2.0 Proposed Action and Alternatives

This chapter describes the alternatives selected for detailed consideration in the EIS and those eliminated from further consideration. The chapter also compares the features of the alternatives and summarizes the potential effects of each alternative that are described in detail in Chapter 4.

2.1 Alternatives Development Process

Section 1.7 in Chapter 1 described the issues that were raised during the scoping process and the key issues that were used to formulate alternatives and design the impact evaluation process. Alternatives were identified by the Forest Service Interdisciplinary Team and screened according to whether they were consistent with the purpose and need and the EIS, as described in section 1.3 in Chapter 1, and were consistent with the Forest Plan and applicable laws and regulations. The three alternatives considered in detail are described in section 2.2. Alternatives that were eliminated from further consideration are summarized in section 2.3.

2.1.1 Alternative 1: No Action

The "no action" alternative is required by regulation in 40 CFR 1502.14(d). It is used, in part, to compare against the action alternatives to determine the effects of not implementing an action alternative. For purposes of this EIS, the No Action Alternative is defined as not approving proposed plans of Plans of Operations. Under this alternative, miners who submit Plans of Operations for suction dredging in Lolo Creek and Moose Creek would not receive approval for their plans of operations. No suction dredging would be allowed under the mining law or under any other authorization. This alternative could not be implemented under current law, including the Mining law of 1872, and violates Forest Service regulations at 36 CFR 228A. However, this alternative provides a comparable environmental baseline against which to evaluate effects of the action alternatives. This is consistent with and legal under NEPA, which allows for analysis of alternatives that are not allowed under current law or regulations but that are valuable for exploring the range of effects.

Under this alternative, there would continue to be approximately the same level of traffic on Forest roads and approximately the same level of dispersed camping and other recreational activities.

2.1.2 Alternative 2: Suction Dredging

Clearwater National Forest proposes to approve, with no further NEPA analysis, proposed Plans of Operation in specified reaches of Lolo Creek and Moose Creek (including two tributaries, Independence Creek and Deadwood Creek) if the operator agrees to specified operating conditions and mitigation measures as described below. The maximum number of operations approved in any year under this analysis is assumed to be 18 for Lolo Creek and 38 for Moose Creek. These numbers correspond with the maximums listed in the USFWS and NOAA Fisheries Biological Opinions (USFWS 2003 and NOAA 2003). Proposed operations exceeding the maximums will require reinitiation of consultation with USFWS and NOAA Fisheries and separate NEPA analysis. The areas in which plans of operations may be approved, and the active

mining claims on these areas, are shown in Figure 2-1 for Lolo Creek and Figure 2-2 for Moose Creek. The study areas are located as follows:

Lolo Creek

14 to 17 miles southeast of Pierce, Idaho,

in portions of:

- T. 34 N., R. 6 E., section 5
- T. 35 N., R. 6 E., sections 10, 16, 17, 20, 29, and 32, Boise Meridian.

All portions of the Lolo Creek study area border Clearwater County and Idaho County

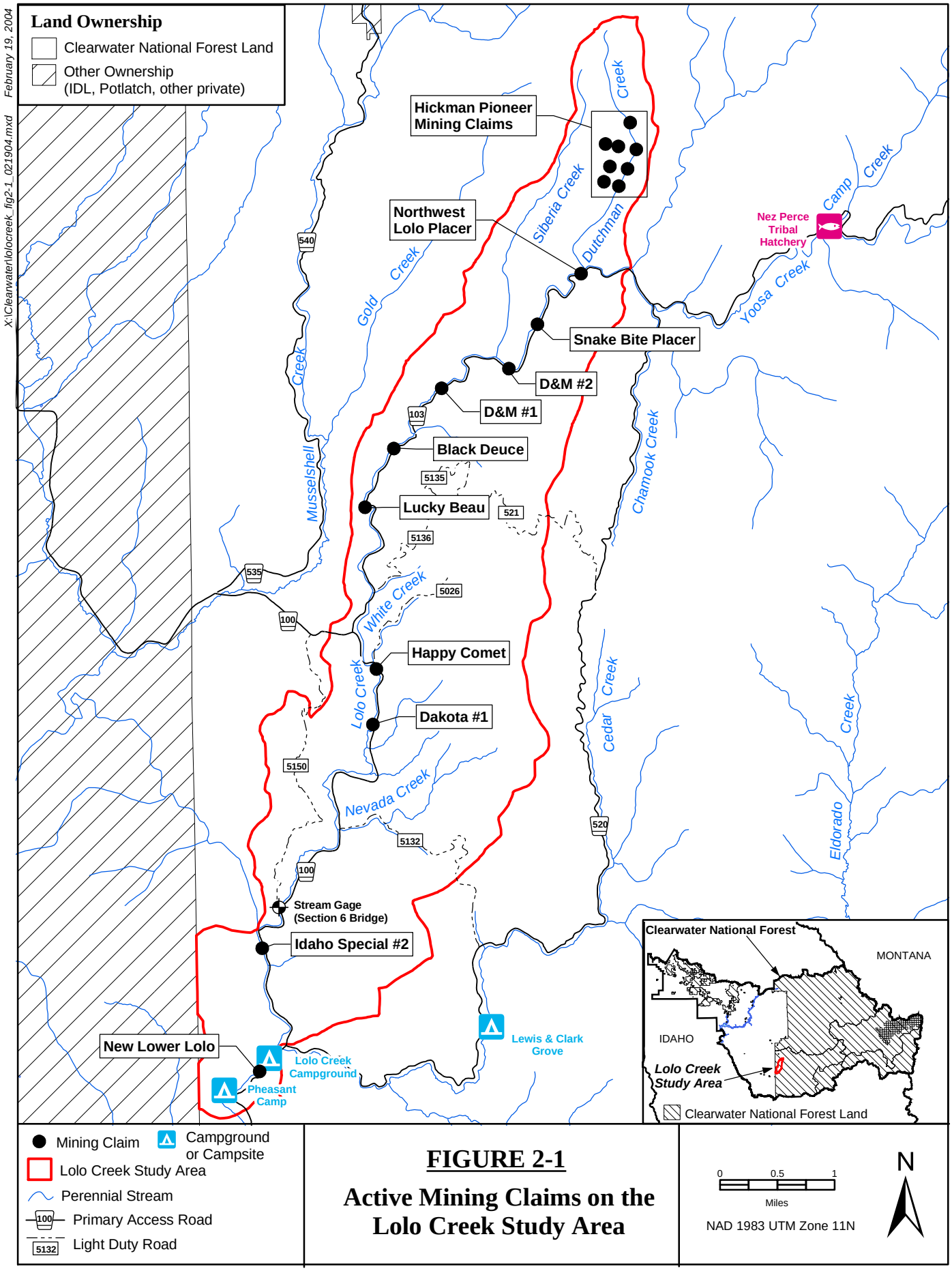
Moose Creek
(and tributaries Deadwood Creek and Independence Creek)
Approximately 12 miles east of
Kelly Forks Work Center in portions of:

