Confluence of the salmon and Klamath Riverst,USFWS

Klamath Basin Integrated Fisheries Restoration and Monitoring Plan

Phase 3 Kick-off Webinar

Clint Alexander, Natascia Tamburello, Marc Porter, Cedar Morton, Darcy Pickard

October 22nd 2019

Attendance, If anyone new brief introductions

Meeting Objective

Introduce our overall plan for engaging with you in Phase 3, emphasizing steps, timeline and approximate level of effort

- Not discussing detailed methodology during this webinar

Call for volunteers willing to participate Jan to May 2020

Agenda

Time	Topic
~9:30a-9:35a	**Arrival, roll call.** Webinar participation reminders: • *Mute phones when not speaking; use chat feature to contribute questions*
9:35a-9:40a	**1// Recap - Where we are in process** • Release Draft IFRMP! • Thank-you for peer review input
9:40a-9:50a	**2// Summary of Phase 3 deliverables, timeline** • What's not included (need for Phase 4)
9:50a-11:00a	**3// Overview of proposed approach to restoration action prioritization** • Rapid surveys, sequence of sub-basin webinars
11:00a-11:20a	**4// Refining Core Performance Indicators** • How they fit into prioritization now and in future
11:20a-11:30a	**5// Call to form sub-basin teams** • Post-webinar survey • Reminder on support funding [Chris / Matt]
11:30a	Adjourn

1 Recap on Recent Events

Where Are We In the Process?

Phase 1: Synthesis Report

IFRMP web site, doc library & interviews

Phase 1 Synthesis Report

Phase 2: Vision, Frameworks & Initial Draft

Define Objectives, Indicators, Actions, Mon + Prioritization Frmwks

Draft Plan Document

(completed public review)

YOU ARE HERE

Phase 3: Prioritization of Restoration Actions

Refine CPIs (& suitability thresholds)

Iterative Prioritization

(subbasin, subregional, basin-wide scales)

Draft Plan Document

(peer review)

Phase 4? TBD

Detailed costs
Monitoring priorities
Adaptive mgmt. implementation
Plan Document

Draft IFRMP document released Oct 15 2019

Obtain here:
http://kbifrm.psmfc.org/

Klamath Basin Integrated Fisheries Restoration and Monitoring Plan (IFRMP) Phase 2 (Task 1.2)

Draft Plan

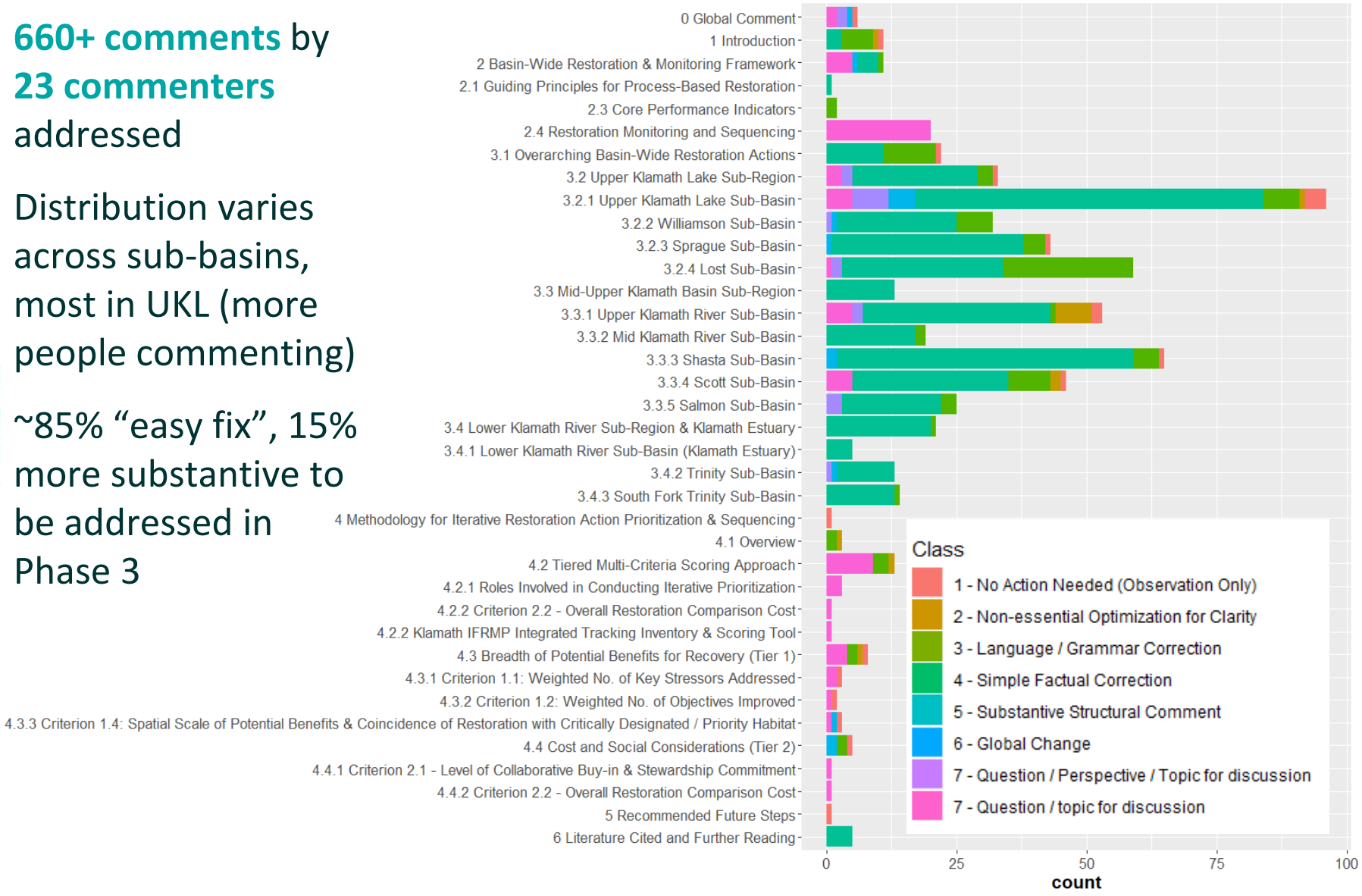
October 15, 2019

Prepared for the Pacific States Marine Fisheries Commission

ESSA

Thank-you for Phase 2 Comments!

- **660+ comments** by **23 commenters** addressed
- Distribution varies across sub-basins, most in UKL (more people commenting)
- ~85% "easy fix", 15% more substantive to be addressed in Phase 3



2 Phase 3 Overview Deliverables & Timeline

Phase 3 (2019-2020)

Refine CPIs & Suitability Thresholds

Peer review **CPIs** & **Suitability thresholds**, That will be essential to guiding sequencing and phasing.

Prioritization

Perform **test application**, conduct **sensitivity analysis**, **Finalize tool.**

Generate prioritized list of actions.

Draft IFRMP Document

Update Plan documents with results of earlier steps.

Peer Review

Engage SRWG members to review products (webinars, 1:1 technical team mtgs, peer review findings workshop).

Phase 3 (2019-2020)

- Increased engagement with **smaller** expertise-based teams to tackle discrete tasks, e.g.,:
  - Core performance indicators (CPIs) & suitability thresholds to gauge phase progression
  - Iteratively test & revise prioritization framework and tool

Phase 3: Timeline & Major Deliverables

Major Milestone / Deliverable	When
Official Phase 3 kick-off webinar. Solicit needed info to add missing actions. Make call to participate in sub-basin prioritization teams, provide overview of Phase 3	**Oct 22**
Clarify/add missing restoration actions to sub-basins	**Oct – Dec 2019**
Refine CPIs & determine suitability thresholds. Attempt initial (qualitative) characterization current CPI status in different sub-basins or regions.	**Oct 2019 – Feb 2020**
Build simple (web) user interface for Integrated Tracking Inventory & Scoring Tool to support collaborative multi-scale prioritization	**Oct 2019 – Jan 2020**
Engage with sub-basin groups (plan and deliver iterative webinars supported by surveys). Iteratively apply ITI Scoring Tool	Late Jan – Apr 2020
Perform the ranking exercise at sub-regional spatial scale	Apr – May 2020
Perform the ranking exercise at basin-wide spatial scale	May 2020

Phase 3: Timeline & Major Deliverables

Major Milestone / Deliverable	When
Draft/update chapters, produce first draft of the main Plan document	Mar - Jun 2020
Following internal review with Federal Coordination Group, **publish draft Plan to Klamath website, conduct peer review of draft Plan**, collect, organize and summarize comments	Jul - mid Sep 2020
Address priority comments, **produce complete draft of main Plan document**	Sep - Oct 2020
Deliver **final Phase 3 presentation webinar**	Oct-Nov 2020

