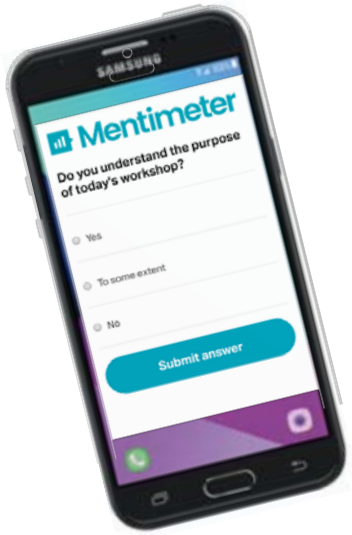
Klamath Basin Integrated Fisheries Restoration and Monitoring Plan (IFRMP) Phase 2

Real-time Survey Webinar

August 30th 2018

Webinar Objectives

- Reminder of **what you need** to FULLY participate:



Computer

- *To see presentation slides, questions*

Landline

- *To listen to presentation with best call quality & reliability*

Smartphone

- *To answer interactive questions on Mentimeter*

Webinar Requirements

Guide all of you through a real-time Mentimeter survey to:

- *Rank and weight specific Plan elements, criteria, questions, etc.*
- *Influence our direction*
- *Identify 'problem areas' needing more input & people who can help*

This isn't the last chance. We will use your input to guide completion of the Initial Rough Draft IFRMP that will be turned over for review October 2018

Today will be different…

- We want to efficiently collect input from a large group, **trying something new!**

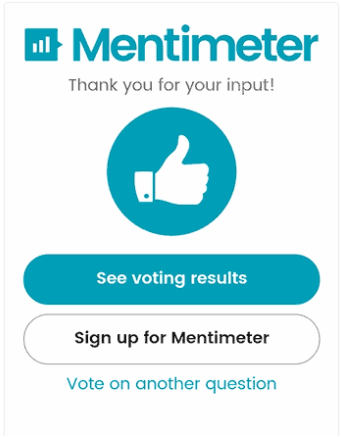
- We will move quickly, so **please follow along!**
- No time today for discussions -- facilitator will **"park" or "peak"** things to be take offline
  - *Submit topics we should follow-up with you on to GoTo chat (to Laurelle)*

- Please do not multi-task, check emails, send text messages, etc. **Be present, stay in the moment!**

Agenda / Webinar Format

Having previously reviewed the Jul 2018 workshop summary document delivered Aug 14 & the Aug 24 version of the IFRMP in progress chapters & outline…

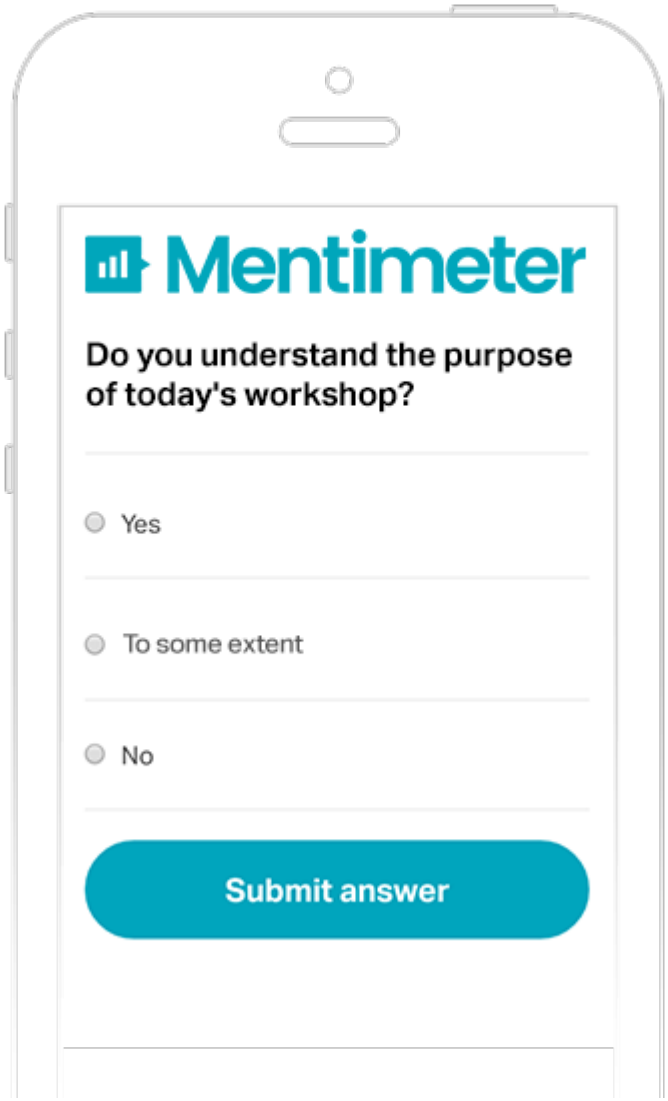
1. **Brief high-level context presentations (1-3 slides per survey question)**
2. **Specific real-time survey questions**
   - Warm-up example!



Next …

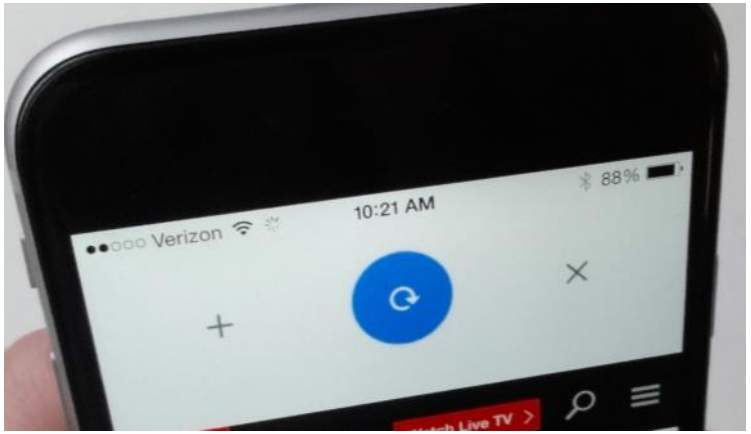
1. **Follow-up with any individuals who had difficulties submitting input**
2. **Review Initial Rough Draft IFRMP document Oct 2018**

"Mentimeter" ?



Warm-up Question

May need to refresh sometimes..