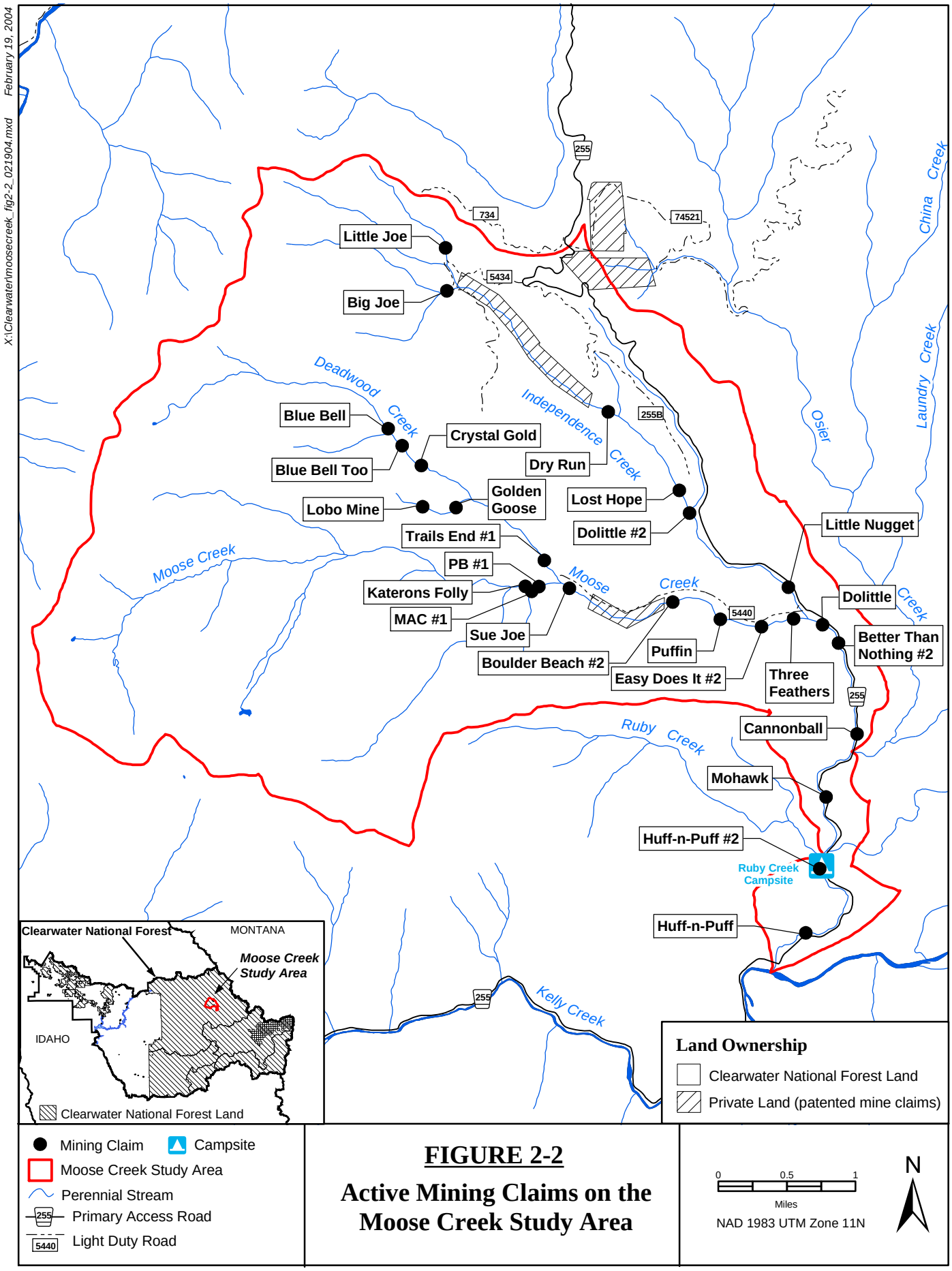
- T. 39 N., R. 11 E., sections 4 and 9
- T. 40 N., R. 11 E., sections 29, 31, 32, 33, Boise Meridian, Clearwater County, Idaho

The present terms and conditions (T&C) with which proposed plans of operations have to comply in order to qualify for approval are listed below. Most of these terms and conditions are conservation recommendations associated with the reasonable and prudent measures listed in the Biological Opinions prepared by NOAA Fisheries (2003) and USFWS (2003). The Forest Service has added additional elements to some terms and conditions and also included additional conditions in response to concerns raised during scoping[3].

1. Operations may occur only below the ordinary high water line during a dredge season extending from July 1 through August 15. *Lolo Creek T&C 1a* and *Moose Creek T&C 3a*
2. The suction dredge may have a nozzle diameter of 5 inches or less and a horsepower rating of 15 horsepower or less.
3. Dredge sites must be located in areas of large substrate not preferred for spawning steelhead trout and bull trout.
4. If streambanks are disturbed in any way, they must be restored to the original contour and revegetated. *Moose Creek T&C 1b*
5. Prior to dredging, operators must meet with a Forest Service fisheries biologist who will inspect the proposed dredge sites. No dredging will be allowed in areas of known bull trout (or steelhead, in the case of Lolo Creek) spawning or in areas identified as spawning habitat. *Moose Creek T&C 1g*
6. Operators may not move cobbles in the stream course to the extent that the deepest and fastest portion of the stream channel (the thalweg) is altered or moved. *Moose Creek T&C 1f*
7. Operators must cease activities during wet periods when project activities are causing excessive ground disturbance or excessive damage to roads. *Moose Creek T&C 2e*
8. All human waste must be kept more than 200 feet away from any live water. All refuse from dredging activities must be packed out and disposed of properly. *Moose Creek T&C 2g*
9. No mechanized equipment may be operated below the mean high water mark except for the dredge itself and any life support system necessary to operate the dredge. No mechanized equipment other than the suction dredge may be used for conducting operations. *Moose Creek T&C 2c*

