Klamath Basin Integrated Fisheries Restoration and Monitoring Plan (IFRMP)

Restoration Action Agenda (2023-2024) Draft

IDAHO • OREGON • ALASKA
PACIFIC STATES MARINE FISHERIES COMMISSION
WASHINGTON • CALIFORNIA

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Cover Photo: Confluence of Salmon River with Klamath River | USFWS 2007

Associated with the Klamath River Integrated Fisheries Restoration and Monitoring Plan (IFRMP) prepared by ESSA Technologies Ltd. on behalf of the PSMFC and USFWS. For more information and to access the full plan document, visit: https://ifrmp.net/

1 Introduction to the IFRMP

The Klamath Basin of south-central Oregon and northern California is one of the largest rivers on the Pacific Coast and was also historically one if its most significant producers of salmon and other native fish. Unfortunately, a wide range of historical and ongoing human activities across the Basin, including construction of four lower Klamath River hydroelectric dams across the river's mainstem and numerous smaller dams along its tributaries, have contributed to reduced flows, habitat loss, and increased nitrogen and sediment inputs across a region that is already naturally nutrient-rich. Adding to these pressures are more frequent and extended droughts and forest fires associated with accelerating global climate change. Some impacts represent key stressors which have significantly impaired underlying watershed functional processes, reduced water quality, and contributed to dramatic declines in many native fish populations. Impacts to fish have been deeply felt by many who live, work, and fish across the basin and led to decades of conflict and debate over how to restore fisheries of great cultural, health, and economic importance while also sustaining other natural goods and services. Many local, Tribal, state, and federal organizations have responded by spearheading a diverse range of restoration efforts, most recently including an effort to remove four lower Klamath River hydroelectric dams.

In 2016, the U.S. Fish and Wildlife Service (USFWS) engaged the Pacific States Marine Fisheries Commission (PSMFC) and ESSA to develop an Integrated Fisheries Restoration and Monitoring Plan (IFRMP or Plan) to help coordinate and prioritize restoration efforts across the Basin to support the recovery of native fish. The USFWS directed the planning team to engage with experts, practitioners, natural resource managers, and other interested participants from a wide range of organizations in a collaborative planning process designed around a set of guiding principles consistent with prior recommendations of the National Research Council. These principles and other Plan details are described in detail in the master IFRMP document found at https://ifrmp.net/.

The **vision** of the Klamath Basin IFRMP is to provide a unifying framework for planning the coordinated restoration and recovery of native fish species from the headwaters to the Pacific Ocean, while improving flows, water quality, habitat and ecosystem processes. The IFRMP serves as the blueprint that describes the highest priority flow, water quality, and habitat restoration and monitoring actions that, in combination with related restoration initiatives, can help reverse the declines of multiple native Klamath Basin fish populations. The Plan helps to answer the basic question: ***given all we know, which functional watershed restoration actions will provide the broadest possible benefits to multiple native Klamath Basin fish species – throughout the Basin and within each sub-basin***. The USFWS intends to update this Plan periodically to reflect changing conditions, needs, and knowledge in the basin through an adaptive management process that will include additional engagement with participants who are willing to help make the plan better.

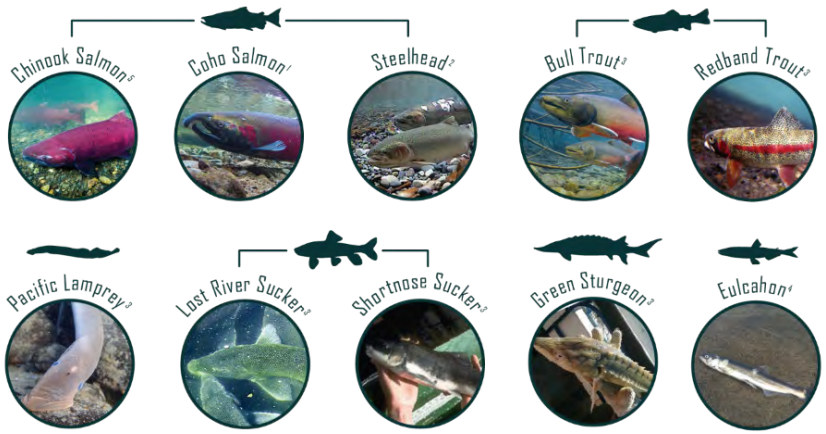


FIGURE 1: focal fish species of the IFRMP

Fish Photos: (1) BLM, (2) Oregon State University, (3) ODFW, (4) Jason Ching, (5) USFWS, (5) Sam Beebe, all images public domain or licensed under CC by 2.0.

2 The Draft IFRMP Restoration Action Agenda

2.1 What is a Restoration Action Agenda?

The Klamath IFRMP plan document contains over 150 proposed **restoration project concepts**, defined as a broad vision for a specific type or types of restoration actions in one or more specific priority sub-watersheds of a sub-basin where that action is needed. However, many acknowledge that it is not possible or appropriate to pursue all of these project concepts across the basin at the same time, nor would it necessarily be possible to implement one specific project concept in every one of the many sub-basins where it has been recommended to occur. This is partly due to capacity and funding constraints, but also because some projects are expected to be more beneficial if other projects are completed first – for example, addressing water quality issues at a project site before investing in instream habitat restoration - and also because priorities may change over time as events, conditions, and restoration activities in the basin continue to evolve.

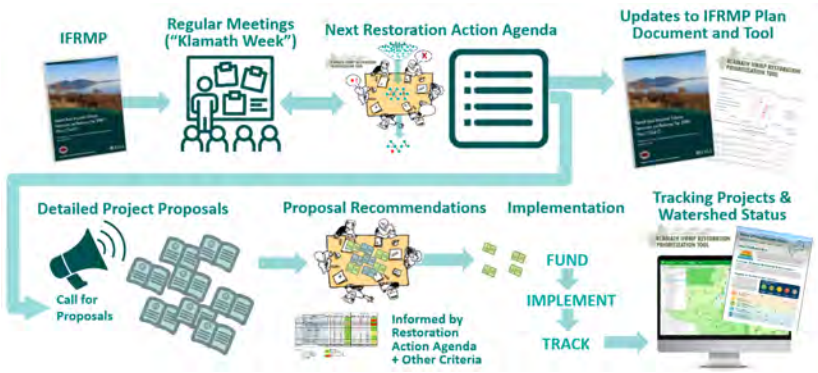


FIGURE 2: Pathway for moving from the IFRMP to the RAA and to a solicitation process to select projects for implementation

To recognize this constraint, the IFRMP has recommended a model whereby participants review and update lists of priority restoration project concepts every one to two years by working together in an iterative participatory process. This process leverages the IFRMP and linked prioritization tool to select a shorter list of restoration project priorities that may be ready for implementation over the next one to two years. This list of near-term restoration priorities represents the **Draft FRMP Restoration Action Agenda (RAA)** for a specific time period.

