution of a Memorandum of Agreement with the State Historic Preservation Office on December 17, 2009 concerning the development of interpretive displays in the interpretive area near Resurrection Pass National Recreation Trailhead. These displays will be developed in partnership with Hope Mining Company and will describe the formation of the historic tailings and other features of the hydraulic mining period on Resurrection Creek.	The destruction of historic tailings piles is an adverse effect on the historic resources within the project area. Per discussion and agreement with SHPO's office through the Memorandum of Agreement, the Forest Service will continue to work with Hope Mining Company to develop interpretive panels to educate visitors about the hydraulic mining era and the resulting tailings (chapter 3, page 129).
X	X	Public safety	12	Hope Mining Company and Restoration contractors shall install signing indicating potential hazards from heavy equipment when operating near Resurrection Pass National Recreation Trail and trail bridge. Forest Service will work with Hope Mining Company and restoration contractors to provide wording and placement of signs.	The visitors using Resurrection Pass National Recreation Trail will be walking directly adjacent to mining operations in area 22 (alternative 2 and 3) and potentially restoration operations on the south end of the restoration corridor (alternative 2 only). Cautionary signing at the start of the trail will help visitors be aware heavy equipment operations they may encounter along the first section of trail (chapter 3, page 156).
X	X	Public Safety	13	No equipment associated with the restoration project or mining operations will be staged at the Resurrection Pass North Trailhead or the dispersed camping area upstream from the trailhead.	This measure will ensure that heavy equipment operations are kept separate from recreation visitor use areas reducing public safety hazards (chapter 3, page 156).

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
	X	Establishment or spread of noxious and invasive plant species	14	All materials brought from off-site to be used for mulching, erosion control, rehabilitation, soil establishment, fill, or other uses should be free of invasive plant species, seeds or plant roots identified in the Forest Service publication*, Selected Invasive Plants of Alaska* (USDA Forest Service, Alaska Region 2009).	This measure will reduce the potential of invasive plant species becoming introduced within the restoration corridor and within proposed mining areas (chapter 3, page 116; (USDA Forest Service, Chugach National Forest 2002a, page 3-25)
X	X	Soil Productivity	15	If material such as buried clay layers or materials determined by the Forest Service to be unsuitable for surface placement are discovered during ground disturbing activities (restoration channel construction, mining of gravel layers, constructing and maintaining settling ponds, reclamation of mined areas, etc.), these materials will either be placed at least 12 inches below the layer of suitable material that plants will grow in (top soil, finer tailings, etc.), where practicable, or will be buried deeper in a constructed landform such as a terrace or pond bottom during reclamation and/or restoration.	This measure will reduce detrimental soil disturbance by keeping materials which limit productive soil development and vegetation reestablishment well below the surface layer and not interfere with how water drains through top layers of soil and gravel substrates (chapter 3, page 74).
X	X	Soil Productivity	16	Equipment and vehicles will avoid newly placed topsoil on restored and reclaimed areas to avoid compaction.	This measure will reduce detrimental soil disturbance by avoiding compaction and will give plants the best possible growing medium (chapter 3, page 74).
	X	Soil Productivity	17	Mulch should be applied to newly exposed ground in the restoration corridor as early as possible after completion of the finished placement and/or exposure. Organic mulch such as weed seed free straw, fine wood chips, or moderately ground plant material is recommended. Where feasible, mulch would include use of organic material from the project area. A single layer of mulch is expected to be sufficient (approximately 1 ton per acre). Tackifier may be recommended by the Forest Service depending on expected conditions during and after application.	This measure will reduce detrimental soil disturbance by reducing soil erosion (chapter 3, page 74).
X	X	Control of noxious and invasive plant species	18	Heavy equipment mobilized into the project area for mining or restoration will be spray washed including wheel wells, undercarriages, tires, tracks before it is brought into the project area so that it is free of all foreign plant materials and soil.	This measure will reduce the potential of new invasive plant species becoming established within the restoration corridor and within previously undisturbed proposed mining areas (chapter 3, page 116 ; (USDA Forest Service, Chugach National Forest 2002a, page 3-25).

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
X	X	Reestablishment of native plant species after disturbance	19	Reclamation of proposed mining areas: Allow areas to naturally revegetate where top soil availability, site conditions, and seed source are favorable towards reestablishing vegetation to meet reclamation objectives. Restoration corridor: Allow areas to naturally revegetate where top soil availability, site conditions, and seed source are favorable towards reestablishing vegetation to meet restoration objectives. When natural revegetation conditions are not favorable, plant native plant species (seed source, cuttings) from the local environment of the project area to maintain local genetic composition.	This measure will help reestablish native plant species to the disturbed site meeting Forest Plan guidelines (chapter 3, page 115); (USDA Forest Service, Chugach National Forest 2002a, page 3-25); (USDA Forest Service, Alaska Region, 2006. Soil and Water Conservation Handbook, Best Management Practices 12.6).
X	X	Habituation and food conditioning of bears	20	Food, fuel, and garbage will be stored in a manner that bears cannot obtain them (bear proof containers, vehicles, and container storage units) to reduce potential for negative bear/human interactions or bear habituation. All garbage must be removed regularly from the site and properly disposed.	This measure will avoid habituation and food conditioning of bears (chapter 3, page 124); (USDA Forest Service, Chugach National Forest 2002a, page 3-28); (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 12.16).
	X	Wildlife habitat	21	Where feasible, retain clumps of largest old cottonwoods and spruce in the existing flood plain in area 19, the interpretive area, northwest of bridge crossing location, and area 16 to maintain diverse wildlife habitat components that would otherwise take many decades to become reestablished.	This measure keeps some components of wildlife habitat intact during restoration activities and is a seed source for areas that have been disturbed (chapter 3, page 123).
	X	Damage to mining improvements and equipment	22	Protect all known mining operations improvements (such as claim corner monuments, camps, equipment, and survey monuments, etc.), during restoration activities by clearly identifying items and areas on the ground, documenting locations with global positioning system (GPS) equipment, and adding specifications to the restoration contracts that documented items will be replaced by contractor at their expense if disturbed.	This measure meets the intent described in the 2007 agreement with Hope Mining Company describing protection of Hope Mining Company property for the duration of the restoration implementation (appendix E, page 265).
X	X	Mining operations and restoration coordination and safety	23	Agreement on gate closures, operation procedures, camps and protection of Hope Mining Company private property and equipment will be reached between Hope Mining Company and the Forest Service before mobilization of restoration equipment. Mining operations and restoration implementation activities will be separated by the greatest distance possible. Regular safety meetings between Hope Mining Company, mine operators, the Forest Service, and restoration contractors will occur to maintain communication and safety.	This measure meets the intent described in the 2007 agreement with Hope Mining Company describing protection of Hope Mining Company property, coordination of operations, and reducing hazards to Hope Mining Company lessees and restoration contractors for the duration of the restoration implementation (appendix E, page 265)

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
	X	Mining operations and restoration coordination	24	Hope Mining Company shall retain reasonable access to all approved mining operations during restoration activities. If an existing mining access route is taken out during restoration, a new route will be constructed to the same standard outside restoration corridor prior to decommissioning. Settling ponds within restoration corridor will be replaced on a volume for volume basis outside the corridor by the Forest Service. Any mining ditch segments within the restoration corridor will be replaced by the Forest Service to maintain a comparable ditch system outside the restoration corridor.	This measure meets the intent described in the 2007 agreement with Hope Mining Company describing keeping reasonable access, ponds, and ditches for mining operations during restoration implementation (appendix E, page 265).
X	X	Water Quality	25	Forest Service will work with Hope Mining Company for design and placement of settling ponds and ditch networks to contain all sediment laden process water as well as runoff, seepage and expected precipitation. Settling ponds will be designed for 10 year, 24 hour storm event. The 10 year discharge elevations will be designated by the Forest Service and/or Department of Environmental Conservation and are on average four feet above the bed of the stream channel. New or reconstructed settling ponds and storage areas will be located in places where they will not be washed out by reasonably predictable seasonal fluctuations in water level and freeze/thaw action. When cleaning out settling ponds, place materials from ponds in locations where liquids ("sludge") from materials cannot flow overland into Resurrection Creek and its tributaries.	This mitigation measure will help reduce adverse effects to water quality by limiting the amount of turbid water entering Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum NTUs (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (chapter 3, page 101). (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.3, 14.5).

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
x	x	Water Quality	26	Fuel delivery and transfer processes will be conducted in a manner that minimizes the potential for spills and contamination of soil and water and will follow all state and federal regulations. Fuel and oil storage facilities will be located, designed, constructed, and maintained in manner that minimizes the potential for contamination of surface and subsurface soil and water resources. All active fuel storage containers will be in good repair and will be repaired or removed if leaking is detected. An impermeable liner will be placed under and around fuel storage and filling areas that is large enough to capture 110 percent of container capacity as required by Alaska Department of Environmental Conservation. Heavy equipment used in mining and restoration work will be kept in good repair to prevent spills and persistent leaking of petroleum fluids.	This measure will reduce the potential of petroleum products entering the surface and ground water in the project area. This measure is also required by Alaska Department of Environmental Conservation in the Aboveground Storage Tank Operator Handbook (Alaska Department of Environmental Conservation 2003, section 1, page 8). This mitigation measure follows the State of Alaska Department of Environmental Conservation's "Recommendations for General Construction Projects near a Public Water System" to limit the potential sources of contamination within 1,000 feet from the surface water source component of a known public water system using groundwater under the direct influence of surface water (chapter 3, page 101). (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 12.8).
X		Water Quality Soil Productivity	27	When determined necessary by the Forest Service, mining operator will recontour steep slopes to their natural slope angle, not to exceed 35 degrees (about 72 percent) and revegetate steep areas (greater than 35 percent) with seed mixture, mulch, and/or organic materials and use other erosion control measures as specified by Forest Service in plan of operations. When bedrock is exposed during mining, mining operator will recontour tailings around and covering bedrock where reasonably practicable.	This mitigation measure will help reduce adverse effects to water quality by limiting the amount of soil eroded into surface water and draining into Resurrection Creek. With this measure in place, State water quality standards are expected to be met for maximum NTUs (no more than 25 NTUs) found in Resurrection Creek above normal background turbidity (chapter 3, page 101). This measure will also minimize risk of landslides by keeping the slope angle to below 72 percent or 35 degrees, (chapter 3, page 76).; (USDA Forest Service, Alaska Region 2006. Soil and Water Conservation Handbook, Best Management Practices 14.7).
X	X	Water Quality	28	If any concentrations of mercury are encountered or observed during mining or restoration operations, work within the immediate area will cease and the Forest Service will immediately be notified. The Forest Service will coordinate with Hope Mining Company or the restoration contractor to safely implement established protocols for mercury cleanup (US Environmental Protection Agency 2009).	Hope Mining Company does not use mercury in any of its operations. Historic placer mining operations used elemental mercury for separating fine gold particles from the collected concentrate captured in the sluice box and some mercury may have been lost or spilled. Mercury can pose a threat to the survival of fish eggs and younger life phases, as they are more susceptible to mercury toxicity. This measure is to ensure immediate cleanup of any concentrations of mercury if found during mining or restoration activities (chapter 3, page 101).

Mining Activities (Alt 2 and 3)	Restoration Activities (Alt 2 Only)	Issues and/or Effects Addressed	Mit. Num.	Mitigation and Control Measures	Need for Mitigation Measure
X (Alt 3 only)		Floodplain functionality	29	To increase flood-prone area and improve aquatic habitat conditions, Hope Mining Company will be allowed to mine historic tailings piles that are within the 20-foot stream buffer as approved by the Forest Service in the mining plan of operations approval. Hope Mining Company would be allowed to remove the tailings piles down to the natural bank elevation in existing mining area 12, 19, and any mining areas with the same conditions, and as designated and staked on the ground by the Forest Service. No equipment would be allowed to work in Resurrection Creek without Hope Mining Company acquiring appropriate permits (ADF&G Title 16 Habitat permit, Army Corps of Engineers Section 401, 404 permits)	By allowing Hope Mining Company to mine historic tailings piles within the required 20 foot buffer, some flood plain functionality will be restored by redistribution of tailings and lowering the height of the remaining banks to a more natural bank elevation. This mitigation measure would help meet part of the purpose and need in alternative 3 where full restoration would not be done (chapter 3, page 110).

Monitoring

Monitoring activities provide a means to assess the effectiveness of achieving project objectives as well as effectiveness of implementing mitigation measures to reduce effects of the project activities. Table 7 displays the specific monitoring actions for each alternative.

Table 7. Monitoring

Monitoring Activity	Elements	Description
Monitoring Activity 1		**Effectiveness of location, design, and maintenance of pond and ditch systems in keeping turbid processed water separate from surface waters during mining operations**
	When Applicable?	Mining Activities (alternatives 2 and 3) and Restoration Activities (alternative 2)
	Method of Measurement	Visually inspect and document if turbid water is present in Resurrection Creek or other surface water tributaries. If turbid water is present take turbidity measurement above and below the pond and ditch systems to ascertain if there is any increase in turbidity levels.
	Frequency of Measurement	Varies, Weekly when turbid water is present in pond/ditch system
	Threshold of Variability	Visual evidence or water quality data collected that demonstrate nonpoint source pollution control measures are not installed correctly, maintained, or operationally effective. Nonconformance with Alaska Pollutant Discharge Elimination System Permit. Turbidity measurements may not exceed 25 nephelometric turbidity units (NTU) above natural conditions when the natural turbidity is 50 NTU or less, and may not have more than 10% increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 25 NTU.
	Action To Be Taken	Contact mining operator and Alaska Department of Environmental Conservation to determine actions necessary to bring mining activities into compliance
	Authority	Plan of Operations, 36 CFR 228.8(b)
	Responsible Party to Conduct Monitoring	Minerals Administrator, Hydrologist

Monitoring Activity	Elements	Description
Monitoring Activity 2		**Effectiveness of mitigation measures in preventing soil from eroding off of disturbed sites and reclaimed areas into surface waters during mining operations**
	When Applicable?	Mining Activities (alternatives 2 and 3)
	Method of Measurement	Visually inspect areas near mining activities and reclaimed areas to verify if soil erosion is occurring and is causing, or potential to cause, turbid water to enter surface waters
	Frequency of Measurement	Varies, Weekly at a minimum when mining activities are occurring
	Threshold of Variability	Fine soil particles eroding from coarser gravels, rills, water flowing down road surface rather than channeled off surface. Visual evidence or water quality data that demonstrate erosion control measures are not installed correctly, maintained, or operationally effective. Non-compliance with Alaska Pollutant Discharge Elimination System Permit and pertinent Best Management Practices
	Action To Be Taken	Contact mining operator and Alaska Department of Environmental Conservation to determine actions necessary to bring mining activities into compliance. Require additional or improved erosion control measures be implemented to prevent erosion
	Authority	Plan of Operations, 36 CFR 228.8(b)
	Responsible Party to Conduct Monitoring	Minerals Administrator, Hydrologist, Soils Scientist
Monitoring Activity 3		**Effectiveness of design criteria in reducing turbidity during channel relocation and construction**
	When Applicable?	Mining Activities (alternatives 2 and 3) and Restoration Activities (alternative 2)
	Method of Measurement	Measuring amount of suspended solids in Resurrection Creek with hand held turbidimeter.
	Frequency of Measurement	During each diversion, measure turbidity with upstream from diversion, at diversion, and 1/2 mile downstream from diversion at 1/2 hour intervals
	Threshold of Variability	Non-conformances with Army Corps of Engineer permit, Title 16 permit, Clean Water Act, State of Alaska water quality standards.
	Action To Be Taken	Require additional or improved turbidity control measures, such as pumps or alternative methods of diversion (partial diversion or staged diversion).
	Authority	Restoration contract, Plan of Operations, 36 CFR 228.8(b).
	Responsible Party to Conduct Monitoring	Forest Service Hydrologist, Contracting Officer's Representative, Minerals Administrator

Monitoring Activity	Elements	Description
Monitoring Activity 4		**Effectiveness of mitigation measures and designs of reclaimed areas, roads, ponds, ditches, and other mining infrastructure in shedding storm water in compliance with Stormwater Pollution Prevention Plan.**
	When Applicable?	Mining Activities (alternatives 2 and 3)
	Method of Measurement	Visually inspect mining areas and infrastructure for signs of turbid water entering surface waters
	Frequency of Measurement	Varies; during or as soon after a five year flood event as feasible (defined at 1400 cubic feet per second or about 50% higher than bankfull at 800-900 cubic feet per second)
	Threshold of Variability	Non-compliance with Alaska Pollutant Discharge Elimination System permit and measures specified in Stormwater Pollution Prevention Plan
	Action To Be Taken	Contact mining operator and Alaska Department of Environmental Conservation to determine actions necessary to bring mining activities into compliance.
	Authority	Plan of Operations, 36 CFR 228.8(b)
	Responsible Party to Conduct Monitoring	Minerals Administrator, Hydrologist
Monitoring Activity 5		**Effectiveness of construction designs in maintaining stable, self- maintaining stream channels, banks, and streambed features**
	When Applicable?	Restoration Activities (alternative 2)
	Method of Measurement	Monitor new stream channels and side channels/ponds for vertical and horizontal stability by measuring topographic stream channel features of permanent cross-sections, longitudinal profiles, and taking linear measurements of stream banks and area of streambed.
	Frequency of Measurement	Monitored yearly for the first five years after spring peak flow runoff. After first five years the project area should be monitored once every five years or after a significant peak flow flood as determined by the Forest Hydrologist, and if notable streambed degradation or aggradation has occurred and/or stream channel avulsions occur.
	Threshold of Variability	Plus or minus 15% change in vertical or horizontal change is expected to occur as a result of natural channel dynamics. Percentage of linear stream banks measured as unstable (actively eroding, no vegetation) greater than 20% of total stream bank and/or exposed clay layers in streambed producing turbidity.
	Action To Be Taken	Forest Service specialists determine necessary actions for improving restored channel stability
	Authority	Forest Service Record of decision,
	Responsible Party to Conduct Monitoring	Forest Service Hydrologist, Fisheries Biologist

Monitoring Activity	Elements	Description
Monitoring Activity 6		**Adult salmon utilization and population trends during spawning season in Resurrection Creek within project area boundary**
	When Applicable?	Mining Activities (alternatives 2 and 3) and Restoration Activities (alternative 2)
	Method of Measurement	Conduct pink, chum, Chinook, coho and sockeye redd surveys and adult presence snorkel and bank surveys within the project area to develop spawner ratios by species compared to those recorded in Phase I restoration area and area before the implementation of restoration and proposed mining activities
	Frequency of Measurement	Monitor salmon spawning at least every two weeks during peak spawning periods for five years after stream channel changes are implemented
	Threshold of Variability	Significant changes in salmon spawning or presence (+/- 25%) in Resurrection Creek within project area.
	Action To Be Taken	Assessment of aquatic habitat and salmon spawning substrate would be conducted within the project area
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Fisheries Biologist
Monitoring Activity 7		**Effectiveness of stream channel reconstruction in providing aquatic habitat within the project area**
	When Applicable?	Restoration Activities (alternative 2)
	Method of Measurement	Quantify linear length of habitat features (pools, riffles and glides) and photograph aquatic habitat (e.g., spawning glides, riffles, pools), substrate size, vegetation, and woody debris in Resurrection Creek.
	Frequency of Measurement	One year prior to implementation, within two years after implementation, and after the first 25 year sized flood event that occurs following implementation
	Threshold of Variability	Greater than + or - 15% change in percent glide, pool & riffle area (+/- 15% is expected to occur as a result of natural channel dynamics)
	Action To Be Taken	Forest Service specialists determine necessary actions for improving restoration channel stability if vertical or horizontal differences of greater than +/-15% occur.
	Authority	Forest Service Record of decision
	Responsible Party to Conduct Monitoring	Forest Service Hydrologist, Fisheries Biologist

Monitoring Activity	Elements	Description
Monitoring Activity 8		**Slope Reclamation on slopes originating at 35% grade**
	When Applicable?	Mining Activities (alternatives 2 and 3)
	Method of Measurement	Conduct inspection of resulting slope grade and materials used for reclamation
	Frequency of Measurement	At start of, during, and immediately after reclamation, then 1 year, 3 years and 5 years after reclamation is complete.
	Threshold of Variability	Visible signs of any landslides, surface erosion, slumping, and lack of successful revegetation
	Action To Be Taken	Contact mining operator to determine necessary steps to remove non- conforming materials, reduce slope, and/or require further erosion control measures be implemented
	Authority	Plan of Operations, 36 CFR 228.8(g)
	Responsible Party to Conduct Monitoring	Forest Service Minerals Administrator and Soils Scientist
Monitoring Activity 9		**Effectiveness of reclamation measures to re-establish vegetation on mined areas.**
	When Applicable?	Mining Activities (alternatives 2 and 3)
	Method of Measurement	Vegetation surveys measuring % plant cover/species composition and soil depth after reclamation.
	Frequency of Measurement	Vegetation surveys yearly for 5 years; measure soil depth on vegetation survey plots first year only
	Threshold of Variability	At year five, verify 60% of plots in reclaimed area have at least 50% of vegetation (herbaceous and woody) re-established.
	Action To Be Taken	Determine feasible actions Forest Service can take to increase vegetation reestablishment: increase soil coverage/depth, reseeding or planting. Use information collected to develop better reclamation techniques for future plans of operation approvals.
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Minerals Administrator, Ecologist

Monitoring Activity	Elements	Description
Monitoring Activity 10		**Effectiveness of restoration activities within the restoration corridor to meet objectives for reestablishing vegetation.**
	When Applicable?	Restoration Activities (alternative 2)
	Method of Measurement	Conduct standard vegetation stocking survey plots within restoration corridor specifically for tree species. Include photo points with stocking survey plots.
	Frequency of Measurement	Conduct baseline vegetation survey prior to restoration, then at year 3, 5 and 10 after completion of revegetation activities following stream restoration.
	Threshold of Variability	At 5 years after revegetation, stocking surveys should meet R10 stocking certification (300 tree species stems per acre, minimum 4 inch height). After 10 years, 60% of stocking survey plots should show tree species composition that meets restoration objectives.
	Action To Be Taken	If stand not fully stocked at 5 years or species composition not developing toward species composition objectives, consider options of additional topsoil distribution, planting, and seeding spruce/birch. Re-do stocking surveys at year 5 after actions taken.
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Ecologist and Forester
Monitoring Activity 11		**Introduction of or increased populations of non-native plant species within project area.**
	When Applicable?	Mining Activities (alternatives 2 and 3) and Restoration Activities (alternative 2)
	Method of Measurement	Conduct invasive plant surveys within project area (disturbed areas, reclaimed areas, and restoration corridor).
	Frequency of Measurement	1st and 3rd year after first complete growing season following completion of restoration activities and reclamation of mining areas.
	Threshold of Variability	New non-native populations have been introduced or existing populations are expanding.
	Action To Be Taken	Design and implement feasible control measures for specific species. Conduct vegetation survey 3rd year after additional control work is completed.
	Authority	Forest Service Record of Decision
	Responsible Party to Conduct Monitoring	Forest Service Ecologist

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the National Environmental Policy Act to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action and Draft Environmental Impact Statement provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives are outside the scope of the need to restore Resurrection Creek and the associated riparian, aquatic and wildlife habitats, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. The Forest Service does not have the authority to choose an alternative that eliminates mining on some or all of the lands on federal mining claims near private property. Mining activities on federal mining claims are governed by the General Mining Act of 1872, as amended, and the 1955 Multiple-Use Mining Act (69 Stat. 367; 30 U.S.C. 601, 603, 611-615). By location and entry, a claimant acquires certain rights against other citizens and against the United States. Alternatives were considered but dismissed from detailed consideration for reasons summarized below.

Full Channel Restoration of the Entire Valley Floor

Full channel and floodplain restoration of the 2-mile section within the project area could be conducted within the constraints of the entire valley floor, both inside and outside of the proposed restoration corridor. A meandering channel could be constructed with numerous side channels and abundant floodplains beyond the 200 to 500 foot wide corridor. However, this restoration alternative would not be in accordance with framework for restoration developed between Hope Mining Company and the Forest Service. Approximately 60 percent of the restoration would occur outside of the agreed upon corridor. This alternative was dropped from further consideration based on Hope Mining Company's existing mining operations and proposed mining activities in areas outside the corridor. Hope Mining Company has agreed to exclude mining only within the specified restoration corridor therefore any restoration work done outside the corridor would be subject to mining activities at any time.

Restoration Excluding State Selected Lands

This alternative was proposed to conduct channel, floodplain, and riparian restoration of only the southern 1-mile section of the project area, within the restoration corridor. The northern 1-mile section of the project area that is selected by the State of Alaska under provision in the Alaska Statehood Act, (figure 2, page 3) would not be restored. Restoration components, including stream channel creation, floodplain development, side channel creation, habitat development, and revegetation would be the same as the restoration activities described in the Proposed Action, but only on the southern 1 mile of the project area.

This alternative was conceptualized to address concerns associated with the potential development of the State selected lands in the lower half of the project reach. Although conveyance of these lands to the State in the future could result in development of these lands, the resources would still be protected by the State of Alaska's laws and statutes regarding development in floodplains and along salmon bearing waters. Title to the lands encumbered by federal mining claims would not convey to the state if the claimant was determined to possess valid and existing rights. Because possible conveyance of these lands is not likely to affect the proposed restoration due to the protections afforded by state regulations, this alternative is not needed and was dropped from further consideration. Correspondence with the State of Alaska relative to the project and State selected lands is ongoing at this time.

Limited Restoration

This alternative considered potential negative effects to water quality and salmon populations that would occur during stream restoration activities such as stream channel construction and relocation. Only the upper mile of the project area would be restored, using a minimalist approach to channel and floodplain restoration. The main channel would not be moved, but the historic tailings piles along the banks would be pulled back from the stream channel to create a channel width of floodplain along one or both sides of the channel. These actions would result in minimal turbidity plumes compared to the magnitude expected with full channel reconstruction and water diversions. Minimalist restoration activities would not occur in the lower mile of the project area because that portion of the existing channel is not within the restoration corridor agreed upon by the Forest Service and Hope Mining Company and would be subject to existing and future mining operations. This alternative is not in accordance with the 2007 agreement with Hope Mining Company and does not fully meet purpose and need for restoring fish habitat and channel to more natural and functional condition. The alternative was not analyzed in further detail.

Restoration and Mining Outside of Inventoried Roadless Areas

Approximately one third of the project area (147 acres) lies within the Resurrection Inventoried Roadless Area (figure 20, page 146). An alternative that would only conduct restoration and respond to the proposed mining plan of operations outside of the boundary of the Resurrection Inventoried Roadless Area was considered but eliminated from detailed study for the following reasons:

1. Hope Mining Company is proposing to construct 0.73 miles of temporary mining roads in the Resurrection Inventoried Roadless Area for access to conduct proposed mining activities on 125 acres of mining claims located within the Resurrection Inventoried Roadless Area. The General Mining Act of May 10, 1872, as amended, confers a statutory right upon a mining claimant to enter upon public lands to prospect, develop and mine valuable minerals. By location and entry, in compliance with the 1872 Mining Law, a claimant acquires certain rights against other citizens and against the United States. This alternative would violate Hope Mining Company’s right of reasonable access to the mineral estate within the Resurrection Inventoried Roadless Area.
2. Approximately 4 acres of the 74 acre restoration corridor is located within the Resurrection Inventoried Roadless Area. To be effective, the channel in this portion of Resurrection Creek must be moved or modified. No options exist for alternate locations of the stream channel outside of the inventoried roadless area because over half of the available valley width at this location is within the inventoried roadless area boundary.
3. It would be necessary for the Forest Service to construct 0.12 miles of temporary mining access routes in the Resurrection Inventoried Roadless Area to replace mining access routes that would be obliterated by the restoration corridor. The road replacement location is confined by the stream corridor and adjacent steep slopes; no option exists to locate this road outside of the inventoried roadless area.
4. Up to 2,000 trees would need to be harvested for materials for construction of log jams within the new channel sections. Approximately 750 spruce and hemlock trees of the 2,000 are located within mining areas in the Resurrection Inventoried Roadless Area. While most of these 750 trees could be taken from other proposed mining areas located outside the Resurrection Inventoried Roadless Area, it would require hauling the trees a greater distance and crossing the stream with them. The result would be increased project cost and potentially increased turbidity in Resurrection Creek.

Comparison of Effects by Alternative

This section provides a summary of the effects of implementation of each alternative. Information is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Air Quality and Climate Change

Air Resources

Alternatives 1, 2, and 3 would all produce localized sources of air pollutants. Any pollutants would generally dissipate quickly, resulting in minimal direct, indirect, or cumulative effects on air resources.

Climate Change

Alternatives 1, 2 and 3 would produce comparable amounts of greenhouse gas emissions as a result of fossil fuel combustion. It is not possible to quantify the effects of greenhouse gas emissions from this project on climate change in a global context. Under **alternative 2**, restoration would reestablish vegetation within the restoration corridor more quickly, increasing the capacity to sequester carbon dioxide in the long term. Under **alternatives 1 and 3**, slower riparian regeneration and poorer riparian conditions would result in lower capacity to sequester carbon dioxide

Effect of Climate Change on Project

Although the effects of climate change on the project cannot currently be quantified, the lack of channel complexity, deep pools, large woody debris and floodplain connectivity in the current incised stream channel for **alternatives 1 and 3** may be less resilient to the effects of warming air temperatures on stream temperatures and have less ability of the system to dissipate the energy of flood flows than **alternative 2**. The restored channel in **alternative 2** would be constructed to be semi-dynamic, allowing the channel to change under natural processes as it constantly adjusts to changing environmental conditions

Soils

Proposed mining operations and stream restoration activities will have a detrimental effect on soil productivity in all alternatives. Forest Service Alaska Region detrimental soil conditions monitoring guidelines (USDA Forest Service, Alaska Region 2006, Soil Quality Monitoring, FSM 2554.05-13) are used as the analysis tool to compare effects of the alternatives and determine significant effects on soil productivity. Greater than a 15 percent loss of soil productivity for any activity area is considered significant.

Total Disturbance from Proposed Restoration and Mining Activities

Detrimental soil disturbance levels are estimated as follows for the alternatives:

***Alternative 1**:*

- Before reclamation of mining infrastructure: 105 acres (25 percent of project area)
- After reclamation: 80 acres (19 percent of project area)

Alternative 2:

- After restoration and before reclamation of mining infrastructure: 78 acres (22 percent of the 348 acre restoration and mining activity area)
- After restoration and reclamation: 58 acres (17 percent of the 348 acre restoration and mining activity area)

Alternative 3:

- Before reclamation of mining infrastructure: 75 acres (26 percent of the 285 acre mining activity area)
- After reclamation: 58 acres (20 percent of the 285 acre mining activity project area)

Effects of Mining on Steep Slopes

The proposed mining operations in **alternative 2 and 3** include mining activities on and near steeper slopes. Mining on one slope in area 16a has been eliminated by Hope Mining Company in both alternatives to reduce risk of landslides from occurring. Mitigation measures have been developed for erosion control and effective reclamation practices for mining on other slopes. **Alternative 2 and 3** have a proposed mining road in area 20 north of camp 1 that has a high risk of soils becoming easily saturated and overloading the adjoining steep slope which may result in a landslide or slump potentially affecting Resurrection Creek Road and the flood plain below.

Noise

Decibel Level of Noise from Mining Activities

Under **alternatives 1, 2 and 3**, noise generated by mining equipment is expected to produce decibel levels in the range of 65 to 80 dB at active mining sites. The persistent equipment noise may disturb private landowners living within 1 mile of mining operations March through October for an estimated 15 year period for **alternative 1** and for a 20 year period for **alternatives 2 and 3**. When mechanical mining is occurring at the extreme southern end of the project area in areas 9 and 12 for **alternative 1** and areas 8, 9, 12, and 22 for **alternatives 2 and 3**, recreation visitors at the Resurrection Pass National Recreation Trailhead may be able to detect equipment noise. The majority of proposed mining within the middle and northern sections of the project area is not expected to affect recreational users at the trailhead due to the masking effect of the high level of ambient noise of Resurrection Creek.

Decibel Level of Noise from Restoration Activities

Under **alternative 2**, noise levels generated by restoration equipment would be identical in nature and level to that of mining operations and are expected to mask each other rather than detectably add or increase noise levels. The majority of restoration activities would occur from May 15 through July 15 for an estimated four year time period. Noise from restoration equipment would be audible and likely impacting to private landowners near the north end of the project area in the short term. Recreation users at the Resurrection Pass North Trailhead could be directly affected by restoration noise only when machines are operating at the extreme southern end of the project area. The majority of restoration in the southern section of the project area is estimated to be completed in two to four weeks with impacts to any recreational users at the trailhead limited to that time period. The remainder of restoration proposed in **alternative 2** (within the middle and northern sections of the project area) is not expected to affect recreational users at the trailhead due to the masking effect of the high level of ambient noise of Resurrection Creek.

Aquatic Resources and Hydrology

Water Quality

Under **alternative 1**, water quality has met standards identified by the State of Alaska for the beneficial uses for Resurrection Creek and is expected to continue into the future. A potential impact to water quality is the proximity of mining infrastructure to the creek; a 20-foot wide vegetative buffer separates the creek from some of the settling ponds and ditches. The closer these features exist in relation to the creek, the higher the potential risk of Resurrection Creek eroding or overtop the banks, particularly in storm events, and capturing the sediment laden settling pond/ditch systems.

Under **alternative 2**, during restoration activities 6 to 10 short, controlled turbidity events of over 300 NTU are likely to occur (May 15 to July 15) spread over approximately 4 years (pending funding availability). Up to 10 turbidity pulses per day of up to 150 NTU would also occur while equipment is working in the channel. Elevated turbidity from mining and restoration equipment crossings would cause minimal effects. Mining activities are not anticipated to affect water quality due to the use of ponds for settling turbid water. Any outflow from the settling pond systems would be required to meet State of Alaska water quality standards.

Under **alternative 3**, during relocation of channel segments for mining purposes (May 15 to July 15), 2 to 4 turbidity events of over 300 NTU would occur, as would the potential for continued increased turbidity levels as the channel stabilizes in its new location. Minimal impacts from elevated turbidity would occur from mining and equipment crossings. The proximity of settling ponds and ditches to Resurrection Creek is the same as **alternative 1** with the same potential for impacts to water quality during high water events.

Channel Structure

Under **alternative 1 and 3**, Resurrection Creek channel would remain in its present impaired condition, with low sinuosity, high channel gradient, large creek bed substrate, few pools, low channel complexity, and few functional floodplain areas. The 20-foot wide vegetated buffer along Resurrection Creek would continue to be limited in its functionality as a riparian zone to provide large wood and habitat complexity to the stream channel. Recovery of the channel to a more natural condition would not likely occur within the next 100 years. **Alternative 1** would continue to have 19 acres of existing wetlands and **alternative 3** would increase wetlands by up to two acres but of lower quality with no off-channel wetlands being created.

Under **alternative 2**, hydrologic function of the stream channel would be restored closer to natural conditions. Functional floodplains would promote riparian vegetation and stable stream banks. The restored corridor would provide an adequate riparian buffer zone from mining operations and infrastructure. **Alternative 2** would reconstruct much of the existing wetlands and increase the acreage to about 26 acres with higher quality channel and off-channel wetlands created.

Aquatic Habitat

Under **alternative 1 and 3**, no improvement to aquatic habitat or populations would occur. Pools, woody debris, spawning areas, and off-channel habitat would be very limited.

Under **alternative 2**, aquatic habitat would be greatly improved in the short term and long term. Improved aquatic habitat will increase aquatic species productivity by increasing available spawning and rearing habitat. The percentage of increase in fish populations is unknown as salmon populations are largely determined on ocean survival.

Aquatic Species

Under **alternative 1**, direct mortality to aquatic species would not be expected to occur. Equipment crossings would be limited to existing fords and there would be a very low risk of direct mortality of fish because of the limited crossings with the existing lower levels of mining activity. Indirect mortality of aquatic species is also not expected because turbidity levels in Resurrection Creek are not expected to increase. **Alternative 1** would result in no benefit to aquatic species because fish habitat within Resurrection Creek would remain limited into the future

Under **alternative 2**, direct mortality of aquatic species could occur at equipment crossings and during channel construction throughout the entire project area. Indirect mortality of aquatic species would be possible from high turbidities in the entire project area and up to 2 miles downstream during restoration. Restoration would result in short- and long-term indirect benefits for both juvenile and adult salmonids by creating large lateral pools for rearing and resting during migrations and over-wintering, and refugia from high flows for a variety of aquatic species. In the long term, salmonids would also benefit from restored and self-maintained levels of channel complexity.

Under **alternative 3**, direct mortality of aquatic species could occur at equipment crossings and during channel relocation. Fish mortality could occur from stranding in the old channel. Indirect mortality of aquatic species would be possible from high turbidities in lower third of the project area and up to 2 miles downstream during channel relocation.

Vegetation Ecology

Amount of Revegetation

Under **alternatives 1 and 3**, vegetation cover would not return to the historic tailings pile areas for many decades and tailings piles would continue to prevent flood flows from delivering fine sediment to the floodplain areas, thereby limiting riparian vegetation growth.

Under **alternative 2**, restoration would initiate reestablishment of native vegetation in the restoration corridor where it is currently lacking. There would be a change in the forested structure and composition of the project area by the removal of all vegetation and reduction of soil productivity through mining activities. The successional pathway of the project area’s forested stands would be altered. These changes may linger in the mining areas as vegetation reestablishes, particularly if nonnative plant populations become more established.

Under **alternative 3**, there would be a change in the forested structure and composition of the project area by the removal of all vegetation and reduction of soil productivity through mining activities.

Nonnative Species

Under **alternative 1**, nonnative plant abundance would be expected to continue and may continue to spread in the project area. However, no new ground would be impacted beyond what has already been authorized in existing plans of operations. Infestation and spread beyond existing mining plans of operations would likely be limited. Under **alternative 2**, restored areas revegetated to native species would reduce the overall presence of nonnative species.

Disturbances associated with restoration and mining have the potential to increase nonnative plant abundance in the project area through influx of nonnative species on equipment and by producing bare soil conditions. Under **alternative 3**, the increase of nonnative plant abundance in the project area would have a greater area to become established due to the larger area of disturbance due to proposed mining activities.

Sensitive Plants

Under **alternatives 1, 2, and 3**, implementation is not expected to adversely affect sensitive plants because while potential habitat occurs for the one region 10 sensitive species, the pale poppy, this species has not been found within the project area.

Wildlife

Habitat Affected by Mining Activities

Under **alternatives 1, 2 and 3**, mining effects to wildlife habitat are adverse in the short- and long-term. Habitat quality and quantity will decrease as vegetation is removed and vegetation composition and structural diversity decreases. Site quality will be lower after reclamation due to some inevitable loss of topsoil during the removal, stockpiling and reclamation process. With lower soil productivity, vegetation may not respond with as much vigor or density as under natural conditions and may take longer (up to 100 years) to reach a mature forest stand structure.

Wildlife Disturbance by Mining Activities

Under **alternatives 1, 2, and 3**, noise and physical disturbance from people, camps, vehicles, and heavy equipment during mining and restoration activities (**alternative 2** only) may cause habitat abandonment or avoidance to a wide variety of wildlife species. Nesting migratory birds and small mammals may have nests destroyed and young or adults killed when vegetation is removed. Noise has the potential to disturb wildlife in the project area at decibel levels from 65 to 80 dB at active mining sites or within the restoration corridor, and adjacent to the project area up to one mile out at decibel levels up to 55 dB. Persistent equipment noise may disturb and displace wildlife during the months of March through October over the 20 years of operation.

Acres of Habitat Restored

Under **alternative 2**, effects to wildlife habitat from restoration activities are adverse in the short term but beneficial in the long term for 74 acres within the restoration corridor. Short-term removal of habitat would be replaced with higher quality habitat throughout the restoration corridor as riparian vegetation composition and structural diversity increases over the long term. Improved riparian habitat would favor species that feed on spawning or rearing salmon (brown bear, otters, eagles, and wolves), breed or forage in side channels (harlequin ducks and other birds), den or nest in riparian vegetation (river otters, bald eagles, and migratory birds), or forage for vegetation or for prey species in riparian areas (moose, lynx, wolverine, wolves, bears, eagles, and goshawks). **Alternatives 1 and 3** would not have these riparian wildlife habitat improvements over the long term.

Heritage Resources

Loss of Historic Properties

The project area has one historic property, the Hope Mining Company Historic Mining District, and historic mine tailings, a contributing feature of this property, will be destroyed as a result of mining under **alternatives 1, 2 and 3** and restoration activities under **alternative 2**. The Forest

Service consulted with the State Historic Preservation Officer and executed a memorandum of agreement in 2009 addressing adverse effects of mining and restoration on these tailings and the development of an interpretive area in which a representative section of intact historic mine tailings will be interpreted. The Forest Service will continue to work in partnership with Hope Mining Company in developing the interpretive area and interpretive signing.

Recreation

Recreation Use within the project area

Under **alternatives 1, 2, and 3** local residents who wish to use the project area for nonmotorized recreational activities may continue to do so but may choose not to due to safety concerns of being in close proximity with heavy equipment operations that would occur throughout the project area March through October over the next 20 years.

Resurrection Pass National Recreation Trail

Under **alternatives 1, 2, and 3**, access to the trail will continue and would not be affected by mining and/or restoration activities. Hope Mining Company and lessees have authorization to utilize the trail bridge and a short section (about 100 feet) of the trail for ATV access to the west side of Resurrection Creek and mining operations located downstream from the bridge under **alternative 1** and would likely have this authorization under **alternative 3.** This access would not be authorized under **alternative 2** when the temporary bridge is in place for restoration access. This ATV use occurs infrequently and has not raised complaints by the recreating public.

Sport Fishing

Under **alternative 2**, restoration activities will increase aquatic species productivity by increasing available spawning and rearing habitat. The percentage of increase in fish populations is unknown and with salmon populations, is largely determined by ocean survival. It is unknown if an increase in fish populations will result in an increase in sport fishing. Under **alternatives 1 and 3** there are no anticipated changes in sport fishing.

Recreational Experience

Under **alternatives 1, 2 and 3**, the recreation setting within and adjacent to the project area would be consistent with the recreation opportunity spectrum classes identified in the Forest Plan which are: "rural" within the project area; and "roaded modified" and "semiprimitive motorized" adjacent to the project area. Visitors using recreation facilities directly adjacent to the southern edge of the project area would spend minimal time in sight of or within audible range of the mining and/or reclamation activities. This exposure is not anticipated to disrupt recreation experiences in a way that would cause visitors to recreate elsewhere.

Scenic Resources

Under **alternatives 1, 2 and 3**, adjacent private landowners and visitors traveling along Resurrection Creek Road and using the Resurrection Pass National Recreation Trail will continue to experience sights associated with mining activity, but such activity would have the potential to be much closer in proximity and more frequent as Hope Mining Company's areas of operations expand from their currently approved mining areas. Mining activity will continue to produce visual conditions that have "unacceptably low" scenic integrity when operations are active. Upon completion of mining activity, reclaimed areas will meet the minimum scenic integrity objective of “very low” in the short term, and improve with time to meet higher scenic integrity objectives in the long term as more vegetation becomes established.

Under **alternative 2**, restoration activities would restore the stream corridor’s natural appearance and ecological function. “Moderate” to “high” scenic integrity objectives can be expected in the short term (1 to 5 years) in the restoration corridor area.

Roadless Areas

Natural Appearing Landscape and Wilderness Suitability

Under **alternative 2**, 147 acres, less than one percent of the total acres of Resurrection Inventoried Roadless Area, would appear more unnatural and would be less capable of being suitable for wilderness designation because evidence of mining would be apparent. After reclamation, the affected portion of the Resurrection Inventoried Roadless Area would appear more natural. Resurrection Creek would more closely represent natural conditions over time after restoration because it would appear and function as it did before historic mining channelized the creek.

Under **alternatives 1 and 3**, the effects associated with mining activities would be the same as in **alternative 2**. However, Resurrection Creek would remain channelized, fish habitat would continue to be poor, and evidence of human disturbance would be apparent. This portion of the Resurrection Inventoried Roadless Area would continue to be less suitable for wilderness designation.

Social and Economic Resources

Net Present Value

Under **alternative 1**, the net present value would be negative $182,866 (in 2009 U.S. dollars). The cost to taxpayers would be less than under the **alternatives 2 or 3**.

Under **alternative 2** the net present value for all activities under this alternative is negative $1,785,900. This includes the cost of restoration as well as mining administration and monitoring costs. To be considered economically efficient, benefits from the project must outweigh the total costs. However, the ecological benefits from restoration are not quantifiable.

Under **alternative 3**, the only direct costs assumed by the Forest Service would be those associated with minerals administration. The net present value of mining administration and monitoring would be $306,403, which is simply the discounted sum of total costs because there are no benefits that can be displayed in dollar values.

Employment

Under **alternative 1**, Hope Mining Company and mining lessees may continue to spend up to about $50,000 in the Hope community on fuel, food, housing, wages, equipment, and services. Under **alternative 2,** restoration activities would have employment and income impacts similar to those that occurred under Phase I restoration; working with local stakeholders and interest groups to perform restoration activities could allow some jobs to be performed by local residents. Under **alternatives 2 and 3**, additional mining areas may make it feasible to have additional mining lessees working in the area. New mining lessees could drive additional economic activity, as food, fuel, and other services are purchased in the local economy.

Property Values

Under **alternative 1**, property values would be affected relative to existing conditions. Under **alternatives 2 and 3,** the road construction and mining activities may decrease adjacent residential property values.

Public Health and Safety

Alternative 1 would not affect public health and safety relative to existing conditions. Under **alternative 2,** public access would be prohibited on the proposed temporary bridge to reduce safety risks. Under **alternatives 1, 2, and 3**, mining activities could negatively affect quality of life for those living near the project area through proximity of mining roads to private property and safety concerns. Mitigation measures, such as signage indicating potential hazards may minimize the potential for public health and safety consequences. Under **alternative 2**, restoration activities could also negatively affect quality of life for adjacent private property owners due to the effects from noise but for a shorter period of time.

Subsistence

Subsistence Fisheries

There is no established subsistence fishery in the Resurrection Creek watershed therefore there is no effect from **alternatives 1, 2, and 3.**

Subsistence Wildlife

Under **alternatives 1, 2, and 3**, there no anticipate direct or indirect effects to wildlife subsistence uses.

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Chapter 3. Affected Environment and Environmental Consequences

This chapter describes the physical, biological, and social environments of the project area and the effects of implementing each alternative on that environment. It also presents a basis for the comparison of effects of alternatives presented in the chapter 2.

Air Quality and Climate Change

Affected Environment

Air quality in Southcentral Alaska is relatively undisturbed from human sources as a result of sparse populations and large distances from major pollution sources. Some regional sources of air quality impairment include smoke from forest fires, glacial dust, volcanic ash, urban pollution, and haze from global sources. Adjacent to the project area and near Hope, sources of air pollution include road dust, wood stove smoke, and vehicle combustion. Road dust from the gravel-surface Resurrection Creek Road is a localized source of particulates in the air during dry spells in the summer when traffic levels are highest. Existing mining operations in the project area produce a minimal amount of air pollutants. Local sources of greenhouse gas emissions, a contributor to climate change, include smoke and vehicle combustion.

The effects of climate change are evident in Alaska and on the Kenai Peninsula. Average temperatures have risen by as much as several degrees Fahrenheit over the past 60 years on portions of the Kenai Peninsula (Alaska Climate Research Center 2009 and Fresco 2012). This warming trend is also evident in the rapid rates of recession and thinning of most glaciers in Southcentral Alaska over the past century (Molnia 2008, Arendt et al. 2002). Climate change projections for southern coastal Alaska indicate that the area will significantly warm with increased precipitation, but decreased snowfall (Fresco 2012).

Impacts to water resources from climate change on the Kenai Peninsula may include changes to the hydrograph, such as increased flood frequency and magnitude, glacial recession, and changes in the timing of peak and low flows. Additionally, increased stream temperatures, and increases in fire potential, invasive species and loss of wetlands are also predicted (Klein et al. 2005, Berg et al. 2006, Haufler et al. 2010, Fresco 2012). Changes in timing and magnitude of freshwater delivery to the Gulf of Alaska may impact coastal circulation as well as biogeochemical fluxes to near-shore marine ecosystems and the eastern North Pacific Ocean (Neal et al. 2010).

Environmental Consequences – Air Quality and Climate Change

Issues

During scoping and the Draft Environmental Impact Statement comment period, no issues for this project were expressed by the public related to air resources or climate change.

Measurement Indicators

Qualitative assessments based on professional judgment are used to discuss the effects of the proposed project on air resources and climate change.

Methodology

The effects of the project on air resources are determined through past observations. It is not currently possible to quantifiably determine the effects of the proposed project on climate change because of the global nature of this issue. Alternatives are compared primarily using qualitative indicators.

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Air Resources

The existing activities would result in current levels of air pollutants in the area surrounding the project area. Sources of current air pollutants are seasonal and localized, and pollutants quickly dissipate under most weather conditions. Current air pollutants do not exceed Alaska State air quality standards (Alaska Department of Environmental Conservation 2013).

The primary source of current air pollutants are from exhaust emissions from heavy equipment, producing fine particulates, nitrogen oxides, and carbon monoxide. Under alternative 1 there would be no changes in current exhaust emissions from heavy equipment.

A secondary source of current fine particulates exists from dust from vehicles and equipment traveling on access roads during dry periods. Under alternative 1 there would be no changes in large truck traffic and likely no changes in dust levels.

Climate Change

Fossil fuel combustion is a source of greenhouse gas emissions that can contribute to climate change. Emission sources for the mining activities, occurring for up to 6 months per year for 20 years, include use of heavy equipment, mobilization of equipment, transportation of personnel and supplies, and generation of electricity. Greenhouse gas emissions as a result of alternative 1 would continue at current levels. It is not possible to quantify the effects of greenhouse gas emissions from this project on climate change.

No additional vegetation will be removed or restored under alternative 1 other than what has already been approved under the existing mining plans of operation. Current vegetation levels would exist to sequester carbon. In the long term, less vegetation would be available for carbon sequestration than under the proposed action because riparian restoration would not occur and the reestablishment of riparian vegetation along Resurrection Creek would be slower.

Effects of Climate Change on the Project

Climate change is likely to increase stream temperatures and the magnitude of peak flows in Resurrection Creek as a result of changes in air temperature, precipitation, snowpack, and weather patterns. The current incised channel, lack of riparian vegetation and location of the current settling ponds may not be able to accommodate and dissipate the energy of increased flood flows related to climate change. Effects from these increased flows may include increased streambed scouring, streambank erosion and settling pond failures. The lack of channel complexity, deep pools, large woody debris and floodplain connectivity in the current incised stream channel may be less resilient to the effects of warming air temperatures on stream temperatures than alternative 2.

Cumulative Effects

The cumulative effects of alternative 1 and all other activities occurring in the Hope area on air resources would not change. A number of activities are being conducted in the Hope area that could increase or decrease the effects of climate change. While increased development of Kenai Peninsula Borough lands in the area can result in increased greenhouse gas emissions and decreased carbon sequestration, hazardous fuel reduction projects in the area reduce the risk of stand-replacing wildfire that would otherwise produce huge carbon dioxide emissions. The activities occurring in this watershed are very small in terms of greenhouse gas emissions in a global context, and because climate change functions on a global scale, it is not possible to quantify the cumulative effects of any number of particular projects on climate change.

Compliance or conflicts with the Forest Plan

Alternative 1 complies with the forestwide standard for air quality (USDA Forest Service, Chugach National Forest 2002a, page 3-22) because existing mining activities comply with state standards for visible and particulate air quality. The Forest Plan does not specifically address climate change.

Consistency with Regulatory Framework

Alternative 1 is consistent with the regulatory framework because existing mining activities are not likely to result in violations of the Clean Air Act or the Alaska State air quality standards (Alaska Department of Environmental Conservation 2013).

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Air Resources

The proposed action would result in minimal short-term increases in air pollutants in the area surrounding the project area. Sources of air pollutants would be seasonal and localized, and pollutants would quickly dissipate under most weather conditions. Air pollutants would not likely exceed Alaska State air quality standards (Alaska Department of Environmental Conservation 2013).

The primary source of air pollutants would be from exhaust emissions from heavy equipment, producing fine particulates, nitrogen oxides, and carbon monoxide. The stream restoration work would involve an average of 5 pieces of heavy equipment and an estimated total of about 2,500 machine-hours per season (May 15 through July 15) for up to 4 years. The proposed mining activities would likely involve a variable number of pieces of heavy equipment and an estimated total of 1,000 to 10,000 machine-hours per season (March through October) for 20 years.

A secondary source of fine particulates would be dust from vehicles and equipment traveling on access roads during dry periods. Although heavy equipment would be primarily confined to the project area, access vehicles would also utilize the gravel-surfaced Resurrection Creek Road, which currently receives moderate traffic during the summer from residents, recreationists, and miners. The additional large truck traffic as a result of the proposed action would only slightly increase dust levels because dust abatement through the use of water trucks would be required (mitigation measure 9, page 41). Earth moving activities during restoration and mining would cause little or no dust because of the course nature of the primarily gravel and cobble substrate. Placer mining operations utilize water to process the material, resulting in relatively little dust.

Climate Change

Fossil fuel combustion is a source of greenhouse gas emissions that can contribute to climate change. Emission sources for restoration activities would include heavy equipment, mobilization of equipment, and transportation of personnel and supplies. Emissions from these activities are expected to occur for 2 months per year for up to 4 years. Emission sources for the mining activities, occurring for up to 6 months per year for 20 years, would include heavy equipment, mining equipment, and mobilization of equipment, transportation of personnel and supplies, and generation of electricity. The effects of this project would be very small in terms of greenhouse gas emissions in a global context. Currently, it is not possible to quantify the effects of greenhouse gas emissions from this project on climate change.

The proposed stream restoration work would reestablish the riparian area in 51 acres within the restoration corridor in the long term. Much of this area is currently bare ground or covered by only sparse vegetation and little soil as a result of historic mining activities. In the long term, restoration would provide a healthy, diverse riparian area that would help offset the impacts of climate change by increasing the capacity to sequester carbon dioxide. However, the proposed mining activities outside of the restoration corridor would remove vegetation from the proposed mining areas outside of the restoration corridor. It is expected that because operations would be sequenced and reclamation would be ongoing, only a portion of the 274 acres proposed for mining would have vegetation removed at any one time, and these disturbed areas would lose their capacity to sequester carbon. These effects would diminish over time as the land is reclaimed. Taken together, alterations in vegetation from the restoration and mining activities are expected to have very little or no influence on climate change on a global context because of the limited area that would be actively mined at any one time and the benefits of restoring the riparian ecosystem.

Effects of Climate Change on the Project

Stream and riparian restoration within the restoration corridor would make this ecosystem more resilient to the impacts associated with climate change. Climate change is likely to increase the magnitude of peak flows in Resurrection Creek as a result of changes in precipitation, snowmelt, and weather patterns. Reconstructing the stream channel, floodplains, and riparian areas to accommodate and dissipate the energy of flood flows would improve the resiliency of the system to floods as compared to the confined nature of the existing stream channel. The restored channel would be constructed to be semi-dynamic, allowing the channel to change under natural processes as it constantly adjusts to changing environmental conditions. Climate change is not likely to affect the proposed mining activities.

Cumulative Effects

The cumulative effects of the proposed action and all other activities occurring in the Hope area on air resources would be minimal. A number of activities are being conducted in the Hope area that could increase or decrease the effects of climate change. While increased development of Kenai Peninsula Borough lands in the area can result in increased greenhouse gas emissions and decreased carbon sequestration, hazardous fuel reduction projects in the area reduce the risk of stand-replacing wildfire that would otherwise produce huge carbon dioxide emissions. The activities occurring in this watershed are very small in terms of greenhouse gas emissions in a global context, and because climate change functions on a global scale, it is not possible to quantify the cumulative effects of any number of particular projects on climate change.

Compliance or conflicts with the Forest Plan

Alternative 2 complies with the Forestwide standard for air quality (USDA Forest Service, Chugach National Forest 2002a, page 3-22) because proposed mining and restoration activities would comply with state standards for visible and particulate air quality. The Forest Plan does not specifically address climate change.

Consistency with Regulatory Framework

Alternative 2 is consistent with the regulatory framework because proposed mining and restoration activities are not likely to result in violations of the Clean Air Act or the Alaska State air quality standards (Alaska Department of Environmental Conservation 2013).

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Air Resources

Alternative 3 would result in minimal short-term increases in air pollutants in the area surrounding the project area. Sources of air pollutants would be seasonal and localized, and pollutants would quickly dissipate under most weather conditions. Air pollutants would be comparable to those of alternative 2. Air pollutants would not likely exceed Alaska State air quality standards (Alaska Department of Environmental Conservation 2013).

The primary source of air pollutants would be from exhaust emissions from heavy equipment, producing fine particulates, nitrogen oxides, and carbon monoxide. The mining activities proposed under alternative 3 would likely involve a variable number of pieces of heavy equipment and an estimated total of 1,000 to 10,000 machine-hours per season (March through October) for 20 years, with additional equipment time needed to move the stream channel as proposed.

A secondary source of fine particulates would be dust from vehicles and equipment traveling on access roads during dry periods. Although heavy equipment would be primarily confined to the project area, access vehicles would also utilize the gravel-surfaced Resurrection Creek Road, which currently receives moderate traffic during the summer from residents, recreationists, and miners. The additional large truck traffic as a result of alternative 3 would only slightly increase dust levels on Resurrection Creek road. Earth moving activities during mining would cause little or no dust because of the course nature of the primarily gravel and cobble substrate. Placer mining operations utilize water to process the material, resulting in no dust.

Climate Change

Fossil fuel combustion is a source of greenhouse gas emissions that can contribute to climate change. Emission sources for the mining activities, occurring for up to 6 months per year for 20 years, would include use of heavy equipment, mobilization of equipment, transportation of personnel and supplies, and generation of electricity. Greenhouse gas emissions as a result of alternative 3 would be comparable to those of the proposed action. The effects of alternative 3 would be very small in terms of greenhouse gas emissions in a global context. It is not possible to quantify the effects of greenhouse gas emissions from this project on climate change.

The proposed mining activities would remove vegetation from active mining areas. It is expected that because operations would be sequenced and reclamation would be ongoing, only a portion of the 285 acres proposed for mining would have vegetation removed at any one time, and these disturbed areas would lose their capacity to sequester carbon. These effects would diminish over time as the land is reclaimed. In the long term, less vegetation would be available for carbon sequestration than under the proposed action because riparian restoration would not occur and the reestablishment of riparian vegetation along Resurrection Creek would be slower. Vegetation removal from mining activities is expected to have very little influence on climate change on a global context because of the limited area that would be actively mined at any one time.

Effects of Climate Change on the Project

Climate change is not likely to affect the proposed mining activities.

Cumulative Effects

Alternative 3 would have the same cumulative effects as alternative 2.

Compliance or Conflicts with the Forest Plan

Alternative 3 complies with the Forestwide standard for air quality (USDA Forest Service, Chugach National Forest, 2002a, page 3-22) because proposed mining activities would comply with state standards for visible and particulate air quality. The Forest Plan does not specifically address climate change.

Consistency with Regulatory Framework

Alternative 3 is consistent with the regulatory framework because proposed mining activities are not likely to result in violations of the Clean Air Act or the Alaska State air quality standards (Alaska Department of Environmental Conservation 2013).

Geology and Soils

Affected Environment

Geology

Resurrection Creek flows northward from its headwaters through a broad valley 21 miles in length, floored with a thick deposit of gravels, and then enters Turnagain Arm at the town of Hope. Throughout the greater part of its length, the stream has incised a deep canyon-like channel. Near the lower end of the valley the stream’s flood plain widens and has a width of 500 feet a short distance below the confluence with Palmer Creek. High bench gravels flank the floodplain along both sides of the valley.