Deferred to Phase 4

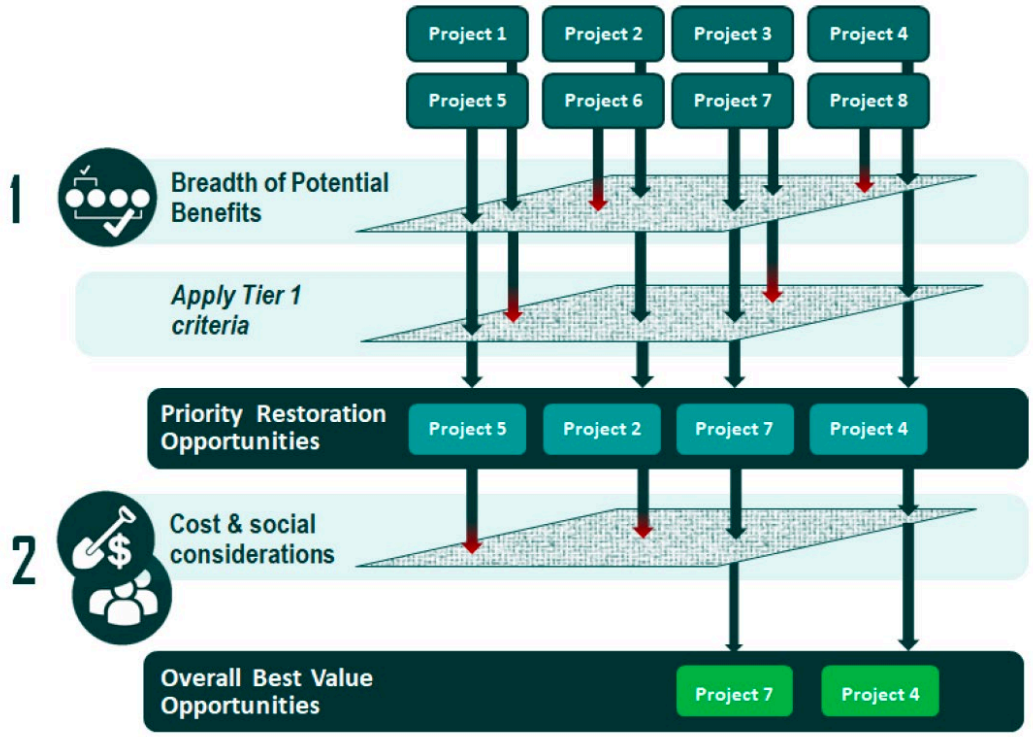
- Detailed **restoration action costs**
- The restructured Phase 3 Plan **will <u>not</u> include any substantive advancements on monitoring aspects of the Plan**, including monitoring cost estimates
- We will strive in Phase 3 to reconcile with Oregon Fisheries Reintroduction Plan, Upper Klamath Watershed Action Plan, Klamath River Renewal Corporation dam removal process decisions by FERC, etc., *but not in detail* (until Phase 4).
- Provision of **adaptive management readiness products** (e.g., mock annual adaptive management reporting template)
- Establishing **Adaptive Governance structures** to empower and enable Plan implementation, as appropriate, and consistent with parallel efforts such as the Coalition of the Willing process, Sovereign's Forum process, etc.
- Additional meetings, workshops, outreach efforts beyond budget
- Any wholesale restructuring of the Plan document

Questions?

Any surprises in the Phase 3 work scope?

3 Overview Phase 3: Approach to Prioritization

Prioritization Criteria from Phase 2



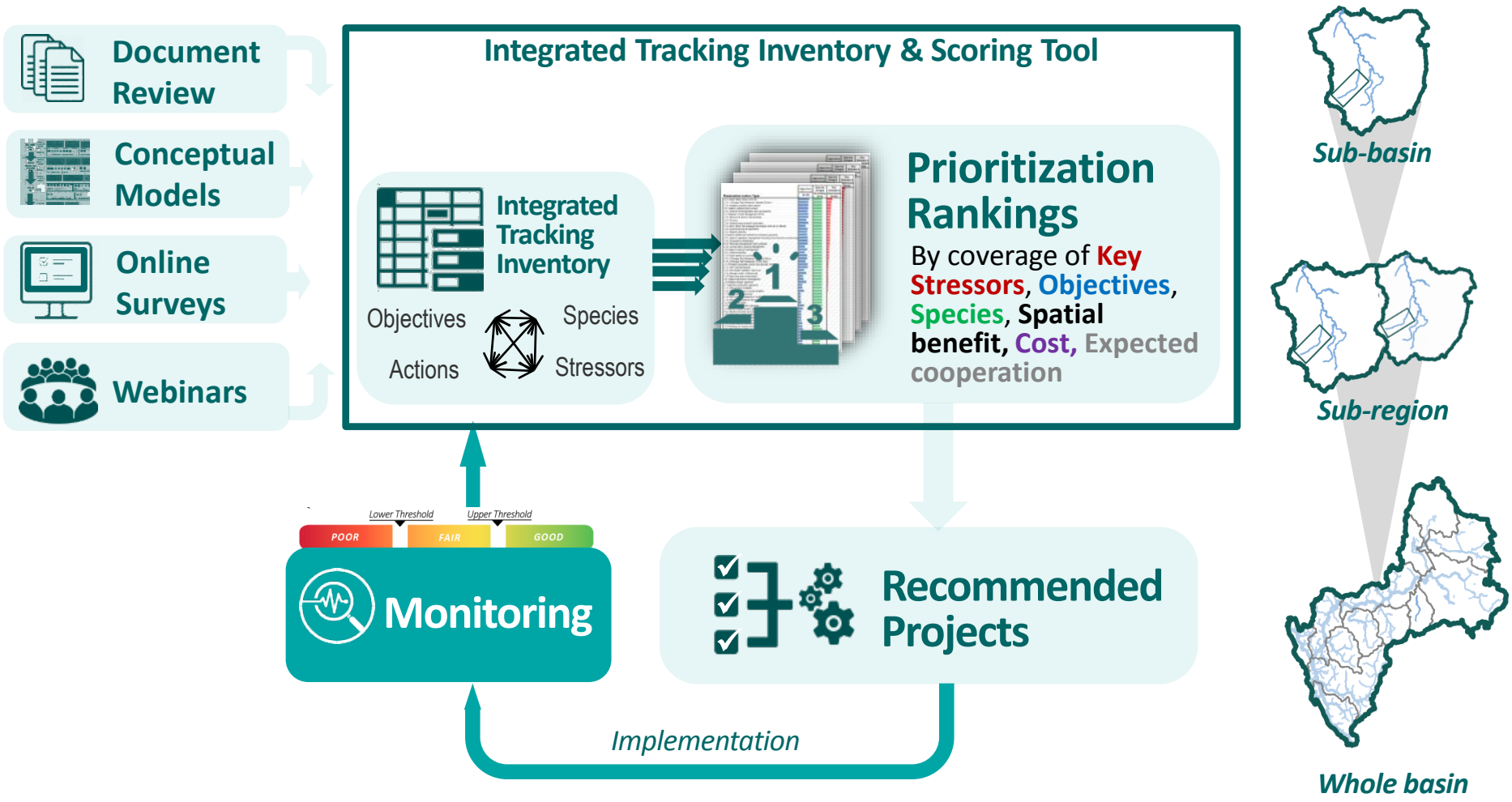
Tier 1 – Breadth of potential benefits (scores)

1. Objectives addressed
2. Biophysical tier targeted
3. Focal species coverage
4. Spatial coverage (scale & priority habitat)

Tier 2 – Cost & social considerations

1. Multi-level collaboration & support (score)
2. Comparison cost (*meta data only)

Participatory approach to restoration action prioritization



What we've accomplished together so far...

- Document Review
- Conceptual Models
- Online Surveys
- Webinars

Integrated Tracking Inventory & Scoring Tool

YOU ARE HERE

Integrated Tracking Inventory

Objectives · Species · Actions · Stressors

Prioritization Rankings

By coverage of **Key Stressors**, **Objectives**, **Species**, **Spatial benefit**, **Cost**, Expected cooperation

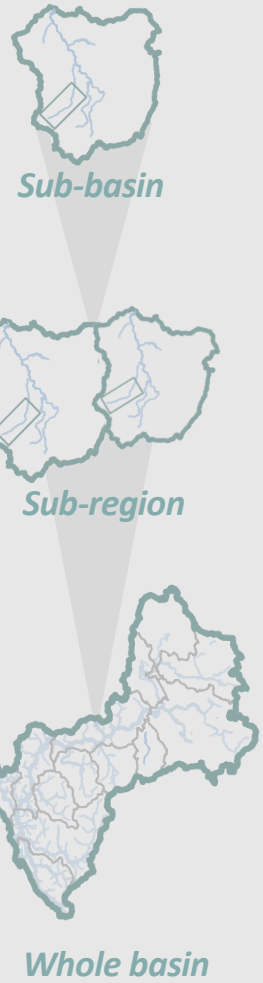
Lower Threshold · Upper Threshold

POOR · FAIR · GOOD

Monitoring

Recommended Projects

Implementation



What's next...

1

Webinars

Online Surveys

Document Review

Conceptual Models

Online Surveys

Webinars

Integrated Tracking Inventory & Scoring Tool

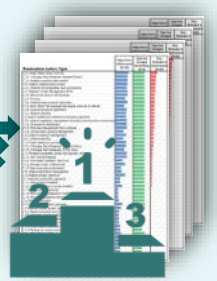
Integrated Tracking Inventory

Objectives

Species

Actions

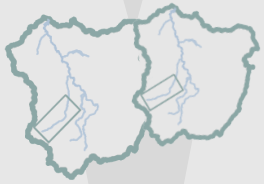
Stressors



Prioritization Rankings

By coverage of **Key Stressors**, **Objectives**, **Species**, **Spatial benefit**, **Cost**, Expected cooperation