The RAA is meant to provide one source of information to help guide funding considerations. Through this process, restoration practitioners can use the IFMRP to further develop restoration concepts presented in the Plan, and submit **detailed proposals for specific projects** that address elements of one or more IFMRP and RAA priorities. This model ensures that restoration occurring in the basin strikes balance between restoration projects that are most needed and restoration projects that proposal proponents are ready and willing to implement, increasing the potential for projects to provide broader benefits.

2.2 The Priority Project Selection Process

The RAA was initially developed during a three-day IFRMP RAA planning workshop held in Ashland, Oregon, in late 2022. This hybrid workshop was attended by **98 participants** (68 in person and 20 through a virtual meeting platform) representing 46 organizations from Tribal, local, state and federal governments, NGOs, researchers, and the private sector.

The first day of the workshop was dedicated to refining proposed project concepts and selecting priority projects for this 2023-2024 RAA, while days two and three were dedicated to discussions of monitoring and implementation. **Participants began by looking at the initial ranking of project concepts in each sub-basin (either on physical wall posters or virtual equivalents) emerging from the IFRMP restoration prioritization framework and tool**, which ranked over 150 projects based on a combination of data-driven criteria (overlap with focal fish habitat, degree of habitat degradation, and number of stressors addressed by project restoration actions) as well as participant-rated criteria (scale of benefit, how easy it would be to implement, and weight of importance of each criterion).

FIGURE 3 shows this process in action on physical wall posters at the 2022 IFRMP RAA planning workshop, as well as the final outputs on priorities for one sub-basin.

Participants were asked to:

1) **validate project details** and provide feedback on any final changes to language, actions, or areas (post-it notes),
2) **suggest changes to rankings**, that is, whether they felt they rank should be higher (green dots) or lower (red dots) based on factors like current conditions and local context that are not considered by the tool,
3) **vote on projects considered to be near-term priorities** for implementation in (blue dots) and then agree on the top 3-5 projects with the most votes to carry forward to this restoration action agenda (starred and outlined in blue in second photo), and
4) **document the rationale** for their choices (post-it notes) to be reflected in the plan document and this RAA.

FIGURE 3: Participants engaging in the participatory priority project selection process (top panel) and a photo of the final results for one sub-basin showing votes cast and priority projects selected (bottom panel). Photos by ESSA.

This RAA provides a high-level summary of the current near-term priority restoration project concepts in each sub-basin and documents participant rationale expressed in the 2022 IFRMP RAA planning workshop process for why these project concepts were selected as more immediate priorities. **For more details on these project concepts and others which were not identified as near-term priorities**, including proposed project areas, please refer to the full IFRMP at https://ifrmp.net/.

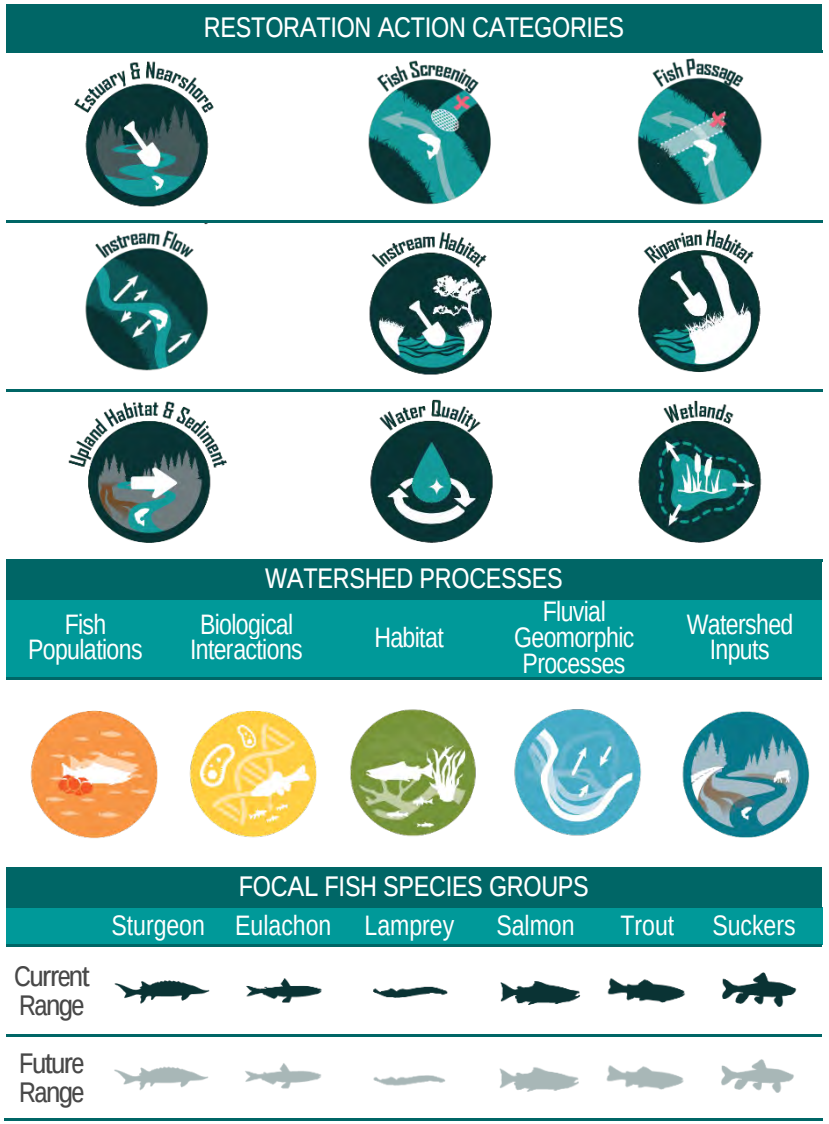
The RAA concludes with a summary of next steps towards the use of these near-term priorities in a solicitation process and tells readers where they can find more information on the IFRMP and its overall iterative planning process.

3 Priority RAA Projects (2023-2024)

This RAA is organized by major sub-region and then sub-basin. The opening page for each sub-region provides a brief review of the watershed context of that region, including key stressors and species of concern, as well as a high-level summary of key themes emerging from restoration project priorities across its sub-basins. Sub-basin pages provide a summary of participant considerations and rationale for the selected priorities as well as the priorities themselves listed in a simple table, listed from top to bottom in decreasing order of participant votes received. Each project is also tagged with icons corresponding to the major classes of restoration actions they include, the main watershed processes expected to be improved by these actions, and the main focal fish species most expected to benefit from these actions. More background on stressors, classes of restoration actions, and more is provided in the main IFRMP plan document.

Legends for the icons in these ranked RAA sub-basin project tables are included on this page for your reference.

TABLE 1: Legend explaining the iconography used to summarize actions and benefits associated with priority project concepts.



3.1 Upper Klamath Lake Sub-Region Overview

Sub-Region Context

The Klamath River's headwaters begin in the gently sloped desert, forest, wetlands, marshlands and open valleys of the Upper Klamath Basin sub-region. These headwaters are supplied primarily by springs emerging from aquifers recharged by snowmelt rather than by rainwater. This region supports a diverse range of commercial activities including agriculture and cattle ranching in the region surrounding Upper Klamath Lake and the basin's larger rivers, as well as forestry in its uplands.