Bedrock in the drainage is slate and graywacke of the Upper Cretaceous Valdez Group (Nelson 1984). Stream and bench gravels consist of sandstone, slate, conglomerate, granite, and minor amounts of clayey matrix. Boulders are common up to three feet wide and are much larger locally. Graywacke boulders predominate while granite and conglomerate boulders are less abundant. The productive gold-bearing gravels typically overlay bluish-yellow clay pseudo “bedrock” layers which vary in thickness.

Soils

Soil is a fundamental part of a forest ecosystem; soil health and productivity influence the long-term forest productivity. Forest Service policy (USDA Forest Service 2010, FSM 2554.05-13) defines soil productivity as the inherent capacity of a soil to support the growth of specific plant communities. Soil productivity is inversely related to detrimental soil disturbance. Soil productivity is maintained by minimizing detrimental soil disturbance.

Well drained, deep, coarse-textured soils form the bulk of the project area. The valley bottom floodplain in the project area is a disturbed, well drained, coarse-textured soil of map unit 305A. Soil map unit 305A is about 153 acres, mostly in the historical floodplain (Davidson 1989). This map unit contains surface material that has been extensively manipulated through historic and modern gold mining. It is typically 5 to 35 feet high tailing piles of rounded cobbles and boulders. This material may also be spread out over the floodplain. It is estimated to have about 50 percent detrimental soil disturbance from hydraulic mining activities dating to the early twentieth century due to loss of topsoil and surface fines. About half of the area previously mined has vegetative cover of mostly cottonwood, birch and some spruce but with relatively limited ground cover vegetation. The rest of the disturbed area has not yet returned to a vegetated state, but it is expected to eventually revegetate.

The remaining portion of the project area has been minimally disturbed by historic mining. There is anecdotal evidence of a fire that burned through the valley in the early 1900s, changing the dominant vegetation from spruce to birch.

Impacts to the soil resource are defined by the type of activity and the number of acres each activity occurs. The disturbance rates are estimates based on observation of existing mining areas around Resurrection Creek and Resurrection Creek Phase 1area (table 8).The disturbance rates for mining assume that topsoil is stockpiled prior to mining and then respread once mining is completed.

Table 8. Estimated detrimental disturbance rates used for analysis of each activity

Activity	Estimated percent detrimental soil disturbance
Mechanical Mining on gentle ground (less than 35 percent)	8
Mechanical Mining on steep ground (more than 35 percent)	20
Existing Historical Mining disturbance	50
Road or trail, constructed and in use	100
Road or trail, reclaimed (recontoured, ripped and closed)	25
Camps, in use	100
Camps, reclaimed	25
Ponds and ditches, in use	100
Ponds and ditches, reclaimed (filled in, recontoured)	25
Restoration activities within corridor	3

About 71.6 acres of the project area are currently detrimentally disturbed from mining activities (table 9). There are about 7.4 miles of mining road and 2 miles of specified Forest Service road in the project area. Existing mining infrastructure include about 10.8 acres of settling ponds, 0.7 acres of ditch line, and 3.6 acres of camps in the project area. The mining disturbances and infrastructure total about 104.8 acres of existing detrimental soil disturbance or about 25.1 percent of the 418 acre project area (table 9 and table 10). The detrimental soil disturbance from the fire is negligible and not included.

Table 9. Existing detrimental soil disturbance from mining

Activity	Acres	Estimated Detrimental Disturbance Rate	Acres detrimental disturbance
Existing approved mining areas	97		
Infrastructure[a]	(13.2)		
slopes over 35 percent	15.0	20%	3.0
slopes under 35 percent	16.3	8%	1.3
Historical Mining Lands within Existing approved mining areas	52.8	50%	26.4
Historical Mining Lands in Project Area	81.8	50%	40.9
Total detrimental disturbance			71.6

a - The infrastructure in table 9 are features which are within approved mining areas but soil disturbance acres from these features are accounted for in table 10 which has soil disturbance acreage from all infrastructure within the project area.

Table 10. Existing detrimental soil disturbances from mining infrastructure

Activity	Measure	Acres	Estimated Detrimental Disturbance Rate	Acres Detrimentally Disturbed
Existing Roads[a]	7.4[b] Miles	17.9	100%	17.9
Existing ATV trail	0.1 miles	0.1	100%	0.1
Camps	10	3.6	100%	3.6
Ponds	27	10.8	100%	10.8
Ditches	1.9 miles[c]	0.7	100%	0.7
Total Acres				33.2

a - All roads are estimated at 20 feet in width and trails are 6 feet wide
b - Total road in the Resurrection Creek project area is 9.4 miles. 2 miles is specified road (Resurrection Creek Road) which does not count as detrimental soil disturbance.
c - Ditches are assumed to be about 3 feet wide, about the width of an excavator bucket and do not include ponds.

Most of the disturbed areas, regardless of the current vegetation condition, generally have lower soil productivity than undisturbed areas due to lack of topsoil resulting from historic mining.

Environmental Consequences – Geology and Soils

Issues

Soil productivity and potential erosion was identified by the public and the Interdisciplinary Team as an issue. Proposed mining and restoration activities will result in detrimental soil disturbance of varying levels as observed from past mining practices in the area and from the implementation of the Phase I restoration project. Members of the public and Forest Service specialists raised concerns specifically about road construction and erosion in areas 16 and 21, and mechanical mining on steep (greater than 35 percent) side slopes. These concerns resulted in changes to the mining proposal and the development of additional mitigation measures (pages 39 through 47). Effects of mining on steep slopes are discussed in the Effects of Mining Activities sections below.

Measurement Indicators

The indicator for the soil resource is detrimental soil disturbance. The effects of mining activities and restoration activities on soil productivity will be measured by determining percent detrimental soil disturbance by the activity type and applied to the activity area.

Methodology

Impacts to the soil resource are defined by the type of activity and the number of acres where each activity occurs. The types of activities for both action alternatives and estimated percent detrimental soil disturbance are described in table 8 (page 71). The scale of analysis, referred to as the activity area, for direct and indirect effects for alternative 2 is the proposed restoration corridor and mine areas (348 acres) and the proposed mine areas for alternative 3 (285 acres). The activity area for alternative 1 and for cumulative effects of all alternatives is the entire project area (418 acres) and considers detrimental soil disturbance effects on historically mined lands (alternative 1 only), existing and proposed mining activities (all alternatives), and restoration (alternative 2 only).

Forest Service Alaska Region detrimental soil conditions monitoring guidelines (USDA Forest Service, Alaska Region, 2006, Soil Quality Monitoring, FSM 2554.05-13) are used as the analysis tool to compare effects of the alternatives and determine significant effects on soil productivity. Greater than a 15 percent loss of soil productivity for any activity area is considered significant.

The time frame for the effects to soil resource is very long term, more than 20 years. Detrimental soil conditions are considered a significant impairment to the productivity of the land. Significant impairments are by definition loss of soil productivity that lasts beyond the planning horizon; typically a rotation age for forestry practices (300 years). It is reasonable to assume that detrimental impacts from mining may last well beyond 300 years.

The following are assumptions used in this analysis:

- Roads are 20 feet wide (16 foot surface and 2 foot ditches on either side).
- ATV trails are 6 feet wide
- Ditches are 3 feet wide (the width of an excavator bucket)
- Gentle ground is defined as less than 35 percent gradient and steep ground is greater than 35 percent gradient.
- The mining lessees, Hope Mining Company, and the Forest Service will follow all proposed mitigation, attain all required permits, and follow all applicable laws for the proposed activities.
- Reclamation activities after mining will not reduce detrimental soil disturbance to zero; there will still be places of residual compaction and impaired productivity compared to a natural, undisturbed forested area.

Alternative 1 – Existing Approved Mining (No Action)

Direct and Indirect Effects

Alternative 1 includes the 97 acres of existing approved mining areas. About 52 acres have not been mined to date. These will be mined and reclaimed as approved under previous plans of operations. The discussion under existing conditions describes the effects for alternative 1.

Detrimental disturbance from the existing approved mining areas is about 71.6 acres (table 9, page 72). Once mining is completed all areas are expected to be reclaimed. Once reclaimed, the detrimental soil disturbance from infrastructure would be about 8.3 acres. The total detrimental disturbance from mining would be about 79.9 acres. This is about 19 percent of the 418 acre project area.

Cumulative Effects

Past activities within the project area that affected soil productivity include the historic mining activities (included in soil mapping unit 305A) and existing approved mining areas. Cumulative effects are similar to the direct and indirect effects. After reclamation there would be about 80.3 acres of detrimental soil disturbance, about 19.2 percent of the 418 acre project area. There would be no restoration activities to improve the area beyond required mining reclamation. The site would slowly revegetate and recover; likely taking decades to recruit surface fines and rebuild topsoil. This level of detrimental soil disturbance exceeds the 15 percent threshold and would be considered a significant effect to soil productivity.

Compliance or conflicts with the Forest Plan

Alternative 1 meet the forestwide standards for soils in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-22 and 3-23) through implementing Best Management Practices specified in the Soil and Water Conservation Handbook (USDA Forest Service, Alaska Region 2006, FSH 2509.22)

Consistency with Regulatory Framework

Alternative 1 is consistent with regulatory framework for the soil resources because even though the detrimental soil disturbance is greater than the 15 percent threshold, this standard is applicable to renewable resources per the National Forest Management Act and does not apply to mining activities.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Direct and Indirect Effects

Effects of Mining Activities

Loss in soil productivity would result from the construction of new and replacement roads, various mining activities, ditches, and settling ponds. Loss of soil productivity is total and permanent in constructed features such as roads or camps as long as those features remain. Loss of soil productivity in the mined area would be variable, because not all of the proposed acres would necessarily be mined, and because the resulting mixed soil following reclamation would be highly variable in quality and productive potential.

Some of the proposed mining is in areas in the valley bottom floodplain where past mining activity occurred. The cumulative disturbance rate for these lands is 50 percent. Additional proposed mining in these areas is not expected to leave the area more disturbed than the current condition.

Much of the material at and near the surface following mining is expected to be boulder, cobble, and coarse sand. These soil materials are very slow to support and grow adequate vegetation. Site productivity improves immensely if at least 4 inches of topsoil is spread over an area. In the past where topsoil was present or placed during mining reclamation, moderately good vegetation cover resulted.

To ensure the site maintains soil productivity, all mined lands and mining infrastructure must be reclaimed. This analysis assumes that mined areas that started with topsoil will have topsoil stockpiled and then respread once mining activities have been completed which is critical for maintaining soil productivity. Greater impacts to the soil resource would be avoided through completion of reclamation and implementation of mitigation measures 1, 3, 4, 6, 15 to 17, 27 (pages 39 through 47).

Table 11 shows the estimated acres of detrimentally disturbed soils for each of the mining activities. The figures are based on new mining areas being reclaimed but new infrastructure continuing to be used. By leaving roads, camps, ponds and ditches in place the estimated rate of detrimental soil disturbance would be about 74.6 acres of the 274 proposed mining acres or about 27 percent of the mining activity area. By reclaiming just the roads, camps, and ponds, the acres of detrimental soil disturbance drops to about 54.8 acres, or about 20 per cent of the mining activity area.

Table 11. Alternative 2 – detrimental soil disturbance from mining activities

		With mining infrastructure remaining in use		With reclamation of mining area and infrastructure	
Activity	**Acres**	**Estimated Disturbance Rate**	**Acres Detrimentally Disturbed**	**Estimated Disturbance Rate**	**Acres Detrimentally Disturbed**
Mechanical mining on gentle slopes	119	8%	9.5	8%	9.5
Mechanical mining on gentle slopes (previously mined areas)	46.2	50%	23.1	50%	23.1
Mechanical mining on steep slopes	78.1	20%	15.6	20%	15.6
Roads					
▪ New Mining Road	6.2 (2.5 miles)	100%	6.4	25%	1.6
▪ Replacement Mining Road	4.3 (1.8 miles)	100%	4.3	25%	1.1
Mining Infrastructure					
▪ Camps	1.7	100%	1.7	25%	0.4
▪ Ponds	13.1	100%	13.1	25%	3.3
▪ Ditches	1.0	100%	1.0	25%	0.3
Total Acres	269.2[a,b]		74.6[b]		54.8[b]

a - Smaller than the 274 proposed mining acres by the existing roads, ditches, and ponds.
b - Rounding error

Since mining activities may continue at varying levels over a period of years, the rate of detrimental disturbance at any one time will be between 20 and 27 percent of the mining activity areas. Soil impacts of the proposed mining activities would exceed the threshold of 15 percent detrimental soil effects for an activity area and therefore would be considered a significant adverse impact to soil productivity.

Effects to Soils from Mining on Steep Slopes

In 2011, Hope Mining Company supplemented their initial 2007 plan of operations by including mechanical mining on steep slopes through the project area. Mining is currently proposed on 78.7 acres of steep slopes that range from 35 percent to more than 80 percent slope. These areas typically are the terraces above the floodplain on the eastern side of Resurrection Creek. The western portion of the project area is underlain by bedrock. The Forest Plan requires a landslide analysis for any ground disturbing activities greater than 0.1 acre on slopes greater than 72 percent slope and on areas greater than 0.5 acre on 56 to 72 percent slope (USDA Forest Service, Alaska Region 2002a, page 3-22).

The soils that comprise these terraces are deep, unconsolidated sands and gravels deposited by glacial processes then reworked by river processes. The slopes are short, the longest is about 100 feet, but this material has a tendency to erode when vegetation is removed. The risk of chronic surface erosion is high across all steep areas if not properly reclaimed. The surface erosion would consist of a constant sediment movement into the restored area and Resurrection Creek rather than in the form of landslides. Proper reclamation includes recontouring steep slopes to their natural slope angle, not to exceed 35 degrees (about 72 percent) and revegetating steep areas (greater than 35 percent) with seed mixture, mulch, and/or organic materials as would be specified by the Forest Service in authorizing a mining plan of operations. With these reclamation measures, the risk of chronic surface erosion is low. Table 12 defines the risk categories and situations where they occur in the project area.

Table 12. Erosion potential on steep slopes - risk categories and defined areas

Risk Category	Acres	Defined areas of Risk Category
1 (Lower risk)	15	Slopes are moderately steep (45 to 65 percent), at risk are Resurrection Creek and/or the restoration corridor. Slopes are very steep (65 to 75 percent), resources are not at risk.
2 (Moderate Risk)	18	Slopes are very steep (65 to 75 percent), at risk are Resurrection Creek and the restoration corridor. Slopes are extreme (greater than 75 percent), resources are not at risk.
3 (Highest Risk)	5	Slopes are extremely steep (greater than 75 percent), at risk are Resurrection Creek, the restoration corridor, and adjacent private lands.

Category 1 and 2 slopes have a moderate risk of mass wasting (landslides) after mining activities have been completed. Landslides would likely be small and there would be few resources at risk; chances of a landslide reaching the main stem of Resurrection Creek would be low.

The area with the highest risk (category 3) is located in mining area 16a. The Forest Service soil scientist discussed this potential risk with Hope Mining Company during a field trip on August 6, 2012. After reviewing the area and discussing potential risks, Hope Mining Company agreed to remove the steep slope within area 16a from their proposed mining operation. This change is reflected in both alternative 2 and 3 maps and acreage figures for proposed mining. Hope Mining Company also agreed to the soil scientist’s recommendations for reclamation of steep slopes as described in mitigation measure 27 (page 46). The proposed road at the top of the terrace where the proposed mining area narrows between the private land boundary and the top edge of the slope is of further concern for the stability of this slope. Hope Mining Company agreed to reduce the proposed road width from 14 feet to 8 to 10 feet wide and place gates at either end to minimize use of road and reduce the potential for erosion of the adjacent steep slope.

A proposed road along the top of the terrace in area 20 just north of camp 1 also poses concerns for stability of the nearby steep slope. The soils are deep, unconsolidated sands and gravels prone to eroding when bare of vegetation. The road would be situated on a narrow strip (56 feet at the narrowest) between the very steep (60 percent) slope and Resurrection Creek Road. The road would cross a small, deep drainage that initiates at a culvert on Resurrection Creek Road. There is a risk that the new culvert on the proposed mining road could plug or fail which would divert and concentrate flow from the existing Resurrection Creek Road and the new road segment, potentially overloading the very steep slope below. Vegetation clearing widths are assumed wider than the road bed itself. In building the road all the vegetation between Resurrection Creek road and the steep slope break would be removed. Roots of vegetation hold soil particles in place, process water, and are critical for slope stability (Zeimer 1981). Soils could easily become saturated and overload the steep slope and cause a landslide or slump into the restored floodplain, potentially compromising Resurrection Creek Road and damaging any restored stream segments. This road poses a very high risk to existing road infrastructure and restoration work.

Effects from Restoration Activities

The expected impacts and restoration potential of the 74 acre corridor is based on observation and experience from the Resurrection Creek Phase I project located one mile upstream. The Phase I project area currently has varying degrees of soil and vegetative recovery. None of the Phase I restored area is as productive as undisturbed areas but it is more productive than if restoration had not occurred. It will take many years, possibly decades, to approach soil productivity and function that was at site prior to disturbance.

Approximately 56.6 acres of historically mined lands are within the restoration corridor and they have an estimated detrimental soil disturbance rate of 50 percent, and about 32.3 of these acres are within existing approved mining areas. There are about 2.5 miles of road, and 5.9 acres of mining operation areas that will be restored within and adjacent to the 74 acre restoration corridor, resulting in the repair of about 40.2 acres of detrimental soil conditions (table 13). Soils within the restored corridor are expected to be more productive than the unrestored area as a result of the following:

- the restoration of floodplain processes on previously mined areas,
- obliteration and rehabilitation of roads, ditches, and ponds
- spreading topsoil over coarse substrate (gravel and cobble) resulting from historic mining
- regrading existing tailings piles

Most of these 74 acres have been disturbed and partially restored through passive processes since the time historic mining was abandoned, or reclaimed after mining over the past three decades. About one third (27 acres) of this area may be redisturbed during channel reconstruction. Restoration activities are expected to reduce detrimental disturbance from the existing 40.2 acres down to 2.2 acres; resulting in about 3 percent of the 74 acres still in a detrimental disturbed state (due to flooding and compaction). There will be about 0.6 acres of road left in the restoration corridor, bringing the total detrimental soil disturbance acreage up to 2.8 acres.

Table 13. Alternative 2 – existing detrimental soil disturbance in the restoration corridor

Restored Existing Mining	Acres	Estimated Disturbance Rate	Acres Detrimentally Disturbed that will be restored
Existing Approved Mining Areas[a]	32.3	50%	16.2
Historical Mining Areas[a]	24.3	50%	12.2
Roads	6.0	100%	6.0
Ponds and Ditches	5.9	100%	5.9
Totals	68.5[b]		40.2[b]

a - Does not include any infrastructure
b - Rounding error

Indirect Effects to the Soil Resource from Restoration Activities

About one third of the restoration corridor (25 acres) may need topsoil replacement. An estimated minimum of 13,444 cubic yards of topsoil would be necessary to cover to a depth of four inches the 25 acres to be restored. An area of soil extraction proportional to the amount of topsoil necessary to meet the revegetation objectives is expected to be available onsite. Excavated topsoil from mining operations will be used for restoration through cooperation with Hope Mining Company and their lessees. Excavation of topsoil from mining areas would not increase the detrimental soil disturbance to the mining area beyond what will occur with mining activities as long as enough top soil remains to adequately reclaim the mining area (4 inches depth, or more, spread over the area). If there is not enough soil available in the mining areas for restoration work, it will have to be purchased from a commercial source.

Total Disturbance from Proposed Restoration and Mining Activities

Total disturbance from mining and infrastructure development is about 77.5 acres (74.6 acres from mining activities and 2.8 acres from restoration activities) or about 22 percent of the 348 acre mining and restoration activity areas. Following mining and after the required mitigation and reclamation of all proposed mining infrastructure, this drops to about 57.6 acres (55.1 acres from mining activities and 2.8 acres from restoration activities) or about 17 percent of the 348 acre mining and restoration activity areas.

Cumulative Effects of Alternative 2

Alternative 2 would have short- and long-term benefits to soil, vegetation, and riparian function in the Resurrection Creek valley bottom by adding more flood-prone area in the valley bottom and directly replacing soils. Historic mining related impacts would be reduced, such as the valley bottom and floodplain disconnection from the channel. This soil and vegetation benefit would be enhanced over time by the deposition of sediments and organics on the floodplain during flood events.

Prior to any mining reclamation occurring, detrimental disturbance is about 119 acres or about 29 percent of the project area (table 14). When restoration activities are coupled with reclamation activities the overall disturbance is about 83 acres or about 20 percent of the 418-acre project area. This level of detrimental soil disturbance exceeds the 15 percent threshold and would be considered a significant effect to soil productivity.

Table 14. Alternative 2 - cumulative detrimental soil disturbance

Activity	Acres of Activity	Acres detrimental disturbance (prior to mining reclamation)	Acres detrimental disturbance (after mining reclamation)
Mining Roads and trails	22.9	22.9	5.7
Camps	5.3	5.3	1.3
Ponds	18.4	18.4	4.6
Ditches	1.3	1.3	0.3
Past and Present Mining disturbance	295	68.5	68.5
Restoration Disturbance	74	2.8	2.8
Totals	--	119.2	83.3
Percent of project area		28.5%	19.9%

Compliance or conflicts with the Forest Plan

Alternative 2 and its mitigation measures meet the forestwide standards for soils in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-22 and 3-23) through implementing Best Management Practices specified in the Soil and Water Conservation Handbook (USDA Forest Service, Alaska Region, 2006, FSH 2509.22), conducting a landslide risk analysis on steep slopes for situations prescribed by the Forest Plan, and evaluating soil stability and potential soil mass wasting. The high risk of slope failure resulting from the construction of the proposed road along the top of the terrace in area 20 north of camp 1 does not meet the management intent under management area prescription 521 – Minerals Management Area where the desired condition states, “Mining activities are carried out so that any long-term adverse effects on other resources are minimized, and all resource protection requirements are met” (USDA Forest Service, Chugach National Forest 2002a, page 4-84).

Consistency with Regulatory Framework

Alternative 2 is consistent with regulatory framework for the soil resources because even though the detrimental soil disturbance is greater than the 15 percent threshold, this standard is applicable to renewable resources per the National Forest Management Act and does not apply to mining activities. Alternative 2 is consistent with the Organic Administration Act of 1897 (16 U.S.C. 473 to 475) because the restoration work, mitigation measures for minimizing detrimental soil disturbance, and prescribed reclamation practices will help improve and protect forest lands.

Alternative 3 - Proposed Mining Only

Direct and Indirect Effects

Effects of Mining Activities

The effects from mining are similar to those discussed in alternative 2. Table 15 shows the estimated acres of detrimentally disturbed soils for each of the mining activities. The figures are based on the assumption that new mining areas would be promptly reclaimed but that new infrastructure would continue to be used for an extended period of time. For the duration that proposed infrastructure are being utilized and not reclaimed, the estimated rate of detrimental soil disturbance would be about 74.6 acres of the entire 285 acre mining activity area. This translates to about 26.1 percent of the mining activity area.

This analysis assumes that mined areas that started with topsoil will have topsoil stockpiled and then respread once mining activities have been completed. This is absolutely critical to maintaining soil productivity. By reclaiming just the roads and infrastructure, the acres of detrimental soil disturbance drops to about 58.0 acres, or about 20.3 percent of the mining activity area.

To minimize long-term impacts to the soil resource, reclamation activities noted above are recommended to maintain soil productivity. Since mining activities may continue at varying levels over a period of years, the rate of detrimental disturbance at any one time will be between 20.3 and 26.1 percent of the mining activity areas.

Table 15. Alternative 3 - Detrimental soil disturbance from mining activities

		With mining infrastructure remaining in use		With reclamation of mining area and infrastructure	
Activity	**Acres**	**Estimated Disturbance Rate**	**Acres Detrimentally Disturbed**	**Estimated Disturbance Rate**	**Acres Detrimentally Disturbed**
Mechanical mining on gentle slopes	119.7[a]	8%	9.6	8%	9.6
Mechanical mining on gentle slopes of historically mined areas	54.3	50%	27.1	50%	27.1
Mechanical mining on steep slopes	78.7	20%	15.7	20%	15.7
Road					
▪ New Mining Road	6.5 (2.7 miles)	100%	6.5[c]	25%	1.6[c]
New Mining infrastructure					
▪ Camps	1.7	100%	1.7	25%	0.4
▪ Ponds	13.1	100%	13.1	25%	3.3
▪ Ditches	0.9	100%	0.9	25%	0.2
Total Acres	**274.8[b]**		**74.8[c]**		**58.0[c]**

a - This number is based on a GIS layer, (located within the Soils Resources Report, appendix E)
b - Smaller than the 285 proposed mining acres by the existing roads, ditches, and ponds.
c - Rounding Error

Effects to soils from mining on steep slopes

The effects of mechanical mining on steep slopes are similar to those discussed above in alternative 2. There are about 78.7 acres of mechanical mining on slopes greater than 35 percent in alternative 3 compared to 78.0 acres in alternative 2.

Cumulative Effects

Total disturbance from existing and proposed mining and infrastructure development is about 152.4 acres of detrimental soil disturbance or about 37 percent of the 418 acre project area.

Following mining and after the required mitigation and reclamation of all proposed mining infrastructure, the detrimental soil disturbance drops to about 110.9 acres or about 27 percent of the activity area (table 16) This level of detrimental soil disturbance exceeds the 15 percent threshold and would be considered a significant effect to soil productivity.

Table 16. Alternative 3 - Cumulative detrimental soil disturbance

Activity	Acres of Activity	Acres detrimental disturbance (prior to mining reclamation)	Acres detrimental disturbance (after mining reclamation)
Mining Roads and trails	24.4	24.4	6.1
Camps	5.4	5.4	1.4
Ponds	23.9	23.9	6.0
Ditches	1.6	1.6	0.4
Mining disturbance	364.2	97.1	97.1
Totals	--	152.4	110.9[a]
Percent of project area		36.5 %	26.5 %

a - Rounding error

Compliance or Conflicts with the Forest Plan

Alternative 3 is in compliance with the Forest Plan for the same reasons as alternative 2.

Consistency with Regulatory Framework

Alternative 3 is consistent with regulatory framework for the same reasons as alternative 2.

Noise

Affected Environment

Noise levels or energy are often measured in decibels (dB). Decibels are units of sound pressure reported on a logarithmic scale (similar to the measurement of earthquake intensity on the Richter scale) (Engineering Tool Box 2009a, 2009b). Each 10 dB increment is a ten-fold increase in sound pressure. A sound level of 10 dB is therefore 10 times the acoustic energy as 0 dB, 20 dB is 100 times the acoustic energy as 0 dB, and 30 dB is 1,000 times the acoustic energy of 0 dB (Ludwig 1996). By definition, 1 dB is the smallest change in volume the human ear can detect (U.S. Department of Transportation, Federal Highway Administration 2009).

While the Environmental Protection Agency does not regulate noise, it has established guidelines for protecting human health as it may be affected by noise. Environmental Protection Agency suggests that noises greater than 55 dB will interfere with outdoor activities and cause annoyance, and noises greater than 70 dB will result in hearing disruption. Noises greater than 90 dB may result in hearing loss, long before actual pain is experienced as noise approaches levels in excess of 120 dB (U.S. Environmental Protection Agency 1974). The Environmental Protection Agency places as much emphasis on duration of noise levels, or total noise exposure, as on peak levels.

Understanding the implications of existing noise outputs as reported by decibel is best understood when compared with common activities and their representative noise levels (table 17).

Table 17. Decibel ranges and representative noise levels of common noises

Decibel (dB) Ranges	Representative Noise Levels
101 -121+ *(125 dB – Pain begins[b])*	140 dB – Small caliber rifle (at 3 feet)[a] 126 dB – Jet take-off (at 200 feet)[c] 117 dB – Chainsaw (at 3 feet)[d] 112 dB – Hammering on a steel plate (at 2 feet)[c] 107 dB – Power mower[b,d]
71-100 *(90-95 dB – Level at which sustained exposure may result in hearing loss[2])*	100 dB – Diesel truck (at 30 feet)[d] 100 dB – Jackhammer (at 7 feet)[e] 90 dB – Food blender (at 3 feet)[d,e] 80 dB – Automobile (at 25 feet)[d] 75 dB – Loud singing (at 3 feet)[d]
31-70	70 dB – Busy traffic (at 16 feet)[e] 60 dB – Normal conversation[d] 52 dB – Average day-night sound level for wooded residential[f] 39 dB – Average day-night sound level for rural residential[f] 35 dB – Average day-night sound level for wilderness ambient[f] 32 dB – Very soft music[c]
21-30	30 dB – Theater, no talking[e] 25 dB – Quiet auditorium[c]
0-20	20 dB – Whispering[e] 18 dB –Quiet whisper (at 5 inches)[f] 10 dB – Leaves rustling[c] 10 dB – Human breathing[e] 0 dB – Threshold of hearing[c,d,e]

Sources:
a - Carol (2007)
b - Ludwidg (1996)
c - Cambridge Street Publishing (1999)
d - Martin (1929) and Stevens (1957)
e - Engineering Tool Box (2009a, 2009b)
f - EDAW Inc. (2009)

It is important to consider that a person's perception of "noise" may differ from that of "sound," and that simple decibel measurement alone is likely insufficient to describe what is acceptable and unacceptable to individual people. It may depend upon the setting where the noise is experienced as well as the volume. According to the Federal Highway Administration, "sound" (considered as a neutral concept) may become "noise" (considered as a negative concept) when it is too loud, unexpected, and uncontrollable, occurs unexpectedly or has pure tone components.

Research into the effect of noise has largely been centered on flight paths of commercial aircraft and impacts to private residences and business areas. In regard to recreational users, the majority of studies have focused on backcountry settings and have been limited to aircraft and helicopter flights within congressionally designated wilderness areas and national parks. While these results may be limited to the effects of aircraft and helicopters it is not beyond reason that comparable noise sources might yield similar reactions on the part of recreation users and private landowners to the noise generated by mining and restoration activities.

Gramann (1999) points out that the National Park Service does not rely principally on acoustical approaches to assessing noise impacts, largely because there are no widely used noise exposure standards. Accordingly, much discussion of the effects of noise is based on psycho-acoustical survey and experimental approaches that focus on human perceptions and preferences rather than on strict decibel measurement. One of the major points of the author is that ambient noise (that is noise resulting from the forces of nature) is generally not regarded as objectionable to recreational users (and to some extent they are viewed as restorative). Further, the presence of objectionable noise may tend to reduce one's perception of the aesthetic quality of an area.

People's expectation of noise clearly appears to be a key determinant in the perception and acceptability of noise impacts. Unexpected noise, or noise types and levels not viewed as consistent with a specific setting, is likely to be considered more undesirable than similar but expected noise outputs.

Existing Ambient Noise

As shown in table 17, wooded residential areas, such as those adjacent to the project area, have ambient (or environmental background) noise levels. General forested areas and "wilderness" areas are estimated to have ambient noise levels in the range of 35 to 45 dB (EDAW Inc. 2009; USDA Forest Service, Chugach National Forest 2002a).

On September 25, 2009 and October 1, 2009, Forest Service personnel recorded decibel levels at five sites in and around the project area. The ambient noise levels on the streambank of Resurrection Creek near the Resurrection Pass North Trailhead exceeded 60 dB. At several other sites further away from the existing mining areas, the ambient noise levels averaged between 35 and 40 dB. Ambient noise levels in and around the project area would vary somewhat throughout the day and year given the vegetative cover, river noise, insects and wildlife, and other normal climatic conditions (flowing water of the river, wind, rain and occasional thunder). In addition, other human caused ambient noise includes vehicle traffic on Resurrection Creek road, aircraft fly-over, and recreational user-generated activity noise ranging from snow machines in the winter to a simple conversation from a group of hikers.

Existing Mining Noise Levels

The intensity of mining and noise generated within and around the project area has varied greatly over the years since 1896, ranging from no mining activity to large-scale heavy equipment operations. Under the existing plan of operations, 97 acres of mining with 10 mining camps totaling 3.6 acres to support activities are currently approved. During the mining period of the months of March through October, the following activities create various levels of noise: clearing of ground vegetation, excavation of tailings, washing gravels with a wash plant, material stockpiling, diesel water pumps and power generation.

In response to public concerns about noise, decibel readings were taken in September and October 2009 to document the level of existing noise at the following sites (figure 8):

1. 400 feet away from the active mining equipment
2. "Bench" site on Resurrection Creek Road 0.2 mile south and east of the mining operations
3. Resurrection Pass North Trailhead
4. Resurrection Creek road at the National Forest boundary near private residences 0.8 miles from the active mining
5. Resurrection Creek Road and Palmer Creek Road intersection 2.9 miles south of the active mining.

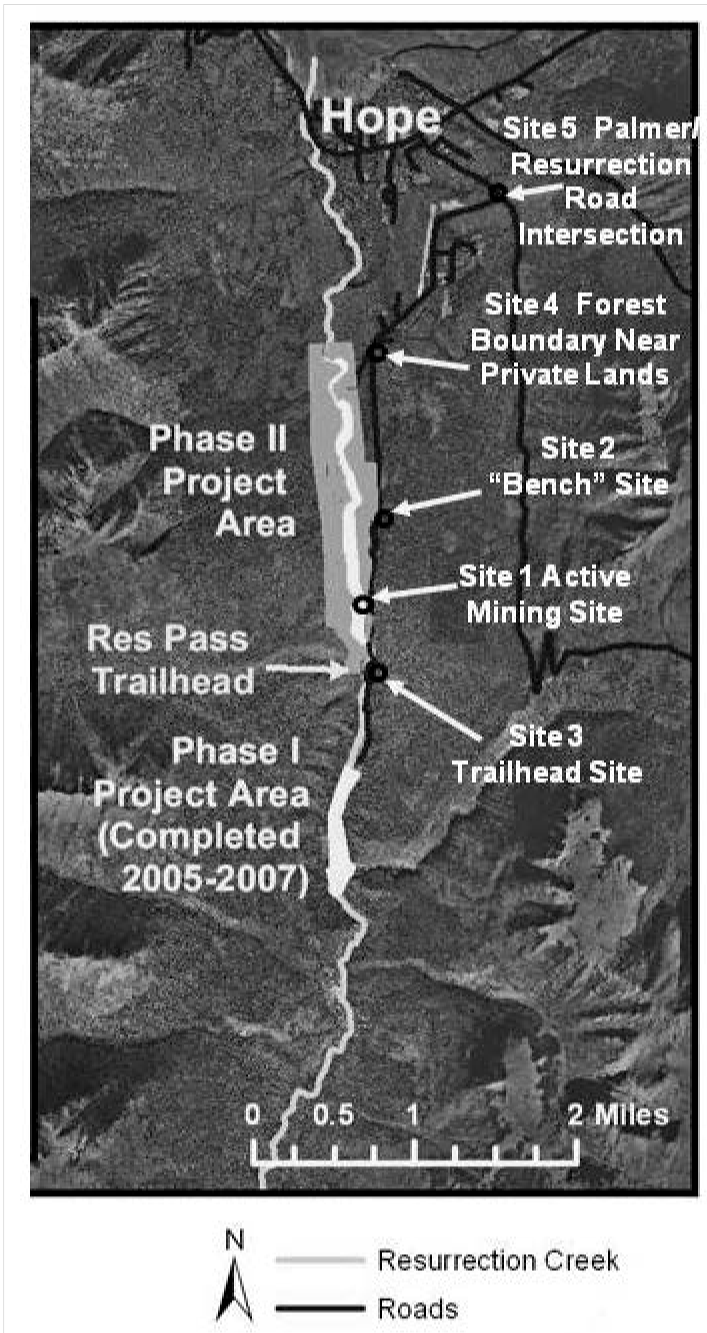

Figure 8. Decibel level reading locations

During the September 2009 readings, active mining operations were ongoing in area 5 including use of one excavator, a diesel water pump, and wash plant with sluice. Decibel readings taken 400 feet away from the equipment averaged 64 to 68 dB. One spike of 80 dB occurred when a six-wheel ATV passed the decibel reader. Decibel readings taken at the "Bench" site on Resurrection Creek road 0.2 mile south and east of the mining operations averaged 55 to 60 dB with one spike of 68 dB. The dominant noise recorded at this site was mining equipment. Decibel readings taken at the Resurrection Pass North Trailhead ranged from 57 to 62 dB. However, Resurrection Creek (cascading water) was the only discernible sound that could be heard. The equipment noise at the project site could not be heard. Decibel readings taken on Resurrection Creek road at the forest boundary near private residences 0.8 miles from the active mining averaged from 35 to 40 dB with a spike of 60 dB when two motor vehicles passed by. Equipment noise from mining operations could not be heard at the time of the recording; however it was also raining during this time and may have been masked by white noise. Decibel readings taken at the Resurrection Creek Road and Palmer Creek Road intersection 2.9 miles south of the active mining ranged from 35 to 40 dB, and no mechanical noise was detected.

On October 1, 2009 decibel readings were repeated at four out of five sites during active mining. Decibel readings were not taken at the “bench” site on Resurrection Creek Road 0.2 miles from active mining. One excavator, a diesel water pump and a wash plant were all operating at this time. Readings were taken approximately 200 feet away from the operating equipment with decibel levels averaged 67 to 72 dB with one recorded spike of 79 dB. Measurements taken at the Resurrection Pass North Trailhead ranged from 55 to 60 dB and were the result of the noise generated by Resurrection Creek flowing water, and mining equipment noise could not be heard. Decibel readings taken on Resurrection Creek Road at the forest boundary near private residences 0.8 miles from the active mining averaged 53 dB, however this time mining equipment noise could be heard. Measurements taken at the intersection of Palmer Creek Road and Resurrection Creek Road averaged 51 dB with no mining equipment noise detected. Table 18 summarizes the recorded decibel levels within and near the project area.

Table 18. Decibel readings in and around the project area

Primary Audible Noise Source	Evaluation Sites (average decibel range recorded)				
	Site 1 Active Mining Site	Site 2 Road Above and Adjacent to Project Area	Site 3 Resurrection Pass North Trailhead	Site 4 Forest Boundary near Private Land (North)	Site 5 Intersection of Palmer Creek Road and Resurrection Creek Road
Ambient Environment	---	---	---	35-40[a]	35-51
Resurrection Creek	---	---	55-60	---	---
Existing Mining Activity	65-72	55-60	---	53[b]	---

Source: Decibel readings in the project area (September – October 2009).
a - September 29, 2009 reading
b - October 1, 2009 reading

Based on the data collected above, mining equipment produced noise levels averaging 65 to 72 dB with infrequent spikes of 72 and 80 dB. Mining equipment noise may be detectable to over one mile from the active mining site with decibel levels potentially reaching 50 to 55 dB at that distance.

Environmental Consequences – Noise

Two groups of people may be affected by noise generated from this project; nearby private land owners and recreating visitors. Per the Kenai Peninsula Borough parcel map, there are 98 parcels of private property within one mile of the project areas (Kenai Peninsula Borough 2009). Eleven parcels are directly adjacent to proposed mining areas and five of these parcels have at least one structure. Recreating visitors who may be affected include those people who are using

Resurrection Pass National Recreation Trail and those who are camping along Resurrection Creek upstream from the trailhead.

Issues

No issues regarding noise were identified.

Private landowners expressed concerns about potential noise levels generated by mining activities. Comments were submitted suggesting the Forest Service require hours of operations, exchange adjacent proposed mining areas with areas farther from private land, create vegetative buffers, or deny approval of some or all mining activities next to private lands. Under the General Mining Act of 1872, as amended, Hope Mining Company has the right to access minerals on their claims, including those adjacent to private lands. The Forest Service does not have the authority to implement an alternative or require mitigation measures (such as vegetative buffers, hours of operation, and denial of approval of mining areas) that denies access to the mineral estate, therefore no alternatives or mitigation measures were considered to address the concerns of noise impacts on private land owners. While these concerns are critical in understanding the effects of the alternatives, the concern about noise is not considered an issue as defined by the National Environmental Policy Act.

Measurement Indicators

The effects of noise from proposed activities on private landowners and recreation users are described in expected level (decibel), proximity, and duration.

Methodology

The effects analysis includes use of the onsite noise measurements of mining activities and ambient sounds at various locations within and adjacent to the project area and review of literature documenting research into the effects of various levels, durations, and impacts of noise on humans. The following key points have particular relevance for the analyzing effects of noise:

- True noise measurement can be complex and there are a number of subtle differences in reported noise measurement metrics.
- Noise associated with multiple activities is likely to add only incrementally to the noise level of the loudest single activity.
- Based on literature and data collected in the project area, it is not unreasonable to assume that peak ambient natural or “white” noise levels at the Resurrection Creek project site may be as high as 62 dB (EDAW Inc. 2009).
- The levels of noise disturbance of both mining and restoration activities are similar.
- It is assumed that mining activities and the associated noise impacts would occur in alternative 1 for the next 15 years and alternatives 2 and 3 for the next 20 years.

The geographic bounds for direct and indirect effects are within 1 mile surrounding the project area. The geographic bounds for cumulative effects are on the watershed scale.

The temporal scale for short- and long-term effects is 1 to 4, and 5 to 20 years respectively, for the operating season of March through October annually. These time frames were chosen to reflect the potential duration of project activities within each alternative.

Alternative 1 –Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Noise from Mining Activities

Under alternative 1, the noise generated from mechanical mining operations is the same as described in the existing condition. The direct short- and long-term effects are that the decibel levels generated by mining equipment are expected to produce noise levels in the range of 65 to 80 dB within the immediate area of active mining sites. This level of noise generated in remaining mining areas would potentially impact all of the eleven private residences however would vary by the intensity and scale of mining activities. It is uncertain what the duration of this maximum noise disturbance might be due to uncertainty on numbers and types of lessees and capabilities of equipment that will be onsite mining under the existing authorized mining plans of operations. In addition, scale of operations varies with mining operator equipment, their production, and volume of placer gravel to process. Noise in mining areas farther away but within one mile of the private land may be audible with decibel levels reaching 50 to 55 dB. Even with lower decibels, audible mining activities may still impact private land owners. These impacts would be experienced March through October each year for the duration of the existing approved plans of operations.

Recreation visitors at the Resurrection Pass North Trailhead would potentially be directly affected by mining noise only when mechanical mining is occurring at the extreme southern end of the project area (area 9 and 12). Recreation visitors camping along Resurrection Creek south of the project area may hear mining noise only when mechanical mining is occurring at the extreme southern end of the project area. Due to their close proximity to Resurrection Creek, most of the mining noise may be masked by the ambient sound of the creek.

Noise from Restoration Activities

Under alternative 1, restoration activities would not occur.

Cumulative Effects

Other sources of noise at the site besides the mining operations include running water from Resurrection Creek, vehicle traffic and human activity associated with fishing, recreational suction dredging, or hiking. These sources of noise do not constitute much of a cumulative effect above that generated by mining and restoration activities; mining and restoration activity noise would likely simply mask other noises rather than detectably add to those noise levels. The noise of Resurrection Creek would likely mask the majority of mining and other noises near the Resurrection Pass North Trailhead.

Compliance or Conflicts with the Forest Plan

The Forest Plan does not specifically address noise resulting from restoration or mining activities.

Consistency with Regulatory Framework

There are no Federal laws regarding noise produced from mining. However the Environmental Protection Agency has established guidelines for protecting human health as it may be affected by noise. The Environmental Protection Agency suggests that noise greater than 55 dB will interfere with outdoor activities and cause annoyance and noise greater than 70 dB will result in hearing disruption.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Noise from Mining Activities

Under alternative 2, the noise generated from mechanical mining operations is expected to be similar to the noise generated from mechanical mining operations described in the existing conditions and alternative 1. In alternative 2, proposed mining areas are located immediately adjacent to private parcels of land therefore noise would be generated in closer proximity than in existing conditions or alternative 1. The proposed mining areas are larger in size therefore the duration of mining would be increased from an estimated 15 years for alternative 1 to a 20 year time period for alternative 2.

Mechanical mining operations could occur in various mining areas across the project area during the course of any one season. Mining equipment is expected to produce noise levels in the range of 65 to 80 dB within the immediate area of active mining sites. This level of noise generated in mining areas 15a, 16a and 21 would potentially impact all of the eleven private parcels due to their close proximity. While mining is occurring in these three areas, private residents could expect maximum noise disturbance including sounds from heavy machinery moving rocks and gravel, excavators dumping loads of rock into wash plants, generators and water pumps, and machinery back up alarms. It is uncertain what the duration of this maximum noise disturbance might be as the length of time operations would occur in each of the three areas varies with mining operator equipment, their production, and volume of placer gravel to process. Noise in mining areas farther away but within 1 mile of the private land may be audible with decibel levels reaching 50 to 55 dB. Even with lower decibels, audible mining activities may still impact private land owners. These impacts would be experienced March through October each year for the duration of the approved plans of operations (assumed to be 20 years for alternative 2).

Recreation visitors at the Resurrection Pass North Trailhead would potentially be directly affected by mining noise only when mechanical mining is occurring at the extreme southern end of the project area in areas 8, 9, 12 and 22. The majority of mining proposed under alternative 2 (within the middle and northern sections of the project area) is not expected to affect recreational users at the trailhead due to the masking effect of the high level of ambient noise of Resurrection Creek which measured 55 to 60dB when directly adjacent to the creek at the Resurrection Pass Trailhead (table 18, page 85). Recreation visitors camping along Resurrection Creek south of the project area may hear mining noise only when mechanical mining is occurring at the extreme southern end of the project area. Due to the campers close proximity to Resurrection Creek, most of the mining noise may be masked by the ambient sound of the creek.

Noise from Restoration Activities

Under alternative 2, restoration activities could be occurring simultaneously with mining operations during the period of May 15 to July 15 for up to four years (or a total of four years spread over a longer period if restoration is done in phases). Noise levels generated by restoration equipment would be identical in nature and level to that of mining operations and are expected to mask each other rather than detectably add or increase noise levels. Restoration activities would be spread out over a greater area and would likely involve more equipment. During restoration there would potentially be up to 10 machines (dump trucks, excavators, front-end loaders, dozers) and other equipment (chain saws, service trucks and personnel carriers) operating at the peak of restoration. Therefore in the short term (one to four years during the May 15 to July 15 restoration operating season), restoration equipment would generate the majority of noise throughout the project area and potentially mask noise from mining equipment.

The restoration equipment noise is likely to impact private landowners near the project area from May 15 through July 15 in the short term. Typical equipment, such as a large dozer (D9) or an excavator, moving large rocks, cobble and gravel would likely produce decibel readings of 65 to 80 dB (U.S. Environmental Protection Agency 1995). Restoration equipment noise would likely be detectable to over one mile from the project area with decibel levels potentially reaching 50 to 55 dB at that distance. The northern half of the restoration corridor ranges from 400 feet to ½ mile from the nearest private lands therefore noise from restoration activities is likely to be audible and potentially impacting.

Recreation visitors using Resurrection Pass North Trailhead and camping along Resurrection Creek would potentially be directly affected by restoration noise only when machines are operating at the extreme southern end of the project area. The majority of restoration in the southern section of the project area is estimated to be completed in two to four weeks with impacts to any recreational visitors limited to that time period. The remainder of restoration proposed under this alternative (within the middle and northern sections of the project area) is not expected to affect recreational visitors at the trailhead due to the masking effect of the high level of ambient noise of Resurrection Creek (55 to 60 dB directly adjacent to the Resurrection Pass North Trailhead).

Cumulative Effects

The cumulative effects of the proposed action and all other activities occurring in the Hope area on noise would be minimal. Other sources of noise at the site besides the mining and restoration operations include Resurrection Creek water sounds, vehicle traffic and human activity associated with fishing, recreational suction dredging, or hiking. These sources of noise do not constitute much of a cumulative effect above that generated by mining and restoration activities; mining and restoration activity noise would likely simply mask other noises rather than detectably add to those noise levels. The noise of Resurrection Creek would likely mask the majority of restoration, mining, and other noises near the Resurrection Pass North Trailhead.

Compliance or Conflicts with the Forest Plan

The Forest Plan does not specifically address noise resulting from restoration or mining activities.

Consistency with Regulatory Framework

There are no Federal laws regarding noise produced from mining. However the Environmental Protection Agency has established guidelines for protecting human health as it may be affected by noise. The Environmental Protection Agency suggests that noise greater than 55 dB will interfere with outdoor activities and cause annoyance and noise greater than 70 dB will result in hearing disruption.

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Noise from Mining Activities

Mechanical mining operations and noise generated from mining are expected to be the same as described in alternative 2. The rate of mining and duration of mining activities in alternative 3 is expected to be approximately the same as alternative 2. With no restoration activities, mining would be the only source of noise but overall noise impacts to privately landowners and recreation visitors would be comparable to levels described in alternative 2.

Cumulative Effects

The cumulative effects of alternative 3 are the same as alternative 2.

Compliance or Conflicts with the Forest Plan

The Forest Plan does not specifically address noise resulting from restoration or mining activities.

Consistency with Regulatory Framework

There are no Federal laws regarding noise produced from mining. However the Environmental Protection Agency has established guidelines for protecting human health as it may be affected by noise. The Environmental Protection Agency suggests that noise greater than 55 dB will interfere with outdoor activities and cause annoyance and noise greater than 70 dB will result in hearing disruption.

Aquatic Resources and Hydrology

Affected Environment

Resurrection Creek Watershed

The Resurrection Creek watershed covers 161 square miles (103,230 acres) and drains into Turnagain Arm of Cook Inlet. Resurrection Creek drains to the south through a large, glacially formed, U-shaped valley. Steep valley sides lead to elevations up to about 5,000 feet, with the majority of the watershed at elevations between 1,000 and 4,000 feet. The project area lies at elevations of about 190 to 350 feet, located about 2 to 4 miles from the mouth of Resurrection Creek near the town of Hope (figure 9).

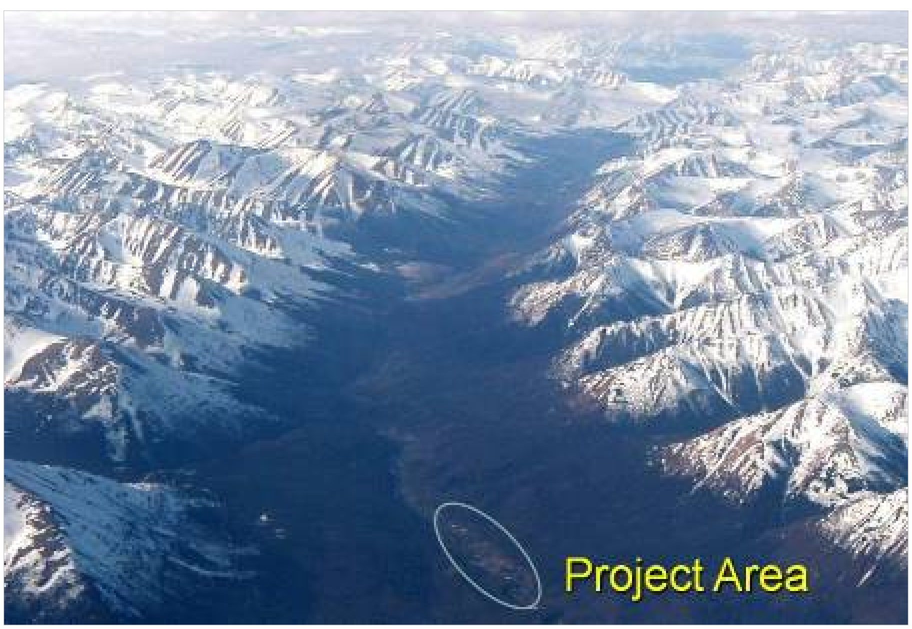

Figure 9. Oblique aerial photo of Resurrection Creek Valley (south view)

Deposition of alluvial gravels in the watershed occurred during glacial recession, when it is likely that the lower valley floor was a glacial outwash plain. Following glacial retreat, Resurrection Creek carried much smaller sediment loads, allowing it to cut down 50 to 100 feet over much of its length into the alluvial gravels and in some areas bedrock. As a result, high terraces are seen on both sides of the Resurrection Creek valley. Where only alluvial gravels exist, Resurrection Creek developed a wide floodplain between the high terraces. Where the down cutting stream encountered resistant bedrock, V-shaped canyons were cut, with very little floodplain. Resurrection Creek flows through three short bedrock canyons on the lower 8 miles of Resurrection Creek. The lower canyon is located just downstream of the project area, and the middle canyon is located just upstream of the Phase I restoration project.

Hydrology

The U.S. Geological Survey collected 18 years of flow data on Resurrection Creek at a gauging station near the northern end of the project area. Data were collected between 1968 and 1986 (U.S. Geological Survey 2007).

Peak flows on Resurrection Creek are typically generated by summer snowmelt. Snowmelt runoff generally starts in early May, with peak flows averaging about 800 cubic feet per second in mid to late June (figure 10). Large peak flow events can occur during summer warm spells as well as during heavy fall rainstorms that create short duration, high water events lasting 1 to 3 days. Winter flows from December through April are generally less than 200 cubic feet per second (cfs), as snowpack covers most of the watershed. The bankfull discharge is estimated to be about 980 cubic feet per second.

The peak flow of record on Resurrection Creek was 3,380 cubic feet per second on July 12, 1980. This corresponds to about a 25-year flood event. The estimated 10-year flood event would be approximately 2,480 cubic feet per second, and the 100-year flood event is approximately 4,780 cubic feet per second (Curran et al. 2003). The lowest recorded flow on Resurrection Creek was 38 cubic feet per second in early April, 1985.

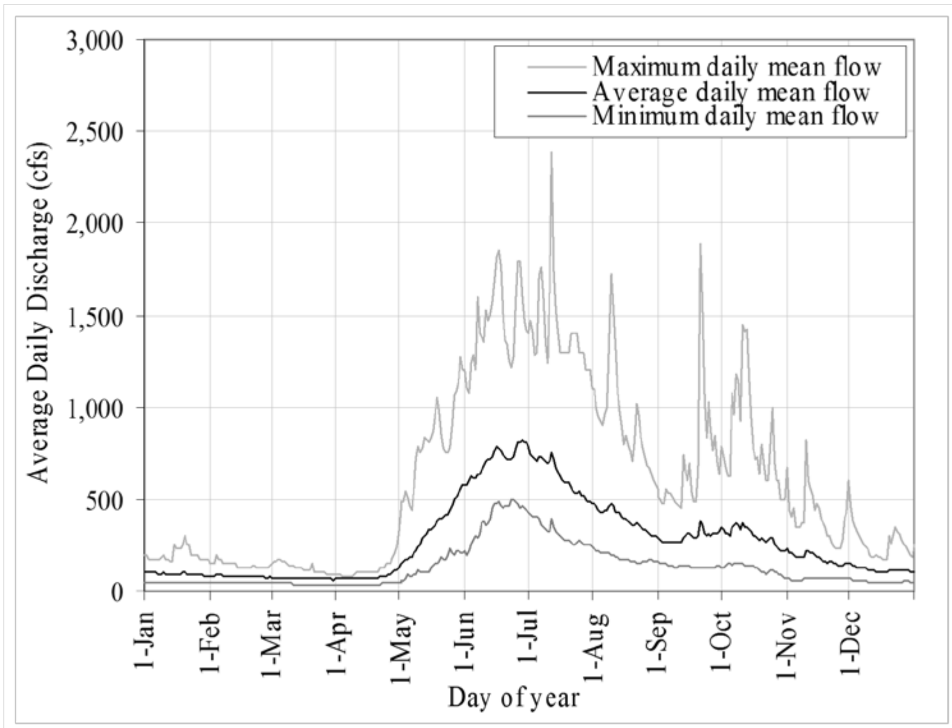

Figure 10. Resurrection Creek hydrograph, 1968 to 1986 (U.S. Geological Survey 2007)

Water Quality

The Clean Water Act Section 303(d) list of impaired water bodies for the State of Alaska does not list any streams within the Resurrection Creek watershed (Alaska Department of Environmental Conservation 2012). All of the waters in the watershed, including those within the project area, are meeting water quality standards as defined by Alaska Department of Environmental Conservation Water Quality Standards 18 AAC 70; dated April 8, 2012 for designated beneficial uses. For Resurrection Creek, beneficial uses include water supply for drinking, culinary, and food processing as well as growth and propagation of fish, shellfish, and other aquatic life.

Sediment loads and turbidity generally increase during high flows, as finer particles become suspended. The sources of sediment naturally delivered to the stream include landslides or bank erosion, or sediment from disturbance related to activities such as mining, road construction, bank trampling, or channel alterations. Natural turbidities on Resurrection Creek vary depending on flow levels; generally from 0 NTU during low flow and up to 10 NTU on moderate and higher flows.

Historic placer mining operations used elemental mercury for separating fine gold particles from the collected concentrate captured in the sluice box. Mercury bonds with gold, forming a gold and mercury amalgam that can be readily captured. Gold was separated from mercury through a distilling process and the resulting mercury vapor was cooled and condensed back to liquid mercury that could be reused. Some Alaskan miners in the early 1900s were known to pour mercury directly into their sluice riffles during the sluicing process. Invariably some mercury was lost or spilled and is likely to have settled through alluvial gravels and collected at impermeable bedrock or clay layers.

Mercury is highly toxic, particularly when in a methyl-mercury compound. In order to exist in water, mercury must be attached to organic or inorganic particles suspended in the water, as elemental mercury is insoluble in water. Mercury can pose a threat to the survival of fish eggs and younger life phases, as they are more susceptible to mercury toxicity.

The Forest Service conducted a series of mercury studies in the Phase I project area (MacFarlane 2004a; MacFarlane 2004b) prior to implementation. A similar study was conducted on both the restored area and the proposed project area in 2008 (MacFarlane and Olegario 2008) and found low levels of mercury within resident fish, sediment, and water in Resurrection Creek. Mercury levels in fish captured in off-channel habitats were slightly higher than those caught in the main channel and the reference site, suggesting that a small amount of mercury may be present in these areas, but all fish tissue sampled remained below the thresholds for human consumption set by the Environmental Protection Agency. Mercury levels in water in Resurrection Creek were well below the Alaska State water quality standards (Alaska Department of Environmental Conservation 2012). Mercury levels in sediment samples were low, and similar to published results from unmined streams in the Cook Inlet area. Modern mining practices employed by Hope Mining Company do not include the use of mercury or other harmful chemicals that were used in the historic mining practices.

Groundwater

Numerous springs are found throughout the watershed, most commonly along lower portions of the valley side slope, below long slopes. Groundwater on the side slopes trickles through the soil layers and the fractured bedrock below, and emerges lower on the slopes. The greywacke and shale bedrock geology of this area is not porous enough to create significant aquifers. Alluvial gravels within the Resurrection Creek valley floor are porous and can contain a sizeable aquifer. The depth of the alluvial gravels is limited in some places by clay layers and bedrock near the surface. Most homes in Hope use wells, which tap into this aquifer, for their water source and approximately 100 wells exist in the Hope community area.

The project area falls within the Zone E Drinking Water Protection Area for a Transient Noncommunity public water system. A public water system located downstream of the project area uses one active well which has been determined to be using groundwater under the direct influence of surface water from Resurrection Creek. In order to protect the water quality, Alaska Department of Environmental Conservation has identified a Zone E Drinking Water Protection Area which encompasses a 1,000 foot buffer on each side of Resurrection Creek and all tributaries. Prior to any authorizing management activities in source watersheds for public water systems, the Forest Service must consult with Alaska Department of Environmental Conservation and the water system owner/operator.

Channel Structure

Resurrection Creek, in its natural state and prior to historic mining, was a low gradient floodplain channel through most of the project area as classified using the Tongass National Forest channel classification system (USDA Forest Service, Alaska Region 1992a). Features typical of this channel type are low gradient (slope less than 2 percent), sinuous or meandering in shape, with wide floodplains. These types of channels will act as a depositional reach, although high flows will mobilize sediment. Large woody debris is important for the maintenance of channel form and habitat, and the channels are sensitive to sediment inputs from the watershed or bank erosion. Riparian and floodplain protection is important for the off-channel features such as side channels, alcoves and beaver ponds that provide critical rearing habitat for Chinook and coho during peak flow events and winter months.