Sub-basin

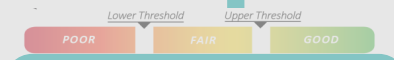


Sub-region

Whole basin

2

Recommended Projects



Monitoring

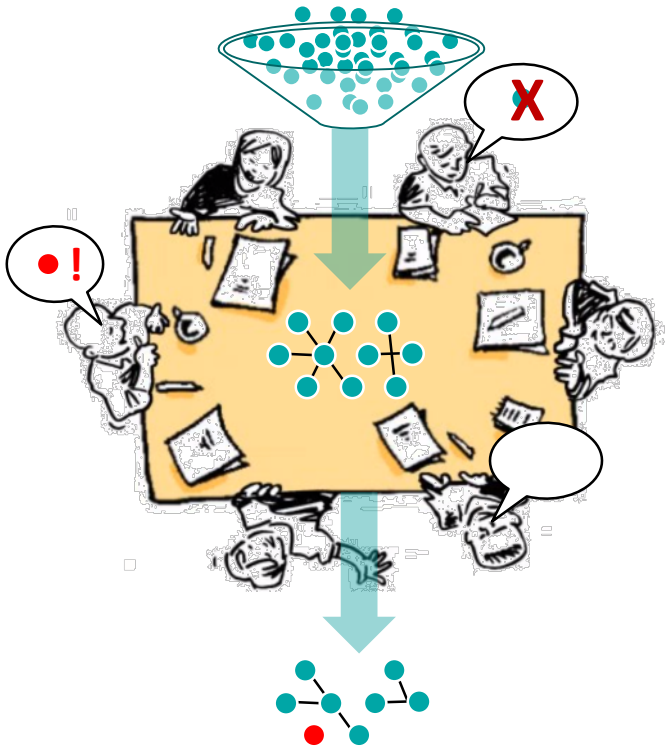
Implementation

Integrated Tracking Inventory & Scoring Tool

riority	Subbasin	Project No.	Project Description	Restoration Action Type (PCSRF Data Dictionary)	Criterion 1.1: Weighted Stressors Addressed	Criterion 1.2: Weighted Objectives Improved	USED Criterion (1.1 + 1.2)/2	Criterion 1.3: Multi-Species Benefit Score	Criterion 1.4: Weighted Spatial Scale of Potential Benefit	Criterion 2.1: Weighted Level Cooperation & Stewardship Commitment	TOTAL SCORE
1	Mid Klamath River	1	Remove upstream Klamath mainstem dams: Iron Gate, Copco 1 and 2, and JC Boyle to restore natura	C.2.c-Major Major dams removed	36	56	46	22	20	12.5	100.5
2	Upper Klamath River	1	Remove upstream Klamath mainstem dams: Iron Gate, Copco 1 and 2, and JC Boyle to allow access t	C.2.c-Major Major dams removed	36	56	46	22	15	12.5	95.5
3	Mid Klamath River	2	Adaptively manage releases from Klamath mainstem dams (while they remain in place, as per 2019	C.3.h.1 Manage Dam Releases (Klamath Dams)	34	48	41	22	20	12.5	95.5
4	Upper Klamath Lake	7	Implement improvements in summertime stream flows through increased water use efficiency, trans	C.3.e Irrigation practice improvement; C.3.f Water leased or purchased	36	44	40	24	15	12.5	91.5
5	Upper Klamath Lake	10	Improve habitat quantity and quality of shoreline springs in Upper Klamath Lake for lake-spawning	C.4.f Spawning gravel placement; C.3.g Manage water withdrawals; C.3.h.3 M	33	52	42.5	24	10	12.5	89
6	Upper Klamath Lake	3	Pursue restoration of additional lake fringe wetlands through wetland reserve easements, land acq	C.8.e Wetland improvement/ restoration	33	44	38.5	22	15	12.5	88
7	Sprague	2	Improve instream flows through increased water use efficiency, particularly through installation of	C.3.e Irrigation practice improvement	36	36	36	24	15	12.5	87.5
8	Upper Klamath Lake	2	Minimize irrigation return flow via conversion of flood or furrow irrigation into drip, sprinkler, or g	C.3.e Irrigation practice improvement	36	36	36	24	15	12.5	87.5
9	Williamson	6	Protect, reconnect, and restore cold-water springs guided by existing groundwater studies and/or FI	C.4.c Channel reconfiguration and connectivity	36	32	34	24	15	12.5	85.5
10	Sprague	6	Improve in-stream habitat by adding large wood and spawning gravels and supporting pool develop	C.4.f Spawning gravel placement; C.4.d Channel structure placement; C.4.c C	36	32	34	24	15	12.5	85.5
11	Upper Klamath Lake	8	Strategic restoration to stage 0 through hydrologic reconnection, remeandering, and beaver manage	C.4.c Channel reconfiguration and connectivity; C.4.h Beavers & beaver dam	36	44	40	18	15	12.5	85.5
12	Upper Klamath River	5	Adaptively manage releases from Klamath mainstem dams (while they remain in place, as per 2019	C.3.h.1 Manage Dam Releases (Klamath Dams)	34	48	41	22	10	12.5	85.5
13	Williamson	1	Implement improvements in summertime stream flows through increased water use efficiency, trans	C.3.e Irrigation practice improvement; C.3.f Water leased or purchased	24	44	34	24	15	12.5	85.5
14	Williamson	5	USDA Forest Service will work with permittees to adjust grazing strategies for pastures and allotmer	C.5.g Conservation grazing management	36	36	36	21	15	12.5	84.5
15	Shasta	5	Identify and implement projects to reduce warm tailwater inputs into streams, with priority implem	C.7.n Tailwater return reuse or filtering; C.3.e Irrigation practice improveme	32	36	34	22	15	12.5	83.5
16	Sprague	3	Work with willing landowners to restore riparian plant communities through installation and main	C.5.c Riparian planting; C.5.d Fencing; C.6.j Upland livestock management	28	36	32	24	15	12.5	83.5
17	Williamson	7	Work with willing landowners to restore riparian plant communities by fencing and/or planting of r	C.5.c Riparian planting; C.5.d Fencing; C.6.j Upland livestock management	36	36	36	24	10	12.5	82.5
18	Williamson	4	Strategic restoration to stage 0 through beaver management and or installation of check dams or be	C.4.h Beavers & beaver dam analogs	36	40	38	16	15	12.5	81.5
19	Upper Klamath River	6	Improve irrigation practices to increase instream flows in tributaries.	C.3.e Irrigation practice improvement	30	36	33	21	15	12.5	81.5
20	Shasta	2	Increase instream flows and improve flow timing by assessing and relocating or redesigning the div	C.3.e Irrigation practice improvement	30	36	33	21	15	12.5	81.5
21	Scott	2	Assess irrigation system water use efficiency and implement water use efficiency improvements thr	C.3.e Irrigation practice improvement	30	36	33	21	15	12.5	81.5
22	Upper Klamath Lake	1	Manage grazing strategies using rotation or variable timing on private lands in the Wood River whi	C.5.g Conservation grazing management	23	36	29.5	24	15	12.5	81
23	Lost	2	Reconfigure the arrangement of Willow Creek with the forebay of Clear Lake to overcome limited acc	C.4.c Channel reconfiguration and connectivity	36	32	34	24	10	12.5	80.5
24	Upper Klamath Lake	6	Reconnect springs and ensure access to spring-fed refuge habitat during periods of poor water qual	C.4.c Channel reconfiguration and connectivity	36	32	34	24	10	12.5	80.5
25	Lost	9	Improve in-stream, wetland, and riparian habitat in around the mouth of Willow Creek where it mee	C.8.e Wetland improvement/ restoration; C.4.d Channel structure placement	46	52	49	6	10	12.5	77.5
26	Shasta	8	Consider restoring upstream fish passage at Dwinnell Dam to open up large areas of suitable coho,	C.4.c Channel reconfiguration and connectivity	28	32	30	20	15	12.5	77.5
27	Shasta	9	Identify and implement restoration projects that restore floodplains through improving or creating	C.4.c Channel reconfiguration and connectivity	28	32	30	20	15	12.5	77.5
28	Scott	6	Assess feasibility, develop a plan, and remove, setback, or reconfigure levees and dikes to restore cl	C.4.c Channel reconfiguration and connectivity	28	32	30	20	15	12.5	77.5
29	Scott	8	Identify high-priority sites for enhancing refugia habitats and construct off channel-ponds, alcoves,	C.4.c Channel reconfiguration and connectivity	28	32	30	20	15	12.5	77.5
30	Salmon	2	Floodplain enhancement and mine tailing remediation. Address historical mining impacts in ripari	C.4.c Channel reconfiguration and connectivity	28	32	30	20	15	12.5	77.5

Prioritization Tool Provides Ranked List of Actions for Further Deliberations…

IS



IMPLEMENT

NOT

IMPLEMENT

Goal…

Recommended Projects

Whole basin

Sub-basin

- ☐ _____
- ☐ _____
- ☐ _____

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
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- ☐ _____

Sub-region filter also possible

Sub-region

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Suggested Process & Sub-basin Teams…

Scott
(TBD)

Test survey & webinar design

Pilot Sub-basin Team

Lower Klamath River & Estuary

Trinity & S. Fork Trinity

Salmon

Shasta

Mid-Klamath River & Upper Klamath River

UKL & Williamson & Sprague

Lost

All Remaining Sub-basin Teams (x8)

Do these sub-basin groupings make sense?
Any advice on choice of pilot sub-basin?