[3] Unforeseen circumstances or changes may require additions or wording revision to listed terms and conditions. All suggested additions or changes will be reviewed and documented during Section 7 consultation with NOAA Fisheries and/or USFWS


Land Ownership
Clearwater National Forest Land
Other Ownership
(IDL, Potlatch, other private)
X:\Clearwater\lolocreek_fig2-1_021904.mxd February 19, 2004
Hickman Pioneer Mining Claims
Northwest Lolo Placer
Snake Bite Placer
D&M #2
D&M #1
Black Deuce
Lucky Beau
Happy Comet
Dakota #1
Idaho Special #2
New Lower Lolo
Stream Gage (Section 6 Bridge)
Lolo Creek Campground
Pheasant Camp
Lewis & Clark Grove
Nez Perce Tribal Hatchery
Siberia Creek
Dutchman Creek
Camp Creek
Yoosa Creek
Gold Creek
Musselshell Creek
Chamook Creek
White Creek
Lolo Creek
Nevada Creek
Cedar Creek
Eldorado Creek
540
103
5135
521
5136
535
5026
100
5150
5132
520
Clearwater National Forest
MONTANA
IDAHO
Lolo Creek Study Area
Clearwater National Forest Land
Mining Claim
Campground or Campsite
Lolo Creek Study Area
Perennial Stream
Primary Access Road
Light Duty Road
FIGURE 2-1
Active Mining Claims on the Lolo Creek Study Area
0 0.5 1
Miles
NAD 1983 UTM Zone 11N
N


X:\Clearwater\moosecreek_fig2-2_021904.mxd February 19, 2004
Little Joe
Big Joe
Blue Bell
Crystal Gold
Blue Bell Too
Golden Goose
Lobo Mine
Trails End #1
PB #1
Katerons Folly
MAC #1
Sue Joe
Boulder Beach #2
Lost Hope
Dry Run
Dolittle #2
Little Nugget
Dolittle
Better Than Nothing #2
Puffin
Easy Does It #2
Three Feathers
Cannonball
Mohawk
Huff-n-Puff #2
Ruby Creek Campsite
Huff-n-Puff
Deadwood Creek
Independence Creek
Moose Creek
Moose Creek
Ruby Creek
Kelly Creek
China Creek
Laundry Creek
Osier
734
74521
5434
255
255B
5440
255
255
Clearwater National Forest
MONTANA
Moose Creek Study Area
IDAHO
Clearwater National Forest Land
Land Ownership
Clearwater National Forest Land
Private Land (patented mine claims)
Mining Claim
Campsite
Moose Creek Study Area
Perennial Stream
Primary Access Road
Light Duty Road
FIGURE 2-2
Active Mining Claims on the Moose Creek Study Area
0
0.5
1
Miles
NAD 1983 UTM Zone 11N
N

10. Dredging must be conducted in a manner so as to prevent the undercutting and destabilization of stream banks, and may not otherwise disturb streambanks. *Moose Creek T&C 1c*
11. Dredging may not dam the stream channel.
12. Operators must maintain a minimum spacing of at least 100 linear feet of stream channel between suction dredging operations.
13. Dredges may not operate in the gravel bar areas at the tails of pools.
14. Dredges may not operate in such a way that fine sediment from the dredge discharge blankets gravel bars.
15. Operators must visually monitor the stream for 300 feet downstream of the dredging operation after the first half hour of continuous operation. If noticeable turbidity is observed downstream, the operation must cease immediately or decrease in intensity until no increase in turbidity is observed 300 feet downstream. *Moose Creek T&C 2d*
16. Dredges must not operate in such a way that the current or the discharge from the sluice is directed into the bank in a way that causes erosion or destruction of the natural form of the channel, that undercuts the bank, or that widens the channel. *Lolo Creek T&C 3a*
17. Operators may not undermine, excavate, or remove any stable woody debris or rocks that extend from the bank into the channel. *Lolo Creek T&M 3b*
18. Operators may not remove, relocate, or disturb stable in-stream woody debris or boulders greater than 12 inches in diameter. *Moose Creek T&C 1e*
19. Gasoline and other petroleum products must be stored in spill-proof containers at a location that minimizes the opportunity for accidental spillage.
20. The suction dredge must be checked for leaks, and all leaks repaired, prior to the start of operations each day. The fuel container used for refueling must contain less fuel than the amount needed to fill the tank. The suction dredge must be on stilts or anchored to the stream bank when refueling while afloat, so that the distance over which fuel must be carried over water is minimized. Unless the dredge has a detachable fuel tank, operators may transfer no more than one (1) gallon of fuel at a time during refilling. Operators must use a funnel while pouring, and place an absorbent material under the tank while refueling to catch any spillage. A spill kit must be available in case of accidental spills. If soil is contaminated by spilled petroleum products, the soil must be excavated to the depth of saturation and removed from the National Forest for proper disposal. *Lolo Creek T&C 2a* and *Moose Creek T&C 2b*
21. All dredge piles must be broken down and all dredge holes must be backfilled before moving to a new dredge location and by the end of the operating season, no later than August 15. *Lolo Creek T&C 1b*
22. Dredging operations must be shut down immediately if fish eggs are excavated, if sick, dead, or injured steelhead or bull trout are observed, or if destruction of redds is observed. Operators must contact Clearwater National Forest and receive authorization to proceed prior to resuming operations. Operators must record the date, time, location, and possible cause of fish injury or death. *Lolo Creek T&C 1c*, and *Moose Creek T&C 4b*. Also, operators must notify the Forest if any emergency or unanticipated situation arises that may be detrimental to bull trout relative to suction dredging. *Moose Creek T&C 4c*

