Appendix D – Habitat Attribute Ratings

Reach Attribute Summaries

The tables below constitute a master list of each stream reach, the habitat attribute rankings, and a brief narrative justification for those rankings. Reach rankings are based on a compilation of current field survey data, data collected from previous survey efforts by USFS, and remote calculations using LiDAR and aerial photo analysis. Ranking criteria for each attribute can be found in Appendix C.

Note: Upper Hollis Creek was not surveyed during this effort due to a recent habitat survey completed by UCD (July 2015) and challenging stream access. Information included here for Hollis Creek is from the 2015 survey, which used a different habitat data protocol and is therefore missing some of the ranked attribute information.

Table 1. Reach Attribute Summaries.

Reach	Riparian condition	Floodplain connectivity	Bank condition / Channel migration	Vertical channel stability	Pools (quantity/ quality)	Large wood and log jams	Mainstem habitat complexity	Off-channel habitat	Fish passage	Fine Sediment
Wind 7a	**Good** Greater than 100' buffer width, mature trees, minimal riparian disturbance. [Field observations and Office data, 2016]	**Good** High connectivity, minimal disturbance (trail), no road density in floodplain. [Field observations and Office data, 2016]	**Good** No hydromodifications or anthropogenic erosion. [Field observations and Office data, 2016]	**Good** No trend of human-caused aggradation or incision. [Field observations and Office data, 2016]	**Good** 8 pools (30/mi), 4 deep, 2 good cover, 6 some cover. [Field observations and Office data, 2016]	**Good** 43 pieces (165 pcs/mi), 10 jams (38.4 jams/mi). [Field observations and Office data, 2016]	**Good** 18 units, (69 units/mi). [Field observations and Office data, 2016]	**Good** Good connection to off-channel habitat. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Good** 2/3 observations <12%, 1/3 >17%, previous survey noted 7% fines. [Field observations and Office data, 2016]
Paradise Creek	**Fair-Good** 3/5 observations >100' buffer; 3/5 observations no riparian disturbance, while 2/5 had roads and campground. Mixed riparian forest stand age classes. [Field observations and Office data, 2016]	**Poor** Only 1/5 observation had good connectivity and only 2/5 lacked anthropogenic disturbances; CMZ is bisected by highway; campground roads in floodplain. [Field observations and Office data, 2016]	**Fair-Poor** Poor hydro-modifications (2/5 observations had roads), but good bank erosion (none). [Field observations and Office data, 2016]	**Fair** 3/5 observations show good stability; 1/5 affected by roadway; channel is migrating at/near natural rates with minimal bank armoring, except along campground. [Field observations and Office data, 2016]	**Fair** 11 pools (22/mi), 5 shallow and 6 deep. 10 had some or good cover. [USFS 1993 survey, Field observations and Office data, 2016]	**Poor** 54 pieces/mi and 14 jams/mi. 1993 USFS survey stated "high recruitment potential." [Field observations and Office data, 2016]	**Good** 35 units/mi. [Field observations and Office data, 2016]	**Fair** No off-channel habitat at 4/5 observations; abundant at 1. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Good** 4/5 observations showed <17%, and mostly <12%. [Field observations and Office data, 2016]
Wind 6d (Mining Reach)	**Fair** Buffer width mostly greater than 100', canopy closure is approx. 60% over the channel, riparian disturbance is minimal, riparian stand age is mostly small trees [Field observations and Office data, 2016]	**Fair** High connectivity and low disturbance in riparian areas, road density is greater than 3 mi/mi² of floodplain [Field observations and Office data, 2016]	**Fair** 66% of the channel had no hydromodifications and no human-caused bank erosion found [Field observations and Office data, 2016]	**Fair** 66% of channel was vertically stable [Field observations and Office data, 2016]	**Fair** 27.7 pools/mi, nearly half of all pools were deep [USFS 2012 survey]	**Fair** 18 med+large pieces/mi, 9.3 log jams/mi found [USFS 2012 survey]. IFI survey observed much more wood and more jams (27 jams/mi), possibly due to a different interpretation of bankfull channel. Most wood is small.	**Good** 57 habitat units/mi) [USFS 2012 survey]	**Good** 55% of channel had good off-channel habitat available [Field observations and Office data, 2016]	**Good** no fish passage barriers [Field observations and Office data, 2016]	**Fair** all ocular measurements recorded >17% fine sediment in channel but no turbidity and less fines in spawning gravels [Field observations and Office data, 2016]

