

Appendix B
Soil, Water, Riparian, and Aquatic Resources
Watershed Condition Indicators

Table B-1 Environmental Baseline Matrices

Golden Hand No. 1 and No. 2 Lode Mining Claims Draft EIS

TABLE B-1 ENVIRONMENTAL BASELINE MATRICES

Agency/Unit	Payette NF, Krassel RD	HU Code and Name	170602060501 Upper Big 170602060503 Big Creek-Little Marble 170602060502 Logan Creek 170602060504 Smith Creek 170602060601 Beaver Creek
Fish Species Present	Chinook, steelhead, bull trout	Spatial Scale of this Matrix	One 5 th level HU (upper Big Creek), One 6 th level HU (Beaver Creek)
(Anad. Sp.) Population:		Subpopulation:	
Core Area (Bull Trout)		Local Population	
Management Actions	Golden Hand 1 and 2		
Pathways & Indicators	Population and Environmental Baseline		
	Desired Condition	Baseline Condition	Discussion of Baseline and Current Condition
Local Population Character (Bull trout only)			
Local Population Size	Mean total local population size or local habitat capacity more than several thousand individuals. Adults in local population > 500. All life stages are represented within the local population.	FA PJ	Data from snorkel surveys in 1994, 1999, 2002 - 2004, and spawning surveys from 2003 - 2004 indicate that bull trout are abundant in Big Creek tributaries including Smith Creek and Beaver Creek, and that all life stages are represented (data on file PAF SO, McCall, ID; Burns et al. 2005). FR rating given because there are not enough data to determine if the total population is more than several thousand or the adult population is >500.
Growth and Survival	Local population has the resilience to recover from temporary or short-term disturbances (e.g., catastrophic events, etc.) or local population declines within 1 to 2 generations (5-10 years). The local population is characterized as increasing or stable. At least 10 years of data support this estimate.	FR PJ	There are not sufficient trend data to characterize growth and survival. - If "...a trend cannot be confirmed, a local population would be considered at risk until enough data is available to accurately determine its trend" (from definition of Functioning at Risk in LRMP App. B, Table B-1)
Life History Diversity and Isolation	The migratory form is present and the local populations are in close proximity to each other. Migratory corridors and rearing habitat (lake or larger river) are in good to excellent condition for the species. Neighboring local populations are large with	FA PJ	Large, presumably migratory, bull trout have been observed in upper Big Creek and tributaries to Big Creek, such as Beaver Creek and Smith Creek. The habitat is generally functioning appropriately (see Matrix entries below). Big Creek flows into a designated Wilderness area and joins the Middle Fork of the Salmon River. In general, bull trout habitat is well connected, bull trout are well distributed, and all life history strategies are likely present within the Big Creek and Middle Fork Salmon River drainage (data on file PAF Supervisors office, McCall, ID). Burns et al. 2005: "Based on the authors' observations of large bull trout, we have made the assumption that fluvial bull trout are still present in the mainstem and probably exchange genetic material with the populations documented in some tributaries that we've assumed to be predominantly resident fish.

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	high likelihood of producing surplus individuals or straying adults that would mix with other local populations.		It appears that the full range of bull trout life histories occur in this watershed.” For Monumental Creek (downstream of the analysis area), migratory corridors and rearing habitat are in good to excellent condition with the exception of where the Thunder Mtn. access road and historical mining have adversely affected the streams, and where several stream crossings may not allow fish passage at all flows and life stages (data on file at PAF SO, McCall, Idaho).
Persistence and Genetic Integrity	Connectivity is high among multiple (5 or more) local populations with at least several thousand fish each. Each of the relevant local populations has a low risk of extinction. The probability of hybridization or displacement by competitive species is low to nonexistent.	FA PJ	Brook trout were observed in upper Big Creek, and Logan Creek in 1993, and in Lick Creek in 1999. Brook trout were not detected in surveys of Logan Cr., NF Logan Cr., and Government Cr. in 2004. No brook trout have been detected in Smith Cr. Hybridization between brook trout and bull trout is likely, but the extent is unknown. (data on file PAF Supervisors office, McCall, ID; Burns et al. 2005; Raleigh 1994). Due to the large extent of suitable and occupied habitat in the Big Creek watershed, and the presence of all life history types (resident and migratory), bull trout population viability remains high relative to other areas on the PAF (Burns et al. 2005).