These activities have produced a number of important stressors in this sub-region. In a system already sensitive to evaporation, drainage of large wetland areas, straightening and diking of natural waterways, and the establishment of irrigation diversions over the last several decades have contributed to disconnection of stream channels from their floodplains, reduced flow inundation events, increased fish passage or entrainment hazards, and loss of fish habitat. At the same time, some livestock grazing practices have contributed to increased erosion of nutrient-rich sediments as well as the loss of riparian vegetation that plays an important role in sediment capture and stream shading. Collectively, these developments have severely impacted water quality in Upper Klamath Lake and its upstream tributaries, which are already sensitive to eutrophication owing to high background loadings of phosphorus from volcanic sediments. Within the lake itself, the resulting high-nutrient conditions contribute to toxic algal blooms resulting in elevated pH and low dissolved oxygen conditions that are detrimental to fish health and may prevent successful migration, spawning, and rearing in affected waterways.

Summary of Current Priorities

Current restoration priorities in the Upper Klamath Lake Sub-Region are largely focused on the restoration of healthy watershed processes, particularly channel migration, connectivity, flows, and watershed inputs affecting water quality. Improvements to these processes are expected to have broad cascading benefits for fish habitats and populations. Many of these restoration activities were selected as priorities because participants felt they needed to be implemented first to improve the outcomes of other restoration actions identified in the IFRMP.

- Improving riparian vegetation to provide habitat, improve water quality, and reduce stream temperatures through riparian grazing management, fencing, and restoration.
- Improving water quality in Upper Klamath Lake and the Klamath River between Keno and Link River Dams by reducing nutrient inputs through wetland restoration, irrigation practice improvement, and tailwater treatment
- Improving instream habitat quality and connectivity through low-tech process-based restoration measures
- Improve hydrological processes such as channel migration, groundwater recharge, and instream flows through reconnection of floodplains and cold-water springs
- Improve conditions for safe fish passage at Keno Dam through additional fish screening and improvements to the existing fish ladder to facilitate upstream movements by migratory fish
- Improve spawning and rearing habitat in critical habitat for suckers, particularly in Upper Klamath Lake and Tule Lake / Lost River

Header Photo: Wood River Wetland in the Upper Klamath Basin | Greg Shine for BLM 2016

3.1.1 Upper Klamath Lake Sub-Basin Priority Projects

As in prior years, participants were most interested in action types that would help to restore fringe wetland habitat, improve grazing management practices along with riparian restoration to repair the impacts of prior grazing, and collection and treatment of tailwater discharge, as well as growing interest in strategic implementation of low-tech process-based restoration to help restore watershed processes and structure to a more natural state. These projects are expected to improve water quality, instream flows, water storage, and overall habitat availability for suckers, resident salmonids, and anadromous fish expected to reach the sub-basin following dam removal. For other candidate projects that did not make this list, participants felt that they had either already been implemented in the most critical areas (e.g., screening and passage in the Wood River), would be more beneficial if water quality issues were addressed first (e.g., instream habitat), or are no longer considered as effective as once thought (e.g., diffuse source treatment wetlands). There was a high level of agreement among participants in the 2022 IFRMP RAA planning workshop regarding which proposed restoration actions in this sub-basin should be selected as near-term priorities, and most projects selected by participants also ranked highly in our initial prioritization using the IFRMP Restoration Prioritization Tool. In some cases, participants recommended combining prior projects into a single project type for actions that were very similar or would generally be implemented together. These new combined projects are reflected by a compound ID number combining the ID numbers of previous projects.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
UKL 3 - Restore fringe wetlands in priority areas identified in the UKBWAP and other wetland strategies to improve water quality and provide habitat for endangered suckers	Wetlands		
UKL 1 - Work with agriculture interests and others to improve riparian grazing management and undertake riparian actions to improve habitat conditions in key Upper Klamath Lake tributaries	Riparian Habitat		
UKL 14 - Work with agriculture interests and others to separate out and treat tailwater discharge in key areas of UKL Sub-basin	Water Quality		
UKL 8b_11_11b - Implement low-tech process-based restoration measures in key tributaries to create fish habitat and increase water residence times and groundwater recharge	Instream Habitat		
UKL 2 - Work with agriculture interests and others to improve irrigation practices to reduce sediment and phosphorus loading to key streams in the Upper Klamath Lake Sub-basin	Water Quality		
UKL 7 - Work with agriculture interests and others to improve summertime flows by encouraging irrigation water use efficiencies and voluntary transfer of water rights for instream flows to benefit fish and riverine processes	Instream Habitat		

Header Photo: Upper Klamath Lake in Winter | Natascia Tamburello 2017, by permission

3.1.2 Williamson Sub-Basin Priority Projects

Participants were most interested in action types that would help to improve grazing management practices along with riparian restoration to repair the impacts of prior grazing, improving the connection of wetlands and channels to the mainstem Williamson River to improve groundwater recharge and access to clean cold-water habitats (particularly for returning salmon), and strategic implementation of low-tech process-based restoration to help restore watershed processes and structure to a more natural state. These projects are expected to improve water quality, instream flows, water storage, and overall habitat availability for suckers, resident salmonids, and anadromous fish expected to reach the sub-basin following dam removal. For other candidate projects that did not make this list, participants felt that sufficient progress had already been made (e.g., reconnecting habitats in the Williamson River Delta), are no longer considered as beneficial in this area as once thought (e.g., gravel supplementation), or were simply considered as lower near-term priorities or may be better addressed through other funding mechanisms (e.g., fire and fuel reduction related actions). There was a high level of agreement among participants in the 2022 IFRMP RAA planning workshop regarding which proposed restoration actions in this sub-basin should be selected as near-term priorities, and the top two projects also ranked highly in our initial prioritization using the IFRMP Restoration Prioritization Tool, while some lower ranking projects were also selected as priorities due to timing and sequencing relative to others. In some cases, participants recommended combining prior projects into a single project type for actions that were very similar or would generally be implemented together. These new combined projects are reflected by a compound ID number combining the ID numbers of previous projects.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Williamson 4_7 - Work with agriculture interests and others to improve grazing practices and fence and/or plant vegetation to improve riparian and instream conditions within the Williamson River and key tributaries			
Williamson 5 - Reconnect channels to restore fish access to existing cold-water springs in Williamson River mainstem reaches and key sub-basin tributaries			
Williamson 6 - Improve connection of Williamson River to the Klamath Marsh NWR and convert existing drains and levees into depressional wetlands			
Williamson 3_8b - Implement low-tech process-based restoration measures in key tributaries to create fish habitat and increase water residence times and groundwater recharge			

Header Photo: Williamson River | Michael McCullough 2010, used under CC by 2.0 licence