Reach	Riparian condition	Floodplain connectivity	Bank condition / Channel migration	Vertical channel stability	Pools (quantity/ quality)	Large wood and log jams	Mainstem habitat complexity	Off-channel habitat	Fish passage	Fine Sediment
Wind 6c DS of Falls Creek	**Poor** Buffer width is often less than 100' due to road, canopy closure is approx. 50% over the channel, riparian disturbance is frequent due to road, riparian stand age is mixed small and large trees [Field observations and Office data, 2016]	**Fair** Naturally confined but narrow floodplains likely encroached upon by road fill [Field observations and Office data, 2016]	**Poor** Majority of reach affected by road on right bank-hydromodification present throughout, intermittent human-caused bank erosion found [Field observations and Office data, 2016]	**Poor** High energy for bed scour due to road fill encroachment	**Fair** 33 pools/mi and all pools were deep [USFS 2012 survey, data based on entire Reach 6]	**Poor** 4.3 med+large pieces/mi, no log jams found [USFS 2012 survey, data based on entire Reach 6, and 2016 field observations]	**Good** 60 habitat units/mi) [USFS 2012 survey, data based on entire Reach 6]	**Good** Channel is in canyon – minimal off-channel habitat is natural and not expected [Field observations and Office data, 2016]	**Good** no fish passage barriers [Field observations and Office data, 2016]	**Poor** all ocular measurements recorded >17% fine sediment in channel, including spawning areas, which were limited [Field observations and Office data, 2016]
Wind 6a	**Fair** Canopy closure is <20% over the channel, riparian disturbance is minimal but there is a dirt road on river-left, riparian stand age includes med-large trees [Field observations and Office data, 2016]	**Good** Minimal disconnection, minimal floodplain disturbance [Field observations and Office data, 2016]	**Fair** Some bank erosion from human access points, but no significant effects on channel migration [Field observations and Office data, 2016]	**Good** No observable impacts [Field observations, 2016]	**Fair** 17.2 pools/mi, 86% are greater than 3 ft deep [USFS 2012 survey, data based on Reach 5]	**Poor** Virtually no wood in this reach [Field observations and Office data, 2016]	**Good** 30 units/mi [USFS 2012 survey, data based on Reach 5]	**Good** Short reach with not a lot of natural off-channel habitat	**Good** No fish passage barriers	**Fair** 12-17% fines
Dry 2 Big Hollow Upstream	**Fair** Impacted by 64 Road and crossing and young stand age [Field observations and Office data, 2016]	**Poor** 64 Road crossing and fill block upstream and downstream connectivity for significant portion of reach. Incision likely related to crossing [Field observations and Office data, 2016]	**Poor** 64 Road crossing limits channel migration and causes incision-related bank erosion downstream [Field observations and Office data, 2016]	**Poor** Incision related to 64 Road crossing [Field observations and Office data, 2016]	**Fair** 25 pools/mi and 65% of pools were deep [USFS 2015 survey, data based on Reach 2]	**Poor** 13 med+large pieces/mi [USFS 2015 survey, data based on Reach 2], and 7 log jams/mi found [2016 field observations]	**Good** >20 units/mi [2016 field observations]	**Fair** Downstream of 64 Road is fair due to incision-related disconnection [Field observations and Office data, 2016]	**Fair** 64 road crossing and culvert appears to be partial barrier [Field observations, 2016]	**Fair** 12-17% [Field observations, 2016]