Resurrection Creek valley floor area ranges from 400 to 1,100 feet wide throughout most of the project area. The lower half-mile of the project area is partially confined by bedrock in the canyon, with valley floor widths ranging from 70 to 450 feet and a slightly steeper gradient.

Portions of Resurrection Creek and its tributaries have been mined for gold using various techniques since 1896. The majority of impacts to the stream channels and riparian areas in the project area arose from historic hydraulic placer mining, which occurred mostly in the first four decades of the 1900s. Miners during this period physically relocated the lower six miles of Resurrection Creek multiple times to accommodate mining activities, and in many places the channel does not lie within its original location. Tailings generated from hydraulic mining rise as high as 20 feet and occupy the majority of the alluvial valley floor within the project area (figure 11).

Figure 11. Historic tailings piles along Resurrection Creek

Throughout the project area, the channel of Resurrection Creek is now confined by historic mine tailings along the edges of both banks, confining the available floodplain to a very narrow corridor. Because high flows are not able to spread out onto the floodplain, flood flows are confined to the channel, causing increased shear stress, increased bank erosion, and limited distribution of sediment and nutrients onto the floodplain.

Sinuosity is a measure of the channel length divided by the valley length. Historic hydraulic mining and relocation of the Resurrection Creek channel over the last 100 years has resulted in a very straight stream channel with a low sinuosity of 1.1. There are sections of the project area where the channel is naturally straight. Sinuosity in the reference site upstream on Resurrection Creek is 1.7 (Bair et al. 2002). The lack of meanders results in a straight channel with little complexity.

The majority of the bed of Resurrection Creek consists of substrate such as gravel-sized material, cobble, and numerous boulders. These boulders are evidence of past glacial activity.

The existing channel has a relatively high channel gradient (slope), as compared to the reference site and premining conditions. The steeper channel slope results in increased stream velocity and increased shear along the bed and banks. These high velocity flows can transport larger material and have caused an increase in substrate size. The channel gradient averages 1.5 percent, which is higher than the 1.2 percent slope measured at the reference site of Resurrection Creek. The average valley slope of the project area is 1.7 percent.

Riparian Areas and Wetlands

Much of the riparian area along the Resurrection Creek project area has been disturbed by past mining activities; the vegetation growing on the banks and streamside tailings piles consists of early seral hardwoods. In a survey conducted in 2002, it was estimated that approximately 86 percent of all riparian trees in the Resurrection Creek disturbed reach (in which the project area was included), were less than 15 centimeters in diameter (Bair et al. 2002). It is assumed this figure has slightly improved due to growth since then but is strongly representative of the current situation in the project area. Riparian vegetation has little species or age class diversity.

From geographic information system analysis, it was estimated that approximately 19 acres of mapped wetlands exist within the Resurrection Creek project area. These wetlands are located in the Resurrection Creek channel within the proposed restoration corridor. Although settling ponds associated with Hope Mining Company operations exist within the project area, these ponds are not considered jurisdictional wetlands and are not under the regulatory authority of the U.S. Army Corps of Engineers. Hope Mining Company has the approval from previous plans of operations to construct and move these ponds for mining purposes on the valley floor within the project area. The floodplain area outside of the main channel has been altered to the point where wetland hydrology, soils, and vegetation are not present.

Aquatic Habitat

Over 95 percent of the project area consists of riffle habitat, and the area has little complexity in habitat features. Small pools exist downstream of several large boulders that were placed in the channel in the past as habitat enhancement features. Small pools have formed on the complex meander bend near area 17. A small pool also exists in the channel constriction where a new channel was blasted through bedrock 500 feet upstream of the entrance to the canyon. Spawning gravel typically exists at the ends of pools in this channel type. Because of the limited pools in the project area, spawning gravel is very limited (estimated to be less than 8 percent of what is found in the reference reach) (Bair et al. 2002), with the majority of the channel substrate containing cobble sized material that is too large for effective spawning habitat. Other habitat features such as point bars and scour pools typical of a meandering channel are also very limited.

The project area presently contains little off-channel habitat, such as side channels and overwinter rearing ponds, that is accessible to fish. Bair et al. (2002) estimated that the disturbed reach, which contains the project area, has only 4 percent of side channels compared to the surveyed Resurrection Creek reference reach and provides approximately 1 percent of the perennial flow. Although much of the valley floor is covered by settling ponds used for modern mining operations, these ponds are purposely separated from the main channel by tailings piles and berms and allow no access for aquatic species. Beaver dams exist on many of the settling pond outlets throughout the valley floor. In comparison with the upstream reference site, the project area is a simplified channel with limited high flow refugia and limited rearing habitat suitable for fish.

Large woody debris is important for hydrologic function and fish habitat in this type of channel and has important roles in trapping and slowing sediment movement, creating a diverse range of habitats, and forming pools and cover. The physical effects large woody debris has on streams includes increasing the stability of stream banks and channels, storage of sediment, dissipation of stream energy, and alteration of channel flows (Bryant 1983; Everest and Meehan 1981; Harmon et al. 1986). Recruitment of large wood from the banks is limited because of the lack of large trees in the riparian areas due to historic and modern mining; resulting historic tailings piles along the banks limit the growth of cottonwoods. It is estimated that less than 12 pieces of large woody debris per mile are currently present in the project area (Bair et al. 2002). This is estimated to be approximately 5 percent of what was found in the reference reach surveyed upstream of the project area in 2002.

Aquatic Species

Both anadromous and resident fish utilize Resurrection Creek. Five species of anadromous salmonids are present in Resurrection Creek, including pink (*Oncorhynchus gorbuscha*), chum (*O. keta*), coho (*O. kisutch*), Chinook (*O. tshawytscha*) and sockeye salmon (*O. nerka*). Pink salmon are the most abundant species with runs estimated at 20,000 to 35,000 returning adults in even-numbered years. Chum salmon are much less numerous, with about 1,000 to 2,000 adults returning yearly. Annual coho peak counts in Resurrection Creek range from 100 to 500 returning adults. Chinook counts range from less than 50 to 500 returning adults. Sockeye, which usually are restricted to systems with lakes, are rare and likely strays from other watersheds that, unlike the Resurrection watershed, contain lakes.

The presence of Chinook is of particular note, as this species is not widely distributed across the Kenai Peninsula and where it does occur, the number of adults has been in steep decline in recent years. The Chinook population in Resurrection Creek is very important to the conservation of this species across the region.

Resident fish include Dolly Varden (*Salvelinus malma*), rainbow trout (*Oncorhynchus mykiss),* whitefish (*Prosopium sp*.), sculpin (*Cottidae spp*.), and stickleback (*Gasterosteidae spp*.). There is no population information for resident species within the Resurrection Creek watershed. The lower six river miles of Resurrection Creek have been identified as critical habitat for spawning and rearing habitat for coho, chum, pink and Chinook salmon (Hart Crowser, Inc. 2002).

The response of fish to the Phase I Resurrection Creek Stream Restoration Project conducted in 2005 and 2006 has been very positive. All five species of Pacific salmon have been observed in the restored channel and side channels, with nearly 70 Chinook, over 4,000 pink, 175 coho, and nearly 100 chum spawning in this reach following restoration in 2006 (figure 12).

Figure 12. Pink salmon in a phase I restored side channel (2006)

Listed, Proposed and Candidate Aquatic Species

No Federal or State listed, proposed or candidate aquatic species are located in the project area or vicinity.

Environmental Consequences – Aquatic Resources and Hydrology

Issues

Increased turbidity and sedimentation from the proposed mining and restoration activities resulting in lower water quality is an issue identified by the public and Forest Services specialists. Disturbance and transport of fine sediment in Resurrection Creek is the primary cause of turbidity and the primary water quality parameter affected by this project.

Measurement Indicators

Water Quality

The indicator to compare the effects on water quality is the level of turbidity. Turbidity can be measured in the field using a turbidimeter. A turbidimeter measures the transmission of light through a sample of water and reports a turbidity value in Nephelometric Turbidity Units (NTU). The measurement will estimate what increase, if any, in NTUs would occur above background by alternative, duration of this occurrence and how many times this would occur.

The State of Alaska standard for turbidity, when it pertains to the growth and propagation of fish, shellfish, or other aquatic life is that turbidity may not exceed 25 NTUs above natural conditions (Alaska Department of Environmental Conservation 2012). The analysis will evaluate what activities, proposed by alternative, will exceed this standard.

State water quality standards for drinking water only pertain to those water systems where the intake comes directly from surface water. Resurrection Creek does not provide drinking water from surface water intake. Therefore, turbidity standards as they pertain to drinking water obtained from a groundwater well are not applicable (Alaska Department of Environmental Conservation 2012).

Channel Structure

Indicators to compare the effects of each alternative on channel structure include:

- channel gradient (slope) measured in percent
- channel sinuosity (channel length divided by the valley length)
- the ratio of floodplain width to channel width
- number of pools per mile of channel

Aquatic Habitat

Indicators to compare effects of each alternative on aquatic habitat include:

- area of spawning habitat
- pieces of large woody debris (LWD) per mile
- length of off-channel habitat

Aquatic Species

Indicators to compare the effects of each alternative on aquatic species include:

- level of direct and indirect mortality of fish
- direct mortality of aquatic macroinvertebrates

Methodology

Turbidity would be measured during project implementation using a turbidimeter. Turbidity measured during channel diversions in the Phase I Resurrection Creek Stream Restoration Project (MacFarlane 2005) were used to estimate the magnitude and duration for turbidity pulses anticipated for this project. The proposed project would presumably create similar turbidity levels as the Phase I project. The effects of high turbidities on fish were determined through literature review.

The effects of the project on channel structure, aquatic habitat, and aquatic species were determined based on conceptual and desired restoration design parameters (Bair et al. 2002) and monitoring data from the Phase I project (MacFarlane et al. 2009). Methodologies are established to measure channel morphology and habitat parameters (Harrelson et al. 1994; USDA Forest Service, Alaska Region 2001; Rosgen 2006). The final design of the stream restoration would be similar to the design of the Phase I restoration project. The effects of mining activities on aquatic resources and hydrology are determined through prerestoration analysis (Bair et al. 2002) and past field visits to active mining areas.

The scale of analysis for direct and indirect effects of this project is the project area and all downstream reaches of Resurrection Creek and for cumulative effects; the analysis scale is the Resurrection Creek watershed. The temporal scale of the effects of the project on turbidities and aquatic populations is short term, defined as the length of the project and the duration of a salmon life cycle (5 years). The temporal scale of the effects of the project on channel structure and aquatic habitat is both short term (1 to 5 years) and long term (5 to 50 years). Fifty years is the minimum time frame anticipated to reestablish the riparian forest and provide large woody debris to the stream channel.

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Water Quality

The existing approved mining activity is governed by the Hope Mining Company Plan of Operations dated January 14, 1999. Operational requirements defined in this document provide the framework for protecting water quality. Turbidity levels in Resurrection Creek would not likely increase above state water quality standards and other water quality parameters would not be negatively impacted as a result of activities within the existing approved mining areas because of implementation of the following requirements within the 1999 plan of operations:

- Hope Mining Company will monitor water quality to ensure that water quality standards (Alaska Department of Environmental Conservation 2012) are met.
- All fuel will be properly stored.
- Sanitation facilities will be located at least 100 feet from any stream.

- Settling pond systems would be used to capture all sediment created during the mining process. Any outflow from the settling pond systems would continue to be required to meet State of Alaska water quality standards.
- Top soil will be placed so that it will not be rehandled or exposed to an excess of wind and water erosion.
- Hope Mining Company will take steps necessary at the close of each operating season to assure that sediment movement associated with surface runoff over the area is minimized. If necessary, this could be done with snow fences, chemical binders, and mulching.
- Revegetation will be carried out in a manner which encourages rapid stabilization of the soil surface with respect to erosion and recovery of productivity levels comparable to which the land supported prior to mining.
- An undisturbed natural 20-foot wide vegetation buffer will be maintained along the main channel of Resurrection Creek and side channels to provide streamside shading, cover, and a source of large organic debris.

These requirements have been in place for approximately 15 years and water quality, as deemed by the State of Alaska, has met standards designated for beneficial uses for Resurrection Creek during this time (Alaska Department of Environmental Conservation 2012). Water quality standards would continue to be met under alternative 1.

It is recognized that there will be localized effects to water quality over the course of various mining operations. Equipment crossings will produce small pulses of turbidity each time equipment crosses the stream. These pulses would be short in duration (less than 30 minutes) and would not likely cause turbidity to exceed the state water quality standard of 25 NTU for the growth and propagation of fish, shellfish, and other aquatic species.

A potential impact to water quality is the proximity of mining infrastructure to the creek; a 20-foot wide vegetative buffer separates the creek from some of the settling ponds and ditches currently. The closer these features exist in relation to the creek, the higher the potential risk of Resurrection Creek eroding or overtop the banks, particularly in storm events, and capturing the sediment laden settling pond and ditch systems.

Channel Structure

The Resurrection Creek channel would remain in its present impaired condition, with low sinuosity (1.1), high channel gradient (1.5 percent), inadequate spawning gravel (160 m^2), few pools (approximately 5 pools per mile), low channel complexity, and few functional floodplain areas (entrenchment ratio of 1:1) (Bair et al. 2002). The 20-foot wide vegetated buffer along Resurrection Creek would continue to be limited in its functionality as a riparian zone to provide large wood and habitat complexity to the stream channel. Recovery of the channel to a more natural condition would not likely occur within the next 100 years. These channel structure characteristics would continue to limit and negatively impact fish habitat and fish production.

Some historic tailings piles may be selectively pulled back and mined from the banks within the 20-foot buffer along Resurrection Creek. This would incrementally help return some of the banks to a natural bank height and recover some of the floodplain that was impaired by these historic tailings piles, improving channel function.

Aquatic Habitat

Aquatic habitat conditions in Resurrection Creek would remain similar to existing conditions. The lack of large woody debris (less than 12 pieces per mile) within the project area would continue to inhibit juvenile salmonid rearing habitat, suitable spawning sites, and habitat diversity. The quantity of large woody debris would potentially decrease because of limited recruitment of new trees, limited riparian areas, and the ability of the straight, simplified channel to flush existing large woody debris downstream. Off-channel habitat, which is estimated to produce less than 1 percent perennial side channel flow for salmonid rearing, would continue to be very limited in the project area, with few side channels or backwater areas. Pool frequency (about 5 pools per mile) and quality would also continue to be limited in the project area and would continue to have direct and indirect negative effects on the production of adult and juvenile salmon and char.

Aquatic Species

Direct mortality to aquatic species would not be expected to occur. Mining would be limited to the 97 acres currently approved and there would not be any channel relocation. In addition equipment crossings would be limited to existing fords and there would be a very low risk of direct mortality of fish because of the limited crossings with the existing lower levels of mining activity.

Indirect mortality of aquatic species is also not expected because turbidity levels in Resurrection Creek are not expected to increase. Alternative 1 would result in no benefit to aquatic species because fish habitat within Resurrection Creek in the project area would remain limited into the future

Essential Fish Habitat

Resurrection Creek drains into the Turnagain Arm of Cook Inlet and salmon (Chinook, coho, pink and chum) are part of the commercial catch along the Kenai Peninsula. The essential fish habitat for these species extends up Resurrection Creek to long-standing natural barriers (river mile 31). The term "essential fish habitat" means those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity (U.S. Department of Commerce 2014), and encompasses the water quality, channel structure, aquatic habitat, and aquatic species sections discussed above. Section 305 (b) of the Magnuson-Stevens Fishery Conservation and Management Act requires each federal agency to consult with the Secretary of Commerce regarding all actions or proposed actions authorized, funded or undertaken by the agency that may adversely affect essential fish habitat. This consultation is documented in appendix C for alternatives 2 and 3. For alternative 1, essential fish habitat would not be affected because no alterations of the fish habitat would occur. There would also be no long-term improvements to essential fish habitat.

Wetlands

The location of the Resurrection Creek stream channel would not be changed or altered under alternative 1. The existing approved 97 acres does not allow for channel alteration under alternative 1. Therefore, the estimated 19 acres of wetlands associated with the project area would not be changed unless a significant flood event unrelated to mining reshapes the channel.

As was disclosed in the affected environment discussion, no jurisdictional wetlands, as determined by the U.S. Army Corps of Engineers, exist within the floodplain area outside of the stream channel, due to the alteration that has occurred from past mining. The settling ponds constructed by Hope Mining Company can be decommissioned and moved to approved locations without concurrence from the Corps; therefore, these ponds are not considered wetlands.

Cumulative Effects

Other activities occurring in the Resurrection Creek watershed are concentrated primarily along the lower several miles of Resurrection Creek and adjacent to the town of Hope and these activities cover less than 10 percent of the watershed. Mining operations in the watershed other than those authorized for Hope Mining Company are small-scale operations, and State water regulations limit the amount of sediments that may enter Resurrection Creek. Fuel reduction projects in the watershed have shown to produce very limited surface disturbance or erosion, and are not located adjacent to the riparian corridor, and would not be expected to create additional stream sedimentation into Resurrection Creek.

The Resurrection Creek Road and the Resurrection Pass National Recreation Trail are known to produce very limited sedimentation or surface erosion. Proposed developments on private lands adjacent to and downstream of the project area are not expected to produce sedimentation into Resurrection Creek, as they are not located adjacent to the riparian corridor.

The combined effects of existing mining activities in the project area and other mining activities in the area are unlikely to exceed state water quality standards.

Compliance or Conflicts with the Forest Plan

The existing activities are consistent with the forestwide guideline for fish, water, and riparian areas as stated in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-23 and 3-24) and are consistent with management area intent under management area prescriptions, Minerals Management Area (521) and Forest Restoration Management Area (314) (page 4-84 through 87 and 4-68 through 72). Alternative 1 does not meet forestwide objectives of restoring riparian habitat and near stream vegetation where it has been determined that the stream's proper functioning condition is outside the historic range of variability (USDA Forest Service, Chugach National Forest 2002a, page 3-2). Alternative 1 does not meet the desired condition of restoring productivity to degraded fish habitat in Resurrection Creek (USDA Forest Service, Chugach National Forest 2002a, page 3-15).

Consistency with Regulatory Framework

Examination of the State of Alaska 2012 Integrated Water Quality Monitoring and Assessment report indicates that no streams in the Resurrection Creek watershed have been listed as water quality impaired. The existing mining activities comply with the state anti-degradation policy (Alaska Department of Environmental Conservation 2012) to prevent deterioration of water bodies that currently meet state water quality standards.

Alternative 2 - Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Water Quality

Stream channel restoration activities would create a number of short-term increases in turbidity and suspended sediment loads in Resurrection Creek. In the restoration corridor, each new channel segment would be fully constructed prior to diverting creek water into the new segment (referred to as constructing "in the dry") which minimizes the amount of sedimentation created. Using berms of material to quickly divert the flow into the newly constructed channel segment also minimizes the duration of the turbidity plumes. Directly downstream of the diversion site, suspended sediment and turbidity would increase considerably in Resurrection Creek as the flow picks up loose particles, dirt, silt, and clay when the flow is redirected to the newly constructed channel segment. These short-term plumes of fine-grained sediment produced during approximately 6 to 10 individual stream channel diversions of Resurrection Creek into newly created channel segments would occur over a period of 2 to 4 years during the implementation. The turbidity plumes would occur during the Alaska Department of Fish and Game's instream construction window (May 15 to July 15), minimizing the effects of sediment on emerging and spawning salmon. This construction window corresponds to a period of naturally elevated turbidity which occurs during snowmelt runoff and when impacts to fish from increased turbidity are the lowest.

Based on observations and turbidity monitoring during the Resurrection Creek Phase I Restoration Project in 2005 (MacFarlane 2005), turbidity levels immediately downstream of the diversion site are likely to exceed 300 NTU for up to 30 minutes during each channel diversion, returning quickly to normal levels. Turbidity levels decrease with distance from the diversion site as particles settle out of suspension. The highest turbidities would occur within 1 mile downstream of the diversion site, but moderate turbidity levels (up to 150 NTU) would be expected after each diversion for up to 1 hour all the way to the mouth of Resurrection Creek. Each stream channel diversion would create a turbidity plume that would temporarily exceed the state water quality standard (25 NTU above background conditions) for the growth and propagation of fish, shellfish, other aquatic life (Alaska Department of Environmental Conservation 2012).

Smaller, more frequent pulses of turbidity would also occur during other instream restoration activities. These include modifications of the channel cross-section (shaping the banks), logjam construction, side channel construction, filling the replaced channel segments, equipment crossings, and bridge construction. Groundwater seepage into the newly constructed channels is likely to also cause increased turbidity as a result of equipment use in wet conditions. These turbidity pulses would quickly decrease to background levels shortly after equipment use ceases (within 30 minutes). Up to 10 small pulses of turbidity per day (if equipment is working in the channel) of up to 150 NTU may occur up to 1 mile below the work site with reductions to below 25 NTU further downstream toward the mouth of Resurrection Creek.

Stream channel design for restoration would incorporate measures to minimize the risk of dynamic changes where the valley floor is narrowest, such as between the proposed areas 21 and 26 and where the restoration corridor is only 200 feet wide and where settling ponds, ditches, and roads would be located within 70 feet of the Resurrection Creek channel. Monitoring measure 5 (page 50) was developed to verify the new creek channel remains stable after implementation.

Construction of access roads, floodplain construction, and spreading of soil on the floodplains, have the potential to cause small increases in turbidity in Resurrection Creek and are not likely to cause turbidity that exceeds the State water quality standards for the propagation of fish, shellfish, other aquatic life (less than 25 NTU). Mitigation measure 1 (page 39) would require the appropriate mechanisms to limit erosion from these sites.

Some of the stream banks along the project area are high, actively eroding historic tailings piles that cause small, localized increases in sedimentation and turbidity. The proposed restoration would improve long-term water quality conditions by redistributing these historic tailings piles and creating stable stream banks that are not likely to have persistent erosion issues. In the long term, these banks would also be stabilized by healthy riparian vegetation.

Channel and floodplain restoration would require the redistribution of historic tailings piles, increasing the potential for the release of mercury into the environment. The potential that any large concentrations of mercury would be found is low (MacFarlane and Olegario 2008). If elemental mercury is disturbed during restoration or mining activities, mitigation measure 28 (page 46) requires immediate attention and cleanup procedures which would minimize its spread into the environment. If released, mercury would likely settle deeper into the sediment and would not likely be carried downstream.

The mining activities under alternative 2 would occur outside of the restoration corridor. Although substantial ground disturbance would occur as a result of mining (274 acres), turbidity levels in Resurrection Creek would not increase as a result of normal mining operations because settling pond systems would be used to capture all sediment created during the mining process (mitigation measure 25; page 45) and reclamation practices on steep slopes (mitigation measure 27, page 46). Any outflow from the settling pond systems would be required to meet state water quality standards. Of the limited mining activities that would be authorized within the restoration corridor, the equipment fords would have the potential to create small turbidity increases. However these pulses would create turbidity of less than 25 NTU, be very short in duration, and not cause turbidity to exceed the State water quality standards. The banks and channel at the equipment ford areas would be hardened using larger substrate in order to minimize any water quality impacts (mitigation measures 2 and 5; pages 39 to 40).

Fuel and oil spills and drips from mining equipment operating adjacent to Resurrection Creek could also potentially impact water quality however; the potential for these water quality impacts would be minimal under alternative 2and would meet state water quality standards (Alaska Department of Environmental Conservation 2012) because of the implementation of mitigation measures 7 and 26 (pages 41 and 4646), following the Forest Service Best Management Practices (USDA Forest Service, Alaska Region 2006; USDA Forest Service 2012) and the greater separation between mining activities and the creek.

The restoration and mining activities will not have an effect on the public water system in Hope that is influenced by surface water because the intake for the public water system is a groundwater well that is over 1,000 feet from the Resurrection Creek channel. Turbid waters do not have the ability to seep into the groundwater and impact the water supply intake.

The Forest Service has consulted with Alaska Department of Environmental Conservation and the public water system owner on the proposed activities. No comments have been received from the public water system owner and consultation with Alaska Department of Environmental Conservation noted that the project will likely improve the quality of water contributing to this public water system in the future. Alaska Department of Environmental Conservation also noted that the project activities may prompt additional treatment or monitoring requirements for the public water system, and this is at the discretion of the public water system owner or the Alaska Department of Environmental Conservation drinking water program compliance specialist for this public water system. Similar projects have been completed in the watershed (Resurrection Creek Phase I) and no water quality impacts were reported from the public water system. Best management practices (USDA Forest Service, Alaska Region 2006; USDA Forest Service 2012) will be followed consistent with the Federal Clean Water Act and the Alaska Department of Environmental Conservation water quality standards (Alaska Department of Environmental Conservation 2012) to protect overall water quality.

Mining activities are not anticipated to affect the ground water within the project area. Water table elevations would only be compromised if water was taken out of the Resurrection Creek system through out of basin diversions or if enough impervious surfaces were constructed to cause runoff to not soak back into the ground and replenish groundwater resources. Mining activities would use surface water from small streams from the adjacent slopes and then let that water infiltrate back into the ground through use of settling ponds to be constructed outside the restoration corridor. A majority of the water used for mining will soak back into the ground, thereby protecting the integrity of the groundwater in the area.

Reviews of several of the existing wells that are located on the bluff above Resurrection Creek indicate that they are approximately 55 feet above Resurrection Creek stream channel. Review of the logs for these wells indicates that the static elevation is 101 feet for one of the wells and 75 feet for the other; both being at least 20 feet or more below the elevation of the Resurrection Creek stream channel. The location of the wells in addition to the fact that no water will be removed from the Resurrection Creek system are the two indicators that water table integrity would not be compromised by future mining and road building activity and water quality would be protected.

No adverse effect to water quality from sanitation or wastewater collection sites is anticipated. The minimum separation distance between the mean annual high water level of a lake, river, stream, spring, or slough, or the mean high water level of coastal waters, and a designated wastewater collection system is 100 feet, measured horizontally as required by state regulations (Alaska Department of Environmental Conservation 2012) (mitigation measure 8; page 41).

Channel Structure

Under alternative 2, Resurrection Creek would be reconstructed into a meandering pool and riffle channel, increasing the main channel length by about 2,640 feet (about 23 percent), decreasing the average channel gradient (slope) from 1.5 percent to about 1.3 percent, and increasing the channel sinuosity from 1.1 to about 1.3. Pool frequency would be increased from less than 5 pools per mile to about 20 pools per mile. Historic tailings piles would be redistributed creating wide floodplains, increasing the average flood-prone width to bank-full width ratios from 1:1 to at least 4:1. These floodplains would allow normal flood waters to flow onto the historic floodplain. About 8,500 feet of new side channels and 4.3 acres of new off-channel Chinook and coho salmon rearing ponds would be constructed in the floodplain to provide additional channel function and habitat.

Reconstruction of this section of Resurrection Creek within the restoration corridor would restore the natural hydrologic function of the stream channel in the short term and would continue to improve over the long term. Restoration would provide a stable, yet semi-dynamic channel system modeled after an undisturbed reference site. Recontoured floodplains would allow flood flows to deliver nutrients to riparian areas, decrease peak flow magnitudes by temporarily storing water on the floodplain, and increase channel stability by reducing shear stresses on the channel bed and banks which would allow for the growth of healthy riparian vegetation, further benefiting ecologic and hydrologic function. A riparian buffer zone of one channel width, where feasible, on each side of Resurrection Creek would protect the stream channel from activities occurring outside of the restoration corridor. The increased sinuosity and decreased channel gradient would decrease flow velocities, reduce shear stresses, allow for stable pool and riffle structure, and increase channel complexity. The pool and riffle sequences would allow for natural sorting of gravels and cobbles, improving channel function and habitat.

The proposed mining would have slight to no effect on channel structure as the majority of the mining activities would occur outside of the restoration corridor. The two proposed and two existing equipment fords across Resurrection Creek and the associated roads through the restoration corridor would have a minimal impact the riparian area during the active mining period. Mitigation measures 1, 2, 4, and 5 (pages 39 and 40) would reduce effects from these activities. Reduced riparian vegetation and bank armoring in these localized areas would produce bank erosion on an estimated 120 feet of the approximately 23,000 total feet of bank within the project area, approximately 0.5 percent of the entire area. This amount of disturbance is considered within the natural range of disturbance for the system.

Aquatic Habitat

The proposed restoration would improve aquatic habitat in Resurrection Creek and within the restoration corridor. Approximately 3,600 square yards of new spawning areas would be constructed in the lower gradient areas of the channel, and the designed channel morphology would allow for natural sorting and retention of spawning gravels in these areas. This large increase in available spawning gravel would dramatically increase Chinook, coho, pink, and potentially chum salmon utilization and production within the project area. Also, Dolly Varden and sculpin would benefit from the increase in prey base.

The number of pools would increase from less than 5 pools per mile to about 20 pools per mile. The increase in primary pools would directly and indirectly benefit all species and life stages of fish by providing low water velocity resting habitat, and bubble curtains and depths that provide hiding cover from predators. However, Chinook and coho in particular will benefit the most from this type of habitat because unlike pink and chum, juvenile Chinook and coho do not migrate to the ocean after hatching, but rather spend an additional 1 to 3 years in freshwater before they are ready for their marine migration. Pool habitat is particularly important for juveniles of these two species to survive the winter period. The increase in pool habitat would also indirectly increase foraging efficiency for juvenile and resident life stages of fish.

Approximately 2,000 trees, including the root wads, would be incorporated into the restored channel as constructed logjams, instream structures, and to provide floodplain roughness. Instream large woody debris would increase from about 12 pieces per mile to over 300 pieces per mile. Benefits to adult and juvenile salmonids from the addition of large woody debris include increased channel complexity, increased cover, increased pool depths, and retention of fish carcasses and other organics. Salmon carcasses can contribute 20 to 30 percent of the available nitrogen and phosphorus in a particular stream system (Bilby et al. 1993). The marine-derived nutrients associated with salmon carcass decomposition are known to play a major role in the productivity of aquatic and riparian systems in anadromous watersheds in the Pacific Northwest (Cedarholm et al. 2000). The addition of large woody debris and the increased retention of these nutrients would benefit all levels of the ecosystem, from stream microorganisms and benthic macroinvertebrates to top level predators.

The proposed stream restoration would in the short and long term indirectly benefit both juvenile and adult salmonids by creating large lateral pools for rearing and resting during migrations and overwintering. In the long term, salmonids would also benefit from restored and self-maintained levels of channel complexity. Large woody debris would provide roughness elements that would help regulate bed load movement of the stream channel and fine sediment deposition on the floodplain. Log complexes would also assist in the regulation of water velocity and volume within side channels.

Approximately 8,500 feet of side channels would be constructed and designed to carry 5 to 20 percent of the flow of Resurrection Creek. The creation of side channels, side channel pond complexes, and other off-channel habitat areas would increase the amount of high flow refugia for a variety of species. These areas would provide the greatest benefits to juvenile coho salmon, although other species such as Dolly Varden and Chinook salmon would also benefit directly and indirectly from the increase in off-channel habitat.

The proposed mining in alternative 2would have little effect on aquatic habitat, as most mining activities would occur outside of the restoration corridor. The two proposed and two existing equipment fords across Resurrection Creek would impede habitat along the banks at these sites by limiting vegetation growth and the development of vegetated overhanging banks that provide cover and habitat. This would impact less than 0.1 acres of stream channel, approximately 0.5 percent of the stream channel within the project area. The widened and armored bed of the channel at the equipment fords would also limit spawning habitat at these sites.

Aquatic Species

Direct mortality of individual fish may occur during the proposed stream restoration as a result of heavy equipment crossing the stream, excavation of the streambed, and channel diversions. The impacts to fish would be minimized because pink, chum, coho, and Chinook salmon, resident Dolly Varden char, mountain whitefish, and sculpin are all outside of their susceptible early life stages (egg to fry) during the May 15 to July 15 instream construction window.

Indirect fish mortality may also occur as a result of increased turbidity. High turbidities have been shown to cause gill abrasion and reduce the feeding ability of salmonids and could kill juvenile coho and Chinook salmon, resident Dolly Varden char, and sculpin within and downstream of the project area (Sigler 1980; Sigler et al. 1984; Lloyd 1987). Many studies have shown that fish can tolerate sediment exposure for short periods (McLeay et al. 1987). When exposure duration is considered as well as concentration, a duration time exposure limit appears to apply to most fish. Salmonids have a harder time feeding when turbidities reach 30 NTU or above and show signs of physical stress at 230 NTU and greater. Mortality has been documented during prolonged exposure to high levels of turbidity (greater than 200 NTU for 96 hours) (Newcombe and MacDonald 1991).

Turbidity was monitored during Resurrection Creek Phase I Restoration Project in 2005 (MacFarlane 2005). Turbidity levels immediately downstream of the diversion exceeded 300 NTU for up to 30 minutes during each channel diversion, returning quickly (within an hour) to normal levels. The creek channel diversions in this project should be similar in effects to the Phase I restoration work. Adverse effects to fish would be short term, occurring during channel construction activities. Due to the short duration of turbidity pulses (1 hour) and work occurring within the Alaska Department of Fish and Game instream work window, the impact to the overall populations is expected to be very small and limited to resident fish and juvenile Chinook and coho salmon within and downstream of the project area. The instream restoration work would occur after fry emergence from gravels and smolts have immigrated to the ocean. Direct impacts within the project area would be limited to age 0 and over 1 year old Chinook and coho salmon, resident Dolly Varden, and sculpin. Direct and indirect mortality of fish are not expected to occur as a result of bridge or road construction.

Because salmon fry will have emerged from stream gravels before any stream diversions are initiated, the previous winter’s eggs would not be threatened by sedimentation of the downstream spawning gravels. Stream flows and flow velocities generally peak during the instream construction window from snowmelt runoff, fine-grained sediments that could potentially deposit in salmon redds (nests) are much more likely to stay in suspension.

Direct mortality of aquatic macroinvertebrates is expected and would be limited to the restored segments and approximately 1 mile downstream. Based on research by Novotny and Faler (1982), recolonization of aquatic invertebrates from upriver reaches would occur. Gersich and Brusven (1981) estimated that full aquatic insect recolonization of rock substrates within disturbed areas would take 47 days.

Essential Fish Habitat

For 1 to 2 years, the project may adversely affect essential fish habitat, therefore formal consultation with National Oceanic and Atmospheric Administration (NOAA) Fisheries has been initiated (see appendix C, page 213). The long-term indirect and cumulative effects of implementing this project would be the restoration of riparian vegetation, increased spawning substrate, increased pool habitat, and increased perennial side channel flows and associated overwintering habitat, which would improve aquatic habitat quantity and quality for fish populations and aquatic invertebrates. Aquatic vertebrate and invertebrate populations are expected to respond positively to the stream channel and riparian rehabilitation. Increased spawning and rearing habitat are expected to provide a long-term benefit to the aquatic ecosystem and the fisheries resources for the foreseeable future.

Wetlands

Much of the existing 19 acres of wetlands would be filled and reconstructed in other locations of the project area through implementation of alternative 2. Alternative 2 proposes to construct a new stream channel as well as side channels and off channel wetlands to replace the current stream channel through the project area.

Conceptual designs estimate that alternative 2 would increase wetland areas in the project area by up to 7 acres with higher quality wetlands than currently exist. Wetlands would include the main stem of Resurrection Creek, which would be constructed as a meandering and dynamic channel through the area as well as side channels and off channel wetlands which do not currently exist. Therefore, alternative 2 would be a net benefit to wetland resources in terms of quantity and quality over the existing condition discussed in alternative 1.

Cumulative Effects

Small scale suction dredging activity is occurring on mining claims not owned by Hope Mining Company along Resurrection Creek to the south of patented claim (about 4 miles upstream from the project area). Between the Resurrection Creek trailhead and the patented mining claim is an area of Chugach National Forest lands that is acquired lands and withdrawn from mineral entry (not available for location of mining claims) and is an area that is used extensively for recreational gold recovery by gold panning and suction dredging. These recreational activities are small scale, localized, and insignificant in relation to the size of the cumulative effects area of the watershed.

Other activities occurring in the watershed are concentrated primarily along the lower several miles of Resurrection Creek and adjacent to the town of Hope. These generally include impacts from roads, houses, and community infrastructure. The majority of this infrastructure is located away from the Resurrection Creek stream channel and riparian corridor and does not affect water quality as is evidenced by the fact that the overall water quality of the Resurrection Creek system is considered acceptable by the Alaska Department of Environmental Conservation.

Vegetation management projects in the area have shown to produce very limited surface disturbance or erosion, are not located adjacent to the riparian corridor, and would not be expected to create additional stream sedimentation into Resurrection Creek. The Resurrection Creek Road and the Resurrection Pass National Recreation Trail are known to produce very limited sedimentation or surface erosion. Proposed developments on private lands adjacent to and downstream of the project area are not expected to produce sedimentation into Resurrection Creek, as they are located on terraces above the stream channel and not adjacent to the riparian corridor.

Alternative 2 would have long-term benefits to the health and function of the riparian corridor, water quality, aquatic and riparian habitat, aquatic species populations, and the overall function of the watershed. With the one mile of restoration completed in the Phase I Resurrection Creek Restoration project, and the two miles of restoration that would be completed in alternative 2, about 3 miles out of the 4.5 miles of stream channel impaired by historic mining would be restored to a naturally functioning condition.

Compliance or Conflicts with the Forest Plan

The proposed activities are consistent with the forestwide guideline for fish, water, and riparian areas and the general wildlife guideline (which includes fish) for important habitat sensitivity and seasonality as stated in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-23 and 3-24, 3-28). The proposed restoration work meet the desired future condition in the Forest Plan for fish habitat restoration in Resurrection Creek and all proposed activities are consistent with management area intent under management area prescriptions, Minerals Management Area (521) and Forest Restoration Management Area (314), (USDA Forest Service, Chugach National Forest 2002a, page 3-15, 4-68 through 71, page 4-84 through 87).

Consistency with Regulatory Framework

No streams listed on the Clean Water Act Section 303(d) list of impaired water bodies are located within or downstream of the project area. The proposed action would comply with the state anti-degradation policy (Alaska Department of Environmental Conservation 2012) to prevent deterioration of water bodies that currently meet state water quality standards. The proposed action would result in a number of short-term turbidity pulses which would exceed the State of Alaska water quality standards for turbidity (Alaska Department of Environmental Conservation 2012) during the course of the stream restoration work, but water quality conditions following restoration would be equal to or better than the existing conditions. All stream restoration work and mining operations would follow all applicable State and Federal permitting requirements, including the regulations under the Clean Water Act Section 404 for dredge and fill within wetlands and the Clean Water Act Section 401 for compliance with water quality standards.

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Water Quality

Substantial ground disturbance would occur as a result of mining but turbidity levels in Resurrection Creek would not likely increase as a result of mining activities outside of the stream channel because settling pond systems would be used to capture sediment created during the mining process (mitigation measure 25, page 45). Mining infrastructure, including stockpiled soil areas, reclaimed areas, roads, trails, and camps, would have appropriate mechanisms in place to limit erosion and sediment to project area stream channels (mitigation measure 1, page 39). Any outflow from the settling pond systems or other mining infrastructure would be required to meet State of Alaska water quality standards before entering back into Resurrection Creek.

Equipment fords used during mining activities would have the potential to create small pulses of turbidity. Mitigation measure 5 (page 40) would ensure that these fords are constructed properly to withstand a 100 year, 24 hour storm event. The fords would be constructed over the course of 30 minutes to an hour. It is anticipated that turbidity effects of approximately 100 NTU would be seen 1 mile below the work site with reductions to below 25 NTU further downstream toward the mouth of Resurrection Creek. When equipment is moved across the stream at these sites after construction, turbidity pulses are expected to last less than 30 minutes in duration and produce no more than 25 NTU, which is less than the State of Alaska water quality standard for turbidity for the growth and propagation of fish, shellfish, and other aquatic life. The banks and channel at the equipment ford areas would be hardened using larger substrate in order to minimize any water quality impacts (mitigation measure 5, page 40).

Fuel and oil spills from mining equipment operating adjacent to Resurrection Creek could also potentially impact water quality however; the potential for these water quality impacts would be minimal under alternative 3 and would meet state water quality standards (Alaska Department of Environmental Conservation 2012) because of the implementation of mitigation measure 26 (page 46) and following the Forest Service Best Management Practices (USDA Forest Service, Alaska Region 2006; USDA Forest Service 2012).

A potential impact to water quality is the proximity of mining infrastructure to the creek; a 20-foot wide vegetative buffer separates the creek from some of the settling ponds and ditches currently. The closer these features exist in relation to the creek, the higher the potential risk of Resurrection Creek eroding or overtop the banks, particularly in storm events, and capturing the sediment laden settling pond/ditch systems. Mitigation measures 1, 3, 4, 19, 25, and 26 (pages 39 through 46) incorporate use of Best Management Practices (USDA Forest Service, Alaska Region 2006) to minimize the opportunity for water quality impacts due to increased turbidity.

Between 2 and 4 short-term turbidity pulses of greater than 300 NTU would likely occur during the relocation of approximately 2,740 feet of Resurrection Creek. Channel restoration design features intended to maintain channel stability would not be implemented as they would be in the alternative 2. Sediment sources from eroding banks, down cutting, and other channel adjustment would continue to cause moderate turbidities of approximately 150 NTU for hours or days after each segment of channel is relocated. Any additional adjustments to the relocated channel made by Hope Mining Company would cause additional turbidity increases. Measures to stabilize banks would include those required in permits from U.S. Army Corp of Engineers (table 1, page 23). Channel stability would improve slowly, and persistent eroding banks would likely cause long-term effects on water quality.

Mining activities will not have an effect on the public water system in Hope. This is because the intake for this system is over 1,000 feet from the edge of Resurrection Creek and it is a groundwater well which is not impacted by sediment and turbidity. Best management practices (USDA Forest Service, Alaska Region 2006 and USDA Forest Service 2012) consistent with the Federal Clean Water Act, will be followed to protect the water quality.

No adverse effects to water quality from sanitation or wastewater collection sites are anticipated. The minimum separation distance between the mean annual high water level of a lake, river, stream, spring, or slough, or the mean higher high water level of coastal waters, and a designated system is 100 feet, measured horizontally (mitigation measure 8, page 41); ensuring protection of water quality near these facilities.

Channel Structure

The Resurrection Creek channel would remain similar to conditions described in alternative 1 with low sinuosity (1.1), high gradient (1.5 percent), large streambed substrate, few pools (less than 5 per mile), low channel complexity, and few functional floodplains. The 20-foot wide vegetated buffer along Resurrection Creek would continue to be limited in its functionality as a riparian zone to protect the stream channel. Recovery of the channel to a more natural condition would not likely occur within the next 100 years and channel structure characteristics would continue to limit and negatively impact fish habitat and fish production.

Approximately 2,740 feet of channel segments would be relocated and would be similar to the existing channel, with low sinuosity, high gradient, large substrate, few pools, low channel complexity, and few functional floodplain areas. This new channel segment would likely look and function similar to the existing stream channel and its conditions within the project area. The potential for dynamic channel changes occurring in this channel segment during high flow events is high.

Some historic tailings piles may be selectively pulled back and mined from the banks within the 20-foot buffer along Resurrection Creek. This would incrementally help return some of the banks to a natural bank height and recover some of the floodplain that was impaired by these tailings piles, improving channel function (mitigation measure 29, page 47).

Floodplain and riparian condition would continue to be impaired under alternative 3 because mining activities would be allowed on the floodplains to within 20 feet of the banks. Floodplains generally function to moderate flood flows, and removal of riparian vegetation in these floodplains could impact flood dynamics. Fine sediments would be removed from the floodplain substrate through the mining process, increasing the ground permeability. Riparian productivity would remain greatly impaired in the long term. Implementation of mitigation measures 1, 3, 6, 15 to 17, and 19 (pages 39 through 44) for reclamation work would help to partially restore riparian function, but many decades would be required after mining to reestablish the riparian ecosystem along the creek.

Aquatic Habitat

Aquatic habitat conditions would remain similar to existing conditions in the long term; channel sinuosity would remain at 1.1, channel slope 1.5 percent, less than five pools per mile, and flood-prone width to bankfull width ratios 1:1. The lack of large woody debris would continue to inhibit juvenile salmonid rearing habitat, suitable spawning sites, and habitat diversity. The quantity of large woody debris would potentially decrease because of limited recruitment of new trees, limited riparian areas, and the ability of the straight, simplified channel to flush existing large woody debris downstream. Off-channel habitat for salmonid rearing would continue to be very limited, with few side channels or backwater areas. Pool frequency and quality would also continue to be limited in the project reach and would continue to have direct and indirect negative effects on the production of adult and juvenile salmon and Dolly Varden char.

Aquatic habitat conditions in the channel segments relocated by Hope Mining Company would be minimal in the short term. Bank stability would be poor, and riparian vegetation would be limited because no beneficial habitat features such as pools, logjams, undercut banks, side channels, or spawning areas would be incorporated into the new channel. Bank stability and riparian vegetation would likely improve over the long term; the overall stability of the new channel segments would be reduced.

Aquatic Species

Under alternative 3, direct mortality to aquatic species would occur as a result of equipment crossings and relocation of approximately 2,740 feet of the Resurrection Creek channel. These impacts are similar to those described in the effects of alternative 2, but on a smaller scale because only about 30 percent of project area would be affected by the channel relocation. Fish mortality (adult resident and juvenile salmon) would also occur as a result of individual fish that are stranded in the old stream channel segment after relocation of the channel.

Indirect mortality of aquatic species would occur as a result of increased turbidity levels in Resurrection Creek resulting from channel relocation, as described in the effects of the proposed action. Fewer pulses of turbidity would be created than under the proposed action, and it is likely that the magnitude and duration of the turbidity pulses would be greater under alternative 3 because the new channel would not have natural design features for stability. Therefore, mortality from prolonged exposure to higher levels of turbidity (greater than 200 NTU for 96 hours) (Newcombe and MacDonald 1991) is likely under alternative 3.

Alternative 3 would result in no benefit to aquatic species due to no habitat improvement, flood plain creation, and side channel availability. The relocated segments of Resurrection Creek would not be restored, just relocated. These segments would be similar to the existing channel in character, with limited fish habitat. Fish production in the new segments would not be expected to increase as a result of the channel relocation because of no net increase in spawning gravels and juvenile rearing areas.

Essential Fish Habitat

In the short term, the project may adversely affect essential fish habitat as a result of the channel relocation proposed in alternative 3. Hope Mining Company would be required to consult with National Oceanic and Atmospheric Administration concerning essential fish habitat prior to relocating the channel.

Wetlands

In alternative 3 a small portion of the existing 19 acres of wetlands in the northern part of the project area would be filled and moved to accommodate new mining proposed under alternative 3. Alternative 3 proposes to reconstruct two sections of the Resurrection Creek stream channel with a channel that is similar in structure to the current channel. No side or off channel wetlands would be constructed under this alternative.

Conceptual designs estimate that alternative 3 would increase wetland areas by up to 2 acres with similar quality wetlands that currently exist. Wetlands would only include the main stem of Resurrection Creek with no off channel wetlands.

Cumulative Effects

Past, present, and future activities occurring in the Resurrection Creek watershed are the same as were discussed under the alternative 2 cumulative effects section. The effects from alternative 3 when added to the past, present, and future activities would have slightly higher impacts to water quality than both alternatives 1 and 2. Alternative 3 would have similar effects as alternative 1 and substantially greater negative effects than alternative 2 in terms of stream channel function and aquatic habitat. Overall water quality could be impacted continuously from the project area to the mouth of Resurrection Creek until the channel stabilizes, which could take many years, therefore it is likely that water quality, in terms of turbidity and sedimentation, would not be within State standards until stabilization occurs.

Compliance or Conflicts with the Forest Plan

The proposed activities are consistent with the forestwide guideline for fish, water, and riparian areas as stated in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-23 and 3-24) and are consistent with management area intent under management area prescriptions, Minerals Management Area (521) and Forest Restoration Management Area (314). Alternative 3 does not meet forestwide objectives of restoring riparian habitat and near stream vegetation where it has been determined that the stream's proper functioning condition is outside the historic range of variability (USDA Forest Service, Chugach National Forest 2002a, page 3-2). Alternative 3 does not meet the desired condition of restoring productivity to degraded fish habitat in Resurrection Creek (USDA Forest Service, Chugach National Forest 2002a, page 3-15).

Consistency with Regulatory Framework

No streams listed on the Clean Water Act Section 303(d) list of impaired water bodies are located within or downstream of the project area. Alternative 3 may comply with the state anti-degradation policy (Alaska Department of Environmental Conservation 2012) to prevent deterioration of water bodies that currently meet state water quality standards. Alternative 3 would result in a number of short-term turbidity pulses that would exceed the State of Alaska water quality standards (Alaska Department of Environmental Conservation 2012) during the course of the channel relocation. All channel relocation and mining operations would follow all applicable State and Federal permitting requirements, including the regulations under the Clean Water Act Section 404 for dredge and fill within wetlands and the Clean Water Act Section 401 for compliance with water quality standards.

Vegetation Ecology

Affected Environment

Historic and modern placer mining operations have influenced development of riparian and floodplain vegetation plant communities including those dominated by willow (*Salix* spp.), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), and Sitka alder (*Alnus crispa* ssp. *sinuata*). Mining activities tend to shift vegetation to earlier seral state of ecological succession consistent with some of the tall scrub and broadleaf or mixed forest types described by DeVelice et al. (1999).

Hydraulic placer mining from the early 1900s generated numerous tailings piles within the project area. The piles are composed of large cobbles which are extremely well drained which prevents the growth of vascular plants, eliminating the development of a duff layer and soil formation, and leaving the tailings piles barren of most vegetation growth other than lichens and mosses. Some tailings piles support individual scattered black cottonwood trees or shrubs.

Forested areas near and within the project area (primarily on the terraces above the valley floor) have been affected by the spruce bark beetle (*Dendroctonus rufipennis*) infestation over the past twenty years. Major changes in the vegetation composition and structure have been documented in the first ten years following a spruce bark beetle outbreak within a watershed (Holsten et al. 1995). Many of the dead spruce (*Picea glauca* and *P. x lutzii*) are now falling over, creating areas of coarse woody debris. Regeneration of both spruce and paper birch (*Betula papyrifera*) is slowed in these areas due to increased cover of dead woody material, dense growth of bluejoint reedgrass (*Calamagrostis canadensis*), and lack of scarified or open soil for seedling establishment.

Disturbances within the project area created a high proportion of seedling/sapling stage trees, mostly black cottonwood. Approximately half of the forested sections are open or in a seedling/sapling stage, with a mix of pole, medium, and large size trees. Very large trees are rare, and are mainly black cottonwood with a few Lutz spruce. Stands of medium to large size mountain hemlock (*Tsuga mertensiana*) are found in the uplands. With succession, the black cottonwood component would eventually be replaced by Lutz spruce, although areas being actively mined will be in a constant state of early succession. Steep areas with bedrock are bordered by spruce and mountain hemlock. Overall forest structure is erratic given the site history and current use, but patches of three structural stages (stand initiation, stem exclusion, overstory reinitiation) are evident (Oliver and Larsen 1990). Old growth is not present except in isolated pockets of very old black cottonwoods. A comprehensive description of the vegetation composition and structure is in the wildlife habitat specialist report in the project record.

Development and other human caused disturbances have allowed the introduction of nonnative species to the project area. Nonnative species are most typically found immediately around developed and disturbed areas. Known populations have not presented a threat to native vegetation, although populations can spread rapidly with increased activity (Myers and Bazely 2003). Known populations of nonnative plant species include a fairly high concentration of common dandelion (*Taraxacum officinale*), populations of narrowleaf hawksbeard (*Crepis tectorum*), and scentless false mayweed (*Triplospermum perforata*) along access roads on the east side of Resurrection Creek. Oxeye daisy (*Leucanthemum vulgare*) is found scattered on both sides of the creek. Other nonnative species include *Linaria vulgaris* (butter and eggs), white and red clover (*Trifolium repens* and *T. pratense*, respectively), pineapple weed (*Matricaria matricarioides*), timothy (*Phleum pratense*), and common plantain (*Plantago major*).

Based on the bioenvironmental database used in the Forest Plan Revision (USDA Forest Service, Chugach National Forest 2002a), the only Alaska Region sensitive plant species potentially occurring in the project area is the pale poppy (*Papaver alboroseum*) but no specimens have been have been observed.

Environmental Consequences – Vegetation Ecology

Issues

No issues regarding vegetation ecology were identified.

Measurement Indicators

Comparison of alternatives in terms of vegetation ecology will be based on the following parameters:

- Amount of area with vegetation reestablished
- Area of potential sensitive plant habitat affected
- Area of potential nonnative species introduction and spread

Methodology

The following data sources were used to analyze vegetation resources:

Landcover Classification GIS Raster Dataset (Markon and Williams 1996): A satellite image based classification that for the main trail corridor was primarily derived from SPOT multispectral imagery from August 1990. Each 30-meter pixel was assigned to one of 25 classes. The vegetation classes basically follow the first three levels of the five level hierarchy of Viereck et al. (1992).

Cover Type GIS Coverage (USDA Forest Service, Chugach National Forest 1997): An air photo based map developed from interpretation of aerial photography from the 1950s through 1970s. Minimum map unit size is 10 acres (about 4 hectares). Each polygon was assigned to one of 21 classes.

Nonnative Plants Report (Duffy 2003): The list of nonnative plant species reported by Duffy (2003) from the Kenai Mountains is presented and the potential implications of the proposed project to nonnative plant occurrences are summarized.

Nonnative Plant Inventory: Kenai Trails (DeVelice 2003): The list of nonnative plant species reported by DeVelice (2003) from the Kenai Trails is presented and the potential implications of the proposed project to nonnative plant occurrences are summarized.

Field Work: Sensitive and invasive plant surveys (Bella and McKee 2007; Mohatt and Charnon 2008).

Sensitive Plants GIS Coverage (USDA Forest Service, Chugach National Forest 1998): This coverage was created from data obtained from the Alaska Natural Heritage Program.

The geographic bound for direct and indirect effects is the project area boundary. Cumulative effects include the entire Kenai Mountains.

Short-term impacts are generally those that occur throughout the duration of the proposed activities. Long-term impacts can occur for decades after activities have ceased, particularly where vegetation composition has changed.

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Area of Revegetation

Under this alternative, existing mining activities would continue to occur. Vegetation cover typical of Southcentral Alaskan stream systems would not return to the historic tailings pile areas for many decades and tailings piles would continue to prevent flood flows from delivering fine sediment to the floodplain areas, thereby limiting riparian vegetation growth.

Nonnative Species

Existing mining areas are expected to continue to have nonnative plant abundance and may continue to spread in the project area. No new ground would be impacted beyond what is authorized in existing plans of operations. Infestation beyond existing mining plans of operations would likely be limited.

Sensitive Plants

Since no new activities would be proposed, no sensitive plants would be adversely affected by alternative 1.

Cumulative Effects

This alternative does not propose any new activities beyond what has already been analyzed in past projects. Other existing or reasonably foreseeable future projects in vicinity of the this project include past vegetation management projects along Hope Highway and Palmer Creek Road, the Resurrection Creek Phase I restoration project, private land development in the Hope area, Porcupine Campground reconstruction, new trailhead development for Hope Point Trail and Gull Rock Trail, Hope Point Trail reconstruction, ongoing trail use of Resurrection Pass National Recreation Trail, and small scale suction dredging mining operations on Palmer Creek. Across the Kenai Peninsula portion of the Chugach National Forest, there are vast areas of potential habitat (over one million acres). Cumulatively, the loss of habitat for sensitive plants on the existing approved mining operations of the Hope Mining when added to the above activities would be an insignificant effect to sensitive plant habitat when over one million acres of potential habitat still exist on the Kenai Peninsula.

Compliance or Conflicts with the Forest Plan

Vegetation condition would not be restored as described in the desired future condition for vegetation in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a; page 3-13) by the mining operator completing required reclamation. This alternative does meet Forest Plan Standards and Guidelines for vegetation management (USDA Forest Service, Chugach National Forest 2002a; page 3-25 through 3-27).

Consistency with Regulatory Framework

Alternative 1 is consistent with the Endangered Species Act. Biological evaluations were completed for threatened and endangered plant species and no threatened and endangered plant species or their habitats are located within the project area. Alternative 1 is also consistent with Executive Order 13112 - *Invasive Species* because existing populations of nonnative species spreading beyond existing mining plans of operations would likely be limited because no additional area would be impacted and mined areas would be required to be reclaimed following the cessation of mining.

Alternative 2 - Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Area of Revegetation

Initially there would be a loss of riparian vegetation during construction of the new channel alignment and would appear mostly barren since the current conditions of these areas are highly disturbed. Restoration activities following new channel construction would include spreading soil on the restored floodplains to support native vegetation, and native vegetation establishment through planting and seeding on sites where conditions for natural regeneration are not favorable. The increased diversity in vegetation composition and structure following restoration activities may improve potential habitat increase for several rare or sensitive plant species, particularly in the riparian zone.

Reclamation would occur after mining of placer gravels is completed and would include recontouring of mined areas, spreading stockpiled top soil or fines (3/4 inch minus material from mining operations, if available), and spreading organic debris (vegetation stockpiled from clearing operations). Most proposed mining areas have some amount of top soil available for reclamation and would rely on natural revegetation (from seed source/roots in stockpiled top soil or blown in from surround vegetation). Vegetation would become reestablished but could take more time and may not be uniformly distributed.

Nonnative Species

There is a high likelihood of nonnative species being introduced and existing populations being spread by equipment, vehicles, and foot traffic, or with materials used for revegetation. The potential for nonnative plant increases would be particularly high in areas of exposed soil. Under this alternative, a maximum of 333 acres (existing/proposed mining areas) would be impacted by ground-disturbing activities with high potential for exposed soil over 20 years. Areas within the restoration corridor would have vegetation becoming reestablished more quickly reducing the time period of exposed soil. The 274 acres of mining areas outside of the restoration corridor would be reclaimed but it would likely take longer for vegetation to become reestablished lengthening the time bare soil is exposed, thus increasing the potential for existing nonnative species in the area to spread. Any materials that are brought in from off-site locations to be used for mulching, erosion control, rehabilitation, soil establishment, fill, or other uses should be free of invasive plant species (mitigation measure 14, page 43). In addition, heavy equipment mobilized for mining or restoration would be spray washed including wheel wells, undercarriages, tires, tracks before it is brought into the project area so that it is free of all foreign plant materials and soil (mitigation measure 18, page 43). Monitoring of reclaimed and restored areas for nonnative plant species would help identify those areas which may require more aggressive weed treatment strategies (monitoring activity 11, page 53).

Sensitive Plants

Potential habitat occurs for one region 10 sensitive species, the pale poppy. Habitats for the pale poppy include gravel bars, dry meadows, and rock outcrops. This species has not been found within areas likely to be affected by project activities (Bella 2007). In addition, this species tolerates moderate levels of disturbance. Therefore, the implementation of this alternative is not expected to adversely affect this sensitive plant.

Cumulative Effects

Other existing or reasonably foreseeable future projects in vicinity of this project include those projects listed under alternative 1. Across the Kenai Peninsula portion of the Chugach National Forest, there are vast areas of potential habitat (over one million acres). Cumulatively, the loss of another 274 acres of vegetation would be an insignificant effect to sensitive plants or their habitats when over one million acres of potential habitat still exist on the Kenai Peninsula.

Compliance or Conflicts with the Forest Plan

Alternative 2 maximizes the opportunity to achieve the desired future conditions for vegetation within active mining claims as specified by the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-13) within the restoration corridor. This alternative also meets Forest Plan Standards and Guidelines for vegetation management (USDA Forest Service, Chugach National Forest 2002a, pages 3-25 through 3-27).

Consistency with Regulatory Framework

Alternative 2 is consistent with the Endangered Species Act. Biological evaluations were completed for threatened and endangered plant species and no threatened and endangered plant species or their habitats are located within the project area. Alternative 2 is also consistent with Executive Order 13112 - *Invasive Species* because existing populations of nonnative species spreading beyond existing mining areas would likely be limited because of mitigation measures required to limit introduction of new infestations (mitigation measures 14, 18, 19; pages 43 and 44), monitoring specified in chapter 2 to determine establishment of any new nonnative species and spread of existing nonnative populations (monitoring activity 11, page 53), and reclamation measures that will encourage revegetation of mining areas with native species as soon after mining is completed (mitigation measure 19, page 44).

