Ridgefield Pits TOG Meeting (Meeting #5)

January 28, 2020

Example Project Goals, Actions & Targets for Group Discussion

Vegetation

Example Goal 1: Restore native vegetation communities, consisting of a patchwork mosaic of age classes and species, that dominate riparian and floodplain areas, with vegetation supported by channel migration processes and high seasonal water table.

Benefits: Shade/cover; large wood recruitment; multi-species habitat; hydraulic roughness.

Example Actions:

- Plant riparian buffer along EFLR mainstem.
  Target species: riparian, including cottonwood galleries, alder, and will dominated shrub communities.
  Target width: 100' buffer.
  Target locations: 4,000 feet of south bank between RM 7.3–8.3 (includes Pits 1–5), other?

- Plant exposed floodplain areas.
  Target species: riparian in recently formed surfaces, native conifer in older floodplain areas.
  Target locations: 1) 3.6-acre area between Manley Cr. beaver ponds and EFLR mainstem (target density > 1500 plants/acre).

- Removal of invasive vegetation, using direct and indirect (i.e. other restoration actions) means.

- Install floodplain roughness structures to promote fine sediment retention and improve riparian plant community establishment.
  Target areas: 1) Mill Cr. confluence with EFLR. 2) others?

Biological

Example Goal 1: Increase available mainstem Chinook and steelhead spawning habitat and juvenile rearing habitat.

Benefits: populations; reestablish historic spawning; habitat diversity/quantity; aquatic food production

Example Actions:

- Increase pool frequency in main and co-dominant channels, with spawning gravels recruited within tail-outs, and intervening riffles supporting prey assemblages for rearing fish.
  Target pool density: Generally 10/mile. 6 in vicinity of Mill Cr. confluence. 7 in proposed high flow channel between Mill/Manley Cr confluence and EFLR.
  Target pool depths: 3–8' (to support adult salmonid holding and juvenile rearing).

- Install large wood jams in channels to promote pool formation, decrease channel energy, increase gravel retention, and provide cover and low velocity areas for fish.
  Target areas and densities: 1) >25 structures at Mill Cr. confluence; 2) > 9 structures in Manley Cr. beaver ponds; 3) TBD elsewhere.

- Create multi-thread channel system through Ridgefield Pits reach resembling an ana-branching planform, with 2-4 co-dominant channels active at low flows and many more channels active at flood flows.

Example Goal 2: Increase floodplain complexity in the form of abandoned oxbows, floodplain wetlands, secondary and side-channel connectivity, and beaver dam complexes.

Benefits: improve juvenile salmonid rearing; increased nutrient exchange; increased habitat for a range of aquatic, terrestrial and avian species.

Example Actions:

- Improve beaver forage habitat.
  Target areas: 1) north of Manley Creek beaver ponds.

- Provide hydraulic connectivity to a variety of side channel features, including perennial flow-through channels; backwater alcoves; hyporheic-fed channels; accessible floodplain wetlands; and wall-based channels fed by groundwater or hillslope seeps, over flows ranging from base to the annual flood event.

- Fill and restore floodplain function to selected Ridgefield Pits whose trajectory for recovery is seen to be delayed based on our revised estimates.

- Create low velocity refuge areas, through installation of large wood jams or other features, at all inundation levels to support juvenile salmon refuge.

Example Goal 3: Increase extent and quality of thermal refuge, without compromising existing thermal refuge areas, and reduce wetted surface area that is subject to solar gain during the summer.

Benefits: improve juvenile salmonid rearing.

Example Actions:

- Create additional thermal refuge areas by establishing head gradients that result in strong hyporheic exchange; for example, highly sinuous meanders that create hyporheic flow paths across point bars that feed into back-bar alcoves.

- Create additional thermal refuge areas by creating or improving access to cold tributary confluences (including Mill/Manley Creek), hillslope seeps, and cool-water side channels.

- Fill Ridgefield Pits whose trajectory for recovery is seen to be delayed based on our revised estimates, to eliminate exchange of overly warm water between Pits and mainstem EFLR during the summer.

Example Goal 4: Decrease predation on juvenile salmonids.

Example Actions:

- Fill Ridgefield Pits whose trajectory for recovery is seen to be delayed based on our revised estimates, to eliminate rearing areas for warm-water predators.
- Install large wood jams in channels and other floodplain hydrologic features to provide juvenile salmonid cover.

Channel Forming and Related Sediment Processes

Example Goal 1: High channel planform, profile, and cross section complexity.

Benefits: supports habitat diversity, hydraulic diversity, sediment sorting and storage, and channel stability.