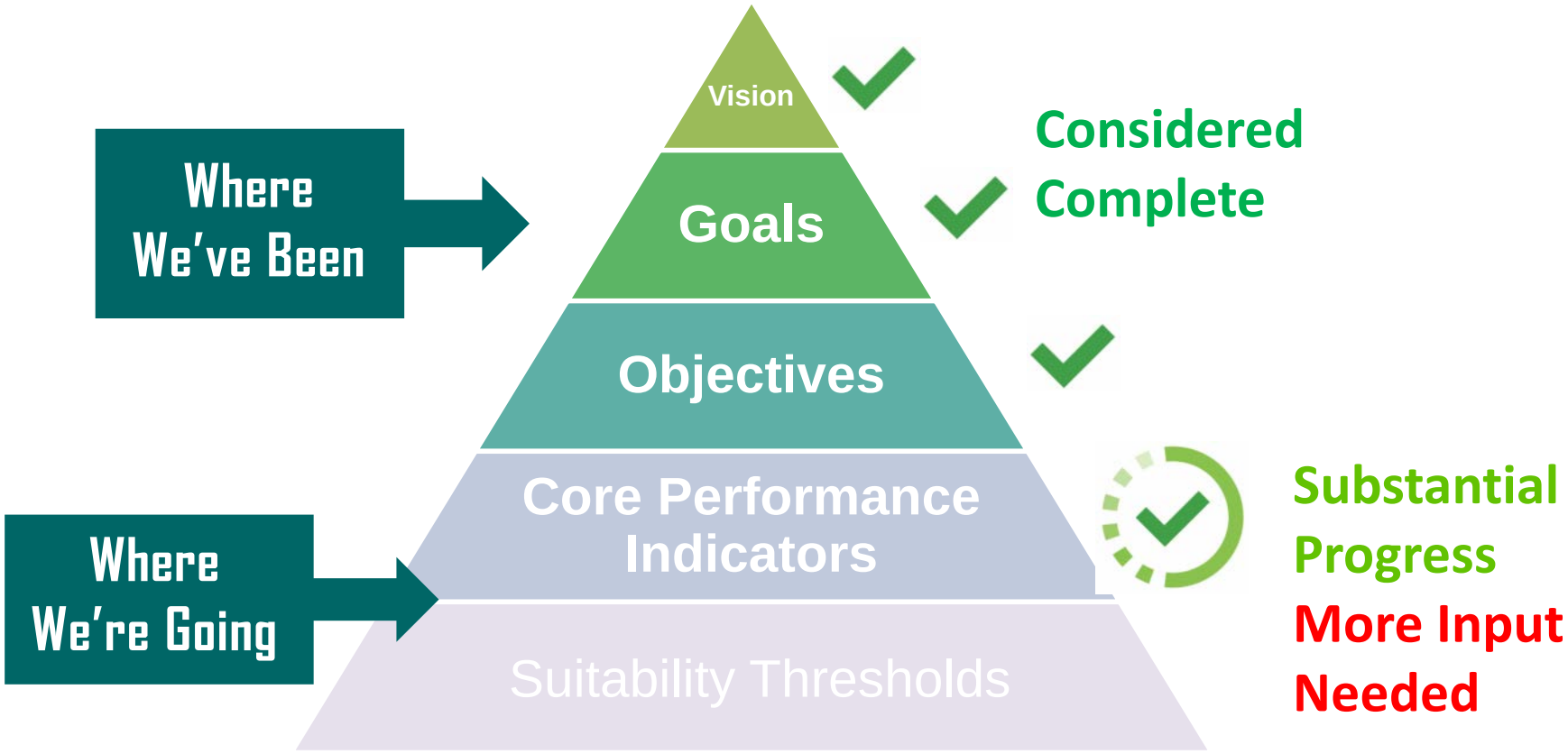


IFRMP Goals & Objectives

Remaining Key Questions...

Goals & Objectives Hierarchy

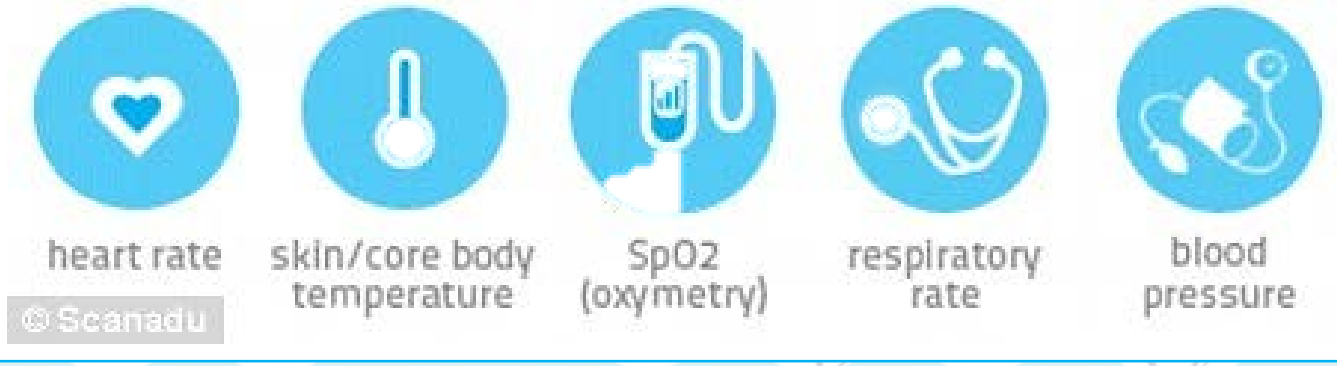
- **Broad agreement** on goals & objectives at workshop
- Proposed and voted on best “core” performance indicators, **with substantial agreement on top choices**



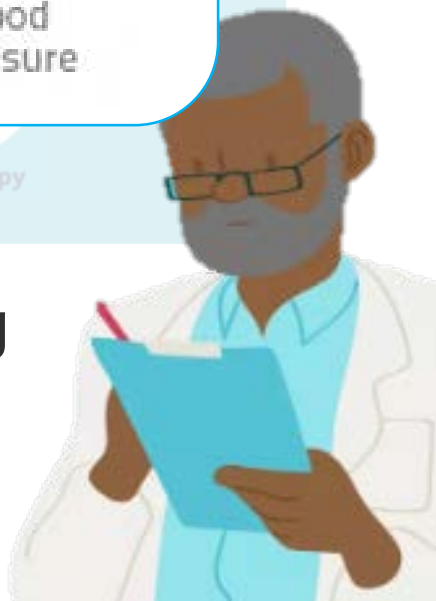
What is a "Core" Performance Indicator?

DIAGNOSTIC INDICATORS →Candidate Performance Indicators

VITAL SIGNS →<u>Core</u> Performance Indicators (CPIs)



- The <u>most critical</u> indicators to keep monitoring regularly, even when resources are limited, to reliably track overall system status.



Goal 1 Core Performance Indicators

Goal 1: Naturally self-sustaining native fish populations with healthy demographic traits capable of providing harvestable surplus

Whole-Basin Nested Core Objectives	Proposed *Candidate* and *Core* Performance Indicators
1.1 Increase juvenile production	★ ***Juveniles per Adult*** (have suitability thresholds for salmon and steelhead only) • *Presence / Absence of Juvenile Larvae*
1.2 Increase juvenile survival and recruitment to spawning populations	• *Loss of Tagged Fish by Reach Over Time (to pinpoint spatial survival constraints)*
1.3 Increase overall population abundance and productivity, particularly in areas of high existing abundance or potential future abundance or in special or unique populations	★ ***Overall Abundance (by species)*** (have suitability thresholds for Coho, Bull Trout, Redband Trout only) • *Whether or not there is harvestable surplus*
1.4 Maintain or increase life history and genetic diversities	★ ***Genetic Diversity Indicators*** ★ ***Age Structure & Demographics*** (have no information on suitability thresholds)
1.5 Maintain or increase spatial distributions as necessary *(i.e., expansion may not be appropriate goal for all species)*	★ ***Habitat Occupancy*** (can compare to historical extent) *(presence/absence; total river miles occupied, overall and above prior dam site(s))*

How satisfied are you with the set of **core performance indicators** for **Goal 1** (achieving self-sustaining populations of focal fish species)?

What essential CPIs are missing?

Table 1 in July 2018 Workshop and Early Draft

Table 5 and Table 7 in Early release copy of in progress chapters and revised annotated outline.

Goal 3 Core Performance Indicators

Goal 3: Reduce biotic interactions (ecological, genetic) that could have negative effects on native fish populations.

Whole-Basin Nested Core Objectives	Proposed *Candidate* and *Core* Performance Indicators
3.1 Do not generate adverse competitive or genetic consequences for native fish when carrying out conservation-oriented hatchery supplementation as needed.	★ ***pHOS*** *(proportion of hatchery origin spawners, identified in Hatchery and Genetic Management Plans)* (have suitability thresholds for **coho** only)
3.2 Minimize disease-related mortality by reducing vectors and factors known to lead to fish disease outbreaks	★ ***Prevalence of Infection*** (**no information** on suitability thresholds) ★ ***Prevalence of Mortality*** (have suitability thresholds for **coho** only) • *Occurrence of fish kills*
3.3 Reduce impacts of exotic plants and animals species on native fish	★ ***Distribution and abundance of non-native species*** (suggested thresholds exist) • *CPUE of non-native species in culling programs*

How satisfied are you with the set of **core performance indicators** for **Goal 3** (reducing negative biotic interactions)?

What essential CPIs are missing?