23. Camping areas, paths, and other disturbed sites that are located along stream banks and that are associated with dredge operations must be revegetated or otherwise restored to their original conditions at the end of the dredge season. *Lolo Creek T&C 3c*
24. Dredging operations must be shut down immediately if the operator observes bull trout in either creek or steelhead in Lolo Creek. The operation must remain shut down until the fish move out of the area, to a point at least 100 feet upstream of the operation or at least 500 feet downstream.
25. Operators must obtain and comply with all required permits, including the Idaho State Permit to Alter a Stream Channel, and comply with all required conservation measures and Best Management Practices. Lolo *Creek T&C 1a* and *Moose Creek T&C 3a*
26. Intakes must be screened with 3/32 mesh. *Moose Creek T&C 2a*
27. Dredging operations must take place during daylight hours. *Moose Creek T&C 3b*
28. Shallow areas must be restored to their original grade each day and natural pools may not be filled. Tailings must be redistributed to avoid creating unstable spawning gravels. *Moose Creek T&C 1d*
29. If operators encounter mercury in dredged material, it may not be returned to the active stream channel or disposed of on Forest Service lands. Operators must cease operations and notify the Forest if more than two droplets of mercury are discovered during the dredging process. Operators may not use mercury, cyanide, or any other hazardous or refined substance to recover or concentrate gold. *Moose Creek T&C 2f*
30. At the end of the operating season, no later than September 15, the operator must provide Clearwater National Forest a description of the actual location(s) of the operation, the surface areas dredged, and the number of days operated. *Lolo Creek T&C 4e*

Other components of Alternatives 2 and 3, which also are based on terms and conditions required to implement the reasonable and prudent measures in the Biological Opinions, involve monitoring by the Forest Service and reporting to USFWS and NOAA Fisheries. Specific monitoring and reporting that will be implemented by the Forest Service include the following:

1. Monitor active operations and the impact of mining on fish habitat in each creek at least five times during the mining season. *Lolo Creek T&C 4b*
2. Monitor changes in stream morphology as a result of mining through specific measures specified in the Biological Opinion. *Lolo Creek T&C 4d*
3. Upon notice by an operator under item 22 above of dead, injured, or sick bull trout, or of the destruction of redds, notify USFWS Division of Law Enforcement and the Snake River Basin office within 24 hours. *Moose Creek T&C 4b*
4. Upon notice by an operator under item 22 above of dead or injured steelhead, or if eggs are excavated, notify NOAA Fisheries Law Enforcement Office in the Vancouver Field Office, and the Grangeville Field Office, prior to authorizing a resumption of dredging. *Lolo Creek T&C 1c*
5. Inspect dredged areas after all dredging activities have been completed for the season. *Moose Creek T&C 4a*
6. Provide written report or letter to USFWS, within 90 days of the end of each dredging season, indicating the actual number of bull trout taken, if any, and any relevant

biological/habitat data or other pertinent information on bull trout that was collected. *Moose Creek T&C 4d*

7. Provide annual monitoring report, by November 30, to NOAA Fisheries that describes operator compliance with suction dredging rules, the amount of stream area mined at each site, a photo of the mined area, and details about streambank disturbance and revegetation, if any. *Lolo Creek T&C 4c*
8. Provide NOAA Fisheries an update of pre-season monitoring no later than June 15, and a report on post-season monitoring progress no later than September 15. *Lolo Creek T&C 1f*

Under this proposed action, a claimant or operator would submit to the District Ranger a proposed Plan of Operations that included all 30 of the terms and conditions above. The proposed plan would provide site-specific information sufficient for the District Ranger to determine that the terms and conditions would be adequate for protection of surface resources on that specific site.

If the District Ranger determines that the proposed plan of operations meets the conditions described above and they are sufficient to protect surface resources on that site, the plan of operations could be approved with no further NEPA analysis. If the Ranger determines that the plan of operations does not meet these conditions, the District Ranger would not approve the plan of operations pending revisions to the plan or completion of a separate NEPA analysis on that plan. Any separate NEPA analysis would require a separate Endangered Species Act §7 consultation with USFWS and/or NOAA Fisheries.

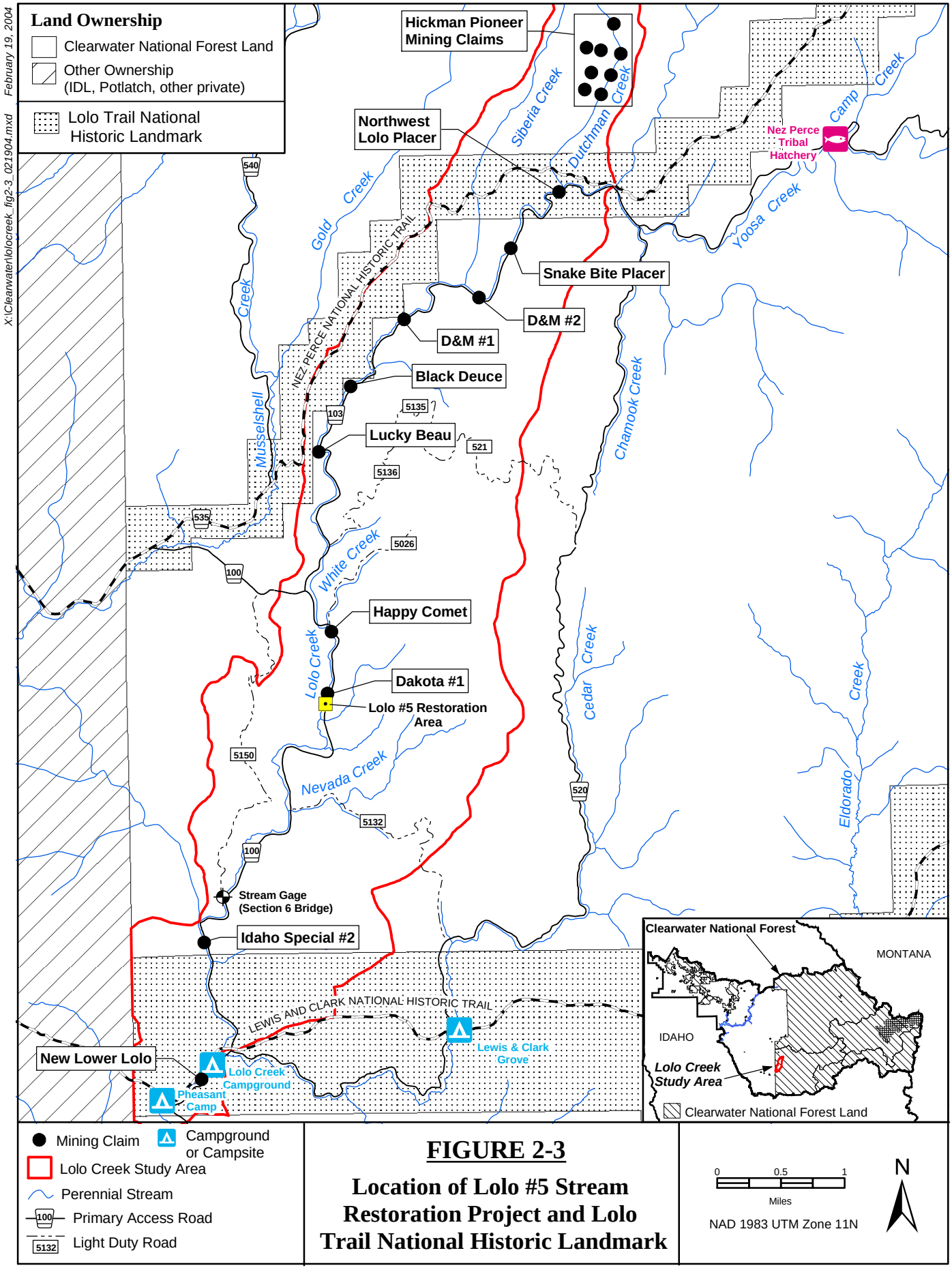
Plan approval would be in effect for the duration of the operating season, as long as the operation is conducted within the terms and conditions. A new plan of operations would have to be submitted and approved for each operation before each mining season.

