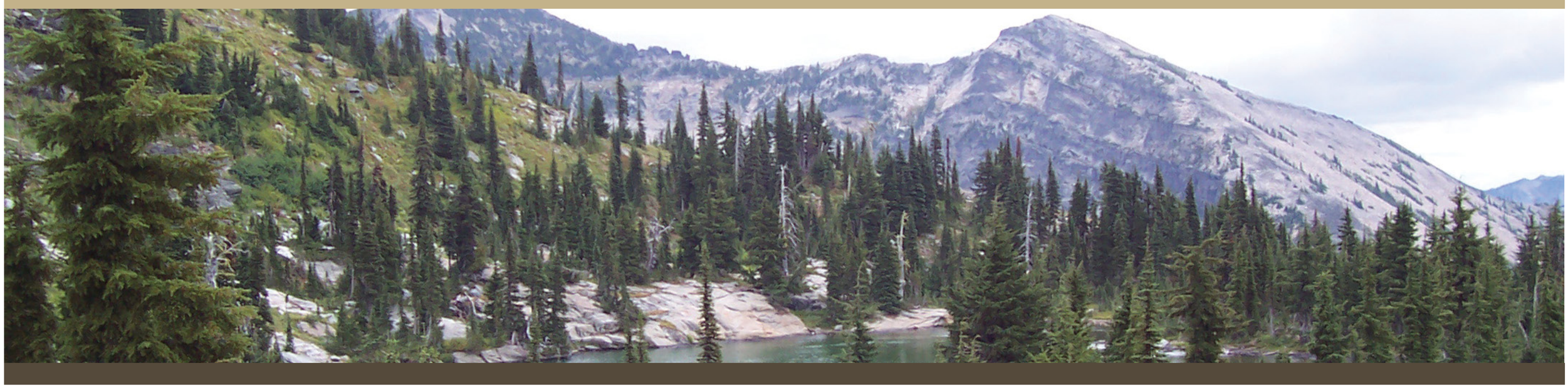
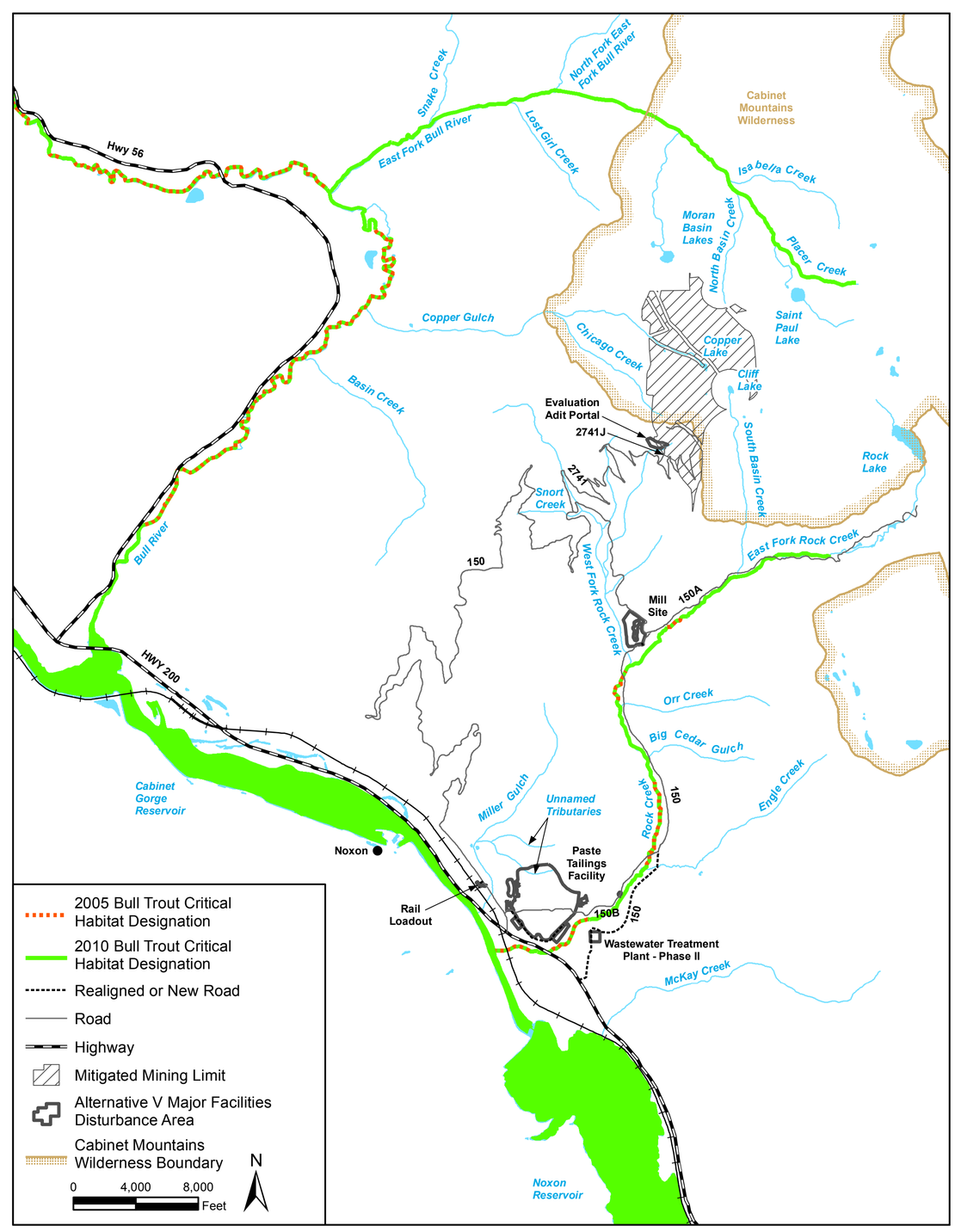