Table 1 in July 2018 Workshop Summary Document

Table 5 and Table 7 in Early release copy of in progress chapters and revised annotated outline.

Goal 4 Core Performance Indicators

Goal 4: Improve freshwater habitat access and suitability/quality for all life stages of focal fish species

Whole-Basin Nested Core Objectives	Proposed *Candidate* and *Core* Performance Indicators
4.1 Restore fish passage and connectivity	• *Number of fish passage barriers*
4.2 Improve water temperatures and other local water quality conditions	★ ***Temperature*** (suggested thresholds exist in TMDLs and for most specific species) • *Site Shade Potential* • *% of days TMDL objectives met*
4.3 Enhance and maintain community and food web diversity	★ ***SWAMP (Surface Water Ambient Monitoring Program)*** *macroinvertebrate and community diversity metrics* • *Stream Condition Index (SWAMP can be used to derive this)* • *Primary productivity (e.g., chlorophyll)*
4.4 Reduce fish mortality due to entrainment, scour, stranding	• *% of diversions unscreened (entrainment)* • *% of days tributaries drop below minimum recommended ecological flows (4.4 and 6.1)*
4.5 Enhance and maintain estuary, mainstem, tributary, lake and wetland habitats for all freshwater life stages and life histories of focal species	★ ***Area & Occupancy of Suitable Spawning Habitat*** ★ ***Area & Occupancy of Suitable Rearing Habitat*** (suggested thresholds exist for specific variables (water velocity, depth, substrate), but more work needed to determine how habitat suitability is defined and measured) ○ *Options for determining habitat suitability are discussed later in this section*

How satisfied are you with the set of **core performance indicators** for **Goal 4** (improving freshwater habitat)?

What essential CPIs are missing?

Table 1 in July 2018 Workshop Summary Document

Table 5 and Table 7 in Early release copy of in progress chapters and revised annotated outline.

Goal 5 Core Performance Indicators

Goal 5: Create and maintain spatially connected and diverse channel and floodplain morphologies

Whole-Basin Nested Core Objectives	Proposed *Candidate* and *Core* Performance Indicators
5.1 Increase and maintain coarse sediment recruitment and transport processes	★ *% of days above X cfs per year* (critical volume able to mobilize coarse sediment) (suggested thresholds specifically for Klamath via USFWS) • Coarse sediment storage capacity (e.g., by channel structure, large woody debris, is an indicator in the Trinity)
5.2 Increase channel and floodplain dynamics, stability and interconnectivity	★ *Acres of seasonally inundated wetland* ★ *Area available for channel migration* (suggested thresholds exist in literature) • % of river in stage 0 (dynamics) (vs. historical extent in USFWS Wetland Data Mapper, but need to set limits)
5.3 Promote and expand establishment of diverse riparian and wetland vegetation that contributes to complex channel and floodplain morphologies	• % Site Shade Potential Realized • Large Woody Debris Recruitment

How satisfied are you with the set of **core performance indicators** for **Goal 5** (spatially connected and diverse channel and floodplain morphologies)?

What essential CPIs are missing?

Table 1 in July 2018 Workshop Summary Document

Table 5 and Table 7 in Early release copy of in progress chapters and revised annotated outline.

Goal 6 Core Performance Indicators

Goal 6: Improving water quality, quantity, and ecological flow regimes

Whole-Basin Nested Core Objectives	Proposed *Candidate* and *Core* Performance Indicators
6.1 Improve instream ecological flow regimes year-round for the Klamath River mainstem and tributary streams	***# cfs returned to stream*** *(distinguish between temporary and permanent)* (**no information** on suitability thresholds) • *Surface-groundwater interaction metrics (metric itself TBD)* • *% diversions metered (reflects actively managed for flows)*
6.2 Reduce anthropogenic fine sediment inputs while maintaining natural and beneficial fine sediment inputs	• *% embedded / % fines (6.2 and 5.1)* • *Source of sediments in the system (e.g., roads vs. mine tailings, etc. Tells you where you need to focus efforts, via for example % of Roads Surveyed)*
6.3 Reduce external nutrient and pollutant inputs that contribute to biostimulatory conditions	***Core water quality metrics (benchmarks specified in TMDLs)*** • *Dissolved Oxygen* • *pH* • *Total Phosphorus (concentration)* • *# acre-feet tail water return flows* • *# of harmful algae blooms*

How satisfied are you with the set of **core performance indicators** for **Goal 6** (water quality, quantity, and ecological flows)?

What essential CPIs are missing?

Table 1 in July 2018 Workshop Summary Document

Table 5 and Table 7 in Early release copy of in progress chapters and revised annotated outline.

Suitability Thresholds

Good progress,
More input needed during document review period

- Excerpted example, 10+ pp, fully referenced in draft plan.
- Includes thresholds for CPIs, as well as alternate indicators.

Table 15: Proposed core performance indicators (CPIs) and published suitability thresholds for HABITAT related objectives that are not species specific.

Sub-Objective	Core Performance Indicator	Units	Published Suitability Thresholds			References
			Poor	Fair	Good	
4.1 Restore fish passage and re-establish channel and other habitat connectivity, particularly in high-value habitats (e.g., thermal refugia)	Number of fish passage barriers - Total *(inland fish)* - Downstream *(anadromous fish)*	Count	>8 ≥4	5 – 7 3 – 2	0 – 4 0 – 1	Table 4 in Fesenmeyer et al. 2013[15] *(indicator at subwatershed scale)*
	% total stream miles accessible *(anadromous fish)*	%	<30%	30-50%	50-90%	Table 4 in Fesenmeyer et al. 2013 *(indicator at subwatershed scale)*
	Ratio of current to historical stream miles accessible *(inland fish)*	%	<75%	75-90%	>90%	Table 4 in Fesenmeyer et al. 2013 *(indicator at subwatershed scale)*
4.2 Improve water temperatures and other local water quality conditions and processes for fish growth and survival	Temperature	°C	OR TMDL: >20 °C (incipent or instantaneous lethal limit for coldwater fish causing mortality over hours to days) CA TMDL: Monthly average at stateline > monthly Temperature Numeric Target SPECIES: Coho & Chinook: ≥ 20 °C *(lethal to eggs)*, ≥ 25 °C *(lethal to juveniles, adults)* Steelhead: ≥ 20 °C *(lethal to eggs)*, ≥ 24 °C *(lethal to juveniles, adults)*	OR TMDL: 17.8-20 °C (sub-lethal limit for coldwater fish associated with reduced performance that becomes lethal with long-term exposure over weeks to months) SPECIES: Bull trout: 15 - 18 °C *(limits adult distributions)* Chinook: 13 – 24 °C	OR TMDL: ≤ 17.8 °C (below lethal and sub-lethal limits for coldwater fish) CA TMDL: Monthly average at stateline ≤ monthly Temperature Numeric Target SPECIES: Coho: 16-17 °C is considered good, <16 °C is very good. Chinook:	OR: Table 2-4 and 4-3 in ODEQ 2010[16] (threshold set for redband trout based on instantaneous or incipient lethal limits for cold-water fish (21°C and over). CA: Table 5.3 in NCRWQCB 2010[17] SPECIES: Coho: Table 4-6 in NMFS 2014[18], Carter 2005[19] *(lethality)*,

[15] Fesenmeyer, K. Henrery, R., and Williams, J. 2013. California Freshwater Conservation Success Index: An Assessment of Freshwater Resources in California, with focus on lands managed by the US Bureau of Land Management Version 1.0, December 2013. Trout Unlimited Science program. 45 pp. (Note: Spatial extent of indices encompass entire Klamath Basin in CA and OR; 5-point indicator scale lumped to fit into 3 categories).
[16] State of Oregon Dept. of Environmental Quality (ODEQ). 2002. Upper Klamath Lake Drainage Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP).
NCRWQCB. [17] 2010. Final staff report for the Klamath River total maximum daily loads (TMDLs) addressing temperature, dissolved oxygen, nutrient, and microcystin impairments in California the proposed site specific dissolved oxygen objectives for the Klamath River in California, and the Klamath River and Lost River implementation plans.
[18] NMFS. 2014. Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (Oncorhynchus kisutch)
[19] Carter, K. 2005. The effects of temperature on steelhead, coho salmon, and Chinook salmon biology and function by life stage: Implications for Klamath Basin TMDLs. Report for California Regional Water Quality Control Board, August 2005.