Activities…

PART 1: All Participants (Basin-wide)

Webinar 1 – The Prioritization Tool
Introduction to the prioritization tool & prioritization contexts/scenarios

Web Survey 1 - CPIs
Preferences about candidate CPI thresholds

Webinar 2 – CPI determination & thresholds
Review survey results & determine site/sub-basin scale CPIs & sub-basin specific suitability thresholds

Activities…

PART 2: Individual Sub-basin Teams (x8 + pilot team)

Webinar 3 – Restoration Actions
Review spatial scale criteria for existing projects
Add and refine any missing actions

Web Survey 2 – Restoration Needs
Preferences about prioritization of restoration needs

Webinar 4 – Prioritization #1
Review of survey results, validation & refinement of prioritization tool outputs

Activities…

PART 3: All Participants (Basin-wide)

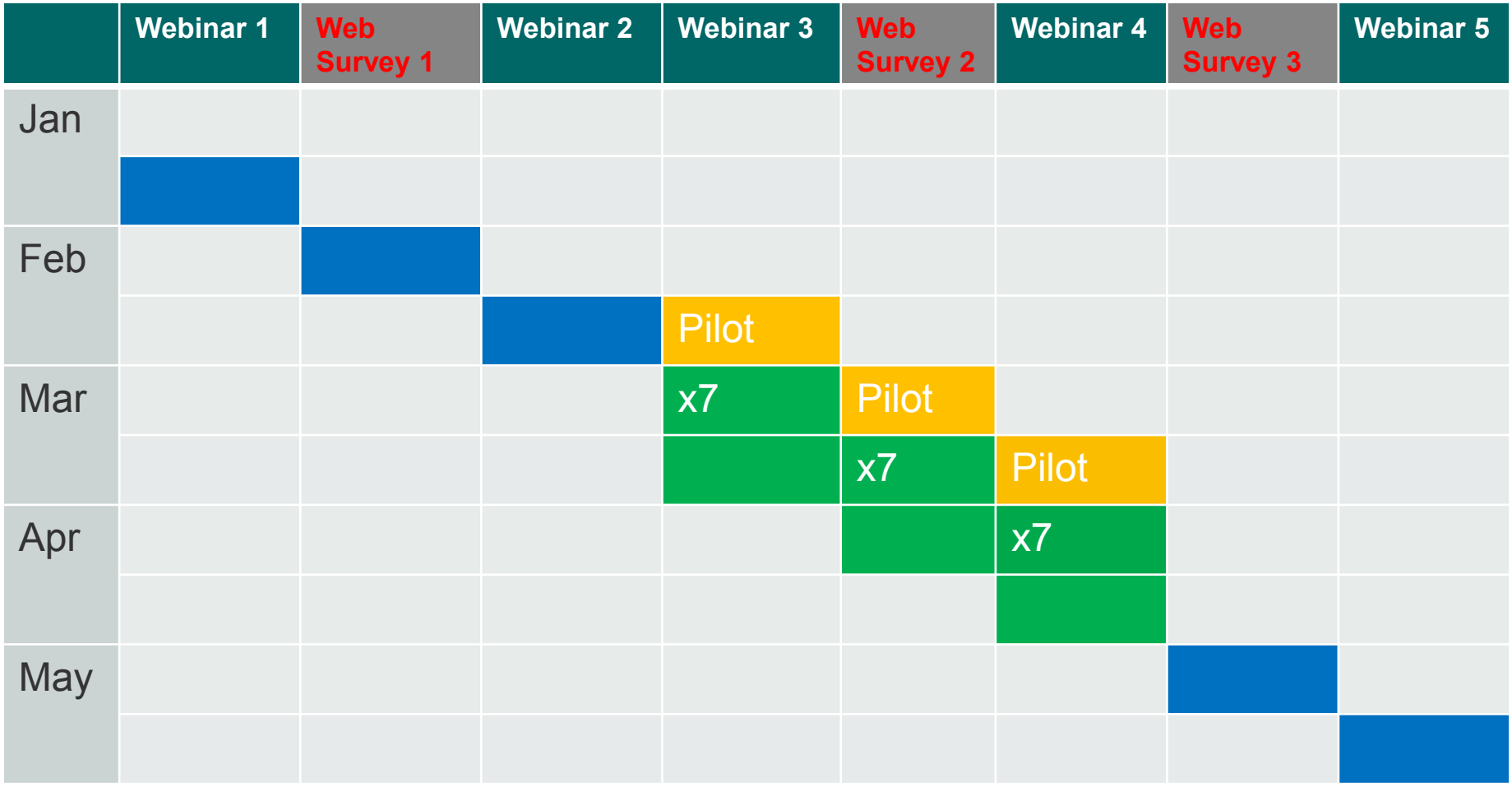
Web Survey 3 – Evaluation Criteria
Preferences about importance of evaluation criteria

Webinar 5 – Prioritization #2
Final peer review comments, validation & refinement of results

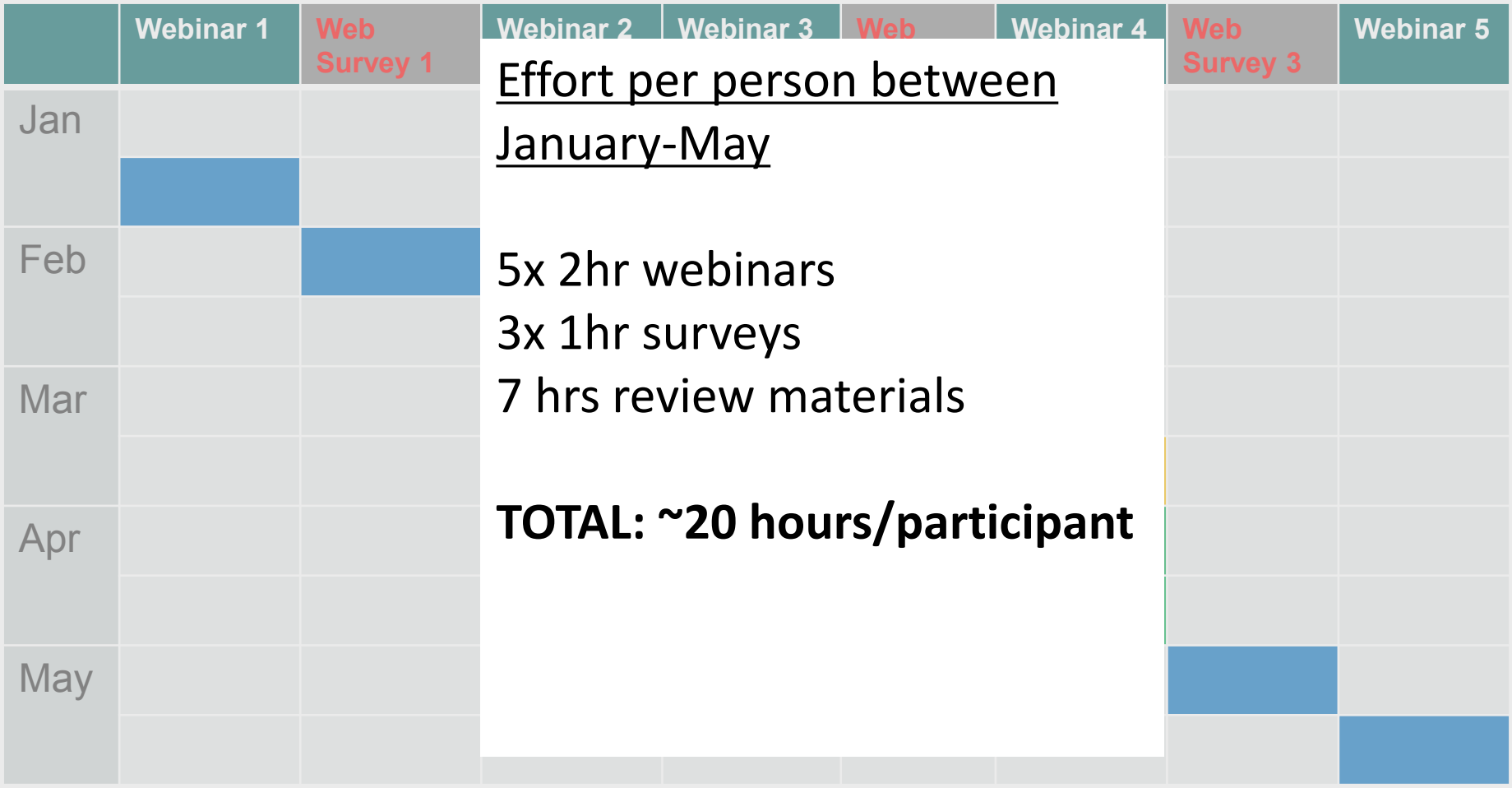
Activity	Purpose	Duration	Timing
Webinar 1 – The Prioritization Tool	Introduction to the prioritization tool & prioritization contexts/scenarios	2hr	late January
Web Survey 1 - CPIs	Preferences about candidate CPI thresholds	~1hr	early February
Webinar 2 – CPI determination & thresholds	Review survey results & determine site/sub-basin scale CPIs & sub-basin specific suitability thresholds	2hr	mid February
Webinar 3 – Restoration Actions	Add and refine any missing actions; define spatial scale criteria rankings for each candidate project (criterion #4 in Tier 1)	2hr	late February (Pilot) March (x8)
Web Survey 2 – Restoration Needs	Preferences about prioritization of restoration needs	~1hr	early March (Pilot) March-April (x8)
Webinar 4 – Prioritization #1	Review of survey results, validation & refinement of prioritization tool outputs	2hr	late March (Pilot) April (x8)
Web Survey 3 – Evaluation Criteria	Preferences about importance of evaluation criteria	~1hr	April
Webinar 5 – Prioritization #2	Final peer review comments, validation & refinement of results	2hr	May

= Sub-basin teams (x9)

Timeline for Engagement



Timeline for Engagement



Effort per person between January-May

5x 2hr webinars
3x 1hr surveys
7 hrs review materials

TOTAL: ~20 hours/participant

Basin-wide (All)	Pilot Sub-Basin	Sub-basins (concurrent x7)

Webinar 1. Introduction to the prioritization tool & prioritization contexts

Document Review

Conceptual Models

Online Surveys

Webinars

Integrated Tracking Inventory & Scoring Tool

Integrated Tracking Inventory

Objectives Species Actions Stressors

Prioritization Rankings

By coverage of **Key Stressors**, **Objectives**, **Species**, **Spatial benefit**, **Cost**, Expected cooperation