3.1.3 Sprague Sub-Basin Priority Projects

Participants were most interested in action types focused on improving grazing management practices along with riparian restoration to repair the impacts of prior grazing, improving habitat connectivity and access to high-quality cold-water habitat, and strategic implementation of low-tech process-based restoration to help restore watershed processes and structure to a more natural state. These projects are expected to improve water quality, water storage, and overall habitat quality and connectivity for suckers, resident salmonids, and anadromous fish expected to reach the basin following dam removal. For other candidate projects that did not make this list, participants felt that they have already been implemented (e.g., major fish barriers in the highest-priority sub-watersheds have already been removed and additional passage in some upper reaches would benefit primarily invasive Brook Trout), are no longer considered as effective as once thought (e.g., diffuse source treatment wetlands given the declining usage of flood irrigation in the region with water calls), or would take place in a context that would require more advanced planning and coordination with partners before they can be implemented (e.g., improvement of grazing and forest management practices on U.S. Forest Service allotments). There was a high level of agreement among participants in the 2022 IFRMP RAA planning workshop regarding which proposed restoration actions in this sub-basin should be selected as near-term priorities, and the top two projects also ranked highly in our initial prioritization using the IFRMP Restoration Prioritization Tool. In some cases, participants recommended combining prior projects into a single project type for actions that were very similar or would generally be implemented together. These new combined projects are reflected by a compound ID number combining the ID numbers of previous projects.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Sprague 3 - Work with agriculture interests and others to improve riparian grazing management and undertake riparian actions to improve habitat conditions in the Sprague river mainstem and key tributaries			
Sprague 7b_9 - Implement low-tech process-based restoration measures in key tributaries to create fish habitat and increase water residence times and groundwater recharge			
Sprague 5 - Restore cold-water springs that have been ponded or otherwise disconnected in the Sprague River mainstem and key tributaries			
Sprague 4 - Promote channel migration and improve habitat conditions in the Sprague River mainstem and key tributaries by removing levees and roads			

Header Photo: Sycan Marsh off the Sprague River | AI Case 2013, used under CC by 2.0 licence

3.1.4 Lost River Sub-Basin Priority Projects

Participants were most interested in action types for improving water use efficiencies throughout the Klamath Project and Tule Lake to improve water quality and temperatures, primarily for resident suckers, improving grazing management practices along with riparian restoration where streambanks are otherwise accessible to cattle, and improving screening and fish passage at Keno Dam. These projects are expected to improve water quality, habitat quality and connectivity, and migratory survival for suckers, resident salmonids, and anadromous fish expected to reach the sub-basin following dam removal. The selection of some near-term priorities was done strategically to benefit from recent planning and complementary funding that will support near-term implementation (e.g., Lost 1 planning funded and beginning at a district level via the Farmers Conservation Alliance and Klamath Wildlife Area, Lost 10a in advanced stages of planning by Ducks Unlimited). For other actions that did not make this list, participants felt that actions benefiting specific fish populations were higher near-term priorities (e.g., priority on projects benefiting suckers in Tule Lake before Clear Lake before Sheepy Creek), that benefits would be greater after priority projects are completed (e.g., benefits of improving passage to habitat above Tule Lake are higher after improvement of habitats within the lake, benefits of increasing flows are higher after safe fish passage is restored). There was a high level of agreement among participants in the 2022 IFRMP RAA planning workshop regarding proposed actions selected as near-term priorities, and the top projects also ranked highly in our initial prioritization using the IFRMP Restoration Prioritization Tool. Participants also recommended splitting projects related to fish passage improvement at Keno Dam (now Lost 11a) and Link River Dam (now Lost 11b) given the much greater need for passage improvements at Keno Dam ahead of the return of anadromous fish.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Lost 1 - Work with agriculture interests and others to improve water use efficiencies throughout the Klamath Project and Klamath River Between Keno and Link River Dams to improve water quality and stream temperatures	Instream Flow, Water Quality		
Lost 9d - Work with agriculture interests and others to install riparian fencing along the mainstem Lost River to reduce grazing impacts	Riparian Habitat		
Lost 5 - Install fish screens in the Keno impoundment reach to prevent adult and juvenile fish mortality	Fish Screening		
Lost 11a - Work with agriculture interests and others to improve the fish ladder at Keno Dam to provide better upstream passage for migratory fish species	Fish Passage		
Lost 10a - Improve condition and extent of spawning habitat for suckers in Tule Lake/Lost River	Instream Habitat		

Header Photo: Lost River and Tule Lake Wetlands | USFWS 2011

3.2 Mid-Upper Klamath River Sub-Region Overview

Sub-Region Context

The Klamath River's headwaters begin in the gently sloped desert, forest, wetlands, marshlands and open valleys of the Upper Klamath Basin sub-region. These headwaters are supplied primarily by springs emerging from aquifers recharged by snowmelt rather than by rainwater. This region supports a diverse range of commercial activities including agriculture and cattle ranching in the region surrounding Upper Klamath Lake and the basin's larger rivers, as well as forestry in its uplands.

These activities have produced a number of important stressors in this sub-region. In a system already sensitive to evaporation, drainage of large wetland areas, straightening and diking of natural waterways, and the establishment of irrigation diversions over the last several decades have contributed to disconnection of stream channels from their floodplains, reduced flow inundation events, increased fish passage or entrainment hazards, and loss of fish habitat. At the same time, some livestock grazing practices have contributed to increased erosion of nutrient-rich sediments as well as the loss of riparian vegetation that plays an important role in sediment capture and stream shading. Collectively, these developments have severely impacted water quality in Upper Klamath Lake and its upstream tributaries, which are already sensitive to eutrophication owing to high background loadings of phosphorus from volcanic sediments. Within the lake itself, the resulting hypereutrophic conditions contribute to toxic algal blooms resulting in elevated pH and low dissolved oxygen conditions that are detrimental to fish health and may prevent successful migration, spawning, and rearing in affected waterways.

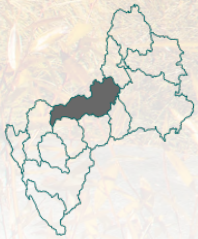
Summary of Current Priorities

Current restoration priorities in the Mid-Upper Klamath River Sub-Region are focused on restoring healthy watershed processes, particularly channel migration, connectivity, and flows, before addressing other restoration needs. Improvements to these processes are expected to have broad cascading benefits for fish habitats and populations. As these underlying issues are addressed, there is also a desire to improve riparian and instream habitats in select reaches where they are limiting for fish.

- Restoring channel form, function, and connectivity through removal of sediment barriers (especially legacy mine tailings), levees, and dikes; reconnection of off-channel habitat and cold-water springs; and the use of low-tech process-based restoration techniques to slow flows and improve groundwater recharge.
- Improving riparian vegetation to provide habitat, improve water quality, and reduce stream temperatures through riparian grazing management, fencing, and restoration.
- Improving water management practices and acquiring water rights to maintain or enhance instream flows where they are limiting for fish.
- Adding in-channel structures like large wood and boulders to improve fish habitats.

