2019 Habitat Indicators, Methods, and Guidance Matrix

PROJECT SIZE AND LOCATION

Broad Geographic Area	Identify broad geographic area: NF, MF, SF, Mainstem, Estuary, Nearshore
Reach/Zone	Identify reach or zone within broad geographic area
Treatment length	Measure thalweg or shoreline length in GIS
Treatment area	Measure treated area in GIS

Note: Sponsors should quantify relevant habitat indicators under existing condition and future restored condition. See Guidance Matrix for key indicators by project type and geographic area.

CATEGORY	HABITAT INDICATORS	METHOD
	Number of pools	Overlay structure locations with wetted low-flow channel (from relevant aerial photo or field mapping; including primary and secondary channels within the active channel).
	Number of deep (>1m residual depth) primary pools formed	Overlay structure locations with primary wetted low-flow channel (see above). Primary pools expected to form where structures engage the thalweg of the primary wetted channel; pools in secondary channels not counted as primary.
	Area of wood engaged at low flow	Overlay structure footprints with primary wetted low-flow channel (see above) to calculate area engaged.
	Number of cold-water refuges (pools formed in cool-water areas - e.g. groundwater discharge, tributary confluences)	Overlay Structure locations with documented seeps, cool water tributaries <2°C cooler (FLIR or field data) in a reach with temperature as a limiting factor
	Total number of log jams/structures installed	Number of log jams proposed
	Total number of stable log jams	Number of log jams proposed that are engineered to be stable in 100-year flood
	Wetted length of side channels available during spawning flows	Wetted length of floodplain channels expected to be available at spawning flows (based on interpreted channel response). Spawning = available during low flow (perennially connected) and focus on side channels (i.e. separated from main channel by well-vegetated island). Reference proposed condition hydraulic model depth if available.
	Wetted length of side channels available during rearing flows	Wetted length of floodplain channels expected to be available at rearing flows (based on interpreted channel response). Rearing may also include other floodplain channels; benefit may be presented at low to 2- year flow. Reference proposed condition hydraulic model depth if available.
	Area of floodplain reconnected at 2-year flow	Area of 100-year floodplain reconnected at 2-year flow based on hydraulic modeling results.
	Area of floodplain reconnected at 100-year flow	Area of 100-year floodplain reconnected at 100-year flow based on hydraulic modeling results.
	Chinook spawning area	Area with substrate suitably-sized for chinook spawning
Fish Passage	Length of chinook habitat connected	Length of suitable habitat upstream of barrier.
	Number of barriers removed	Count of partial or complete barriers; note extent of passability in documentation if available.
Restoration of Vegetation/ Wetlands	Forks/Mainstem: Area in and within 300 feet of Historic Migration Zone vegetated and on trajectory to PFC[a]	Overlay planted/revegetated area with Collins & Sheikh historic migration zone (1859+) plus 300 feet buffer on either side (include forested island area)
	Tributaries: Area in and within the site potential buffer that is vegetated and on trajectory to PFC[a]	Overlay planted/revegetated area with site potential buffer (include forested island area)
	Estuary/nearshore: Area of shoreline revegetated with appropriate vegetation	
	Area of wetlands restored by type	

Sediment	Length of forest road treated	
	Area of sediment point sources, such as stream-adjacent landslides, stabilized	
	Area of shoreline armoring/artificial fill removed	
Removal of hydromod	Edge habitat length by type	Edge types: bar, bank, hydromodified at low and high flows (question for sponsors will be how it is defined or will be defined) bank flow width, length of channel at low flow length of channel at mid flow and produce the ratio per unit length per river mile.
	Length of channels and/or area of waterbody reconnected by type	freshwater: floodplain, tributaries, wetlands; tidal: distributaries, other tidal channels, embayments, pocket estuaries
	Length of shoreline armor removed or set-back	
	Area of floodplain/ erosion hazard area/estuarine area reconnected by hydromodification setback/removal	
Acquisition	Barriers to restoration that will be addressed	
	Out of the area protected, how much of the HMZ+300' is protected?	
	Area of the shoreline and relevant habitat process protected	
	How much the area is already protected? How much is threatened? How much of the land area has mature trees?	
Design	Potential barriers to implementation in the design reach.	
	How will design get you to the next stage for reach restoration (i.e., anticipated benefits)?	
	Current and potential habitat conditions characterized (need for restoration/ enhancement demonstrated)	