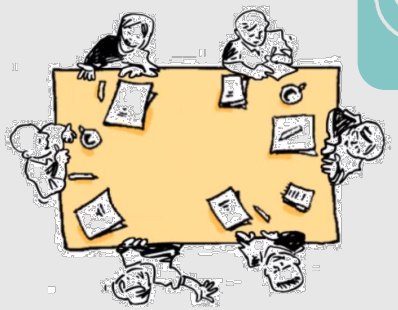
Lower Threshold Upper Threshold

POOR FAIR GOOD

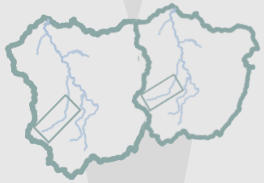
Monitoring

Recommended Projects

Implementation



Sub-basin



Sub-region

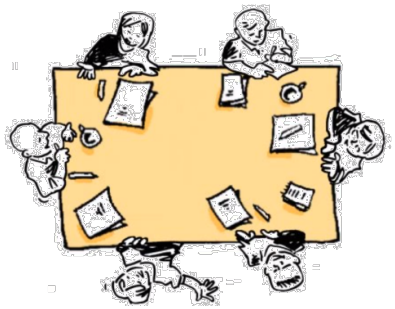
Whole basin

Webinar 1. Introduction to the prioritization tool & prioritization contexts

Example…

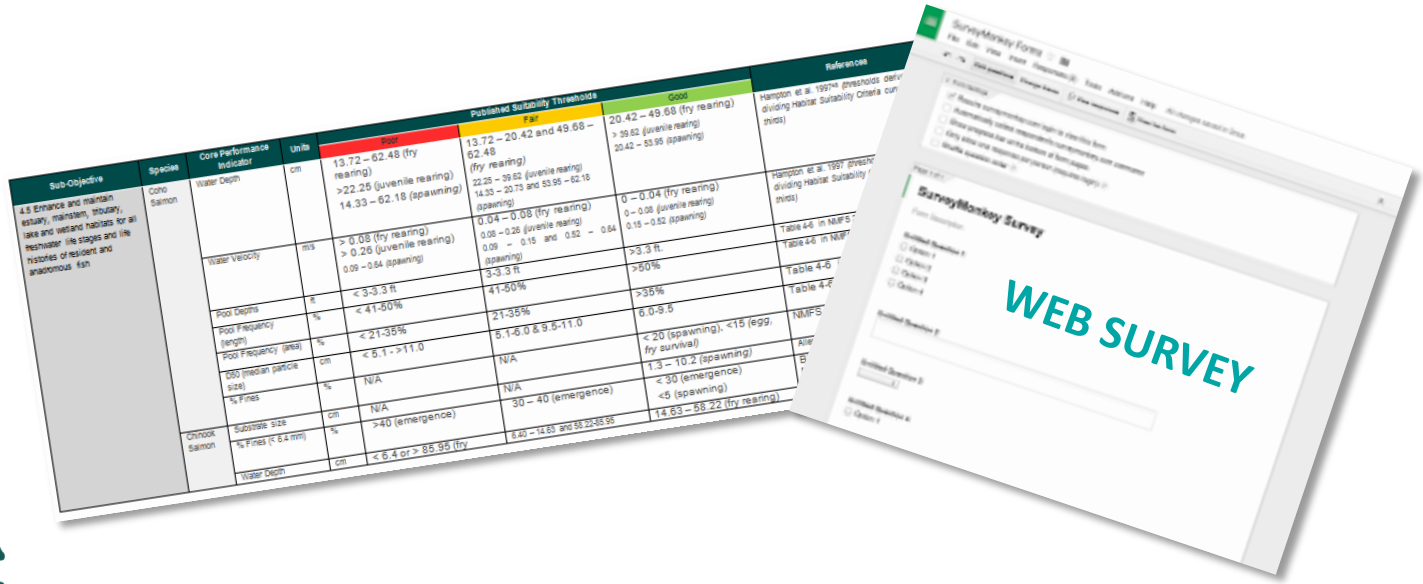
Scenario 1*	Scenario 2
• Dams in (current hydrosystem) • Current climate or future climate? (TBD)	• Dams out • Current climate or future climate? (TBD)

***Note: Survey responses required for each scenario**



Basin-wide

Web Survey 1. CPIs and Thresholds

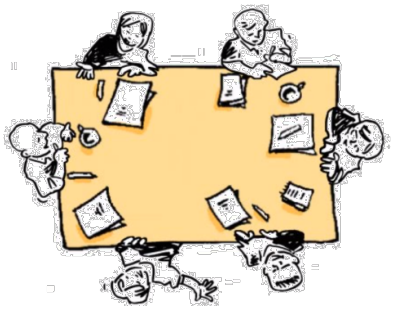


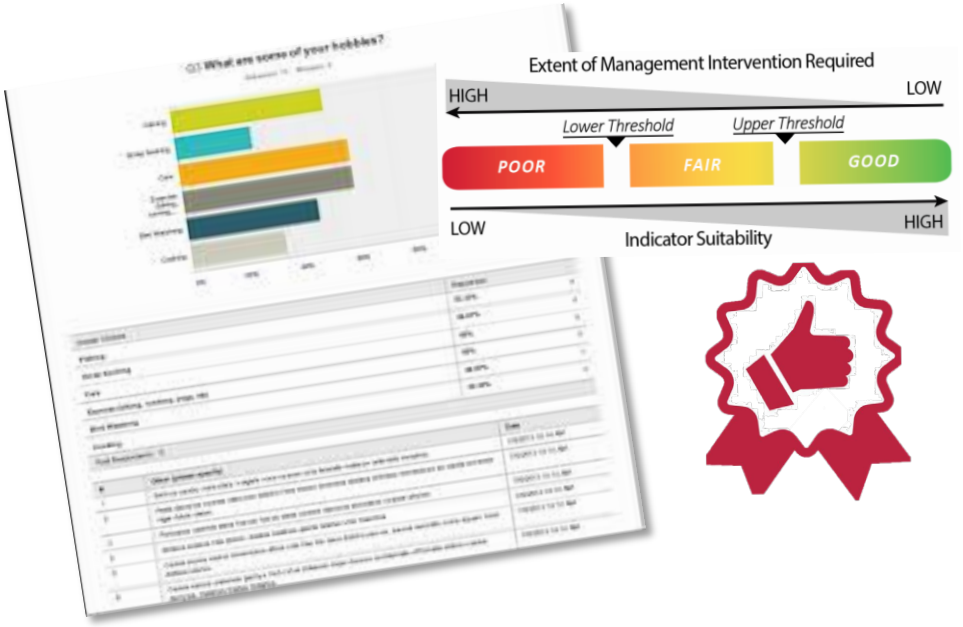
Sub-basin teams Individually

- **Pre-reading of potential CPI thresholds** identified by literature review in Phase 1
- **Web survey** to elicit preferences on thresholds for SITE to SUBBASIN scales CPIs **thresholds for specific sub-basins** (from table or new)

Webinar 2. CPI & Thresholds Determination

- Review **results of CPI & threshold web survey**
- Discuss and reach general agreement on best thresholds to use for different sub-basins and contexts
- Discuss suitability of roll-ups proposed for whole-basin scale

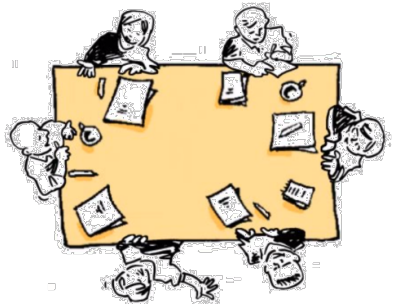




Basin-wide

Webinar 3. Add and Refine Missing Actions

Easy web-based user interface to incorporate participant feedback (ESSA facilitates, performs configuration w tool)



Sub-basin teams Individually

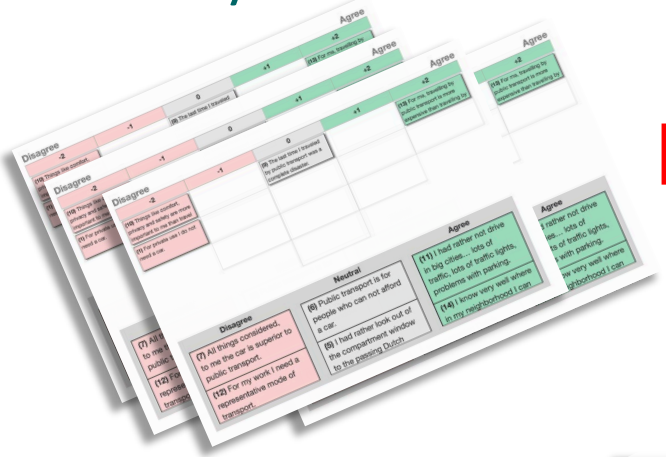
Web Survey 2. Preferences about importance of different restoration needs

Sub-basin teams Individually

- Quick; easy
- Statistically robust
- Repeatable
- Forces trade-offs
- Identifies ‘consensus’ priorities

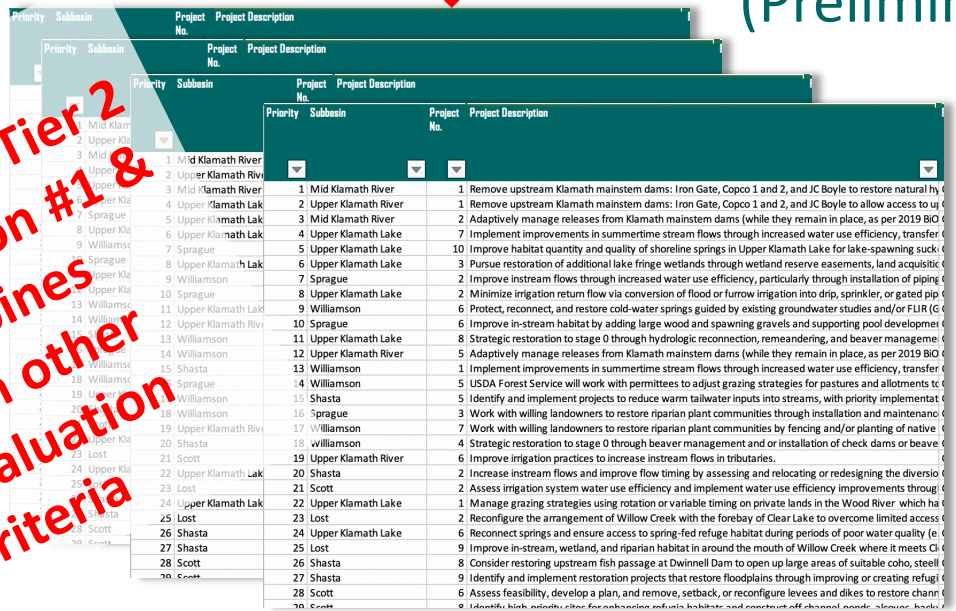
ESSA Application of Survey 2 Results to Prioritization Tool