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Area of Revegetation

Reclamation of mining activities would have the same effects as described in alternative 2. Vegetation cover typical of Southcentral Alaskan stream systems would not return to the historic tailings pile areas for many decades and tailings piles would continue to prevent flood flows from delivering fine sediment to the floodplain areas, thereby limiting riparian vegetation growth.

Nonnative Species

Proposed mining activities are expected to increase nonnative plant abundance and spread due to existing nonnative plants in the project area, the amount of disturbed bare soil from mining activities, and the length of time it may take for vegetation to become reestablished after reclamation. Cleaning heavy equipment prior to mobilizing on site and effective reclamation practices (mitigation measures 18 and 19, page 43) would minimize any new introductions of nonnative plant species.

Sensitive Plants

Similar to alternative 2, potential habitat for one sensitive species occurs in the project area (the pale poppy). Habitat for the pale poppy includes gravel bars, dry meadows, and rock outcrops. This species has not been found within areas likely to be affected by project activities (Bella 2007). In addition, this species tolerates moderate levels of disturbance. Therefore, the implementation of this alternative is not expected to adversely affect this sensitive plant.

Cumulative Effects

Other existing or reasonably foreseeable future projects in vicinity of the project are the same as those described in alternative 2 with the same cumulative effects. Across the Kenai Peninsula portion of the Chugach National Forest, there are vast areas of potential habitat (over one million acres). Cumulatively, the loss of another 285 acres of vegetation would be an insignificant effect to sensitive plants or their habitats when over one million acres of potential habitat still exist on the Kenai Peninsula.

Compliance or Conflicts with the Forest Plan

Vegetation condition would not be restored as described in the desired future condition for vegetation in the Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 3-13) with required mining reclamation work on mining areas. Alternative 3 does meet Forest Plan Standards and Guidelines for vegetation management (USDA Forest Service, Chugach National Forest 2002a, pages 3-25 through 3-27).

Consistency with Regulatory Framework

Alternative 3 is consistent with the regulatory framework for the same reasons as listed for alternative 2.

Wildlife Habitat

Affected Environment

Placer mining nearly a century ago has greatly altered the wildlife habitat in the project area through removal of riparian and forest vegetation and changes in ecological succession capability.

The wildlife specialist report in the project record notes all species and habitats documented during wildlife surveys, as well as species considered but not analyzed further due to lack of existing or potential habitat.

Vegetation Composition and Structure

The Resurrection Creek project area contains a mixture of primarily pole size to large hardwoods (cottonwood, birch) and seedling/sapling to large conifers (white and Lutz spruce and mountain hemlock). Current vegetation is a mix of some early succession species that have reestablished after mining activities and later successional species in areas that have had relatively little disturbance to natural composition and stand structure. More details on the vegetation composition and structure are listed in the wildlife specialist report and in the Vegetation Ecology section in this chapter (pages 112 through 118).

Wildlife

Threatened, Endangered and Sensitive Species

There are no threatened, endangered, sensitive or proposed species, or designated critical habitat likely to occur in the project area.

Management Indicator Species and Species of Special Interest

Management indicator species and species of special interest and existing or potential are listed in table 19.

Table 19. Management indicator species (MIS) and species of special interest (SSI) in the project area

Species	MIS	SSI	Existing Habitat	Potential Habitat
Brown Bear	X		Yes	Yes
Moose	X		Yes	Yes
Bald Eagle		X	Yes	Yes
Northern Goshawk		X	No	Yes (foraging)
Gray Wolf		X	Yes	Yes
Lynx		X	Unknown	Yes
River Otter		X	Unknown	Yes
Townsend’s Warbler		X	Yes	Yes
Wolverine		X	Unknown	Yes

Management Indicator Species

Moose: Moose populations on the Chugach National Forest are stable or declining according to Alaska Department of Fish and Game Harvest and Management Reports (McDonough 2010, Selinger 2012). Moose are primarily associated with early- to mid-successional habitat and riparian areas. On the Kenai Peninsula the factor limiting the growth of moose populations is the availability of early- to mid-successional habitat, and the main mortality factors are predation, hunting, and mortality from collisions with vehicles along the highway and railroad (Lottsfeldt-Frost 2000). Selinger (2012) lists severe winters and deep snows as contributing to high mortality in game management unit 7. Recent declines in animals observed in Resurrection Creek and Juneau Creek during composition counts in 2010, caused Alaska Department of Fish and Game to lower the population estimate in GMU 7 from 700 to 1,000 animals in 2010 to 600 to 800 animals in 2012 (Selinger 2012).

Moose use the project area during the rut and as winter range (Alaska Department of Fish and Game 1985) and were noted during surveys in the summer. Moose sign is present throughout the project area.

Brown Bear: Brown bears have large home range requirements and an intolerance of human disruption and development. The primary limiting factor for brown bears on the Kenai Peninsula is spring and summer feeding habitat. South-facing hillsides and avalanche chutes, big-game winter ranges, and salmon streams provide the high quality forage needed by bears before and after denning (Suring et al. 2005). The project area does not contain primary bear habitat (Graves et al. 2007) although bears are known to travel through and forage for salmon in Resurrection Creek.

Species of Special Interest

Gray Wolf: Wolves are highly social animals and usually live in packs that include parents and pups of the year. Wolves are adaptable and exist in a wide variety of habitats (Alaska Department of Fish and Game 2007). One pack was reported by Alaska Department of Fish and Game to exist in Resurrection Creek (personal communication with Ted Spraker, Alaska Department of Fish and Game 2001). Mining lessees also reported seeing wolves in the past ten years.

Lynx: Lynx inhabit much of Alaska's forested terrain and use a variety of habitats, including spruce and hardwood forests, and both sub alpine and early seral communities. The best habitat occurs where there is a diversity of vegetation types with an abundance of early successional growth, which provides habitat for snowshoe hare and other small prey species. Hares also like dense conifer thickets of seedlings and saplings for food and cover. Lynx sign was not evident during surveys, yet potential habitat exists because of the diverse mix of spruce and hardwood forest and patches of early-seral growth. The project area occurs close to the community of Hope. Local trapping efforts may influence lynx numbers or potential use of the project area.

River Otter: River otters are associated with coastal and fresh water environments and the immediately adjacent (within 100 to 500 feet) upland habitats. Beach characteristics affect the availability of food and cover, and adjacent upland vegetation provides cover. Old-growth forests have the highest habitat value, providing canopy cover, large-diameter trees and snags, and burrow and den sites. Younger successional stages provide lower quality habitat. River otters hunt on land and in fresh and salt water and eat snails, mussels, clams, sea urchins, insects, crabs, shrimp, octopi, frogs, a variety of fish, and occasionally birds, mammals, and vegetable matter. High quality habitat for otters does not occur in the project reach. Otters were not noted during wildlife surveys. Lower quality habitat exists and otters may use the project area for traveling, foraging or denning.

Townsend's Warbler: Townsend's warblers are fairly common breeding birds on the Chugach National Forest and can be found primarily in coniferous forests or mixed forests where coniferous trees comprise a predominant feature of the habitats (Bent 1953; Erskine 1977). The Townsend's warbler is found almost exclusively in mature white spruce dominated forests in Southcentral Alaska (Matsuoka et al. 1997). The Townsend's warbler population has declined in the past 10 years in Southcentral Alaska; however, the regional and national level population trends are believed to be stable (Prosser 2002; Sauer et al. 2011). Townsend's warblers were observed in the project area during surveys but did not appear to be abundant.

Wolverine: The wolverine is an animal of montane forest, tundra, and taiga. Several factors appear to influence wolverine habitat selection at the landscape and forest stand levels. The distribution and density of large mammal carrion is a primary factor along with the level of human disturbance. Other habitat parameters such as escape cover from predators, availability of den sites, prey concentrations, and cover can affect daily movement and habitat use patterns (Howell 1999). Wolverine tracks were observed in Resurrection and Palmer Creeks during a 1992 interagency survey (Golden 1994). In 2004, another survey was conducted, and no tracks were noted in the area (Golden 2004). The project area probably does not provide suitable denning habitat. Wolverines may travel through the project area while foraging.

Bald Eagle: Bald eagles are often found along Alaska's coast, offshore islands, and interior lakes and rivers. Bald eagles often use and rebuild the same nest each year. Eagles in Southcentral Alaska nest in old cottonwood trees near water. The majority of bald eagle nests on the Seward Ranger District are in mature cottonwood trees with an average diameter of 31 inches and within one quarter mile of an anadromous fish bearing streams. There is a substantial lack of such trees in the watershed, in part due to past mining activities. No nests are known to occur in the project area.

Northern Goshawk: The northern goshawk is a forest raptor that feeds in the understory on squirrels, birds and snowshoe hares. The amount and combination of feeding and nesting habitat appears to be the primary limiting factors (Iverson et al. 1996). The majority of goshawk nests on the Seward Ranger District are in old-growth hemlock-spruce stands characterized by a closed canopy, large average diameter, gap regeneration and an open understory. No nests have been located in the project area. Much of the large spruce has been killed by spruce bark beetles. The majority of birch and hemlock in the project area does not appear large enough to provide optimal goshawk nesting habitat. Goshawks may use the project area for foraging, however potential nesting habitat is limited.

Migratory Birds

Neotropical migratory birds nest and breed in North America, generally spending their wintering months south of the United States. Priority species identified in the most recent publication of the Birds of Conservation Concern (USDI Fish and Wildlife Service 2008) were reviewed. The project area may contain suitable habitat for the rufous hummingbird and olive-sided flycatcher, although they were not detected during surveys.

- **Rufous Hummingbird**: Rufous hummingbird tends to prefer open conifer forests, along edges of open conifer forests, and in shrub alpine habitats. The global population of the rufous hummingbird has a decline of 2 percent per year range wide, with a decline of 2.9

percent within the Pacific rainforest bioregion, although with a global population of 6.5 million the population is generally considered secure (Sauer et al. 2011).

- **Olive-sided Flycatcher:** Olive-sided flycatchers tend to prefer to nest in mid-seral hardwood forests, forests that have regenerated from fire, and other disturbances. Olive-sided flycatcher population has a range wide annual decline of 3.5 percent, with a decline of 3.7 percent in the Pacific rainforest bioregion. Local population decreases have been documented in parts of California (Shuford and Gardali 2008).

Environmental Consequences – Wildlife Habitat

Issues

No issues regarding wildlife were identified.

The public expressed concerns about disturbance to wildlife and habitat abandonment from noise, people, and machinery. They also suggested adding buffer widths and protecting mature trees for wildlife habitat. Under the General Mining Act of 1872, as amended, Hope Mining Company has the right to access minerals on their claims, including areas with mature trees and wildlife habitat. The Forest Service does not have the authority to implement an alternative that denies reasonable access to the mineral estate therefore alternatives were not considered with these suggestions. While these concerns are critical to the effects of each alternative, they are not considered an issue as defined by the National Environmental Policy Act.

Measurement Indicators

Units of measure to describe and compare relative effects on wildlife include the following:

- Acres of habitat affected by mining or restoration
- Acres of habitat restored
- Duration of disturbance to wildlife

Methodology

The Forest Plan and other documents were reviewed for direction regarding wildlife and habitat management. Wildlife surveys were conducted in 2008 and 2009 and a variety of bird and mammal species or their sign were observed. Hope Mining Company employees and several lessees were interviewed on what species they had observed over the past 10 years. Results from these surveys and interviews are detailed in the Wildlife Specialist report located in the project record and have been incorporated into the analysis in this section. Factors used for analysis includes wildlife species present, habitats, and effects from each alternative. Mitigation measures 20 and 21 were designed, where possible, to minimize those effects (page 44).

The assumptions for this analysis include the following:

- There is no existing or potential habitat for, and thus no effect on threatened, endangered, sensitive or proposed species in the project area.
- Mining operations at varying levels will occur over the next 20 years. Mining operations will include use of heavy equipment, use of camps, and use of vehicles on existing and proposed mining roads.
- Mining operations and restoration activities will generate similar levels of noise and human presence. Noise from both activities may extend up to one mile beyond the project area.

- All acres are considered habitat for one or more wildlife species.

Geographic bounds for direct and indirect effects were considered to be the project area plus an area that extends one mile from the project area (approximately 5,444 total acres). This boundary was selected because vegetation would be removed from the project area, and noise from mining or restoration operations could extend one mile beyond the project area boundary.

The watershed was considered for cumulative effects because many wide ranging species such as wolverines, bears, moose, goshawks and others may move through or use habitat within the project area and throughout portions of the entire watershed.

Short-term effects would be considered those lasting 1 to 4 years and long-term effects would be 5 to 100 years (potential timeframe for vegetation to be restored to mature structure and composition).

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Habitat Affected by Mining Activities

Removal of all or most vegetation during proposed mining activities on the remaining approved acres would have a direct short-term negative effect on wildlife habitat for most species through destruction of nesting and foraging habitat and cover. Approximately 45 acres out of 97 have already been mined and 28 acres have been reclaimed. Removal of vegetation and disturbance of soil layers over the entire 97 acres may cause long-term effects on soil productivity which would likely be reduced for many decades. Lower soil productivity alters the manner and rate at which these areas reestablish vegetation influencing the type of vegetation and habitat the project area would provide into the future. Vegetation species that are more tolerant of lower soil productivity, such as alder, would be the dominant species to become reestablished initially. Alder is a less preferred browse species for moose. Some limited early seral hardwood browse (cottonwood and willow) would also reestablish in the reclaimed areas. Alder does provide nesting and roosting habitat for many birds or cover for small mammals. With lower soil productivity, vegetation may not respond with as much vigor or density as under natural conditions and may take longer (up to 100 years) to reach a mature forest stand structure. Species that depend on mid-aged or mature forest would experience longer-term habitat loss.

Wildlife Disturbance by Mining Activities

Wildlife species may be disturbed and avoid or abandon habitat during mining operations over an estimated 15 year operating period. Noise disturbance within 1 mile of the mining areas may cause habitat avoidance, abandonment, or behavioral changes by some species or individuals.

Acres of Habitat Restored

The riparian area along Resurrection Creek was previously mined by hydraulic mining methods and has very limited topsoil. Riparian vegetation would remain sparse indefinitely, retaining poor habitat conditions for riparian species.

Alternative 1 may impact individual animals; however none of the activities are expected to affect populations or viability of any species. More detail on effects on specific management indicator species and species of special interest can be found in the wildlife specialist report in the project record.

Cumulative Effects

The following projects were considered for cumulative effects:

- Past fuel reduction projects/harvesting/pile burning along Hope Highway and Palmer Creek Road, about 800 acres
- Resurrection Creek Restoration Project Phase I in 2005 and 2006
- Past, ongoing and future development on private land at Mile 14 of Hope Highway and along Resurrection Creek Road
- Porcupine Campground Reconstruction completed in 2012
- Past trailhead development for Gull Rock and Hope Point Trail along Cripple Creek Road
- Hope Point Trail reconstruction
- Ongoing recreation use of Resurrection Pass National Recreation Trail
- Small-scale suction dredging on Palmer Creek
- Development on patented mining claims at the end of Resurrection Creek Road

These projects modify wildlife habitat by affecting vegetation through removal or modification of forest structure and composition. Approximately 5 percent of all wildlife habitat (both forested and unforested) within the watershed has, is or likely will be affected by mining, fuel reduction, recreation or other development. Cumulatively, this level of habitat change within the watershed is not expected to affect populations or viability of any species.

Compliance or Conflicts with the Forest Plan

Alternative 1 complies with Forest Plan for the wildlife resource by complying with the forestwide standards and guidelines for wildlife management (USDA Forest Service, Chugach National Forest 2002a; page 3-28 through 33).

Consistency with Regulatory Framework

Alternative 1 is consistent with the Endangered Species Act with regards to wildlife. No threatened and endangered wildlife species or their habitats are located within the project area.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Mining and restoration can have effects on both wildlife individuals and their habitats. Direct effects to wildlife habitat are caused by vegetation removal for mining or restoration activities and direct effects to individual animals are primarily related to the disturbance. Indirect effects to wildlife species and habitat occur as a result of the long-term beneficial effects of riparian habitat restoration.

Habitat Affected by Mining and Restoration Activities

Effects on wildlife habitat from mining for alternative 2 are the same as described in alternative 1 but take place over 274 acres of mining areas.

Restoration activities would result in similar short-term direct effects of habitat loss from vegetation removal and disturbance occurring within the 74 acre restoration corridor during creation of the new stream channel and side channels and ponds. These activities would occur over a 4 year period (pending funding availability). Most of the vegetation in the restoration corridor has already been removed by past mining operations but some existing vegetation (estimated at less than 3acres) may need to be removed during reconstruction of the channels and side channels. Clumps of larger trees in the existing intact floodplain within the corridor would be left undisturbed where feasible (mitigation measure 21; page 44).

Habitat Restored

Over the long term restoration will benefit a variety of wildlife species. Within the 74-acre restoration corridor, restoration of 51 acres of floodplain and riparian vegetation, and development of 1.6 miles of new side channels would create new habitat favoring species that feed on spawning or rearing salmon such as brown bear, otters, eagles, and wolves (see wildlife specialist report in project record), breed or forage in side channels (harlequin ducks and other birds), den or nest in riparian vegetation (river otters, bald eagles, and migratory birds), or forage for vegetation or for prey species in riparian areas (moose, lynx, wolverine, wolves, bears, eagles, and goshawks). The riparian vegetation would have the potential to grow into mature forest over time benefiting bald eagles by providing nesting habitat. The riparian vegetation in the restoration corridor would offer 200 to 500 feet of screened foraging habitat for bears and cover for animals using the creek as a travel corridor (bears, wolves, otters, and moose).

Wildlife Disturbance by Mining and Restoration Activities

Noise and physical disturbance from people, camps, vehicles, and heavy equipment during mining activities on 274 acres over a 20 year period and restoration activities on 74 acres up to a 4 year period may cause direct effects such as habitat abandonment or avoidance to a wide variety of wildlife species. Nesting migratory birds and small mammals may have nests destroyed and young or adults killed when vegetation is removed.

Decibel levels generated by mining equipment are expected to produce noise levels in the range of 65 to 80 dB at active mining sites and may be detectable up to 1 mile from the active mining site with decibel levels ranging from 50 to 55 dB (refer to the Noise section in this chapter, pages 81 through 90). The total area that could be disturbed by noise within and outside the project area is approximately 5,444 acres (acres contained within the project area and within 1 mile of the project boundary). Noise levels would be variable based on topography and vegetation. Persistent equipment noise may disturb and displace wildlife annually during the months of March through October.

The potential effect of mining or restoration noise to different species or individuals at various distances and decibel levels is difficult to quantify. Animals rely on meaningful sounds for communication, navigation, avoiding danger and finding food (Kaseloo and Tyson 2004). The effect of noise on wildlife has only recently been considered a potential threat to animal health and long-term survival. Little research has been done on the effects of mining noise on animals; most of the research focus has been on vehicles, roads and aircraft. Research into the effects of noise on wildlife often presents conflicting results because of the variety of factors and variables that can affect and/or interfere with the determination of the actual effects that human-produced noise is having on any given animal. Most researchers agree that noise can affect an animal’s physiology and behavior, and if it becomes a chronic stress, noise can be injurious to an animal’s energy budget, reproductive success and long-term survival. The diversity of effects that noise can have among and between species makes it difficult for the scientific community to present definitive evidence for wildlife as a whole. Management or protection through mitigation is difficult because each species could potentially have different thresholds of disturbance (Radle 2005). Noise disturbance may impact individual animals of a variety of species to varying degrees, causing direct effects such as habitat abandonment or avoidance.

Alternative 2 may impact individual animals through disturbance from noise, physical disturbance, and effects to habitat from mining or restoration; none of the activities are expected to affect populations or viability of any species. More detail on effects on specific management indicator species and species of special interest can be found in the wildlife specialist report in the project record.

Cumulative Effects

The same projects listed under alternative 1 were considered for cumulative effects with the addition of existing approved mining operations within Hope Mining Company claims north of Resurrection Pass Trail Bridge on both sides of Resurrection Creek (97 acres).

Wildlife habitat is affected by changes in vegetation through removal or modification of forest structure and composition. Approximately 5 percent of all wildlife habitat (both forested and unforested) within the watershed has, is or likely will be affected by mining, fuel reduction, recreation and development. Most of these activities are concentrated in forested habitats which are limited to 25 percent of the watershed. Human use may increase in the watershed through development on private lands and recreation. These activities can affect wider ranging species such as bears, moose, wolverines, wolves, and lynx that use forested areas. Mature forested habitats may continue to decline with spruce bark beetle impacts, development, mining and recreation, affecting species such as northern goshawks, Townsend’s warblers and bald eagles in riparian zones. Approximately 20 percent of the forested habitat within the watershed may experience varying levels of habitat degradation. The species living in these forested habitats may experience continued disturbance and temporary or longer term displacement from these habitats. The Resurrection Creek Restoration Project Phase 1 has provided beneficial effects to wildlife habitat. Cumulative effects are not expected to affect populations or viability of any species.

Compliance or Conflicts with the Forest Plan

Alternative 2 complies with Forest Plan for the wildlife resource by complying with the forestwide Standards and Guidelines for wildlife management (USDA Forest Service, Chugach National Forest 2002a; page 3-28 through 33):

- Requiring removal of garbage and correct storage of food by mining operators or restoration contractors (mitigation measure 20, page 44)
- Evaluation of project area for threatened or endangered species habitat or species

Consistency with Regulatory Framework

Alternative 2 is consistent with the Endangered Species Act for wildlife. Biological evaluations were completed for threatened and endangered wildlife species. No threatened and endangered wildlife species or their habitats are located within the project area.

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Habitat Affected by Mining Activities

Mining operations would occur over 285 acres, 11 acres more than alternative 2. Many of the mining activities would be similar in intensity and area to those described in alternative 2 causing short- and long-term habitat loss and reduction of soil productivity, disturbance, and associated effects to wildlife as in alternative 2.

Wildlife Disturbance by Mining Activities

Wildlife species may be disturbed and avoid or abandon habitat during mining operations on 285 acres over the 20-year operating period, similar to alternative 2. Noise disturbance within 1 mile of the project area may cause habitat avoidance, abandonment, or behavioral changes by some species or individuals.

Acres of Habitat Restored

Alternative 3 would not offer the benefits to enhancing wildlife habitat (food, cover, foraging areas) on the 74 acres through restoration. In alternative 3 most of the riparian area can be mined and would have the same effects as in other mining areas. Because the riparian area was previously mined by hydraulic mining methods, it has very limited topsoil. Riparian vegetation would remain sparse indefinitely, retaining poor habitat conditions for riparian species.

Alternative 3 may impact individual animals; however none of the activities are expected to affect populations or viability of any species. More details on effects on specific management indicator species and species of special interest can be found in the wildlife specialist report in the project record.

Cumulative Effects

Cumulative effects for alternative 3 are the same as listed for alternative 2.

Compliance or Conflicts with the Forest Plan

Alternative 3 complies with Forest Plan for the same reasons listed under alternative 2.

Consistency with Regulatory Framework

Alternative 3 complies with the Endangered Species Act for wildlife. No threatened or endangered species habitats or species occur within the project area.

Heritage Resources

Affected Environment

Placer gold mining on Resurrection Creek began in the late 1800s. Extensive hydraulic and heavy equipment placer mining began in the early 1900s and continued until 1942 (Jansons et al. 1984). There was an unsuccessful attempt to use a hydraulic elevator on Resurrection Creek which failed due to lack of water and presence of large boulders (Moffit 1906). The productive portion of Resurrection Creek is from its junction with Palmer Creek to Turnagain Arm.

The town of Hope was established in 1895 and in 1896, 3,000 people came to the Turnagain Arm gold field. It was estimated that 2,000 to 2,500 people came to the adjacent Sunrise District. The initial surge of gold production, mining activity, and production decreased quickly because the deposits which could be easily worked profitably by hand methods were exhausted and the small size of higher grade deposits which were usually confined to the channels of the present day stream courses. Substantial amounts of lower grade stream placer and low grade glacial deposits remained but required the development of hydraulic mining systems and considerable capital investment.

By 1908 there were approximately 50 people working on claims in the area. In 1931 only 20 people worked mines in the Moose Pass and Hope Mining Districts and the adjacent town of Sunrise had dwindled to a population of two people by 1930. During the 1930s, 60 to 70 people lived between Hope and Moose Pass and in the summer an additional 25 miners came into the area. Gold mining was halted in 1942 due to World War II; mining resumed at a much slower pace in the 1950s and 1960s.

Historic mining resources constitute the greatest part of the known cultural resources in and near the project area. Numerous Euro-American historic properties have been documented within the Resurrection Creek watershed. Of these sites, one lies within this current proposed project area, the Hope Mining Company Historic Mining District. This site has been properly documented and is eligible for inclusion on the National Register of Historic Places.

On March 30, 2009, the Omnibus Public Lands Management Act of 2009 was signed, designating Alaska's first national heritage area, known as the Kenai Mountains-Turnagain Arm National Heritage Area, and focuses on the theme of transportation for mining and settlement. This project area falls within the boundaries of this National Heritage Area and the Forest Service anticipates working closely with the Kenai Mountains-Turnagain Arm Heritage Corridor Communities Association and National Park Service (who administers the National Heritage Area) to interpret the historic resources in the area.

The Forest Service is currently in partnership with Hope Mining Company to develop an interpretive area and interpretive panels in the southern part of the project area to interpret the geology and mining history of the area (figure 13).

Figure 13. View of Resurrection Creek from the future interpretive area (historic mine tailings in foreground)

Environmental Consequences – Heritage Resources

Issues

No issues regarding heritage resources were identified.

All alternatives would affect historic tailings which are contributing elements of the Hope Mining Company historic mining district. Under the General Mining Act 1872, as amended, Hope Mining Company has the right to access minerals on their claims where the historic tailings are located. There is no physical way to avoid disturbance of these tailings and the effects are discussed in this section for all alternatives.

Measurement Indicators

Measurement indicators are the number of historic properties affected and changes to the characteristics of a property that make it eligible to the National Register of Historic Places. There is one historic property in the project area, the Hope Mining Company Historic Mining District.

Methodology

Knowledge of the current range, distribution and condition of cultural resources is dependent on the research of historic records, reports, archives and field investigations. The information available for the known cultural resources comes primarily from research and field investigations conducted by the Chugach National Forest Heritage Staff and the private sector archaeological contracts for various Chugach National Forest projects. Investigations follow current research methodologies and techniques as described in Forest Service policy (USDA Forest Service, Recreation, Wilderness, and Related Resource Management 2008a, Chapter 2363). An existing data review was conducted for this project and an intensive field survey implementing a complete pedestrian examination of the area of potential effect was completed to identify cultural resources. Investigations follow current research methodologies and techniques, and are reviewed by the State Historic Preservation Office to ensure the latest acceptable scientific methods and protocols are followed. The area of potential effect has been surveyed by heritage specialists and all known cultural resources have been documented.

The geographic boundary for direct, indirect, and cumulative effects is the project area. The time frame considered for effects to cultural resources for this project is only long term; once a historic property is adversely affected, those effects are irreversible.

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

The Hope Mining Company Historic Mining District is a historic property that will be affected by the existing mining activities. Historic tailings, which are a contributing feature for the Hope Mining Company Historic Mining District, will be destroyed in area 19. These effects have been analyzed through past environmental documentation (USDA Forest Service, Chugach National Forest 2009) and mitigated through a Memorandum of Agreement with the State Historic Preservation Office (Alaska Department of Natural Resources 2009). Historic tailings located outside of existing mining area boundaries will remain undisturbed, although seasonal flooding and erosion will minimally redistribute some tailings along the banks of the creek and in low lying areas prone to flooding.

Cumulative Effects

There are no cumulative effects for alternative 1.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

The restoration and new mining activities would result in the redistribution of approximately 7.2 acres of historic mine tailings piles. The tailings are contributing features for the Hope Mining Company Historic Mining District, and redistribution would constitute an adverse effect that is unavoidable. The Forest Service consulted with the State Historic Preservation Officer and executed a memorandum of agreement in 2009 addressing adverse effects of mining on these tailings on a previous mining project; the effects from this project were also included in the memorandum (Alaska Department of Natural Resources 2009). To mitigate this adverse effect, the memorandum of agreement describes the development of an interpretive area which will be located on the south end of the project, with public access near Resurrection Creek Road, where a representative section of intact historic mine tailings will be interpreted (mitigation measure 11, page 42). The Forest Service is working in partnership with Hope Mining Company to develop the interpretive area and interpretive signing.

A dragline, which is a piece of historic mining equipment is located within the restoration corridor and would need to be moved prior to restoration activities in that location. The dragline is listed as a contributing feature of the Hope Mining Company Historic Mining District and the Forest Service would coordinate with Hope Mining Company to move it to a location still within the boundaries of the Historic Mining District where it will not be damaged by restoration or mining activities. The State Historic Preservation Officer concurred with the Forest Service finding that since this equipment was designed to be mobile, relocation within the Historic Mining District will result in no adverse effect to historic properties.

Mitigation measure 10 (page 42) was developed to address any additional undocumented mining artifacts actions that would be uncovered by mining operator and/or restoration contractor.

Cumulative Effects

The past approval and implementation of mining operations within Hope Mining Company claims north of Resurrection Pass Trail Bridge on both sides of Resurrection Creek (97 acres) was the only activity that was considered under cumulative effects for alternative 2 because it is the only activity that has taken place within the project area (which is the cumulative effects geographic boundary also). Approximately 5 acres of historic tailings have been or will be disturbed through existing mining operations described in alternative 1. These 5 acres are in addition to the approximate 7 acres that would be disturbed through proposed activities in alternative 2. All historic tailings within the project area are contributing features of the Hope Mining Company Historic Mining District.

Compliance or Conflicts with the Forest Plan

Alternative 2 complies with Forest Plan in that site surveys were completed to determine effects to heritage resources as is required by a forestwide standard (USDA Forest Service, Chugach National Forest 2002a, page 3-34) when surface or subsurface activities disturb more than one square meter of ground or when this ground disturbance occurs in areas of known heritage resources, sites, or districts on, or eligible for the National Register of Historic Places.

Consistency with Regulatory Framework

Heritage site surveys completed for effects analysis and the development of the mitigation measures 10 and 11 (page 42) were done in consultation with the State Historic Preservation Office and the Advisory Council on Historic Preservation, and are consistent with Section 106 and 110 of the National Historic Preservation Act.

Alternative 3 – Proposed Mining Operations Only

Proposed mining operations have the same potential to affect the historic tailing of the Hope Mining Company Historic Mining District. The short- and long-term direct and indirect effects as well as the cumulative effects would be the same as alternative 3.

Recreation

Affected Environment

Recreation Opportunities

The Forest Service utilizes a system called the recreation opportunity spectrum to describe different recreation settings across the Forest. The recreation opportunity spectrum system describes different settings as classes with specific, defined attributes such as scenic quality, access, remoteness, and social encounters expected. The recreation opportunity spectrum classes range from highly modified and developed places ("rural" class – i.e. Begich Boggs Visitor Center, approved mining operations) to primitive, undeveloped settings ("primitive" class – i.e. Black Mountain Research Natural Area on the Kenai Peninsula near Moose Pass, Icy Bay in Prince William Sound). The recreation opportunity spectrum class for all mining claims is "rural" which includes the entire project area. The recreation opportunity spectrum class immediately adjacent to the project area on the east side is "roaded modified" (within ¼ mile of Resurrection Creek Road) and "semiprimitive nonmotorized" west and south of project area boundary.

Recreation Use within the Project Area

Limited summer and winter recreation use occurs within the project area. Recreation use that does occur is most likely from local Hope residents that live in the vicinity who walk and/or ski along the main mining road on the east side of the creek and parallel to the Resurrection Creek road. The mining road is gated on both the south and the north end of the project area and therefore only allows nonmotorized public access. This section of Resurrection Creek does not provide fishing opportunities that are desired by a majority of sport anglers. The Resurrection Creek road bounds the east edge of and crosses a small portion of the project area. The recreation visitors using the Resurrection Creek road are likely travelling from the town of Hope to the trailhead for the Resurrection Pass National Recreation Trail or to the recreational gold panning area just upstream from trailhead. The road ends at private land boundary approximately 1 mile to the south of the project area.

Resurrection Pass National Recreation Trail

The primary recreation activity immediately adjacent to the project area is use of the Resurrection Pass National Recreation Trail. By definition, national recreation trails represent the more outstanding trail opportunities of the Forest developed trail system, offer extended trail experiences reasonably close to population centers, and possess significant natural and cultural features. The scenic features along the Resurrection Pass National Recreation Trail include alpine meadows, mountain lakes, and Juneau Falls near Cooper Landing. Cultural features include remnants of the mining and trapping era. The Resurrection Pass National Recreation Trail is nationally recognized for mountain biking opportunities as well as hiking. The 38.8 mile long trail is used year round for nonmotorized activities including hiking, biking, cross-country skiing, and horseback riding. The north trailhead is located at the southern boundary of the project area. Every other year from December 1 to April 30, the trail is open to snow machine use when there are adequate snow conditions. It is open to horse and bicycle use from July 1 to March 31.

Hope Mining Company and lessees have authorization to utilize the trail bridge and a short section (about 100 feet) of the trail for ATV access to the west side of Resurrection Creek and mining operations located downstream from the bridge. This ATV use occurs infrequently and has not raised complaints by the recreating public.

First time visitors to the Resurrection Pass National Recreation Trail may expect a relatively undeveloped recreation setting driving to and at the trailhead based on literature available online and in tour books about the trail. The recreation setting as defined by the recreation opportunity spectrum class is roaded modified along Resurrection Creek road in which visitors will see very evident modifications to the landscape (homes, powerlines, small airstrip, etc.). Active mining operations (rural recreation opportunity spectrum class) are evident along a short section of Resurrection Creek Road which may be a different visual experience than visitors would be expecting.

Recreational Gold Panning, Sluicing, and Dredging; Dispersed Camping

Gold panning, sluicing, and dredging for recreational purposes are important outdoor activities on the Forest as indicated by the number of participants, investment in equipment and supplies, impact on local economies, and the frequency of this type of activity. Gold panning, suction dredging and dispersed camping occurs just upstream and south of the project area along a one mile section of Resurrection Creek. The only site amenity is a vault toilet. Recreation use is typically higher from May 15 to July 15 when suction dredging is permitted by Alaska Department of Fish and Game within anadromous creeks.

Sport Fishing

The Alaska Department of Fish and Game is responsible for regulating fishing on National Forest System lands. According to Alaska Department of Fish and Game regulations, Resurrection Creek is closed year-round to sport fishing for all Chinook salmon, and open to sport fishing for other salmon, trout, and char (Alaska Department of Fish and Game 2009). Fishing for Chinook salmon is closed because at this time there is a lack of information on the status of Resurrection Creek Chinook salmon. In other locations that Chinook salmon are known to occur (e.g., Kenai River) the number of returning adults has been in steep decline in recent years affecting sport fishing opportunities. Several small populations of Chinook salmon are present in Cook Inlet, and low abundance combined with limited information on population status preclude establishment of a viable harvest oriented Chinook salmon sport fishery (Begich 2009, personal communication). Sport fishing regulations, including for Resurrection Creek, are only changed through the Alaska Board of Fisheries regulatory process.

Sport fishing for pink salmon mainly occurs at the mouth of Resurrection Creek. Anglers can be seen fishing downstream of the highway bridge on any given day during the salmon season. Limited sport fishing occurs along Resurrection Creek between the highway bridge and the footbridge on Resurrection Pass National Recreation Trail.

From 2006 to 2012, an average of 3,078 sport anglers fished 4,279 days per year in the Resurrection Creek watershed (Alaska Department of Fish and Game 2013, Alaska Sport Fishing

Survey). During this 7-year period, the average annual catch of pink, chum, and coho salmon was 3,004; 49; and 194 fish, respectively.

Environmental Consequences – Recreation

Issues

No issues were identified for the recreation resources.

During the public comment period of the Draft Environmental Impact Statement, a member of the public identified a concern associated with recreational access through the project area. Nonmotorized public access is allowed on active mining claims as long as it does not interfere with mining operations. No alternatives were developed as a result of this concern.

Measurement Indicators

The measurement indicator is the number of recreation opportunities affected by proposed activities and the extent of disruption of participation in the recreation activity.

Methodology

Effects to recreation are described in a qualitative assessment of impacts from implementation of restoration and proposed mining activities. Recreation use figures are used in the analysis where available. Refer to the Noise analysis in this chapter for noise impacts to recreating visitors (beginning on page 81).

Geographic bounds for direct and indirect effects were considered to be the project area and the area immediately adjacent to both sides of Resurrection Creek from the Resurrection Pass Trailhead to the private land to the south of the trailhead.

The lower Resurrection Creek drainage from the confluence of Palmer Creek to Turnagain Arm plus Palmer Creek valley is the boundary for cumulative effects because recreation visitors typically travel most of this area in pursuit of recreation opportunities.

Short-term effects are when mining operations are active (1 to 20 years) or when restoration implementation is occurring (1 to 4 years).

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Recreational Use of Project Area

Existing mining activities would continue to limit recreation use from March through October because of the presence of heavy equipment operating on the mining areas, noise, and lower scenic quality during and after mining operations (see Noise Analysis, beginning on page 81 and Scenery Resources Analysis, beginning on page 136). The limited winter recreation use of the project would not change with the continuation of the existing mining activities.

Resurrection Pass National Recreation Trail

Continuation of existing mining activities is not expected to have any effect on visitors accessing Resurrection Pass National Recreation Trail in summer or winter months.

Sport Fishing

The continuation of existing mining activities is not anticipated to have any effect on sport fishing opportunities because mining activities will not change the stream channel habitat or water quality.

Recreational Experience

The recreation setting within and adjacent to the project area is consistent with the recreation opportunity spectrum class identified in the Forest Plan (USDA Forest Service 2002a) which is rural, roaded modified, and semiprimitive motorized with the continuation of existing mining activities. Recreation visitors using Resurrection Pass National Recreation Trail would drive adjacent to existing mining areas (area 6, 14, 19) on the Resurrection Creek Road and then hike adjacent to the project area over the trail bridge and along the first several hundred feet upstream on the trail. While sights and sounds of mining may be much different than what recreation visitors might be expecting based on information in online literature and tour books, they would be traveling through the existing mining areas and be in visible and audible range of the mining operations for a short duration. It is not anticipated that this proximity to the mining area and the difference of expectations would disrupt recreation visitors enough to cause them to recreate elsewhere.

Authorized ATV use of the Resurrection Pass National Recreation Trail by Hope Mining Company mining operators and lessees to access the west side of Resurrection Creek would continue but anticipated ATV use would be infrequent (twice a day) and of very short duration (less than 2 minutes to cross bridge and travel north into the mining areas within the project area).

Recreation visitors camping in and using the recreation area upstream from the Resurrection Pass National Recreation Trailhead for recreational gold panning, sluicing, and dredging activities would be out of sight of the mining area and it is anticipated they would not be disrupted by continuation of mining activities.

Cumulative Effects

Visitors seeking recreation activities in the Hope area are mainly influenced by the availability of camping sites (National Forest System lands or privately owned lands), parking availability at trailheads, and sport fishing opportunities along Resurrection Creek. Several projects in the Resurrection Creek drainage have changed the availability of these opportunities. The Porcupine Campground reconstruction project completed in 2012 increased the number of campsites (from 24 sites to 34 sites). The reconstruction of the Hope Point and Gull Rock Trailhead at a different location increased the overall capacity for trailhead parking. The continuation of mining activities within the project area is not anticipated to further change or affect recreation opportunities in the broader context of the lower Resurrection Creek drainage and Palmer Creek valley.

Visitor expectations of a pristine, undeveloped area near Resurrection Pass National Recreation Trail, as advertised online and in available tour books may be different than the actual experiences of driving to and accessing the Resurrection Pass National Recreational Trail due to the following activities and development:

- Sights and sounds created by the use of heavy equipment in various projects along Hope Highway and along Resurrection Creek Road
- Development on private land at Mile 14 of Hope Highway and along Resurrection Creek Road

- Sights and sounds from suction dredge in the recreational gold panning, sluicing, and dredging area on Resurrection Creek

It is not anticipated that these differences between expectations and actual experience would cause a disruption in visitors using the Resurrection Pass National Recreation Trail because the visitor use of trail has remained consistent over the past decade.

Compliance or Conflicts with the Forest Plan

The continuation of mining activities are in compliance with the Forest Plan because the activities meet the recreation opportunity spectrum class for the project area as defined by a forestwide standard for recreation and tourism (USDA Forest Service, Chugach National Forest 2002a; page 3-35) and existing activities also meet forestwide guideline ensuring the levels of use and development are consistent with recreation opportunity spectrum class characteristics (USDA Forest Service, Chugach National Forest 2002a, pages 3-35 – 3-40).

Consistency with Regulatory Framework

Alternative 1 is consistent with Executive Order 12962 – *Recreational Fisheries* because it will not impact the public’s ability to recreationally fish in the project area or downstream from the project area.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Recreational Use of Project Area

Opportunities for local residents for summer nonmotorized recreational activities within the project area may continue to be limited due to heavy equipment operations occurring throughout the project area from March through October over the next 20 years. These limitations would not differ from current conditions. The project area has limited winter recreation use by local residents which would not change with implementation of this alternative.

Resurrection Pass National Recreation Trail

Alternative 2 is not expected to have any effect on visitors accessing Resurrection Pass National Recreation Trail in summer or winter months.

Sport Fishing

The effects of alternative 2 on sport fishing cannot be accurately predicted with the information currently available. Consistent with the Phase I restoration projects results, the proposed restoration activities is expected to increase productivity by increasing available spawning and rearing habitat (see Aquatic Resources and Hydrology section, page 106 to 107). The percentage of increase in fish populations is unknown and with salmon populations, is largely determined on ocean survival.

Recreational Experience

After implementation of restoration and mining activities for alternative 2, the recreation setting within and adjacent to the proposed project area would still be consistent with the recreation opportunity spectrum class identified in the Forest Plan (USDA Forest Service 2002a) which are “rural”, “roaded modified”, and “semiprimitive motorized”. Recreation visitors using Resurrection Pass National Recreation Trail would drive through more extensively mined areas (area 6, 6a, 8, 14, 20, 21) on their way to the trailhead and then travel adjacent to the project area over the trail bridge and along the first several hundred feet upstream on the trail. While sights and sounds of mining may be much different than what recreation visitors might be expecting based on information in online literature and tour books, they would be traveling through the existing mining areas and be in visible and audible range of the mining operations for a short duration. It is not anticipated that this proximity to the mining area and the difference of expectations would disrupt recreation visitors enough to cause them to recreate elsewhere.

Authorized ATV use of the Resurrection Pass National Recreation Trail bridge by Hope Mining Company mining operators and lessees to access the west side of Resurrection Creek would temporarily cease when the bridge is constructed for the restoration activities thereby eliminating some motorized use of the bridge and a very short section of trail beyond the bridge. After restoration implementation and monitoring is completed and the temporary bridge removed, Hope Mining Company may request authorization to use the trail bridge for ATV access to the west side of Resurrection Creek.

Recreation visitors camping in and using the recreation area upstream from the Resurrection Pass National Recreation Trailhead for recreational gold panning, sluicing, and dredging would be out of sight of the project area and it is anticipated they would not be disrupted by mining activities.

Cumulative Effects

The cumulative effects for alternative 2 are the same as alternative 1.

Compliance or Conflicts with the Forest Plan

The project is in compliance with the Forest Plan because the proposed mining and restoration activities meet the recreation opportunity spectrum class mapped for the project area as defined by a forestwide standard for recreation and tourism (USDA Forest Service, Chugach National Forest 2002a, page 3-35) and proposed activities also meet forestwide guideline ensuring the levels of use and development are consistent with recreation opportunity spectrum class characteristics (USDA Forest Service, Chugach National Forest 2002a, pages 3-35 – 3-40).

Consistency with Regulatory Framework

The project is consistent with the policies and laws that relate to recreation resources as stated in alternative 1.

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Recreational Use of Project Area

The effects of proposed mining operations would be the same as alternative 2.

Resurrection Pass National Recreation Trail

The effects of proposed mining operations would be the same as alternative 2.

Sport Fishing

There would be no anticipated change on sport fishing with implementation of alternative 3. No increase or decrease of fish populations would be anticipated as a result of this alternative.

Recreational Experience

The effects would be the same as alternative 2.

Compliance or Conflicts with the Forest Plan

The project is in compliance with the Forest Plan as described for alternative 2.

Consistency with Regulatory Framework

The project is consistent with the policies and laws that relate to recreation resources as described in alternative 1.

Scenery Resource

Affected Environment

The project area has been influenced by human activities for over a century including mining activities that started in the late 1800s. Past and current mining activities are partially visible from the Resurrection Creek Road which is the main transportation system adjacent to the project area. Power lines, driveways, homes, private lands, developed recreation, and dispersed recreation sites can also be seen in the vicinity. Mining has had the greatest impact on scenery because of its quantity, scale, proximity to the road system, proximity to adjacent property, and length of time required for visual recovery of these landscapes.

Existing Scenic Integrity

Scenic integrity is the measure of the degree to which a landscape is visually perceived to be complete. The highest scenic integrity ratings are given to those landscapes which have little or no deviation from the character valued by constituents for its aesthetic appeal. Scenic integrity is used to describe an existing situation, or can be applied as a standard for management called a scenic integrity objective (USDA Forest Service 2003; Recreation, Wilderness, and Related Resource Management (FSM 2300, Section 2380)).

Existing scenic integrity within the project area ranges from “moderate” to “unacceptably low”. The description of these existing conditions is as follows.

- **Moderate** – Human activities are evident but are visually subordinate to the attributes of the existing landscape character. They may repeat form, line, color or texture common to these characters but changes in quality, size, number, intensity, etc. must remain visually subordinate to the attributes, qualities or traits of a landscape that give it an image and make it identifiable or unique.
- **Low** – Human activities of vegetative and landform alterations may dominate the original, natural landscape character, but should appear as natural occurrences when viewed at background distances.
- **Very Low** – The valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character and may not borrow from valued attributes such as size, shape, edge effect, pattern of natural openings, changes in vegetation type, or architectural styles within or outside the landscape being viewed. Deviations must be shaped by and blend with the natural terrain so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.
- **Unacceptably Low** – The valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern, or scale from the landscape character. Landscapes at this level of scenic integrity need to be rehabilitated. “Unacceptably low” existing scenic integrity is never used as

objective for scenery management. This level is only used to discuss the existing condition (USDA Forest Service, Chugach National Forest 2002b).

In most areas viewed from the Resurrection Pass National Recreation Trail, the existing landscape character can be described as naturally appearing to modified or altered, a result of past mining activities (figure 14). The scenic integrity of these areas would be "moderate".

Areas where active mining operations are occurring would appear extremely altered compared to surrounding areas. Areas of heavily altered landscapes are considered to have an "unacceptably low" level of scenic integrity, since they so strongly dominate the natural landscape character (figure 15).

Figure 14. Historic tailings piles along the riverbank serve as evidence of past mining activity, as seen from the Resurrection Pass trailhead located at the south end of the project area boundary

Figure 15. Appearance of active mining operation

In areas where mining activity occurred, reclamation completed by the mining operator has prevented the existing scenic integrity from staying at an "unacceptably low" level. A site within the project area reclaimed in the mid-1980s can be considered naturally appearing to the casual observer since vegetation has reestablished. Figure 16 and figure 17 depict how newly reclaimed placer mining sites typically appear, and how they typically appear after years of regeneration of vegetation.

Figure 16. Area where mining operations recently occurred and was subsequently reclaimed (this represents the short-term scenery effect)

Figure 17. Appearance of where mining operations occurred within the project area boundary and reclaimed per the plan of operations in the 1980s (this represents the long-term scenery effect)

Hope Mining Company is currently approved for mining operations on 97 acres within the project area. As part of the plan of operations, mined areas would be reclaimed (i.e., recontouring of disturbed areas to harmonize better with the landforms that surround them, and spreading stockpiled soil and larger woody debris).

The public traveling along Resurrection Creek Road and using the Resurrection Pass Trailhead and private land owners on adjacent properties will continue to experience sights associated with mining activity. Adjacent areas not currently being mined act as vegetated buffers and provide varied levels of visual screening between viewers and the existing mining areas.

Mining activity will continue to produce visual conditions that have “unacceptably low” scenic integrity where active operations are occurring. Upon completion of mining, reclaimed areas will continue to meet the minimum scenic integrity objective of “very low” in the short term, and improve with time to meet higher scenic integrity objectives in the long term as vegetation continues to reestablish.

The existing condition within the project area will continue to meet the Forest Plan prescribed minimum scenic integrity objective of “very low” in the short term, and increase slowly over the long term to achieve “low” to “moderate” scenery integrity objectives. The public will continue to experience the sights associated with active mining activity over an indefinite period from adjacent lands and roads.

Environmental Consequences – Scenery Resources

Issues

There are no issues related to scenery resources.

Numerous concerns were raised by the public during scoping and review of the Draft Environmental Impact Statement regarding scenery resources. Comments received included concerns about sights associated with mining operations and how mined areas might appear afterwards and affect those that see it, including adjacent property owners. Some suggestions included retaining vegetation for visual buffers along Resurrection Creek Road and private lands. Under the General Mining Act of 1872, as amended, Hope Mining Company has the right to access minerals on their claims including areas directly adjacent to Resurrection Creek road and to private land boundaries, therefore, no alternatives were considered that included buffers as a way to mitigate effects to the scenery resources.

Measurement Indicators

The key measurement indicator is the level of scenic integrity change from the prescribed scenic integrity objectives for the area.

Methodology

This analysis was conducted using ArcMap and relevant geographic information system data layers from the Forest. A photo record to document existing conditions was created based on a field visit September 18, 2012 and is in the project record.

The potential impacts to scenery resources from the proposed project were determined based on the site visits within the project area, review of photos of the project area, use of geographic information system data, and review of similar projects.

Effects to scenery in terms of meeting scenic integrity objective are analyzed for the period after project implementation and include assessing how the landscape appears following reclamation measures as prescribed in the plan of operations.

“Unacceptably low” existing scenic integrity is never used as an objective for scenery management and is only used to discuss the existing condition (USDA Forest Service Chugach National Forest 2002b). For the purposes of this analysis, “unacceptably low” describes the visual condition of the landscape prior to reclamation or restoration and reflects sites that are being worked by people, machines, and equipment for minerals extraction or restoration activities.

The following assumptions were used:

- Analysis assumes all best management practices, project design features, or mitigation measures identified under each alterative are applied.

- The timeline for implementing the proposed mining activities is variable and based on mining operator interest, equipment capability, and economics (predicting when an area will be mined and reclaimed and, over time, adopt higher scenery integrity objective is speculative).
- Scenery conditions described as “unacceptably low” (i.e., how the landscape settings can appear while mining activity takes place) may be seen by the public who own adjacent property, travel along Resurrection Creek Road, and use the Resurrection Pass Trailhead for indefinite periods of time.

The spatial context for effects analysis is based on visibility of the project area from Resurrection Creek Road, Resurrection Pass National Recreation Trail, and from sites both inside and outside the National Forest boundary. Also included in the cumulative effects analysis are areas of past, ongoing, and potential future activities outside the actions of the proposed project which have the potential to impact scenery.

The temporal context of the effects to the visual resource can be described as short and long term. The proposed mining operations do not have a set implementation date, therefore, visitors, users of the forest, and residents on adjacent private lands can expect exposure to sights of temporary roads, settling ponds, workers, trucks and equipment, wood piles, slash piles, wash plants, etc. for an indefinite period of time, and in various locations within the project area boundary at various times and areas in the project area.

Short term is defined as 1 to 5 years after mining or restoration activities have been completed. Long term is defined as 6 to 30 years after mining or restoration activities have been completed.

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

The public who own adjacent property, travel along Resurrection Creek Road, and use the Resurrection Pass Trailhead would continue to experience sights and sounds associated with mining activity, but such activity would remain at current levels. Vegetative buffers would continue to provide varied levels of visual screening between viewers and the existing approved mining areas.

When operations are active in existing approved areas, mining activity would continue to produce visual conditions that have “unacceptably low” scenic integrity when seen. Upon completion of mining activity, reclaimed areas would continue to meet the minimum scenic integrity objective of “very low” in the short term, and improve with time to meet higher scenic integrity objectives in the long term as vegetation reestablishment continues.

Cumulative Effects

Cumulative effects of alternative 1 are the combination of the following elements:

- Existing condition as a result of past mining activities
- Continuation of current trends in land use and natural processes
- The effects on scenic resources of other activities or projects in the foreseeable future

The scenic integrity objective for the project area is “very low” due to its mineral management area designation, and is the lowest scenic integrity objective managed on the Forest. There are no activities or projects in past, present, or foreseeable future that would change the existing visual condition to one that is either lower or higher, therefore, there are no cumulative effects.

Compliance with Forest Plan

The proposed action is consistent with the Forest Plan because the existing mining activities and their effects on scenery resources meet the scenic integrity objectives defined by the Forestwide standard (USDA Forest Service, Chugach National Forest 2002a, pages 3-35 – 3-36).

Consistency with Regulatory Framework

Alternative 1 is consistent with numerous federal laws requiring federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning, project design, implementation, and monitoring including the Multiple-Use Sustained-Yield Act of 1960 and the National Forest Management Act (1976).

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Restoration would restore the stream corridor's natural appearance and ecological function. Results from the recently implemented Resurrection Creek and Riparian Restoration Phase I Project (USDA Forest Service, Chugach National Forest 2004), located a short distance south of the project area boundary, demonstrate that "moderate" to "high" scenery integrity levels can be expected in the short term (1 to 5 years). "Moderate" and "high" scenic integrity levels exceed the Forest Plan prescribed minimum scenery integrity objectives of "very low" for the project area. Figure 18 shows photos taken in 2012 depicting results of the Phase I riparian restoration project implemented in 2005 and 2006.

The public travelling along Resurrection Creek Road and using the Resurrection Pass Trailhead and private land owners on adjacent properties will continue to experience sights associated with mining operations, but such activity would have the potential to be much closer in proximity and more frequent as Hope Mining Company's areas of operations expand from their currently approved areas.

Figure 18. Phase I riparian restoration effort that resulted in "high" scenic integrity level within a 5 year timeframe

The existing vegetation currently serving as buffers may be reduced or eliminated with expanded mining areas providing limited or no visual screening between viewers and the associated mining activity.

It is expected that mining activity will continue to produce visual conditions that have an "unacceptably low" scenic integrity level during active operations. Reclaimed areas will continue to meet the minimum scenery integrity objective of "very low" in the short term (1 to 5 years). Vegetation on reclaimed sites should start to recover and soften the landscape by year 5. Visual recovery will begin to occur and start to mask visible signs associated with the previous mining activity. A "very low" scenic integrity level will visually improve, but slowly, to "low" scenic integrity. The restoration corridor is expected to reflect a "moderate" scenic integrity level within this timeframe because of the added details associated with ecosystems design that reclamation alone lacks.

In the long term (6 to 30 years) visual scenery will improve as vegetation becomes established. At the end of this time period, vegetation should be well established and visual recovery is expected to occur to the point where most previous mining activity is unnoticed to the casual observer and may resemble "moderate" to "high" scenic integrity level. The restoration corridor is expected to reflect "high" scenic integrity level conditions within this timeframe because of the added details associated with ecosystems design that reclamation alone lacks.

Cumulative Effects

Cumulative effects of alternative 2 are the combination of the following elements:

1. Existing condition as a result of past mining activities
2. Continuation of current trends in land use and natural processes
3. The effects on scenic resources of other activities or projects in the foreseeable future

The scenery integrity objective for the project area is "very low" due to its mineral management area designation and this is the lowest scenery integrity objective that the Forest manages for. There are no activities or projects in the past, present, or foreseeable future that will change the existing visual condition to one that is either lower or higher. Therefore, there would be no cumulative effects.

Compliance with Forest Plan

The proposed action is consistent with the Forest Plan because the proposed activities and their effects on scenery resources meet the scenic integrity objectives defined by the Forestwide standard (USDA Forest Service, Chugach National Forest 2002a, pages 3-35 – 3-36).

Consistency with Regulatory Framework

Alternative 2 is consistent with numerous federal laws requiring federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning, project design, implementation, and monitoring including the Multiple-Use Sustained-Yield Act of 1960 and the National Forest Management Act (1976).

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

It is expected that mining activity in alternative 3 will have a larger adverse effect to scenery in the short term than alternative 2. Mining activities would continue to produce visual conditions that have "unacceptably low" scenic integrity level throughout the entire project area when mining operations are active. Upon completion of mining activity, reclaimed areas will continue to meet the minimum scenery integrity objective of "very low" in the short term, and improve with time to meet higher scenery integrity objectives in the long term as more vegetation becomes established.

Cumulative Effects

The cumulative effects of alternative 3 would be the same as alternative 2.

Compliance with Forest Plan

This alternative would have similar compliance as alternative 2.

Consistency with Regulatory Framework

This alternative would have similar consistency as alternative 2.

Inventoried Roadless Areas

Affected Environment

In January 2001, the United States Department of Agriculture adopted the Roadless Area Conservation Rule to protect and conserve inventoried roadless areas on National Forest System lands (see 36 CFR 294.10 through 36 CFR 294.14 (2001). Inventoried roadless areas are large relatively undisturbed landscapes. The following features generally characterize inventoried roadless areas:

1. High quality or undisturbed soil, water, and air
2. Sources of public drinking water
3. Diversity of plant and animal communities
4. Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land
5. Primitive, semiprimitive nonmotorized and semiprimitive motorized classes of dispersed recreation
6. Reference landscapes
7. Natural appearing landscapes with high scenic quality
8. Traditional cultural properties and sacred sites
9. Other locally identified unique characteristics

Location and Background

The Resurrection Inventoried Roadless Area is located on the Kenai Peninsula. It is 224,460 acres and is one of 16 inventoried roadless areas on the Chugach National Forest. The Resurrection Inventoried Roadless Area lies south of the community of Hope and north of the community of Cooper Landing. It is bounded on the east by the Seward Highway; on the south by the Sterling Highway; and the west by the Kenai Wilderness Area and proposed wilderness within the Kenai National Wildlife Refuge (figure 19). The Resurrection Inventoried Roadless Area has numerous access points along the Seward and Sterling Highway.

The boundary of the Resurrection Inventoried Roadless Area begins approximately 1/4 mile from the Seward Highway, Sterling Highway, Palmer Creek Road, and Resurrection Creek Road. There are non-National Forest System lands adjacent to the Resurrection Inventoried Roadless

Area near the communities of Hope, Sunrise, and Cooper Landing and near the junction of the Seward and Hope Highways, and the Summit Lakes area. The above highways and non-National Forest System lands have been subject to human influences and development.

As evidence of human influence and development are more apparent in some areas adjacent to the Resurrection Inventoried Roadless Area, the presence of roadless area characteristics within these adjacent portions of the Resurrection Inventoried Roadless Area are somewhat diminished. Approximately 147 acres of the project area lie within the inventoried roadless area. Human influences that are noticeable from the portion of the project area within the Resurrection Inventoried Roadless Area include ongoing placer mining and traffic along Resurrection Creek Road.

