

# Klamath Basin Integrated Fisheries Restoration and Monitoring Plan (IFRMP)

## Phase 3 - Prioritization Criteria Quick-Reference Guide

### 1 Multi-Criteria Scoring Approach

After careful consideration of alternatives, we adopted a **multi-criteria scoring approach** to prioritization that has undergone multiple rounds of peer-review by Sub-basin Working Group (SBWG) participants. The multi-criterion prioritization framework developed for Phase 3 of the IFRMP is based on **six key questions** to ask about any restoration project under consideration, which are linked to corresponding criteria as outlined in **Table 1**. These criteria are explained further below. Note: The following explainer is a more streamlined version of what is in Section 3 of the IFRMP.

**Table 1: Summary of key prioritization questions and corresponding criteria used to score and rank proposed restoration projects to determine priority sequencing based on available information.**

Key Prioritization Question	Corresponding Criterion	Source of Information
1. Are focal fish present in the place a project is being proposed?	<b>Criterion 1 - Range Overlap:</b> Overlap of relevant focal species distributions with the location(s) of the proposed restoration project	Data-driven (with expert validation of data) 
2. How impaired is the watershed in the place a project is being proposed (how much is restoration needed)?	<b>Criterion 2 - CPI Status:</b> The magnitude of impaired ecosystem processes and fish habitats, used as an indicator of restoration need.	Data-driven (with expert validation of data) 
3. How many stressors is this project going to address?	<b>Criterion 3 - Stressors Addressed:</b> The total number of stressors addressed by the restoration action (in relation to biophysical tiers & species)	Data-driven (with expert validation of data) 
4. How far and wide will project benefits be felt?	<b>Criterion 4 - Scale:</b> Perceived scale of restoration project benefit for relevant focal species, from local to basin-wide benefit.	Expert elicitation (through a survey) 
5. Is it feasible to implement this project in this place?	<b>Criterion 5 - Implementability:</b> Reflecting how easy it would be to implement the project based on current expert-based understanding of cost, permitting, political, logistical, or other similar considerations.	Expert elicitation (through a survey) 
6. How much do we care about the answers to each question?	<b>Criterion Weights (W):</b> Are set collectively by each Sub-Basin Working Group and are applied to each criterion above to determine their relative importance, which may vary by sub-basin or scenario.	Expert elicitation (through facilitated discussion) 

#### Overall Prioritization Formula

$$\begin{aligned}
 \text{Prioritization Scores} = & (W_1 * \text{Range Overlap}) \\
 & + (W_2 * \text{CPI Status}) \\
 & + (W_3 * \text{Stressors Addressed}) \\
 & + (W_4 * \text{Scale}) \\
 & + (W_5 * \text{Implementability})
 \end{aligned}$$

## How should we interpret the results of prioritization?

- Prioritization scores and ranks reflect the suggested sequencing of projects to meet the overarching goal of the IFRMP, which is to obtain the greatest benefits across the widest range of focal species and stressors across a given sub-basin.
- The results do NOT do not reflect the overall importance or validity of a proposed project, and a lower prioritization score does not mean a project shouldn't be implemented.
- These scores and ranks will also be different for different prioritization objectives, such as single-species management or importance to other organizations and initiatives.

## How will these prioritization results be used to inform restoration decisions?

- The prioritization scores and rankings that emerge from this process should be thought of as **an initial result intended to encourage informed and systematic discussions** of the benefits, opportunities, and risks of different strategies to improve fish habitat and stream function rather than a rigid list defining exactly what restoration must occur.
- It is likely that **the original sequencing may need to be adjusted by reviewers to reflect dependencies between projects or other contextual factors** not easily captured in a criteria-driven prioritization tool.
- Final decisions about which projects to implement must be informed by professional judgment, taking into account prioritization outcomes as well as additional information including landowner interests, opportunities created by special funding or scheduled maintenance, and restoration emphasis in a particular watershed by multiple agencies or stakeholders.
- In addition, any prioritization method should be **iteratively applied every few years** as state of the system and social landscape changes over time. The priorities identified during IFRMP work in 2020 may not remain accurate in 2024 and beyond.
- *It should be noted that projects and sequencing identified in the IFRMP restoration planning process are not binding on federal agencies and do not commit federal funding, or future federal funding, to specific restoration projects.*

## 1.1 Criterion 1: How Is Range Overlap Assessed?

### What Is This Criterion?

The **Range Overlap** prioritization criterion is intended to evaluate how much a proposed restoration project in a specific location overlaps with important habitat for focal fish species. This is assessed by using the best available information on the historical habitat, current habitat, federally-designated critical habitat, and special emphasis areas as defined by working groups. These data are available for each of the ten focal species of the IFRMP and have been mapped to every sub-watershed (HUC12) in the Klamath Basin.

### What Data Inform This Criterion?

Key datasets used to compile species range information include [ODFW Fish Habitat Distribution Data](#), [USFWS Critical Habitat Designation data](#), [UC Davis PISCES Fish Range and Occurrence Data](#), the [Pacific Lamprey Assessment And Template For Conservation Measures In California](#) (USFWS 2012b) and the [Species Status Assessment for the Endangered Lost River and Shortnose Sucker](#) (USFWS 2019c). Each of these data sources were reviewed by local species experts and

suggested changes to these range maps were made accordingly. The raw data used to set the range overlap criterion are summarized in a series of **species range maps** in the sub-basin chapters within Section 4 of the IFRMP and are also viewable within the IFRMP Restoration Prioritization Tool.