Bull Trout

Effects of Changes in Baseflow

- In the upper reaches of perennial streams, groundwater derived stream flow (baseflow) is maintained during the driest part of each year by groundwater flowing from bedrock fractures.
- Baseflow reductions in the upper perennial stream reaches may occur due to adit and mine inflows that would reduce the inflow of deeper bedrock groundwater to the streams, which would also decrease flow in reaches downstream by the amount of surface flow that is lost upstream.
- Baseflow conditions typically coincide with the seasonal timing of bull trout upstream migration, spawning, and incubation.
- Reduced baseflows would be possible in designated bull trout critical habitat in mainstem Rock Creek, East Fork Rock Creek, West Fork Rock Creek, East Fork Bull River, and Bull River downstream of East Fork Bull River.
- Reduced baseflow may affect designated bull trout critical habitat by:
  - reducing spawning and rearing habitat,
  - increasing the duration/frequency of flow intermittency in Rock Creek,
  - creating or extending barriers to fish passage, and
  - affecting important groundwater/stream water interactions such as upwelling necessary for redd incubation and moderation of surface water temperatures.
- The 3D groundwater model cannot be used to quantify effects or determine specific location of effects because:
  - a number of model input parameters are not well defined, and
  - it is not currently possible to verify the accuracy of the results.
- Specific effects and locations of stream flow changes and their effects on bull trout would be re-evaluated after Phase I data were collected and the 3D groundwater model was updated.



Bull Trout Critical Habitat

Design Features, Mitigation, and Monitoring

- The aquatics and fisheries mitigation plan complies with the Terms and Conditions of the 2007 Biological Opinion Supplement for bull trout.
- The Watershed Consulting and Salmon Environmental Services reports meet the intent of the Terms and Conditions of the Biological Opinion for the watershed assessment. RCR would update the assessment with any new data collected prior to the initiation of Phase II Construction.
- To minimize groundwater inflows to the mine and adits:
  - Maintain buffers between mine void and water-bearing faults and Cliff Lake
  - Grout ahead of blasting
  - Leave a minimum of 450 feet of overburden over the mine workings
- To achieve a reduction of 400 tons per year of sediment delivery needed for mitigation of the entire mine project:
  - Phase I sediment mitigation would reduce the current sediment load by about 234 tons per year.
  - RCR would submit a final Phase II mitigation plan for additional sediment mitigation of about 165 tons per year to the KNF, DEQ, and USFWS for approval prior to Phase II.
  - Sediment source reduction activities would be completed before the mine construction period and maintained throughout the life of the mine.
- Leave an unaltered vegetation buffer between Rock Creek and the road and utility corridors, where possible, to protect bull trout habitat.
- Implement a stream habitat enhancement program to improve ability of bull trout to move throughout the year in Rock Creek and increase bull trout habitat availability and diversity. When possible, coordinate with work being done by Avista or the local watershed council.
- Improve or replace the existing culvert on the West Fork Rock Creek above the confluence with East Fork Rock Creek.
- Monitor impacts on benthic macroinvertebrates, fish populations, periphyton, and metals accumulations in fish tissues. Coordinate with water quality and streamflow monitoring.
- Prior to the start of Phase II mining activities, submit a plan for USFWS approval to monitor groundwater effects as they relate to bull trout habitat requirements.
- As part of Water Resources Monitoring Plan, develop monitoring action levels and a Contingency Action Plan.