Reach	Riparian condition	Floodplain connectivity	Bank condition / Channel migration	Vertical channel stability	Pools (quantity/ quality)	Large wood and log jams	Mainstem habitat complexity	Off-channel habitat	Fish passage	Fine Sediment
Dry 1 Mouth to Big Hollow	**Fair** Canopy closure is approx. 50% over the channel, riparian disturbance is moderate due to road/bridge and spoil bank, riparian stand age includes many large trees [Field observations and Office data, 2016]	**Fair** Minimal disconnection, floodplain disturbance from road/bridge and spoils bank, road density is greater than 3 mi/mi² of floodplain [Field observations and Office data, 2016]	**Fair** Spoil bank is causing hydromodification. Minimal human-caused bank erosion found [Field observations and Office data, 2016]	**Fair** 20% of channel was not vertically stable, 30% of channel was relatively stable, 50% of good [Field observations and Office data, 2016]	**Fair** 25 pools/mi and 65% of pools were deep [USFS 2015 survey, data based on Reach 2]	**Fair** 13 med+large pieces/mi [USFS 2015 survey, data based on Reach 2 only] and 15 log jams/mi [2016 field observations]	**Good** >20 units/mi [2016 field observations]	**Fair** Mostly good or naturally confined, except for limitations at spoil bank [Field observations and Office data, 2016]	**Good** only potential natural bedrock cascade and falls barriers present [Field observations and Office data, 2016]	**Fair** 12-17% fine sediment in channel, though spawning areas appeared to have less fines and a majority of measurements were <12% [Field observations, 2016]
Eightmile Creek	**Good-Fair** Some young stands in riparian area; buffer >100' in all observations, canopy cover 70-90% [Field observations and Office data, 2016]	**Fair** 3/7 observations good connectivity, 3/7 fair, 1/7 none. No floodplain disturbance and no roads in floodplain. [Field observations and Office data, 2016]	**Good** No anthropogenic erosion, no hydromodifications. [Field observations and Office data, 2016]	**Good** No human-induced trend of aggradation or incision. [Field observations and Office data, 2016]	**Fair** 36 pools (55 pools/mi) Few deep pools, most some cover or good cover. Width to depth 9.7. [Field observations and Office data, 2016]	**Fair** 48 pieces (74 pcs/mi), 7 jams (11 jams/mi) [Field observations and Office data, 2016]	**Good** 79 units (122 units/mi) [Field observations and Office data, 2016]	**Fair** 3/7 observations good, 2/7 fair, 2/7 low. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Good-Fair** 1 observation > 17%, 3/7 12-17%, 3/7 <12%. [Field observations and Office data, 2016]
Wind 5d	**Fair** Canopy closure is <20% over the channel, there are a few areas with riparian disturbance (rd, hatchery, levees), wide buffers >100 ft, riparian stand age is mixed age [Field observations and Office data, 2016]	**Poor** Mineral Spgs Rd crossing + approach fills, hatchery facilities, and levees all disconnect floodplain processes	**Poor** Mineral Spgs Rd crossing + approach fills, hatchery facilities, occasional armoring, and levees all disconnect channel migration processes	**Poor** Mineral Spgs Rd crossing + approach fills, armoring, and levees have created a downcut channel that is still responding to impacts	**Poor** 8.6 pools/mi, 66% are greater than 3 ft deep [USFS 2012 survey, data based on Reach 4]	**Poor** 2.9 med+large pieces/mi, [USFS 2012 survey, data from Reach 4]. More wood observed in field surveys in 2016 compared to USFS data, possibly due to a different interpretation of bankfull channel. >10 jams/mi counted [Field observations, 2016]	**Good** 24 units/mi [USFS 2012 survey, data based on Reach 4]	**Poor** Floodplain disconnections, armoring, and associated downcutting has reduced off-channel connectivity compared to what would be expected naturally	**Good** No fish passage barriers	**Poor** 75% of ocular measurements recorded >17% fine sediment in channel, including spawning areas