Example Actions:

- Create multi-thread channel system through Ridgefield Pits reach resembling an ana-branching planform, with 2-4 co-dominant channels active at low flows and many more channels active at flood flows.
  Target sinuousity: >1.4 but highly variable with a range of meander development from recent avulsions to highly tortuous meander bends
  Target channel w/d ratios: approximately 6–12, with high variability. Goal is to reduce wetted surface area that is subject to solar gain during the summer.

- Create highly sinuous meandering channel through Daybreak Reach, with abundant side-channels and abandoned oxbows/floodplain wetlands.
  Target sinuousity: >1.4 but highly variable with a range of meander development from recent avulsions to highly tortuous meander bends.
  Target channel w/d ratios: approximately 6–12, with high variability. Goal is to reduce wetted surface area that is subject to solar gain during the summer.

- Install large wood in channels to promote channel forming processes, channel complexity, pool formation, decrease channel energy, increase gravel retention, and provide cover and low velocity areas for fish.
  Target wood placement: at least 80 pieces/mi (>24" diam., >50 ft. length), and possibly higher in large jams. Most of the wood to be placed in large jams with intermediate stability (i.e. no significant. mobilization or re-organization up to at least the 10-year recurrence flood magnitude). Jams can induce sediment aggradation, initiate split flow conditions, divert flows into side channels, and recruit additional wood over time.
  Target placement techniques: ballasting via partial burial, bracing against existing trees or vertically buried members, backfilling with coarse substrate or more wood. Mechanical anchors to be used sparingly, or at the extent possible given existing constraints, not at all.

Example Goal 2: Sediment composition of stream beds to be composed of a mix of sediment sizes, with channel bed dominated by gravels and cobbles and floodplains topped with fines. Increase substrate patchiness.

Benefits: improved rearing and spawning opportunities for salmon.

Example Actions:

- Install large wood jams in channels to promote channel forming processes, channel complexity, pool formation, decrease channel energy, increase gravel retention, and provide cover and low velocity areas for fish.

Example Goal 3: Ridgefield Pits and Daybreak Reaches to remain depositional zones, to promote sediment capture and re-building of grade lost to gravel pit avulsion, and eventual restoration of sediment transport processes to downstream reaches that have been deprived of sediment since the 1996 channel avulsion into Ridgefield Pits.

Benefits: restore sediment transport processes to project reaches and downstream reaches.

Example Actions:

- Re-grade channel and floodplain areas to promote channel stability, and restoration of sediment transport processes.

Floodplain connectivity (lateral and vertical)

Example Goal 1: Increase lateral floodplain connectivity.

Benefits: supports habitat diversity, hydraulic diversity, floodplain sediment processes, sediment sorting and storage, and flood energy dissipation.

Example Actions:

- Increase overbank flows and floodplain inundation to occur annually. Currently, most of the Ridgefield Pits Reach floodplain and half of the Daybreak Reach floodplain become inundated at the 5-year event. Reduce bank heights and channel inverts, and remove levee features, to allow this extent of flooding to occur at the 1 or 2-year event.

Example Goal 2: Increase channel migration zone to the maximum extent possible within the historical extent, given existing constraints.

Benefits: reduce avulsion risk, increase habitat diversity and extent, hydraulic diversity, floodplain sediment processes, sediment sorting and storage, channel stability, and flood energy dissipation.

Example Actions:

- Reduce/remove levees and other raised features.
  Target locations: 1) west side of Ridgefield Pit #3,4,5.

- Create highly sinuous meandering channel through Daybreak Reach, with abundant side-channels and abandoned oxbows/floodplain wetlands.
  Target sinuousity: >1.4 but highly variable with a range of meander development from recent avulsions to highly tortuous meander bends.
  Target channel w/d ratios: approximately 6–12, with high variability.

Example Goal 3: Increase vertical floodplain connectivity (decrease depth to alluvial aquifer).

Benefits: increase thermal refuge opportunities for summer rearing juvenile salmon by increasing groundwater/surface water exchange.

Example Actions:

Human

Example Goal 1: Decrease, or at minimum avoid increase of, potential channel avulsion into Daybreak Pits.

Example Goal 2: Consider river recreation in all project design concepts.

Example Goal 3: Maintain access to, and do not undermine structural integrity of, BPA powerline towers (consult BPA to refine this criterion).

Example Goal 4: Reduce, or at minimum do not increase, flood or erosion risk to public and private infrastructure, including County maintenance yard, Daybreak Pits access road and aggregate loading/processing area, airstrip, and private residences.

Example Actions:

- Install at least 1 structure at toe of left bank downstream of Mill Creek confluence to reduce erosion at toe of loamy cliff.
- Consider similar actions along other highly erosional banks in proximity to infrastructure