

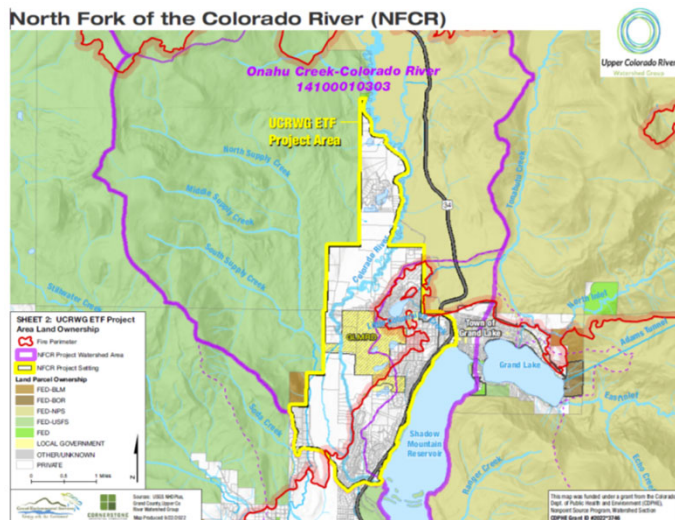
Supporting Document 3-1 Stream Characteristics and Treatment Ramifications for the North Fork Colorado River and Supply Creek in the ETF Project Area

Brief prepared for the Upper Colorado River Watershed Group
Under CDPHE Grant #2000-3746
And Fire on the Mountain, Inc. Grant 2022
December 2022

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Part A Focus on the North Fork Colorado River (NFCR) and Tributaries in the UCRWG ETF Project Area

- The NFCR and tributary Supply Creek are primary contributors of water, sediment, detritus, and various chemical constituents to 303(d) listed Shadow Mountain Reservoir (SMR) and thus primary influences on SMR water quality
- Stream bank, channel stability, and sediment transport are thus important to better understanding ETF impacts upon the streams and SMR and likely restoration treatments

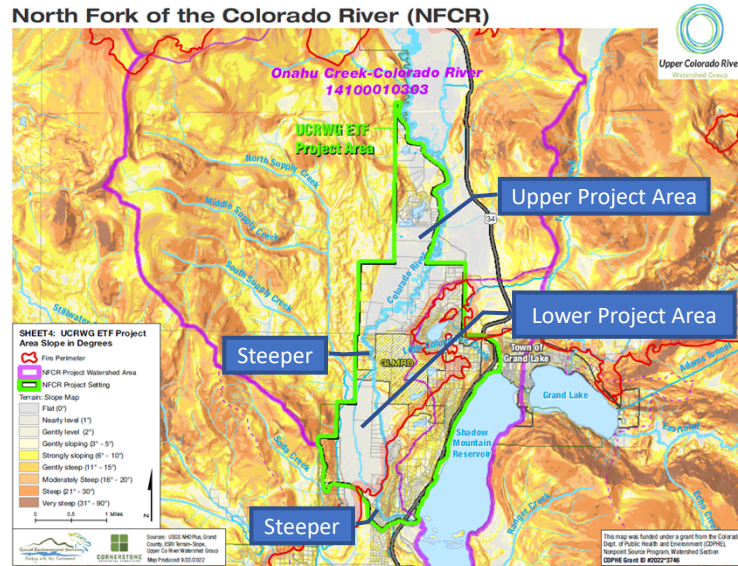


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Valley Gradient In the UCRWG ETF Project Area

- Most of the UCRWG ETF project area is relatively flat and flanked by steeper slopes to the east and west, typical of U-shaped morphology in Rocky Mtn glacial valleys
- The characteristically wide valley floor necks down with two steeper reaches at the Grand Lake Metro Rec District (GLMRD) and below the ETF fire zone just before entering Shadow Mtn Reservoir

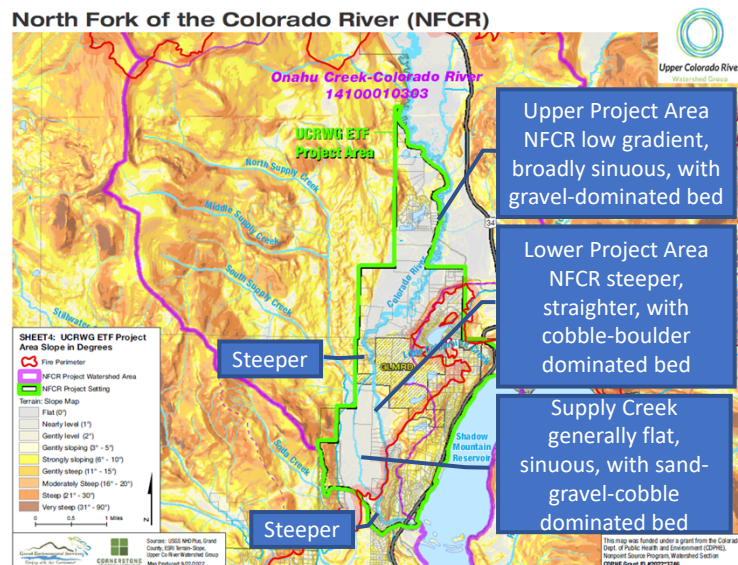


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Plan-View Stream Morphology In the UCRWG ETF Project Area

- The NFCR meanders broadly across the upper project area then steepens and becomes straighter downstream at GLMRD
- NFCR bed materials change from fine-grained above GLMRD to coarse grained below
- Supply Creek is more sinuous with fine-medium grained bed materials width/depth ratio, bank stability, and bed load