### ***How is the Information Used in Prioritization?***

Within the prioritization equation, **a restoration project located in one or more HUC12 sub-watersheds receives one Range Overlap point for meeting each of the conditions below for each focal species:**

- Overlaps with area of **historical distribution**
- Overlaps with area of **current distribution**
- Overlaps with **Federally-designated critical habitat**
- Overlaps with areas identified by participants as **special emphasis areas (e.g., “anchor habitat”)**, that is, areas that are considered poised to make a particularly important production contribution for an IFRMP focal species and warrant special consideration when prioritizing restoration sites. This could include places with life-history connectivity adjacent to higher functioning habitats that offer promise in restoring strongholds.

For each HUC12 assigned to a restoration project, the range overlap scores for each of the 10 species and their run types (Eulachon, Coho, Spring Chinook, Fall Chinook, Summer Steelhead, Winter Steelhead, Sockeye, Pacific Lamprey, Green Sturgeon, Lost River Sucker, Shortnose Sucker, Bull Trout, Redband Trout) are determined per the categories above and then summed together. These independent focal species scores per restoration project are normalized on a standard 0 to 10 point scoring scale based on the raw point scores generated for all candidate restoration projects that are in the study frame. **The candidate restoration project with the highest score receives the maximum point allowance of 10 for this criterion. The other candidate restoration projects in frame are scaled accordingly.** Finally, the normalized range overlap score can be modified by a weighting factor (W1; 0-1 scale) that lets participants specify how much importance to place on the species range overlap criterion *itself* in the overall prioritization score.



**Prioritization Scores** =  $(W_1 * \text{Range Overlap}) + (W_2 * \text{CPI Status}) + (W_3 * \text{Stressors Addressed}) + (W_4 * \text{Scale}) + (W_5 * \text{Implementability})$

**Important Note:** As with all criteria, the raw Range Overlap scores determined from the point assignments below are normalized to a common 0 to 10 point scale.

**EXAMPLE**

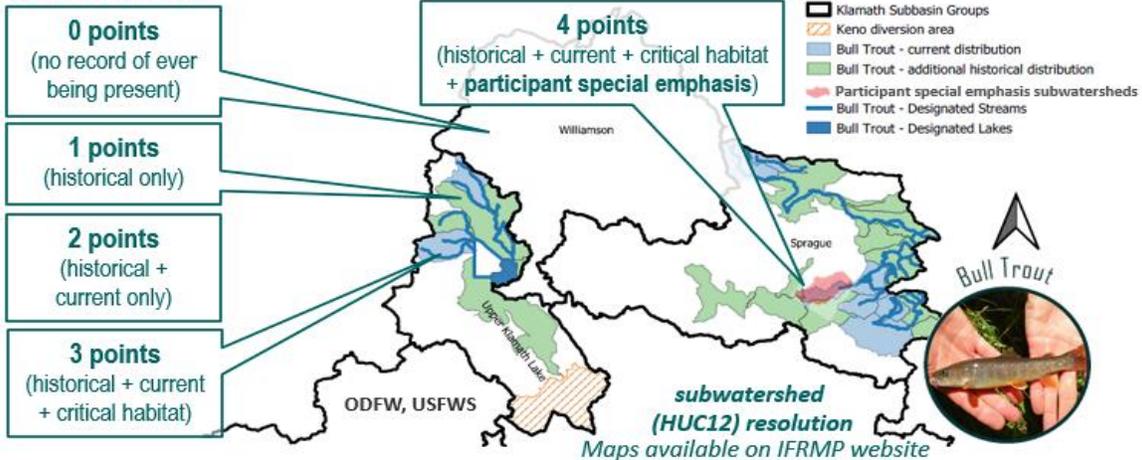


Figure 1: A visual summary of how the Range Overlap criterion score is determined.

**1.2 Criterion 2: How Is Habitat Restoration Need Assessed?**

**What Is This Criterion?**

In the IFRMP, **Core Performance Indicators (CPIs)** are indicators of fish habitat status that participants have identified for use in future monitoring of status and trends in the Klamath Basin. Within the IFRMP multi-criteria scoring prioritization framework, CPI scores or CPI proxy scores are intended to act as a measure the overall level of existing habitat impairment or “habitat restoration need” in areas of current or potential fish habitat. Several CPIs have been suggested to date that correspond to one of the functional watershed tiers and also to one of four spatial scales. This list has been iteratively refined through participant feedback through a CPI Survey and CPI Webinar (more details available through the Klamath [website](#)). To ensure consistency across all candidate restoration projects, the CPIs that inform this criterion **must be available throughout the entire basin**.

**What Data Inform This Criterion?**

Without a basin-wide monitoring framework already in place, data on all of the proposed CPIs will not be readily available for all parts of the basin over which prioritization must take place, which will make it harder to fairly compare projects against one another in the prioritization scheme.

To help correct this issue, we have also worked with participants to identify a suitable range of landscape-scale **CPI proxy indicators** for each of the selected CPIs which are associated with publicly available data at the subwatershed (HUC12) hydrologic scale throughout the Klamath Basin. Decisions about which proxies to include in the final list considered participant reflections on proxy data quality, appropriateness for prioritization (as opposed to simply monitoring), and level of agreement about the proxy. These proxies or analogs were used to automatically populate “default scores” for CPI status in the interactive prioritization tool to help approximate “habitat restoration need” when data on the specific site-scale CPIs is not readily available. There is a



long history of using landscape-scale metrics for spatial prioritization of watershed restoration projects (e.g., Thom et al. 2011 for the Columbia River Basin and Fesenmeyer et al. 2013 across the state of California), and it helps to provide an even playing field for comparing project locations in relation to habitat impairment across the entire basin.

The final set of CPIs and CPI proxies selected by participants for use in first-pass prioritization is summarized in Table 2. *It should be noted that only CPI proxy data was used for this first round of prioritization as data for preferred CPIs themselves was not consistently available across all CPIs, species, and areas of the Klamath Basin.* Although participants were given multiple opportunities for manually overriding this default proxy CPI data before, during, and after sub-basin webinars, participants chose not to do so in this phase of work. Instead, more concerted efforts to identify existing CPI datasets and discuss the best ways to integrate them into the tool will continue in Phase 4 of work.