Survey #2 Results



Prioritization Tool

Recommended Projects (Preliminary)



Survey informs Tier 2 criterion #1 & combines with other evaluation criteria

Sub-basin level

Goal…

Recommended Projects

Whole basin

Sub-basin

- ☐ _____
- ☐ _____
- ☐ _____

- ☐ _____
- ☐ _____
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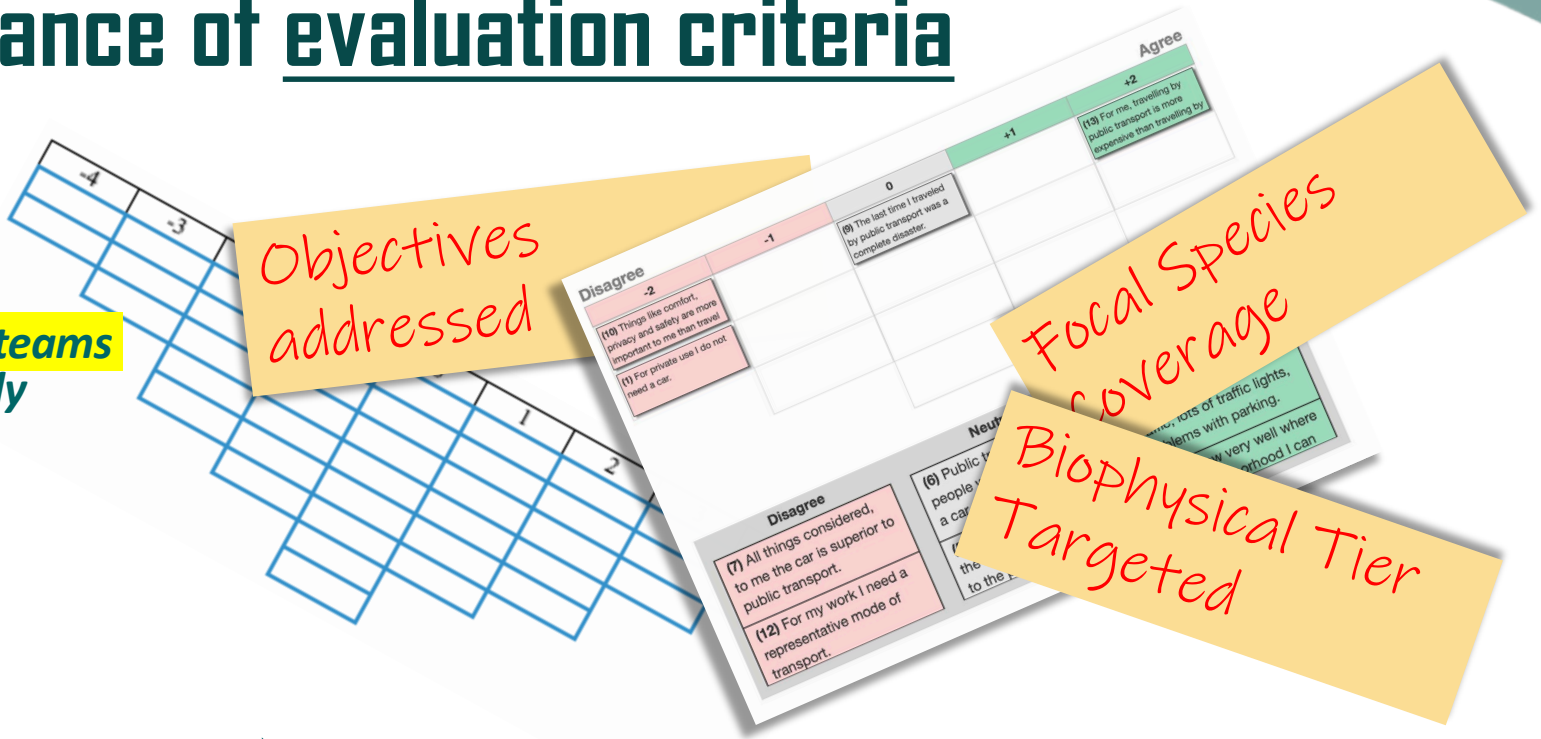
Sub-region filter also possible

Sub-region

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Web Survey 3. Preferences about importance of evaluation criteria

All sub-basin teams simultaneously



1. **Biophysical tier targeted**
1. Objectives addressed
2. ~~Biophysical tier targeted~~
3. Focal species coverage
4. Spatial coverage (scale & critical habitat)
5. Multi-level collaboration & support

ESSA Application of Survey 3 Results to Prioritization Tool

Survey #3 Results

Prioritization Tool

Survey informs scoring tool. All evaluation criteria now combined and weighted

Priority	Subbasin	Project No.	Project Description
1	Mid Klamath River	1	Remove upstream Klamath mainstem dams: Iron Gate, Copco 1 and 2, and JC Boyle to restore natural hy
2	Upper Klamath River	1	Remove upstream Klamath mainstem dams: Iron Gate, Copco 1 and 2, and JC Boyle to allow access to u
3	Mid Klamath River	2	Adaptively manage releases from Klamath mainstem dams (while they remain in place, as per 2019 BiO
4	Upper Klamath Lake	7	Implement improvements in summertime stream flows through increased water use efficiency, transfer
5	Upper Klamath Lake	10	Improve habitat quantity and quality of shoreline springs in Upper Klamath Lake for lake-spawning suck
6	Upper Klamath Lake	3	Pursue restoration of additional lake fringe wetlands through wetland reserve easements, land acquisitic
7	Sprague	2	Improve instream flows through increased water use efficiency, particularly through installation of piping
8	Upper Klamath Lake	2	Minimize irrigation return flow via conversion of flood or furrow irrigation into drip, sprinkler, or gated pip
9	Williamson	6	Protect, reconnect, and restore cold-water springs guided by existing groundwater studies and/or FLIR (G
10	Sprague	6	Improve in-stream habitat by adding large wood and spawning gravels and supporting pool developmer
11	Upper Klamath Lake	8	Strategic restoration to stage 0 through hydrologic reconnection, remeandering, and beaver manageme
12	Upper Klamath River	5	Adaptively manage releases from Klamath mainstem dams (while they remain in place, as per 2019 BiO
13	Williamson	1	Implement improvements in summertime stream flows through increased water use efficiency, transfer
14	Williamson	5	USDA Forest Service will work with permittees to adjust grazing strategies for pastures and allotments to
15	Shasta	5	Identify and implement projects to reduce warm tailwater inputs into streams, with priority implementat
16	Sprague	3	Work with willing landowners to restore riparian plant communities through installation and maintenanc
17	Williamson	7	Work with willing landowners to restore riparian plant communities by fencing and/or planting of native
18	Williamson	4	Strategic restoration to stage 0 through beaver management and or installation of check dams or beave
19	Upper Klamath River	6	Improve irrigation practices to increase instream flows in tributaries.
20	Shasta	2	Increase instream flows and improve flow timing by assessing and relocating or redesigning the diversio
21	Scott	2	Assess irrigation system water use efficiency and implement water use efficiency improvements throug
22	Upper Klamath Lake	1	Manage grazing strategies using rotation or variable timing on private lands in the Wood River which ha
23	Lost	2	Reconfigure the arrangement of Willow Creek with the forebay of Clear Lake to overcome limited access
24	Upper Klamath Lake	6	Reconnect springs and ensure access to spring-fed refuge habitat during periods of poor water quality (e
25	Lost	9	Improve in-stream, wetland, and riparian habitat in around the mouth of Willow Creek where it meets Cl
26	Shasta	8	Consider restoring upstream fish passage at Dwinnell Dam to open up large areas of suitable coho, steelh
27	Shasta	9	Identify and implement restoration projects that restore floodplains through improving or creating refugi
28	Scott	6	Assess feasibility, develop a plan, and remove, setback, or reconfigure levees and dikes to restore chann
29	Scott	8	Identify high-priority sites for enhancing refugia habitats and construct off-channel ponds, sloughs, backv

Recommended Projects (Final)

Basin-wide

Goal…

Recommended Projects

Whole basin

Sub-basin

- ☐ _____
- ☐ _____
- ☐ _____

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Sub-region filter also possible

Sub-region

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Questions?