Suitability Thresholds – Focus on Gaps

- ***Juveniles per Adult*** (have suitability thresholds for salmon and steelhead only)
- ***Overall Abundance (by species)*** (have suitability thresholds for Coho, Bull Trout, Redband Trout only)
- ***Genetic Diversity Indicators***
- ***Age Structure & Demographics*** (have no information on suitability thresholds)
- ***pHOS*** *(proportion of hatchery origin spawners, identified in Hatchery and Genetic Management Plans)* (have suitability thresholds for coho only)
- ***Prevalence of Infection*** (no information on suitability thresholds)
- ***Prevalence of Mortality*** (have suitability thresholds for coho only)
- ***SWAMP (Surface Water Ambient Monitoring Program)*** *macroinvertebrate and community diversity metrics*
- ***Area & Occupancy of Suitable Spawning Habitat***
- ***Area & Occupancy of Suitable Rearing Habitat*** (suggested thresholds exist for specific variables (water velocity, depth, substrate), but more work needed to determine how habitat suitability is defined and measured)
- ***Acres of seasonally inundated wetland*** (vs. historical extent in USFWS Wetland Data Mapper, but need to set limits)
- ***# cfs returned to stream*** *(distinguish between temporary and permanent)* (no information on suitability thresholds)

Please keep these gaps in mind when providing **written feedback on DRAFT PLAN**.

IFRMP Phasing

Pivot...

IFRMP Restoration Phasing - Pivot

- In the Elwha project, the "Phases" of restoration were **defined primarily by suitability thresholds/triggers for POPULATION level performance indicators**.

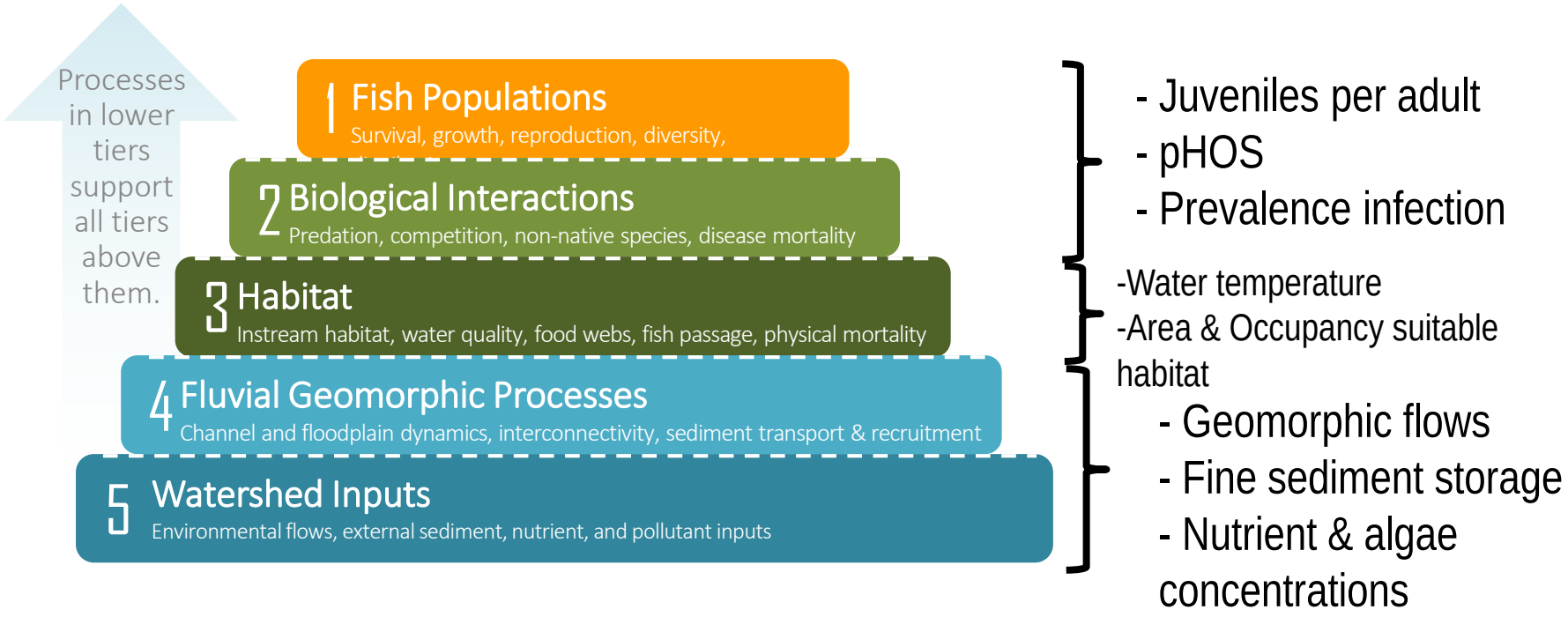
Species: Chinook Salmon
Oncorhynchus tshawytscha

		Preservation	Recolonization	Local Adaptation	Viable Natural Population
PHASE					
GOALS		Prevent extinction and preserve the existing genetic and life history diversity of native salmonid populations until fish passage is restored and water turbidity is determined to be non-lethal to fish in the river	Salmonids are continually accessing habitats above the old dam sites with some fish succesfully spawning and producing smolts	Maintain or increase life history diversity of natural-spawning populations through local adaptation to the Elwha River ecosystem until minimum levels of spawner abundance, productivity, and distribution are met	Ensure that self-sustaining and exploitable population levels continue once desired values for all VSP and habitat parameters have been met and hatchery programs are no longer needed for protection, recovery, or exploitation
Abundance (Weir, Sonar, foot and boat surveys, aerial surveys)	Natural spawners	950	>950 or <4,340	>4,340 or <10,000	>10,000
	Spawner escapement duration	4 yrs	4 yrs	4 yrs	4 yrs
Managing for pHOS (Otoliths, CWT, Scale samples)	pNOS (natural-origin spawner)	*	0.95	1.0	1.0
	pHOS (proportion hatchery-origin spawner)	*	0.05	0	0
Productivity (Weir, Sonar, Spawner Surveys, Smolt trap, otoliths, cwt, harvest)	#Juvenile migrants/female	200	200	200	200
	#Pre-fishing recruits/spawner (h+n)	>1.56	*	*	*
	#Spawners/spawner (h+n)	>1.0	*	*	*
	#Pre-fishing recruits/spawner (n)	*	>1.56	>1.56	>1.85
	#Spawners/spawner (n)	*	>1.0	>1.0	~1.0
	Productivity trend	4 yrs	4 yrs	4 yrs	4 yrs

Elwha: Peters et al. 2014.