2.1.3 Alternative 3: Suction Dredging and Stream Improvement Projects

This alternative is the same as alternative 2, except that it includes two specific stream improvement projects.

The first project involves bank stabilization and reclamation of the abandoned Lolo #5 mining claim on Lolo Creek (see Figure 2-3). Lolo #5 was placer mined by backhoes and dozers in the late 1970s, and the site was never reclaimed. The mining also caused Lolo Creek to be rerouted from its original floodplain and channel. Stockpiled overburden and bermed placer tailings along the creek have remained unstable and continue to be a major contributor of fine sediment to the stream system. Studies conducted by Clearwater National Forest in 1998 showed that unstable stream banks had increased from 56 to 418 meters per kilometer since being surveyed in 1993. The mitigation project would stabilize and reclaim approximately 260 meters of Lolo Creek, and would include the following components.

- Regrade and reclaim existing placer tailings away from the current channel to provide stable non-erodable slopes and to blend the local landscape into existing topography.


Land Ownership
Clearwater National Forest Land
Other Ownership
(IDL, Potlatch, other private)
Lolo Trail National
Historic Landmark
February 19, 2004
X:\Clearwater\lolocreek_fig2-3_021904.mxd
Hickman Pioneer
Mining Claims
Northwest
Lolo Placer
Siberia Creek
Dutchman Creek
Camp Creek
Nez Perce
Tribal
Hatchery
Gold Creek
Yoosa Creek
NEZ PERCE NATIONAL HISTORIC TRAIL
Snake Bite Placer
D&M #2
D&M #1
Black Deuce
Lucky Beau
Musselshell Creek
Chamook Creek
White Creek
Happy Comet
Lolo Creek
Dakota #1
Lolo #5 Restoration
Area
Cedar Creek
Eldorado Creek
Nevada Creek
Stream Gage
(Section 6 Bridge)
Idaho Special #2
LEWIS AND CLARK NATIONAL HISTORIC TRAIL
Lewis & Clark
Grove
New Lower Lolo
Lolo Creek
Campground
Pheasant
Camp
540
535
103
5135
521
5136
100
5026
5150
5132
520
Clearwater National Forest
MONTANA
IDAHO
Lolo Creek
Study Area
Clearwater National Forest Land
Mining Claim
Campground
or Campsite
Lolo Creek Study Area
Perennial Stream
Primary Access Road
Light Duty Road
FIGURE 2-3
Location of Lolo #5 Stream
Restoration Project and Lolo
Trail National Historic Landmark
0
0.5
1
Miles
NAD 1983 UTM Zone 11N
N

- Regrade and reclaim existing placer tailings away from existing emergent wetlands that have formed in parts of the old channel and prevent erosion of materials into these wetlands.

- Rehabilitate and restore the existing creek to provide stable banks and a new channel that is geomorphologically and hydraulically stable and provides suitable aquatic habitat with riparian vegetation along stream banks. This may include rerouting the channel to provide increased meandering, lowering the current gradient, and regrading to provide a functional floodplain.

The restoration project would not take place during critical salmonid spawning or migration periods and would follow all appropriate construction Best Management Practices to control erosion and minimize short-term impacts due to construction.