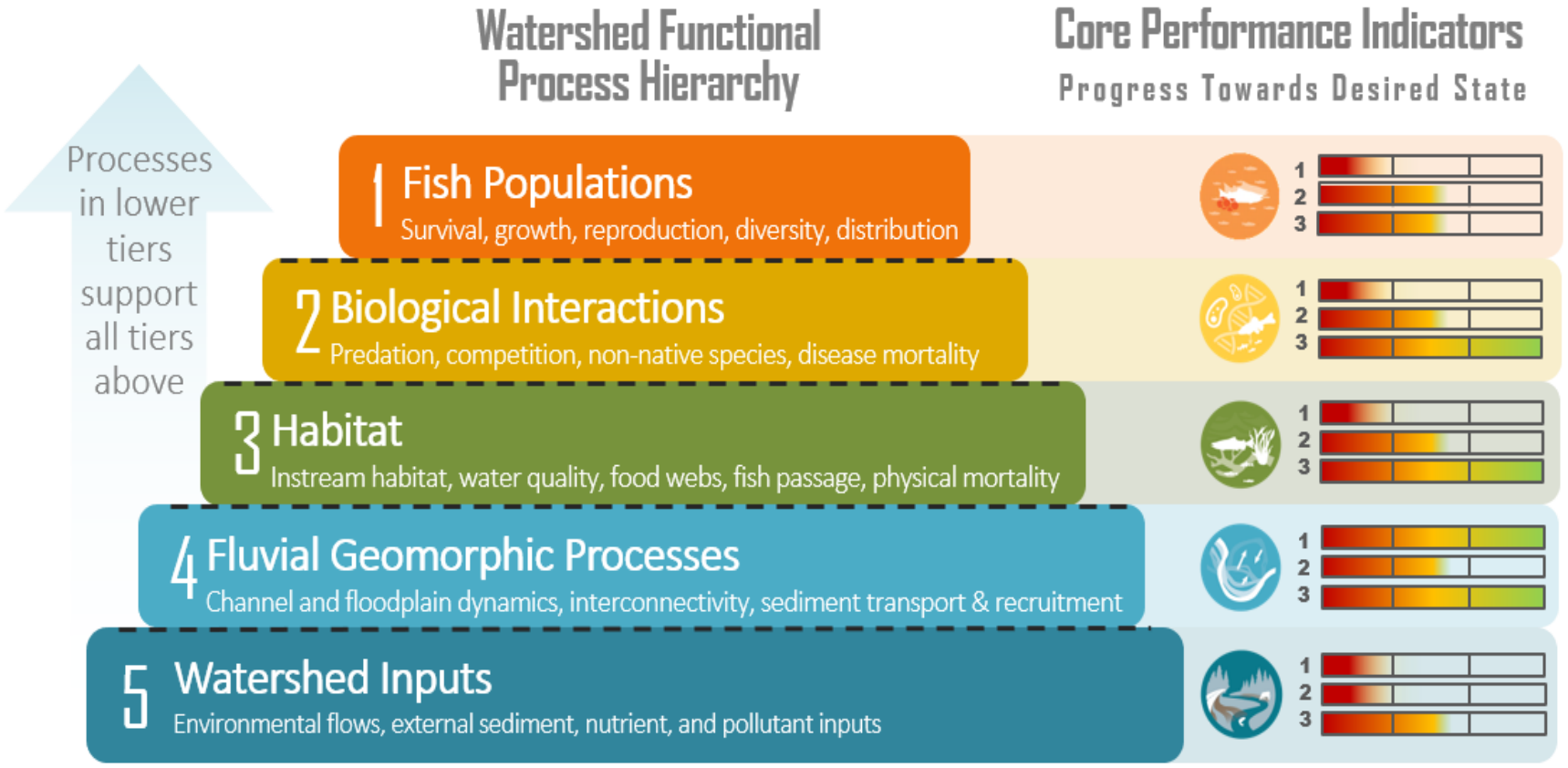
Given the goal of prioritizing basin-wide restoration actions, does the sequence and number of proposed surveys and webinars seem reasonable to you?

4

Core Performance Indicators – How They Fit In

Process-Based Restoration

- Bottom-up restoration by tier of **watershed functional processes** *instead of population benchmarks (e.g., Elwha)*
- *Default principle: Actions benefitting lower tiers favored as they will generate* **broader benefits to multiple species**

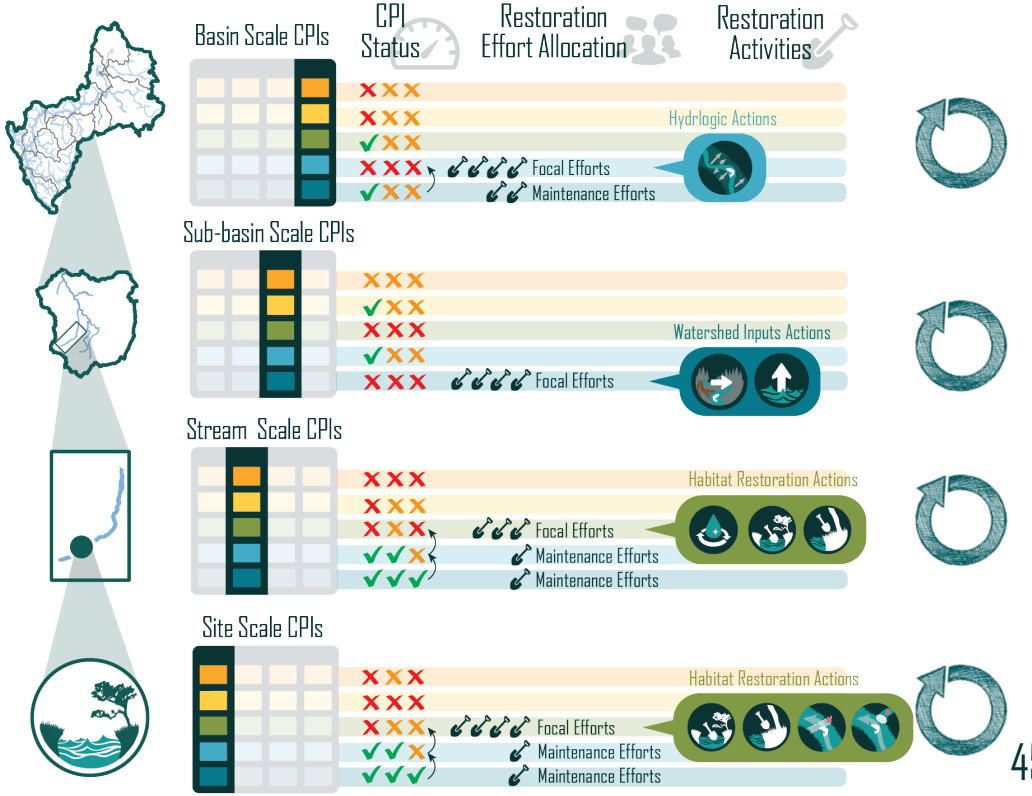


Prioritization favors projects with broadest benefits

Restoration & Monitoring Phasing, Sequencing

- Scale specific **CPIs** and **thresholds** are the basis for future **monitoring** of project effectiveness and system status and trends.
- They can also **inform phasing restoration** actions over time and space through **effects on prioritization**.

- *Default principle (but up for debate!):*
  - *CPIs **far from "good"** status will be **upweighted** for higher priority, lead to more intensive focal restoration.*
  - *CPIs **closer to "good"** status will be **downweighted** for lower priority, efforts will shift towards "maintenance" activities.*



Core Performance Indicators (CPIs)





Goal	Site / Reach	Tributary / Lake	Sub-Basin*	Whole Basin
Fish Populations *(by species)* 1. Achieve naturally self-sustaining native fish populations.	• Presence / absence [1.3, 1.5] • Presence of spawning [1.2, 1.3] • Abundance [1.3] • Growth • Survival	• Juveniles per adult [1.1] • Abundance [1.3]	• % of historical habitat occupied [1.5] • Age structure and demographics [1.2] • Genetic diversity [1.4]: Integrity, Redundancy, Life History Diversity • Estimated population size [1.3]	• # sub-basins achieving their population targets (for occupancy, abundance, extinction risk, etc.) for species that have sub-basin specific targets [1.3, 1.5] • Total # of fish populations [1.3, 1.5]
Biological Interactions (BI) 3. Reduce biotic interactions that could have negative effects on native fish pops.	• Non-native species presence, abundance [3.2] • Host polychaete *M. speciosa* and *C.shasta* densities	• Prevalence of infection [3.1] • Prevalence of mortality [3.1]	• Total stream miles with high prevalence of infection, mortality [3.1] • Total stream miles with high levels of impact by non-native species [3.2]	• # sub-basins with concerning levels of disease. • # sub-basins with concerning levels of non-native species.
Habitat (H) 4. Improve freshwater habitat access and suitability for fish and the quality and quantity of habitat used by all freshwater life stages	• Core Water Quality Metrics in suitable ranges (*by species*) [4.2] Temperature , Dissolved Oxygen, pH, Total Phosphorous, Total Nitrogen, Nuisance Phytoplankton (density, chlorophyll-a, cyanotoxins)	• Stream Condition Index [4.3] (via SWAMP monitoring program) • Habitat Suitability Rating [4.5] By species based on: Water depth and velocity, pool frequency (depth and area), D_{50} (median particle size), % fines, salinity (estuary), lake level (suckers)	• % historical habitat accessible [4.1] • % of moderate/ high intrinsic Potential (IP) habitat occupied [4.1] • Estimated number of fishes entrained *(by species)* [4.4] • Cumulative size and number of thermal / WQ refugia habitat [4.2, 4.5]	• # sub-basins with desirable habitat suitability (*by species*) [5.1, 5.2, 5.3]
Fluvial Geomorphic Processes (FG) 5. Create and maintain spatially connected and diverse channel and floodplain morphologies	• Bed mobility at selected reaches [5.1] • Large wood recruitment [5.3]	• Geomorphic flushing flows (extent and duration) [5.1] • Area of connected floodplain • Index of channel complexity • % of riparian area disturbed	• Area and duration of inundation at identified key flow thresholds [5.2] *(including floodplain, wetlands, off-channel habitat)* • Total area recently logged	• # sub-basins with desirable morphology [5.1, 5.2, 5.3] • Total stream miles with desirable morphology [5.1, 5.2, 5.3]
Watershed Inputs (WI) 6. Improve water quality, quantity, and ecological flow regimes	• Ratio fine to coarse particulate organic matter (FPOM: CPOM) [6.2]	• # diversions / area OR # cfs dedicated to stream (temporary v. permanent) [6.1] • Monthly flows as % of modelled historical natural flows [6.1] • Annual loads sand or larger grain sizes (magnitude and variability) [5.2]	• Implementation rate of agricultural, ranching, and logging best management practices [6.3] • Total stream miles with desirable flow and sediment conditions [6.1, 6.2, 6.3] • Road density	• # Sub-basins with desirable mean flow and sediment conditions [6.1, 6.2, 6.3] • Total stream miles with desirable flow and sediment conditions [6.1, 6.2, 6.3]

NEW since early Phase 2

Several comments on these received in Phase 2, but not yet addressed.
Documented to seed work on refining CPIs in Phase 3.