IFRMP Restoration Phasing

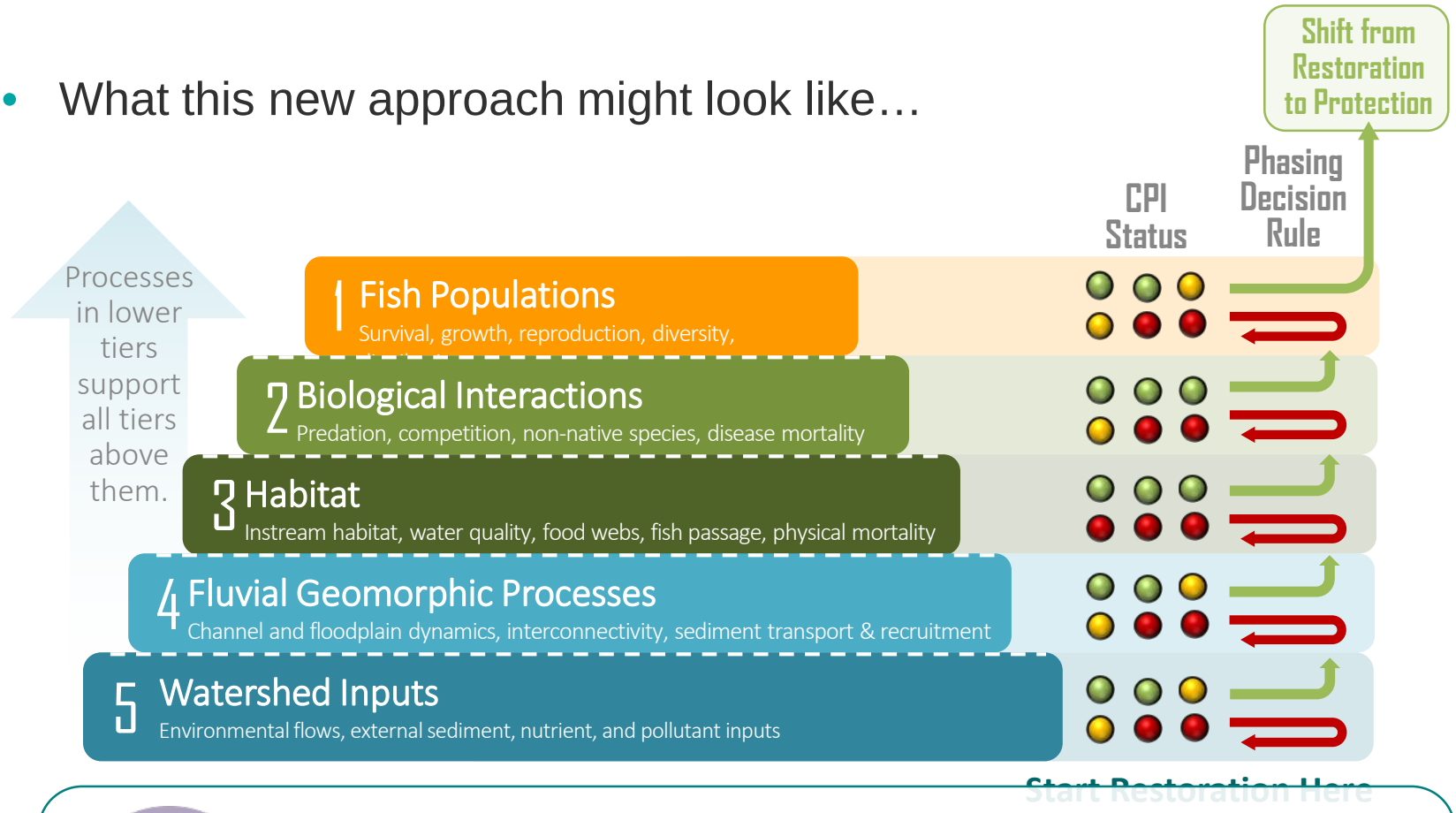
- Instead, we intend to **define phasing by TIERS OF WATERSHED PROCESSES**
- Once refined, **CPI suitability thresholds** will be identified to suggest **transition between restoration emphasis amongst tiers of watershed function** in final plan. E.g.,



Adapted from – EPA 2012, Function Based Framework for Stream Restoration

IFRMP Restoration Phasing

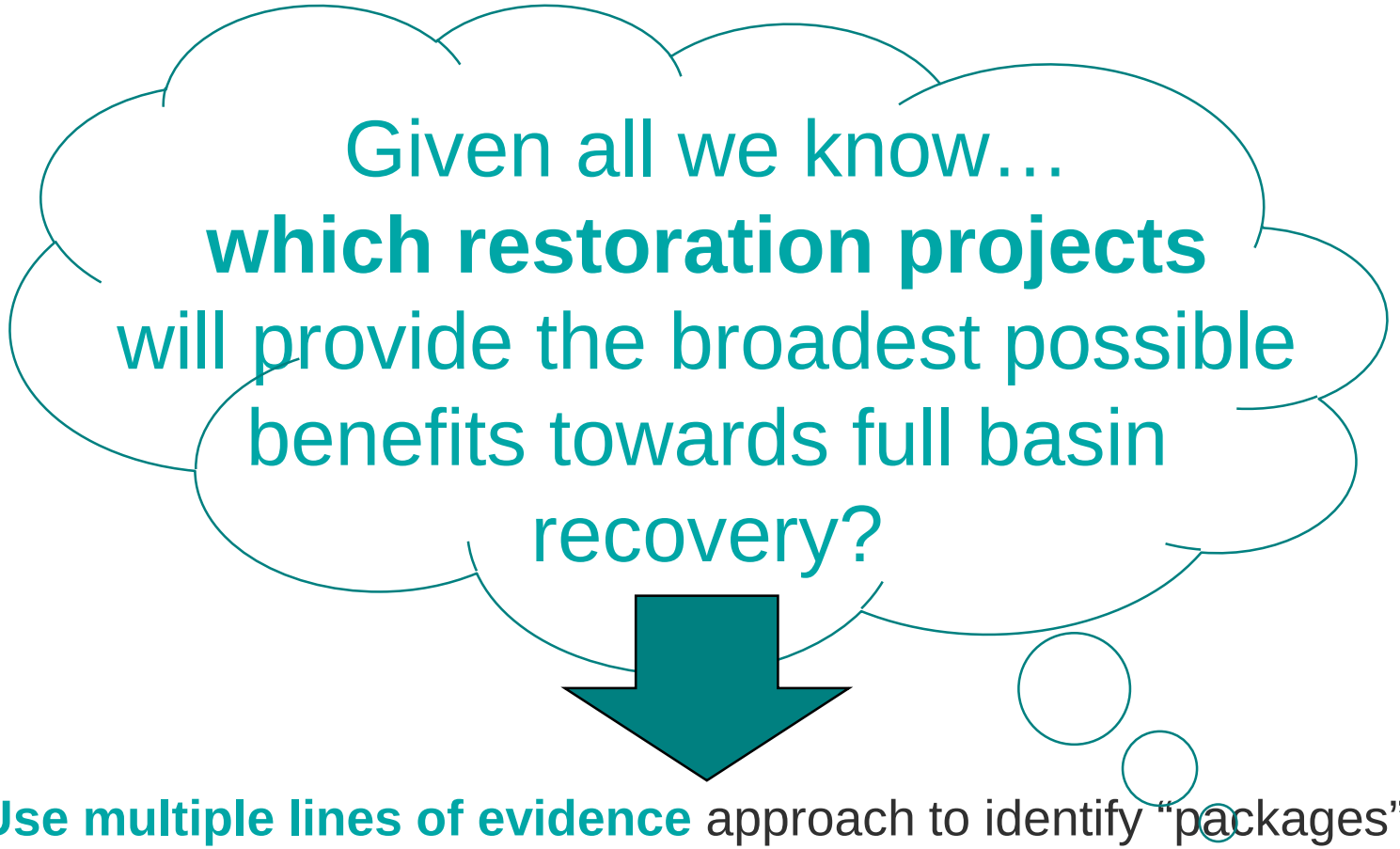
- What this new approach might look like…



- Indicate the extent you **agree or disagree** with the components of this proposed approach to phasing restoration.

IFRMP Actions

Actions – Where We're Going



- **Use multiple lines of evidence** approach to identify "packages" of restoration actions with broadest benefit across most objectives, species, and key stressors

Restoration Project Selection Workflow

Document Review

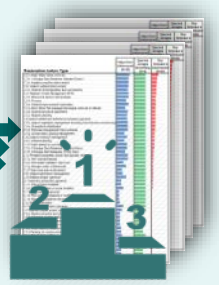
Conceptual Models

Online Surveys

Workshops

Integrated Tracking Inventory

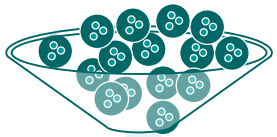
Objectives Species Actions Stressors



Subregional Action Type Rankings

By coverage of **Objectives**, **Species**, **Key Stressors**

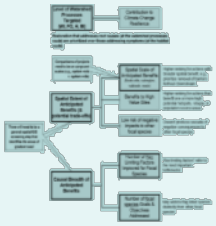
Ranks provide 'breadth of benefit' weightings to be used in prioritization framework.