Header Photo: Confluence of Salmon River with Klamath River | USFWS 2007

3.2.1 Upper Klamath River Sub-Basin Priority Projects

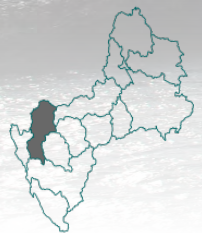


Participants emphasized implementable actions for reconnecting off-channel ponds and side channel habitats, including removing barriers to enhance access to cold-water habitat. A related priority action is the use of beavers or beaver dam analogues as part of a low-tech, process-based restoration approach to prolong water residence time which can improve groundwater recharge, promote the growth of riparian vegetation, further reduce temperatures, and create slow-water rearing habitats for fish. Riparian fencing was also considered a priority to reduce streambank erosion and improve sediment inputs to streams associated cattle access to streambanks and increase sediment capture from all sources, potentially including upland sources such as roads. Lastly, this list includes a new, time-sensitive project proposed at the 2022 IFRMP RAA planning workshop that involves the acquisition of approximately 11,000 acres of property within the Klamath Reservoir Reach which is owned by PacifiCorp but not directly associated with the Klamath Hydroelectric Project or within the FERC project boundary for the purposes of future habitat restoration to benefit resident and anadromous fish. For other actions that did not make this list, participants felt that actions on this list focused on protecting and restoring channel form, function, and connectivity were higher priority than other actions considered, and that the need for some of these other actions may decline or their benefits would be greater after priority projects are completed (e.g., riparian fencing, (UKR 5b) before considering planting and grazing management (UKR 5a,c), and determining whether riparian restoration is sufficient for reducing sediment inputs before considering decommissioning roads (UKR 6)). Actions UKR 19, 5b, 10 identified by workshop participants were also in the top 5 priority projects originally identified through the IFRMP Restoration Prioritization Tool prior to the workshop.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
UKR 10 - Reconnect floodplains and off-channel habitats by removal of levees and other barriers within the Upper Klamath River sub-basin	Fish Passage; Instream Habitat		
UKR 19 - Identify and implement projects to protect existing or potential cold-water refugia for fish	Instream Habitat		
UKR 5b - Work with agriculture interests and others to install fencing along riparian corridors to reduce erosion into the UKR mainstem and key tributaries	Riparian Habitat; Upland Habitat & Sediment; Water Quality		
UKR 18 - Install BDAs in key Upper Klamath River tributaries to provide improved seasonal fish rearing habitats	Instream Habitat		
UKR 20 - Address restoration needs of PacifiCorp Parcel A lands	Instream Habitat; Riparian Habitat		

Header Photo: Jenny Creek | Michael Campbell for BLM 2019

3.2.2 Mid Klamath River Sub-Basin Priority Projects



Participants emphasized implementable actions with direct benefits to fish, particularly reconnecting off-channel ponds, wetlands, and side channel habitats including removing barriers to provide access to existing cold water refugia. This includes restoring hydrologic connection to floodplain and off-channel habitat in reaches impacted by tailings from historical industrial-scale mining. Other priority actions include fish passage improvements (e.g., removal of sediment barriers) often at the confluence of lower reaches of Klamath River tributaries. This will enhance access to existing cold-water habitat and potentially expand thermal refugia habitat by construction off of-channel ponds for Coho salmon that would be fed by cool groundwater. MKR 12 focuses on in-channel structure placement. Channel structure placement is often a component of channel reconfiguration and reconnection projects, and in thermal refugia restoration/enhancement/creation projects but also frequently occurs independently as a single action. Participants for this sub-basin requested that the previously separate actions 6 and 10 be merged to reflect the fact that they are closely related and should occur together. For other actions that did not make this list, participants felt that some were important but more challenging to implement in practice (e.g., upland vegetation management for fire mitigation through MKR 5) or addressed stressors that were not currently limiting factors in the region (e.g., riparian habitat) and/or which would be expected to improve naturally as fringe benefits of other actions (e.g., anticipation of natural improvements in riparian vegetation following restoration of river form and function through MKR 11 rather than by direct intervention through riparian planting proposed in MKR 8). Actions MKR 11 and MKR 6_10 identified by 2022 IFRMP RAA planning workshop participants were also in the top 5 priority projects originally identified through the IFRMP Restoration Prioritization Tool prior to the workshop.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
MKR 11 - Reconnect off-channel habitats by removing or reconfiguring stream levees and dikes			
MKR 6_10 - Remove sediment barriers or construct low flow channels to provide access to existing cold water refugia within the Middle Klamath River sub-basin			
MKR 12 - Install in-channel structures such as LWD, boulders, etc. to improve condition of fish habitats			

Header Photo: Klamath River at Happy Camp | Matt Baun for USFWS 2009

3.2.3 Shasta Sub-Basin Priority Projects

Priority projects for the Shasta subbasin focus on increasing and maintaining adequate instream flows and removal of priority fish passage barriers. Water management (e.g., required and enforced minimum flows on tributaries), water rights acquisition, ongoing enforcement actions (e.g., deployment of emergency regulations, money for aerial observations, data collection) and encouraging tailwater reuse to reduce warm tailwater inputs (Shasta 1, 3, 5) help overcome low-flow barriers and maintain colder water temperatures. Participants noted that enforcing current regulations requires no additional money. Shasta 7 and 8a focus on restoring fish passage. Shasta 7 identifies other fish passage barriers across the sub-basin such as the barrier on Little Springs Creek near Louie Road, Parks Creek and the Novy Ranch impoundment. For other actions that did not make this list, participants felt that some were less important than the selected near-term priorities, less effective unless combined with other projects (e.g., riparian planting in Shasta 6), or need more work to determine the best approach (e.g., choosing between relocation, redesign, or elimination of the Parks Creek diversion in Shasta 2), or are already being done (e.g., managing discharges from Dwinnell Dam to comply with local TMDLs in Shasta 4). Workshop participant recommendations were generally in good alignment with IFRMP multi-criteria prioritization scores with three projects (Shasta 1, 3, and 5) also in the top 5 priority projects originally identified through the IFRMP Restoration Prioritization Tool. Participants also elected to eliminate the Shasta 11 project (diverting water from mainstem Klamath River via a gravity flow conduit below Keno Dam), noting that its goals can more feasibly be achieved through efforts considered in Shasta 1.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Shasta 1 - Work with agriculture interests and others to manage water withdrawals across the Shasta sub-basin to maintain instream flows and to overcome low water barriers to upstream habitats			
Shasta 3 - Increase cold water refuge habitats for fish in the upper Shasta sub-basin through improved irrigation and groundwater management and secured water rights			
Shasta 5 - Implement projects to reduce warm tailwater inputs in prioritized implementation areas as guided by the Shasta sub-basin's Tailwater Reduction Plan			
Shasta 7 - Implement projects to provide for fish passage at identified priority fish passage barriers across the Shasta sub-basin			