Core Performance Indicators (CPIs)





Goal	Site / Reach	Tributary / Lake	Sub-Basin*	Whole Basin
Fish Populations *(by species)* 1. Achieve naturally self-sustaining native fish populations.	• Presence / absence [1.3, 1.5] • Presence of spawning [1.2, 1.3] • Abundance [1.3] • Growth • Survival	• Juveniles per adult [1.1] • Abundance [1.3]	• % of historical habitat occupied [1.5] • Age structure and demographics [1.2] • Genetic diversity [1.4]: Integrity, Redundancy, Life History Diversity • Estimated population size [1.3]	• # sub-basins achieving their population targets (for occupancy, abundance, extinction risk, etc.) for species that have sub-basin specific targets [1.3, 1.5] • Total # of fish populations [1.3, 1.5]
Biological Interactions (BI) 3. Reduce biotic interactions that could have negative effects on native fish pops.	• Non-nati… species presence, abund… [3.2] • Host p… C.sha…	• Prevalence of infection [3.1] • Prevalence of mortality [3.1]	• Total stream miles with high prevalence of infection, mortality [3.1]	• # …basins with concerning levels of di…se. • # sub-…sins with concerning levels of non-…ative species.
Habitat (H) 4. Improve freshwater habitat access and suitability for fish and the quality and quantity of habitat used by all freshwater life stages	• Core … suitab… ranges *(by s…* Tempe…rature , Dissolved Oxygen, pH, To…al Phosphorus, Nitrog…n, Nuisance P…, (densi…, chlorophyll-a, cyano…bons)	• Habitat Suitability Rating [4.5] • … particle size), % fines, salinity (estuary, lake … and duration) [5.1] • … channel complexity	• (IP) habitat occupied [4.1] • Cumulative size and number of … [4.2, 4.5] • … identified key flow thresholds [5.2]	• # sub-…sins with desirable habitat …y *(by species)* [5.1, 5.2, 5.3]
Fluvial Geomorphic Processes (FG) 5. Create and maintain spatially connected and diverse channel and floodplain morphologies	• Bed m… [5.1] • Large … wood recruitment	… stream (temporary v. permanent) [5.1]	• … management practices [6.3]	• # sub-…sins with desirable …ogy [5.1, 5.2, 5.3] • Total …eam miles with desirable …ogy [5.1, 5.2, 5.3]
Watershed Inputs (WI) 6. Improve water quality, quantity, and ecological flow regimes	• Ratio … to coarse particulate organic … (FPOM: CPOM) [6.2]	• Monthly flows as % of modelled historical natural flows [6.1] • Annual loads sand or larger grain sizes (magnitude and variability) [5.2]	• Total stream miles with desirable flow and sediment conditions [6.1, 6.2, 6.3] • Road density	• # sub-…sins with desirable mean … and sediment conditions [6.1, 6.2, 6.3] • Total stream miles with desirable flow and sediment conditions [6.1, 6.2, 6.3]

- Refining CPIs to be done via survey and discussion in a whole-basin group setting
- Smaller commitment than prioritization subgroups (**1 survey, 2 webinars**)

NEW since early Phase 2

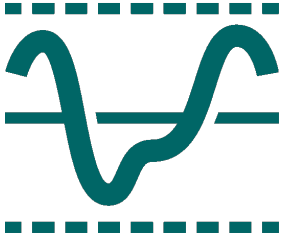
Several comments on these received in Phase 2, but not yet addressed. Documented to seed work on refining CPIs in Phase 3.

What Makes a Good Indicator?

- All things we will need to consider and discuss

RESPONSIVENESS

REQUIRED FREQUENCY



SUITABLE LIMITS

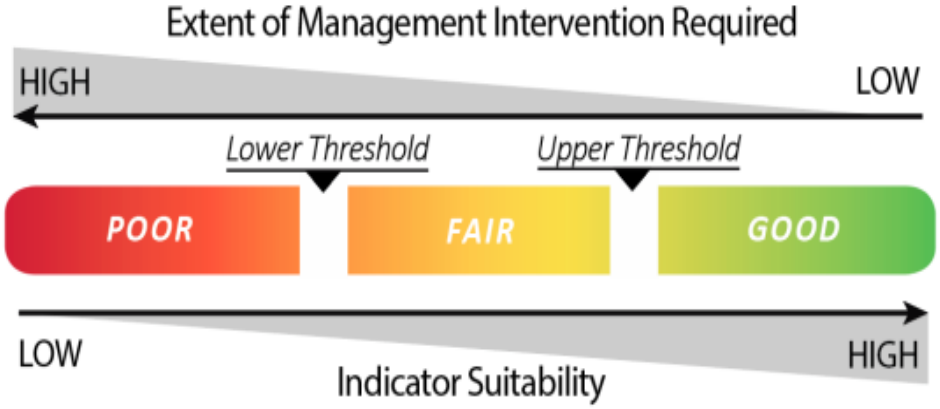
WHEN, HOW LONG

WHERE, RESOLUTION

SUPPORTING EVIDENCE

Suitability Thresholds

- For each indicator, **suitability thresholds** or targets must be identified to help guide prioritization of restoration needs and progression through functional watershed tiers



Extensive literature review of possible CPI thresholds conducted in Phase 1.

Can help guide Phase 3 work.

Sub-Objective	Species	Core Performance Indicator	Units	Published Suitability Thresholds			References
				Poor	Fair	Good	
4.5 Enhance and maintain estuary, mainstem, tributary, lake and wetland habitats for all freshwater life stages and life histories of resident and anadromous fish	Coho Salmon	Water Depth	cm	13.72 – 62.48 (fry rearing) >22.25 (juvenile rearing) 14.33 – 62.18 *(spawning)*	13.72 – 20.42 and 49.68 – 62.48 *(fry rearing)* 22.25 – 39.62 *(juvenile rearing)* 14.33 – 20.73 and 53.95 – 62.18 *(spawning)*	20.42 – 49.68 (fry rearing) > 39.62 *(juvenile rearing)* 20.42 – 53.95 *(spawning)*	Hampton et al. 1997[48] *(thresholds derived by dividing Habitat Suitability Criteria curves into thirds)*
		Water Velocity	m/s	> 0.08 (fry rearing) > 0.26 (juvenile rearing) 0.09 – 0.64 *(spawning)*	0.04 – 0.08 (fry rearing) 0.08 – 0.26 *(juvenile rearing)* 0.09 – 0.15 and 0.52 – 0.64 *(spawning)*	0 – 0.04 (fry rearing) 0 – 0.08 *(juvenile rearing)* 0.15 – 0.52 *(spawning)*	Hampton et al. 1997 *(thresholds derived by dividing Habitat Suitability Criteria curves into thirds)*
		Pool Depths	ft	< 3-3.3 ft	3-3.3 ft	>3.3 ft.	Table 4-6 in NMFS 2014[49] (for coho)
		Pool Frequency (length)	%	< 41-50%	41-50%	>50%	Table 4-6 in NMFS 2014 (for coho)
		Pool Frequency (area)	%	< 21-35%	21-35%	>35%	Table 4-6 in NMFS 2014 (for coho)
		D50 (median particle size)	cm	< 5.1 - >11.0	5.1-6.0 & 9.5-11.0	6.0-9.5	Table 4-6 in NMFS 2014 (for coho)
		% Fines	%	N/A	N/A	< 20 (spawning), <15 *(egg, fry survival)*	NMFS 2001[50]
	Chinook Salmon	Substrate size	cm	N/A	N/A	1.3 – 10.2 *(spawning)*	Allen and Hassler 1986[51]
		% Fines (< 6.4 mm)	%	>40 (emergence)	30 – 40 (emergence)	< 30 (emergence) <5 (spawning)	Bjornn and Reiser 1991, cited in NMFS 2001

Questions?

Is it clear how CPIs will be used to support iterative prioritization and future monitoring both now and in the future?

5

Call to Form CPI & Sub-Basin Teams!

Engaging with sub-basin groups

Klamath Sub-basin Teams

1. Please provide:

Name	
Affiliation	
email	
primary business phone number	

2. Which subbasin teams would you like to join? Check all that apply.

- [ ] Upper Klamath Lake
- [ ] Williamson & Sprague
- [ ] Lost
- [ ] Shasta
- [ ] Salmon
- [ ] Scott
- [ ] Mid-Klamath RIver & Upper Klamath River
- [ ] Lower Klamath River
- [ ] Trinity & SF Trinity

3. What are your areas of expertise? Please check all that apply

- [ ] Watershed inputs (e.g. landscape disturbance, climate, nutrient dynamics, environmental flows, etc.)
- [ ] Fluvial geomorphology (e.g. channel and flooplain dynamics, sediment transport & recruitment, etc.)
- [ ] Fish habitat (e.g. instream habitat, water quality, fish passage, etc.)
- [ ] Biological interactions (e.g. predation, competition, disease, invasive species, etc.)
- [ ] Fish populations (e.g. distribution, diversity, growth, survival, etc.)

4. What are your preferred subject areas for participation? Check all that apply.

- [ ] Core performance indicators (CPIs) & associated suitability thresholds
- [ ] Restoration action prioritization

5. Please provide any additional comments

Questions?

Before we close, any final comments on other things we should take into consideration when engaging with you during Phase 3?

Thank You!

Contacts

Chris Wheaton (cwheaton@psmfc.org) – lead PSMFC
Clint Alexander (calexander@essa.com) – lead ESSA
Laurelle Santana (lsantana@essa.com) – communication coordinator, mailing lists, etc.

Further Information

Visit the IFRMP website at: http://kbifrm.psmfc.org/