COARSE Filter for Broad Action Types

Use learning to update understanding (PE).

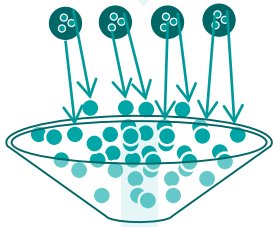
Use learning to adjust scoring for technical merit(PE) and spatial need (ST).



Prioritization Framework

Iterative prioritization by criteria of scientific benefit, feasibility, cost.

Prioritization favors projects with broadest benefits as determined above.



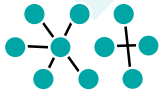
FINE Filter for Specific Projects

Monitoring

Status & Trends (ST)
Project Effectiveness (PE)

Recommended Projects

For **further deliberation.**



Packages of Actions

Restoration Project Selection Workflow

IS NOT

IMPLEMENT

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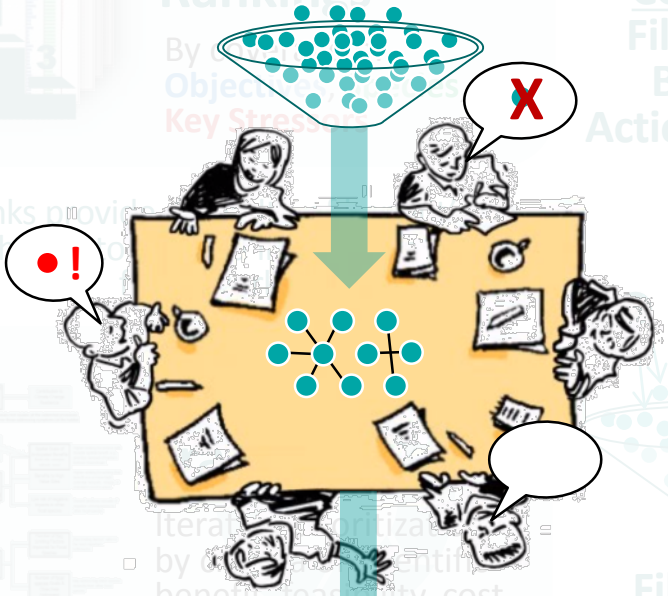

IMPLEMENT

Projects
For **further deliberation.**

Packages of Actions

Restoration Project Selection Workflow

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Integrated Tracking Inventory

Objectives

Species

Actions

Stressors

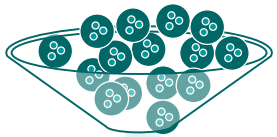
Use learning to update understanding (PE).

Use learning to adjust scoring for technical merit(PE) and spatial need (ST).

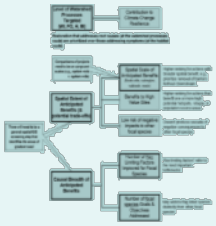
Subregional Action Type Rankings

By coverage of **Objectives**, **Species**, **Key Stressors**

Ranks provide 'breadth of benefit' weightings to be used in prioritization framework.



COARSE Filter for Broad Action Types



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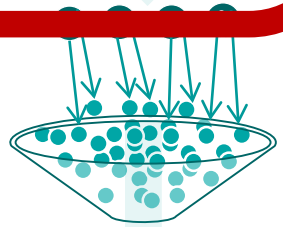


FINE Filter for Specific Projects

Prioritization favors projects with broadest benefits as determined above.

Monitoring

Status & Trends (ST)
Project Effectiveness (PE)

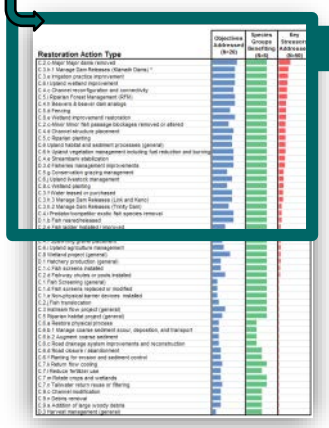
Recommended Projects

For **further deliberation.**

Packages of Actions

Actions – Focusing In & Adding Context

- Create ranking
- Create a rule to **shortlist** to a subset of actions
- Assemble these into “packages” of related actions **by watershed tier.**
- For each package, add: **Focal Location(s)** , **Ex’s of High-Benefit Projects**



	Broad-Benefit Actions *(top ranked in prior sorting exercise)*		Potential Focal Areas *(from participant input, plans, TU CSI)*	Potential Candidate Projects *(from participant input, plans)*
Watershed Inputs	• Instream Flow Package	• C.3.e Irrigation practice improvement • C.4.h Beavers & beaver dam analogs • C.3.f Water leased or purchased • C.3.h.3 Manage Dam Releases (Link and Keno)	• Focus on the Upper Klamath Lake (Wood River), Sprague (Sprague River), and Williamson (Williamson River) Subbasins, which have the lowest water quantity scores under the Trout Unlimited Conservation Success Index metrics for Water Quantity, which are based on counts of miles canals and number of diversions per subwatershed (Fesenmeyer et al. 2013). While the Lost River subbasin also has low water quantity scores, it is not as biologically significant as the other basins mentioned here.	• Reduce on-farm water withdrawals through improvements to irrigation efficiency, crop types, tracking of groundwater use. WS • Promote overall watershed stewardship by private landowners. WS • Strategic groundwater recharge with tailwater returns filtered via constructed diffuse-source treatment wetlands (DSTWs) (Upper Basin: Wood, Sprague, and Williamson Rivers). WS • Restore healthy fire processes through forest management, prescribed fire, and managed wildfire to thin encroaching pones from montane meadows and improve snowpack accumulation and potential water storage. WS • Readjucate water rights where appropriate. WS • Purchase land and water rights for permanent instream flow protection in the upper basin. WS
	• Sediment Reduction Package	• C.6 Upland habitat and sediment processes (general) • C.6.l Upland wetland improvement • C.6.h Upland vegetation management including fuel reduction and burning • C.5.g Conservation grazing management • C.6.j Upland livestock management	• Focus on the Upper Klamath Lake and Sprague Subbasins, which have the most HUC12 subwatersheds with> 20 stream miles 303(d) listed for sediment impairment (Fesenmeyer et al. 2013)	• Replace culverts on road crossings in Klamath National Forest, upper basin *(IFRMP Workshop, 2018)*

Actions – Reporting

- Actions are rolled up at the highest level by counts.

What is the preferred method of **ordering** restoration actions in this list? i.e., by…

- Most objectives,
- Most stressors, or
- Most species addressed
- These are all equally important