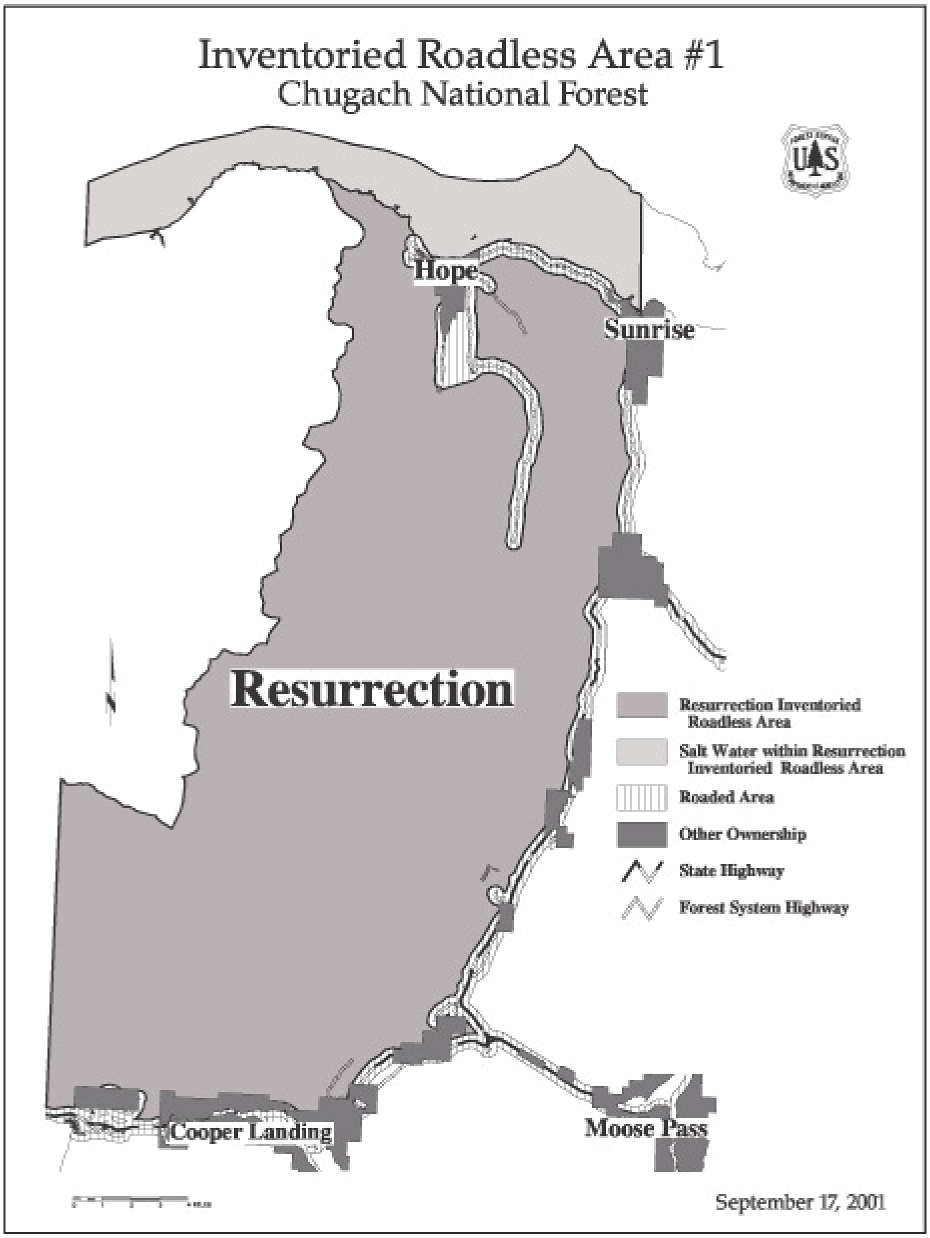

Figure 19. Resurrection Inventoried Roadless Area

Roadless Area Characteristics

A description of the general roadless area characteristics and a discussion on whether these characteristics are present in the Resurrection Inventoried Roadless Area is provided below. The description also includes a discussion on the extent to which these characteristics are present within the project area portion of the inventoried roadless area (figure 20).

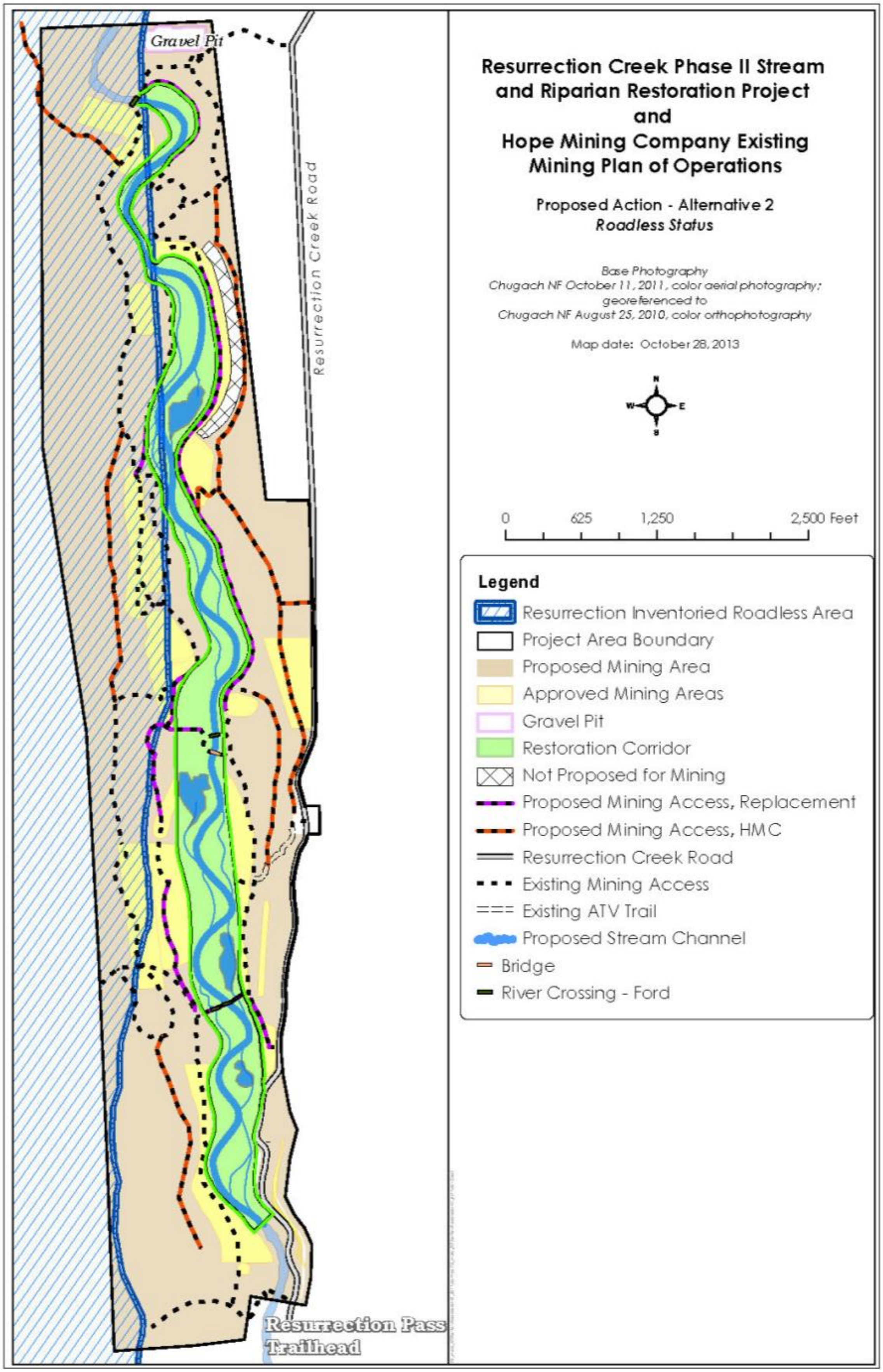

Figure 20. Resurrection Inventoried Roadless Area within the project area

Soil, Water, and Air: The soils throughout the entire Resurrection Inventoried Roadless Area are generally in good condition and are well or moderately well drained, and moderately deep to deep. Most soils within the inventoried roadless area have a surface organic layer, which is thickest under a forest canopy or in wetter areas. Soils in the valley bottoms are usually formed in alluvial deposits and are well to poorly drained, depending on the depth of the water table, and slightly acid (USDA Forest Service, Chugach National Forest 2002b). Soils within the inventoried roadless area portion of the project area are a combination of generally well drained, deep, coarse-textured soils on the side slopes and disturbed, well drained, coarse-textured soil on the valley bottom floodplain that has been extensively manipulated through placer gold mining and is estimated to have about 50 percent detrimental soil disturbance dating to the early twentieth century (see Geology and Soils Affected Environment section, page 70).

The majority of homes in Hope use wells for their water source. Approximately 100 wells exist in the area. Numerous springs are found throughout the watershed, most commonly along lower portions of the valley side slope, below long slopes. Groundwater on the sideslopes trickles through the soil layers and the fractured bedrock below, and emerges lower on the slopes. The greywacke and slate bedrock geology of this area is not porous enough to create significant aquifers. Alluvial gravels within the Resurrection Creek valley floor are porous and can contain a sizeable aquifer. Most wells in Hope tap into this aquifer. In the project area, the depth of the alluvial gravels is limited in some places by clay layers and bedrock near the surface (USDA Forest Service, Chugach National Forest 2002b) (Aquatic Resources and Hydrology analysis, pages 91 to 93).

Air quality in Southcentral Alaska is relatively undisturbed from human sources as a result of sparse populations, large distances from major pollution sources, and climate (see Air Quality analysis, page 65).

Diversity of Plant and Animal Communities: The Resurrection Inventoried Roadless Area is characterized by conifer forest trees include white spruce, Lutz spruce, mountain hemlock, and occasional black spruce. Mountain hemlock occurs primarily on sideslopes at low to mid elevations while the spruces may dominate on both valley bottoms and sideslopes. Paper birch is a dominant broadleaf forest species and a major component of the mixed forests. Sitka alder characterizes the tall scrubland. Natural and human caused fires are common and significantly affect forest vegetation succession in this area. The spruce bark beetle caused extensive mortality within the spruce forests of this area over the past two decades. Undergrowth species common within the forest zone include bluejoint reedgrass, rusty menziesia, early blueberry, devil's club, wood fern, lowbush cranberry, crowberry, splendid feathermoss, and Schreber feathermoss. Broadleaf forests of black cottonwood and willow (especially Barclay and feltleaf) are normally found in the valley bottoms. Alpine vegetation consists of dwarf scrublands and herbaceous vegetation types often dominated by such species as crowberry, starry cassiope, bog blueberry, luetkea, white mountain-avens, bluejoint reedgrass, and rough fescue. These plant species all can be found in the inventoried roadless area portion of the project area.

Moose, black and brown bears, some sheep, wolves, and coyotes are the dominant large wildlife in the inventoried roadless area. A small herd of caribou inhabits the northern half of the inventoried roadless area. Wolverine, fox, lynx, marten, mink, otter, red squirrel, grouse, ptarmigan, hare, bald eagle, owls, hawks and a variety of passerine birds are present. Many of these wildlife species may occur in the project area portion of the inventoried roadless area. No federally listed threatened or endangered species or Alaska Region sensitive wildlife species occur within the Resurrection Inventoried Roadless Area (Wildlife Affected Environment analysis, pages 118 to 120).

The pale poppy is the only Alaska Region sensitive plant species known or suspected to occur within the inventoried roadless area (see Vegetation Ecology analysis, page 112).

Reference Landscapes: The majority of the Resurrection Inventoried Roadless Area appears unmodified and in a predominately natural condition; however, there are minor modifications, such as the Resurrection Pass National Recreation Trail and public use cabins (USDA Forest Service, Chugach National Forest 2002b, appendix C, pp C-10 through C-11).

The project area portion of the Resurrection Inventoried Roadless Area is not a representative example of a reference landscape due to the presence of past mining within the inventoried roadless area and because of human influences on the lands adjacent to the inventoried roadless area.

Landscape Character and Recreation Settings: The Resurrection Inventoried Roadless Area provides primarily primitive, semiprimitive nonmotorized, and semiprimitive motorized recreation settings and opportunities. The majority of the Resurrection Inventoried Roadless Area appears unmodified and in a predominately natural condition and provides spectacular scenery (USDA Forest Service, Chugach National Forest 2002b, appendix C, pg. C-11). Although the majority of the inventoried roadless area represents natural conditions, the project area portion of the Resurrection Inventoried Roadless Area is not a naturally appearing landscape due to the historic and present day mining activities and the proximity to Resurrection Creek Road (Scenery Resources analysis, page 136 to 139).

Traditional cultural properties and sacred sites: There are no known traditional cultural properties or sacred sites within the Resurrection Inventoried Roadless Area.

Environmental Consequences – Inventoried Roadless Areas

Issues

There are no issues concerning roadless areas.

Measurement Indicators

The change to the natural appearing landscape and wilderness suitability

Methodology

The following analysis is qualitative and examines two specific characteristics of the inventoried roadless area as proposed activities are implemented: natural appearing landscape and wilderness suitability. The temporal scope for the short term is 1 to 5 years, and long term is 20 years. The geographic bounds of the analysis for direct and indirect effects are the project boundary, and for cumulative effects it is the entire Resurrection Inventoried Roadless Area.

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Natural Appearing Landscape and Wilderness Suitability

The project area encompasses approximately 147 acres of the Resurrection Inventoried Roadless area. Approximately 18 acres of existing mining areas and 1.9 miles of existing mining access roads fall within the inventoried roadless area. Approximately 13 of the 18 acres have already been mined or are currently being mined. Most of the trees have been removed from these acres. Timber cutting and road building have the potential to adversely affect roadless area characteristics. The mining areas currently appear less natural and would be less capable of being suitable for wilderness designation because evidence of mining is apparent. All areas would be reclaimed after completion of mining operations and affected portions of the Resurrection Inventoried Roadless Area would appear more natural over the long term (20 years and later after reclamation) and may become suitable for wilderness designation.

Cumulative Effects

Roadless area characteristics within the Resurrection Inventoried Roadless Area are somewhat diminished due to past activities where the boundary is adjacent to highways, non-National Forest System lands or other development. The project area portion of the inventoried roadless area is specifically affected by Resurrection Creek Road and present mining activities (18 acres of existing mining areas and 1.9 miles of existing mining roads within the inventoried roadless area). The inventoried roadless area is still predominately an undisturbed landscape. Existing activities (18 acres) would affect only a fraction of one percent of the entire Resurrection Inventoried Roadless area (224,460 acres). Alternative 1 would not meaningfully affect the wilderness suitability for the majority of the Resurrection Inventoried Roadless Area because only a very small portion of the inventoried roadless area is expected to be affected and these effects would not be permanent.

Compliance or Conflicts with the Forest Plan

The Forest Plan Record of Decision states that inventoried roadless areas within the Forest will be managed consistent with all interim direction and the final roadless rule. Alternative 1 is compliant with this direction as described below in the Consistency with Regulatory Framework section.

Consistency with Regulatory Framework

The mining plan of operations would require tree removal on the remaining 5 acres of approved mining areas. Alternative 1 is consistent with the 2001 Roadless Rule. Tree removal for mining activities is exempted at 36 CFR 294.12(b)(3) because of a prior existing mineral right was established in 1974 when the federal mining claims were located.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Natural Appearing Landscape and Wilderness Suitability

The project area encompasses approximately 147 acres of the Resurrection Inventoried Roadless area (see figure 20, page 146). The mining plan of operations is expected to take place over 20 years. Trees would be removed from 125 acres of the Resurrection Inventoried Roadless Area during mining activities, and approximately 0.85 miles of road would be constructed for mining access. Timber cutting and road building have the potential to adversely affect roadless area characteristics. The 125 acres would appear less natural and would be less capable of being suitable for wilderness designation because evidence of mining would be apparent. All areas would be reclaimed after completion of mining operations and affected portions of the Resurrection Inventoried Roadless Area would appear more natural over the long term (20 years and later) and may become suitable for wilderness designation.

Approximately 4 acres of the proposed restoration corridor lie within the inventoried roadless area. The restoration effort is expected to take up to four years. It is expected that this portion of the restoration corridor within the inventoried roadless area would appear more unnatural during the short term (1 to 5 years) after implementation. In the long term (6 to 20 years), Resurrection Creek would more closely represent natural conditions because it would appear and function as it did before mining channelized Resurrection Creek early in the 20th century. It is expected that this area would gradually appear more natural as revegetation and proper functioning of the floodplain returns and the evidence of human disturbance from restoration becomes less noticeable. It is also expected that the 4-acre portion of the restoration corridor within the inventoried roadless area would become more suitable for wilderness designation for this reason.

Cumulative Effects

Roadless area characteristics within the Resurrection Inventoried Roadless Area are somewhat diminished due to past activities where the boundary is adjacent to highways, non-National Forest lands or other development. The project area portion of the inventoried roadless area is specifically affected by Resurrection Creek Road and present mining activities (18 acres of existing mining areas and 1.9 miles of existing mining roads within the inventoried roadless area). The inventoried roadless area is still predominately an undisturbed landscape. Proposed activities and existing activities (147 acres) would affect only a fraction of one percent of the entire Resurrection Inventoried Roadless area (224,460 acres). Alternative 2 would not meaningfully affect the wilderness suitability for the Resurrection Inventoried Roadless Area because only a very small portion of the inventoried roadless area is expected to be affected and these effects would not be permanent.

Compliance or Conflicts with the Forest Plan

The Forest Plan Record of Decision states that inventoried roadless areas within the Forest will be managed consistent with all interim direction and the final roadless rule. Alternative 2 is compliant with this direction as described in the Consistency with Regulatory Framework section.

Consistency with Regulatory Framework

Alternative 2 is consistent with the 2001 Roadless Rule for the following reasons:

- The restoration of Resurrection Creek would require tree removal on 4 acres. The trees in this area are generally small diameter hemlock (less than 24 inches d.b.h.). Once removed, the trees would be used to accomplish restoration. Timber cutting for the restoration is exempted under the 2001 Roadless Rule at 36 CFR 294.13(b)(1)(ii) because the restoration project restores ecosystem characteristics that were adversely affected by historic mining.
- The mining plan of operations would require both tree removal and road building. The mining plan of operations proposes cutting of small diameter (less than 24 inches d.b.h.) birch, hemlock, and spruce trees on 125 acres and 0.85 miles of temporary road construction within the inventoried roadless area. Tree cutting and road construction for mining operations

is exempted under the 2001 Roadless Rule at 36 CFR 294.12(b)(3) because of a prior existing mineral right established in 1974 when the federal mining claims were located.

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Natural Appearing Landscape and Wilderness Suitability

Resurrection Creek would remain channelized; fish habitat would continue to be poor through the small section of Resurrection Inventoried Roadless area and evidence of human disturbance along the creek would remain apparent. In addition, timber would be removed from approximately 125 acres of the inventoried roadless area and 0.76 miles of road would be constructed (see Map 7 in appendix B, page 211). The portion of the inventoried roadless area within the project area would appear less natural and would be less capable of being suitable for wilderness designation in the short term because evidence of mining would be apparent. After completion of mining operations, areas would be reclaimed. It is expected that after reclamation, the affected portion of the inventoried roadless area would appear more natural over time (20 years and later) and may become suitable for wilderness designation.

Cumulative Effects

Cumulative effects under alternative 3 would be the same as under the proposed action.

Compliance or Conflicts with the Forest Plan

Alternative 3 would be compliant with the Forest Plan for the same reasons as alternative 2.

Consistency with Regulatory Framework

Alternative 3 is consistent with the 2001 Roadless Rule because the mining plan of operations would require both timber cutting and road building. The mining plan of operations proposes cutting of small diameter (less than 24 inch d.b.h.) birch, hemlock, and spruce trees on 125 acres and 0.76 miles of temporary road construction within the inventoried roadless area. Tree cutting and road construction for mining activities is exempted under the 2001 Roadless Rule at 36 CFR 294.12(b)(3) because of a prior existing mineral right established in 1974 when federal mining claims were located.

Social and Economic Resources

Affected Environment

Activities occurring on National Forest System lands play a role in the economic health of Hope and Sunrise. Recreational activities that bring tourists into the area include use of Resurrection Pass National Recreation Trail, Gull Rock Trail, Hope Point Trail, Porcupine Creek Campground, recreational gold panning, and the Palmer Creek road for dispersed recreation activities. These recreation visitors may utilize local businesses in Hope including stores and restaurants. Salmon fishing in mid-summer also brings visitors to the town of Hope. Commercial mining on Resurrection Creek and Palmer Creek also play a small role in economic support. Many residents rely to some extent on subsistence uses tied to Resurrection Creek drainage. Subsistence uses include hunting, fishing, gathering of wood products for building materials and firewood, and the harvest of special forest products such as mushrooms, berries, and moss (Hart Crowser, Inc. 2002).

The Alaska Department of Labor and Workforce Development, Research and Analysis Section reports that the estimated 2011 population was 193 in Hope and 14 in Sunrise (Alaska Department of Commerce 2011a and b). According to the Alaska Department of Commerce, 88 and 94 percent of the sampled populations in Hope and Sunrise reported their race as white. Seven percent of Hope residents reported that they were American Indian or Alaska Native (no Sunrise residents reported American Indian or Alaska Native heritage). The median age was reported as 54.3 in Hope and 47.5 in Sunrise (Alaska Department of Commerce 2011a and b).

Limited community-level employment and income data are available. The most recent data come from the Alaska Department of Labor and Workforce Development. In 2010, 63 Hope residents and 9 Sunrise residents were employed. The largest sectors employing Hope residents are leisure and hospitality (20 workers), construction (8 workers), and trade, transportation, and utilities (7 workers). There are only four sectors employing Sunrise residents: educational and health services (3 workers), local government (3 workers), leisure and hospitality (2 workers), and construction (1 worker) (Alaska Department of Labor and Workforce Development 2011).

Average wages in Sunrise were $29,199 and $26,816 in Hope (Alaska Department of Labor and Workforce Development 2011). Per capita income and poverty estimates are not available for Sunrise. In Hope, per capita income is estimated at $38,641 and 14 percent of individuals live below the poverty line (Alaska Department of Commerce 2011). The per capita income in the United States is $26,059 and $30,598 in Alaska (U.S. Bureau of the Census 2010b). In 2010, 15 percent of Americans and 10 percent of Alaskans lived below the poverty line (U.S. Bureau of the Census 2010b).

The school and local retail businesses provide the only employment in Hope. There is also a small sawmill used by the community. One resident holds a commercial fishing permit (Alaska Department of Commerce 2011a and b). Some mining activity occurs in area; four Hope residents are employed in the natural resources and mining sector (Alaska Department of Labor and Workforce Development 2011). Many Hope community members rely on subsistence uses, which lower the level of labor force participation and median incomes (USDA Forest Service, Chugach National Forest 2004).

Hope Mining Company conducts placer gold mining operations on Resurrection Creek south of Hope, Alaska. Between 1979 and 2000, Hope Mining Company lessees produced 2,795 ounces of gold (Johnson et al. 2004); production has likely been much higher in recent years but no figures have been made available by Hope Mining Company. Annually, the company and mining lessees spend approximately $50,000 in the Hope on fuel, food, housing, wages, equipment, and services. These purchases support employment in local retail businesses. The mining lessees buy additional fuel, parts, and supplies and services in Seward and Anchorage (Al Johnson, personal communication, February 1, 2013).

Environmental Consequences – Social and Economic Resources

Issues

There were no issues identified for the social and economic resources.

The public identified several concerns regarding the proposed action. The concerns are as follows:

1. Road construction and mining in areas 16a and 21 could negatively affect residential property values.

2. Mining activities could affect public safety, with particular risks to young children who live nearby.
3. The project poses financial costs on government, and therefore, taxpayers.
4. Restoration could increase demand for recreation in the area (particularly sportfishing) resulting in impacts to Hope's limited infrastructure to handle visitors and impacts to the residents.

These concerns were not brought forward as issues in the analysis because alternatives that reduce the mining activity or provide buffers to private landowners were not feasible based on the mining operator's right to access the locatable mineral estate. The Forest Service worked with Hope Mining Company to move one proposed road further away from the private land in area 21 and reduced the size and proposed traffic on the proposed road in area 16a. Commenters also expressed a desire to see employment opportunities provided in Hope in association with the proposed restoration activities.

Measurement Indicators

Social and economic effects are discussed in the following terms:

- Economic efficiency
- Employment
- Property values
- Public safety and quality of life

Methodology

The following tools and data sources were used to analyze social and economic effects:

IMPLAN Professional Version 2.0: an economic input-output analysis tool, which estimates the employment and income consequences of projects on a local or regional economy (Minnesota IMPLAN Group 2008).

Quick-Silver 6: an analysis tool developed by the Forest Service to generate measures of financial efficiency, including net present value (USDA Forest Service 2008b).

TMECA: a spreadsheet tool that interfaces with IMPLAN to develop estimates of the economic consequences of recreation on national forests (USDA Forest Service 2008b).

Peer-reviewed literature on effects to residential property values: this literature examines the relationship between road traffic and open space on residential property values (Anderson and West 2006, Bateman et al. 2001, Nicholls and Crompton 2005).

Alaska State Economic and Demographic Data: state agencies collect data on population size, race and ethnicity, housing occupancy, employment, and income (Alaska Department of Commerce 2011a and b; Alaska Department of Labor and Workforce Development 2011).

The study area for the analysis of direct, indirect, and cumulative social and economic effects for the proposed project is the Resurrection Creek drainage, including the communities of Hope and Sunrise, Alaska.

Activities for this project are expected to occur over a 20-year period with the main restoration activities occurring over a 4 year period followed by monitoring of project effectiveness and administration of minerals resources. The direct, indirect and cumulative impacts are assumed to occur during this period.

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Economic Efficiency

The Forest Service would continue to oversee mining activities and reclamation procedures conducted by Hope Mining Company. The only direct costs assumed by the Forest Service would be those associated with minerals administration. The discounted cost of this project to the Forest Service would be $182,866 (in 2009 U.S. Dollars), assuming existing mining at the site continues for 10 years. Since there are no monetary benefits, the net present value would be negative $182,866. The cost to taxpayers would be less than under the alternative 2 or 3.

Employment

Hope Mining Company and mining lessees would continue to spend up to about $50,000 in Hope on fuel, food, housing, wages, equipment, and services. These purchases support employment in local retail businesses. The mining lessees would also continue to buy additional fuel, parts, and supplies in Seward and Anchorage. These expenditures would continue for an estimated 10 to 15 years, until the remaining 52 acres of the existing approved mining acres have been mined and reclaimed.

Property Values

Alternative 1 would not affect property values relative to existing conditions.

Public Safety and Quality of Life

Alternative 1 would not affect public health and safety relative to existing conditions.

Cumulative Effects

None of the past, present, or reasonably foreseeable future actions are expected to interact with the effects of the alternative to measurably affect social and economic well-being in the project area.

Compliance or Conflicts with the Forest Plan

There is no specific social or economic direction in the Forest Plan.

Consistency with Regulatory Framework

Alternative 1 is consistent with Executive Order 12898 - *Federal Actions to Address Environmental Justice in Minorities and Low Income Populations* because the demographic data for the project area revealed no environmental justice communities. Implementation of existing activities would not result in environmental justice consequences under alternative 1.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Alternative 2 would present a cost to the Forest Service and result in changed ecological conditions in the watershed. Restoration costs and improved ecological conditions could affect the social and economic environments in many ways.

Economic Efficiency

The effects analyzed for alternative 2 would occur as a result of implementation of full restoration and the continuation of mining operations. The net present value for all activities under this alternative is negative $1,785,900 (in 2009 U.S. Dollars). This includes the cost of restoration as well as administration and monitoring costs. The discounted cost of restoration activities themselves would be negative $1,479,497; and the discounted cost of mining administration and monitoring would be $306,403.

The proposed restoration activities and mining administrative costs would be funded by the Forest Service, resulting in the expenditure of funds supplied by U.S. taxpayers. Various ecological benefits, described elsewhere in this document, are anticipated to occur because of this project. For the project to be considered economically efficient, benefits from the project must outweigh the total costs. Since the majority of benefits are unquantifiable and must be measured in qualitative terms, there is no distinct decision criterion representing economic efficiency, and much is left to the discretion of the deciding official.

There exists a potential for mining activities to occur in the restoration corridor after implementation as Hope Mining Company still would own the locatable mineral rights within the mining claims in the restoration corridor and would be granted reasonable access if mining was proposed in the future. It is assumed that the probability of future mining in the restoration corridor is low because the improved technology used now for mining should allow for the majority of gold to be extracted prior to restoration implementation, greatly reducing the potential benefit of future mining. If future mining were to occur in the restoration corridor, the mining operator would be required to reclaim the landscape to post-restoration conditions. Therefore, it is assumed that benefits from restoration would last well into the future.

Economic benefits to Hope from recreation tourism are not expected to change. It is unknown how restoration activities may change salmon populations and the level of sport fishing into the future. Recreation use is not anticipated to change as a result of proposed mining activities (page 134).

Employment

Restoration activities would have employment and income impacts similar to those that occurred under Phase I restoration; some restoration activities could be performed by local residents. Alternative 2 may generate new mining lessees which would drive additional economic activity, as food, fuel, and other services are purchased in the local area.

Property Values

Most research related to property values and natural amenities are based on urban areas. The validity of these studies for rural areas is uncertain but provides guidance on the direction and magnitude of potential effects. Road views have a statistically significant negative effect on residential property values and it is estimated that "each decibel increase in traffic noise decreases property price by 0.20 percent" (Bateman et al. 2001). In contrast, other studies have found that greenways and open space increase residential property values (e.g., Nicholls and Crompton 2005). The mining activities under alternative 2 may decrease adjacent residential property values due to the anticipated increase in noise decibels and decrease in scenic integrity while mining operations are ongoing.

Public Safety and Quality of Life

Members of the public raised concerns about safety related to mining activities. Public access across the proposed bridge would be prohibited to reduce public exposure to hazards associated with heavy equipment operations for restoration and mining activities. The Forest Service would require Hope Mining Company and restoration contractors to install signing indicating potential hazards from heavy equipment when operating near Resurrection Pass National Recreation Trail and trail bridge (mitigation measure 12, page 42) and would not allow equipment associated with the restoration project or mining operations to be staged at the Resurrection Pass National Recreation Trailhead or the dispersed camping area upstream from the trailhead (mitigation measure 13, page 42). Mining road construction would occur in close proximity to private property which may adversely affect those property owners. Based on public comments, Hope Mining Company changed their planned road width and use and have proposed gating either end of the proposed road in area 16a to limit the size and amount of mining traffic on this road and has moved a proposed road location away from the private land boundary in area 21 in an effort to reduce some impacts to nearby private landowners. Traffic volume on Resurrection Creek Road from restoration activities is expected to be light but the increase in truck traffic and noise may adversely affect area residents during implementation. Dust created from restoration truck traffic on Resurrection Creek Road will be minimized with dust abatement actions when dry conditions occur during restoration implementation (mitigation measure 9, page 41).

Cumulative Effects

Existing and proposed mining activities may increase the demand for support services in the local economy beyond what is described here. The cumulative effect of increased demand may increase economic feasibility for more services to be provided locally. Given the relatively small scale of these activities, much of the economic activity will continue to occur outside the local economy.

Proposed development on private land may increase exposure to social and economic consequences. The proposed residential development on Resurrection Creek Road may increase recreational demand in the project area, increase exposure to potential safety concerns, and affect private property values. However, these effects are not expected to meaningfully differ from the direct and indirect effects described above.

Compliance or Conflicts with the Chugach Forest Plan

There is no specific social or economic Forest Plan direction.

Consistency with Regulatory Framework

Alternative 2 is consistent with Executive Order 12898 *Federal Actions to Address Environmental Justice in Minorities and Low Income Populations* because the demographic data for the project area revealed no environmental justice communities and no public comments raised concerns related to environmental justice. The implementation of restoration and mining operations under alternative 2 would not result in environmental justice consequences.

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Economic Efficiency

Restoration would not occur under alternative 3 and the Forest Service would continue to administer surface mining and reclamation conducted by Hope Mining Company. The only direct costs assumed by the Forest Service would be those associated with minerals administration. The discounted cost of this project to the Forest Service would be $306,403 (in 2009 U.S. Dollars). Since there are no monetary benefits, the net present value would be negative $306,403. The cost to taxpayers would be less than under the proposed action, but no restoration activities would take place and no associated ecological benefits would be realized. Recreation visitor use and associated economic benefits to Hope is not anticipated to change with alternative 3 (Recreation analysis, page 135).

Employment

There would be no impacts to local employment and income resulting from restoration activities. Alternative 3 may generate new lessees which would drive additional economic activity, as food, fuel, and other services are purchased in the local area.

Property Values

The effects would the same as alternative 2.

Public Health and Safety

Under alternative 3, Hope Mining Company would construct a bridge and approximately 2.6 miles of new mining roads. The bridge across Resurrection Creek would be used only for mining related purposes. The Forest Service would require Hope Mining Company to install signing indicating potential hazards from heavy equipment when operating near Resurrection Pass National Recreation Trail and trail bridge (mitigation measure 12, page 42) and would not allow equipment associated with the mining operations to be staged at the Resurrection Pass National Recreation Trailhead or the dispersed camping area upstream from the trailhead (mitigation measure 13, page 42). Mining road construction would occur in close proximity to private property which may adversely affect those property owners with the same effects as alternative 2. Traffic volume on Resurrection Creek road is not expected to change from existing conditions with alternative 3.

Mining activities could negative affect quality of life for those living near the project area. Design criteria and mitigation measures, such as signage indicating potential hazards (mitigation 12, page 42) and limiting public access in mining and restoration areas may reduce public safety hazards and some of the potential for adverse effects to quality of life for nearby property owners.

Cumulative Effects

The cumulative effects of alternative 3 would be consistent with the cumulative effects described under alternative 2.

Compliance or Conflicts with the Forest Plan

There is no specific social or economic direction in the Forest Plan.

Consistency with Regulatory Framework

Alternative 3 is consistent with Executive Order 12898 *Federal Actions to Address Environmental Justice in Minorities and Low Income Populations* for the same reasons as alternative 2.

Subsistence

Affected Environment

Subsistence is important to rural Alaska residents. Residents may rely on subsistence to supplement or replace income derived from seasonal employment or to take advantage of renewable natural resources that are less expensive than store-purchased products. For some cultures, the harvest, use, and redistribution of subsistence resources is an integral part of cultural and social value systems.

Cooper Landing and Hope are small unincorporated communities within the Kenai Borough. Residents of Cooper Landing and Hope are classified as rural, and therefore qualify for subsistence use under the Alaska National Interest Lands Conservation Act. The subsistence resources around the communities abound and consist of moose, black and brown bears, caribou, mountain goats, sheep, wolves, coyote, foxes, lynx, marten, mink, land otter, wolverines, marmot, hares, and beaver (Seitz et al. 1992). Fish are also a major part of the subsistence resource.

Table 20. Cooper Landing subsistence resource use (August 1990 through July 1991)

Type of Subsistence Resource	Pounds of usable resource per person	Percent of total wild resources
Salmon	40	43
Land Mammals	29	32
Other Fish	14	16
Wild plants, eggs, marine invertebrates	9	9
Totals	**92**	

Table 21. Most commonly used subsistence resources by Cooper Landing residents (August 1990 through July 1991)

Type of Subsistence Resource	Percent of households using this resource
Sockeye Salmon	77
Berries	71
Halibut	65
Dolly Varden	57
Coho Salmon	53
Moose	43
Other Plants	35
Grouse	33
Chinook Salmon	30
Lake Trout	25

Cooper Landing residents are dependent on a wide diversity of fish and wildlife resources, harvesting an average of 8.3 different kinds of resources, similar to other road-connected communities on the Kenai Peninsula. From August 1990 through July 1991, all households in Cooper Landing were estimated to have used at least one wild resource. Ninety-four percent harvested some kind of wild resource. The per capita harvest of wild resources, measured in pounds of useable weight, was 91.5 pounds while the mean household harvest was 238 pounds. Table 20 refers to specific resources harvested (Seitz et al. 1992). The most commonly used subsistence resources by residents of Cooper Landing are shown in table 21 (Seitz et al. 1992).

Hope households use an average of 9 kinds of wild resources during the year (Seitz et al. 1992). Almost all households (93.9 percent) hunted, fished, or gathered wild foods and 100 percent used at least one type of wild resource. The per capita harvest of wild resources was 111 pounds per person while the mean household harvest was 262 pounds. Table 22 refers to specific resources harvested (Seitz et al. 1992). The most commonly used subsistence resources by residents of Hope are shown in table 23 (Seitz et al. 1992).

Table 22. Hope subsistence resource use (August 1990 through July 1991)

Type of Subsistence Resource	Pounds of usable resource per person	Percent of total wild resources
Salmon	50	45
Land Mammals	33	30
Other Fish	16	14
Wild Plants	6	5
Marine invertebrates	4	4
Birds and eggs	2	2
Totals	**111**	

Table 23. Most commonly used subsistence resources by Hope residents (August 1990 through July 1991)

Type of Subsistence Resource	Percent of households using this resource
Berries	78
Moose	67
Dolly Varden	59
Sockeye Salmon	59
Pink Salmon	55
Coho Salmon	54
Halibut	53
Other Wild Plants	39
Chinook Salmon	35
Ptarmigan	30

Subsistence Fisheries

Resurrection Creek has documented all five species of salmon present as well as resident fish species such as Dolly Varden (Alaska Department of Fish and Game 2013). The rural community of Hope has documented use of salmon and other fish species in Resurrection Creek (Seitz et al. 1992). There is no established subsistence fishery in this area. Fishing by Cooper Landing and

Hope residents in the Resurrection and Palmer Creek Watersheds is considered a sport and a personal use activity regulated by Alaska Department of Fish and Game.

Subsistence Wildlife

The Chugach National Forest, Seward Ranger District is within Alaska Department of Fish and Game's game management unit 7. Within game management unit 7 under subsistence management regulations for the harvest of wildlife on federal public lands in Alaska, all rural residents are permitted to harvest black bear, beaver, coyote, hare, lynx, wolf, and wolverine as well as grouse and ptarmigan under regulatory seasons. Cooper Landing and Hope are the rural communities that have documented use of wildlife resources for subsistence purposes within the Chugach National Forest (Seitz et al. 1992). The community of Cooper Landing has documented use within the Hope area but not to the extent of Hope residents. The communities of Hope and Cooper Landing currently have customary and traditional use for Moose within game management unit 7, which Resurrection Creek drainage occupies. The community of Hope also has customary and traditional use of caribou. The community of Cooper Landing may be provided customary and traditional use for caribou starting in the future.

Moose and black bear are the main wildlife species that are found within the project area that have been documented being harvested by Hope community members and a consistent pattern of use has been demonstrated for the Resurrection Creek drainages (Seitz et al. 1992). Other wildlife species, such as furbearers are also available for trapping, and documented use has occurred within the watershed (Seitz et al. 1992). No moose or caribou were harvested in the proposed project area under Federal harvest during the timeframe that Cooper Landing and Hope have had rural preference under the Federal subsistence program. It is expected that the immediate project area has not been hunted by subsistence users; no documented subsistence use in the immediate project area exists.

Environmental Consequences – Subsistence

Issues

There were no issues identified for subsistence resources.

Measurement Indicators

Qualitative assessments based on professional judgment are used to discuss the effects of the alternatives on fisheries and wildlife subsistence resources.

Methodology

The following are the basis for the analysis of effects to subsistence resources:

- The Forest Plan direction (USDA Forest Service. 2002b) and Title VIII of the Alaska National Interest Lands Conservation Act regarding protection of subsistence resources
- Rural communities and other subsistence users and their uses and needs
- The potential for subsistence use to occur within the project area based on existing or potential habitat
- Potential impacts to wildlife and fisheries resources as a basis to describe the impacts on subsistence uses and needs.

Geographic bounds for direct and indirect effects were considered to be the project area plus an area that extends one mile from the project area (approximately 5,444 total acres). This boundary was selected because vegetation would be removed from the project area, and noise from mining or restoration operations could extend one mile beyond the project area boundary. The watershed was considered for cumulative effects because many wide ranging species such as furbearers, moose, bears and others may move through or use habitat within the project area and throughout portions of the entire watershed.

Short-term effects would be considered those lasting 1 to 4 years and long-term effects would be 5 to 100 years (potential timeframe for vegetation to be restored to mature structure and composition).

Alternative 1 – Existing Approved Mining (No Action)

Short- and Long-term Direct and Indirect Effects

Subsistence Fisheries

The rural community of Hope has documented use of salmon and other fish species in Resurrection Creek (Seitz et al. 1992). There is no established subsistence fishery in this area so alternative 1 does not currently impact the subsistence fishery users.

Subsistence Wildlife

No moose or caribou have been harvested in the project area under Federal harvest during the timeframe that Cooper Landing and Hope have had rural preference under the Federal subsistence program. Documented subsistence use in the project area does not exist so alternative 1 does not currently impact subsistence wildlife users in the short term but it is unknown whether any subsistence use would begin to occur in the project area over the long term. Under indirect effects, the current condition of the project area affects the habitat for commonly hunted large mammals such as moose and black bear. Wildlife habitat will continue to change as existing approved areas are mined and reclaimed. It is not anticipated that this level of wildlife habitat acreage change would affect species population and thereby availability of wildlife for subsistence use (page 122).

Cumulative Effects

The following activities on National Forest System Lands and adjacent non-National Forest lands were considered for cumulative effects:

- Reconstruction of Porcupine Campground completed in 2012
- Past fuel reduction projects/harvesting/pile burning along Hope Highway and Palmer Creek Road, about 800 acres (from 2005 – 2013)
- Resurrection Creek Restoration Project Phase I implemented in 2005 and 2006
- New trailhead development for Gull Rock and Hope Point Trail along Cripple Creek Road – Completed in 2012
- Hope Point Trail reconstruction – partially completed by end of 2013
- Ongoing recreation use of Resurrection Pass National Recreation Trail
- Small-scale suction dredging on Palmer Creek
- Maintenance of side channel in Resurrection Restoration Phase I project completed in June of 2014

- Ongoing recreational gold panning and suction dredging along Resurrection Creek south of project area
- Past, ongoing and future development on private land at mile 14 of the Hope Highway and along Resurrection Creek Road
- Subdivision and potential future development of Borough land near Resurrection Creek Road/Palmer Creek Road intersection
- Development on the patented mining claim at the end of Resurrection Creek Road
- Small scale channel realignment of Resurrection Creek just south of Hope Highway along private land to protect privately owned structures from creek movement implemented in 2013

All of these activities have had no adverse effects on subsistence uses. Because there are no expected direct and indirect adverse effects on subsistence uses and no adverse effects from other projects within the watershed on subsistence uses, alternative 1 would have no adverse cumulative effects.

Compliance or Conflicts with the Forest Plan

Alternative 1 is consistent with the Forest Plan because the existing activities do not adversely affect access for subsistence activities as specified by forestwide standards (USDA Forest Service, Chugach National Forest 2002a, page 3-41 and 3-42). Alternative 1 also meets the desired future condition of wildlife and fisheries species being available for subsistence uses (USDA Forest Service, Chugach National Forest 2002a, page 3-13).

Consistency with Regulatory Framework

Alternative 1 is consistent with Section 810 of the Alaska National Interest Lands Conservation Act because the effects on subsistence uses on federal lands have been evaluated and findings of no significant restriction of subsistence uses have been disclosed for this alternative. This alternative is also consistence with Section 811 of the Alaska National Interest Lands Conservation Act because the existing activities do not impede reasonable access for rural residents engaged in subsistence uses.

Alternative 2 – Proposed Mining and Stream Restoration (Proposed Action)

Short- and Long-term Direct and Indirect Effects

Subsistence Fisheries

Fishing by Cooper Landing and Hope residents in the Resurrection and Palmer Creek Watersheds is a sport and a personal use activity regulated by Alaska Department of Fish and Game. There is no established subsistence fishery in the Hope area so the implementation of stream restoration activities and proposed mining operations would not result in a significant restriction on subsistence fishery uses.

Subsistence Wildlife

A search of the Federal Subsistence Permit System harvest report data shows that no subsistence hunting for wildlife has occurred in the immediate project area. All reported Federal subsistence hunting has occurred above Palmer Creek in the Moose Creek drainage and in the Palmer Creek drainages outside of the project area. There are no known direct effects to subsistence users as they do not currently utilize the project area and it is unknown if subsistence users would begin using the project area in the long term as wildlife habitat changes with restoration and mining operations.

An indirect effect to subsistence users would be the change in population of animals in the Resurrection Creek watershed as a result in the reduction in the amount or availability of these types of habitat in the project area. Changes to wildlife habitat occur in both the short term and long term as restoration and mining activities are implemented. During the short term, wildlife habitat conditions will be impacted during the proposed restoration activities but will improve over time within the proposed restoration corridor. Mining operations will adversely impact wildlife habitat in the short term and in the long term, it may take decades to reestablish wildlife habitat composed of mature tree species. Wildlife habitat change is not anticipated to adversely affect wildlife populations and should not result in a significant restriction of subsistence wildlife uses (page 124). The long-term projection of the proposed action would improve the habitat in the area and potentially increase availability of subsistence resources.

Cumulative Effects

The activities considered for cumulative effects would be the same as alternative 1 except the addition of the Hope Mining Company's existing approved mining operations within the project area (97 acres). Alternative 2 would have no adverse cumulative effects because the proposed activities would not result in a significant restriction of subsistence uses and no significant restriction of subsistence uses are anticipated from other projects within the watershed on subsistence uses.

Compliance or Conflicts with the Forest Plan

Alternative 2 is consistent with the Forest Plan because the proposed activities do not adversely affect access for subsistence activities as specified by forestwide standards (USDA Forest Service, Chugach National Forest 2002a, pages 3-41 and 3-42). Alternative 2 also meets the desired future condition of wildlife and fisheries species being available for subsistence uses (USDA Forest Service, Chugach National Forest 2002a, page 3-13) and the goal of maintaining habitat to produce viable and sustainable wildlife populations that support the use of fish and wildlife resources for subsistence (USDA Forest Service, Chugach National Forest 2002a, page 3-4).

Consistency with Regulatory Framework

Alternative 2 is consistent with Section 810 of the Alaska National Interest Lands Conservation Act because the effects on subsistence uses on federal lands have been evaluated and findings of no adverse effect on subsistence resources have been disclosed for this alternative. This alternative is also consistence with Section 811 of the Alaska National Interest Lands Conservation Act because the proposed activities do not impede reasonable access for rural residents engaged in subsistence uses.

Alternative 3 – Proposed Mining Only

Short- and Long-term Direct and Indirect Effects

Subsistence Fisheries

Fishing by Cooper Landing and Hope residents in the Resurrection and Palmer Creek Watersheds is considered a sport and a personal use activity regulated by Alaska Department of Fish and Game. There is no established subsistence fishery in the Hope area so the implementation of stream restoration activities and proposed mining operations not result in a significant restriction on subsistence fishery uses.

Subsistence Wildlife

Similar to alternatives 1 and 2, there are no known direct effects to subsistence users as they do not currently utilize the project area and it is unknown if subsistence users would begin using the project area in the long term as wildlife habitat changes with proposed mining operations.

Similar to alternative 2, an indirect effect to subsistence users would be the change in population of animals in the Resurrection Creek watershed as a result in the reduction in the amount or availability of these types of habitat in the project area. Mining operations will adversely impact wildlife habitat in the short term and it may take many years to reestablish wildlife habitat reliant on mature tree species. Wildlife habitat changes are not anticipated to result in a significant restriction of subsistence wildlife uses (page 126).

Cumulative Effects

Cumulative effects would be the same as alternative 2.

Compliance or Conflicts with the Forest Plan

Alternative 3 is consistent with the Forest Plan because the proposed mining activities do not adversely affect access for subsistence activities as specified by Forestwide standards (USDA Forest Service, Chugach National Forest 2002a, page 3-41 and 3-42). Alternative 3 also meets the desired future condition of wildlife and fisheries species being available for subsistence uses (USDA Forest Service, Chugach National Forest 2002a, page 3-13).

Consistency with Regulatory Framework

Alternative 3 is consistent with Section 810 of the Alaska National Interest Lands Conservation Act because the effects on subsistence uses on federal lands have been evaluated and findings of no adverse effect on subsistence resources have been disclosed for this alternative. Alternative3 is also consistence with Section 811 of the Alaska National Interest Lands Conservation Act because the proposed activities do not impede reasonable access for rural residents engaged in subsistence uses.

Short-term Uses and Long-term Productivity

National Environmental Policy Act requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (National Environmental Policy Act Section 101).

Short-term uses are those expected to occur on the Forest over the next five years. These uses include commercial placer mining, recreation opportunities (both noncommercial and guided opportunities), and fuel reduction and vegetation treatments. Long-term productivity refers to the capability of the land to provide resource outputs for a period of time beyond the next five years. Restoration activities within alternative 2 will increase the long-term productivity of Resurrection Creek through improvements in aquatic and riparian habitat for fish and wildlife. Alternative 3 does not include these long-term benefits to the riparian habitat. Mining operations to recover gold are considered to be a short-term and long-term use of the project area and will occur in all alternatives. The mining operations will affect long-term soil productivity of areas where gold is extracted and areas where mining roads, camps, and settling pond and ditch systems are located. Upon reclamation, these areas will slowly start to recover their soil productivity but it will take many decades. Loss of soil productivity also lengthens time of vegetation reestablishment and may affect species composition into the future.

Monitoring specified in this Environmental Impact Statement and the Forest Plan validates that the management requirements and mitigation are effective in protecting long-term productivity.

Unavoidable Adverse Effects

The following information is a summary of the unavoidable adverse effects analyses in this chapter.

Unavoidable Adverse Effects from Implementation of Alternative 2

Noise: Noise from mining activities may impact private landowners located within 1 mile of the activities for the next 20 years during the months of March through October. Restoration activities would occur farther from private landowners but noise would likely still be audible and may be an impact from May 15 to July 15 for the 4 year period of implementing restoration.

Hydrology/Aquatic Resources: Turbidity pulses from construction of new stream channel could impact aquatic populations in the short term, but the impact of these turbidity pulses on the overall fish populations is expected to be small and limited to the project area and two miles downstream.

Wildlife: Removal of the majority of vegetation during mining operations on up to 274acres may adversely affect wildlife habitat and the resulting delay in developing mature forest stand structure due to loss of soil productivity cannot be avoided or mitigated. About 58 acres of detrimental soil disturbance (17 percent of the 348 acre mining and restoration activity area) would occur due to flooding, compaction, or lack of topsoil prolonging early seral revegetation and resulting habitat.

Scenic Resources: Mining activity will produce visual conditions that have “unacceptably low” scenic integrity over the next 20 years when mining operations are active and seen from adjacent private land, Resurrection Creek Road, and Resurrection Pass National Recreation Trail. Upon completion of mining activity, reclaimed areas will meet the minimum scenic integrity objective of “very low” in the short term, and improve with time to meet higher scenic integrity objectives in the long term as vegetation continues to become reestablished.

Unavoidable Adverse Effects from Implementation of Alternative 3

Noise: Noise from mining activities may impact private landowners located within 1 mile of the activities for the next 20 years during the months of March through October.

Hydrology/Aquatic Resources: Alternative 3 would result in short-term increases in turbidity during the course of the channel relocation. These turbidity pulses could impact aquatic species in the short term, but the impact on the overall fish populations is expected to be small and limited to the lower portion of the project area and two miles downstream.

Wildlife: Removal of the majority of vegetation during mining operations and the resulting delay in developing mature forest stand structure due to loss of site productivity will result in short- and long-term adverse effects on up to 285 acres of wildlife habitat. About 58 acres of detrimental soil disturbance (20 percent of the 285 acre mining activity area) would occur due to compaction or lack of topsoil prolonging early seral vegetation and resulting habitat.

Scenic Resources: Mining activity will produce visual conditions that have “unacceptably low” scenic integrity over the next 20 years when mining operations are active and seen from adjacent private land, Resurrection Creek road, and Resurrection Pass National Recreation Trail. Reclaimed areas will meet the minimum scenic integrity objective of “very low” in the short term, and improve with time to meet higher scenic integrity objectives in the long term as vegetation continues to become reestablished.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined mineral concentrate. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

Irreversible and Irretrievable Commitments of Resources for Alternative 2

Minerals: The extraction of gold is an irreversible commitment of resources. Approximately 274 acres of placer gravels would be mined for gold.

Soils: About 58 acres of detrimental soil disturbance would likely be permanent due to flooding, compaction, or lack of topsoil.

Ecology: The change in the forested structure of the project area by the removal of trees is an irretrievable commitment of resources. The successional pathway of the project area’s forested stands would be altered and potential long-term changes in forest composition of the project area could occur. These changes may linger in the mining areas due to nonuniform establishment of natural vegetation and if nonnative species become more established.

Heritage Resources: Loss of portions of the historic landscape (historic mine tailings) would be an irreversible commitment of resource.

Social and Economic Resources: Commitment of Forest Service fiscal and labor resources to conduct restoration, oversee mining operations, and monitor reclamation activities are irretrievable.

Irreversible and Irretrievable Commitments of Resources for Alternative 3

Minerals: The extraction of gold is an irreversible commitment of resources. Approximately 285 acres of placer gravels would be mined.

Soils: There are about 58 acres of detrimental soil disturbance would likely be permanent due to flooding, compaction, or lack of topsoil.

Ecology: The change in the forested structure of the project area by the removal of trees is an irretrievable commitment of resources. The successional pathway of the project area’s forested stands would be altered and potential long-term changes in forest composition of the project area could occur. These changes may linger in the mining areas due to nonuniform establishment of natural vegetation and if nonnative species become more established.

Heritage Resources: Loss of portions of the historic landscape (historic mine tailings) would be an irreversible commitment of resources.

Social and Economic Resources: Commitment of Forest Service fiscal and labor resources to oversee mining operations and monitor reclamation activities are irretrievable.

Other Required Disclosures

National Environmental Policy Act at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders.”

The biological evaluation for wildlife (see appendix A) indicates that no formal or informal consultation with the U.S. Fish and Wildlife Service is necessary for wildlife species because there are no federally listed or proposed wildlife species or designated or proposed critical habitats in the action area.

The Forest Service consulted with the Alaska State Historic Preservation Office concerning the destruction of the historic mine tailings through implementation of proposed restoration and mining activities. The historic mine tailings are a contributing feature of the Hope Mining Company Historic Mining District which is eligible for listing in the National Register of Historic Places. The Forest Service and the State Historic Preservation Officer signed a memorandum of agreement in 2009 outlining mitigation of producing interpretive panels that address the historic tailings as they relate to the post-gold rush mining (mitigation measure 11, page 42).

The Forest Service is required to maintain water quality consistent with Alaska Water Quality Standards (18 AAC 70) and protect source watersheds consistent with federal Safe Drinking Water Act and Alaska Drinking Water Regulations (18 AAC 80). As part of this process, the Forest Service consulted with Alaska Department of Environmental Conservation and the owner/operator of the public water system located in Hope regarding proposed activities. No comments have been received from the system owner. Alaska Department of Environmental Conservation recommended mitigation measures for actions within the zone E drinking water protection area and these have been incorporated in the mitigation measures (see mitigation measures 1, 2, 4, 5, 7, 8, 25, 26, 27, and 28, pages 39 through 47)

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Chapter 4. Consultation and Coordination

Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this Environmental Impact Statement:

Interdisciplinary Team Members

Brian Bair	US Forest Service TEAMS - Fisheries Biologist
Project Role	Interdisciplinary Core Team Member: Fisheries, Noise; Lead Project Designer
Education	Bachelor of Science in Biology, Montana State University 1990
Experience	19 years of experience in watershed and aquatic habitat condition assessment, water quality and habitat restoration / rehabilitation project planning, design and implementation.
Cheryl Beck	US Forest Service TEAMS – Cartographic Technician
Project Role	Interdisciplinary Core Team Member, GIS; Map Production
Education	Utah State University, Fish &Wildlife/Forestry
Experience	20 years of substantial and varied GIS experience in natural resource management.
Mary Ann Benoit	Chugach National Forest - Wildlife Biologist
Project Role	Wildlife Biologist
Education	Bachelor of Science in Biology, Northern Arizona University, 1994. Bachelor of Arts in Interior Design, Mount Vernon College, 1980
Experience	28 years of experience in wildlife biology, natural resource management, and environmental analysis, 4 national forests in regions 3 and 10.
Matthew Boisseau	US Forest Service TEAMS - Landscape Architect (now Deputy District Ranger on Ruby Mountains/Jarbidge Ranger District on the Carson National Forest)
Project Role	Landscape Architect for Scenery Analysis
Education	Master of Landscape Architecture, Texas Tech University
Experience	9 years as Forest Service employee for NEPA and other special projects in areas of vegetation management, fires and fuels, transportation planning, and recreation resources.
Betty Charnon	Chugach National Forest - Ecologist
Project Role	Ecologist
Education	Bachelor of Arts in Human Ecology, Connecticut College 1988 Master of Forestry, Yale School of Forestry and Environmental Studies 1991
Experience	21 years’ experience as ecologist/botanist for the Forest Service.

Interdisciplinary Team Members

Ruth D'Amico	Chugach National Forest – Subsistence Biologist (now Fisheries Biologist on the Fremont-Winema National Forest)
Project Role	Interdisciplinary Core Team Member, Subsistence uses
Education	Bachelor of Science in Environmental Policy, Institutions and Behaviors, Minor Fisheries Management, Rutgers, the State University of New Jersey, 2001
Experience	12 years of experience in fisheries (region 10), with the past 2 years focus on subsistence management (region 10).
Jacquie Foss	Tongass National Forest – Forest Soil Scientist
Project Role	Soils investigation, analysis, and interpretation.
Education	Bachelor of Science General Engineering & Soil Science, 2002 California State Polytechnic State University, San Luis Obispo
Experience	10 years of experience as a Soil Scientist for the Tongass National Forest
Chad Hermandorfer	US Forest Service TEAMS - Hydrologist
Project Role	Hydrologist
Education	Environmental Science degree, Bowling Green State University, 1994; Master's degree candidate in Watershed Management, Humboldt State University, 1999
Experience	14 years of experience with the US Forest Service in watershed and stream condition assessment and project planning.
Steve Hohensee	Chugach National Forest - Forest Geologist
Project Role	Forest Geologist, Mineral Examiner, and Certified Minerals Administrator. Advisory role on mining law, mineral management regulations, financial assurance and bonding, mining methodology, etc.
Education	MS in Geology, University of Missouri-Columbia, 1989 BS in Geology, Northwest Missouri State University, 1985
Experience	13 years managing large mining projects from environmental analysis to construction/implementation, administration during operations, maintaining adequate financial assurance for reclamation; and 13 years in geodetic survey, satellite geodesy, and cartography.
Delilah Jaworski	US Forest Service TEAMS - Social Scientist
Project Role	Social and Economic Analyst
Education	Master of Science in Environment and Development, London School of Economics, 2008; Bachelor of Arts in Middle Eastern Studies, George Washington University, 2007
Experience	5 years of experience conducting social and economic analysis for NFMA and NEPA compliance
Sherry Kime	Chugach National Forest - District Heritage Program Manager
Project Role	SHPO Consultation
Education	MA Anthropology, History and Historic Preservation, University of Oregon 2002; BA Anthropology, Minor Geological Sciences, University of Oregon, 2000
Experience	7 years with the Forest Service
Karen Kromrey	Chugach National Forest - Public Services Staff Officer – Planning
Project Role	Interdisciplinary Core Team Member, Mining Administration; Team

Interdisciplinary Team Members

	Leader
Education	Bachelor of Science in Forestry, Colorado State University, 1987
Experience	27 years of experience in forest management, recreation management, with the past eight years focus on minerals management (regions 2 and 10).
Bill MacFarlane	Chugach National Forest Hydrologist (now Forest Hydrologist on the Salmon-Challis National Forest)
Project Role	Interdisciplinary Core Team Member: Hydrology, Air/Climate Change; Project GIS/mapping specialist
Education	Master's degree in Watershed Science, Colorado State University, 2001
Experience	8 years of experience in watershed and stream condition assessment, project planning, and stream restoration implementation.
Josh Milligan	Chugach National Forest - NEPA Coordinator (now Forest Planner on the Arapahoe-Roosevelt National Forest)
Project Role	NEPA Assistance
Education	Masters in Environmental Law/J.D.
Experience	10 years with the Forest Service in natural resource management.
Robert Nykamp	US Forest Service TEAMS – Archaeologist (since retired)
Project Role	Archaeologist; assist in the preparation of cultural resource mitigation factors and contribution to NEPA document
Education	BA, Anthropology, University of Colorado, Boulder (1978); Graduate Studies program, University of Colorado, Boulder, 1982-1985
Experience	Professional archaeologist since 1977; Forest Archaeologist for 10 years, 3 years Wild and Scenic River planner; NEPA IDT member and project leader; TEAMS Heritage Resources Program Lead (manager) since 2001
Barbara Ott	US Forest Service TEAMS – Economist (now TEAMS Planning Director)
Project Role	Social and Economic Analyst responsible for the Social and Economic Affected Environment analysis.
Education	MS in Management from Colorado State University. BA in Business Administration, Chadron State College.
Experience	30 years of experience in social and economic analyses for NFMA and NEPA compliance, forest plan revisions, resource management plans, and projects, with experience in all 9 regions of the Forest Service.
Bobbie Jo Skibo	Chugach National Forest - Recreation Specialist
Project Role	Recreation Environmental Analysis
Education	Master of Applied Science- Environmental Management and Policy, University of Denver, 2009; Bachelor of Arts-Ecopsychology, Prescott College, 2002.
Experience	10 years of experience working on broad-based interagency and interdisciplinary natural resource issues on the Chugach National Forest.