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Water Quality			
Temperature	<p>Bull trout: 7-day average maximum temperature in a reach during the following life history stages: Incubation: 2-5°C or 35.6-41.0°F Rearing: 4-12°C or 39.2-53.6°F Spawning: 4-9°C or 39.2-48.2°F Also temperatures do not exceed 15°C or 59.0°F in areas used by adults during migration (no thermal barriers)</p> <p>Chinook/steelhead: 7-day average minimum. Spawning, rearing and migration: 50-57°F (10-13.9°C)</p>	FR D,PJ	<p>Temperature values range from FA to FUR, but data are considered to reflect a natural temperature regime in the Big Creek drainage because except for roads in RCAs and the pasture and airstrip on McKorkle Creek, there is little evidence of management effects in these watersheds that would contribute to elevated temperatures. Given the stream elevation, topography, aspect, and riparian vegetation characteristics, the data likely reflects the natural range of variability. Little to no data during winter incubation months past September.</p> <p>The temperatures are summarized as seasonal maximum of 7-day average of daily maximums in degrees Celsius.</p> <p>Beaver at mouth (E228) 12.9 – 14.2 (2002-2008) Coin Creek at Golden Hand (E279) 7.7 (2009) Coin Creek tributary (E305) 8.3 (2009) Smith Creek at mouth (E208) 10.8-13.9 (2000, 2001, 2004, 2009) North Fork Smith Creek (E301) 10.8 (2009)</p> <p>Logan Creek (E123) 14.1 (1994) Logan Creek at NFK Logan (E245) 11.2 (2004) Logan Creek upper (E094) 11.3 (2009)</p> <p>Big Creek at McKorkle Cr (E118) 14.3 - 15.2 (2009, 2010) Big Creek at Logan Cr (E109) 15.1 – 18.0 (1994-2004, 2010) Big Creek at Jacobs Ladder Cr (E289) 10.3 - 11.9 (2009-2010)</p> <p>Unpublished data on file at PAF SO, McCall, ID</p>
<p>Intragravel Quality (in areas of spawning and incubation for anadromous fishes)</p> <p>“Sediment” WCI has been replaced by new</p>	<p>Revised WCI for PAF, Nelson and Burns 2005 High intragravel quality is indicated by: (a) 5-year mean fines < 6.3 mm concentrations at depth of 28% or less with no more than two years between</p>	See Interstitial Sediment Deposition, below	Intragravel quality data is not available for this analysis area. See Interstitial Sediment Deposition, below

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indicator from Nelson and Burns 2005	28% and 36%. OR (b) 5-year mean fines < 6.3 mm concentrations at depth between 28% and 36% with a decreasing trend over at least 10 years.		
Chemical Contaminants and/or Nutrients	Low levels of chemical contamination from agricultural, industrial, and other sources; no excess nutrients, no 303(d) water quality limited water bodies.	FA PJ	No 303d water quality limited bodies, intermittent water quality testing shows no evidence of contamination from past mining actions (Jim Egnew, Minerals, Payette NF, Personal communication)
Habitat Access			
Physical Barriers	Any man-made barriers present in watershed allow upstream and downstream fish passage at all flows.	FR PJ, D	All culverts in the area have been inventoried using the National Inventory and Assessment Procedure (Clarkin et al. 2003). A culvert on a small tributary to NF Logan Cr. and one culvert near the headwaters of McCorkel Cr. may hinder or block passage for fish and other aquatic organisms. However, the high gradient and small stream size upstream of the culverts would not likely provide good spawning, rearing, or migration habitat for bull trout, or steelhead. There are two culverts that are barriers on Big Creek upstream of Edwardsburg, but the high stream gradient and multiple vertical falls may preclude fish from moving upstream regardless of the culverts (data on file at PAF Supervisors Office, McCall, ID). Numerous stream crossings in the analysis area are fords, which are not likely barriers to fish passage. Other barriers to fish and aquatic organisms may occur at points of diversion for water rights. There are no human caused barriers in the Beaver Creek subwatershed.