Restoration Action Type	Objectives Addressed (N=20)	Species Groups Benefiting (N=6)	Key Stressors Addressed (N=50)
C.2.c-Major Major dams removed			
C.3.h.1 Manage Dam Releases (Klamath Dams) *			
C.3.e Irrigation practice improvement			
C.6.l Upland wetland improvement			
C.4.c Channel reconfiguration and connectivity			
C.5.i Riparian Forest Management (RFM)			
C.4.h Beavers & beaver dam analogs			
C.5.d Fencing			
C.8.e Wetland improvement/ restoration			
C.2.c-Minor Minor fish passage blockages removed or altered			
C.4.d Channel structure placement			
C.5.c Riparian planting			
C.6 Upland habitat and sediment processes (general)			
C.6.h Upland vegetation management including fuel reduction and burning			
C.4.e Streambank stabilization			
D.3.d Fisheries management improvements			
C.5.g Conservation grazing management			
C.6.j Upland livestock management			
C.8.c Wetland planting			
C.3.f Water leased or purchased			
C.3.h.3 Manage Dam Releases (Link and Keno)			
C.3.h.2 Manage Dam Releases (Trinity Dam)			
C.4.i Predator/competitor exotic fish species removal			
D.1.b Fish reared/released			
C.2.e Fish ladder Installed / improved			
C.3.g Manage water withdrawals			
C.4.f Spawning gravel placement			
C.6.i Upland agriculture management			
C.8 Wetland project (general)			
D.1 Hatchery production (general)			
C.1.c Fish screens installed			
C.2.d Fishway chutes or pools Installed			
C.1 Fish Screening (general)			
C.1.d Fish screens replaced or modified			
C.1.e Non-physical barrier devices installed			
C.2.j Fish translocation			
C.3 Instream flow project (general)			
C.5 Riparian habitat project (general)			
C.6.a Restore physical process			
C.6.b.1 Manage coarse sediment scour, deposition, and transport			
C.6.b.2 Augment coarse sediment			
C.6.c Road drainage system improvements and reconstruction			
C.6.d Road closure / abandonment			
C.6.f Planting for erosion and sediment control			
C.7.k Return flow cooling			
C.7.l Reduce fertilizer use			
C.7.m Rotate crops and wetlands			
C.7.n Tailwater return reuse or filtering			
C.9.c Channel modification			
C.9.n Debris removal			
C.9.s Addition of large woody debris			
D.3 Harvest management (general)			

Actions – Reporting

- Still a long list! Need to **focus FURTHER** on actions with the broadest benefit for an efficient whole-basin recovery plan.
- We propose focusing on those actions meeting **these criteria**:
  - >1 objective addressed,
  - >1 species addressed, AND
  - >1 key stressor addressed
- There **WILL be exceptions** – (e.g., "narrow" emergency measures to prevent extinction). Address via executive decisions based on **this as a starting point**.

Monitoring

Remaining Key Questions...

IFRMP Monitoring Framework

Status and Trend

Action Effectiveness

New ↔ Existing

New ↔ Existing

- Key questions/decisions related to actions or status/trend (***why***)
- Indicators (***what***)
- Sampling Designs (***when*** and ***where*** to sample)
- Response Designs (***how*** to acquire the data)
- Data analysis and reporting plan (***how*** to analyze, and report the data)

Monitoring Framework (Phase 3)

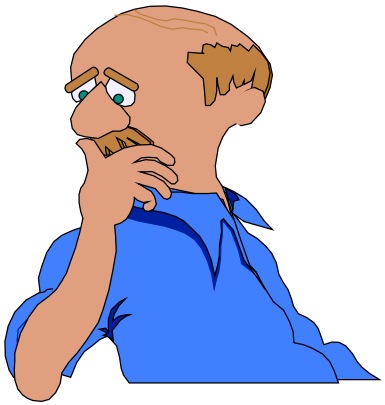
Narrowing Down

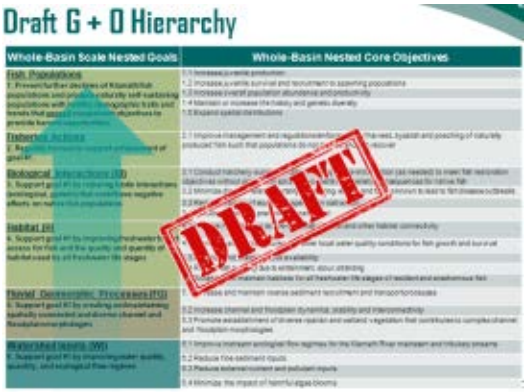
During the workshop there was unanimous agreement that the IFRMP needs to focus on a smaller subset of core indicators and likewise monitoring questions.

VITAL SIGNS

Easier to prioritize and communicate results at this level.

What do people **really** want to know about?





Workshops

Primary IFRMP Monitoring Questions

1. Are **abundances** of focal fish species increasing within and across Klamath subregions to levels adequate to enable persistence, recovery and harvestable surplus?
2. Is **juvenile production and survival** of focal fish species increasing within and across Klamath subregions to enable persistence, recovery and harvestable surplus?
3. Is the spatial **distribution** of focal fish species increasing towards their target (historical) extent?
4. Is there a decrease in **pathogen prevalence** and associated disease-related mortality in salmonids in the lower Klamath River?
5. Is the physical suitability and capacity of **habitats** for focal fish spawning and rearing improving across the basin?
6. Has there been an increase in **channel and floodplain connectivity** in the mainstem Klamath River?
7. Are instream **ecological flow regimes** improving for the Klamath River mainstem and tributary streams, so that these water bodies can better support the focal fish species?
8. Has anthropogenic **inputs of nutrients and pollutants** been reduced across the basin (especially in UKL)?

Indicate the extent you **agree or disagree** with the following proposed key IFRMP monitoring questions.

Secondary IFRMP Monitoring Questions

1. Are **life history and genetic diversity** of focal fish populations being maintained or increasing?
2. Have control and removal methods been effective in reducing the impacts of **exotic/invasive species** on focal fish species?
3. Is **water quality** (e.g., high temperatures, DO, pH, hypereutrophication, etc.) improving across the Basin, especially in UKL?
4. Are **aquatic invertebrate communities** sufficient to maintain fish populations across the basin?
5. Has there been a reduction in **fish mortality** from entrainment, scour, and stranding?
6. Are **fine & coarse sediment** recruitment and transport processes in the Klamath mainstem below the dams moving towards natural patterns?
7. Are anthropogenic inputs of **fine sediment** into streams decreasing across the Basin?
8. Have there been increases in the **extent and diversity of riparian vegetation** [illegible] across the basin, especially in UKL?

Indicate the extent you **agree or disagree** with the following proposed key IFRMP monitoring questions.

Candidate Monitoring Case Studies

- We plan to work through **3-5 case studies** to illustrate application of monitoring framework.

- Case studies should **represent a range of monitoring scenarios**, to surface challenges to be addressed in Phase 3 of the IFRMP.

- **AFTER THIS CALL - Identify SRWG members who can contribute to each case study [email dpickard@essa.com if interested]**

Candidate Monitoring Case Studies

Status and Trend

- Area & occupancy of suitable spawning habitat
  - Complexities of addressing multiple spec
- Nutrient concentrations and algae concentrations
  - Case with well established thresholds
- Acres of seasonally inundated wetland
  - Case primarily using remote sensed information

Indicate the extent you **agree or disagree** with the proposed monitoring case studies.

Action Effectiveness

- Dams out – dynamics of channel redevelopment
  - Case with significant gaps in current or proposed monitoring
- Dams out – recolonization
  - Case which demonstrates how IFRMP can integrate with existing/ongoing efforts (i.e., ODFW plan)

Prioritization

Remaining Key Questions...

IFRMP and Prioritization

PRIORITIZATION (def.)

A prioritization framework provides a **systematic**, **repeatable** and **transparent** rationale for making restoration action decisions given *limited funding, capacity and time* (Beechie et al. 2008, Roni et al. 2013).

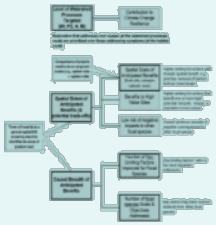
Restoration Project Selection - Prioritization

- **Prioritization framework will be applied to <u>future restoration projects under consideration</u>**
- **Our common <u>inventory</u> of stressors, objectives, CPIs, etc. and mapping of <u>existing projects</u> will assist in characterizing level of effort/gaps (part of prioritization)**

Ranks provide 'breadth of benefit' weightings to be used in prioritization

Use learning to update understanding (PE).

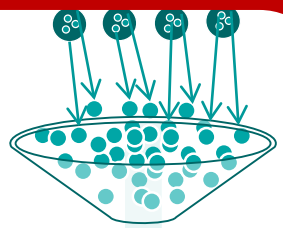
Use learning to adjust scoring for technical merit(PE) and spatial need (ST).



Prioritization Framework

Iterative prioritization by criteria of scientific benefit, feasibility, cost.

Prioritization favors projects with broadest benefits as determined above.