Reach	Riparian condition	Floodplain connectivity	Bank condition / Channel migration	Vertical channel stability	Pools (quantity/ quality)	Large wood and log jams	Mainstem habitat complexity	Off-channel habitat	Fish passage	Fine Sediment
Wind 5c	**Fair** Road, campground, and hatchery facilities affect buffer width, canopy closure is less than 20%, stand age is mixed but medium age overall [Field observations and Office data, 2016]	**Poor** Road, campground levees, and hatchery fill affect connectivity [Field observations and Office data, 2016]	**Poor** Road, campground armoring, and hatchery armoring restrict CMZ [Field observations and Office data, 2016]	**Fair** Armoring and levees have caused downcutting but channel has stabilized since initial impacts [Field observations and Office data, 2016]	**Poor** 2.25 pools/mi, 100% are greater than 3 ft deep [USFS 2011 survey, data based on Reach 3]	**Poor** 14.3 med+large pieces/mi, [USFS 2011 survey, data from Reach 3].More wood observed in field surveys in 2016 compared to USFS data, possibly due to a different interpretation of bankfull channel. >10 jams/mi counted [Field observations, 2016]	**Fair** 11 units/mi [USFS 2011 survey, data from Reach 3]	**Poor** Road, campground levees, and hatchery fill disconnect off-channel habitat compared to what would be expected under natural conditions	**Good** No fish passage barriers	**Poor** Ocular measurements recorded >17% fine sediment in channel, including spawning areas
Wind 5a	**Fair-Poor** 3/5 observations >100' buffer; low canopy closure (20-40%); greater than 20% riparian area disturbed at 3/5 points. 4/5 observations noted large trees. [Field observations and Office data, 2016]	**Fair** 2/5 = good, 2/5 = low. Some disturbance at 3/5 sites. [Field observations and Office data, 2016]	**Fair** Bridge abutments at 2/5 sites, and old restoration project log jams at 2/5; 2/5 observations had no hydromodifications. [Field observations and Office data, 2016]	**Good** No trend of human-caused aggradation or incision. [Field observations and Office data, 2016]	**Fair** 9 pools (5/mi), 8 deep and 8 some or good cover. [Field observations and Office data, 2016]	**Poor** 63 medium or large pieces (38 LWD/mi). 7 jams (4/mi). [Field observations and Office data, 2016]	**Fair** 19 units (11.3/mi) [Field observations and Office data, 2016]	**Poor** 2/5 observations had none (1 was canyon), 3/5 were low habitat. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Fair** 4/5 were <17%. Good. [Field observations and Office data, 2016]
Hollis Creek*	**Good** Minimal riparian disturbance observed, canopy cover 90% [UCD, 2015]	unknown	**Good-Fair** One location of relic dam has debris and heavily incised channel downstream. No other anthropogenic erosion or hydromodifications. [UCD, 2015]	unknown	**Good** 95 pools/mi. [UCD, 2015]	unknown	**Good** Average = greater than 100 units/mi [Field observations and Office data, 2016]	unknown	**Good** No man-made barriers. Natural barrier exists at 45.8532, -121.931324. [UCD, 2015]	unknown

Reach	Riparian condition	Floodplain connectivity	Bank condition / Channel migration	Vertical channel stability	Pools (quantity/ quality)	Large wood and log jams	Mainstem habitat complexity	Off-channel habitat	Fish passage	Fine Sediment
Trout Creek	**Fair** Some disturbance noted (logging, road crossing), canopy cover 20-40% [Field observations and Office data, 2016]	**Fair** 3/5 observations noted low connectivity, 2/5 noted high or not applicable (canyon). [Field observations and Office data, 2016]	**Good-Fair** No anthropogenic erosion, 1 hydromodification (road bridge) in boulder/canyon area. [Field observations and Office data, 2016]	**Good** Primarily bedrock through this reach. [Field observations and Office data, 2016]	**Fair-Poor** 7 pools (14.9/mile), 4 deep and 3 shallow; all had some cover. [Field observations and Office data, 2016]	**Poor** 9 pieces (19.1 LWD/mile) and no jams. [Field observations and Office data, 2016]	**Good** 22 units (46.8/mile) [Field observations and Office data, 2016]	**Fair** 3/5 observations had some modest off-channel habitat, 2/5 had none (canyon reach). [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Good** 5/5 observations <12%. [Field observations and Office data, 2016]
Martha Creek	**Fair** ¾ of observations noted some riparian disturbance and buffer width of less than 100'. Canopy closure 70-90%. [Field observations and Office data, 2016]	**Good** Good connectivity and low disturbance in riparian areas, road density is less than 1 mi/mi2 of floodplain [Field observations and Office data, 2016]	**Good-Fair** No hydromodifications present; no anthropogenic bank erosion. Some areas of incision. Previous USFS survey recorded 94.9% bank stability. [Field observations and Office data, 2016]	**Fair** Some areas of heavy incision, high cut banks, and bedrock stretches [Field observations and Office data, 2016]	**Fair** Meets pool frequency but lacks deep pools, and pools with good cover [Field observations and Office data, 2016]	**Poor** 18 pcs/mi, 6 jams/mi. Modest potential future recruitment likely. [Field observations and Office data, 2016]	**Good** 35 units (103/mi). [Field observations and Office data, 2016]	**Fair** 2/4 observations noted some available off-channel, 2/4 noted no available off-channel.	**Good.** No barriers. [Field observations and Office data, 2016]	**Good** No observations of >17% fines. [Field observations and Office data, 2016]