[a] PFC = Properly functioning conditions

2019 Habitat Indicators, Methods, and Guidance Matrix

CATEGORY	HABITAT INDICATORS	GEOGRAPHIC AREA										
		Bellingham Bay	Other Nearshore	Estuary (RM 0- RM 6.6)	Lower Mainstem RM 6.6-23.8	Mainstem (RM 23.8- SF Conf)	Lower NF (SF Conf-Glacier)	Upper NF (Glacier to Falls)	Lower MF (RM 0-MLR)	Upper MF[5] (MLR-RM 18.5)	Lower SF (RM0-14.5)	Upper SF (RM14.5-RM31)
Instream Habitat - Large Wood Restoration	Length of stream treated				X	X	X	X	X	X	X	X
	Number of pools						X	X	X	X	X	X
	Number of deep (>1m residual depth) primary pools formed						X	X	X	X	X	X
	Area of wood engaged at low flow						X	X	X	X	X	X
	Number of cold-water refuges (pools formed in cool-water areas - e.g. groundwater discharge, tributary confluences)										X	X
	Total number of log jams/structures installed						X	X	X	X	X	X
	Total number of stable log jams						X	X	X	X	X	X
	Wetted length of side channels available during spawning flows					X	X	X	X			
	Wetted length of side channels available during rearing flows					X	X	X	X			
	Area of floodplain reconnected at 2-year flow				X	X	X	X	X	X	X	X
	Area of floodplain reconnected at 100-year flow				X	X	X	X	X	X	X	X
	Chinook spawning area									X[1]		X[1]
Fish Passage	Length of chinook habitat connected	X	X	X	X	X	X	X	X	X	X	X
	Number of barriers removed	X	X	X	X	X	X	X	X	X	X	X
Restoration of Vegetation	Forks/Mainstem: Area in and within 300 feet of Historic Migration Zone vegetated and on trajectory to PFC[a]			X	X	X	X	X	X	X	X	X
	Tributaries: Area in and within the site potential buffer that is vegetated and on trajectory to PFC[a]			X	X	X	X	X	X	X	X	X
	Estuary/nearshore: Area of shoreline revegetated with appropriate vegetation	X	X	X								
	Area of wetlands restored by type			X								
Sediment	Length of forest road treated[4]										X	X
	Area of sediment supply reconnected	X	X	X								
	Area of sediment point sources, such as stream-adjacent landslides, stabilized[4]										X	X
	Area of shoreline armoring/artificial fill removed	X	X									
Nearshore/Estuary Habitat	Area of nearshore or estuary habitat created, restored, or enhanced	X	X	X								
Removal of hydromod	Edge habitat length by type			X	X	X	X	X	X	X	X	X
	Length of channels and/or area of waterbody reconnected by type			X	X	X						
	Length of shoreline armor removed or set-back[3]	X	X	X								
	Area of floodplain/ erosion hazard area/estuarine area reconnected or re-established by hydromodification setback/removal[2]	X		X	X	X	X	X	X	X	X	X

2019 Habitat Indicators, Methods, and Guidance Matrix

Acquisition	Barriers to restoration that will be addressed	X	X	X	X	X	X	X	X	X	X	X
	Out of the area protected, how much of the HMZ+300' is protected?			X	X	X	X	X	X	X	X	X
	Area of the shoreline and relevant habitat process protected	X	X									
	How much the area is already protected? How much is threatened? How much of the land area has mature trees?	X	X	X	X	X	X	X	X	X	X	X
Design	Potential barriers to implementation in the design reach.	X	X	X	X	X	X	X	X	X	X	X
	How will design get you to the next stage for reach restoration (i.e., anticipated benefits)?	X	X	X	X	X	X	X	X	X	X	X
	Current and potential habitat conditions characterized (need for protection/ restoration/ enhancement demonstrated)	X	X	X	X	X	X	X	X	X	X	X

[1] Spawning habitat limitations assumed in the SF upstream of Camp 18 and in the upper MF

[2] Includes the common indicator CI_M01 "functional estuary surface area"

3 This is framed in terms of edge types in the freshwater- not sure if ther eis something equivalent for the nearshore

[4] Fine sediment is considered limiting in the South Fork Watershed

[5] Are we ready to start working in the upper MF?