Interdisciplinary Team Members

Jan Spencer	US Forest Service TEAMS - Landscape Architect
Project Role	Interdisciplinary Team Leader and Writer-Editor
Education	Bachelor of Landscape Architecture, Utah State University, 1988 (Sigma Alpha Zeta); Associate of Science, Northwest Community College, 1985
Experience	23 years of experience regarding environmental analysis, with an emphasis on scenery management in Forest Service regions 2, 3, 4, 5, 6, 8 and 10.
Joshua Wilson	US Forest Service TEAMS – Economist (now TEAMS Executive Officer)
Project Role	Social and Economic Analyst Environmental Consequences
Education	BS Managerial Economics, UC Davis 2003; MS Ag and Resource Economics, Colorado State University 2005
Experience	1.5 Years as a STEP Economist for the Forest Service Ecosystems Management Coordination, 1.5 Years as a contractor Economist for TEAMS, and permanent TEAMS employee since April 2009.
Kristin Whisennand	US Forest Service TEAMS - Writer-Editor
Project Role	Document editing and publication layout
Education	BA Anthropology, Dartmouth College 1984 BS Resource Conservation Management, University of Montana 2006 Graduate study in archaeology and invertebrate paleontology University of Montana, 1989-1993
Experience	12 years as a writer-editor of environmental documents for TEAMS, 4 years as an assistant team leader for the Content Analysis Team, and 7 years as an archaeological technician

Distribution of the Environmental Impact Statement

This Final Environmental Impact Statement has been distributed to individuals who specifically requested a copy of the document. In addition, copies of the Final Environmental Impact Statement and/or a website link were made available to the following Federal agencies, federally recognized tribes, Native Corporations, State and local governments, organizations, and individuals:

Federal Agencies

Congress

Honorable Don Young, U.S. House of Representatives
Honorable Lisa Murkowski, U.S. Senate
Honorable Dan Sullivan, U.S. Senate

Advisory Council on Historic Preservation

Advisory Council on Historic Preservation, Director of Planning and Review

Department of Agriculture (USDA)
USDA APHIS PPD/EAD
Natural Resources Conservation Service
National Agricultural Library

Department of Interior (DOI)
Bureau of Land Management, Alaska Office
Office of Environmental Policy and Compliance

Department of Commerce (DOC)
NOAA Office of Policy and Strategic Planning
NOAA Restoration Center
National Marine Fisheries Service

Department of Defense (DOD)
Army Corp of Engineers, Pacific Ocean Division

Department of Energy (DOE)
Director, Office of NEPA Policy and Compliance

Environmental Protection Agency (EPA)
Environmental Protection Agency, Region 10

Department of Transportation (DOT)
U.S. Coast Guard, Environmental Impact Branch

Federal Aviation Administration (FAA)
Federal Aviation Administration, Alaska Region Headquarters

U.S. Fish and Wildlife Service (USFWS)
Ecological Services
Office of Subsistence Management

State Agencies

Alaska Department of Fish and Game (ADF&G)
Office of Habitat Management and Permitting
Alaska Department of Natural Resources (ADNR)
Division of Mining, Lands & Water
Alaska Department of Environment Conservation (ADEC)
Division of Water
State Historic Preservation Office (SHPO)

Local Agency

Kenai Peninsula Borough (KPB)

Local/Regional Groups

Alaska Center for the Environment
Alaska Miners Association, Inc.
Chugach Outdoor Center, Jay Doyle
Hope Mining Company, Al Johnson
Hope Sunrise Historical Society, Diane Olthius
Hope/Sunrise Neighborhood Development Association, Jeanne Berger

Tribes

Kenaitze Indian Tribe

Native Corporations

Chugach Alaska Corporation
Cook Inlet Incorporated

Individuals

Jill Brekkan
Todd Bureau
Jamie Carlon
Art and Lynn Copoulos
Willie Davidson
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Allison Erickson
Chelton Feeny
Julian Fischer
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Fred Scriver
Fayrene Sherritt
Jim Skogstad
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Glossary

Anadromous – migrating up rivers from the sea to breed (i.e. salmon species)

Anoxic — The condition of oxygen deficiency or absence of oxygen. Soils that have undergone a long period of oxygen deficiency lack biological attributes important for plant growth and have an altered chemistry that is not conducive to near surface soil processes.

Bank full channel — The stream channel that is formed by the dominant discharge, also referred to as the active channel, which meanders across the floodplain as it forms pools, riffles, and point bars.

Bar or Gravel Bar — (1) A sand or gravel deposit found on the bed of a stream that is often exposed during low-water periods. (2) An elongated landform generated by waves and currents, usually running parallel to the shore, composed predominantly of unconsolidated sand, gravel, stones, cobbles, or rubble and with water on two sides.

Bed Load — (1) Sediment particles up to rock, which slide and roll along the bottom of the streambed. (2) Material in movement along a stream bottom, or, if wind is the moving agent, along the surface. (3) The sediment that is transported in a stream by rolling, sliding, or skipping along or very close to the bed. Contrast with material carried in Suspension or Solution.

Bed Shear Stress — The force per unit area exerted by water as it shears over a surface.

Entrenchment Ratio — Flood-prone width divided by bankfull width; a measure of floodplain accessibility and inundation.

Floodplain — (1) (FEMA) Any normally dry land area that is susceptible to being inundated by water from any natural source. This area is usually low land adjacent to a river, stream, watercourse, ocean or lake. (2) A strip of relatively smooth land bordering a stream, built of sediment carried by the stream and dropped in the slack water beyond the influence of the swiftest current. It is called a living flood plain if it is overflowed in times of high water but a fossil flood plain if it is beyond the reach of the highest flood. (3) The lowland that borders a stream or river, usually dry but subject to flooding. (4) The transversely level floor of the axial-stream drainage way of a semi-bolson or of a major desert stream valley that is occasionally or regularly alluviated by the stream overflowing its channel during flood. (5) The land adjacent to a channel at the elevation of the bankfull discharge, which is inundated on the average of about 2 out of 3 years. The floor of stream valleys, which can be inundated by small to very large floods. The one-in-100-year floodplain has a 0.01 chance per year of being covered with water. (6) That land outside of a stream channel described by the perimeter of the maximum probable flood. Also referred to as a flood-prone area.

Flood-prone Width — Width or extent of floodwaters within a valley.

Graminoid — A grass or grass-like plant.

Highbanker – A portable piece of mining equipment used to separate gold from placer gravels.

Hyporheic — The hyporheic zone is a region beneath and lateral to a stream bed where there is mixing of shallow groundwater and surface water.

Instream Large Woody Material — Coarse wood material such as twigs, branches, logs, trees, and roots that fall into streams.

Length of Meander — One full sine wave of a stream meander.

Meander — (1) The turn of a stream, either live or cut off. The winding of a stream channel in the shape of a series of loop-like bends. (2) A sinuous channel form in flatter river grades formed by the erosion on one side of the channel (pools) and deposition on the other side (point bars).

Meander Belt Width — Amplitude or width containing the meander.

Mine tailings — Rock spoils from mining activity.

Montane – Pertaining to, growing in, or inhabiting mountainous regions**.**

Morphology — (1) The science of the structure of organisms. (2) The external structure form and arrangement of rocks in relation to the development of landforms. River morphology deals with the science of analyzing the structural makeup of rivers and streams. Geomorphology deals with the shape of the Earth's surface.

Net Present Value (NPV) — The discounted sum of monetizable costs and benefits.

Office of General Counsel – The Office of General Counsel provides legal advice and services to the Forest Service.

Organic — Matter derived from living organisms.

Overburden – Soil and other organic material covering gravel or bedrock

Palustrine – Relating to a system of inland, nontidal wetlands characterized by the presence of trees, shrubs, and emergent vegetation (vegetation that is rooted below water but grows above the surface). Palustrine wetlands range from permanently saturated or flooded land (as in marshes, swamps, and lake shores) to land that is wet only seasonally (as in vernal pools).

Placer gravels –Gravels that potentially also contain gold flakes and nuggets.

Pool — (1) A location in an active stream channel, usually located on the outside bends of meanders, where the water is deepest and has reduced current velocities. (2) A deep reach of a stream; a part of the stream with depth greater than the surrounding areas frequented by fish. The reach of a stream between two riffles; a small and relatively deep body of quiet water in a stream or river. Natural streams often consist of a succession of pools and riffles.

Push up dam – a berm composed of cobble and gravel from the streambed that is pushed into place by a bulldozer to divert water

Reclamation – those actions performed during or after mineral activities to shape, stabilize, revegetate, or otherwise treat the affected lands in order to achieve a safe and ecologically stable condition and land use that is consistent with long-term forest land and resource management plans and local environmental conditions.

Recreation Opportunity Spectrum (ROS) — A system developed by the Forest Service that classifies recreation settings on National Forest lands according to their physical, social, and managerial characteristics. These ROS settings are formally applied to National Forest lands and not adjacent private lands. However, the presence and condition of private lands influence the ROS settings assigned to National Forest lands.

Recurrence Interval — In statistical analysis of hydrologic data, based on the assumption that observations are equally spaced in time with the interval between two successive observations as a unit of time, the return period is the reciprocal of 1 minus the probability of a value equal to or less than a certain value; it is the mean number of such time units necessary to obtain a value equal to or greater than a certain value one time. For example, with a one-year interval between observations, a return period of 100 years means that, on the average, an event of this magnitude, or greater, is not expected to occur more often than once in 100 years.

Redd — A depression in gravel created by salmon and trout to deposit and incubate their eggs.

Reference Reach — Undisturbed reach of stream that possesses similar channel morphology, hydrology, sediment regime and biota relative to the disturbed site to be analyzed, rehabilitated or restored.

Refugia – Referring to side water channels or ponds where aquatic organisms can escape injury or mortality from higher water velocity.

Restoration – A set of activities that help improve the environmental health of a river or stream. These activities aim to restore the natural state and functioning of the river system in support of terrestrial and aquatic biodiversity and fluvial processes.

Riffle — (1) A shallow rapids, usually located at the crossover in a meander of the active channel. (2) Shallow rapids in an open stream, where the water surface is broken into waves by obstructions such as shoals or sandbars wholly or partly submerged beneath the water surface. (3) Also, a stretch of choppy water caused by such a shoal or sandbar; a rapid; a shallow part of the stream.

Riparian Areas (Habitat) — (1) Land areas directly influenced by a body of water. Usually such areas have visible vegetation or physical characteristics showing this water influence. Streamsides, lake borders, and marshes are typical riparian areas. Generally refers to such areas along flowing bodies of water.

Salmonid -belonging or pertaining to the family Salmonidae, including the salmons, trouts, chars, and whitefishes.

Sediment — (1) Soil particles that have been transported from their natural location by wind or water action; particles of sand, soil, and minerals that are washed from the land and settle on the bottoms of wetlands and other aquatic habitats. (2) The soil material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by erosion (by air, water, gravity, or ice) and has come to rest on the earth's surface. (3) Solid material that is transported by, suspended in, or deposited from water. It originates mostly from disintegrated rocks; it also includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation. (4) In the singular, the word is usually applied to material in suspension in water or recently deposited from suspension. In the plural the word is applied to all kinds of deposits from the waters of streams, lakes, or seas, and in a more general sense to deposits of wind and ice. Such deposits that have been consolidated are generally called sedimentary rocks. (5) Fragmental or clastic mineral particles derived from soil, alluvial, and rock materials by processes of erosion, and transported by water, wind, ice, and gravity. A special kind of sediment is generated by precipitation of solids from solution (i.e., calcium carbonate, iron oxides).

Semiprimitive Nonmotorized — An area characterized by a predominantly natural or natural appearing environment. Interaction with between other users is low, but there is often evidence of users.

Seral – A seral community (or sere) is an intermediate stage of vegetation growth found in ecological succession in an ecosystem advancing towards its climax community of vegetation. In many cases more than one seral stage evolves until climax conditions are attained.

Side Channel — Typically small stream channel which branches off of the mainstream channel.

Snag — A tree or branch embedded in a lake or streambed. A stub or stump remaining after a branch has been lopped or torn off.

Smolt — A juvenile, silvery salmon up to 15 cm long, which has lost its parr marks and has attained the silvery coloration of the adult. This coloration signifies the readiness of the young fish to migrate to the seas and its ability to adapt to the water environment.

Spawning Gravel — Streambed substrate suitable for salmonid spawning.

Subsoiling — The breaking up of subsoils without inverting them.

Succession — (Biology) (1) The ecological process of sequential replacement by plant communities on a given site as a result of differential reproduction and competition. (2) Directional, orderly process of change in a living community in which the community modifies the physical environment to eventually establish an ecosystem which is as stable as possible at the site in question.

Thalweg — (1) The line connecting the deepest points along a stream. (2) The lowest thread along the axial part of a valley or stream channel. (3) A subsurface, groundwater stream percolating beneath and in the general direction of a surface stream course or valley. (4) The middle, chief, or deepest part of a navigable channel or waterway.

Turbidity - A measure of light obscuration by water. Turbidity increases as the amount of suspended sediments in the water column increase.

Vascular Plants – Any plant that has a specialized conducting system consisting mostly of phloem (food-conducting tissue) and xylem (water-conducting tissue).

Wash plant – A large piece of mining equipment that gravity separates gold from placer gravels.

White Noise – a constant background noise; especially one that drowns out other sounds

Woody Debris — Coarse wood material such as twigs, branches, logs, trees, and roots that fall into streams.

Acronyms and Abbreviations

ACMP	Alaska Coastal Zone Management Program
ACOE	Army Corps of Engineers
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ATV	all-terrain vehicle
BLM	Bureau of Land Management
BMP	best management practice
cfs	cubic feet per second
CFR	Code of Federal Regulations
CNF	Chugach National Forest
dB	decibel
d.b.h.	diameter at breast height (Forestry)
DEIS	draft environmental impact statement
EFH	essential fish habitat
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	final environmental impact statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information Systems
HMC	Hope Mining Company
IRA	inventoried roadless area
LAA	likely adversely affected
LRMP	land and resource management plan
MIS	management indicator species
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NHA	National Heritage Area
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	notice of intent
NPV	net present value
NTU	nephelometric turbidity unit
OGC	Office of General Counsel
OHV	off-highway vehicle
OMB	Office of Management and Budget
R10 SQS	Forest Service Region 10 Soil Quality Standards
SHPO	State Historic Preservation Office
SIO	scenic integrity objective
USC	United States Code
USDA	United States Department of Agriculture

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Appendix A. Biological Evaluation

Chugach National Forest - Biological Evaluation for Threatened, Endangered, or Sensitive Species

Date: 10-31-13

Project Name: Resurrection Creek Restoration II

District: Seward Ranger District

Project Type: Riparian area restoration and mining operations

Location: Seward District – Resurrection Creek, Hope Mining Company claims near Hope Alaska.

Project Actions: Restoration of 74 acres of floodplain, and mining on up to 285 acres.

Vegetation/Habitat Type: Pole size to large hardwoods (cottonwood, birch) and seedling/sapling to large conifers (white spruce and mountain hemlock).

I. Prior Biological Evaluation				No	Yes
Prior Project BE: Wildlife	Date:	8-11-09		X	
II. Species and/or Habitat				No	Yes
2. Previous Species Observation				X	
3. Federally Listed Species Present				X	
4. Habitat For Federally Listed Species Present				X	
5. Sensitive Species Present				X	
6. Habitat For Sensitive Species Present				X	
III. Analysis of Effects				No	Yes
1. Significant Habitat Alteration					X
2. Effects Outside Project Area					X
3. Cumulative Effects on Listed Species or Habitat				X	
4. Cumulative Effects on Sensitive Species or Habitat				X	
IV. Determination of Effects				No	Yes
1. No Affect Threatened, Endangered, or Proposed Species					X
2 May Affect Threatened, Endangered, or Proposed Species				X	
3. May Affect Individual Sensitive Species				X	
4. May Affect Sensitive Species' Population Viability				X	
V. Consultation Requirements				No	Yes
1. Formal Consultation Required				X	
2. Additional Informal Consultation Required				X	

Prepared and Approved By	Mary Ann Benoit		Date: 10-31-13

Affected Environment

Habitat

The Resurrection Creek project area is approximately 418 acres, containing a mixture of primarily pole size to large hardwoods (cottonwood, birch) and seedling/sapling to large conifers (white spruce and mountain hemlock). Details are listed in the affected environment section of the wildlife specialist report.

Wildlife

Effects on Federally Threatened and Endangered Species or Critical Habitat

The humpback whale (*Megaptera novaeangliae*) is an endangered species that occurs in all oceans of the world. Humpback whales do not occur in the project area. *Determination of Effect: No effect to humpback whales or their habitat.*

The Steller's sea lion (*Eumetopias jubatus*) is an endangered species with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands. The Steller's sea lion does not occur in the project area. *Determination of Effect: No effect to Steller's sea lions or their habitat.*

Steller's eiders (*Polysticta stelleri*) are a threatened species that do not breed on the Chugach National Forest. They may winter on the south end of the Kenai Peninsula, but not on the Seward Ranger District (Shuster 2003). *Determination of Effect: No effect to Steller's eiders or their habitat.*

Effects on Proposed or Candidate Threatened and Endangered Species and Critical Habitat

The Kittlitz's murrelet (*Brachyramphus brevirostris*), is a candidate species for listing as endangered or threatened. This small diving seabird inhabits Alaskan coastal waters. During the breeding season, this species prefers habitat near tidewater glaciers, and to a lesser extent, offshore of remnant high-elevation glaciers and deglaciated coastal mountains. Breeding habitat requirements are less well known. Available information indicates this species nests in unvegetated scree fields, coastal cliffs, barren ground, rock ledges, and talus above timberline in coastal mountains, generally in the vicinity of glaciers, cirques near glaciers, or recently glaciated areas. During the breeding season they are often found in mid-bay waters and within 200 m of shore. Outside of the breeding season they often occur farther offshore. Breeding and nonbreeding habitat does not likely exist in the project areas. *Determination of Effect: No effect to Kittlitz's murrelets or their habitat.*

Effects on Sensitive Species

The dusky Canada goose (*Branta canadensis occidentalis*) is a region 10 sensitive species. The breeding distribution is restricted primarily to the Copper River Delta (Campbell 1990). It winters primarily in the Willamette Valley in Oregon, and along the Columbia River in Washington (Cornely et al. 1985). The dusky Canada goose does not occur in the project area. *Determination of Effect: No effect to dusky Canada geese or their habitat.*

The Aleutian tern (*Sterna aleutica*) is a region 10 sensitive species that generally arrives at the Kenai Peninsula between the 4^{th} and 16^{th} of May. Fall migration begins shortly after individuals abandon colonies, typically in August. Staging sometimes occurs in coastal areas, but birds usually depart directly for the sea. Breeding colonies are restricted to coastal sites, typically located at heads of bays, reefs, permanent and ephemeral islands, estuaries in lagoons and at river mouths (Haney et al. 1991, North 1997). They often nest with Arctic terns. Nests are a depression in vegetation, usually on grassy or mossy flats, sand spits, sandbars, sand dunes, pebbly seacoasts, vegetated summits of flat-topped islands, reticulate and string bogs, wet coastal marshes, or tundra (Haney et al. 1991, North 1997). Colony locations frequently shift from year to year among traditionally used sites; as a result, local populations may fluctuate greatly (Haney et al. 1991). They usually forage in shallow water, including tidal rips, along rivers, and over inshore marine waters, and freshwater ponds and marshes, bays or fjord habitats. Summer diet is primarily small fishes; capelin and sand lance are favored. They may also consume marine invertebrates and some insects. In summer, they forage mostly in shallow water, near colonies and within 1 to 10 km of land, but also well out to sea.

Individuals lay clutches of 1 to 3 eggs in mid-May to late June. Hatching occurs mid-June to late July. Young fledge in 4 weeks, mid-July to late August; and may remain at nest for 1–2 weeks after they are able to fly. They forage alone, in monospecific flocks, or in mixed-species flocks. They are frequently associated with Arctic tern in North America. Due to the species tendency to concentrate in a few areas, contamination as a result of oil spills is a potential threat. Heavy predation by birds and mammals and mortality associated with exposure to inclement weather may contribute to low reproductive success. Species is sensitive to disturbance at nesting colonies; complete colony abandonment has been observed following a single visit by humans (Haney et al. 1991). On nonbreeding range, threatened by over fishing of prey species, uncontrolled waste disposal, and land-based pollution (Haney et al. 1991).

The project area does not contain suitable nesting habitat, but potential habitat may exist near the mouth of Resurrection River. The project area is within 10 km of this site and the coast so the project area may contain potential foraging habitat. This species has not been documented to occur in the area. Surveys have not been done in the area as it was just added to the sensitive species list. Mining operations are not expected to affect fish habitat or induce contaminants into the river due to mitigation measures, state regulations, and best management practices required during this operation. Mining activities are unlikely to affect tern populations. Restoration activities will benefit fish habitat, but the project is limited in scale so may only have minor beneficial effects to individuals. *Determination of Effect: No effect to Aleutian terns or their habitat.*

The black oystercatcher (*Haematopus bachmani*) is a region 10 sensitive species.

Completely dependent on marine shorelines for its food and nesting, this is a monogamous, long-lived bird. Breeding pairs establish well defined, composite feeding and nesting territories and generally occupy the same territory year after year, often along low-sloping gravel or rocky shorelines where intertidal prey are abundant. Pairs nest just above the high tide line and use the intertidal zone to feed themselves and provision their chicks. Diets of adults and chicks consist mainly of mollusks; principally mussels and limpets. No existing or potential nesting or foraging habitat exists in the project area. *Determination of Effect: No effect to black oystercatchers or their habitat.*

Discussion of Cumulative Effects

This project will not cause short- or long-term changes to sensitive wildlife habitat as a direct result of mining activities. There should be no adverse cumulative effects on endangered, threatened, or sensitive species due to mitigation measures and best management practices followed to reduce any impacts to fish populations or potential contamination of the creek.

Mitigating Measures Required For All Alternatives

Mitigation measures are listed in detail in the environmental impact statement for this project.

Conclusion

The Resurrection Creek II Restoration Project is not likely to have an adverse effect on vertebrate endangered, threatened or endangered species or their habitats, nor should it impact sensitive species or their habitats.

Literature Cited in Biological Evaluation

Campbell, B. H. 1990. Factors affecting the nesting success of Dusky Canada Geese, *Branta canadensis occident*al*is* , on the Copper River delta, Alaska. Can. Field-Nat. 104: 567–574.

Cornely, J. E., B. H. Campbell and R. L. Jarvis. 1985. Productivity, mortality, and population status of dusky Canada Geese. Trans. N. Am. Wildl. Nat. Resour. Conf. 50: 540–548.

Haney, J. C., J. M. Andrew, and D. S. Lee. 1991. A closer look: Aleutian Tern. Birding, December 1991: 347-351.

North, M. R. 1997. Aleutian Tern (*Sterna aleutica*). In: The Birds of North America, No. 291 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Shuster, Bill. 2003. Seward Ranger District Resource Staff Officer, personal communication re: Steller’s eider

Appendix B. Maps

The following maps are provided in this section:

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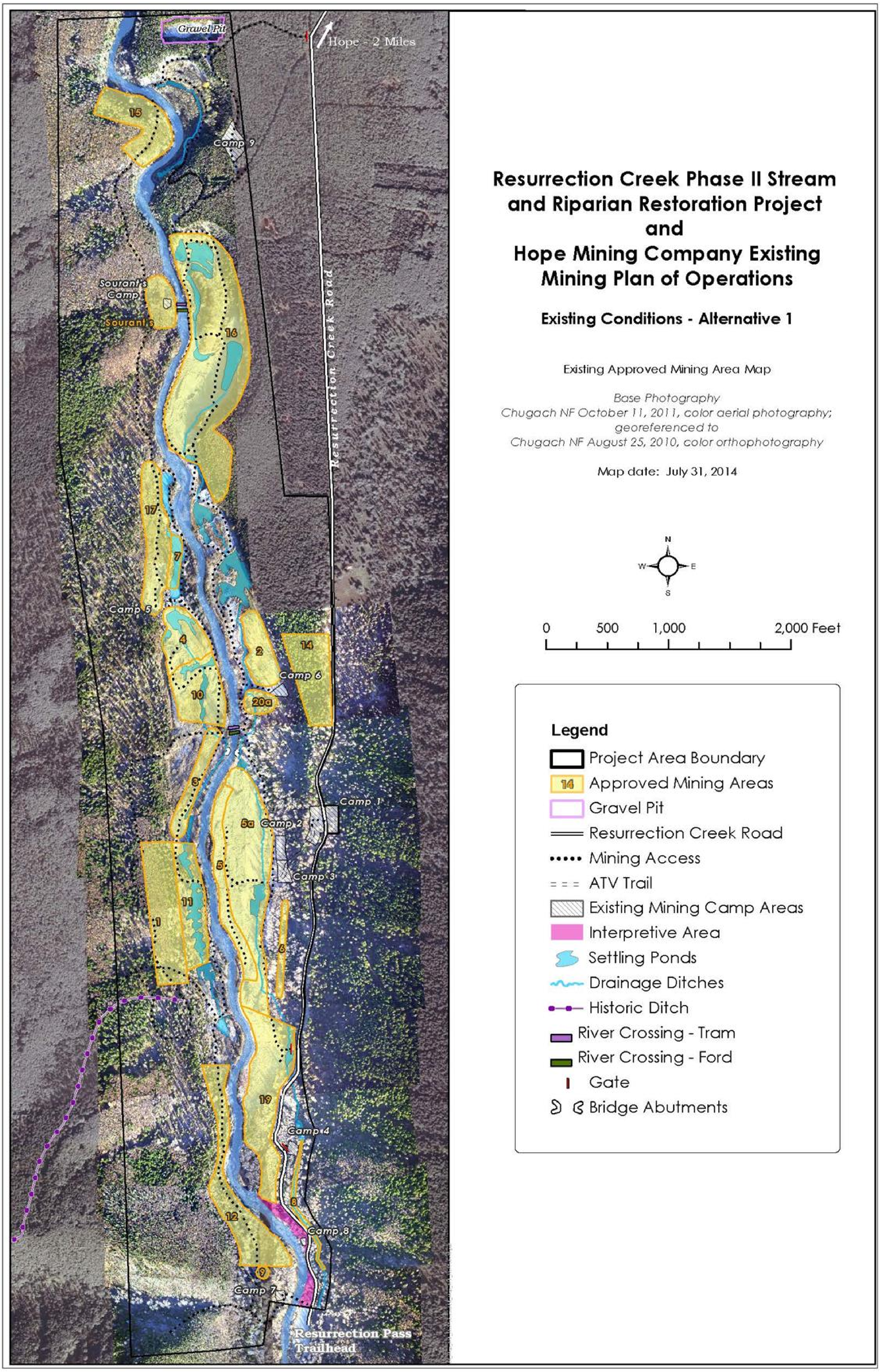

Map 1. Map of existing condition, which is the same as the no-action alternative

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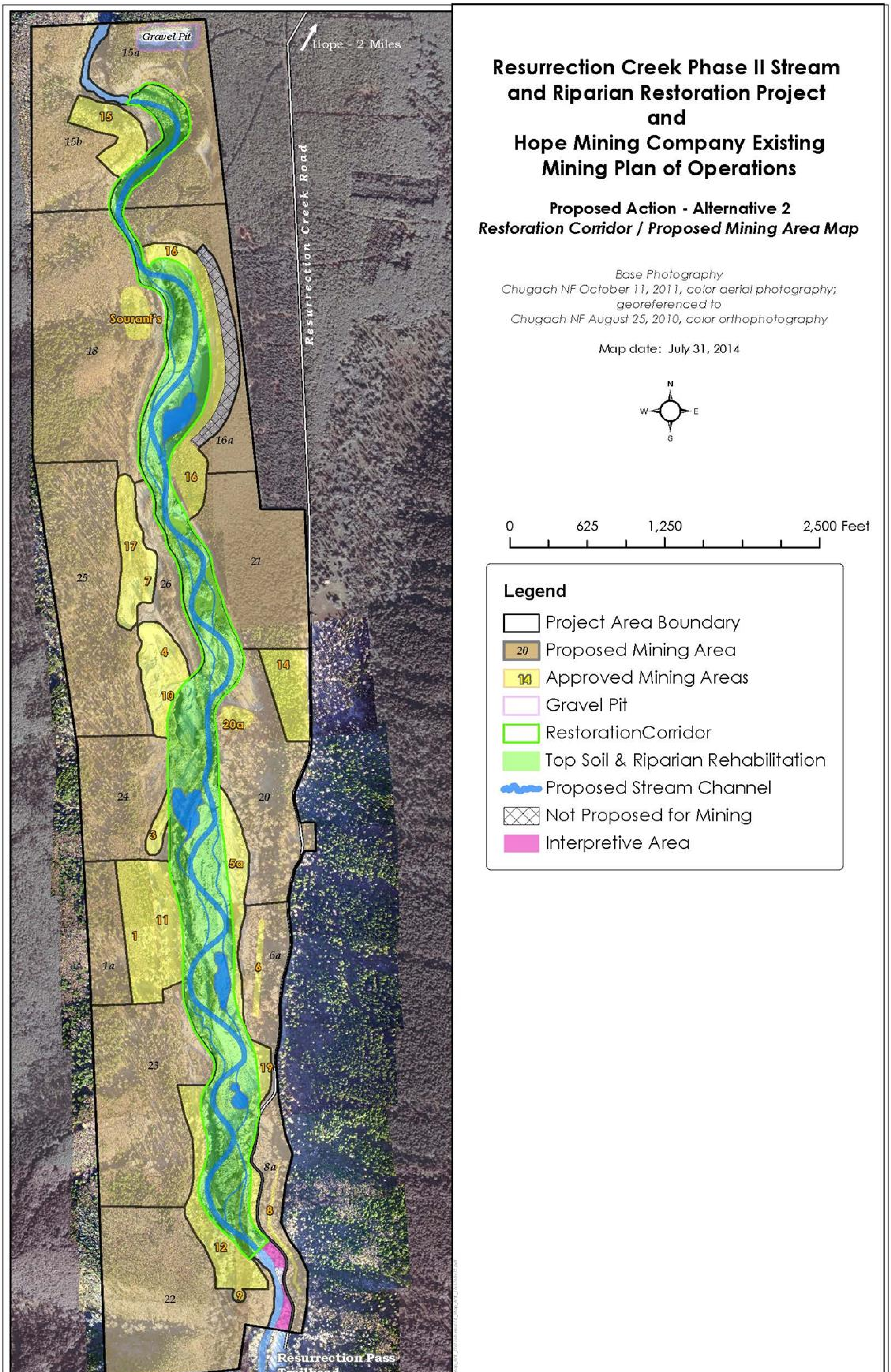

Map 2. Map of alternative 2, the proposed action

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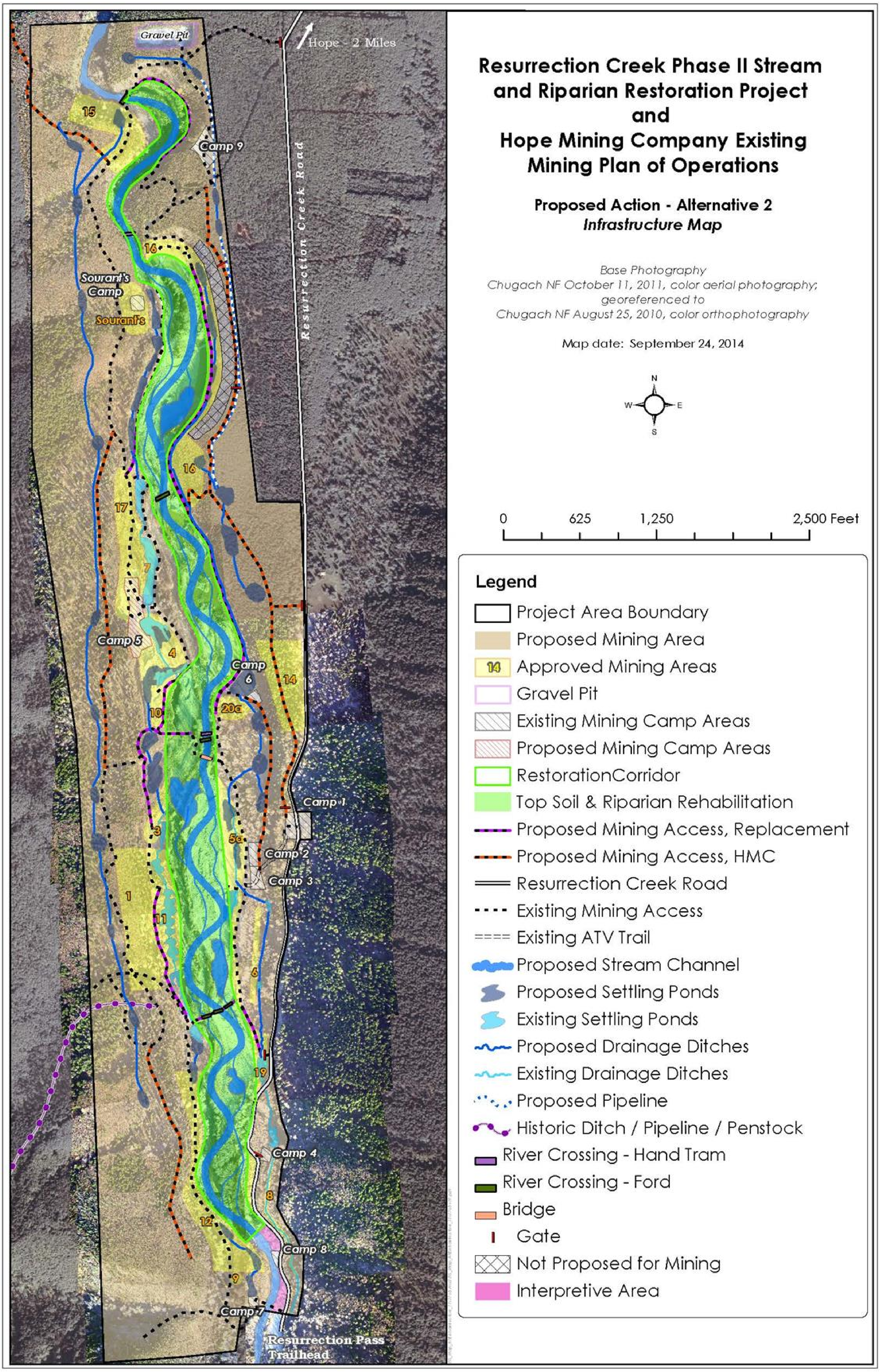

Map 3. Map of infrastructure proposed in alternative 2

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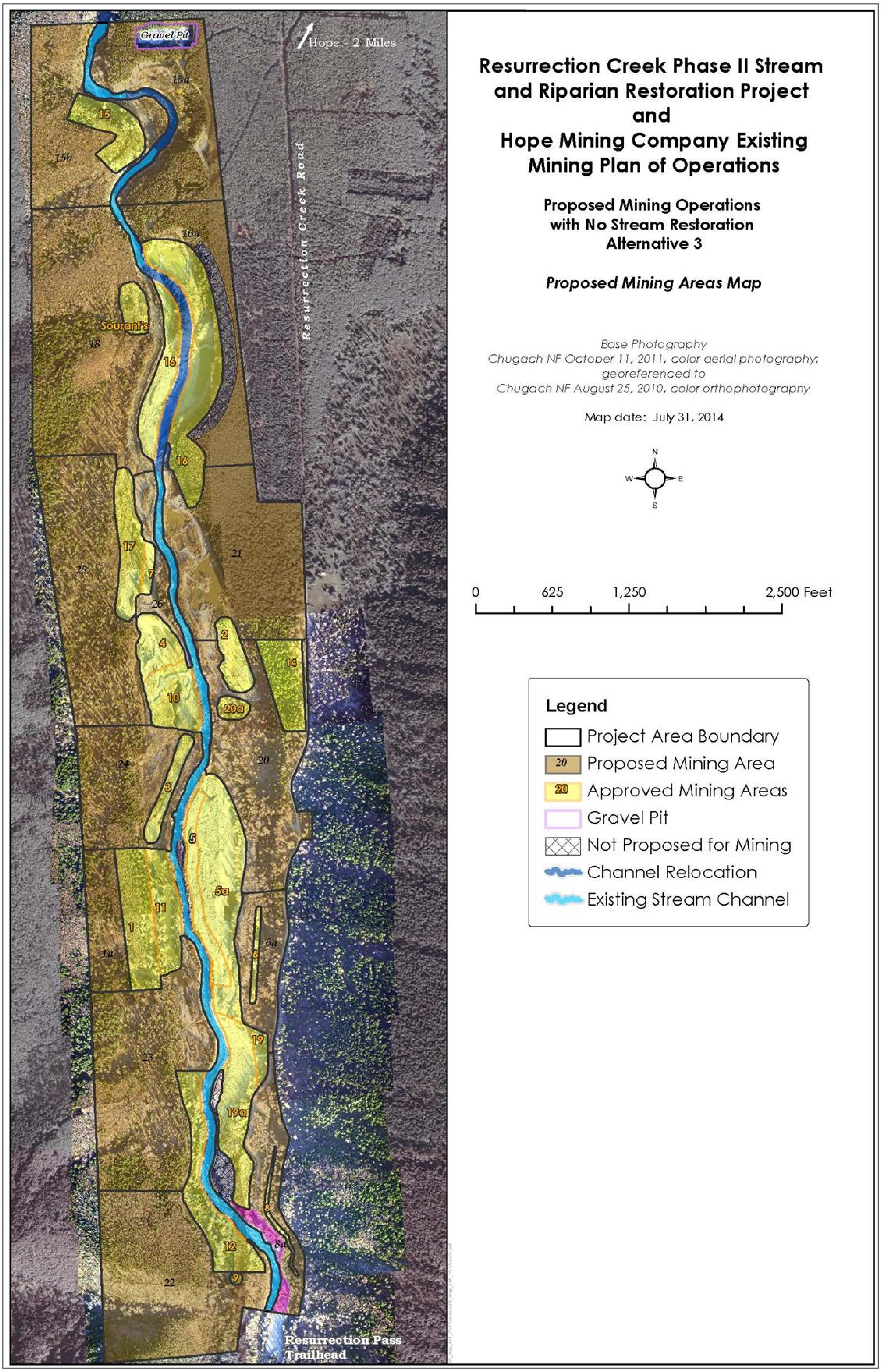

Map 4. Map of alternative 3, proposed mining only

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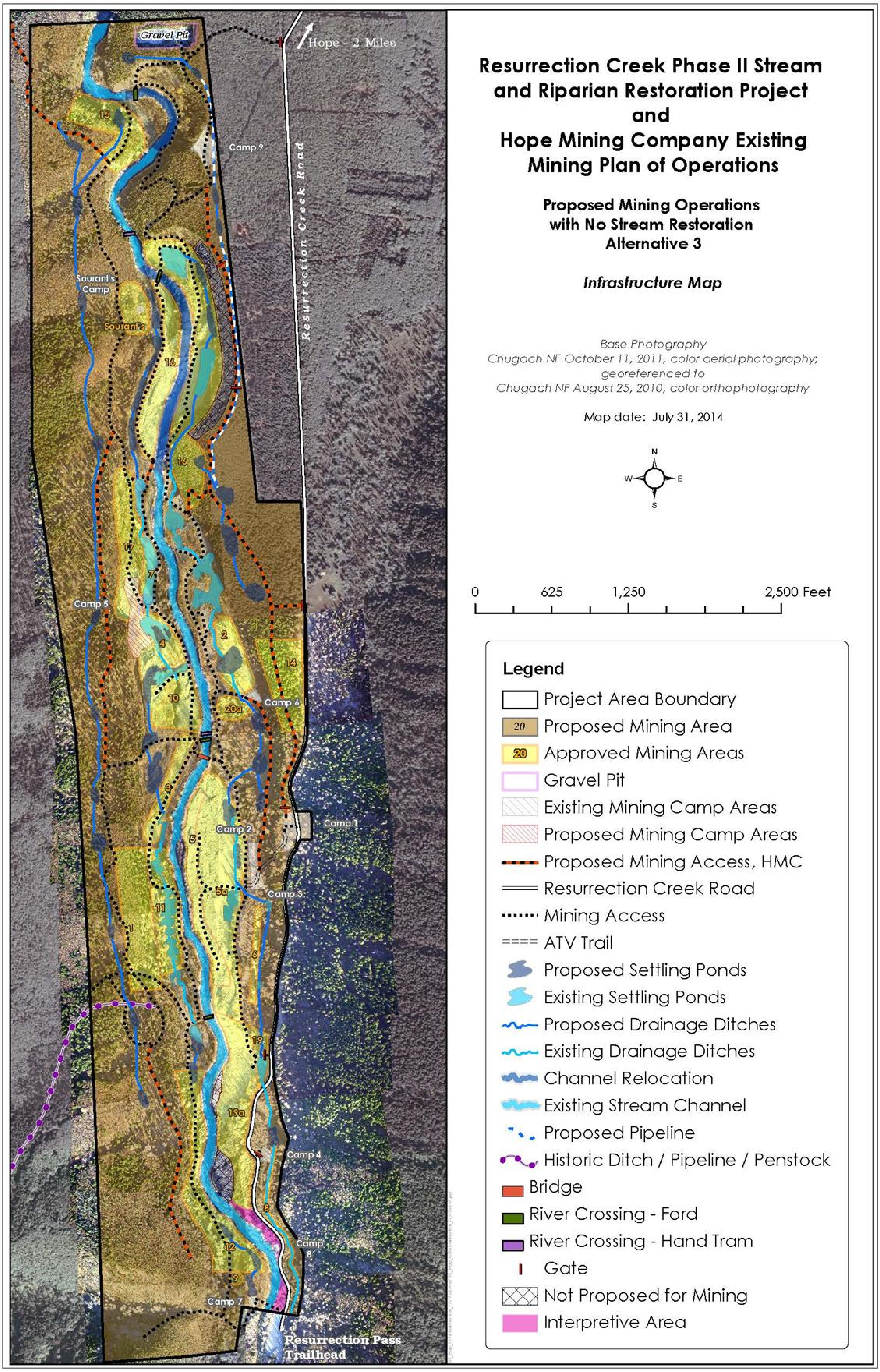

Map 5. Map of infrastructure proposed in alternative 3

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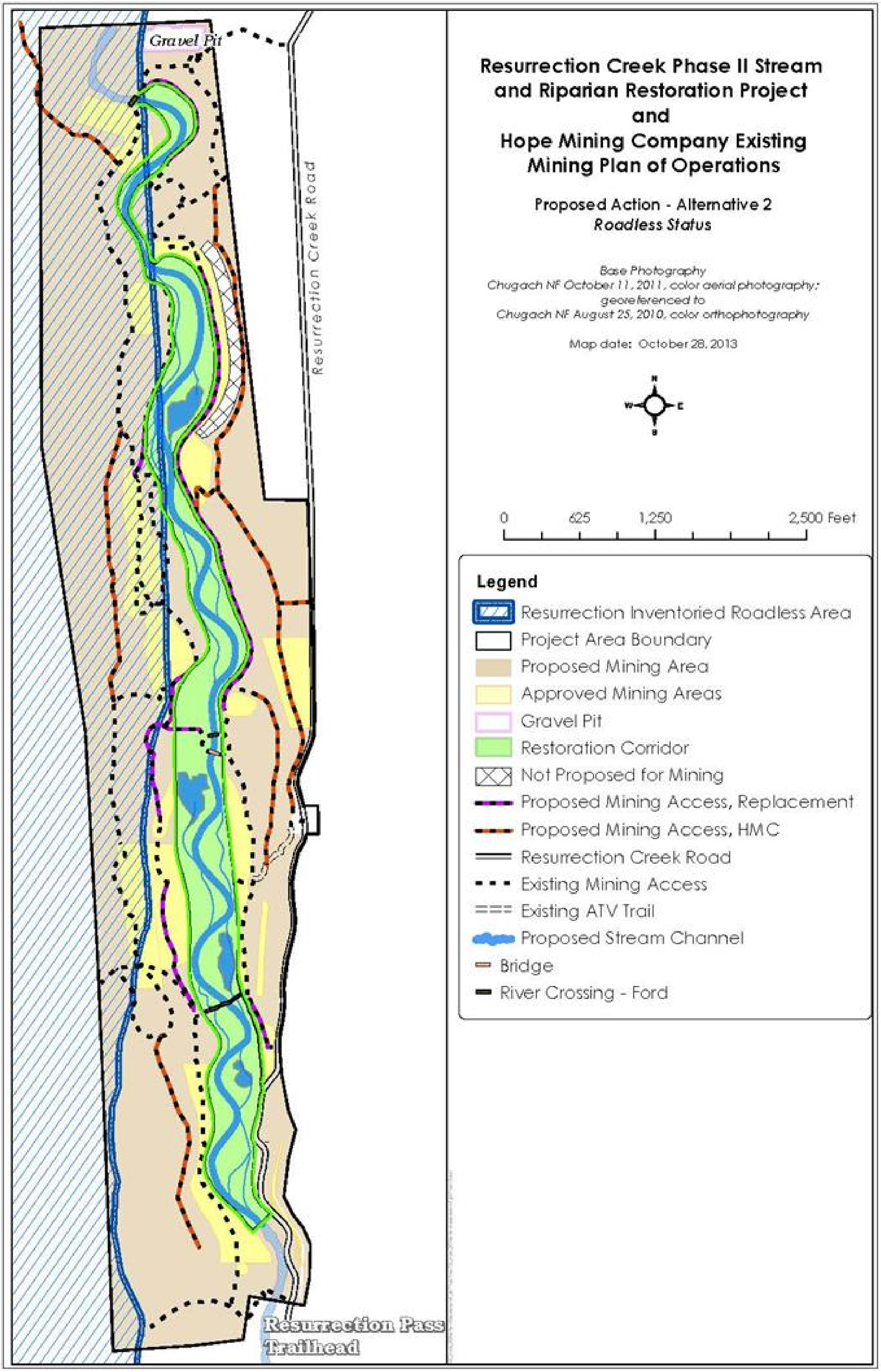

Map 6. Map of alternative 2 and inventoried roadless area overlay

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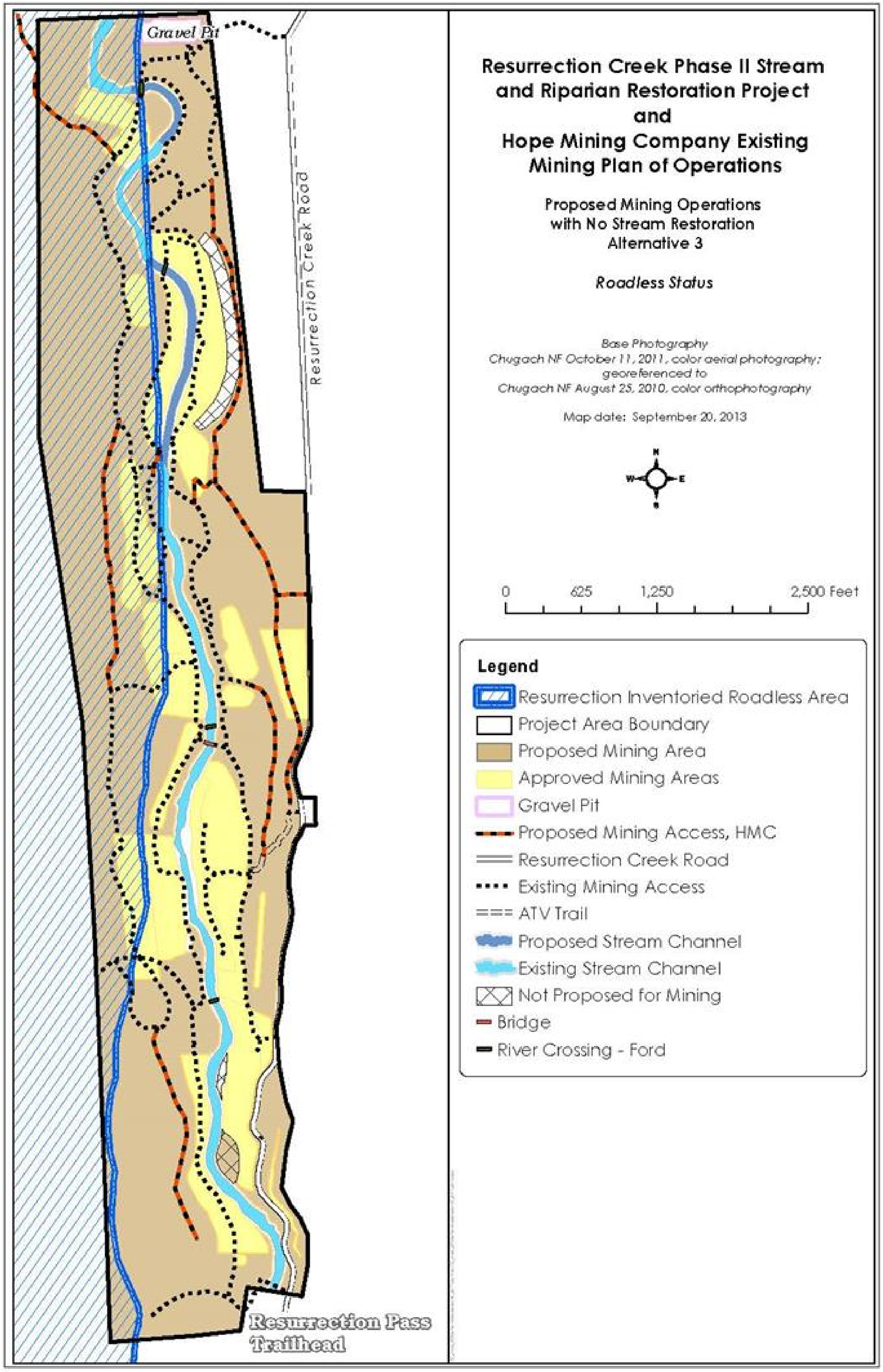

Map 7. Map of alternative 3 and inventoried roadless area overlay

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Appendix C. Essential Fish Habitat Analysis

The Forest Service consulted with National Oceanic and Atmospheric Administration /National Marine Fisheries Service per the procedures outlined in the June 26, 2007 agreement signed by the Forest Service Region 10 Regional Forester and the Administrator for National Marine Fisheries Service. The steps followed are outlined below.

The Forest Service sent the project scoping letter on January 4, 2008 to National Marine Fisheries Service. No written reply was received.

In the Draft Environmental Impact Statement, the Forest Service made a determination that alternative 2 may adversely affect essential fish habitat in the short term (1 to 2 years), and therefore consultation with National Marine Fisheries Service was initiated. Our essential fish habitat consultation consisted of including an essential fish habitat assessment in the Draft Environmental Impact Statement which was sent to National Marine Fisheries Service during the public comment period.

The findings for the essential fish habitat assessment for alternative 2 included the following:

> "In the short term (1 to 2 years) the project may adversely affect essential fish habitat, therefore consultation with National Oceanic and Atmospheric Administration Fisheries has been initiated. However, the long-term indirect and cumulative effects of implementing this project would be the restoration of riparian vegetation, increased spawning substrate, increased pool habitat, and increased perennial side channel flows and associated over-wintering habitat, which would improve aquatic habitat quantity and quality, fish populations and aquatic invertebrates. Aquatic vertebrate and invertebrate populations are expected to respond positively to the stream channel and riparian rehabilitation. Increased spawning and rearing habitat created by the project are expected to provide a long-term benefit to the project area, the aquatic ecosystem, and fisheries resources for the foreseeable future."

Mitigation measures were also developed to reduce the impacts of restoration activities (using best management practices) during construction of channels, excavation of new channels " in the dry", bank stabilization practices, minimizing the number of diversions and magnitude of plumes, and minimizing equipment used below ordinary high water.

The aquatic species risk assessment for alternative 2 is shown in table 24.

Table 24. Aquatic species risk assessment for alternative 2

Species	Probability of Effect	Consequence of Effect	Cumulative Effect	Determination of Effect
Pink salmon *O. gorbuscha*	Low	Low	Low	Low risk of impacting individuals or habitat in the short term and would likely contribute to increased production and viability for the species in the long term.
Chum salmon *O. keta*	Low	Low	Low	Low risk of impacting individuals or habitat in the short term and would likely contribute to increased production and viability for the species in the long term.
Coho salmon *O. kisutch*	Moderate to Low	Low – Some mortality of 0 – 1+ parr	Low	May impact individuals or habitat in the short term but would likely contribute to increased production and viability for the species in the long term.
Chinook salmon O. tshawytscha	Moderate	Low – Some mortality of 0 – 2+ parr	Low	May impact individuals or habitat in the short term but would likely contribute to increased production and viability for the species in the long term.
Whitefish *Prosopium* sp.	Low	Low – Some mortality of juveniles	Low	May impact individuals or habitat in the short term but would likely contribute to increased production and viability for the species in the long term.
Sculpin *Cottidae*	Moderate	Moderate – Mortality of adult and juvenile sculpin within project reach expected	Low	May impact individuals or habitat in the short term but would likely contribute to increased production and viability for the species in the long term.
Stickleback *Gasterosteidae*	Moderate	Low	Low	May impact individuals or habitat in the short term but would likely contribute to increased production and viability for the species in the long term.
Dolly Varden *Salvelinus malma*	Moderate	Low – Some mortality of juveniles	Low	May impact individuals or habitat in the short term but would likely contribute to increased production and viability for the species in the long term.

The findings for the essential fish habitat assessment for alternative 3 included the following:

> In the short term, the project may adversely affect essential fish habitat as a result of the channel relocation [by Hope Mining Company] proposed in alternative 3. Because no stream restoration would occur, no long-term improvements to essential fish habitat would occur as they would under the proposed action.
>
> Hope Mining Company would be permitted through Army Corps of Engineers and Alaska Department of Environmental Conservation for design and construction of the new stream channel.

National Marine Fisheries Service sent a response (August 5, 2010) during the public comment period for draft including three recommendations:

a. Supporting alternative 2
b. Implementing a monitoring plan to evaluate the success of the restoration project
c. Conducting a repeat of the Blanchet/Wenger 1993 study to test the hypothesis that poor overwintering habitat manifests as shorter juvenile residence time, and smaller size smolt.

The Forest Service contacted National Marine Fisheries Service on September 12, 2014 asking for clarification on their recommendation of conducting a repeat of the Blanchet/Wenger 1993 study. National Marine Fisheries Service indicated they would support a decision for restoration even though funding would not be available to repeat the 1993 study. The Forest Service sent a letter to National Marine Fisheries Service on November 26, 2014 confirming this conversation and giving a project status update noting when National Marine Fisheries Service could expect to receive the Final Environmental Impact Statement and a request for Essential Fish Habitat concurrence.

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Appendix D. Response to Comments

Commenter Number	Commenter Name
1	Jean Public
2	Art and Lynn Copoulos
3	National Marine Fisheries Service - James Balsiger
4	Alaska Miners Association, Inc - Steven Borell
5	United States Department of the Interior, Office of Environmental Policy and Compliance - Pamela Bergmann
6	Frank Gwartney
7	Joel Schumacher
8	Angela Palmer
9	Julian Fischer
10	Jill Brekken
11	Frank Von Hippel
12	Erin Schumacher
13	Shawn and Marnie DeFord
14	Allison Erickson
15	Alaska Center for the Environment - Valerie Connor
16	Andy and Susie Hall
17	United States Environmental Protection Agency - Christine B. Reichgott
18	Hope Mining Company

Other Agency, Organizations, and Individual Comments

Commenter/ Comment Number	Comment	Response
1.01	I oppose allowing Hope Mining Company to expand to pollute Alaska. It is clear mining is horribly polluting. It is time to stop allowing profiteers like this to destroy earth so completely. Most of earth won't be fit to live in if we keep giving profiteers these rights to destroy so easily. The toxic chemicals in mining pollute earth for hundreds of years. Especially in a cold hostile climate like Alaska.	The General Mining Act of 1872, as amended, is a United States federal law that authorizes and governs prospecting and mining for economic minerals, such as gold, platinum, and silver, on federal public lands. This law, approved on May 10, 1872, codified the informal system of acquiring and protecting mining claims on public land. All citizens of the United States, 18 years or older, have the right under the 1872 mining law to locate a lode (hard rock) or placer (gravel) mining claim on federal lands open to mineral entry. The Forest Service cannot prohibit mining on National Forest System Lands open to mineral entry. Under 36 CFR 228 Subpart A regulations, the Forest Service works with mining operators to minimize adverse impact to surface resources through approval of mining plans of operations which include reclamation of surface resources after mining is completed.
2.01	We support the proposed action contingent on the public having access. Phase 1 was a huge success and based on that success this project should proceed providing that the public has access to phase 2 areas and to areas on the west side of the creek. All new roads, access points, bridges, that are in the project area or in the expanded mining area and that are built as a part of this project should be open to the public. No gates with "road closed" signs should be installed that effectively block off access to the restored areas or to the west side of the creek. If the public is paying to restore the area they must have complete access to it. If the roads, bridges, etc., are not open to the public then the project and mining areas should be scaled back or cancelled.	The public would be allowed nonmotorized pedestrian access to the entire project area. If an area is being actively mined it may be necessary to temporarily restrict public access due to safety concerns with having members of the public in areas where heavy mechanized equipment is operating (36 CFR 228.9 Maintenance during operations, public safety). Hazardous sites or conditions resulting from operations shall be marked by signs, fenced or otherwise identified to protect the public in accordance with Federal and State laws and regulations (page 156). The proposed temporary bridge would be constructed specifically for the purposes of access to the restoration activities on the west side of Resurrection Creek by the restoration contractor and Forest Service. Forest Service has agreed that Hope Mining Company can also use this bridge for mining access while the bridge is in place (page 27). The public will not be allowed to use this bridge for pedestrian foot traffic due to safety concerns. The trail bridge on the Resurrection Pass National Recreation Trail on the south end of the project area serves the purpose of providing public access to the west side of Resurrection Creek.
2.02	A trail to link up the west side of Resurrection Creek to the new Gull Rock Trail head should be included as a part of the proposed project. This project will open up the west side of the creek. It is important to also open that area to hikers and to link the area with the new Gull Rock trailhead. The West side of the Creek is not a "miners only" area.	A new trail on the west side of Resurrection Creek that would link the Gull Rock/Hope Point trail with the Resurrection Pass Trail is outside the purpose and need for this project (restoration of stream channel and approving proposed mining) and will not be considered in this project. The public may use the west side of Resurrection Creek at any time for nonmotorized recreation as long as their activities do not interfere with the operators right to reasonable access to the mineral estate.