Header Photo: Big Springs Ranch on the Shasta River | NOAA 2009

3.2.4 Scott Sub-Basin Priority Projects

Remediation of the Callahan dredge tailings and related portions of mainstem Scott River was a top priority for a large fraction of 2022 IFRMP RAA planning workshop participants. This particular restoration action implemented carefully would improve year-round connectivity by removing low flow barriers to fish passage from the canyon to upper watershed. Actions associated with Scott 1 is not strictly restoration but are fundamentally about acquiring water rights to ensure these waters support instream flows in the river to benefit fish. Water acquisition actions are often cost effective and can be the most permanent type of 'action' assuming the water rights that get acquired are truly applied and enforced to increase instream flows to benefit fish. In contrast, restoration actions Scott 10 and 8 involve mechanical channel modification and reconfiguration and removal or reconfiguration of levees and dikes to restore floodplain connectivity and enhance off-channel habitat features like alcoves, backwaters and oxbows plus yielding contributions to more dynamic groundwater recharge. The SRWC 2018 plan was a key guide and these actions are also high priorities with in the NOAA SONCC recovery plan (NMFS 2014). Interestingly, only one of these restoration actions naturally fell within the top 5 of the IFRMP Restoration Prioritization Tool (Scott 15) lending further emphasis to its importance. Once issues related to water rights and enforcement are better addressed, future prioritization discussions will likely focus on more typical habitat restoration projects. A number of other restoration actions at the workshop received some participant votes with regards to their importance suggesting low to mild agreement amongst participants on the importance, urgency, or feasibility of other actions (e.g., Scott 14 focused on improving water storage by upland wetlands and meadows was considered important but not urgent; compliance with irrigation interventions in Scott 4 perceived as challenging to implement). In this circumstance of more variable participant perspectives on priorities, additional emphasis should be returned to the IFRMP Restoration Prioritization Tool multi-criteria rankings when prioritizing restoration projects.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Scott 15 - Callahan dredge tailings remediation			
Scott 1 - Acquire water rights from willing sellers within priority areas of the Scott River sub-basin to help maintain instream flows for fish			
Scott 10 - Restore floodplain connectivity and create refuge habitats across Scott River sub-basin streams as identified in the SRWC plan			
Scott 8 - Remove or reconfigure priority river/stream levees and dikes identified in the SRWC plan to restore channel form and floodplain connectivity			

Header Photo: Scott River by Scott Bar | Tom Hilton 2013, used under CC by 2.0 licence

3.2.5 Salmon Sub-Basin Priority Projects

Participants emphasized implementable actions related to restoring floodplain connectivity and in-channel structural complexity and improving stream temperatures with riparian shade and upland wetland restoration. Ensuring fish have access to existing thermal refugia is critical while other important projects take time to be planned, designed and implemented. Several of these projects are expected to provide in-channel structure to areas that have been mined and logged and thus help trap sediment, sort gravel, alleviate incision, create refugia, and overall improve habitat quality. Others improve connection to off-channel rearing habitats and re-connect floodplains that are important for spring chinook and coho salmon, amongst other species. The kinds of off-channel design proposed in Salmon 3 (alcoves, backwater oxbow restoration) are more elaborate than Salmon 2's more fundamental grading and contouring to reconnect areas to floodplains following mine tailing remediation. Thus, Salmon 3 could be packaged with Salmon 2, but is not dependent on doing so. Often, constructing off-channel habitats would also logically precede riparian planting and in channel structure placement actions in focal areas where these recommended actions overlap. For other actions that did not make this list, participants felt that some were less effective unless combined with other projects (e.g., riparian planting and grazing management in Salmon 6), or faced implementation issues (e.g., adherence to riparian protection agreements in Salmon 5). There was a high level of agreement among participants in the 2022 IFRMP RAA planning workshop regarding which proposed restoration actions in this sub-basin should be selected as near-term priorities, and most projects selected by participants also ranked highly in our initial prioritization using the IFRMP Restoration Prioritization Tool. Where there were larger differences between initial multi-criteria rankings and workshop participant voting, projects were elevated through participant votes to reflect perspectives about those that would be easier to implement in the near term.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Salmon 4 - Install LWD, boulders and other in-channel structures to improve fish habitats within the Salmon River and sub-basin tributaries			
Salmon 2 - Undertake mine tailing remediation in priority reaches of the Salmon River and North and South Forks mainstems and reconnect floodplains			
Salmon 3 - Build and improve connection to off-channel rearing habitats in Salmon Sub-basin tributaries			
Salmon 7 - Restore upland wetlands and meadows to improve cold water storage and runoff attenuation in the Salmon River Sub-basin			
Salmon 8 - Remove physical barriers blocking fish passage to key thermal refuge areas within the Salmon River Sub-basin			

Header Photo: Salmon River in Six Rivers National Forest | USFS

3.3 Lower Klamath River Sub-Region Overview

Sub-Region Context

The Lower Klamath River sub-region includes the mainstem Klamath River (from its estuary on the Pacific Ocean to the confluence with the Trinity River), the Trinity River, and the South Fork Trinity (California's largest unregulated watershed). Cool streams entering the lower reach of the Klamath River mainstem below the Trinity confluence represent important refugia habitat for fish in the sub-region but can be prone to excessive sediment loading due to erosive soils and the heavy logging activity and associated high road densities in the area. The history of extensive logging in the region has led to a low overall supply of large wood, which is a primary stressor in this sub-basin. Low large wood densities also compound sediment-related issues: the lack of in-stream obstructions leads to poor retention of spawning gravels and the persistence of armor layers as continued supply of coarse-grained material results from logging legacies and hillslope mass-movements. Lack of local wood availability also inhibits restoration efforts and increases costs for projects that aim to add wood to the system.

Additionally, inter-basin diversion of water into California's Central Valley can divert a significant amount of the Trinity River's historical annual flow. The largest effect of this diversion is on spring flows with reduced flows having caused channel degradation and floodplain disconnection. Other issues in the sub-region include inaccessible salmon habitat in the upper Trinity, lack of gravel recruitment, and erosion of fine sediments into streams from logging, grazing, and past placer mining.

Summary of Current Priorities

Current restoration priorities in the Lower Klamath Sub-Region are focused on restoring channel connectivity, complexity, and flows, in part through ongoing measures to address overall flows, conveyance and distribution of flows, and temperature management associated with the operation of the Trinity and Lewiston dams in the region. Improvements to these processes are expected to have broad cascading benefits for fish habitats and populations. As these underlying issues are addressed, there is also a desire to improve riparian and instream habitats in select reaches where they are limiting for fish.

- Restoring channel form, function, and connectivity through reconnection of floodplains, construction of off-channel habitats, use of low-tech process-based restoration techniques like beavers, beaver dam analogs, and the addition of instream wood or other structures to further slow flows and create fish rearing habitats.
- Continuation of the Trinity River Restoration Program (TRRP), which has its own funding source and addresses mainstem issues of flow management, gravel augmentation, floodplain reconnection, and off-channel habitat construction.
- Improving agricultural water use and overall instream flows where they are limiting for fish, particularly in the South Fork Trinity sub-basin.
- Adding in-channel structures like large wood and boulders to improve fish habitats complexity in addition to slowing flows.