### **How is the Information Used in Prioritization?**

CPI proxy data for each indicator exists for each of the HUC12 sub-watersheds in the Klamath Basin, and are normalized from their original units of measure to a common scale of 0 to 10 to facilitate comparison.

These normalized **individual HUC12 CPI scores must be aggregated** together to arrive at a single score for any proposed restoration project, which could include multiple HUC12 sub-watersheds. In the prioritization equation, the scores for each CPI proxy are aggregated first across HUC12 sub-watersheds where the project takes place (Step 1) as summarized in Figure 2. When CPI scores for each functional tier are aggregated to a single tier scores (Step 2), **tier weights can be applied** to specify the importance of impairment in each watershed tier (Step 3). For example, CPI scores for fluvial geomorphic process impairment may be given a higher weight than CPIs in other tiers to reflect the current local restoration strategy. The tier scores and weights are used to generate a single weighted average score (Step 4) to arrive at one final score reflecting overall habitat impairment in the project location.

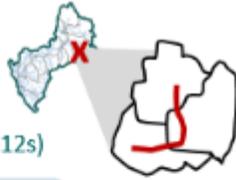
In addition, **users can use a toggle function in the prioritization tool to choose between prioritizing Low, Moderate, or High Impairment** areas depending on the local context and restoration objectives. In some cases, it may be more desirable to prioritize moderately impairment habitat instead of high impairment habitat, which may be too severely degraded to achieve effective restoration outcomes. The current default in the tool is to prioritize Moderate impairment, unless sub-basin participants chose otherwise.



**Prioritization Scores** =  $(W_1 * \text{Range Overlap})$   
 $+ (W_2 * \text{CPI Status})$   
 $+ (W_3 * \text{Stressors Addressed})$   
 $+ (W_4 * \text{Scale})$   
 $+ (W_5 * \text{Implementability})$

**EXAMPLE**

**Project 1**  
 A riparian fencing project spanning 3 sub-watersheds (HUC12s)



**Impairment Priority Toggle**

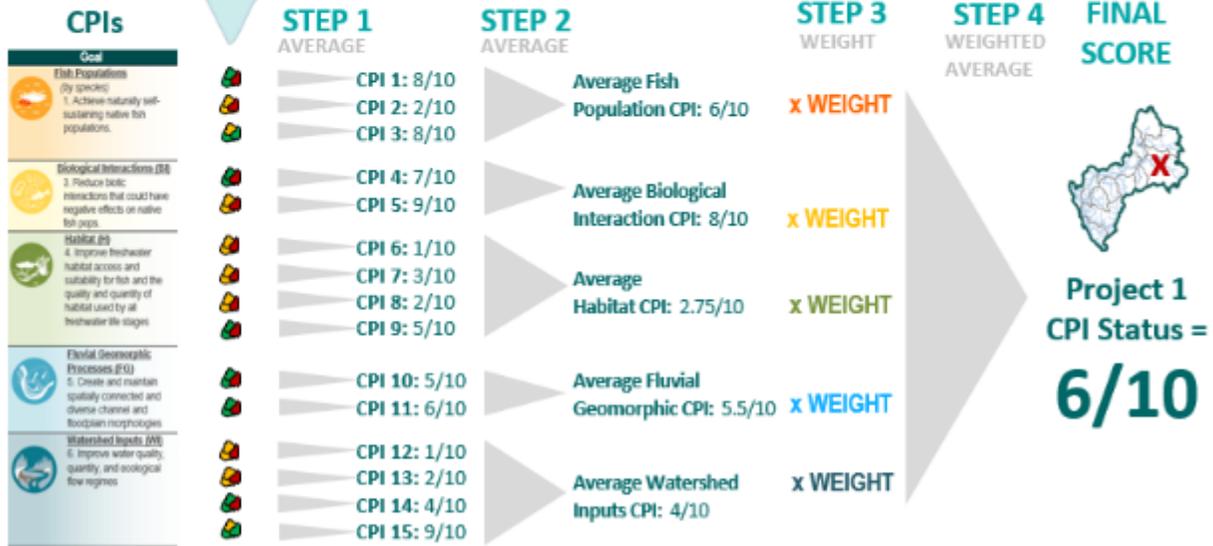


Figure 2. A visual summary of how the “Habitat Restoration Need” or CPI criterion score is determined. Where CPIs were not available, CPI proxies were used in the same way. Importantly, participants were able to choose which level of impairment should be prioritized in a sub-basin to reflect different strategies.



**Table 2: IFRMP Core Performance Indicators and proposed CPI proxies (in dark yellow) selected by Sub-basin Working Group participants across goals and spatial scales, with relevant objectives for each listed in [square brackets]. Indicators relevant to the mainstem are captured at the sub-basin scale for those sub-basins it runs through.**