Commenter/ Comment Number	Comment	Response
2.03	The proposed restoration and planned future mining projects have positive benefits for the community, public, and miners. It's good to see both projects go forward to stimulate economic activity and growth.	Comment noted.
3.01	National Marine Fisheries Service supports Alternative 2, the Proposed Action. Increases in turbidity would occur during the course of the stream restoration work. These turbidity pulses could impact aquatic populations in the short term, but impact of these turbidity pulses on the overall fish populations is expected to be small and limited to the project area and two miles downstream. Increased spawning and rearing habitat created by the project are expected to provide long-term, positive benefits to the project reach, the aquatic ecosystem, and fisheries resources.	The effects to aquatic resources have been analyzed and disclosed in the Final Environmental Impact Statement (pages 90 to 112).
3.02	National Marine Fisheries Service recommends that a monitoring plan be implemented to evaluate the success of the restoration project. Specifically we recommend a repeat of the Blanchet and Wenger 1993 study to test the overall hypothesis that poor overwintering habitat quality manifests as shorter juvenile residence time, as well as smaller sized smolt, when compared to un-mined reference reaches. This relationship should reverse after the physical habitat goals of the project are met, with both residence time and smolt size coming in line with reference systems.	The Forest Service has reviewed National Marine Fisheries Service's recommendation to repeat the Blanchet and Wenger 1993 study to evaluate juvenile fish within the restored sections of Resurrection Creek. The Forest Service has been monitoring spawning adult salmon both within the restored creek sections and within the proposed Phase II project area since 2005. The adult monitoring results of Phase I restoration work show dramatic increases in adult spawning and utilization. The Phase II proposed restoration work will build on the Phase I project. Funding would not be available to repeat the Blanchet and Wenger study unless it could be funded and implemented in partnership with other interest groups/agencies such as Cook Inlet Aquaculture Association, National Marine Fisheries Service and the Alaska Department of Fish and Game (pages 213 to 217)
4.01	This proposed restoration project is an excellent example of how mining is a temporary use and how mining and environmental enhancement can co-exist and ultimately result in increased benefits to future users of the land.	Support for the project noted.
4.02	Under the 1872 Mining Law as amended, mining claimants have the statutory right to prospect for and develop mineral resources on lands that are open to mineral entry. We favor the proposed project that ensures those mining rights both within and outside the restored stream corridor.	Comment noted.

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4.03	Proposed mitigation measures should be designed to protect the environment to the extent feasible, while still allowing mining to occur without being unnecessarily or unreasonable burdensome to the miner.	All mitigation measures pertaining to Hope Mining Company's proposed plan of operations have been disclosed to Hope Mining Company to ensure that the measures are feasible for mining operator to implement.
4.04	The DEIS is generally well written and easy to understand. However, definitions for several additional scientific terms used in the document should be included in the glossary. Examples include: seral hardwoods, palustrine wetlands.	Noted and added to Final Environmental Impact Statement (page 187 to 191).
4.05	Page 8 Minerals. A discussion of an objective for saleable minerals (such as sand and gravel and other common variety materials) might be appropriate here.	The objective to provide saleable minerals (such as sand, gravel, and common variety materials) from the project area is not within the scope of the purpose and need for the project (page 11 to 13) and was not added to the Final Environmental Impact Statement.
4.06	Page 18, Revegetation. Source areas for soil and sod used for revegetating constructed flood plains should be selected to avoid using materials that would be needed for closure and reclamation of new mining areas.	This comment has been addressed in the effects analysis for the soils resource (page 74 to 78). There is a large stockpile of soil in area 16 and additional soil is available in areas currently approved for mining operations.
4.07	Top of Page 29 Continuation of Table 1 Comparison of Alternatives – Dust Abatement. This mitigation measure should be included under Air/Climate Change rather than Recreation.	Dust Abatement is listed as mitigation measure 9 with air quality as the concern being addressed (page 41).
4.08	Page 29 Table 1 Vegetation Ecology. Cleaning mechanized equipment off-site before bringing them into the project area could be difficult, especially in that this would have to include vehicles used by project visitors such as officials from regulatory agencies. The miner has no control over such vehicles.	The Final Environmental Impact Statement has been revised to include only heavy equipment in mitigation measure 18 (page 43).
4.09	Page 32 Table 1Soils. We suggest replacing the word “wasted” in the 4th line of the first mitigation measure with “disposed of”. Such materials might have utility, as suggested, for construction of terraces and ponds.	The wording has been changed in the Final Environmental Impact Statement to address this comment in mitigation measure 3 (page 39). Some material may not be deemed suitable for construction for terraces or ponds and will need to be buried.

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4.10	Page 34 Monitoring Common to all Action Alternatives - Mining. Inspection for this operation should be no different than for other mines, There is no need for weekly compliance inspections. Such inspections become unduly burdensome on the mine operators if they result in delay of the operation. This would also unnecessarily increase Forest Service compliance cost. The timing and duration of compliance inspections should be based on the nature of the operation and its compliance record. We also suggest coordination of compliance visits with personnel from other regulatory agencies to minimize disruption of the operation.	Forest Service has a regulatory responsibility to ensure that the 36 CFR 228 Subpart A regulations are implemented. These regulations govern how the Forest Service monitors surface resources that may be affected by Hope Mining Company operations. The nature of the proposed restoration project requires the Forest Service to work in a collaborative relationship with Hope Mining Company to develop a restoration project that can be implemented without negatively impacting Hope Mining Company's right of access to the mineral estate in proposed corridor and other areas in the project area. The monitoring section was revised in the Final Environmental Impact Statement to reflect the resource or item to be monitored during the inspections and frequencies of inspections (page 48 to 54).
4.11	Page 48, Line 5. The sentence “The proposed Action would have no adverse effects” seems incomplete. We suggest adding “on air quality or climate change”.	Summarization of all the adverse effect findings have now been grouped into one section at the end of chapter 3 in the Final Environmental Impact Statement and are no longer separated out in each resource section (page 165).
4.12	Page 68, Environmental Consequences, General Health Effects of Noise. Reference should simply be made to MSHA noise standards without further details. http://www/msha.gov/MEDIA/PRESS/1999/NR990909.HTM	The environmental consequences for the noise section of chapter 3 was substantially rewritten to better reflect the methodology used in the effects analysis (page 85 to 90).
4.13	Page 72, Alternative 3 - No Restoration, last paragraph. "Alternative 3 would mechanically mine 3 acres more than Alternative 2." Elsewhere in the document you suggest that 200 acres would be mined in alternative 2. If so, the sentence should read: "Alternative 3 would mechanically mine 7 acres less than Alternative 2."	The Environmental Consequences for the noise section of chapter 3 was substantially rewritten; this section under alternative 3 does not refer to specific acre figures (page 89 to 90).
4.14	Page 76, 2nd paragraph. On page 75 sockeye salmon are mentioned as being present in Resurrection Creek. However, no observational data is included in this paragraph. This suggests that they are rarely present and the statement should be worded that way.	Sockeye show up in Resurrection in small numbers every year. It is unknown if the sockeye in Resurrection Creek are small river rearing population or strays from the Kenai Peninsula meta population. The wording in the Final Environmental Impact Statement has been changed to reflect this (page 96).

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4.15	Page 78, paragraph 3. The presence of large boulders in Resurrection Creek is in large part due to glacial transport and deposition. Large blocks of country rock fall onto and become entrained by glacial ice and can be transported many miles by the glacier before ultimately being deposited at the terminus or where the glacier ceases to advance. Depending upon boulder characteristics (size and shape, etc.) gradients, and quantities of melt water, large boulders may be transported shorter distances by water or via processes of mass wasting (slides, solifluction, etc.).	This paragraph has been updated to reflect the role that glaciation has had on boulder transport in the Resurrection Creek watershed (page 93).
4.16	Page 81, line 4. "...and some mercury vapor may have been deposited..." Mercury metal may have been deposited but not mercury vapor unless it has been distilled.	The paragraphs referring to historic use of mercury have been rewritten to address this comment (page 92).
4.17	Page 81, 4th paragraph, line 7. "Lead concentrations violating State standards were measured upstream of a mining site on Palmer Creek." Palmer creek valley hosts numerous mineral prospects. Galena, a lead sulfide mineral, is a relatively abundant gangue mineral. Lead concentration in the water likely reflects local geology and occurs naturally in water.	This entire paragraph referring to heavy and trace metals was deleted from the Water Quality section of the Affected Environment discussion for Aquatic Resources and Hydrology because the discussion wasn't pertinent to understanding the effects of the alternatives on water quality (page 92).
4.18	Page 82, Groundwater, line 9. "...the depth of the alluvial gravels..." This would make more sense if the word gravels was changed to aquifers.	This section of the document is describing the affected environment for hydrology. This paragraph is referring to a physical attribute of the subsurface material common to the Resurrection Creek valley and not a groundwater attribute. The word "gravels" is more appropriate in this usage and therefore is retained (page 92).
4.19	Page 116, 1st paragraph. The discussion here should reflect that many of the existing ponds and ditches are post 1975 in origin.	This paragraph was deleted from the Affected Environment section for the heritage resources because the cultural landscape is addressed and analyzed as part of the determination if a property (such as the Hope Mining Company Historic Mining District) is eligible for the National Register of Historic places rather being analyzed as a historic property by itself (page 126).
4.20	Page 116, Environmental Consequences, line 2. "The tailings are contributing features for the Hope Mining Company Historic Mining District..." Mining Company should be deleted from the name of the district.	The Hope Mining Company Historic District was recorded under this name in 1991 when it was evaluated and determined eligible for inclusion in the National Register of Historic places. The name will be corrected throughout this document.

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4.21	Page 123, Inventoried Roadless Area, Location and Background. What is the official boundary of the Resurrection IRA? What public document shows the boundaries? All reference to IRA's should be removed from the DEIS due to the fact that the IRA program does not apply to the State of Alaska.	The Final Environmental Impact Statement revision includes a map (page 144) showing the entire Resurrection IRA. The commenter appears to be referring to the 2001 Roadless Area Conservation Rule (36 CFR Part 294 (2001). This rule does apply to the Chugach National Forest.
4.22	Page 138, Recreation Capacity & Visitor Days, line 7. There is an extra "that" in this sentence	The Social and Economic Environmental Consequences section was substantially rewritten (Page 154 to 158) and no longer refers to Recreation Capacity and Visitor Days. Information on effects to Recreation resources is now found in the Recreation Environmental consequences section (page 132 to 136).
4.23	Page 140, NPV. An NPV of over $689,000 seems excessive for administration of a single mining operation over 20 years even though this apparently reflects more stringent administration in the future. The administration should be based on current requirements, not some hypothetical future. Any reference to future requirements not yet promulgated through rulemaking is purely speculative.	The Net Present Value analysis has been updated to more accurately reflect the cost of administration under alternative 3. The discounted cost of alternative 3 is estimated to be $306,403 (page 157).
4.24	Alaska Miner's Association supports the proposed action. The economic benefits and the long term environmental and socio-economic benefits, though difficult to quantify, will likely greatly exceed the short term financial costs and minimal environmental risks of restoring the two-mile long section of Resurrection Creek.	Support for the project noted.
5.01	No Comments	
6.01	Having attended the public meeting of 8/11/10 and having witnessed the magnificent restoration results accomplished by Phase I, I wish to express my wholehearted support of the Phase II plan to restore and protect that vital part of this waterway. I look forward to an enhanced Coho fishery and increased Chinook numbers.	Support for the project noted.

Commenter/ Comment Number	Comment	Response
6.02	My only concern is the ambivalence of Hope Mining Co. toward this fragile environment and the consequences of their actions. I realize that an antagonistic approach is unhelpful but the collegial relationship that developed between Hope Mining Co. and the Forest Service under Duane Harp was harmful, costly and did a lot to damage the Forest Service image in the community and beyond (the ensuing struggle made three feature articles in the ADN).	Hope Mining Company has a right of access to the mineral estate within the project area and is required to follow all state and federal regulations to protect resources and to complete reclamation to control erosion, control water runoff, and reshape and encourage revegetation, where practicable. Forest Service strives to maintain a professional and collaborative relationship with all mining operators, including Hope Mining Company as well as engaging with local residents to understand how proposed mining operations may affect the local communities (page 20).
7.01	A new road along the top of the steep embankment on the west side of the Horse Creek Subdivision will most certainly compromise the property values of the area in-so-much as there is very limited space between the edge of the hillside and our property line to construct a road without encroaching on the existing property line along that stretch of National Forest. Please consider that there is less than one hundred feet of National Forest land between our property line and the edge of the steep hillside, which provides inadequate space there for a new road without severely degrading the value of our property.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. The Forest Service has reviewed Hope Mining Company's proposed operations and has verified that proposed roads provide reasonable access to proposed mining areas. Potential effects on property values were not addressed in the Draft Environmental Impact Statement. An analysis of how proposed mining roads may affect property values has been included in the Final Environmental Impact Statement (page 155 and 157). The analysis finds that road construction may have a negative effect on property values. After discussion with the Forest Service, Hope Mining Company has agreed to moving one proposed road away from the private property boundary in area 21 and building a narrower road with gates on either end that would limit the vehicles that would use the road in area 16a (pages 76 and 155).
7.02	The current road system affords excellent access to the mining operations without imposing additional impacts on the property owners and recreational public, who are also rightful users of National Forest lands. Therefore, the addition of a road in the proposed area is not only unnecessary for the continued operation of the mines, but would most certainly have a negative impact on the current property owners and recreational public.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. The Forest Service has reviewed Hope Mining Company's proposed operations and has verified that all proposed roads provide reasonable access to proposed mining areas. After discussions with Hope Mining Company about property owner concerns on proposed road in area 16a and area 21, Hope Mining Company has agreed to limit the use of the road in area 16a between the private land and slope break, and has moved proposed road location away from the private land boundary in area 21 (pages 76 and 155). The recreation effects analysis concluded that recreation visitor's short duration in travelling along and through mining activity would not cause visitors to recreate elsewhere (page 132).

Commenter/ Comment Number	Comment	Response
7.03	As we recognize that mining has a long history in the area and is likely to continue, please consider that the Resurrection Valley of today also provides tremendous recreational benefits to a population that far outnumbers the small few who benefit from the mining operation. Currently, the negative impacts on the area of the mining operation are significant, and Hope Mining Company and its affiliates seem to operate with little to no consideration for the cost to other users in the area.	The Forest Service recognizes concerns of how mining activity might affect recreation opportunities for local residents and visitors and has completed effects analysis for recreation resources and scenery resources (pages 130 and 136). The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. The Forest Service has reviewed Hope Mining Company's proposed operations and has included mitigation measures, where feasible, to minimize potential impacts of mining operations on surface resources (pages 39 to 47). Several of these mitigation measures includes addressing public safety at Resurrection Pass National Recreation Trailhead and along the first part of the trail (page 42) and would be incorporated as part of the mining operating plan.
7.04	In the interest of reasonable compromise, please consider allowing reasonable continuation without the unmitigated expansion that impassively disregards the wants and needs of everyone else involved. Please deny the proposal to construct a new road in the area considered.	See comment 7.02
8.01	The north-south road proposed in Area 16b and the east-west road in Area 21 are either impractical, unnecessary or both. This corridor is too narrow for a road. No room exists for a buffer between the bluff and the road and between the road and the private property in the Horse Creek Subdivision No.2. This will result in drainage and erosion problems. According to 36 CFR 228.8 mining roads have to be built to assure adequate drainage and minimize or eliminate damage to soil resources.	See comment 7.02
8.02	Additionally the north-south road in Area 16b is unnecessary because of other road access to these areas. Currently a road exists at the toe of the bluff, and roads are proposed at the toe of the bluff in both Alternatives 2 and 3. Furthermore, another entry point is indicated on the map in Area 14 making the section of road on the north end of Area 21 and leading into Area 16b redundant.	The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for locatable minerals on federal public lands. Under this mining law, Hope Mining Company has the right to access minerals on their claims. The Forest Service understands and recognizes the concerns of local land owners relative to mining activity. The Forest Service has reviewed Hope Mining Company's proposed operations and has verified that all proposed roads are reasonable for access to proposed mining areas and for maintenance of mining infrastructure such as ditches or water pipeline. The existing roads at the bottom of the slope in area 21 and 16 do not provide access to the portion of the mining area at the top of the slope. As mentioned in response to Comment 7.02, the Forest Service worked with Hope Mining Company to move the location of the proposed road in area 21 and reduce the scope of the road in area 16a (pages 76 and 155).

Commenter/ Comment Number	Comment	Response
8.03	Finally the east-west road in Area 21 and the north-south road in Area 16b would highly degrade our property value, and the experience on our land. The proposed new access road in Area 21 and 16b should be eliminated for the above reasons.	See comment 7.01
8.04	If roads are built in Areas 21 and 16b we urge the proposal to include a 200 feet minimum buffer from private property.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. The Forest Service cannot impose restrictive buffers that restrict mining access within a mining claim. Adjacent landowners would have the ability to keep a buffer on the private property. The Forest Service has reviewed Hope Mining Company's proposed operations and has verified that all proposed roads are reasonable for access to proposed mining areas. After discussing with Hope Mining Company about property owner concerns on proposed road in area 16a and area 21, Hope Mining Company has agreed to change road in area 16a to a narrower, limited use road in narrow section between private land and slope break, and has moved proposed road location away from private land boundary in area 21 (pages 76 and 155 .
8.05	We also suggest that any proposed road be clearly defined in the EIS in terms of its width and substrate. Roads should be the minimal width to allow mining equipment into claims.	The Final Environmental Impact Statement more clearly defines proposed roads width and substrate (page 27). Approved roads will be the minimum necessary to reasonably access the mineral estate.

Commenter/ Comment Number	Comment	Response
8.06	We are concerned that settling and pumping ponds proposed in Areas 16b and 21 pose threats to the water table for future wells on our property and in our subdivision. Ponds should be built well away from private property and comply with Federal and State water quality standards. We suggest ponds be moved to Area 14 or the southern boundary of Area 21, away from private property.	Water table elevations would only be compromised if water was taken out of the Resurrection Creek system through out-of-basin diversions or if enough impervious surfaces were constructed to cause runoff to not percolate back into the ground and replenish groundwater resources. Neither one of these is the case. Mining activities would divert water out of Resurrection Creek and then let that water percolate back into the ground through settling basins that will be constructed along the Resurrection Creek stream channel. Therefore, a majority of the water used for mining will percolate back into the ground, thereby protecting the integrity of the groundwater in the area. The amount of road to be constructed along Resurrection Creek is minor in comparison to the size of the watershed and the amount of disturbance that would have to take place to impact hydrologic function of the system. Reviews of several of the existing wells that are located on the bluff above Resurrection Creek indicate that they sit approximately 55 feet above Resurrection Creek stream channel. Review of the logs for these wells indicates that the static elevation is 101 feet for one of the wells and 75 feet for the other, well below the Resurrection Creek stream channel. The location of the wells as well as the fact that no water will be removed from the Resurrection Creek system are two indicators that water table integrity and water quality would not be compromised by future mining and road building activity (page 101).
8.07	We are greatly concerned with the potential of forest clearing and noise pollution associated with mining in Areas 21, 16b and 14. In terms of noise pollution, currently mining is active at the south end of the project area far from our cabin. Despite this distance from our cabin, we can hear equipment running late into the evening above the roar of the Resurrection River. We fear that if mining occurs in direct proximity to our property in Areas 21 and 16b it will directly degrade the quiet solitude we heard when we purchased our land. Vegetative buffers will at least help reduce noise pollution on private property.	There is a north-south road proposed for area 16a that would be constructed to access the water pumps and equipment to support mining operations. This would generate noise during mining of claims on the east side of the river. Hope Mining Company agreed to reduce the mining traffic and scope of the road to reduce impacts to adjacent private lands. The east west road in area 21 was moved further south away from private property which may reduce impact of noise from use of mining road (page 156). Area 16a and area 21 would still be mined and noise impact to adjacent private land owners will result. See chapter 3 Effects Analysis for Noise effects (page 85 to 90). Vegetative buffers are not feasible within the project area due the mining operator's right to mine the entire surface estate on the mining claim, including those areas adjacent to the private land boundary.

Commenter/ Comment Number	Comment	Response
8.08	Under 36 CFR 228.8 miners must harmonize operations with scenic values and one method suggested is vegetative screening. We urge 200 foot buffers along the Resurrection Road and along all boundaries with private property to ensure scenic values.	The Forest Service understands and recognizes the concerns of local land owners relative to reduction of scenic quality from mining activity near private land boundary and Resurrection Creek Road. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. The Forest Service cannot impose restrictive vegetative buffers that unnecessarily restrict mining access. The Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 4-86) specifies mining operations meet, at a minimum, the very low scenic integrity objective. Hope Mining Company's proposed operating plan requires reclamation measures which recontours (or harmonizes) disturbed sites to represent a more natural land form and ensures this objective is met in the short term. As reclamation is completed, vegetation will again provide screening (page 136 to 143). The very low scenic integrity objective can be met without leaving a buffer for vegetative screening.
8.09	We support the creation of better fish and wildlife habitat through restoration of Resurrection Creek proposed in Alternative 2	Support for the project noted.
9.01	I strongly suggest the Proposed Mining Plan of Operations be modified in the Final EIS to remove Area 16b and the northern portion of Area 21 in exchange for an area of equal acreage away from private property. Area 16b and the northern portion of Area 21 represent a very small fraction of the land specified in the Proposed Mining Plan of Operations, but it is this area where the rights of landowners most directly compete with those of the mining industry.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. The Forest Service has no authority to suggest or require mining operators to switch proposed mining areas with other areas not proposed based on the anticipated impacts to adjacent private land owners.

Commenter/ Comment Number	Comment	Response
9.02	Prior to purchase, all prospective buyers reviewed and accepted Declarations, Covenants, Conditions and Restrictions (DCCRs) specific to this subdivision. Provisions of these DCCRs specify Reasonable Use to protect owners' rights to use and enjoy their respective properties; specify limitations on tree clearing; prohibit noxious or offensive activity including loud sounds and unenclosed or above ground generators; and prohibit mining operations. While the authority of these DCCRs does not extend beyond private lots, the DCCRs clearly reflect the interests of individual landowners to maintain the current aesthetics of the landscape and soundscape that are jeopardized by the Proposed Mining Plan of Operations.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. Hope Mining Company is required to comply with their approved plans of operations which do not include provisions outlined in the Declarations, Covenants, Conditions and Restrictions specific to the private land subdivision. The effects of mining operations as it pertains to noise and scenery are disclosed on pages 85 to 90 and pages 139 to 143, respectively.
9.03	Page S-9 of the DEIS states that the Scenic Integrity Objective (SIO) will decrease to "very low" under Alternatives 2 and 3. This change will have the greatest acute and long-term impact to landowners whose properties are adjacent to Area 16b and Area 21 in the Proposed Mining Plan of Operations. Under 36 CFR 228.8 subpart a, federal law addresses Scenic Values specifically, stating that mining operations, facilities and means of access should harmonize and blend with the landscape. Areas 16b and 21 are characterized by mature closed canopy forest. Unfortunately, the Proposed Mining Plan of Operations, as currently drafted, could significantly change habitat in these areas, reducing scenic values immediately adjacent to private property where the impact will be experienced most directly.	The Forest Plan (USDA Forest Service, Chugach National Forest 2002a, page 4-86) states that the minimum allowable scenic integrity objective is very low. The Forest Plan states on page 4-84, under the heading Social Systems Desired Condition (for minerals management areas), "Developed mines can display significant evidence of site disturbance. Users can expect to see other humans and evidence of resource development areas. Management activities will generally dominate most visible areas." The proposed mining plan of operations is expected to reduce scenic qualities in previously undisturbed areas as anticipated in the Forest Plan. On page 4-84 under the Ecological Systems Desired Systems heading, the Forest Plan states, "Mining activities are carried out so that any long term adverse effects on other resources (to include scenery) are minimized...". Based on past reclamation efforts by Hope Mining Company, the scenery setting will meet the Forest Plan requirement of Low Scenic Integrity in the short term as recontoured landscapes will appear bare but intact. Scenic integrity will increase to moderate or even high as the area is revegetated over time (page 141 to 143). Mining sites reclaimed within the project area in the mid-1980s are barely noticeable now to the casual observer.
9.04	The Proposed Mining Plan of Operations provides approval for a road to be built through the length of Area 16b that is unnecessary. Mining access could be achieved via a spur road from the southern portion of Area 21, south of private land holdings. Any unnecessary road approved would be in conflict with the intent of 36 CFR 228.8 subpart a.	See comment 8.02. The road through area 16b is necessary to service and maintain ditch or water pipeline adjacent to the proposed road.

Commenter/ Comment Number	Comment	Response
9.05	In addition, the sighting of the proposed road through Area 16b runs in a very narrow corridor between a steep bluff and private homes, a situation that will cause erosion to the bluff and clearing of vegetation along private property lines.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. The Forest Service has reviewed Hope Mining Company's proposed operations and has verified that all proposed roads are reasonable for access to proposed mining areas. After discussions with Hope Mining Company about property owner concerns with proposed roads in area 16a and area 21, Hope Mining Company has agreed to limit the use of roads in area 16a between the private land and slope break (page 76), and has moved a proposed road location away from boundary in area 21 (page 156). Hope Mining Company can clear vegetation adjacent to the property boundary for mining purposes as approved in a mining plan of operations.
9.06	Moreover, road construction and associated mining activities in that area may impact the water table thereby compromising existing and planned wells on private property.	See comment 8.06
9.07	Taken together, the proposed road in Area 16b is unnecessary for access and if constructed would result in increases in noise and dust and decreases in privacy and land value for private landowners.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. The Forest Service has reviewed Hope Mining Company's proposed operations and has verified that all proposed roads are reasonable for access to proposed mining areas. Potential effects on property values were not addressed in the Draft Environmental Impact Statement. An analysis of how proposed mining roads may affect property values has been included in the Final Environmental Impact Statement (page 154). The analysis finds that road construction may have a negative effect on property values. After discussing with Hope Mining Company about property owner concerns on proposed road in area 16a and area 21, Hope Mining Company has agreed to change road in area 16a to a narrower, limited use road in narrow section between private land and slope break, and has moved proposed road location away from private land boundary in area 21 (page 154). The effects of mining operations as it pertains to noise and scenery are disclosed on pages 85 to 90 and pages 139 to 143, respectively.

Commenter/ Comment Number	Comment	Response
10.01	The north-south road proposed in Area 16b and the east-west road in Area 21 are either impractical, unnecessary or both. This corridor is too narrow for a road. No room exists for a buffer between the bluff and the road and between the road and the private property in the Horse Creek Subdivision No.2. This will result in drainage and erosion problems. According to 36 CFR 228.8 mining roads have to be built to assure adequate drainage and minimize or eliminate damage to soil resources.	See comment 7.02
10.02	Additionally the north-south road in Area 16b is unnecessary because of other road access to these areas. Currently a road exists at the toe of the bluff, and roads are proposed at the toe of the bluff in both Alternatives 2 and 3. Furthermore, another entry point is indicated on the map in Area 14 making the section of road on the north end of Area 21 and leading into Area 16b redundant.	See comment 8.02
10,03	Finally the east-west road in Area 21 and the north-south road in Area 16b would highly degrade our property value, and the experience on our land. The proposed new access road in Area 21 and 16b should be eliminated for the above reasons.	See comment 7.01
1004	If roads are built in Areas 21 and 16b we urge the proposal to include a 200 feet minimum buffer from private property.	See comment 8.04
10.05	We also suggest that any proposed road be clearly defined in the EIS in terms of its width and substrate. Roads should be the minimal width to allow mining equipment into claims.	See comment 8.05
10.06	We are concerned that settling and pumping ponds proposed in Areas 16b and 21 pose threats to the water table for future wells on our property and in our subdivision. Ponds should be built well away from private property and comply with Federal and State water quality standards. We suggest ponds be moved to Area 14 or the southern boundary of Area 21, away from private property.	See comment 8.06

Commenter/ Comment Number	Comment	Response
10.07	We are greatly concerned with the potential of forest clearing and noise pollution associated with mining in Areas 21, 16b and 14. In terms of noise pollution, currently mining is active at the south end of the project area far from our cabin. Despite this distance from our cabin, we can hear equipment running late into the evening above the roar of the Resurrection River. We fear that if mining occurs in direct proximity to our property in Areas 21 and 16b it will directly degrade the quiet solitude we heard when we purchased our land. Vegetative buffers will at least help reduce noise pollution on private property.	See comment 8.07
10.08	Under 36 CFR 228.8 miners must harmonize operations with scenic values and one method suggested is vegetative screening. We urge 200 foot buffers along the Resurrection Road and along all boundaries with private property to ensure scenic values.	See comment 8.08
10.09	We support the creation of better fish and wildlife habitat through restoration of Resurrection Creek proposed in Alternative 2.	Support for the project noted.
11.01	However, the construction of a road in Area 16b and the northern part of Area 21 will directly impact families. Some of these potential problems are obvious, such as noise, traffic and dust adjacent to what is now a quiet forested area.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. The Forest Service has reviewed Hope Mining Company's proposed operations and has verified that all proposed roads are reasonable for access to proposed mining areas. The Forest Service cannot impose restrictive buffers that restrict mining access. After discussing with Hope Mining Company about property owner concerns on proposed road in area 16a and area 21, Hope Mining Company has agreed to change road in area 16a to a narrower, limited use road in narrow section between private land and slope break, and has moved proposed road location away from private land boundary in area 21 (page 154). The effects of mining operations as it pertains to air quality and noise are disclosed on pages 65 to 70 and pages 85 to 90, respectively.

Commenter/ Comment Number	Comment	Response
11.02	Other problems that are likely to induce conflict include unrestrained dogs and ATV use that pose a safety concern for our children. Similarly, a new road along the bluff will inevitably lead to high speed ATV traffic there, which poses a safety concern for small children like mine.	Mining operator/lessees are required to comply with all Mining Safety and Health Act requirements regarding warning and mitigation of hazardous operations including heavy equipment operations and settling ponds and ditches. Forest Service will also discuss with mining operator private land owners concerns when operating in areas adjacent to private land. After discussing with Hope Mining Company about property owner concerns on proposed road in area 16a and area 21, Hope Mining Company has agreed to change road in area 16a to a gated, narrower, limited use road in narrow section between private land and slope break, and has moved proposed road location away from private land boundary in area 21 (page 154).
11.03	A new road along the bluff would also reduce property values, could potentially lead to erosion along the bluff, and would likely reduce community support for mining in Hope.	See comment 7.01. Hope Mining Company has responded to community concerns by listening to private landowners' concerns and agreeing to change the location of the road in area 21 and limiting the scope and use of the road in 16a (pages 76 and 154).
12.01	I am in support of the Stream Restoration Project Phase II Alternative II with modifications to the Hope Mining Company Proposed Mining Plan of Operations.	Support for the project noted.
12.02	1) Our quality of life in Hope has been compromised by the operations by HMC. There is incessant noise from sunup to sundown. We no longer hear the owl that would hoot at dawn. 2) Currently mining is active at the south end of the project area far from our property. Despite this distance, we can hear equipment running late into the evening. We fear that if mining occurs in direct proximity to the residences in Areas 21 and 16b it will greatly impact the peace and quiet that our family so enjoys.	The Forest Service understands and recognizes the concerns of local land owners relative to disturbance to adjacent private land owners from proposed mining activities. The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. The effects of mining operations as it pertains to noise and scenery are disclosed on pages 85 to 90 and pages 139 to 143, respectively.
12.03	We accept that the noise is part of owning land near a mining company. However, we do not support the proposal of a new road being put in behind the properties of Horse Creek Subdivision. The new road will compromise the safety of young children whose parents own land along the bluff, diminish property values, and take away privacy from landowners.	See comment 7.01 and comment 11.02. The effects of mining operations as it pertains to noise and scenery are disclosed on pages 85 to 90 and pages 139 to 143, respectively.

Commenter/ Comment Number	Comment	Response
12.04	Another concern is the proposed new settling ponds, mining drainage ditches, and pumping ponds in Area 16 and Area 21. Property owners depend on wells for water and the proposed ponds and ditches could lead to water contamination.	See comment 8.06. The settling ponds are constructed to allow the turbid water created by the mining operations to settle out before percolating back into surface water such as Resurrection Creek. Turbid waters do not have the ability to seep into the groundwater and impact the water supply intake from ground wells (page 101). No addition chemicals are added during mining operations except for flocculants, which are also used to reduce turbidity in public drinking water supplies.
12.05	Open water ponds and mining equipment would also become another safety concern for property owners in the area with children.	See comment 11.02
13.01	We feel that it is a worthy goal to restore resurrection creek to its natural environment.	Support for the project noted.
13.02	However, at this time and with the current agreement with HMC and the Forest Service, we feel it is impractical to pursue a restoration project of this scale with so many unresolved variables connected with HMC. For instance, HMC is currently mining within the restoration corridor and may continue to do so at their leisure, regardless of the restoration projects approval.	The Forest Service is pursuing a restoration project within active mining claims based on the success of the restoration project upstream and the agreement with Hope Mining Company that would allow restoration to occur on Hope Mining Company claims. The Forest Service and Hope Mining Company conducted extensive negotiations that resulted in identifying low value areas for mining (i.e. those areas that had been mined numerous times) for the location of the proposed restoration corridor. While Hope Mining Company (or any future mining claim owners) has the right to propose mining within the restored corridor at a future date, the Forest Service would require a reclamation bond which would ensure that the restored area would be reclaimed back to the restored condition. The likelihood of this being an economically feasible option is low (page 155).
13.03	HMC has a number of their claims under application to be patented, we should know if any of these claims are in the restoration corridor.	The Final Environmental Impact Statement better defines Hope Mining Company claims within the restoration corridor that were in the process of being patented when the Congressional moratorium on processing any further patents occurred in 1994 (page 9).

Commenter/ Comment Number	Comment	Response
13.04	At the expense of the taxpayers the Forest Service would be doing reclamation on mining claims that should be done by HMC, as well as building roads and a bridge that would greatly assists HMC with present and future mining on both east and west sides of the creek, we feel this is very inappropriate.	Hope Mining Company is required to complete reclamation activities for all areas that are being actively mined. If the mined area falls within the proposed restoration corridor and required reclamation activities would have a negative effect on proposed restoration activities, then Forest Service may not require certain reclamation activities (i.e. respreading stockpiled soil after mining is completed when restoration activities would need to stockpile it again prior to using it after restoration is completed). Forest Service acknowledges that some restoration activities benefit mining operations (use of temporary bridge to access west side of Resurrection Creek) but primary purpose of these activities, such as construction of a bridge or use of trees from mining areas, is for restoration purposes. When the bridge is no longer needed, it will be removed by the Forest Service (page 31). Building replacement ponds and roads are a necessity as the restoration corridor would eliminate these existing mining infrastructures and would interfere with allowing reasonable mining access if not replaced (page 31).
13.05	We recommend that this road [area 16] be removed from HMC plan of operations for the following reasons: It is not necessary for access, as there is currently an existing road at the base of the very steep embankment directly west of the proposed road. In both alternative II & III, there is the existing road as well as new roads that would allow HMC access to their claims. 36 CFR 228.108 (a) Surface Use Requirement. The operator shall conduct operations on leasehold on National Forest System lands in a manner that minimizes effects on surface resources, prevents unnecessary or unreasonable surface resource disturbance, and that is in compliance with other requirements of this section.	The referenced regulation is only applicable to mineral leasing and does not apply to locatable mineral operations. See comment 7.02 and comment 8.02. The road through area 16a is necessary to service and maintain ditch or water pipeline adjacent to the proposed road.
13.06	There are seven private lots with homes and cabins that lie directly east of the proposed road [area 16]. Along several of these lots there is less than 70ft between private land and nearly vertical embankment. Building a road would in all likelihood erode the embankment and possible private land.	See comment 7.02
13.07	Our house as well as neighboring cabins is built along the west border for privacy and serenity. A mining access road would greatly devalue our quality of life as well as our property value.	See comment 7.01

Commenter/ Comment Number	Comment	Response
13.08	There is not enough area to build a road without causing erosion along the steep embankment. 36 CFR 228.108 (j) (2) states “The operator shall take measures to minimize or prevent erosion and sediment production. Such measures include, but are not limited to, siting structures, facilities and other improvements to avoid steep slopes and excessive clearing of land.”	The referenced regulation is only applicable to mineral leasing and does not apply to locatable mineral operations. See comment 7.02
13.09	This section of road [area 21] is not necessary for access to area 21, because if approved the north south road through area 21 & 14 would allow adequate access.	See comment 8.04
13.10	Our concern is that these settling ponds [in area 21 and 16 should be removed because they] would contaminate the water quality. It is our understanding that several of these ponds would be in a close system which in all likely hood wood increase the risk for water contamination. We feel that clean water has a substantially greatly value than any amount of gold that may or may not be found. 36 CFR 288.8 (b) Water Quality. Operator shall comply with applicable Federal and State water quality standards, including regulations issued pursuant to the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et seq.)	See comment 8.06 and comment 12.04. All mining operations are required to comply with the Clean Water Act which is enforced by the Alaska Department of Environmental Conservation.
13.11	The clearing of land, construction of ponds and constant noise pollution from large pumps, heavy machinery and shaker plants greatly devalues our quality of life and property value. Allowing these proposed ponds would have the same negative affects to our neighbors.	See comment 8.06, comment 9.07 and comment 12.04.

Commenter/ Comment Number	Comment	Response
13.12	Prior to any approval to start restoration, HMC should give a specific date as to when they will cease mining operations within the entire restoration corridor. HMC should be required to reclaim portions of the corridor and then remove any and all equipment owned or used by them within the restoration corridor.	Forest Service will obtain a written supplement from HMC that would update HMC's approved plan of operations for all mining areas located within the restoration corridor which would eliminate most mining activities from the corridor as outlined in the proposed action (page 31). HMC is required to complete reclamation activities for all areas that are being actively mined (page 28). If the mined area falls within the proposed restoration corridor and required reclamation activities would have a negative effect on proposed restoration activities, then FS may not require certain reclamation activities (i.e. respreading stockpiled soil after mining is completed when restoration activities would need to stockpile it again prior to using it after restoration is completed). All mining equipment would be removed from restoration corridor with exception of those items described in the proposed action (pumps for replacement water in ponds, etc.) (page 31).
13.13	HMC should withdraw any claims from the patent process that may be within the restoration corridor.	The Forest Service has no authority to require HMC to withdraw any mining claims from the patent process. Effective October 1, 1994, Congress imposed a moratorium on spending appropriated funds for the acceptance or processing of mineral patent applications that had not yet received First Half Final Certificate or were not in Washington, D.C. for Secretarial review on or before September 30, 1994. Until the moratorium is lifted, the Bureau of Land Management will not accept any new applications. No HMC claims received the First Half Final Certificate prior to the moratorium going into effect (page 9).
13.14	Furthermore any portion of the claims that are within the restoration corridor should be surrendered by HMC to the Forest Service.	The Forest Service has no authority to require HMC to surrender mining claims that are located within the restoration corridor. The Bureau of Land Management manages mining claims (but not the surface mining operation); if Bureau of Land Management were to attempt to assert authority and declare a mining claim null and void, it would be considered an adverse action against HMC.
13.15	Any future access into the restoration corridor by HMC should be explained in detail.	Per the 2007 agreement with Hope Mining Company and outlined in the proposed action, certain mining activities would still be allowed to occur within restoration corridor. These would be outlined in detail in the supplemented mining plan of operation which would update the existing mining plans of operations of all existing approved mining areas within the proposed restoration corridor ((page 31). Hope Mining Company can still enter the restoration corridor in the future with another mining proposal. The likelihood of this occurring is low and if it were to occur, the Forest Service would require a reclamation bond to ensure restored areas are reclaimed back to the restored state (page 155).

Commenter/ Comment Number	Comment	Response
13.16	"We feel that HMC should not have the use of this bridge at any time during or after the restoration. If the Forest Service are going to use tax dollars to construct a temporary bridge for the purpose of stream restoration then that is all it should be used for. If Hope Mining Company would like the use of a bridge to access their claims on the west side of Resurrection Creek, they can apply for the necessary permits and build a bridge at their expense not that of the U.S. tax payer.	Forest Service acknowledges that some restoration activities benefit mining operations (use of temporary bridge to access west side of Resurrection Creek) but primary purpose of these activities such as construction of bridge is for restoration purposes and when the need is complete, then the bridge will be removed at Forest Service prerogative (page 31). Having two bridges crossing Resurrection Creek unnecessarily increases the potential impact to resources and the restoration corridor. After the Forest Service removes the temporary bridge, Hope Mining Company can build a bridge that would meet their continued needs for access to west side of creek. Hope Mining Company is currently approved to build a bridge per the 1999 approved plan of operations.
13.17	If it is to be a temporary bridge it should then be dismantled at the completion of the restoration project. If the goal is to restore the creek and surrounding landscape to its natural environment there is no place for a bridge.	See comment 13.16
14.01	I support the Stream and Riparian Restoration Project that is included in this DEIS. In seeing the restoration work that has been done previously, I am impressed with how much commitment, effort and money is needed to restore the habitat after mining is conducted in a creek.	Restoration support noted.
14.02	"The activity proposed in areas 16b and 21 directly impact land	See comment 9.03 and 9.05. The effects of mining operations as it pertains to noise and scenery are disclosed on pages 85 to 90 and pages 139 to 143, respectively.
14.03	It appears that Alternatives 2 and 3 conflicts with the intent of 36 CFR 228.8, as this activity does not harmonize and blend with the landscape.	See comment 9.03

Commenter/ Comment Number	Comment	Response
14.04	I am concerned that this increased mining activity intrinsically conflicts with recent and ongoing investments in the Hope area that are pursuant in building a unique Alaskan town surrounded in natural beauty. The Kenai Peninsula Borough has recently developed residential land plots, which would most certainly be a draw for vacationers or small eco-tourism business owners. All of the restoration money and work that has taken place (and is planned to take place) along the Resurrection Creek is surely an effort to enhance the natural beauty, the flora, and the fauna – another key draw for those visiting the area. Increasing the scale of the mining activity along the creek seems to be in direct conflict with the economic investment that has been employed here.	The General Mining Act of 1872, as amended, authorizes and governs prospecting and mining for economic minerals on federal public lands. Under this Act, Hope Mining Company has the right to access minerals on their claims. The Forest Service also recognizes that restoration activities could greatly enhance riparian areas with long term benefits remaining long after mining of the project area has been completed. The proposed action addresses both the right to access mining claims but also enhancing riparian health (pages 17).
14.05	I encourage the project team to closely evaluate whether there are options within the scope of this operation that will minimize impact to landowners. Vegetative buffers, limiting road construction, instituting hours of operation would be helpful in minimizing the impact felt by landowners and their visitors.	See comment 8.04 and 8.08. In addition, restricting Hope Mining Company to specific hours of operations would restrict their access to the mineral estate (pages 14 and 86).
15.01	However, it does appear that the restoration of the creek will actually have the effect of enabling Hope Mining Company to access new undisturbed areas for mining activities. This includes access provided by the Forest Service into the eastern portion of Hope Mining Company's claims. A proposed bridge, additional roads, limited reclamation responsibilities and clearing of trees will not only benefit the restoration project, but will have the added effect of making Hope Mining Company's mining plan of operations more economically feasible. Though we are supportive of restoration efforts to return Resurrection Creek back to a functioning river system, we are circumspect about using public lands and funding to benefit a private corporation.	See comment 13.04 and 13.16

Commenter/ Comment Number	Comment	Response
15.02	Additionally, we are concerned about the fate of the restoration corridor and heartily encourage the Forest Service to work towards withdrawing the restoration corridor from mineral entry. Despite the challenges of obtaining a withdrawal, it makes sense in the long-term protection of the area, especially after putting such a considerable investment into restoration efforts.	A mineral withdrawal would only withdraw lands from mineral entry that are not already encumbered by mining claims. The entire restoration corridor is encumbered by mining claims so no lands could actually be withdrawn under this scenario. Existing mining claims within a withdrawn area possess valid existing rights; therefore a withdrawal would not be an effective way to preclude additional mining activities in the restoration corridor.
15.03	In reviewing the DEIS and attending a site visit, we contend that the proposed road in Area 16 in Alternatives I and II is unnecessary and unreasonable. This road would cut through a very narrow swath of land between a steep slope and private property and would remove a stand of old growth mountain hemlock. The Hope Mining Co. has reasonable access provided by existing roads. To reinforce our findings the following regulations are sited: 36 CFR 228.108(a).	The referenced regulation is only applicable to mineral leasing and does not apply to locatable mineral operations. See comment 8.02
15.04	"§ 228.8 (d) Scenic Values. Operator shall, to the extent practicable, harmonize operations with scenic values through such measures as the design and location of operating facilities, including roads and other means of access, vegetative screening of operations, and construction of structures and improvements which blend with the landscape."	See comment 9.03

Commenter/ Comment Number	Comment	Response
15.05	The DEIS identifies the Resurrection IRA as being unmodified and predominantly in natural condition. The new proposed road in areas 1, 23, 24 and 25 are located inside of an IRA. Because of this, we wish to reiterate that such road construction must be conducted in a manner that minimizes effects on surface resources, prevents unnecessary or unreasonable surface disturbance. In most cases, a road would not be allowed. An exception is made for 36 CFR 294.12(b) (7) with the following requirements: A road is needed in conjunction with the continuation, extension, or renewal of a mineral lease on lands that are under lease by the Secretary of the Interior as of January 12, 2001 or for a new lease issued immediately upon expiration of an existing lease. Such road construction or reconstruction must be conducted in a manner that minimizes effects on surface resources, prevents unnecessary or unreasonable surface disturbance, and complies with all applicable lease requirements, land and resource management plan direction, regulations, and laws. Roads constructed or reconstructed pursuant to this paragraph must be obliterated when no longer needed for the purposes of the lease or upon termination or expiration of the lease, whichever is sooner.	New roads will meet the requirements of the Forest Plan for road design and maintenance and within accordance to mitigation measures on pages 38 to 47. All new roads not previously approved under an existing plan of operation will be required to be removed during final reclamation.
15.06	Steep slopes should be left undisturbed to prevent increases in erosion, slumping and water runoff. Watershed protection. (1) Except as otherwise provided in the approved surface use plan of operations, the operator shall not conduct operations in areas subject to mass soil movement, riparian areas and wetlands.	The steepest, most prone to mass wasting section in the project area (area 16) will not be mechanically mined (page 76). This issue was addressed in the soil and hydrology resource reports updates between the draft and final Environmental Impact Statements. The mining operator is allowed to conduct operations in areas approved in a plan of operations and must comply with all state and federal laws.

Commenter/ Comment Number	Comment	Response
15.07	The DEIS admits on p.S-6 that 22 acres of disturbance outside of the restoration corridor would be permanently degraded. This is simply not acceptable and we site the requirements for reclamation: "(1) Unless otherwise provided in an approved surface use plan of operations, the operator shall conduct reclamation concurrently with other operations. (2) Within 1 year of completion of operations on a portion of the area of operation, the operator must reclaim that portion, unless a different period of time is approved in writing by the authorized Forest officer. (3) The operator must: (i) Control soil erosion and landslides; (ii) Control water runoff; (iii) Remove, or control, solid wastes, toxic substances, and hazardous substances; (iv) Reshape and revegetate disturbed areas."	This comment is further addressed in the updates to the Soil Resource Report and the Affected Environment and Environmental Consequences section in chapter 3 for the geology and soils resource between Draft and Final Environmental Impact Statement (pages 72 to 81). There is a difference between reclamation and restoration, which is also addressed in the chapter 2 under the description of the alternatives (page 25). Forest Service soil conditions monitoring guidelines (USDA Forest Service, Alaska Region, 2006, Soil Quality Monitoring, FSM 2554.05-13) are used as the analysis tool to compare effects of the alternatives and determine significant effects on soil productivity. Greater than a 15 percent loss of soil productivity for any activity area is considered significant (page 73). Robust design criteria through utilizing Best Management Practices as noted in the mitigation measures (pages 38 to 47) and monitoring (pages 48 to 54) help to minimize erosion and sedimentation concerns. Reclamation requirements include spreading stockpiled topsoil where available. Some areas within the project area do not have sufficient soils to stockpile prior to operations. It is not reasonably practicable to bring in topsoil from off-site as stated in 36 CFR 228.8 (g)(4).
15.08	The proposed river crossings (fords and bridge) through the restoration corridor should be reconsidered, and we believe another option should be found after restoration is completed.	Currently Hope Mining Company is permitted by the State of Alaska to move equipment through the stream as many times through the year as they need at two crossings. By having designated stream crossings, the amount of creek channel disturbance is limited (mitigation measures 2 and 5 on pages 39 and 40 and effects analysis of creek crossings on page 101).
15.09	The width of the restoration corridor should be increased to introduce a buffer. There are several places where steep slopes lie adjacent to the corridor or stands of mature trees which would enhance the restoration corridor and allow for wildlife to pass along the river and improve water quality in the watershed.	The restoration corridor is between 200 and 500 feet and will allow for the reestablishment of functioning floodplain and riparian areas over time. One section of excessively steep slope will not be mechanically disturbed by proposed mining (page 76). Implementation of alternative 2 will provide a function alluvial river channel thus providing improved water quality, fish and wildlife habitat for the area (pages 101 and 123). Hope Mining Company has proposed mining in areas outside of the identified restoration corridor for proposed mining including most of the steeper slopes (with exception of the slope near area 16). The Forest Service cannot unilaterally increase the restoration corridor width and prohibit access to the mineral estate (page 54).

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15.10	The rules seem very clear that no further mining plan of operations should be approved before reclamation has occurred on sites that are no longer being actively mined. Additionally, revegetation appears to be a requirement, where reasonably practicable. We reason that if mining activities preclude an area from ever being vegetated again, resulting in irreversible and irretrievable commitments to resources then the Forest Service has grounds for disallowing mining to occur in that specific area.	Reclamation has occurred on all sites at the conclusion of mining operations. Reclamation requirements include spreading stockpiled topsoil, where feasible. Some areas within the project area do not have sufficient soils to stockpile prior to operations. It is not reasonably practicable for the mining operator to bring in topsoil from off-site (36 CFR 228.8(g)(4)). In addition, the mining operator may propose a plan of operations in the future that includes areas that have been previously mined and reclaimed. The operator would still be required to reclaim these areas once the mining operations have ceased.
15.11	After walking through the Hope Mining Company's current mining operations along Resurrection Creek, it appears that some of the requirements as outlined in their approved mining plan of operations are not being complied with. In particular, the dimensions of the open trenches are larger than what was agreed upon, the trenches have been left open beyond the end of the year's operating season, and the maximum amount of ½ acre of open trenches at any given time appear to be in violation of the Record of Decision. The operators should be held to the highest standard possible while upholding the public process.	Hope Mining Company has many areas approved through several different decisions. All current operations are in compliance with their respective approval parameters and subsequent supplements.
15.12	The DEIS mentions throughout the document that the impacts will be noticeable for 20 years or more. A more realistic estimate should be made and included in the final EIS.	Long term effects for soils, wildlife, and vegetation ecology resources have been modified between Draft and Final Environmental Impact Statements and include longer, more realistic time frames for productive soil establishment (page 73), wildlife habitat reestablishment (page123) and vegetation reestablishment (page 115) after mining reclamation.
15.13	Alaska Center for the Environment recognizes the efforts by the Forest Service to mitigate impacts to the environment caused by mining and restoration activities. We would suggest replacing the word "should" with "will" or "shall" in the mitigation section. "Should" is used 11 times and in most cases "will" or "shall" is a more appropriate word.	Noted. Mitigation measures section has been updated in the Final Environmental Impact Statement (pages 38 to 47).

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16.01	Our property lies directly east of area 16 and we are in the process of developing cabin rentals which border both area 16 & 21. We are currently and will be further affected by Hope Mining Co. operations and any activities associated with the proposed stream restoration.	See comment 7.01. The effects of mining operations and restoration activities as it pertains to noise and scenery are disclosed on pages 85 to 90 and pages 139 to 143, respectively.
16.02	However, at this time and with the current agreement with HMC and the forest service, we feel it is impractical to pursue a restoration project of this scale with so many unresolved variables connected with HMC. For instance, HMC is currently mining within the restoration corridor and may continue to do so at their leisure, regardless of the restoration projects approval.	See comment 13.02
16.03	HMC has a number of their claims under application to be patented, we should know if any of these claims are in the restoration corridor.	See comment 13.03
16.04	At the expense of the taxpayers the Forest Service would be doing reclamation on mining claims that should be done by HMC, as well as building roads and a bridge that would greatly assists HMC with present and future mining on both east and west sides of the creek, we feel this is very inappropriate.	See comment 13.04
16.05	We recommend that this road [area 16] be removed from HMC plan of operations for the following reasons: It is not necessary for access, as there is currently an existing road at the base of the very steep embankment directly west of the proposed road. In both alternative II & III, there is the existing road as well as new roads that would allow HMC access to their claims.	See comment 7.02 and comment 8.02. The road through area 16a is necessary to service and maintain ditch or water pipeline adjacent to the proposed road.
16.06	There are seven private lots with homes and cabins that lie directly east of the proposed road [area 16]. Along several of these lots there is less than 70ft between private land and nearly vertical embankment. Building a road would in all likelihood erode the embankment and possible private land.	See comment 7.02

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16.07	Our house as well as neighboring cabins is built along the west border for privacy and serenity. A mining access road would greatly devalue our quality of life as well as our property value.	See comment 7.01
16.08	There is not enough area to build a road without causing erosion along the steep embankment. 36 CFR 228.108 (j) (2) states “The operator shall take measures to minimize or prevent erosion and sediment production. Such measures include, but are not limited to, siting structures, facilities and other improvements to avoid steep slopes and excessive clearing of land.”	The referenced regulation is only applicable to mineral leasing and does not apply to locatable mineral operations. See comment 7.02
16.09	This section of road [area 21] is not necessary for access to area 21, because if approved the north south road through area 21 & 14 would allow adequate access.	See comment 8.04
16.10	Our concern is that these settling ponds [in area 21 and 16 should be removed because they] would contaminate the water quality. It is our understanding that several of these ponds would be in a close system which in all likely hood wood increase the risk for water contamination. We feel that clean water has a substantially greatly value than any amount of gold that may or may not be found. 36 CFR 288.8 (b) Water Quality. Operator shall comply with applicable Federal and State water quality standards, including regulations issued pursuant to the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et seq.)	See comment 8.06 and comment 12.04. All mining operations are required to comply with the Clean Water Act which is enforced by the Alaska Department of Environmental Conservation.
16.11	The clearing of land, construction of ponds and constant noise pollution from large pumps, heavy machinery and shaker plants greatly devalues our quality of life and property value. Allowing these proposed ponds would have the same negative affects to our neighbors.	See comment 8.06, comment 9.07 and comment 12.04.

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16.12	Prior to any approval to start restoration, HMC should give a specific date as to when they will cease mining operations within the entire restoration corridor. HMC should be required to reclaim portions of the corridor and then remove any and all equipment owned or used by them within the restoration corridor.	See comment 13.12
16.13	HMC should withdraw any claims from the patent process that may be within the restoration corridor.	See comment 13.13
16.14	Furthermore any portion of the claims that are within the restoration corridor should be surrendered by HMC to the Forest Service.	See comment 13.14
16.15	Any future access into the restoration corridor by HMC should be explained in detail.	See comment 13.15
16.16	We feel that HMC should not have the use of this bridge at any time during or after the restoration. If the Forest Service is going to use tax dollars to construct a temporary bridge for the purpose of stream restoration then that is all it should be used for. If Hope Mining Company would like the use of a bridge to access their claims on the west side of Resurrection Creek, they can apply for the necessary permits and build a bridge at their expense not that of the U.S. tax payer.	See comment 13.16
16.17	If it is to be a temporary bridge it should then be dismantled at the completion of the restoration project. If the goal is to restore the creek and surrounding landscape to its natural environment there is no place for a bridge.	See comment 13.17
17.01	As with the previous Phase I project, EPA supports the Forest Service's efforts to restore the degraded stream channel, floodplains, and habitat conditions caused by the historical placement of mine tailings in the alluvial valley bottom of Resurrection Creek. We are particularly pleased that recent (2008) studies determined that historic mercury concentrations throughout the project are relatively low, and there is low probability of encountering mercury in the remaining tailings.	Support for restoration noted.

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17.02	Through the re-creation of a complex of stream channels and wetlands, the project holds great potential for restoring high quality habitat for salmon, bears, bald eagles, moose, and other fish and wildlife species. Also, by allocating mining and operational area acreage outside of the restoration corridor, the potential for success for the restoration activities will be substantially increased. As a consequence, we support the selection of Alternative 2 as it would maximize the restoration efforts in the corridor, as well as amend the existing HMC's Plan of Operation to reflect the restoration goals for the corridor. Because Alternative 3 would not include the restoration activities proposed in Alternative 2, we have identified Alternative 2 as the environmentally preferred alternative.	Support for alternative 2 noted.
17.03	It is assumed that the information gleaned from the implementation of Phase I has contributed to the development of the proposed action. It is unclear, however, how this information has been incorporated and is being used to improve the chances of success for this project or future projects. We recommend that additional discussion be included in the final EIS regarding the "lessons learned" from Phase I.	Monitoring of Phase 1 has shown an immediate and overwhelming biological response to the restoration activities. Aside from the dramatic increase in fish use within the project area, the stream channel has responded extremely well (page 10). Use of reference information and studying channel morphology appears to have been on the mark. Information from Phase I area monitoring and surveys of reference areas would be thoroughly assessed during design phase of restoration activities specified in alternative 2.
17.04	Finally, the potential impacts, and particularly cumulative impacts, relating to the mining company should be included in the final EIS	Cumulative impacts from mining and restoration actions are included in the Final Environmental Impact Statement for all resources affected by this project.

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17.05	We are particularly interested in the statements on pages 89 and 95 regarding the possibility that State water quality standards could be temporarily exceeded. We support consideration of additional best management practices and strategies that will further minimize sedimentation and avoid possible exceedance of the turbidity standard. This may include use of settling ponds or expanding the project schedule to allow for disturbance to smaller quantities of material at any given time. We recommend that such strategies be developed and incorporated into the proposed action in the final EIS.	The project has been designed to reduce sediment delivery and turbidity. State of Alaska and Forest Service Best Management Practices will be used to their fullest extent to reduce impacts to water quality (pages 27, 32). Approximately 90 percent of the restoration stream channel work will be conducted without the flow of water in it. A portion of the newly constructed stream channel consists of high clay content, meaning that when water is released a pulse of sediment is expected. Further exacerbating the issue is the fact that instream work and water release can only be conducted from May 15th through July 15th, during the highest typical peak flows. This is due to the fish spawning window set by the Alaska Department of Fish and Game. Therefore, sediment and turbidity caused by the restoration work cannot be totally eliminated from the system. It should be noted that during the May 15th through July 15th window, the stream typically has sediment and turbidity loads that are naturally high. It is recognized that short term impacts to water quality may occur but overall water quality and aquatic habitat will be improved in the long term (page 101).
18.01	The document does not address contractor or Forest Service security requirements during the restoration project.	Gate usage and potential security concerns would be addressed during project implementation and has been included as mitigation measure 23 (page 44).
18.02	Protection of memorial in cottonwood stand near bridge location is not included.	Memorials are not allowed on National Forest System lands. Activities to implement alternative 2 or alternative 3 will not disturb this cottonwood stand, however, due to its proximity to the proposed bridge location and the value of keeping large mature cottonwoods in place where possible in the restoration corridor or in alternative 3 along the creek (mitigation 21, page 44).
18.03	The existing Hope Mining Company trams are not included.	Trams will be included in the alternative maps (pages 199 to 211) and are specified in the Final Environmental Impact Statement (pages 27, 36).
18.04	Dangerous chemicals such as mercury and arsenic are not used at Hope Mining Company and Hope Mining Company is compliant with all existing regulations and requirements.	The historic use of mercury and disclosure that modern mining practices employed by Hope Mining Company do not include the use of mercury is clarified (pages 28 and 92).
18.05	The Forest Service cites reaching a “conceptual agreement” with Hope Mining Company. Hope Mining Company has it documented that the agreement is legal and binding.	Discussions with Hope Mining Company since the Draft Environmental Impact Statement was released have resulted in changing how the 2007 agreement is referenced (page 11).