Header Photo: Klamath River Estuary | Linda Tanner 2011, used under CC by 2.0 licence

3.3.1 Lower Klamath River Sub-Basin Priority Projects

Priority projects for the Lower Klamath River Sub-Basin focused on projects that address the main theme of ongoing and historical forestry impacts on degraded riparian forests, floodplain habitats, and wood supply to streams. Several projects aim to address the lack of instream wood directly through wood additions, beaver dam analogues, or other in-channel structures, which are expected to improve physical habitat quality for fish, slow down water flows, and benefit hydraulic connectivity to floodplain habitats. It was noted that projects utilizing different types of in-channel structures or wood placements may be synergistic; for example, efforts to slow down water flows through wood jams or floodplain reconnection may improve the function and success chances of beaver dam analogues in lower gradient streams. The selected priority projects from the 2022 IFRMP RAA planning workshop largely align with the top projects from the IFRMP Restoration Prioritization Tool. Other projects that were identified as important but were not among the selected priority projects include those focusing on riparian vegetation health (e.g., feral cattle management, riparian vegetation planting, forest harvest restrictions); workshop participants felt that a focus on in-stream projects that directly address habitat needs was most important and that positive progress to riparian management was already being made.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Lower Klamath River 11 - Install BDAs in key tributaries in the Lower Klamath to promote increased base flows and provide improved rearing habitats			
Lower Klamath River 10 - Install LWD to increase floodplain connectivity and provide cover for spawning and rearing fish in key Lower Klamath River tributaries			
Lower Klamath River 6 - Increase habitat connectivity and enhance floodplain habitats in key Lower Klamath River streams			
Lower Klamath River 15 – Seek opportunities to conduct thinning of forest stands and cultural and prescribed burns to restore historic prairie habitats within key Lower Klamath River tributary watersheds			

Header Photo: Morning on the Lower Klamath River | Linda Tanner 2011, used under CC by 2.0 licence

3.3.2 Trinity Sub-Basin Priority Projects

Projects identified as priorities focused on both mainstem and tributary applications, with mainstem projects associated with the Trinity and Lewiston dams rising to the top. The key item in this sub-basin is the continuation of the Trinity River Restoration Program (TRRP), which has its own funding source and addresses mainstem issues of flow management, gravel augmentation, floodplain reconnection, and off-channel habitat construction. Based on science conducted by the TRRP, temperature management from the Trinity Reservoir could result in major, immediate improvements for fish. In this case, participants recommended combining two project concepts (new temperature control device on Trinity Reservoir and new conveyance system from Trinity Reservoir to Carr tunnels) into one high priority project concept. There was also agreement that improving flows to Weaver Creek should be a high priority, as the infrastructure already exists and ensuring that Weaver Creek has adequate flows during summer drought periods should greatly benefit coho and other salmonids. Other important projects included tributary placements of in-channel structure and beaver dam analogues. Projects focusing on sediment issues that had been previously selected as important were de-emphasized or removed as it was noted that sediment problems were not as prevalent in these systems as originally identified.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
Trinity 1* - Implement managed flows from Trinity and Lewiston dams, gravel augmentation, and reconnect floodplains by removing levees and constructing off-channel habitats			
Trinity 17_18 - Install temperature control device for Trinity Reservoir and evaluate and develop a new conveyance system from Trinity Reservoir to the Carr tunnels to improve temperature management			
Trinity 4 - Maintain flows in Weaver Creek by using Trinity River to provide summer water to the Weaverville Community Services District			
Trinity 6 - Install in-channel structures such as LWD, boulders, etc. to improve fish habitats in priority tributaries			
Trinity 15 - Translocate beaver and install BDAs to impound water and create seasonal fish rearing habitats in Trinity River tributaries, particularly in the Weaver basin			
Trinity 16 - Undertake upland vegetation management as needed to thin forest and reduce fuels across the Trinity River sub-basin			

Header Photo: Trinity River Confluence with the Klamath River | Dan Brekke 2014, used under CC by 2.0 licence

3.3.3 South Fork Trinity Sub-Basin Priority Projects

Many of the restoration actions identified for the South Fork Trinity Sub-Basin are located in the Northeast portion of the sub-basin, with a focus on water availability and agricultural water use. The 2022 IFRMP RAA planning workshop participants agreed that low flows are the primary limiting factor in this basin, which was largely consistent with the conclusions of the Sub-basin Working Group and the scores from the IFRMP Restoration Prioritization Tool. The top two projects address flows through groundwater management and through operational changes at Ewing Reservoir to increase water availability during summer low flow periods. In line with this theme, the workshop process resulted in an increased priority for project Trinity 1b aimed at managing legal agricultural diversions. Workshop participants also discussed the potential benefits of addressing unauthorized water diversions but agreed that this could be beyond the IFRMP scope and may not be feasible. Besides flow-focused projects, workshop participants also valued in-channel structure projects in key tributaries, noting that this type of action may be easier to implement than other projects while also reducing acute habitat pressures associated with broader water availability issues in key discrete areas. Participants considered lumping together all the flow-focused projects into one 'portfolio' project but opted to keep them separate for clarity and to retain explicit emphasis on their specific aspects of flow management and restoration. Workshop participant recommendations were generally in good alignment with IFRMP multi-criteria prioritization scores with three projects (SF Trinity 3, 2, and 9) also in the top 5 priority projects originally identified through the IFRMP Restoration Prioritization Tool prior to the workshop.

Priority Project Concepts (2023-2024)	Key Action Classes	Watershed Processes Benefiting	Species Benefiting
SF Trinity 3 - Increase groundwater storage in the South Fork Trinity Sub-basin through upland wetland restoration actions	Instream Flow; Upland Habitat & Sediment; Wetlands		
SF Trinity 2 - Increase storage capacity and delivery capability of Ewing Reservoir to allow increased seasonal water flows in Hayfork Creek	Instream Flow		
SF Trinity 1b - Work with agricultural irrigators to reduce diversions by developing an incentives and enforcement program to increase flows	Instream Flow		
SF Trinity 7 - Improve planning and oversight of diversions to protect thermal refugia in tributaries of the South Fork Trinity sub-basin	Instream Flow		
SF Trinity 9a - Install LWD, boulders and other in-channel structures to increase habitat complexity in key South Fork Trinity tributaries	Instream Habitat		

*This project refers to the Trinity River Restoration Program (TRRP) which has a separate funding stream, but is included here for completeness and to reflect its overall priority for the sub-basin.

Header Photo: South Fork Trinity River at Hyampom | Konstantins Europe 2016, used under CC by 2.0 licence

4 Monitoring Priorities

Each of the IFRMP objectives is linked to associated **core performance indicators (CPIs)** co-developed with planning process participants that will be monitored across the Klamath Basin to track and communicate progress towards basin-wide recovery of functional watershed processes and fish habitat.

IFRMP monitoring is intended to provide broad-scale, ongoing tracking of CPI status and trends to confirm that whole-basin recovery of species, habitats, and watershed processes is occurring and is being maintained over time. Any worrisome signals in monitoring of CPIs could indicate the need for further diagnostic investigation through additional, more detailed monitoring or special studies to evaluate causes. These shifts in CPI state will also influence future prioritization of restoration projects through the Klamath IFRMP Restoration Action Prioritization Tool. While **IFRMP monitoring will focus on evaluating basin-wide status and trends**, additional support and funding are also needed to ensure that other ongoing monitoring programs across the Basin will be able to continue to evaluate local project implementation and effectiveness.