Goal	Site / Reach	Sub-watershed	Sub-basin*	Whole Basin
 <p><b>Fish Populations (FP)</b> 1. Achieve naturally self-sustaining native fish populations.</p>	<ul style="list-style-type: none"> <li>• Presence / absence [1.3, 1.5]</li> <li>• Presence of spawning [1.2, 1.3]</li> <li>• Presence of rearing [1.2, 1.3]</li> </ul>	<ul style="list-style-type: none"> <li>• Juveniles per adult [1.1]</li> </ul>	<ul style="list-style-type: none"> <li>• % sub-watersheds of historical habitat occupied [1.5]</li> <li>• Age structure / demographics [1.2]</li> <li>• Genetic &amp; Life History Diversity [1.4]</li> </ul>	<ul style="list-style-type: none"> <li>• # sub-basins achieving sub-basin population targets (for occupancy, abundance, extinction risk, etc.) for species that have targets [1.3, 1.5]</li> </ul>
 <p><b>Biological Interactions (BI)</b> 3. Reduce biotic interactions that could have negative effects on native fish pops.</p>	<ul style="list-style-type: none"> <li>• Non-native species presence, abundance [3.2] <ul style="list-style-type: none"> <li>○ Proxy: # Aquatic invasive species per subwatershed</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Prevalence of infection [3.1]</li> <li>• Prevalence of mortality [3.1]</li> <li>• % Sub-watersheds with high levels of impact by non-native species [3.2]</li> </ul>	<ul style="list-style-type: none"> <li>• % Sub-watersheds with high prevalence of infection, mortality [3.1]</li> </ul>	<ul style="list-style-type: none"> <li>• % of sub-watersheds with high levels of impact by non-native species [3.2]</li> </ul>
 <p><b>Habitat (H)</b> 4. Improve freshwater habitat access and suitability for fish and the quality and quantity of habitat used by all freshwater life stages</p>	<ul style="list-style-type: none"> <li>• Core Water Quality Metrics in suitable ranges (by species) [4.2] <i>Temperature, Dissolved Oxygen, pH, Total Phosphorous, Total Nitrogen, Nuisance Phytoplankton (density, chlorophyll-a, cyanotoxins)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Stream Condition Index [4.3]</li> <li>• Habitat Suitability Rating [4.5] <ul style="list-style-type: none"> <li>○ Proxy: EPA - % Potentially Restorable Wetlands;</li> </ul> </li> <li>• % historical habitat accessible [4.1] <ul style="list-style-type: none"> <li>○ Proxy: EPA - Density Road-Stream Crossing; Trout Unlimited - Ratio current max. stream network connectivity to historical (inland)</li> </ul> </li> <li>• % suitable habitat occupied [4.1, 4.5]</li> </ul>	<ul style="list-style-type: none"> <li>• % historical habitat accessible [4.1]</li> <li>• % suitable habitat occupied (e.g., high intrinsic potential) [4.1] <i>[these two rolled up to sub-basin scale]</i></li> <li>• Extent thermal refugia habitat [4.2, 4.5] <ul style="list-style-type: none"> <li>○ Proxy: NorWeST Mean Aug Stream Temperatures – 2040s</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• % historical habitat accessible [4.1]</li> <li>• % suitable habitat occupied (e.g., high intrinsic potential) [4.1] <i>[these two rolled up to whole-basin scale]</i></li> </ul>
 <p><b>Fluvial Geomorphic Processes (FG)</b> 5. Create and maintain spatially connected and diverse channel and floodplain morphologies</p>	<ul style="list-style-type: none"> <li>• Large wood recruitment and retention (as a contributor to embeddedness) [5.3] <ul style="list-style-type: none"> <li>○ Proxy: EPA - % Developed, High Intensity in RZ (riparian zone); Density all roads in RZ (riparian zone)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Geomorphic flushing flows (extent, frequency, duration) [5.1]</li> <li>• Floodplain connectivity (area, volume, stage) <ul style="list-style-type: none"> <li>○ Proxy for Area: EPA - % Developed, High Intensity in HCZ (Hydrologically Connected Zone); Proxy for Area &amp; Volume: Net river-floodplain exchange in unconfined reaches (composite proxy)</li> </ul> </li> <li>• Index of channel complexity</li> </ul>	<ul style="list-style-type: none"> <li>• Extent, frequency, and duration of inundation at identified key flow thresholds [5.2] <i>(including floodplain, wetlands, off-channel habitat)</i></li> <li>• Annual measures of change in topography and bathymetry [5.2]</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
 <p><b>Watershed Inputs (WI)</b> 6. Improve water quality, quantity, and ecological flow regimes</p>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly flows as % measured / modeled historical natural flows [6.1] <ul style="list-style-type: none"> <li>○ Proxy: Trout Unlimited - Water Quantity Sub-Index, Flow volume change risk II (base flow)</li> </ul> </li> <li>• Annual loads of nutrients [6.1] <ul style="list-style-type: none"> <li>○ Proxy: Trout Unlimited - # Diversions per stream mile; EPA - % Agriculture in Watershed</li> </ul> </li> <li>• Annual loads sand or larger grain sizes (magnitude, variability) [5.2] <ul style="list-style-type: none"> <li>○ Proxy: USGS Count Past Placer Mines in Sub-Watershed</li> </ul> </li> <li>• Annual loads fine sediment (magnitude, variability) [5.2] <ul style="list-style-type: none"> <li>○ Proxy: EPA - PHWA Wildfire Vuln. Sub-index, Density all roads in Watershed</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• % of sub-watersheds with desirable mean flow and sediment conditions [6.1, 6.2, 6.3]</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## 1.3 Criterion 3: How Are Stressors Addressed by Restoration Assessed?

### *What Is This Criterion?*

The **Number of Stressors Addressed** prioritization criterion evaluates how many stressors a given type of restoration action is expected to address for the focal fish species in the project location. This helps to provide a rough idea of the relative scope of benefit associated with different types of projects to go along with the Scale of Benefit criterion for individual projects.

### *What Data Inform This Criterion?*

**Linkages between focal species, project types, and key stressors addressed were previously identified using conceptual models** created in Phase 2 of the IFRMP planning process, which relied on input from the published literature and from IFRMP participants contributing to surveys and workshops during Phase 2 of IFRMP development 2018-2019. These linkages have been further updated through additional participant input in Phase 3 of the IFRMP planning process.