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Habitat Elements			
<p>Interstitial Sediment Deposition (all listed fished in tributary systems)</p> <p>“Substrate Embeddedness” WCI has been replaced by new theory in Nelson and Burns 2005</p>	<p>Revised WCI for non-granitics, such as Big Creek, PAF, Nelson and Burns 2005, Nelson et al. 2006.</p> <p>Adequate interstitial space is indicated by: A five-year mean measured cobble embeddedness level of 19% or less OR A five-year mean free matrix count of 43% or more.</p> <p>Surface fines less than 3%</p>	<p>FUR D</p>	<p>CE = Cobble Embeddedness, FM = Free Matrix, SF = Surface Fines.</p> <p>CE less than 19% = FA; 19 – 25% = FR; greater than 25% = FUR FM greater than 43% = FA; 33-43% = FR; less than 33% = FUR SF less than 3% = FA; 3-6% = FR; greater than 6% = FUR.</p> <p>Big Creek CE 2 yr mean =12.9% FA; FM 2 yr mean = 44.8% FA; SF 2 yr mean = 2.3% FA</p> <p>Government. Creek CE 4 yr mean = 26.9% FUR; FM 5 yr mean = 28.1% FUR, SF 5 yr mean = 6.6% FUR</p> <p>Jacobs Ladder CE 5 yr mean = 20.4% FR; FM 5 yr mean = 48.1% FA, SF 5 yr mean = 2.2% FA</p> <p>Lower Logan CE 5 yr mean = 28.3% FUR; FM 5 yr mean = 24.8% FUR, SF 5 year mean = 7.8% FUR</p> <p>Upper Logan CE 3 yr mean = 23.1% FR; FM 3 yr mean = 31.1% FUR, SF 5 year mean = 3.9% FR</p> <p>Smith Creek CE 5 yr mean = 20.8% FR; FM 5 yr mean = 34.4% FR, SF 5 yr mean = 2.2% FA</p> <p>*All 5 year mean were calculated from 1994-1997, and 2004. CE has only been measured 3 times on Govt and upper Logan Cr 1990, 1994, 2004. Big Creek has only 1 year of data, 2004.</p> <p>PAF survey of Coin Creek surface fines in 2002 = 3.3%</p> <p>Using different sampling methodologies than used for the data reported above, House et al. (2005) report similar to higher values for cobble embeddedness in Coin Creek, Smith, and Beaver Creek. Estimates of surface fines by House et al (2005), were in Coin, Smith, and Beaver Creek were generally higher than PAF estimates.</p>