In many cases, it will be possible to leverage and integrate existing local monitoring efforts within the basin to inform understanding of status and trends, particularly for fish populations which are already well monitored by state and federal agencies and their partners. **In other cases, new monitoring will be needed under the IFRMP to fill existing monitoring gaps**.

Monitoring priorities were developed through a series of webinars convened by the IFRMP in June - August 2021, during which subject-area experts discussed in detail the current monitoring infrastructure in place across the Klamath Basin, evaluated the strength of existing monitoring for providing broad evaluations of the status of CPIs within the different biophysical tiers, identified important monitoring gaps, and made recommendations as to where/how the IFRMP could best supplement existing monitoring information to improve basin-scale assessments of CPI status and trends. The subject-area workgroups were: Watershed Inputs and Water Quality (nine participants), Fluvial Geomorphology (10 participants), Fish Habitat and Connectivity (16 participants), and Biological Interactions (nine participants). Recommendations from the webinars were vetted through additional literature review where possible. Participants noted the importance of **co-locating monitoring sites** for multiple CPIs to minimize sampling effort, the need for **improved standardization of data collection** and storage, the importance of coarse **system-wide assessments**, and the need for better **event-driven monitoring** associated with large storms.

Once a full portfolio of monitoring necessities was identified, individual recommendations were ranked into five tiers (Tier 1 – Tier 5) of priority based on the discussions during working groups and expert judgement. Tier 1 monitoring activities are considered the most important for near-term implementation and provide the most comprehensive understanding of basin-wide status and trends. These monitoring priority ranks were also further refined by participants during the 2022 IFRMP RAA planning workshop. The set of Tier 1 priority monitoring actions is shown in **TABLE 2**; further information on the other monitoring actions and priority ranks can be found in **Appendix H** of the IFRMP Plan Document.

Photo: Juvenile Chinook salmon monitoring on the mainstem Klamath River | USFWS 2015

TABLE 2. Tier 1 monitoring priorities for CPIs

Watershed Process Tier	CPI	Description
Watershed Inputs 	5.2.1 Seasonal Instream Flow	Expand existing network of real-time streamflow gaging stations
	5.2.2 Nutrient Loads	Establish network of automated water samplers
	5.2.3 Fine Sediment Loads and Turbidity	Expand/maintain network of continuous real-time sondes (top priority sites)
Fluvial Geomorphic Processes 	5.3.2 Geomorphic Flushing / Scouring Flows	Characterize flushing flows with gage data and transport measurement calibrations
	5.3.4 Channel Complexity	Assess basin-wide planform complexity from aerial imagery
	5.3.5 Sediment Transport	Map substrate sizes with remote sensing (bathymetric LiDAR, air photos)
Habitat 	5.4.1 Water Temperature	Expand/maintain network of continuous real-time sondes (top priority sites)
	5.4.2 Water Chemistry (DO, pH, conductivity)	Expand/maintain network of continuous real-time sondes (top priority sites)
	5.4.3 Turbidity	Expand/maintain network of continuous real-time sondes (top priority sites)
	5.4.4 Thermal Refugia	Identify and map thermal refugia across the basin with airborne thermal infrared remote sensing
	5.4.5 Nutrients	Establish network of automated water samplers
	5.4.6 Nuisance phytoplankton and associated algal toxins	Expand/maintain existing monitoring network for evaluating levels of nuisance phytoplankton/algal toxins with indirect measures
	5.4.7 Stream Habitat Condition (Physical)	Assess basin-wide planform complexity from aerial imagery
	5.4.8 Riparian Condition	Assess riparian vegetation with aerial NDVI
Biological Interactions 	5.5.1 Disease	Expand existing monitoring network for *Ceratonova shasta* and *Parvicapsula minibornis*
	5.5.1 Disease	Expand existing monitoring network for *Ichthyopthierius multifiliis* (Ich) and *Flavobacterium columnarae* (Columnaris)
	5.5.2 Invasive aquatic species	Establish eDNA sampling network for monitoring invasives
Fish Populations 	5.6.1 Focal Species Population Indicators	Establish eDNA sampling network for monitoring distribution of focal fish species
	5.6.1 Focal Species Population Indicators	Fill existing or upcoming gaps on life-cycle monitoring

5 Next Steps Towards Implementation

Over the next two years, there are many significant funding opportunities that are available. Federal agencies in the Basin are working on ways to make it easier for stakeholders to apply for funding. Passage of the Bi-Partisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) could provide significant funding for Klamath Basin restoration. The IFRMP, and by extension, the RAA, offers funding agencies a plan that identifies some of the most important restoration throughout the Basin. In addition, the IFRMP and RAA was developed with significant stakeholder involvement and participation.

Many considerations related to cost, permitting constraints, support among landowners and other key stakeholders and other interannual factors will always need to be considered by decision authorities when making actual restoration and monitoring project funding decisions year to year. Consequently, some projects listed in this RAA or the broader IFMRP might not ultimately be implemented. Finally, nothing in the IFRMP constitutes an official federal agency position or obligation for current or future action.

As described in the IFRMP, further recommendations for implementation are also being developed to bring the Plan to life. These will include a recommended process for periodically updating Restoration Action Agenda, guidance for restoration and monitoring information to request from proponents during future rounds of solicitation, and initial suggestions for data consolidation and reporting through the production of a regularly updated State of the Klamath Report Card.

6 Where to Learn More

Visit the IFRMP website (https://ifrmp.net/) to learn more about this planning process and access key outputs such as:

- The full **IFRMP Plan Document**, including:
  - Key basin-wide restoration goals, objectives, and indicators of success.
  - A list of over 150 priority restoration project concepts across 12 subbasins, which are meant to be implemented over many years through a series of Restoration Action Agendas such as this one.
  - Strategies for closing gaps in basin-wide monitoring for important indicators of fish and watershed status
  - Cost estimates for restoration and monitoring.
  - Recommendations for ongoing plan implementation and adaptively updating restoration priorities.
- The **IFRMP Synthesis Report**, which summarizes the state of the Klamath Basin fish and fish habitats as well as prior restoration and monitoring efforts.
- The **IFRMP Restoration Prioritization Tool**
- The **IFRMP Document Library** of key references used to support the planning process
- Other **supporting materials** such as conceptual models, fish habitat suitability thresholds, reference data tables and files, and complementary multimedia products.

If you have comments, suggestions, or ideas for the RAA or IFRMP, please contact the USFWS IFRMP Project Team Lead, Matt Baun (Matt_Baun@fws.gov).

7 Acknowledgements

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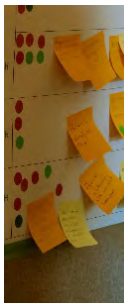
We are also grateful to the talented photographers who have captured the images of the basin used in our reporting - all photos in this document are public domain, used by permission, or used under a Creative Commons License.



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