The IFRMP ‘stressor-action linkage dictionary’ available for download from the Klamath IFRMP [website](#) documents the action types and the corresponding stressor types and associated specific stressors they are expected to address is. These action types and stressors were modified from the [NOAA Pacific Salmon Restoration Fund Data Dictionary](#), and combined with IFRMP Phase 2 conceptual modelling provide the framework for a systematic classification of what watershed restoration action types address different lists of key stressors. In some cases, the original framework includes multiple related stressors for specific stressor themes (e.g., there are 5 stressors related to water quality). To avoid inadvertent weighting due to some redundancy in very similar detailed stressor categories, the complete list of 71 stressors was mapped onto a smaller set of 21 unique stressor categories.

### *How is the Information Used in Prioritization?*

Because stressors are species-specific, the first step in determining the overall score for this criterion is to identify which focal species are present anywhere in the project area based on the same species distribution data used in the Range Overlap criterion (Step 1). Importantly, this count includes both current and historical species. Next, a stressor-action linkage database based on the data dictionary noted above is scanned to obtain a tally of the total number of unique stressor categories addressed by the action type(s) associated with the overall project for each focal species associated with the overall project area (Step 2).

Each stressor category is then assigned two weights (from 0 to 1) based on the sub-basin specific priority level assigned by Sub-Basin Working Groups to:

- (i) the functional watershed tier at which each associated stressor category occurs (Step 3), and
- (ii) the priority level of individual species benefiting from addressing the stressor category (Step 4).

For each stressor category, the product of these weights is calculated and then normalized to a common scale from 0 to 10 (Step 5). The final “tier-weighted” and “species-weighted” score for the project is calculated as the sum of these weighted scores across all of the stressor categories addressed by the project, and this is then normalized relative to the maximum stressor score across all projects in the sub-basin to put all projects on one comparable stressor scale (from 0 to 10).

Note that, because stressors categories are summed, projects including a larger number of HUC12 sub-watersheds may receive higher scores, but only if there is high spatial variability in the way



species are distributed across the sub-basin. Where this is the case, it reflects a real advantage in the number of stressors addressed by a project across multiple species.



Figure 3. A visual summary of how the Number of Stressors Addressed criterion score is determined.

## 1.4 Criterion 4: How Is the Scale of Potential Benefits Assessed?

### What Is This Criterion?

The **Scale of Potential Benefit** criterion is intended to reflect how far and wide beyond the project area the *benefits* of a restoration action are expected to be felt and is distinct from the project's actual footprint. For example, a project that helps to reduce nutrient inputs to an important tributary is also expected to have benefits for fish in downstream reaches, while a project that removes a dam is expected to have benefits for fish now able to migrate into upstream reaches.

### What Data Inform This Criterion?

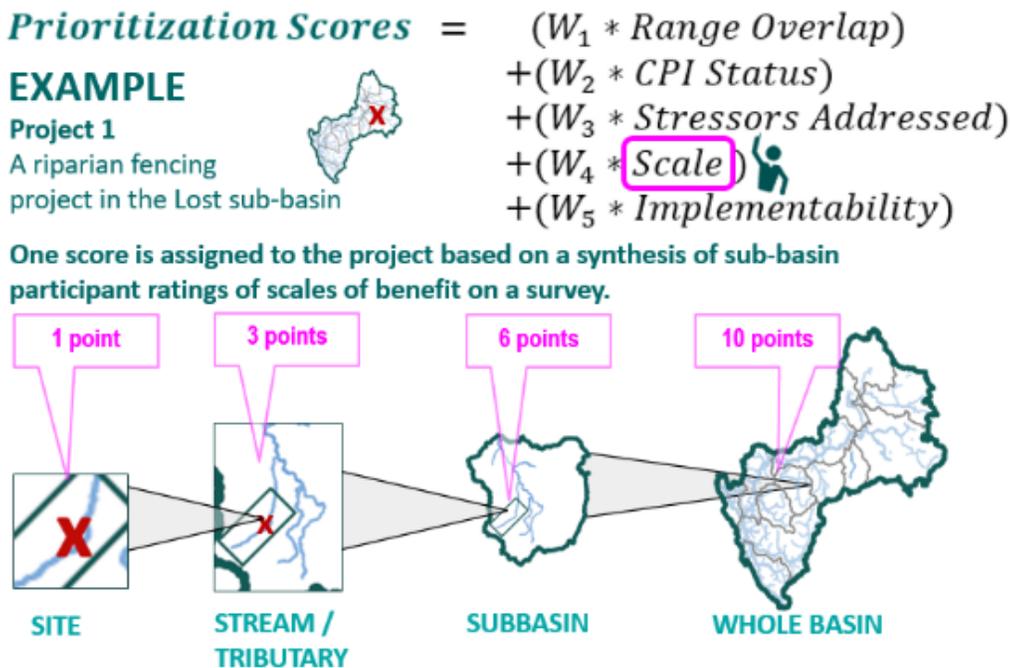
The scores assigned to various scales of benefit are illustrated in Figure 4, following **the standard 0 - 10 point raw scoring scale used for each of the IFRMP scoring criteria**. Each individual proposed restoration project is assigned a single score based on the central tendency of Sub-Basin Working Group responses to a Scale of Benefit Survey and discussions within each group. Web-based survey methods can be designed and deployed in facilitated meetings to develop weighting preferences that are representative of a broad audience. On the survey, participants were asked to assign a Scale of Benefit score to each proposed restoration project based on the following definitions for each scale:

- **Site Scale Benefits:** The project has significant fish habitat benefits within a small area directly associated with the project footprint (e.g. channel structure that creates pool rearing habitat).
- **Stream/Tributary Scale Benefits:** The project has significant fish habitat benefits both within the project footprint and to a variable extent to localized set of upstream, downstream, and/or adjacent

HUC12s to the project site (e.g. riparian planting that creates stream shading with associated cooler water temperatures at the project site as well as cooler water temperatures for a variable stream length below the site until temperature effects dissipate; removal of a stream culvert that opens up habitat at the site and for a variable length of the stream network above the culvert).