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Large Woody Debris	> 20 pieces per mile, > 12 inches in diameter, > 35 feet length; and adequate sources of large woody debris for both long and short-term recruitment in RCAs.	FA D	There are > 20 pieces per mile of > 12 " diameter and > 35 ' in length LWD in upper Big Cr., Logan Cr., Government Creek, and Coin Creek (Raleigh 1994, Unpublished data on file at PAF SO (2002, 2008)). The amount of LWD is close to or exceeds the values for average counts of LWD in plutonic streams with similar avg. wetted width given in the Natural Conditions database (Overton et al. 1995; data on file at PAF Supervisors Office, McCall, ID)																				
Pool Frequency	<p>Bull trout: Pools have good cover and cool water, and only minor reduction of pool volume by fine sediment. Large woody debris recruitment standards for functioning appropriately (above) are met and pool frequency in a reach closely approximates:</p> <table border="1"> <thead> <tr> <th>Wetted Width (ft.)</th> <th>Number of Pools/Mile</th> </tr> </thead> <tbody> <tr><td>0-5</td><td>39</td></tr> <tr><td>5-10</td><td>60</td></tr> <tr><td>10-15</td><td>48</td></tr> <tr><td>15-20</td><td>39</td></tr> <tr><td>20-30</td><td>23</td></tr> <tr><td>30-35</td><td>18</td></tr> <tr><td>35-40</td><td>10</td></tr> <tr><td>40-65</td><td>9</td></tr> <tr><td>65-100</td><td>4</td></tr> </tbody> </table> <p>steelhead: Pools have good cover and cool water, and only minor reduction of pool volume by fine sediment.</p>	Wetted Width (ft.)	Number of Pools/Mile	0-5	39	5-10	60	10-15	48	15-20	39	20-30	23	30-35	18	35-40	10	40-65	9	65-100	4	FA D	<p>The number of pools per mile in the smaller streams such as Logan Cr., and Government Cr, and Coin Creek exceed the desired values for bull trout and steelhead, and exceed or are close to the number of pools per mile given in the Natural Conditions database (Overton et al. 1995). Large woody debris recruitment stream temperatures and sediment are functioning appropriately. The number of pools per mile in Coin Creek and Beaver are low, but this may be due to small size of the streams especially with Coin Creek (2008 data on file PAF SO, McCall, ID).</p> <p>The number of pools per mile in upper Big creek (20 pools/mile, width 28 ft) is less than the desired condition for bull trout and /steelhead, but exceeds the number of pools per mile in the Natural Conditions database. Large woody debris recruitment standards are functioning appropriately; therefore that component of fish cover is adequate. Stream temperatures and sediment are functioning appropriately (data on file at PAF Supervisors Office, McCall, ID; Raleigh 1994).</p>
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	<p>Large woody debris recruitment standards for functioning appropriately (above) are met and pool frequency in a reach closely approximates:</p> <table border="1"> <thead> <tr> <th>Channel Width (ft.)</th> <th>Number of Pools/Mile</th> </tr> </thead> <tbody> <tr> <td>0-5</td> <td>184</td> </tr> <tr> <td>5-10</td> <td>96</td> </tr> <tr> <td>10-15</td> <td>70</td> </tr> <tr> <td>15-20</td> <td>56</td> </tr> <tr> <td>20-25</td> <td>47</td> </tr> <tr> <td>25-50</td> <td>26</td> </tr> <tr> <td>50-75</td> <td>23</td> </tr> <tr> <td>75-100</td> <td>18</td> </tr> </tbody> </table>	Channel Width (ft.)	Number of Pools/Mile	0-5	184	5-10	96	10-15	70	15-20	56	20-25	47	25-50	26	50-75	23	75-100	18		
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Pool Quality	Each reach has many large pools > 3.28 feet (1 meter deep). Pools have good cover and cool water, and only minor reduction of pool volume by fine sediment.	FA D	See WCI for Pool frequency																		
Off-Channel Habitat	Watershed has many ponds, oxbows, backwaters, and other off-channel areas with cover; side channels are low energy areas.	FA D	There has been very little anthropogenic channel modification that would have altered the amount or condition of off-channel habitat in the Big and Marble Creek watersheds (personal observation). Therefore, off-channel habitat should be functioning appropriately. Off-channel habitat is constricted locally along developed areas in Upper Big Creek, but otherwise intact within the analysis area (GIS road layers, data on file at the PAF Supervisors Office, McCall, Idaho) (personal observation).																		

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Refugia	<p>Bull trout: Habitats capable of supporting strong and significant local populations are protected and are well distributed and connected for all life stages and forms of the species.</p> <p>Steelhead: Habitat refugia exist and are adequately buffered (e.g., by intact riparian conservation areas); existing refugia are sufficient in size, number, and connectivity to maintain viable populations or sub-population</p>	FA PJ	The habitat in the Big Creek drainage is generally functioning appropriately (refer to relevant Matrix entries) and has not been fragmented with barriers. Big Creek flows into a designated Wilderness area and joins the Middle Fork of the Salmon River where the habitat is well connected and generally reflects natural conditions. (data on file PAF Supervisors office, McCall, ID)
Channel Condition and Dynamics			