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DRAFT Stream Reach Characteristics in the ETF Project Area

	Upper COR Project Reach	Lower COR Project Reach	Lower Supply Creek Project Reach
Gradient	Low	Moderate	Mostly low, some moderate
Sinuosity	Moderate to high	Low to moderate	Moderate to high
Bed materials	Gravel dominated	Boulder + cobble dominated	Cobble + silt dominated ¹
Bank vegetation, stability	Some instability, eroding banks common with perched vegetation	Banks generally well vegetated with recovering willow, alder, and mesic grass-forb	Banks upstream grassy with rare willow, downstream near NFCR generally well vegetated with willow, alder, and hydric grass-forb ¹
Channel morphology	Generally good but entrenched ² + notable cutoff chutes	Entrenched with high Width/Depth ratio, well armored banks but monotonous	Generally good ¹
Beneficial log jams	Significant natural structures capturing sediment, supporting riparian processes	Areas with burned logs in channel but not yet pioneering riparian	NA?

¹Based upon limited observations

²Low and high flows in ~same channel width

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Characteristic Upper Meandering Reach on Kaback Property Near Sun Valley Lake with Abundant Gravel and Coarse Woody Material but Heavily Browsed Willow – note good channel morphology with low floodplain access



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Characteristic Upper Meandering Reach
NFCR at Sun Valley Trailhead, RMNP
Note Logjam collecting sediment creating high value riparian
habitat



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Steeper Gradient at GLMRD, Sediment Starved and
Sparse Coarse Woody Material
Note straight channel with limited floodplain access



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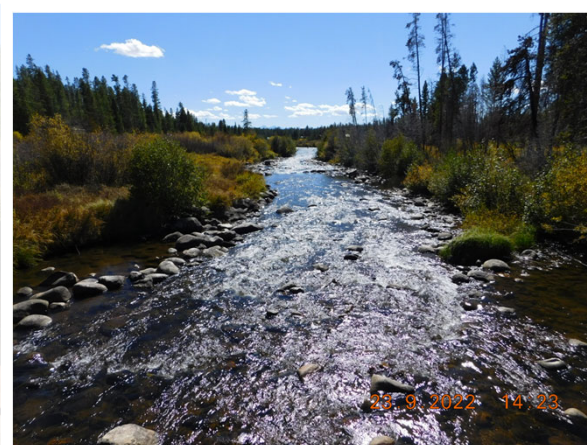
More Moderate Gradient Farther Below GLMRD
 Boulder-Dominated, Straight Channel
 Note heavily armored bed and banks with good willow growth, also logs accumulating along bank



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More Moderate Gradient Above Confluence with
 Supply Creek -- Boulder-dominated, straight
 wide/shallow channel, with limited floodplain access.



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Upper Supply Creek Below USFS
 Low-moderate gradient, good sinuosity but eroding banks
 Sparse willow but plenty of coarse woody material



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Lower Supply Creek Near Confluence with NFCR
 Low-moderate gradient, good sinuosity with lateral
 channels, well-vegetated banks with abundant willow



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DRAFT Generally Applicable Recommendations for Restoration of Natural Areas in the ETF Zone

- a) Protect recovering vegetation – willow, aspen, conifer seedlings, grass/forb
- b) Treat burned wood as a resource, utilizing organic material on site:
 - Logs laid on contour to reduce runoff, capture sediment on slopes and in riparian areas
 - Logs with root wads for structure – retaining walls, stream banks where practicable
 - Logs for habitat projects – leaky check dams, “Zeedyk baffles”, lop and scatter
 - Chip for mulch, sediment control, weed barrier
 - Burn only as last resort ☹️
- c) Treat heavily burned (high SBS) patches with mycorrhizae, seeds, wood chip mulch

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DRAFT Treatment Suitability for Stream Reaches

	Upper COR Project Reach	Lower COR Project Reach	Lower Supply Creek Project Reach
Protect and plant willows, cottonwood (cages and exclosures)	Yes, will stabilize stream banks over time	Not necessary	Not necessary?
Fish-friendly diversions and return-flow treatment wetlands	Yes	Yes	Yes
Zeedyk baffles	Yes to stabilize banks and expand log-jams	Yes to collect sediment, develop riparian processes in channel	Yes
(Beaver friendly) leaky check dams	Yes in tributaries, sloughs and highwater channels, ditch return flows	NA?	Yes in channel and lateral waters
Traditional vegetated boulder-log structures	Yes to raise channel bed and increase hydrogeomorphic processes	Yes to raise channel bed and increase hydrogeomorphic processes	Probably not?

¹Based upon limited observations

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DRAFT Treatment Scheduling for Stream Reaches

	Pilot Projects Summer 2022	More Pilot Projects Fall 2022	2023 and Beyond
Protect and plant willows, cottonwood (cages and exclosures)	Yes, done	Yes 3+ properties scheduled	Yes continue
Fish-friendly diversions and return-flow treatment wetlands	No, will be long process with surveys, designs, and negotiations with ditch owners and multiple agencies	No, will be long process with surveys, designs, and negotiations with ditch owners and multiple agencies	Yes
Zeedyk baffles	Not yet	Yes two possible target areas identified	Yes
(Beaver friendly) leaky check dams	Not yet	Yes two possible target areas identified	Yes
Traditional vegetated boulder-log structures	No, will be long process with surveys, designs, and negotiations with landowners and multiple agencies	No, will be long process with surveys, designs, and negotiations with landowners and multiple agencies	Yes

¹Based upon limited observations

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Thank You, Happy to Answer Questions or Schedule a Field Trip



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