- **Sub-basin Scale Benefits:** The project has significant fish habitat benefits across the majority of HUC12s in the sub-basin (e.g. irrigation practices that benefit flows in all sub-basin streams).
- **Whole Klamath Basin Scale Benefits:** The project has broadly significant fish and habitat benefits across most or all sub-basins with the Klamath Basin. Examples:
  - a packaged suite of actions completed within approximately 5 years that dramatically reduced nutrient inputs in the upper watershed, enforced water use restrictions, and substantially improved flow management at dams with fish passage facilities or reconnecting key thermal refugia critical for the population persistence of migratory species or
  - if approved the removal of four mainstem Klamath River dams or
  - the addition of extensive and effective fish passage facilities at these mainstem dams if ultimate removal is not approved.

Participants were also reminded to limit their interpretation of these definitions **to the individual incremental project under consideration for prioritization, NOT the cumulative total of the class of the project** that may already be implemented in the sub-basin over 6+ years or to consider the impact of that class of action *if it were to be implemented generally among multiple sub-basins*.



**Figure 4. A visual summary of how the Scale of Benefit criterion score is determined.**

The ESSA team further screened these assignments for consistency across sub-basin teams to help align different sub-basin team interpretations for consistent scoring across the entire basin.

### **How is the Information Used in Prioritization?**

The individual Scale of Benefit scores for each proposed restoration project are multiplied by the weight assigned to the Scale of Benefit criterion and used directly in the overall project prioritization score sum without further modification.

## 1.5 Criterion 5: How is Implementability Assessed?

### *What Is This Criterion?*

Restoration projects can grind a halt due to opposition if decision-makers fail to recognize the importance of social and logistical considerations. The **Implementability** (or feasibility) prioritization criterion evaluates how easy participants think it should be to implement a particular type of restoration action. **The Implementability criterion encompasses several aspects that can be categorized as: 1) red tape, 2) technical/logistical feasibility, and 3) agreeability.** Though cost may also be a factor, we consider cost a separate criterion entirely (see Section 3.7 in the IFRMP).

### *What Data Inform This Criterion?*

We developed scores for proposed IFRMP restoration projects' implementability using expert focus groups and surveys, targeting each of the six subcategories (Administrative/Legal Feasibility, Permitting and Environmental Compliance (by project type), Permitting and Environmental Compliance (by land ownership type), Technical Feasibility, Logistical Feasibility, and Agreeability). For the three subcategories under **red tape**, and the technical subcategory under **technical/logistical feasibility** (4 of 6 subcategories) we treated these as generic basin-wide sub-criteria for broad project types and land ownership types. We used a three-step process involving focus group discussions and polling of expert views; participants first answered draft polls, then discussed results during focus group meetings, and finally re-did the polls. Poll results were further refined after the process, upon reviewing feedback received during the focus group meetings. There were three final polls: 1) administrative/legal feasibility, 2) permitting and environmental compliance, 3) technical feasibility. The administrative/legal and technical feasibility polls had participants rank 10 broad project types in order from most to least feasible. Similarly, the permitting and environmental compliance poll ranked the 10 broad project types, but also factored in 8 land ownership types (e.g., private, state, federal, Tribal). We used the ranks from the final poll results as scores for the four relevant subcategories.

We treated the remaining two subcategories (logistical feasibility and agreeability) as project-specific, requiring feedback from participants with local knowledge of the real-world context. We issued a survey using SurveyMonkey asking participants to rate each individual project as High, Medium, or Low feasibility for the sub-basins where participants work regularly or otherwise have extensive knowledge. These results produced the High, Medium, or Low rating for each project for these two subcategories.



 <b>RED TAPE</b>	
<b>Administrative/legal Feasibility</b> (by broad project type)	The general level of administrative/legal effort and complexity <u>typically</u> associated with Action Type Categories (e.g., miscellaneous administration, legal review, water rights and land appraisals, etc.)
<b>Permitting and Environmental Compliance</b> (by broad project type)	The general level of permitting and environmental compliance complexity <u>typically</u> associated with Action Type Categories (e.g., 401 certification, TMDLs).
<b>Permitting and Environmental Compliance</b> (by land ownership type)	The general level of permitting and environmental compliance complexity <u>typically</u> associated with land ownership types (e.g., 401 certification, TMDLs).
<i>All Red Tape sub-criteria scores were determined via polling and discussion with expert focus groups</i>	
 <b>TECHNICAL/LOGISTICAL</b>	
<b>Technical feasibility</b> (by broad project type)	The general level of effort and complexity for “boots on the ground” implementation <u>typically</u> associated with Action Type Categories (e.g., anything involving shovels, helicopters, heavy machinery, etc.)
<b>Logistical feasibility</b> (by specific project)	The specific level of effort and complexity for “boots on the ground” implementation expected for proposed Projects in the Klamath prioritization tool given local knowledge about terrain, accessibility, available personnel, lag time to implementation. Participants to flag specific HUCs.
<i>Technical feasibility scores were determined via polling and discussion with an expert focus group. Logistical feasibility scores were determined via participant survey</i>	
 <b>AGREEABILITY</b>	
<b>Agreeability</b> (by specific project)	The extent to which specific Projects in the Klamath prioritization tool are likely to be implemented given local knowledge about existing levels of collective support across agencies, Tribes, landowners, and other relevant parties.
<i>Agreeability scores were determined via a participant survey</i>	

Figure 5. Factors affecting implementability and their definitions used for scoring purposes.