Reach	Riparian condition	Floodplain connectivity	Bank condition / Channel migration	Vertical channel stability	Pools (quantity/ quality)	Large wood and log jams	Mainstem habitat complexity	Off-channel habitat	Fish passage	Fine Sediment
Little Wind River 3 (upper)	**Good** Greater than 100' buffer width, no disturbance, >90% canopy cover. [Field observations and Office data, 2016]	**Good-Fair** No roads impinge floodplain; modest to limited incision; 3/6 observations showed limited connectivity, 2/6 good connectivity. [Field observations and Office data, 2016]	**Good** No hydromodifications present; no anthropogenic bank erosion. [Field observations and Office data, 2016]	**Good** No obvious trend of aggradation or incision. [Field observations and Office data, 2016]	**Fair** 42 (33.5/mi), 26 had some cover and 13 good cover. [Field observations and Office data, 2016]	**Poor** 31pcs (24/mi), and 4 jams (3/mi). [Field observations and Office data, 2016]	**Good** 100 units (77.5/mi). [Field observations and Office data, 2016]	**Fair** 3/6 observations = good; 3/6 observations = none. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Fair** 3/6 observations <12%, 1/6 = 12-17%, 2/6 = >17%. [Field observations and Office data, 2016]
Little Wind River 2 (middle)	**Good** Greater than 100' buffer width, no disturbance, 70-90% canopy cover. [Field observations and Office data, 2016]	**Good** Connected, if limited, floodplain ¾ observations, no disturbance, no roads. [Field observations and Office data, 2016]	**Good** No hydromodifications present; no anthropogenic bank erosion. [Field observations and Office data, 2016]	**Good** No obvious trend of aggradation or incision. [Field observations and Office data, 2016]	**Fair-Good** 34 pools (41/mi); 22 are shallow; 0 no cover, 26 some cover, 8 good cover. [Field observations and Office data, 2016]	**Poor** 31 pcs (37.3/mi), and 8 jams (9.6/mi). [Field observations and Office data, 2016]	**Good** 76 units (91.5/mi). [Field observations and Office data, 2016]	**Fair** 2/4 observations had no off-channel habitat (canyon), 1 had low, 1 had good habitat. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Good** 3/4 observations <12%, 1 = >17%. [Field observations and Office data, 2016]

Reach	Riparian condition	Floodplain connectivity	Bank condition / Channel migration	Vertical channel stability	Pools (quantity/ quality)	Large wood and log jams	Mainstem habitat complexity	Off-channel habitat	Fish passage	Fine Sediment
Little Wind River 1 (lower)	**Good** Greater than 100' buffer width. Little to no ongoing disturbance. Some large conifers. 70-90% canopy. [Field observations and Office data, 2016]	**Good-Fair** No roads impinge floodplain; modest to limited incision. [Field observations and Office data, 2016]	**Good** No hydromodifications present [except for remnant dike below sampled area; and that was recently breached]; no anthropogenic bank erosion. [Field observations and Office data, 2016]	**Good** No obvious trend of aggradation or incision. [Field observations and Office data, 2016]	**Fair** 36 pools/mi, but 75% of them are shallow. 31 have some cover, but limited cover, and 5 have no cover. [Field observations and Office data, 2016]	**Poor** 15 pcs (15/mi), and 2 jams. [Field observations and Office data, 2016]	**Good** 74 units (74/mi). [Field observations and Office data, 2016]	**Fair** 4 of 6 observations had some, mostly limited connected habitat. 1/6 low, 1/6 none. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Fair** 3/6 observations = >17%, and 2/6 = 12-17%. [Field observations and Office data, 2016]
Wind 2	**Fair** Minimal riparian disturbance, 0-20% canopy cover, 25-100' buffer. [Field observations and Office data, 2016]	**Poor** Floodplain disturbance (riprap, fill, sheet pile), 1.8 mi/mi² road density. [Field observations and Office data, 2016]	**Poor** Several hydromodifications (riprap, levee structure) and anthropogenic erosion. [Field observations and Office data, 2016]	**Poor** Several hydromodifications (riprap, levee structure) and anthropogenic erosion. [Field observations and Office data, 2016]	**Poor** Reach is essentially one large pool due to backwater from Bonneville. Pool is deep, and has some areas of cover. [Field observations and Office data, 2016]	**Poor** Only 1 piece of large wood noted within the channel, and no jams within the channel. [Field observations and Office data, 2016]	**Poor** 5 units (3.9 units/mi). Reach comprised primarily of one pool, with several riffles and glides. [Field observations and Office data, 2016]	**Poor** Very minimal off-channel habitat available. [Field observations and Office data, 2016]	**Good** No barriers. [Field observations and Office data, 2016]	**Poor** All observations >17% fines. [Field observations and Office data, 2016]