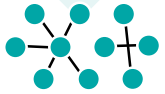
<u>FINE</u> Filter for Specific Projects

Monitoring

Status & Trends (ST)
Project Effectiveness (PE)

Recommended Projects

For further deliberation.

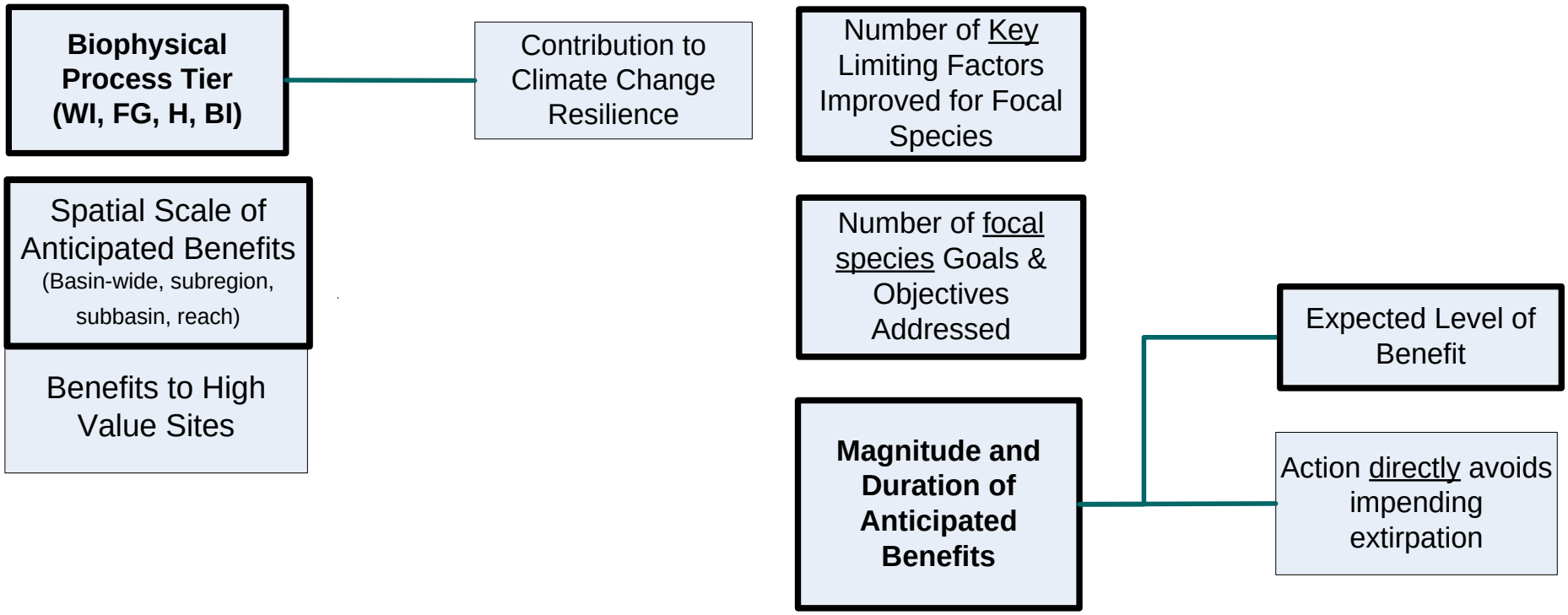


Packages of Actions

Technical Merit / Scientific Benefit

- Your feedback will help to determine **how criteria should be weighted** when applying the prioritization framework.

How would you **rate the importance of following criteria** on technical merit / scientific benefit?



Feasibility & Cost

- Your feedback will help to determine **how criteria should be weighted** when applying the prioritization framework.

How would you **rate the importance of following criteria** on feasibility and cost?

**Note: Based on July 2018 workshop participant feedback we dropped the initial planning and implementation cost criteria.

Ongoing Annual Costs (for site maintenance & essential monitoring)

Costs Sharing Opportunities

Ability to monitor / demonstrate effectiveness

Risk of failure?

Legal/Administrative Permitting Effort Required

Social Considerations

- Your feedback will help to determine **how criteria should be weighted** when applying the prioritization framework.

How would you **rate the importance of following criteria** on social considerations?

Level of Landowner Cooperation Required vs. Established (L, M, H)

Economic Benefit of the Restoration Action (L, M, H)

Stewardship Commitment over Long-term

Initial Rough Draft IFRMP Document

ONLY IF AHEAD OF SCHEDULE..

Some Questions...

Overall Impressions So Far

- For those who reviewed Initial Rough Draft IFRMP…

How strongly overall **do you feel we are getting things right** and are on the right track?

If you could **change/improve just ONE thing** about the Initial Rough Draft IFRMP, what would t be?

Next Steps

1. Seeking a Few Good Men & Women…
   - 1:1 phone conversations to clarify desired input/timeframe
2. Distribute today's survey results to participants
   - Provide any additional comments / questions by email to lsantana@essa.com on survey and/or workshop summary
3. ESSA completes Initial Rough Draft IFRMP document [Sep]
   - Comment period [Oct]

Seeking a Few Good Men & Women

- We need **YOU** to help coauthor & review chapters.
- Below are **names already put forward** to help on key topics.
- If you'd like **to propose someone new**, send a private GoTo chat to Laurelle Santana or email: lsantana@essa.com

Watershed Input & Fluvial Geo. Objectives & CPIs	Defining & Measuring Habitat Suitability	Monitoring case studies	Applying Scoring Frameworks for Prioritization
• **Lee Harrison**, NOAA • **Brian Cluer**, NOAA • **Chauncey Anderson**, USGS • **Robert Franklin**, Hoopa Tribe • **Scott McBain**, McBain & Associates	• **Bill Pinnix**, USFWS • **Damon Goodman**, USFWS • **Tommy Williams**, NOAA • **Robert Franklin**, Hoopa Tribe	• ??	• **Mike Edwards**, Partners for Fish and Wildlife Program

Thank-you!

Mouth of the Klamath River by Linda Tanner, 2011, licensed under CC by 2.0

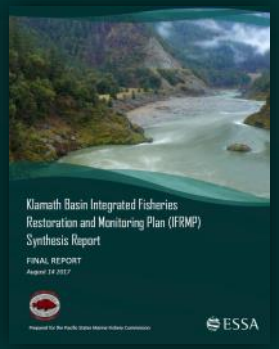
Contacts

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/

Where you can also read our Plan Vision Brochure AND Synthesis Report:
ESSA. 2017. Klamath Basin Integrated Fisheries Restoration and Monitoring (IFRM) Synthesis Report. 416 pp + Appendices.

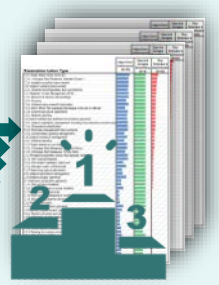


Restoration Project Selection Workflow

- Document Review
- Conceptual Models
- Online Surveys
- Workshops

Integrated Tracking Inventory

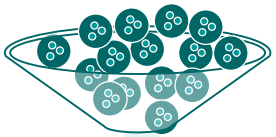
Objectives, Species, Actions, Stressors



Subregional Action Type Rankings

By coverage of **Objectives**, **Species**, **Key Stressors**

Ranks provide 'breadth of benefit' weightings to be used in prioritization framework.



COARSE Filter for Broad Action Types

Use learning to update understanding (PE).

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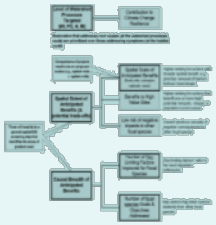

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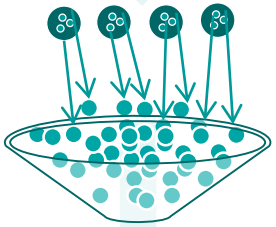

FINE Filter for Specific Projects

Monitoring

Status & Trends (ST)
Project Effectiveness (PE)

Recommended Projects

For further deliberation.

Packages of Actions