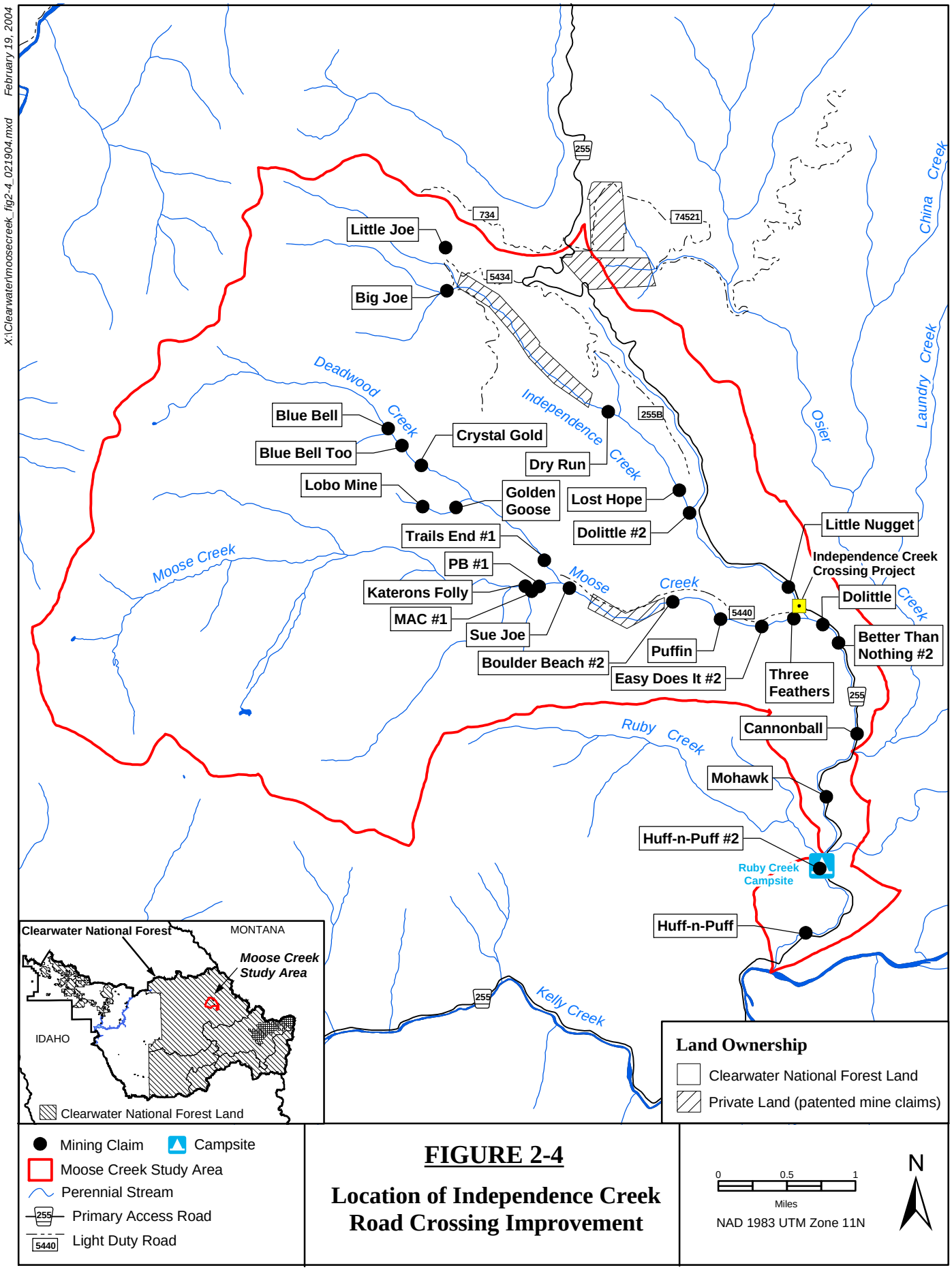
The second project would involve installation of a fish-friendly drainage device or ford with concrete planking where there is now an unimproved ford where Forest Road 5440 crosses Independence Creek (see Figure 2-4). Road 5440 is a native surfaced local Forest road used to access the mining claims along Moose and Independence Creeks. The present Independence Creek crossing is a ford that is a potential fish barrier during low flows and also a source of sediment to downstream Independence Creek and Moose Creek. As with the Lolo Creek stream restoration project, the Independence Creek project would not take place during critical salmonid spawning or migration periods and would follow all appropriate Best Management Practices to minimize short term impacts due to construction.

2.2 Alternatives Eliminated from Detailed Consideration

Several alternatives were suggested during scoping or otherwise identified by the Interdisciplinary Team, but then eliminated from further consideration. These alternatives, and the reason they were eliminated, include:

- *Withdrawal* of all Riparian Habitat Conservation Areas, all potentially eligible streams for National Wild and Scenic Rivers, and/or all areas that contain special features. This was based on a scoping comment (see Chapter 1). Presumably, this comment meant these areas should be withdrawn from mineral entry. This alternative was not carried forward because it is not consistent with the Purpose and Need, as described in Chapter 1.

- *Complete a separate NEPA analyses* for each small-scale suction dredging operation in these creeks. This alternative was not carried forward because the Forest Service considers it to be unnecessary. This EIS evaluates the impacts of multiple operations, so the potential impacts identified in the EIS would be inclusive of the impacts of each single operation, and so this EIS considers all the impacts that a series of operation-specific NEPA analyses would evaluate. A single EIS is a much more efficient means of identifying and disclosing impacts than would be multiple environmental assessments or EISs. In addition, the Forest Service notes Alternatives 2 and 3 being evaluated in this EIS is not the approval of proposed plans of operations; rather, they would allow the


X:\Clearwater\mooosecreek_fig2-4_021904.mxd February 19, 2004
Little Joe
Big Joe
Blue Bell
Blue Bell Too
Crystal Gold
Lobo Mine
Golden Goose
Dry Run
Lost Hope
Dolittle #2
Trails End #1
PB #1
Katerons Folly
MAC #1
Sue Joe
Boulder Beach #2
Puffin
Easy Does It #2
Three Feathers
Little Nugget
Independence Creek Crossing Project
Dolittle
Better Than Nothing #2
Cannonball
Mohawk
Huff-n-Puff #2
Ruby Creek Campsite
Huff-n-Puff
Deadwood Creek
Independence Creek
Moose Creek
Moose Creek
Ruby Creek
Kelly Creek
China Creek
Laundry Creek
Osier
734
74521
5434
255
255B
5440
255
255
Clearwater National Forest
MONTANA
Moose Creek Study Area
IDAHO
Clearwater National Forest Land
Land Ownership
Clearwater National Forest Land
Private Land (patented mine claims)
Mining Claim
Campsite
Moose Creek Study Area
Perennial Stream
Primary Access Road
Light Duty Road
FIGURE 2-4
Location of Independence Creek Road Crossing Improvement
0
0.5
1
Miles
NAD 1983 UTM Zone 11N
N

District Ranger to approve proposed plans of operation if the District Ranger determined that the 30 terms and conditions to which the operator would have agreed would protect surface resources on that site of the operation.

- *Longer or shorter mining seasons*. A longer mining season could intrude on the period before July 1 in which juvenile steelhead would be affected and the time that bull trout move upstream to spawn in late August and September. This would be inconsistent with the reasonable and prudent measures specified by NOAA Fisheries and USFWS and could result in unacceptable impacts to these species. A shorter mining season would not result in significantly reduced impacts and would provide no additional protection to threatened or endangered salmonid species.

- *Approve operation only when claimant demonstrates valid right to mine* under mining laws. This suggested alternative was rejected because it is inconsistent with Forest Service policy. The Forest Service Policy on Mining of Public Domain Mineral Estate (USFS 2003g) states "On National Forest system lands reserved from public domain and open to entry under the mining law, the Forest Service is not required to inquire into claim validity before processing and approving proposed plans of operations."

2.3 Comparison of Potential Effects of Alternatives

This section provides a summary of the potential effects to each resource that would result from implementation of each alternative considered in detail. Figure 2-5 provides a conceptual model of the sources of potential impacts and the resource areas that would be affected. It also shows the mitigation measures that are intended to reduce the potential impacts. Table 2-1 summarizes in somewhat more detail the findings in Chapter 4 for each alternative in Lolo Creek and Moose Creek, respectively, and allows a comparison of potential impacts among the alternatives.