### How is the Information Used in Prioritization?

After surveying participants, each subcategory had a set of response metrics to appropriately inform the final score. For broad Action Type Categories, we assigned scores (polled ranks) to projects using Action Types, since each project is associated with at least one unique Action Type. For the single land ownership metric (polled rank), we estimated the approximate area of each land ownership type within the project HUC12s, multiplied these by the polled ranking values, and summed ownership types together to get an area-weighted score per project. For the project-specific metrics (High, Medium, Low response frequencies) we used the most re-occurring

response (mode) within the survey results to get a High, Medium, or Low rating per project (High = 3, Med = 2, Low = 1). In some cases, responses resulted in very different subcategory scores associated within a project, so rather than simply averaging conflicting scores we applied a weighting rule that sets the overall project score toward lower feasibility. This rule assumes that if a project has one or more highly feasible sub-components but also one sub-component that is highly *infeasible*, that one component is more likely to set the entire project infeasible and non-executable. Therefore, the project deserves an overall score that indicates it is less likely to be implemented easily. Since not all these metrics are on the same scale, we normalized them to a common scale (1-10) and combined the sub-categories into red-tape (3 sub-components), technical/logistical (2 sub-component), and agreeability (1 sub-component). We calculated a final score by adding the normalized scores for these three components together. Lastly, based on feedback received during the Klamath IFRMP workshop held in Ashland in September 2022, we applied adjustments to these scores (e.g., 30% increase/decrease depending on feedback). More details on how workshop input was used to adjust scores is available in detailed supplementary materials on the Klamath IFRMP Website (<https://ifrmp.net/>).

Note that funding agencies have their own processes to determine the implementability of a project. When opportunities to pursue restoration projects on private lands arise, real-world decision-making needs to involve objective consultation practices. The implementability scores presented here should be viewed as a starting point for those practices.

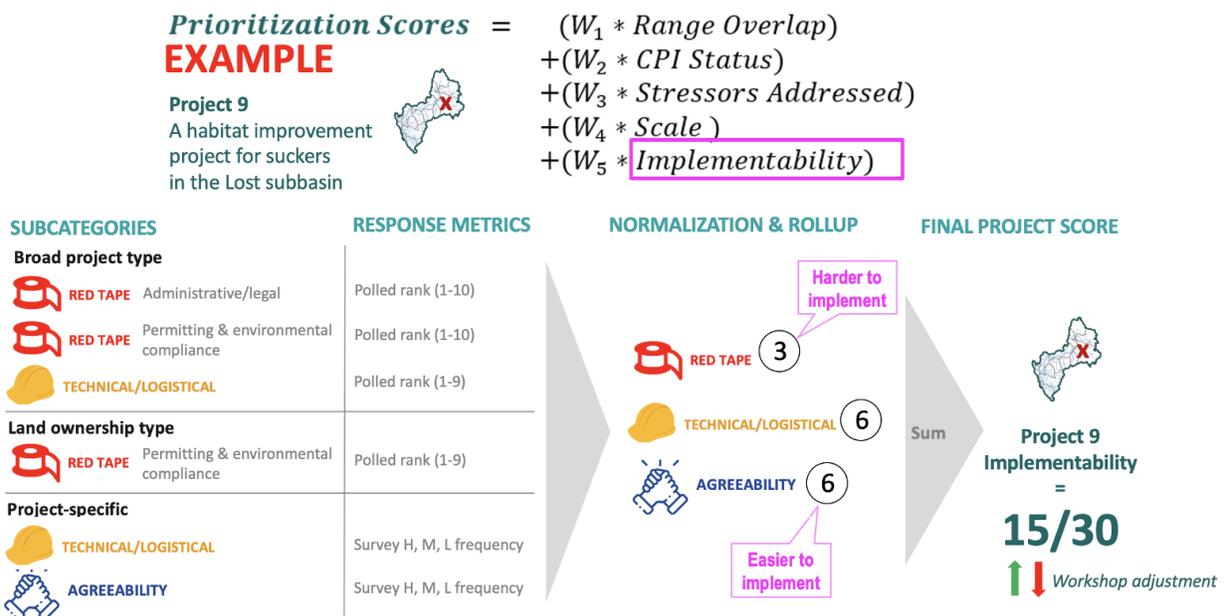


Figure 6. A visual summary of how the Implementability criterion score is determined.

## 1.6 The Klamath IFRMP Restoration Prioritization Tool

As part of developing the Plan, our team developed interactive, web-based **Klamath IFRMP Restoration Prioritization Tool** (Figure 7). This Tool was intended as a platform to meet the following restoration planning needs:

- pulling together the multiple strands of information being considered as part of prioritization into one place for ease of access and review,
- automatically calculating criteria scores and sorting projects based on myriad input data that can be collected at the basin-wide scale,
- allowing for dynamic adjustments to input data (including overriding proxy information with detailed site specific information as it becomes available) and the relative importance of criteria during facilitated webinars with Sub-basin Working Groups to see how it might affect sorting results,
- provide a one-stop service to make it highly efficient to add new restoration projects and remove others based on results of adaptive management and monitoring,
- providing a quick way to access the results and their associated project metadata, and
- serve to consistently organize and inform future prioritization efforts and discussions within the basin.

### Accessing the Tool

**Website:** <http://klamath.essa.com>

**Username:** ifrmpguest

**Login:** ifrmp2020

Note that this is a **read-only guest account** displaying the current status of prioritization results as determined by Sub-basin Working Groups. While guest users can adjust different settings to see how priorities reshuffle, these settings will not be saved.

The Tool has been developed to **allow restoration planning participants to adjust weights for different criteria, watershed process tiers, and species to reflect changing restoration goals, objectives, and funding contexts**. For example, participants may choose to place higher importance on actions that reduce the number of stressors operating at the Watershed Input and Fluvial Geomorphology levels compared to other tiers if there is overall group agreement that this is the large limiting factor for fish populations in a particular sub-basin. Similarly, participants may choose to place higher importance on the Habitat tier or on a specific fish species if new funding opportunities arise for these specific uses. Decisions whether to give criteria higher importance or more weight require expert judgment and must be agreed upon by restoration planning participants working in the given sub-basin.