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Width/Max Depth Ratio	≤10	FA D	The width/maximum depth ratios in Logan Cr., NF Logan Cr., and Government Cr. are ≤10. The width/maximum depth ratio is not available for upper Big Cr.; however, the average width depth ratio for Big Cr. within the project area is 24.4 which are similar to the mean (27) and mode (20) width to max depth ratio for "B" channel, plutonic streams documented in the Natural Conditions database (Overton et al. 1995) (data on file PAF Supervisors office, McCall, ID; Raleigh 1994). Recent surveys (2003, 2008) show mean width:max depth ratios (FBase output): Smith Ck: = 8.8 Beaver Ck: = 9.2 Coin Creek (2008) = 7 There are many motorized fords on the FRD 371, 373, and trail 194, but these affect a small relative proportion of the streambanks.
Streambank Condition	>90% of any stream reach has stable banks relative to the percent of inherent stable streambanks associated with a similar unmanaged stream system.	FA D	Stream bank stability is >90% for upper Big Creek tributaries (Raleigh 1994). (data on file at the PAF Supervisors Office, McCall, Idaho) There are many motorized fords on the FRD 371, 373, and trail 194, but these affect a small relative proportion of the streambanks.
Floodplain Connectivity	Within RCAs, floodplains and wetlands are hydrologically linked to the main channel; overbank flows occur and maintain wetland/floodplain functions; and riparian vegetation succession.	FA PJ	Floodplains are constricted along some roads but otherwise intact within the analysis area (personal observation).
Flow/Hydrology			
Change in Peak/Base Flows	Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of	Big Creek 5 th HU - FR D Beaver Creek 6 th HU – FA, D	There are a number of State water rights for irrigation, domestic, culinary, and hydropower use in the analysis area. Water rights in the analysis area total 2.24 cfs. Some of these diversions withdraw more than 10% of the flow from smaller fish bearing tributaries. (data on file PAF, S.O. McCall, ID).

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	a similar size, geomorphology and climatology.		<p>There are currently no diversions on Coin Creek or Beaver Creek. Base flow in Coin Creek 0.5 cfs near Forest trail #194 crossing (Raleigh 1994; data on file PAF, SO McCall, ID).</p> <p>Flow near mouth of Coin Creek has been estimated at 6.25 cfs (Sept. 8, 2008), and 3.35 cfs (July 30, 2002) and as low as 0.71 cfs on September 23, 1993 by Raleigh (1994). The 0.71 cfs estimate by Raleigh (1994) could not be verified with raw data. Base flow in Beaver Creek near Big Creek has been estimated at 40 cfs (Raleigh 1994).</p> <p>The indicator for peak/base flows in the analysis area is considered FR for Big Creek due to the influence of the various diversions on tributaries to Big Creek, and FA for Coin and Beaver Creek (Beaver Creek 6th HU) where no diversions occur.</p>
Drainage Network Increase	Zero or minimum change in active channel length correlated with human caused disturbance.	FR D	Roads and ATV trails on old roadbeds have changed active channel length in localized areas within upper Big Creek (GIS data on file PAF SO, McCall, ID).