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Hydrology and stream discharge	- no effect on streamflow or water yield - continued elevated sediment yield from Lolo #5 area and Independence Creek 5440 road crossing	- same as Alternative 1	- no effect on streamflow or water yield - short-term increase in sediment yield during construction projects - long-term decrease in sediment yield from Lolo #5 project area - long-term decrease in sediment yield from road 5440 crossing of Independence Creek	- erosion controls and other construction BMPs under Alternative 3
Stream geomorphology	- Lolo Creek would remain channelized in Lolo #5 area - banks would remain unstable in Lolo #5 area - Scouring and erosion would continue where road 5440 crosses Independence Creek	- same as Alternative 1 - damming or movement/ removal of woody debris and/or boulders could cause erosion/channel movement over time - deflection of streamflow into bank could cause undercutting and collapse - piled tailings could deflect flow	- same as Alternative 2, except: - reduction/removal of channelization in Lolo #5 area - increase bank stability from restoration in Lolo #5 area - elimination of scouring/erosion at Independence Creek crossing	- no dams allowed (11) - no moving/removal of woody debris or boulders (17, 18) - no deflection of flow into bank (16) - no undercutting or destabilization of banks (10) - displaced material must be replaced (21) - any disturbed streambank must be restored

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Water quality	- refuse and human waste could reach water - otherwise, minimal impacts from casual visitors and campers - continued increased sediment/turbidity in Lolo #5 area and downstream of Independence Creek/5440 crossing	- same as Alternative 1 - fuel spills from storage or tank refilling - spills from chemicals used to recover gold - dispersal of mercury encountered during operations - increase in sediment in water for short distance downstream of suction dredge operations in areas with fine material in substrate - introduction of new sediment into stream from dredging outside stream channel	- same as Alternative 2, except: - short-term increase in sediment/turbidity in and downstream of project areas during construction - long-term decrease in and downstream of Lolo #5 and downstream of Independence/5440 crossing	- refuse and human waste >200 feet from stream (8) - fuels must be properly stored and used (19 and 20) - no gold recovery using hazardous or refined substances (29) - stop operations of mercury encountered (29) - operators must visually monitor after startup, must stop if turbidity visible over 300 feet downstream (15) - USFS will monitor repeatedly during operations - erosion controls under Alternative 3 - no dredging outside channel (1)

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Fisheries	- no significant effects: recreational fishing may take individual fish	- sediment could cover spawning gravels and affect eggs/alevins - salmonid alevins could be crushed underfoot - alevins could be sucked through pump and killed - dislocation of aquatic insects could cause short-term attraction fish to dredge area - reduction in aquatic invertebrates would reduce food supply until recolonization occurred - excavating pools could cause localized area of lower temperature, which could attract fish - filling natural pools could displace fish from favored area - fine sediment could irritate gills - fine sediment could reduce habitat quality by filling interstial spaces in substrate that are used by juveniles and reducing benthic invertebrate prey - fuel spills from suction dredge engines could kill or disperse fish at all life stages	- same as Alternative 2 - eggs and larvae in Lolo #5 area would be displaced and/or killed - fish in Lolo #5 area would be dislocated during construction projects - fish immediately downstream of Independence Creek project may avoid area during construction - improved crossing will improve fish passage during base flow	- limited spawning habitat in study areas - dredging season limited to July 1 to August 15 to minimize impacts to juveniles/larvae, occurs after bull trout and steelhead emerge from substrate (1) - allowed only in areas of large substrate not preferred by spawning steelhead and bull trout (3) - no dredging in spawning habitat, as determined by UISFS inspection (5) - intakes must have 2/32 screen (26) - excavated pools must be filled at end of season (21) - no filling natural pools (28) - operation may not blanket sediment bars (14) - may not operate in gravel bar areas at end of pools (13) - fuels must be properly stored and used (19 and 20)

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Instream habitat	- negligible	- damming or flow alteration could affect stream channel and banks - Densely packed operations could remove undisturbed areas useful for refuge - moving rocks or woody debris could change flow and fish habitat	- same as Alternative 1, except long-term improvement in habitat due to more natural stream channel and riparian area	- no dams (11) - dredge piles have to be broken down (21) - may not disturb streambanks (10, 16) - minimum of 100 feet between operations (12) - no moving woody debris or large rocks (17, 18) - large rocks have to be replaced by end of season (21) - redistribute tailings to avoid creating unstable spawning gravels (28)
Aquatic invertebrates	- no effect on aquatic invertebrates	- same as Alternative 1 - some downstream displacement of aquatic invertebrates, minimal injury or mortality to aquatic insects - disturbance/disruption could cause temporary abundance of dislodged aquatic insects - reduced abundance of benthic invertebrates after dredging - mollusk abundance could remain depressed for some time - fine sediment could fill interstices in gravel/cobble, reducing habitat	- same as Alternative 2 - aquatic invertebrates in Lolo #5 project site would be disturbed, dislocated, or killed - sediment downstream of construction equipment at both projects may irritate gills or fill interstices, reducing habitat	- most benthic species can recolonize within week - sediment would likely be scoured in next high flow, allowing recolonization - Mitigation described under Water Quality will mitigate effects of sediment

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
T&E Species	- no significant effects: recreational fishing may take individual fish	- see Fisheries for potential effects on T&E fish - *fall-run chinook salmon:* no effect in Lolo, not present in Moose Creek - *spring-run (and hatchery) chinook salmon*: In Lolo Creek, short-term displacement or avoidance during dredging hours, temporary localized peaks in macroinvertebrat availability immediately after disturbance. Thereafter, localized reductions in macro-invertebrate availability until recolonization. Not present in Moose Creek - *steelhead trout*: In Lolo Creek, short-term displacement and dislocation, temporary reduction in macroinvertebrate prey. Steelhead not present in Moose Creek - *bull trout:* not likely to adversely affect. Some fry may have short-term dislocation or disturbance. Some reduction in invertebrate prey. - *westslope cutthroat trout:* similar to bull trout	- same as Alternative 2 - disturbance and dislocation in Lolo #5 project area, possibly some injuries or mortality, during construction season. - Improved habitat at Lolo #5 - Access by fish to Independence Creek above road 5440 during base flow	- USFS biologist inspects before mining. If area has known spawning or is spawning habitat, no mining (5) - chinook: July 1 to August 15 dredge season is after previous-year offspring are out of gravel and before most spawning begins. (1) - Steelhead: July1 to August 15 season is after spawning and after most steelhead emerge from substrate before season opens (1) - Bull trout: July 1 to August 15 season -- fry should have emerged from gravel before season - Must dredge in areas of large substrate not preferred by steelhead and bull trout (3) - no operations in gravel bars at tails of pools (13) - operations may not blanket bars with sediment (14) - shut down and contact USFS if eggs are excavated; sick, injured, or steelhead or bull trout are observed; or if redd destroyed (22) - Shut down if bull trout observed in either creek or if steelhead observed in Lolo Creek, until fish move out of range - USFS will monitor operations at least 5 times during season