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18.06	New ground to be approved within the Environmental Impact Statement framework and proposed operating plan approximates 101 acres. The Environmental Impact Statement consistently cites 264 acres, leading the reader to believe that this is additional new mining area. The Environmental Impact Statement does not consistently credit “replacement acres” and steep bench slopes that are factored into the original agreement. The perceived impact by the public is unnecessarily inflated. Regardless of the outcome of the project decision, this is unnecessarily damaging to Hope Mining Company’s efforts to use mineral resources prudently within the scope of applicable law.”	The Final Environmental Impact Statement and Record of Decision will clearly define the areas and acreage proposed for mining based on Hope Mining Company’s 2007 proposed plan of operations, with supplements, that have been submitted to the Forest Service (pages 17, 26, 32, 197).
18.07	Hope Mining Company has several comments and questions regarding how the Forest Service described approval of individual operations in the future after the Record of Decision is signed.	The Record of Decision would make available for authorization the mining operations described in the decision. Approval of mining operations would occur when Hope Mining Company submits supplements to the 2007 plan of operations which describe scope of the individual mining operation and the equipment and infrastructure that would be used, and provide financial assurance (bonding) for required reclamation work (36 CFR 228.13 Bonds; Forest Service Manual 2800, Chapter 2810; Section 2817.24 - Bonds) (page 28).
18.08	Hope Mining Company noted that their mining operations are also under the scrutiny of and bound by other regulatory agencies and state and Federal laws.	A list of the permits Hope Mining Company is required to obtain was added to chapter 1 (page 23).
18.09	Hope Mining Company noted that the 200 to 500-foot wide restoration corridor may need to be “narrower in some areas where not feasible or not in support of joint agreements between the Forest Service and Hope Mining Company.	The wording was changed to the description of the restoration corridor in the proposed action in chapter 1 to give some flexibility on the width of the corridor (page 29).
18.10	Hope Mining Company noted concern about a statement on page 18 where the proposed action states that the public could use the bridge to be built for restoration access. Hope Mining Company’s concerns were for public safety and liability when mining operators would utilize the bridge.	After further internal discussion about public safety and restoration and mining uses of the proposed bridge, this wording was removed (page 31). The Resurrection Pass National Recreation Trail bridge provides public pedestrian access to the west side of Resurrection Creek. Wording was added to chapter 3 (page 156) in the social and economic section that public access on the proposed bridge would be prohibited.

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18.11	Hope Mining Company expressed concern about the description of the proposed bridge being temporary; they understood the bridge would remain in service as long as it's maintained and inspected.	The proposed bridge for restoration would be temporary as described in the 2007 Forest Service/Hope Mining Company Agreement (page 265). The Forest Service would keep the proposed bridge onsite for restoration activities and will remove it once restoration activities including monitoring and any necessary restoration maintenance activities are completed (page 31).
18.12	Hope Mining Company noted concern about a statement on page 18 that mining operator use of the proposed bridge would need to be approved in a plan of operations.	Maintenance and use of the bridge would need to be described in individual plans of operations submitted once lessees are identified. Any maintenance of the bridge by Hope Mining Company or lessees would be described and approved through a supplement to the 2007 plan of operations (page 28).
18.13	Hope Mining Company estimated their relocation of Resurrection Creek from its current alignment in two locations would be 2140 feet rather than the 2500- foot estimated given in the Draft. Hope Mining Company would like this number verified.	The Forest Service worked with the Geographic Information Specialist who created the maps and the distance of stream channel realignment by Hope Mining Company in alternative 3 is now estimated at a total of 2,740 feet for the two locations. Wording was changed to reflect the approximate nature of these realignments (page 34).
18.14	Hope Mining Company noted that access routes for Areas 17, 18, 11, and 12 were missing in the description of mining access needed.	Areas 17, 11, and 12 all have existing mining access and are not included in the description of proposed mining access routes for this reason (page 27). Area 18 is now included in the list of mining areas needing new access because a small segment of new access was added through this area (maps for alternative 2; pages 201 and 203).
18.15	Hope Mining Company wanted a change of wording in the mining description for Alternative 3 which described the bridge Hope Mining Company is approved to build from their 1999 plan of operations and access to new mining areas on the west side of the creek. Hope Mining Company wanted to delete "existing approved mining area and new proposed mining areas." and add "mining claims on the west side of Resurrection Creek" as was discussed at the 11/03/10 Forest Service /Hope Mining Company meeting.	The 1999 Plan of Operations approved the use of a bridge to access those areas listed in the 1999 plan. The use of the proposed bridge to access new mining areas would need to be defined in plans of operations that would supplement the 2007 plan of operations (page 28).

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18.16	Hope Mining Company noted that their lessee's use of large vehicles on Resurrection Creek Road is minimal and very rarely uses it for any mining related activities. Movement of vehicles is within the Hope Mining Company claims behind the gates. New and replacement equipment is brought to and from Hope Mining Company claims but at a frequency and volume insufficient to require dust mitigation measures.	In recognition of the infrequent mining use of the Resurrection Creek Road, mitigation measure 9 (page 41) was changed so that dust abatement is required for equipment used during restoration activities only.
18.17	A new box needs to be added in mitigations concerning security during restoration efforts that specifically addresses the use of Hope Mining Company gates, keeping them locked, the distribution of keys, and respect for the private property of miners on site including their camp areas. This may be addressed separately through agreements with contractors.	A new mitigation measure, 23, was added to address this concern (page 44).
18.18	Hope Mining Company would like to have it documented where the camps, fuel storage area, equipment storage areas and camp areas will be for crews engaging in restoration work.	Logistics of restoration activities will be discussed with Hope Mining Company during the contract development phase for restoration (Mitigation Measure 23, page 44).
18.19	Hope Mining Company objects to the requirement that new settling ponds and long-term drainage ditches connecting these settling ponds are located a minimum of 70 feet from either bank of Resurrection Creek. The imposition of a 70 foot rule is unfounded and unacceptable.	Per discussions with Hope Mining Company and Forest Service hydrologist, wording was changed to reflect that the minimum distance is 20 feet but wider separation is preferable for alternative 2: "Locations of new ponds and ditches are conceptual and would be field-fit in the most logical location for the topography and for proper gradient and located away from the new stream channel (minimum of 20 feet but farther away where feasible) to minimize the potential for flooding during high water flow events" (pages 27 and 33) and "A riparian buffer zone of one channel width, where feasible, on each side of Resurrection Creek would protect the stream channel from activities occurring outside of the restoration corridor" (page 104). For alternative 3, the minimum 20 feet separation would be required: "…mining operations would continue to occur adjacent to Resurrection Creek in approved areas except in a 20-foot wide vegetative buffer which would be required to be maintained along the edge of the creek as has been required in previous approved plans of operations" (page 33).

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18.20	Hope Mining Company has no real issue with weekly inspections described on page 34 because they welcome the feedback about their ongoing efforts to operate within the auspices of all applicable laws and regulations. However, Hope Mining Company feels that this is discriminatory treatment based on the ease of access to Hope Mining Company. Hope Mining Company is drafting a letter to the Forest Service in the form of a Freedom of Information Act request to produce documentation of the imposition of similar inspection requirements on other mines operating on Forest Service lands.	The monitoring activities were substantially rewritten (pages 48 to 54). Forest Service will inspect mining operations on a frequency based on level of mining operations occurring. This is congruent with frequency of inspections for all other mining operations occurring on the Chugach National Forest.
18.21	Hope Mining Company noted that during the channel diversions, the Forest Service stated they would monitor turbidity upstream from the diversion, at the diversion and about ½ mile downstream from the diversion and was wondering why Hope Mining Company isn't held to this lenient standard. They would like to be able to measure turbidity ½ mile downstream.	The monitoring of turbidity during restoration channel diversions is described in monitoring activity 3 (page 50) and would be what would be required under Army Corps of Engineer permit to verify that turbidity is not exceeding permitted levels. Under alternative 3, Hope Mining Company would be held to the same turbidity monitoring during realignment of stream channel sections. Concerns with other potential turbidity sources may be monitored differently (monitoring activities 1,2, and 4; page 49 and 50).
18.22	Hope Mining Company indicated that wording about Forest Service projects not materially interfering with mining activities and the regulatory obligation to approve plans of operations are a good defense for why Alternative 1 is not viable and if provided in the summary, it might set the tone for the document in a different way.	The abstract and the summary were substantially rewritten to provide readers information early in the document about the regulatory requirement to approve plans of operation (abstract; page ix to xiv).
18.23	Hope Mining Company expressed concern about the wording on page 60 that states "…it is not known what time frames this [mining in Alternative 3] would occur in over the twenty-year life of the proposed operation, so it is assumed that the roads, settling ponds, ditches, and camps would exist as permitted for the 20 year duration of the permit". They state "The camps already exist and therefore are protected under the original operating plan, as are some of the replacement settling ponds and roads. This language is an intrusion into existing operating plans and must be stricken."	The Soils Resource effects analysis was substantially rewritten and recognizes that previous plans of operations govern existing infrastructure and timing of reclamation into the future (pages 72 to 81).

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18.24	Hope Mining Company questioned what the word “temporary” means when the Forest Service referred to 1.06 miles of temporary road that would be built in the inventoried roadless area (page 129).	Temporary roads are roads that would be obliterated during final reclamation at the cessation of mining activities. Temporary roads may stay in use for a number of years while mining is occurring but will ultimately be obliterated during reclamation (page 28).
18.25	Hope Mining Company expressed several concerns about where boulders, soil, and large woody debris would come from to support restoration.	Soil, rock, boulders, and large woody debris material for restoration will come from the restoration corridor and adjacent mining areas within the project area. Soil sources for restoration alternative 2 have been updated (page 30).
18.26	Hope Mining Company asked if the lack of soil and soil nutrients entirely caused by mining or is some of this area naturally lacking in soil? “If so, it should be mentioned that the soil conditions are at least partially naturally poor.”	This question has been addressed in the revised soil analysis (page 72 to 81). Once the nutrient-rich surface horizons are removed from the soil surface then the site is impaired, but not necessarily permanently.
18.27	Hope Mining Company commented that no one has any idea how many cubic yards will be mined because the mining depth varies from anomaly to anomaly and area to area. They suggested that the reference to the yardage should be removed from the Geology/Soils section in Chapter 3.	The references to yardage have been removed and only a general reference remains about where productive gold-bearing gravels are located within the geology of the watershed (page 70).
18.28	Hope Mining Company stated that the reference to the production grades of the placer gravels is very dated and in fact Hope Mining Company testing and records indicate otherwise.	This reference was deemed not necessary and has been removed from the Affected Environment section for Geology and Soils analysis (page 70).
18.29	Hope Mining Company noted that camp areas measure more than 3.3 acres and also that not all camps are active nor is it likely that they would all be active at one time. “Another example of where, without clarification or additional supporting language, the impression that is that mining on all 95 acres and 9 operational camps at once is going to be producing these levels of noise.”	The total camp area as measured from the aerial photos of the project area total around 3.6 acres. The noise analysis accounts for all activities which could occur within the proposed mining areas but recognizes that noise in different areas may mask one another rather than add increase cumulatively (page 86).
18.30	Hope Mining Company noted an error in the description of the noise study done by the Forest Service in 2009. The statement in the Draft Environmental Impact Statement says that active mining was only occurring at one location in the southern portion of the project area, at Area 5. Both Mike and Phillip and Lynn’s plants and supporting equipment were in operation.	This section of the Noise Affected Environment now lists only the equipment for the operation occurring in area 5 (Mike and Phillip’s) (page 83).

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18.31	Hope Mining Company expressed concern about how the “Bench” site for the noise study was selected and to” just admit that this is a direct response to a private property owner’s concerns and that this monitoring was done on this area to either reinforce or refute those concerns. Hope Mining Company sees this degree of collaboration as deceitful on the part of the Forest Service and may identify it publicly. A member of Hope Mining Company has property along that area and no one asked him if he needed sound monitoring.”	During project scoping private landowners expressed concerns about potential noise levels. Decibel levels were recorded within close proximity to mining activities, near the Resurrection Creek Trailhead, along the Palmer Creek Road and along the private land boundary. The decibel data was taken to assess actual noise levels and potential impacts to recreating visitors and private land owners (page 83).
18.32	Hope Mining expressed concern about how spikes in decibels were used in representing the findings of the data; the “spike” for when an ATV passed the decibel reader is used to establish the upper range in Table 3 under the “Site 1” column; spikes for when cars passed by the Resurrection Creek road site were also used.	The wording for the Noise Affected Environment section was changed to reflect the average level of noise recorded for that site but did still recognize the ATV noise and cars as spikes in noise for those sites (page 83).
18.33	Hope Mining Company noted that in the document the Forest Service states that the Environmental Protection Agency seems to place as much emphasis on duration of noise levels, or total noise exposure, as on peak levels. “Why are the peaks used rather than the sustained levels identified? This makes the effect seem worse than it is.”	Table 3 in the Draft Environmental Impact Statement has been modified (now table 17, page 82) and uses the average range of decibels recorded rather than the spikes being the upper limit of the range, but still acknowledges infrequent spikes of noise to those magnitudes measured at the various sites.

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18.34	Hope Mining expressed concern about statements in the Noise effects analysis that mining noise duration and proximity is not fairly represented. “In the pre-2007 agreement meetings, Hope Mining Company and the Forest Service worked cooperatively in scheduling mining in areas closest to residences to coincide with restoration work in those areas. The Forest Service’s inability to move this project into the operational stage prior to mining occurring in Areas 5 and 19 directly results in Hope Mining Company having to move into these adjacent areas before Forest Service restoration work could begin. Hope Mining Company gets no credit for attempting to do this which is outside of the 2007 agreement that the Forest Service and Hope Mining Company would garner equal representation and credit for their efforts to ensure project success.”	The Noise effects analysis recognizes that mining noise may mask or be masked by restoration related noise (page 87). Mining noise is anticipated to occur every year whereas restoration work would occur as funding becomes available. The effects analysis more clearly demonstrates relative magnitude and duration of mining operations and restoration by being analyzed separately.
18.35	Hope Mining Company expressed concern about a statement that noise generated from mining combined with that of restoration would likely be a source of nuisance for some residents living within one mile of the project area and potentially make some parcels of land less suitable for some uses. “This is speculative and as far as Hope Mining Company is concerned, it is a reference to mining dragging down property values in the area. HMC has been mining in this area long before private residences were established.”	Analysis of the effects of mining on property values of adjacent private land was included in the Final Environmental Impact Statement and the conclusion was that some decrease in property value could be anticipated with new mining roads built adjacent to private property and with an increase in noise (page 155).
18.36	“The description of existing hydrologic conditions of Resurrection Creek implies that all of the lack of sinuosity within the proposed project area is due to mining. This is not true. Some of the existing channel is naturally straight. By omission, this language is discrediting to Hope Mining Company.”	The description of existing hydrologic conditions refers to early 20th-century mining, which predates when Hope Mining Company was operating in the area. Therefore, the Forest Service does not feel this is a discredit to Hope Mining Company but rather a statement of fact regarding historical events and resulting conditions. The Affected Environment section of the Aquatic Resources and Hydrology analysis in chapter 3 does acknowledge there are sections of channel in the project area that are naturally straight (page 93).
18.37	Hope Mining Company questioned the statement that the restoration activities were to occur from May 15 to July 15 with no description of any work outside that timeframe	This statement was reworded to read that all instream work would occur from May 15 through July 15. Restoration of floodplains and any other restorative actions not generating turbidity would be permitted outside of that window (page 32).

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18.38	Hope Mining Company questioned the statement that the relocated channel segments would be similar to the existing condition, but with decreased stability and challenges the Forest Service to provide documentation indicating that the existing 20 foot buffer rule is insufficient. In earlier meetings this was specifically addressed and Hope Mining Company specifically disagreed with this proposal. Hope Mining Company also disagreed with the statement that a moderate to high potential for catastrophic water quality impacts would exist from settling pond failure or erosion.	The Forest Service has worked with Hope Mining Company about a location south of area 16 where Resurrection Creek shifted to the east and was starting to erode a mining road and encroach on a settling pond and ditch. The Aquatic Resources and Hydrology section has been rewritten but still recognizes that a potential impact to water quality is possible due to the proximity of mining infrastructure to the creek; the closer these features exist in relation to the creek, the higher the potential risk of Resurrection Creek eroding or overtop the banks, particularly in storm events, and capturing the sediment laden settling pond/ditch systems (page 101). The channel relocation proposed in alternative 3 would not likely have some of the stabilizing features that the restored channel in alternative 2 would have therefore may take more time to stabilize and cause long term effects on water quality with persistent eroding banks (page 108).
18.39	Hope Mining Company questioned the statement that the effects of Alternative 3 on sport fishing cannot be accurately predicted with the information currently available and that an increase in fish populations is not expected to occur from implementation of mining activities. Hope Mining Company felt this statement was unnecessary. "The river's been this way since it's been straightened and historical tailings have been deposited there. It's another example of an unnecessary statement that adds to the overall negative tone of the Environmental Impact Statement."	This section of the recreation effects analysis was rewritten and mentions only that there would be no anticipated changes in fish populations for alternative 3 (page 135).
18.40	Hope Mining Company expressed concern about how the Forest Service represented the events leading up to settling pond "O" failing and the status of the pond presently throughout the Draft Environmental Impact Statement.	The references to Pond "O" have been deleted from the document during the revising of the Aquatic Resources and Hydrology section of chapter 3. This analysis section still recognizes that a potential impact to water quality is possible due to the proximity of mining infrastructure to the creek; the closer these features exist in relation to the creek, the higher the potential risk of Resurrection Creek eroding or overtop the banks, particularly in storm events, and capturing the sediment laden settling pond/ditch systems (pages 101and 108).

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18.41	Hope Mining Company expressed concern about statements concerning potential water quality impacts from a large precipitation event eroding through a disturbed mining area and potentially delivering large amounts of sediment to the stream channel. “No such event has happened or has been recorded since mining has taken place in the valley over the years. This is conjecture. Yes, anything can happen, but the writer is not balanced from the perspective of not adding additional language indicating that although the likelihood is there, it hasn’t happened in the recorded history of mining operations in the area. The use of the phrase “the clearing of ANY portion…” is inciting. That means that even if just the small hand mining operation was the only permitted operation, it poses the threat of wanton and widespread destruction. What constitutes a large precipitation event? In 2010 the area saw rainfall that broke all existing recorded precipitation records and there was no negative effect. The Forest Service simply cannot defend this degree of conjecture.”	During the revision of the Aquatic Resources and Hydrology section of chapter 3 (page 101 to 104), this language was removed. The Forest Service soils scientist worked with Hope Mining Company on mitigation measures that will minimize erosion from disturbed mining areas, particularly on steeper slopes (mitigation measure 25 and 27; pages 45 and 46).
18.42	Hope Mining Company questioned how mining activities would introduce non-native species.	Nonnative species are introduced by vehicles, foot traffic, and other equipment. Specifically, nonnative plant materials attached to vehicles, footwear, or equipment could be deposited into areas where vegetation has been cleared (page 116).
18.43	Hope Mining Company requested more concise wording regarding sensitive plants and habitat and that these plants are not found within the project area.	The Vegetation/Ecology section of chapter 3 was revised with more concise language regarding sensitive plants (page 112.
18.44	Hope Mining Company expressed concern about a statement in the Inventoried Roadless Area effects analysis (page 129) that a small portion of small diameter hemlock that would be cut during restoration activities may be made available for personal use firewood. “This should not be non-specific because this does not imply that there would be public gathering of firewood, nor would the public be granted access to Hope Mining Company areas with motorized vehicles.”	The Forest Service retains the jurisdiction over the surface resources including the use of any timber harvested for restoration or mining purposes. Hope Mining Company may be authorized to utilize the wood for mining purposes, however, the Forest Service may also sell or permit the wood to the public as long as Hope Mining Company retains reasonable access the mineral estate and the public does not materially interfere with mining operations. The Consistency or Conflicts with Regulatory Framework section of the Inventoried Roadless area analysis for alternative 2 in chapter 3 has been revised and specific wording about use of trees harvested has been removed due to other possible uses of the wood in addition to firewood for the public (page 150).

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18.45	“Please reference the type and number of wildlife species known to have abandoned this area due to past or current operations. Hope Mining Company has been mining in this area for 100 years.”	The actual number and type of species that may have avoided or abandoned habitat in the mining area over the last 100 years would be impossible for anyone to know. The statements regarding disturbance to wildlife from noise which may cause avoidance was made based on literature on disturbance to wildlife from mining, other similar activities or noise (page 122 to 126).
18.46	Hope Mining Company questioned why beaver and black bear don’t’ show up on the Management Indicator Species Table.	Beaver and black bear are not considered Management Indicator Species or Species of Special Interest in the Chugach National Forest Plan Environmental Impact Statement (USDA Forest Service, 2002b; page 3-209), so are not included in that table. Beaver and black bear were considered in the analysis along with all other species we know occur or have potential to occur in the project area.
18.47	Hope Mining Company questioned inclusion of in-depth analysis of research into the effects of noise on wildlife when there are conflicting results and in doing so, the information contributes to the overall negative tone of the document.	The intent of this sentence is to inform the reader that the research on wildlife effects from human generated noise is conflicting; some research indicates that human generated noise has a negative impact on wildlife while other research shows that it has little if any impact (page 124).
18.48	Hope Mining Company questioned the inclusion of mining effects into the analysis of effects to wildlife across the Resurrection Creek watershed and how that gives the document a negative spin towards mining.	The purpose of this section is to explain cumulative effects of all activities, including mining, which may have affected wildlife within in the watershed over time. Not all of the area is forested within the watershed. The larger number only refers to percent of the forest affected in the watershed and is noted because the paragraph is describing effects on species that only use forested habitats (page 125).
18.49	Hope Mining Company questioned why the table on page 103 didn’t list black bears, but now on page 114 the conclusion for Alternative 3 leads the reader to believe all bears are affected. “Introducing more fish into the river or increasing the King species isn’t going to make a difference to the average bear that forages for food in the area; they will eat anything they can capture and digest and are prolific in the area, concurrent with mining when the fish are running and at all times for that matter. The same applies to moose.”	The conclusion section of the Wildlife effects analysis was integrated in with each alternative effects analysis and does not specifically address effects to management indicator species (pages 122 to 126). Full effects analysis for each management indicator species is in the Wildlife Resource Report in the project record.

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18.50	"The description of the start of the gold rush in Hope and Sunrise does not reflect Russian prospecting earlier than that."	Mary Barry 1997 [1973]:13 stated that some Russian artifacts were reportedly recovered from Resurrection Creek, Devils Gulch, and Shaft Creek, but these claims have yet to receive substantiation. The peak of the Klondike gold rush was in 1898, but it began in 1897. This date is documented in "Prospects and Producers: Historic Context for Mining Properties, Chugach and Tongass National Forests, Alaska, 1850s-1950s" by Simon Bruder; and "Memories of Old Sunrise" by Albert Weldon Morgan and Rolfe G. Buzzell.
18.51	Hope Mining Company expressed concerns with how their involvement in the establishment of the mining interpretive area and partnering with the Forest Service on developing interpretive signing about the mining history is represented.	The Heritage Resource section of chapter 3 (pages 126 to 130) and mitigation measure 11 (page 42) has been rewritten to clarify Hope Mining Company's involvement in developing the interpretive area and interpretive signing.
18.52	Hope Mining Company expressed concerns with description of process of what happens if they or their mining lessees should find historic artifacts during mining operations. "Hope Mining Company will set the find aside for periodic inspection by the District Archeologist, but will not call every time a cultural resource is discovered. If it is significant, Hope Mining Company will, but reserves the right to manage their operations accordingly. Thus far, in the last three mining seasons, the Forest Service has remained distinctly disinterested when Hope Mining Company has shared small discoveries."	The word "immediately" will be deleted. However, Forest Service must be notified of inadvertent discoveries to be in compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA) which requires Federal agencies to take into account the effects of their undertakings on historic properties (page 42, mitigation measure 10). Notification need only consist of a phone call and shouldn't affect operations. To date this approach has worked well between Forest Service and Hope Mining Company.
18.53	Hope Mining Company expressed several concerns with the statements that the majority of impacts to the stream channels and riparian areas in the project area arose from hydraulic placer mining, which occurred mostly in the first two decades of the 1900's and that historic mining that took place after 1942 is not well documented. "Hydraulic mining was actually at its peak in the '30's and '40's and was the height of activity for placer mining in Resurrection Valley. Hope Mining Company retains records; this is another example of the Forest Service not working in concert with Hope Mining Company on this project. It's disheartening that the FS did not consider Hope Mining Company a creditable source for information and instead relied exclusively on dated historical data."	These statements were in the Aquatic Resources/Hydrology and Minerals Affected Environment sections. The whole minerals section has been deleted and the aquatics resource report was modified to include Hope Mining Company's information about the hydraulic mining phase (page 93). The Heritage Resources Affected Environment analysis covers generally the level of mining activity in the 1950s and 1960s (page 126).

Commenter/ Comment Number	Comment	Response
18.54	Hope Mining Company questioned the accuracy of the name of the historic property within the project area. "On page S-4, it is listed as the Hope Mining Company Historic Mining District and on page 115 it is listed as Hope Historic Mining District. Hope itself and the Hope area was not included in the study, just the Hope Mining Company Historic area, so this title is incorrect."	The correct title for the historic property is the Hope Mining Company Historic Mining District and the document has been revised to correct this error (pages ix, xi, 60, 126).
18.55	Hope Mining Company noted that they are not relinquishing mineral rights in the interpretive area. "The language in the document (page 118) suggests that what was before a nicety afforded by Hope Mining Company has become a requirement for compliance. There is no mention of the agreement between Hope Mining Company and the Forest Service which is what this all about. Note that the State Historic Preservation Office has not once convened with Hope Mining Company on this initiative as was agreed upon in 2007."	Compliance with Section 106 of the National Historic Preservation Act is required for any undertaking by the federal government, including approving surface use on mining claims. Because historic tailings will be redistributed during mining and restoration work and the historic tailings are considered a contributing feature to the Hope Mining Company Historic Mining District, the Forest Service is required to consult with the State Historic Preservation Office on this adverse effect. The 2009 Memorandum of Agreement formalizes this consultation and agreement on mitigation. This process does not involve any suggestion of relinquishment of mineral rights by Hope Mining Company nor does it change anything in the 2007 agreement between the Forest Service and Hope Mining Company. The Heritage effects analysis was revised to help clarify why consultation and mitigation was necessary (page 128).
18.56	Hope Mining Company had concerns about the statement that their potential continued use of ATV's crossing Resurrection Pass Trail bridge to access mining operations on the west side of Resurrection Creek by Hope Mining Company may cause safety concerns with recreation users. "Hope Mining Company has the established right to use the bridge for ATV access to areas on the west side of the river. Although there have been no document safety concerns (more Forest Service conjecture here) about this minimal use, all Hope Mining Company personnel that use the bridge have been briefed on protocol concerning use of the bridge. This includes not approaching or using the bridge while it is in use by non-Hope Mining Company entities. Hope Mining Company personnel are instructed to stop well before the bridge approach and wait for complete vacancy of the bridge and approaches to it before using it."	Hope Mining Company has authorization to use the footbridge for mining related access to the west side and this use may continue to be authorized until a bridge is built either for restoration activities (alternative 2) or by Hope Mining Company for mining access (alternative 3) (pages 9, 33, and 135). The Forest Service would require Hope Mining Company (alternatives 2 and 3) and restoration contractors (alternative 2 only) to install signing indicating potential hazards from heavy equipment when operating near Resurrection Pass National Recreation Trail and trail bridge (mitigation measure 12, page 42) to reduce potential for safety concerns (page 156).

Commenter/ Comment Number	Comment	Response
18.57	Hope Mining Company had several comments regarding the Scenic Integrity Objective and how scenic quality can change for the landscape when the area has always been a mining area and how scenic integrity is measured.	The scenery resources affected environment and effects analysis sections were removed from the Recreation Resource section and analyzed as a separate resource and substantially rewritten to include more information and figures to illustrate changes in scenery with mining and restoration (pages 136 to 143). The scenery management system used by the Forest Service to manage scenery resources was developed to help meet the public's expectation for scenic beauty while allowing for multiple resource use. The scenic integrity objective scale is based on naturally appearing landscapes and is measured by considering how dominant human activities appear in the context of a natural environment (page 136). The scenic integrity objective for the project site while the mining operations are active is prescribed by the Forest Plan (USDA Forest Service, 2002a; page 4-86) as very low (meaning the existing scenery has been disturbed and altered by humans and does not appear as a natural landscape). The existing scenic integrity description is consistent with this Forest Plan scenery prescription. Requires mining reclamation of disturbed sites serves to move an unacceptably low scenery description to a very low scenery objective.
18.58	Hope Mining Company expressed concern about a statement requiring a 20-foot vegetative screening along Resurrection Creek Road in mining Areas 14 and 21 to retain some scenic values for visitors and residents driving Resurrection Creek Road. "Area 14 is already approved for mining under the 1999 Plan of Operations. The 20 foot vegetative screening was mentioned as "desirable" in conversation with Hope Mining Company, but is not part of the 2007 agreement. There is no requirement and no agreement surrounding any vegetative buffer. Is this included in the 1872 mining law as amended? If the requirement is imposed then the Forest Service will have to calculate additional replacement areas or afford financial reimbursement for the lost acreage."	Hope Mining Company's 2007 plan of operations for new mining areas included retaining a 20 foot vegetative buffer along Resurrection Creek Road. Hope Mining Company has since supplemented their proposed plan of operations to withdraw this element and the Final Environmental Impact Statement will reflect this change (pages 27, 140 to 143).
18.59	Hope Mining Company expressed concern about statements scenic integrity objective and "how the landscape has not changed since the area was first mined, before the first resident, recreationist or bureaucrat came to make some arbitrary decision that an always existing feature has a low Scenic Integrity Objective. What happened to the happy reference to the "sense of place to the community of Hope" referenced on page 119?"	The scenery resources affected environment and effects analysis sections were removed from the Recreation Resource section and analyzed as a separate resource and substantially rewritten to include more information and figures to illustrate changes in scenery with mining and restoration. This section no longer contains this reference to "sense of place" (pages 139 to 143).

Commenter/ Comment Number	Comment	Response
18.60	Hope Mining Company questioned what was included in the net present value figures and the cost estimates of administering the mining activities.	The net present value analysis consists of a detailed estimate of costs and year of occurrence of restoration and mining administrative activities over a 20-year period. The mining administration cost figures are based on estimates of frequency of visits to the mining operations at levels of operating activity seen over the past 3-5 years (page 155).
18.61	Hope Mining Company asked what information the statements about employment were based on. “As the price of gold, which is a variable, continues to increase, mining becomes more attractive. As mining becomes more attractive there are more lessees and hence more employment. This is of course unless the Forest Service is discounting Hope Mining Company as a source of income for those that work there. Note that Hope Mining Company uses resources within the town of Hope and uses local vendors. For instance, certain lessees buy their fuel exclusively from the Davidson’s gas station in Hope, and periodically use the grocery store and local dining areas for some meals and provisions.”	Information regarding economic effects of mining operators' spending in local community was not known at the time the Draft Environmental Impact Statement was published. This information has been included (pages 151, 154, 155, and 157).
18.62	Hope Mining Company questioned where numbers come from in Table 7 on page 132 and the statement about “some mining activity continues to occur” on page 133.	The Social Economic section has been revised and no longer includes Table 7. The Affected Environment Analysis does still include statistics about employment in the Hope areas and the source is noted. This section also acknowledges that mining does employ people in the area and has been clarified with Alaska Department of Commerce data (page 151).
18.63	Hope Mining Company questioned if the inflation rate being left at zero for the Net Present values calculations would also apply to reclamation bond calculations.	Inflation is assumed at zero for the purposes of calculating future costs and Net Present Value from recommendations in Office of Management and Budget Circular A-94. This level of detail is no longer in the Environmental Impact Statement but is in the Social Economic Resource Report in the project record (page 153). Bonding calculations use the latest information available for calculating inflation. Bonds also are updated frequently to ensure up-to-date costs/values are being used.
18.64	Hope Mining Company questioned the statement that they would be responsible to reclaim the watershed to its current state on page 140. Hope Mining Company suggested deleting the wording "to its current state" and adding "in accordance with applicable reclamation guidelines (reference this)." They will reclaim but not to the current state, and in accordance with published and mandated reclamation guidelines.	The social and economic section has been revised and no longer includes the Ecological Health section. The description of reclamation practices is within the existing mining section (page 6), within the description of proposed mining in alternative 2 (page 28), and within federal regulations at 36 CFR 228.8(g).

Commenter/ Comment Number	Comment	Response
18.65	Hope Mining Company questioned the statements on page 140 that the Forest Service would increase administrative oversight of mining operations and reclamation activities for more oversight of mining activities, and more assurance that Hope Mining Company would comply with the standards set forth in the Settlement Agreement.	The Forest Service determines how frequently a mining operation warrants inspection based on the level of mining activity and potential level of impact to surface resources. For the type of activity occurring in the past several years at Hope Mining Company operations, weekly inspections have been warranted to ensure all specifications in the mining plan of operations are being adhered to by mining operator's lessees (monitoring activities 1, 2, 4, and 8), pages 48 to 54). The social and economic section has been revised and no longer references the Settlement Agreement (described on Page 9 in the Existing Mining section of chapter 1).
18.66	Hope Mining Company questioned the statement on page 141 about Forest Plan direction to work with local communities and interest groups to identify, record, restore, or preserve heritage resources on National Forest System lands. “Who are the interest groups, unless this is a broad generalization? No one is working with Hope Mining Company to identify cultural resources. Some of these things no one knows about but Hope Mining Company”.	This reference to the Forest Plan was removed from the social and economic section (page 156). The Heritage Resource section of chapter 3 (page 126) and mitigation measure 11 (page 42) has been rewritten to clarify Hope Mining Company’s involvement in developing the interpretive area and interpretive signing about the mining history of the area.
18.67	Hope Mining Company questioned the statement on page 141 about the Forest Service having greater administration over Hope Mining Company’s mining and reclamation activities. “If this alternative is a no change alternative, why would administration be greater and where does this come from?”	Forest Service inspections of mining operations would not be substantially different between alternative 2 and 3. The level of mining activity occurring and potential level of impact to surface resources is what drives the frequency of inspections and administrative tasks. This effects analysis was changed to reflect the same cost of mining administration between alternatives 2 and 3 (pages 155 to 157).
18.68	Hope Mining Company had questions about the cumulative effects section and the relationship of small scale suction dredging in Palmer Creek, fuel reduction work, recreation activities, and development on private lands in relation to the proposal.	Cumulative effects as defined by the Council on Environmental Quality is: “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such other actions (40 CFR 1508.7)”. Resource specialists determine how other activities within the Resurrection Creek watershed might cumulatively affect the environment in addition to proposed mining in the project area.

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Appendix E. Forest Service / Hope Mining Company December 3, 2007 Letter – Framework for Restoration

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USDA United States Department of Agriculture | Forest Service | Seward Ranger District | P.O. Box 390 334 Fourth Avenue Seward, AK 99664-0390

File Code: 1950
Date: December 3, 2007

Al Johnson
Hope Mining Company
PO Box 101827
Anchorage, AK 99510

Dear Mr. Johnson:

This letter documents the points of agreement that were reached between March 2006 and October 2007 between the Hope Mining Company (HMC) and the US Forest Service (USFS) concerning potential stream restoration efforts on Resurrection Creek and HMC's plan of operations. This letter supersedes the previous letters documenting agreements sent on October 25, 2006 and August 23, 2007.

This letter documents that HMC and the USFS are in agreement on the restoration corridor and HMC's proposed future mining operations outlined in the supplemental plan of operations. The points of agreement outlined in this document are critical for both the HMC and USFS in developing appropriate alternatives for environmental documentation of the proposed restoration project and mining operations. During the March 02, 2007 USFS/HMC meeting, it was agreed that the NEPA for both the proposed restoration project and the proposed supplemental plan of operations would be conducted as one assessment as a result of the connected actions surrounding the exclusion of the restoration corridor. If either portion of the assessment were to fail, additional negotiations and re-assessment would have to take place before further actions could take place. I will be the deciding official, as the Seward District Ranger.

Discussions between HMC and the USFS have been ongoing over the past 2 years to explore rehabilitation alternatives for Resurrection Creek within HMC's claims that would provide mutual benefits to both fish and wildlife habitat along Resurrection Creek, and HMC's ongoing mining operations. Representatives from HMC and the USFS held meetings at the Forest Service's Anchorage Office on March 2, 2006, April 13, 2006, May 5, 2006, September 12, 2006, March 2, 2007, March 9, 2007, March 23, 2007, April 20, 2007, and June 21, 2007. Al Johnson and/or Jim Roberts represented HMC at these meetings, and Joe Meade, Jeni Evans, Dave Blanchet, Bill MacFarlane, and/or Carol Huber represented the Forest Service. Brian Bair of the National Forest Service TEAMS Planning Enterprise met with Al and Jim on site on June 24, 2006 to field review the area and discuss potential alternatives. Brian also joined the September 12, 2006 meeting (via teleconference) and the March 2, 2007 meeting.

The discussions have focused on 1) where within Resurrection Creek's valley floor a stream restoration corridor or meander belt width could best be placed to maximize fish and wildlife habitat and reduce conflicts with high priority mining areas, 2) reassurance to the Forest Service of maintaining restored habitats over the long term, 3) maintaining access and facilities within the HMC claims, and 4) future mining and plan of operations for HMC. The following points represent the agreements reached over the course of these meetings:

1. **Restoration Corridor.** Considerable work was done by the group in developing a mutually agreed upon restoration corridor through the valley floor. The USFS and HMC have worked extensively on the boundaries of the corridor. Revisions to the original September 12, 2006 version of the restoration corridor boundary were made during meetings between Al Johnson and Bill MacFarlane on March 9, 2007 and September 26, 2007. The mutually agreed upon restoration corridor (September 27, 2007 version) is shown in **figure 1**.

   Minor adjustments may be made to the corridor boundary in the future during site survey, channel design, and restoration implementation to account for any previously unknown topographical or other natural occurrences such as bedrock outcrops. Any future changes will require mutual agreement between HMC and the USFS.

   Stream channel, floodplain, and riparian restoration would be conducted within the boundaries of the restoration corridor. Mining operations would be excluded from this corridor, with the exception of survey line maintenance, survey monument maintenance, water extraction for replenishment of settling ponds, the bridge and equipment crossings, and operations associated with the patenting process. Under extreme low water or drought circumstances, where HMC would need access through the restoration corridor to place a pump for withdrawal of water to maintain settling ponds, HMC and USFS will mutually agree on the access route and withdrawal location. HMC retains the right to patent claims that lie within the restoration corridor and satisfy BLM requirements for patenting.

   The USFS agrees to replace any permanent survey monuments that are removed or destroyed during restoration implementation.

2. **Mining Plan of Operations.** Portions of the proposed restoration corridor overlap with areas previously approved for mining in the 1988 HMC Mining Plan of Operations (as approved January 1999). During the March 2, 2007 meeting, all parties agreed that there is a need to supplement the plan of operations in order to go forward with the project, and it would be the only vehicle to protect the restoration corridor. In addition, future mining operations in new areas as proposed by HMC would also be included in the supplemental plan of operations. Any changes to existing approved plans of operations would also have to be included in a supplemental plan of operations.

   The existing Plan will be supplemented to exclude the restoration corridor from all mining operations with the exception of survey line maintenance, survey monument maintenance, water extraction for replenishment of settling ponds, the bridge and equipment crossings, and operations associated with the patenting process. The location of the bridge and fords will be determined during the environmental planning process. Likewise, any new areas made available for mining by the restoration activities will need to be included in the supplemental plan of operations.

3. **Temporary Bridge.** The USFS will need a temporary bridge for crossing Resurrection Creek during restoration construction work. HMC indicated that they need a bridge for future mining operations. After the March 2, 2007 meeting, internal USFS discussions resulted in the decision that the USFS would construct a temporary bridge for the restoration project. HMC could also use the bridge as approved in the supplemental plan of operations. The bridge would be designed to last for five to ten years after restoration implementation. The USFS Regional Bridge Engineer would approve the structure, and USFS engineers would periodically inspect the bridge. HMC would be responsible for any maintenance and repairs to USFS standards for the life span of the structure after restoration implementation. If the bridge is damaged beyond repair or becomes unsafe due to age, use, or neglect and fails inspection by a qualified USFS engineer, the bridge will be decommissioned. HMC will retain the right to construct a bridge independent of the restoration project, as approved in their 1999 plan of operations. Any bridge (new construction or replacement) must be approved by the USFS Regional Bridge Engineer and Seward District Ranger before construction.

4. **Access Routes.** HMC currently has access routes developed on both sides of Resurrection Creek for accessing different parts of the claims. The Forest Service agrees that any segments of these roads and trails that are removed during channel restoration would be replaced with roads or trails of at least equal quality that would retain access along the east and west sides of Resurrection Creek. **Figure 2** shows the approximate locations of the existing routes and potential locations of replacement routes.

5. **Settling Ponds.** The USFS will relocate the settling ponds located within the restoration corridor by constructing new settling ponds outside the corridor. However, the total volume of the new settling ponds constructed by the USFS outside the corridor will not exceed the total volume of the decommissioned ponds within the corridor. The number, size, and locations of the newly constructed settling ponds will ultimately be determined so that they support the existing 1999 mining plan of operations and any supplemental plans resulting from this project. The USFS will work with HMC to refine the exact pond locations during the process of supplemental plan approval. **Figure 2** shows the approximate locations of the existing settling ponds and potential locations of desired replacement ponds.

6. **Potential use of Soil, Trees and Boulders Outside the Restoration Corridor.** The Forest Service would need boulders for construction of a restored channel, trees for logjam construction, and soil for spreading on restored floodplain areas to enhance revegetation efforts. Soils deposits, trees, and boulder piles can be found in a number of locations both within the proposed restoration corridor and on adjacent areas within HMC claims. **Figure 2** outlines areas that were mutually agreed upon between HMC and the USFS for acquiring soil and trees.

7. **Security:** The USFS will coordinate security procedures with contractors and HMC to secure the property of HMC through the duration of the restoration project.

Figure 1: Revised restoration corridor (9-27-07) for restoration on Resurrection Creek.

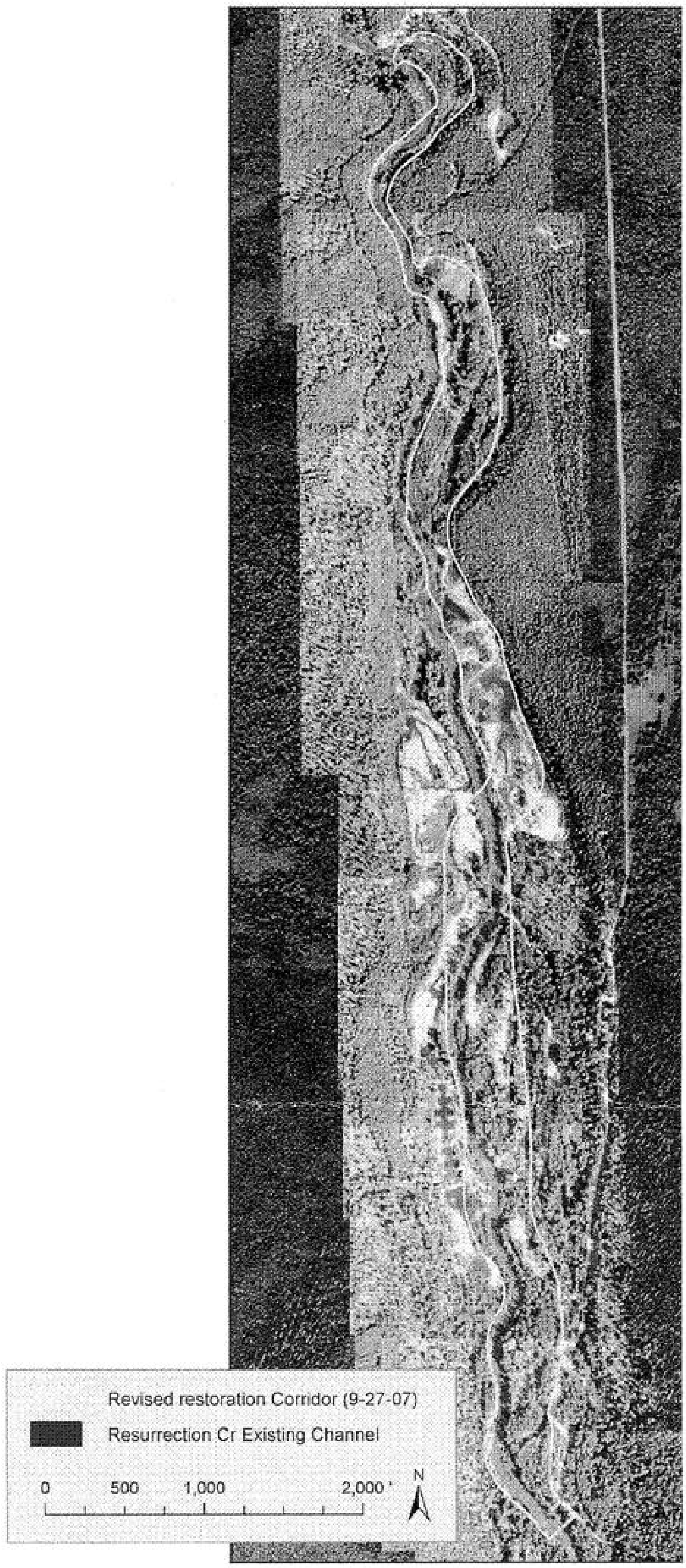
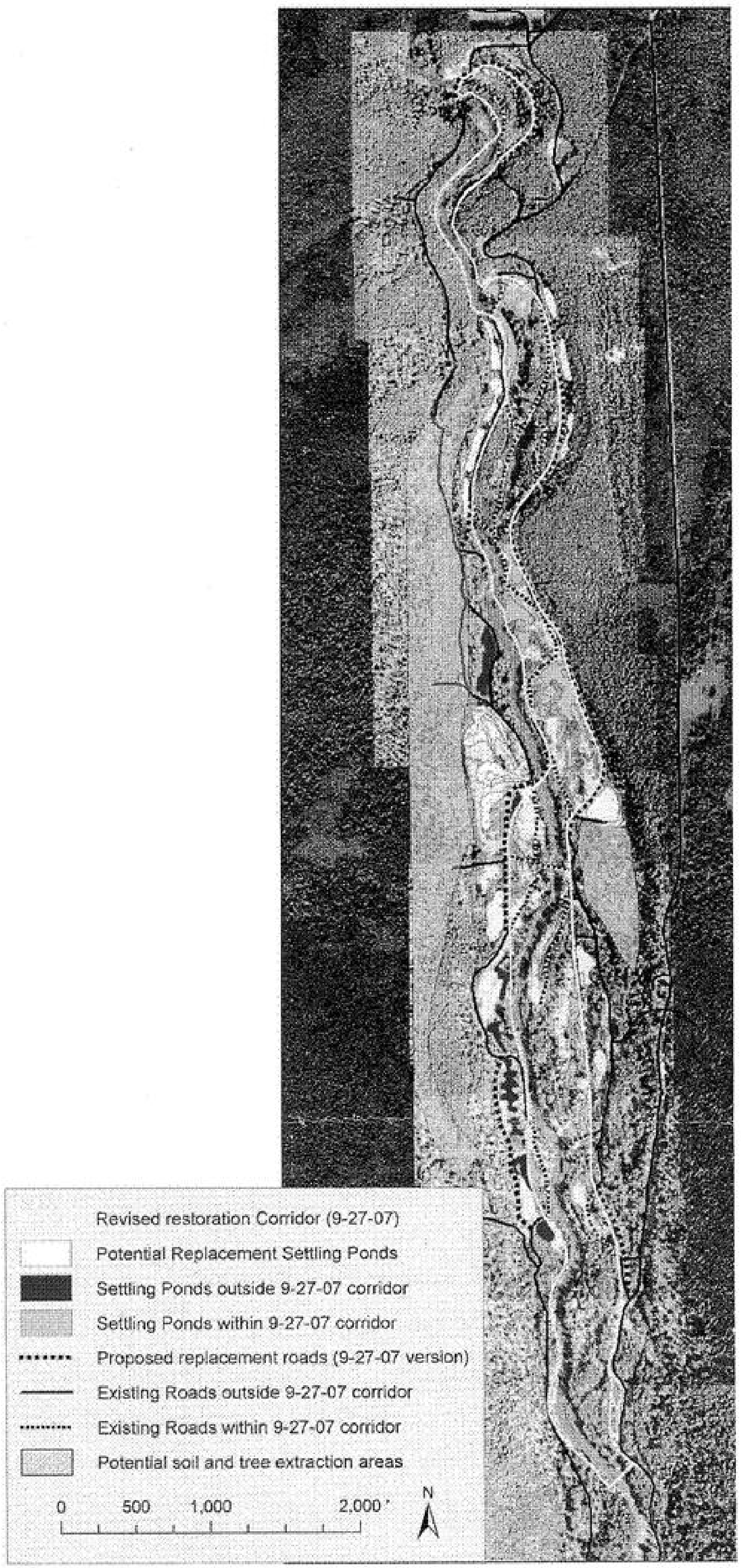


Figure 2: Revised restoration corridor (9-27-07) shown with proposed replacement roads, desired settling pond locations, and potential locations for soil and tree extraction for use in restoration.



This memo reflects the current agreements between HMC and the USFS regarding the boundaries of the restoration corridor, the bridge, access routes, settling ponds, acquisition of boulders, trees, and soil, and security. Before any of the proposed actions discussed in the above are undertaken, environmental analyses and approved plans of operation will need to be completed.

This has been a long process but we appreciate your patience and look forward to working together. Please sign and return this letter to me to document your concurrence on our agreements as stated in this letter and we will move forward with the next phase.

Sincerely,

Jeni Evans

JENI BRADLEY EVANS
District Ranger

Agreed: Al Johnson 12/07/07
AL JOHNSON, President/HMC

Appendix F. Federal, State and Local Government Comments

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

August 5, 2010

Bill MacFarlane

Chugach National Forest

3301 C Street, Suite 300

Anchorage, AK 99503

RE: Draft Environmental Impact Statement: Resurrection Creek Phase II Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations

Dear Mr. MacFarlane:

The National Marine Fisheries Service (NMFS) has reviewed the above referenced Draft Environmental Impact Statement (DEIS) from the U.S. Forest Service (USFS). The purpose of the proposed action is to 1) restore the stream channel, riparian areas, and fish and wildlife habitat of a 2-mile segment of Resurrection Creek on National Forest System lands within a designated restoration corridor; 2) approve a supplement to the existing mining plans of operations in order to exclude most existing approved mining activities from the proposed restoration corridor; and 3) approve new mining operations within proposed mining areas outside of the restoration corridor only after Hope Mining Company (HMC) defines specific operations and provide acceptable reclamation bonds.

Under Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), federal agencies are required to consult with the Secretary of Commerce on any action that may adversely affect Essential Fish Habitat (EFH). EFH has been designated in the project area for anadromous salmon. EFH for salmon consists of the aquatic habitat necessary to allow salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to healthy ecosystems.

Project Area and Background

Resurrection Creek drains in the Turnagain Arm of Cook Inlet near Hope, Alaska. The Resurrection basin is EFH for populations of Chinook, coho, pink and chum salmon, which contribute to commercial catch along the Kenai Peninsula. Pink salmon are the most abundant species with runs estimated at 20,000 to 35,000 returning adults in even-numbered years. Chum salmon are much less numerous, with about 200 adults returning yearly. Annual coho peak counts in Resurrection Creek range from 100 to 500 returning adults. Chinook counts range from less than 100 to upwards of 500 returning adults. The lower six river miles of Resurrection Creek (the project area) have been identified as habitat for spawning and rearing habitat for all four species.

A 1990-1992 study evaluated juvenile salmon distributions, smolt out-migrations, and stream habitat (Blanchet and Wenger 1993). The results show that Resurrection Creek coho smolts were considerably smaller by age class (about 30%) than on three other study streams on the Kenai Peninsula. In addition, virtually all Resurrection Creek coho smolts were emigrating at age 1; however 90% of coho smolts on the other streams emigrated at age two and three. The lack of growth and early age at which coho smolts emigrate from the watershed indicate that rearing within the system is severely limited. This was found to be a result of tailings piles within the placer-mined reaches that have disconnected the stream from the historic floodplains and side channel habitat, which historically provided the flood flow refugia and over-wintering habitat which were critical to salmonids, especially coho.

The USFS has developed three alternatives. Under Alternative 1 the No Action alternative, no restoration would occur, and existing approved mining activities would continue to take place in the project area. Alternative 2, the Proposed Action, would restore two miles of Resurrection Creek's channel, floodplain and streamside vegetation within a designated restoration corridor and made available for approval 264 acres of mining areas and operational areas outside of the restoration corridor, pending HMC defining discrete operation and providing acceptable reclamation bonding. Alternative 3 would not restore any portion of Resurrection Creek, and no restoration corridor would be established. This alternative would make 267 acres of mining areas and operational areas throughout the project area available for approval pending HMC defining specific operations and providing acceptable reclamation bonding.

The proposed stream restoration would occur within federal mining claims held by HMC. The USFS reached a conceptual agreement with HMC on December 3, 2007 that establishes a designated restoration corridor, identified procedures for replacing existing settling ponds and mining roads that are within the restoration corridor, stipulates use of a temporary bridge over Resurrection Creek, and identifies areas outside of the restoration corridor that are suitable for restoration source materials. Under the conceptual agreement, HMC would submit a proposed mining plan of operations that would exclude mining operations from the restoration corridor, with the exception of survey line maintenance, survey monument maintenance, and water extraction to replenish settling ponds, bridge and equipment crossings, and operations associated with the patenting process. The proposed plan of operations also proposes mining operations on additional areas outside of the proposed restoration corridor. Because the proposed plan of operations would support and protect the restoration activities by excluding mining from the restoration corridor, the DEIS analyzes the proposed stream restoration activities as well as the proposed mining plan of operations.

EFH Conservation Recommendations

NMFS supports Alternative 2, the Proposed Action. Increases in turbidity would occur during the course of the stream restoration work. These turbidity pulses could impact aquatic populations in the short term, but the impact of these turbidity pulses on the overall fish populations is expected to be small and limited to the project area and two miles downstream. Increased spawning and rearing habitat created by the project are expected to provide long-term, positive benefits to the project reach, the aquatic ecosystem, and fisheries resources.

NMFS recommends that a monitoring plan be implemented to evaluate the success of the restoration project. Specifically we recommend a repeat of the Blanchet and Wenger 1993 study to test the overall hypothesis that poor overwintering habitat quality manifests as shorter juvenile residence time, as well as smaller sized smolt, when compared to un-mined reference reaches. This relationship should reverse after the physical habitat goals of the project are met, with both residence time and smolt size coming in line with reference systems.

Please note that, under section 305(b)(4) of the Magnuson-Stevens Act, the USFS is required to respond in writing within 30 days to NMFS EFH Conservation Recommendations. If the USFS does not make a decision within 30 days, the USFS should provide NFMS with a letter to that effect, and indicate when a full response will be provided.

Should you have any questions regarding the issues we have identified, please contact Brain Lance at 907-271-1301 or Brian.Lance@noaa.gov.

Sincerely,

James W. Balsiger, Ph.D.
Administrator, Alaska Region

cc:

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References:

Blanchet, D. and M. Wenger, 1993. Fisheries Habitat Restoration in Placer Mined Reaches of Resurrection Creek. In Papers of the Second EPA Placer Mine Reclamation Workshop. US Environmental Protection Agency publication #EPA 910-R-93-015.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1689 C Street, Room 119
Anchorage, Alaska 99501-5126

TAKE PRIDE IN AMERICA

9043.1 August 25, 2010

ER10/627

PEP/ANC

Chugach National Forest

Attn: Forest Supervisor

c/o Bill MacFarlane

3301 C Street, Suite 300

Anchorage, AK 99503

Dear Mr. MacFarlane:

The U.S. Department of the Interior has reviewed the July 2010 Draft Environmental Impact Statement for the proposed Resurrection Creek Stream Restoration Project Phase II. We have no comments to offer at this time.

Thank you for the opportunity to comment. If you have questions, you may contact me at 907-271-5011.

Sincerely,

Pamela Bergmann

Pamela Bergmann
Regional Environmental Officer - Alaska

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS, TRIBAL AND
PUBLIC AFFAIRS

September 7, 2010

Bill MacFarlane
Chugach National Forest
3301 C Street, Suite 300
Anchorage, AK 99503-3998

RE: EPA comments on the USFS Draft EIS for the Resurrection Creek Phase II Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations, EPA Project #08-073-AFS

Dear Mr. MacFarlane:

The U.S. Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (DEIS) for the proposed Resurrection Creek Stream Phase II Stream and Riparian Restoration Project and Hope Mining Company Proposed Mining Plan of Operations (CEQ No. 20100266) in accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act. The draft EIS evaluates a No Action alternative and two (2) action alternatives that propose restoration or protection activities along a two-mile segment of Resurrection Creek near Hope, Alaska. The draft EIS identifies Alternative 2 as the agency proposed action.

As with the previous Phase I project, EPA supports the Forest Service's efforts to restore the degraded stream channel, floodplains, and habitat conditions caused by the historical placement of mine tailings in the alluvial valley bottom of Resurrection Creek. We are particularly pleased that recent (2008) studies determined that historic mercury concentrations throughout the project are relatively low, and there is low probability of encountering mercury in the remaining tailings. This was our primary concern with Phase I.

Through the re-creation of a complex of stream channels and wetlands, the project holds great potential for restoring high quality habitat for salmon, bears, bald eagles, moose and other fish and wildlife species. Also, by allocating mining and operational area acreage outside of the restoration corridor, the potential for success for the restoration activities will be substantially increased. As a consequence, we support the selection of Alternative 2 as it would maximize the restoration efforts in the corridor, as well as amend the existing Hope Mining Company's Plan of Operations to reflect the restoration goals for the corridor. Because Alternative 3 would not include the restoration activities proposed in Alternative 2, we have identified Alternative 2 as the environmentally preferred alternative.

We do have some recommendations for your consideration in the preparation of the final EIS. It is assumed that the information gleaned from the implementation of Phase I has contributed to the development of the proposed action. It is unclear, however, how this information has been incorporated and is being used to improve the chances of success for this project or future projects. We recommend that additional discussion be included in the final EIS regarding the "lessons learned" from Phase I.

Also, it is unclear why Phase I and Phase II were not evaluated under the same EIS, or if future restoration activities are being planned. We recommend that if future activities are being planned adjacent to the current restoration corridor, that they are included in this analysis, or that the final EIS provide a clear explanation as to why this phased approach is appropriate.

Finally, the potential impacts, and particularly cumulative impacts, related to the mining and operations activities associated with the proposed new acreage for the Hope Mining Company should be included in the final EIS. We are particularly interested in the statements on pages 89 and 95 regarding the possibility that State water quality standards could be temporarily exceeded. We support consideration of additional best management practices and strategies that will further minimize sedimentation and avoid possible exceedance of the turbidity standard. This may include use of settling ponds or expanding the project schedule to allow for disturbance to smaller quantities of material at any given time. We recommend that such strategies be developed and incorporated into the proposed action in the final EIS.

Based on our review and evaluation, we have assigned a rating of LO (Lack of Objections) to the draft EIS. This rating, and a summary of our comments, will be published in the Federal Register. A copy of the rather system used in conducting our review is enclosed for your reference.

Thank you for the opportunity to provide comments on the draft EIS. Please contact Jennifer Curtis of my staff in Anchorage, if you would like to discuss our comments. Ms. Curtis may be reached at 907-271-6324 or curtis.jennifer@epa.gov.

Sincerely,

Christine B. Reichgott, Manager
Environmental Review and Sediments Management Unit

Enclosure

Draft Environmental Impact Statements
Definitions and Follow-Up Action*
<u>Environmental Impact of the Action</u>

LO - Lack of Objections

The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - Environmental Concerns

EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - Environmental Objections

EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). The EPA intends to work with lead agency to reduce these impacts.

EU - Environmentally Unsatisfactory

EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS state, this project will be recommended for referral to the Council on Environmental Quality (CEQ).

<u>Adequacy of the Impact Statement</u>

Category 1 – Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of National Environmental Policy Act and or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

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