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Fish Species Present	Chinook, steelhead, bull trout	Spatial Scale of this Matrix	One 5 th level HU (upper Big Creek), One 6 th level HU (Beaver Creek)			
(Anad. Sp.) Population:		Subpopulation:				
Core Area (Bull Trout)		Local Population				
Management Actions	Golden Hand 1 and 2					
Pathways & Indicators	Population and Environmental Baseline					
	Desired Condition	Baseline Condition	Discussion of Baseline and Current Condition			
			Overall	12.9	8.0	20.9
			Road density is functioning at risk, but many of the roads are located within RCAs, with roads paralleling the stream channels. There are many motorized fords on the FRD 371, 373, and trail 194.			
Disturbance History	< 15% ECA (entire watershed) with no concentration of disturbance in areas with landslide or landslide prone areas, and/or refugia, and/or RCAs.	FR D, PJ	ECA is 18% for the analysis area (data on file WARS database PAF SO McCall, ID). Nelson et al. 2004: " We cannot confirm that even high ECA, as estimated on the PAF to date, has any observable effect on salmonid habitat. This suggests that estimated ECA on the PAF says little about the potential for affected streams to support salmonids. We cannot determine whether there is some threshold value above which habitat conditions would be unacceptably altered...". During a field visit to the area in 2008 it was noted that the stream channels (all perennial and intermittent) had scoured out from the head waters down to where trail 013 fords the eastern most tributary and Coin Creek. Because of the high elevation of the area and the northerly aspect of the drainage the scouring was most likely caused by a high intensity rain storm on a severely burned area in the headwaters. There is a concentration of road related disturbance in some RCAs (see road density and location WCI) (GIS data on file PAF SO McCall, ID)			
Riparian Conservation Areas	The riparian conservation areas within the subwatershed(s) have historic and occupied refugia for listed, sensitive or native/desired nonnative fish species which are present and provide: adequate shade, large woody debris recruitment, sediment buffering, connectivity, and habitat protection and connectivity to adequately minimize adverse effects from land management	FR D, PJ	Nearly 19 miles of streams have been inventoried in the Upper Big Cr. H.U. Of those, 86% rated "good", 14% rated "fair" based on the Pfankuch Stability Rating methodology. Fair ratings were given to tributaries of Big Cr., and Logan Creek and sections of McKorckle Cr. (Riparian inventory, 2004, on file PAF Krassel RD, McCall, ID). In the Big Creek-Beaver Cr. H.U. limited inventory indicates that the mainstem of Beaver Cr. is in good condition (Stream inventory, 2003). Personal observation of the east fork and west fork of Coin Cr show these channels have been scoured (including fords crossing both channels). Scouring is most likely due to a high intensity rain event that occurred in the summer of 2007. RCAs are not intact where roads, private in-holdings and FS administrative sites occur (i.e., FS			

Golden Hand No. 1 and No. 2 Lode Mining Claims Draft EIS

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	activities (>80% intact). All vegetative components are within desired conditions identified in Appendix A of the Forest Plan. RCA functions and processes are intact, providing resiliency from adverse affects associated with land management activities. Conditions fully support habitat for aquatic species.		stock pasture) but otherwise intact within the analysis area (GIS data on file PAF SO, McCall, ID). % of RCA with roads Big Creek-Little Marble 4 Logan Creek 43 Upper Big Creek 20 Smith Creek 36 Beaver Creek 2 Total 16 % of RCA with roads calculated by dividing the miles of road in RCA by the miles of road.
Disturbance Regime	Disturbance resulting from land management activities are negligible or temporary. Streamflow regimes are appropriate to the local geomorphology, potential vegetation and climatology resulting in appropriate high quality habitat and watershed complexity that provide refugia and rearing space for all life stages or multiple life-history forms. Ecological processes are within historical ranges.–Resiliency of habitat to recover from land management disturbances is high.	FA PJ	Management activities have not altered the disturbance regime significantly (e.g., wildfire has burned actively in surrounding areas; limited vegetation management in recent decades). There is good connectivity between high quality habitat and refugia for all life history stages. See entries above for Local Population Size, Growth and Survival, Life History Diversity and Isolation and Refugia. Roads are the most significant influence on disturbance regime, see drainage network increase WCI.

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Integration of Species and Habitat Conditions	Habitat quality and connectivity among local populations is high. The migratory form is present. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival and growth are consistent with pristine habitat. The local population has the resilience to recover from short-term disturbance within one to two generations (5 to 10 years). The local population is fluctuating around an equilibrium or is growing.	FR D, PJ	<p>Bull trout Bull trout are well distributed in Big Creek and tributaries (data on file PAF SO, McCall, ID).. Habitat connectivity appears to be good within the analysis area; some WCI's are functioning at risk.</p> <p>Chinook/steelhead Habitat connectivity appears to be good within the analysis area; some WCI's are functioning at risk. Long-term adult return and redd count data shows a declining sub population trend (57FR14653, 60FR43937, 63FR31647).</p> <p>Westslope cutthroat trout Westslope cutthroat trout are well distributed in Big Creek and tributaries (data on file PAF SO, McCall, ID). Habitat connectivity appears to be good within the analysis area; some WCI's are functioning at risk.</p>