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Wildlife	- Minimal` effects - wildlife would avoid active campsites and roads - seasonal hunting would kill/injure isolated game animals	- same as Alternative 1 - pump/compressor noise may cause wildlife to avoid riparian areas in daylight hours - food left outdoors would attract wildlife - amphibian eggs and young could be entrained in dredge pipe and injured or killed	- same as Alternative 2 - heavy equipment noise would cause wildlife to avoid project areas during operations	- amphibians' preferred habitat and egg-laying area is along/under streambanks, which may not be may not be dredged (16)
Riparian Vegetation and Wetlands	- some trampling by casual visitors and campers	- some trampling during access to stream channel - brush clearing or even tree cutting on campsites - Could disturb/destroy three federally listed plants: individual Macfarlane's four-o'clock *(Mirabilis macfarlanei),* water howellia *(Howellia aquatilis),* and Ute ladies'-tresses, Spalding's catchfly is found in mesic fescue grasslands and ponderosa pine-Idaho fescue savannas, neither of which are found along, or are affected by, the valley bottom of the stream for mining.	- same as Alternatives 1 and 2 - wetlands on and near Lolo#5 would be disturbed by construction	- wetlands delineation at Lolo #5 before Alternative 3 implemented. - design will incorporate jurisdictional wetlands and construction BMPs will mimimize disturbance - USFS regulations control brush clearing and tree cutting…. Endangered Species Act modeling showed the watersheds in which the proposed project is located did not contain suitable habitat for the three federally listed plants. - Any disturbed streambank must be revegetated.

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Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Recreation	- Change in, and possible decrease in, recreation use if no suction dredging allowed	- daylight noise may cause nonmining recreationists to avoid areas near active operations - hikers on Lolo National Historic Trail may hear engines as they pass near operations; this could last 30 minutes or more, depending on hiking speed, wind, and other factors.	- same as Alternative 2 - mining noise may cause recreationists, including suction dredge operators, to avoid project areas during construction	- Highest noise levels in daytime, which is when ambient (wind) and human noises (traffic, aircraft) are highest. This could serve to mask noise from suction dredging or stream improvement projects.
Visual Resources	- some campsites may be visible from trails	- same as Alternative 1 - some operations may be visible from Lolo National Historic Trail	- same as Alternatives 1 and 2 - construction and mining operations would be visible from roads and (near Lolo #5) possibly from trails	
Noise	- motorized camper generator noise near campsites - noise from traffic on roads	- same as Alternative 1 - suction dredge pumps/compressors would generate noise, could be audible at 100m or more during daylight hours	- same as Alternatives 1 and 2 - construction equipment would generate noise, could be audible for 100m or more during operations	- suction dredges may operation only during daylight hour (1)
Socioeconomics	- negligible	- negligible	- negligible	None

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Heritage resources	- minor potential: visitors or campers could encounter and disturb artifacts, old cabins, or other potential resources	- same as Alternative 1 - operators could encounter and disturb artifacts or other resources in the streams	- same as Alternative 1 - construction operations in Lolo #5 could damage or destroy artifacts or other resources buried in the tailings or overburdened piles - Installation of new crossing at Independence Creek may encounter or disturb artifacts or other resources in stream.	- USFS will survey Lolo #5 area prior to implementing project. If resources are located, USFS will consult with SHPO and tribal groups and develop mitigation measures - USFS rules require that work be stopped until site is inspected by USFS archaeologist. As necessary, USFS initiates consultation with SHPO and/or Tribal groups.
Native American treaty rights and traditional uses				
Fishing	- negligible. Tribal and other fishing would continue as at present. - Presence of non-tribal members may be less than optimal climate	- same as for Alternative 1 - for impacts on salmon, see above under Fisheries and T&E Species. In general, minor to negligible effects expected.	- same as Alternative 2 - for impacts on salmon, see above under Fisheries and T&E species. In general, minor to negligible effects expected. - Removal/improvement of Independence Creek ford could allow fish passage during low flows	- USFS has initiated contact with Nez Perce Tribe to identify other impacts to tribal fishing - See measures under Fisheries and T&E rows above.
Hunting	- negligible. Tribal and other hunting would continue as at present. - Presence of non-tribal members may be less than optimal climate	- Same as under Alternative 1. - Game animals would avoid riparian corridors due to noise in daylight hours and human presence at more extended times.	- Same as under Alternative 2 - Game animals would avoid project areas when heavy machinery and humans were present.	- USFS has initiated contact with Nez Perce Tribe to identify other impacts to Tribal hunting - Dredging season would end before prime hunting season

Table 2-1. Summary and Comparison of Potential Impacts

Resource Area	*Potential Impacts Unique to Alternative(s)*			*Mitigation Measures (under Alternative 2, except as noted) (see note 1)*
	Alternative 1: No Action	*Alternative 2: Suction Dredging*	*Alternative 3: Stream Improvement Projects*	
Gathering	- negligible. Tribal and other gathering would continue as at present - Presence of non-tribal members may be less than optimal climate	- Same as under Alternative 1. - Could cause indirect effects (noise, for example) to adjacent Tribal gathering area	- Same as under Alternative 2. - Machinery could disturb gatherers and could affect adjacent Tribal gathering areas.	- USFS has initiated contact with Nez Perce Tribe to identify other impacts to Tribal hunting

Note 1: numbers in parentheses refer to the conditions, described in section 2.1.1 in Chapter 2, to which an operator must agree to comply before the Forest Service would approve the proposed plan of operation