






Klamath IFRMP – CPIs and Proxies to be Used in Prioritization as Selected by Survey / Webinar Participants (current March 10, 2020)

Goal	CPIs (N = 33) What we wish we had for tracking status & outcomes (tracked for future phases)	CPI Proxies* (N = 18 unique) What we currently have in hand for use in prioritization (current phase)
 <p>Fish Populations (by species) 1. Achieve naturally self-sustaining native fish populations.</p>	<p>SITE SCALE - Presence / absence (across all focal species, acts as a measure of fish diversity, also captured in Prioritization Criterion 1 – Range Overlap)</p> <p>SITE SCALE - Presence of spawning</p> <p>SITE SCALE - Presence of rearing</p> <p>SUBWATERSHED SCALE – Juveniles per adult</p> <p>SUBBASIN SCALE - % Sub-watersheds of historical habitat occupied</p> <p>SUBBASIN SCALE - Age structure / demographics</p> <p>SUBBASIN SCALE - Genetic diversity</p> <p>SUBBASIN SCALE - Life History Diversity</p> <p>KLAMATH BASIN SCALE - % or # Sub-basins achieving their population targets (occupancy, abundance, extinction risk, etc.) for species that have specific targets</p>	<p>Collected Range Maps - Current Range as Proportion of Historical Range by Sub-Watersheds [Proxy for % Historical Habitat Occupied]</p> <p><i>[This proxy will be developed after receiving feedback from participants to improve the accuracy of current species range maps]</i></p>
 <p>Biological Interactions (BI) 3. Reduce biotic interactions that could have negative effects on native fish pops.</p>	<p>SITE SCALE - Non-native aquatic species presence, abundance</p> <p>SUBWATERSHED SCALE - Prevalence of infection</p> <p>SUBWATERSHED SCALE - Prevalence of mortality</p> <p>SUBWATERSHED SCALE - % Sub-watersheds with high levels of impact by non-native species</p> <p>SUBBASIN SCALE - % Sub-watersheds with high prevalence of infection, mortality</p> <p>KLAMATH BASIN SCALE - % or # Sub-watersheds with high levels of non-native species.</p>	<p># Aquatic invasive species per subwatershed [Proxy for # Non-native species present]</p>

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 <p>Habitat (H) 4. Improve freshwater habitat access and suitability for fish and the quality and quantity of habitat used by all freshwater life stages</p>	<p>SITE SCALE - Core Water Quality Metrics (e.g., Temperature, Dissolved Oxygen, pH, Total Phosphorous, Total Nitrogen, Nuisance Phytoplankton (density, chlorophyll-a, cyanotoxins))</p> <p>SUBWATERSHED SCALE - Stream Condition Index</p> <p>SUBWATERSHED SCALE - Habitat Suitability Rating <i>[rolled up across focal species]</i></p> <p>SUBWATERSHED SCALE - % historical habitat accessible <i>[rolled up across focal species, and can be rolled up to higher spatial scales]</i></p> <p>SUBWATERSHED SCALE - % suitable habitat occupied (e.g., high intrinsic potential) <i>[rolled up across focal species, and can be rolled up to higher spatial scales]</i></p> <p>SUBBASIN SCALE - Extent of thermal refugia habitat</p>	<p>NorWeST Stream Temperatures – Mean August Stream Temperatures 2040s Climate Projection Scenario (new proxy for thermal refugia proposed by participants as a better metric than # springs and seeps)</p> <p>EPA - % Potentially Restorable Wetlands [Proxy for Habitat Suitability / Potential]</p> <p>EPA - Density Road-Stream Crossing in WS [Proxy for % Historical Habitat Accessible]</p> <p>Trout Unlimited - % of stream miles accessible to anadromous fish (within historical range) [Proxy for % Historical Habitat Accessible – Anadromous Fish]</p> <p>Trout Unlimited - Ratio of current maximum stream network connectivity (mi) to historical (inland) [Proxy for % Historical Habitat Accessible – Resident Fish]</p>
 <p>Fluvial Geomorphic Processes (FG) 5. Create and maintain spatially connected and diverse channel and floodplain morphologies</p>	<p>SITE SCALE - Large wood recruitment and retention (as a contributor to embeddedness)</p> <p>SUBWATERSHED SCALE - Geomorphic flushing flows (extent, frequency, and duration)</p> <p>SUBWATERSHED SCALE – Floodplain connectivity (area, volume, stage)</p> <p>SUBWATERSHED SCALE - Index of channel complexity</p> <p>SUBBASIN SCALE – Extent, frequency, and duration of inundation at identified key flow thresholds (including floodplain, wetlands, off-channel habitat)</p> <p>SUBBASIN SCALE – Annual measures of change in topography and bathymetry <i>[new indicator proposed by participants]</i></p>	<p>EPA - % Developed, High Intensity in HCZ (Hydrologically Connected Zone) [Proxy for Floodplain Connectivity (area)]</p> <p>EPA - % Developed, High Intensity in RZ (riparian zone) [Proxy for Large wood recruitment]</p> <p>EPA - Density all roads in RZ (riparian zone) [Proxy for % Riparian Area Disturbed] [includes coverage of rural and forest roads]</p> <p>Scott et al. 2019 - Net river-floodplain exchange in <u>unconfined channels</u> [median $\log_{10}(\text{m}^3)/\text{year}$] [Proxy for Floodplain Connectivity (volume)][†]</p> <ul style="list-style-type: none"> McManamay and DeRolph 2019 - Valley Confinement [Proxy for Floodplain Connectivity (area)] Scott et al. 2019 - Net river-floodplain exchange [median $\log_{10}(\text{m}^3)/\text{year}$] [Proxy for Floodplain Connectivity (volume)] <p><i>[† This proxy was derived using the two proxies below it, where we are considering floodplain exchange only for those reaches</i></p>

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		<i>that have large natural floodplains as opposed to those reaches that are naturally confined channels where this indicator would be inappropriate]</i>
 <p><u>Watershed Inputs (WI)</u> 6. Improve water quality, quantity, and ecological flow regimes</p>	<p>SUBWATERSHED SCALE - Monthly flows as % of measured or modelled historical natural flows</p> <p>SUBWATERSHED SCALE – Annual loads of nutrients</p> <p>SUBWATERSHED SCALE - Annual loads of sand or larger grain sizes (magnitude and variability)</p> <p>SUBWATERSHED SCALE – Annual loads of fine sediment</p> <p>SUBBASIN SCALE - % of sub-watersheds with desirable flow and sediment conditions</p>	<p>Trout Unlimited - Water Quantity Sub-Index [Proxy for Monthly Flows as % of Measured or Modelled Natural Flows]</p> <p>Trout Unlimited - Flow volume change risk II (base flow) [Proxy for Monthly Flows as % of Measured or Modelled Natural Flows]</p> <p>Trout Unlimited - # Diversions per stream mile [Proxy for magnitude of tailwater returns and thus Nutrient Loads]</p> <p>EPA - % Agriculture in Watershed [Proxy for Nutrient Loads]</p> <p>EPA - PHWA Wildfire Vuln. Sub-index [Proxy for Annual Fine Sediment Loads]</p> <p>EPA - Density all roads in Watershed [Proxy for Annual Fine Sediment Loads] [includes coverage of rural and forest roads]</p> <p>EPA - Count All Mining in Watershed [Proxy for Availability of Coarse Sediment Inputs <i>[not yet included – pending receipt of key data from California Department of Natural Resources]</i></p>

* Proxies were included if they were judged by participants to be relevant in most areas of the Kamath Basin, and will be overridden as needed in those areas for which they are less accurate or less relevant.