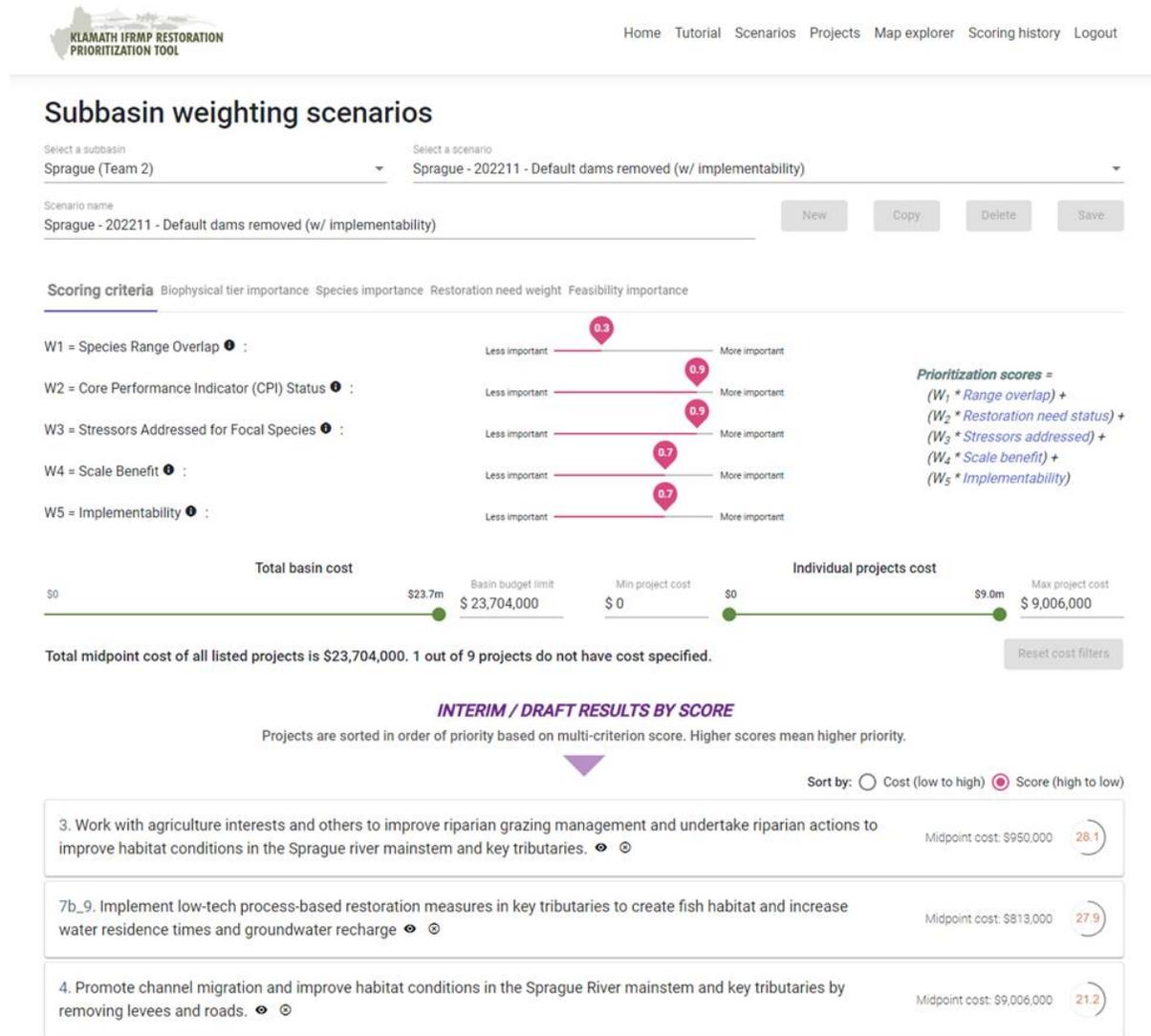
The Klamath IFRMP Prioritization Tool (<https://ifrmp.net/>) provides a thorough, transparent, and consistent method for prioritization across the entire Klamath basin.. **The tool is specifically designed to be routinely updated with the results from ongoing adaptive management and monitoring**. Readers are encouraged to log into the tool (Guest Username: ifrmpguest / Guest Password<sup>1</sup>: ifrmp2020) and experiment with different weighting systems to test the sensitivity of project prioritization ranks.

The resulting set of ranked restoration projects from every round of the Tool will provide **a starting point for more focused discussions among authorities responsible for selecting the best projects for restoration, whether they be at the sub-basin or sub-regional or basin-wide scale**. As funding becomes available, the intention is that this Plan and the real-time, “living”

<sup>1</sup> Note: If these login credentials do not work for you, it is most likely because of a local information technology security policy put in place by your organization. Contact your local systems administrator / local IT helpline for assistance.



prioritization tool will be repeatedly applied to guide future funding decisions. Similarly, **the relationships defined in the databases underlying the Tool would also need to be updated as results from ongoing monitoring appear and insights on key focal species' stressors are revealed.**



**Figure 7. A screenshot of the main prioritization interface of the Klamath IFRMP Restoration Prioritization Tool, accessible to Sub-Basin Working Group participants through their login credentials via <http://klamath.essa.com/>.**

**NOTE: Projects and rankings identified in the IFRMP restoration planning process are not binding to federal agencies and do not imply federal funding, or future federal funding, is automatically granted to specific restoration projects.**

The Klamath IFRMP Prioritization Tool (<http://klamath.essa.com>) provides a rigorous, transparent and consistent method across the entire Klamath basin. Adjustments to various inputs and weighting factors are structured and automated to ensure consistency and scoring flexibility. The tool is specifically designed to be routinely updated based on results of ongoing adaptive management and monitoring. Readers are encouraged to log into the tool and experiment with alternative weighting systems to test the sensitivity of priority rankings.

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