Northwest **Power** and **Conservation** Council

August 2, 2016

MEMORANDUM

TO: **Council Members**

FROM: **Patty O'Toole, Program implementation manager and Stacy Horton, Washington Council staff Policy Analyst**

SUBJECT: **Presentation on the Research Plan – Habitat**

BACKGROUND:

Presenter: Tom Karier, Washington Council Member

Summary: Tom Karier will continue the discussion on revision of the Research Plan by looking at habitat research and potential priorities within the habitat theme. "The Council is committed to an adaptive management approach that uses research and monitoring data to understand, at multiple scales, how program projects and measures are performing, and to assess the status of focal species and their habitat."(2014 Columbia River Basin Fish and Wildlife Program, p.101)

Relevance: Updating the Council's Research Plan is relevant to the Council's Fish and Wildlife Program priority #2: Implement adaptive management (including prioritized research on critical uncertainties).

Background: The 2014 Fish and Wildlife Program describes how the Council will develop a new research plan by working with regional managers, independent science panels, and BPA.

More Info: This agenda item begins to address task 5 in the draft work plan for updating the Research Plan (May 3, 2016).

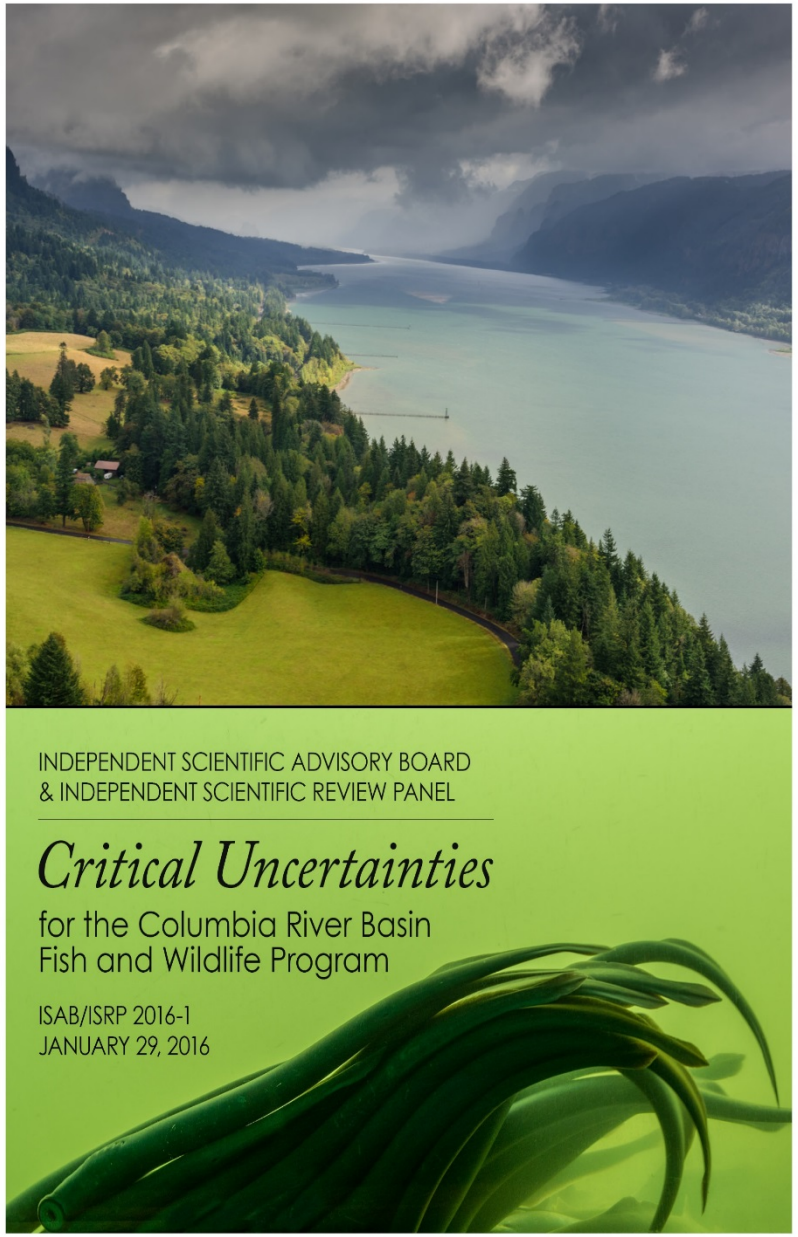
851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

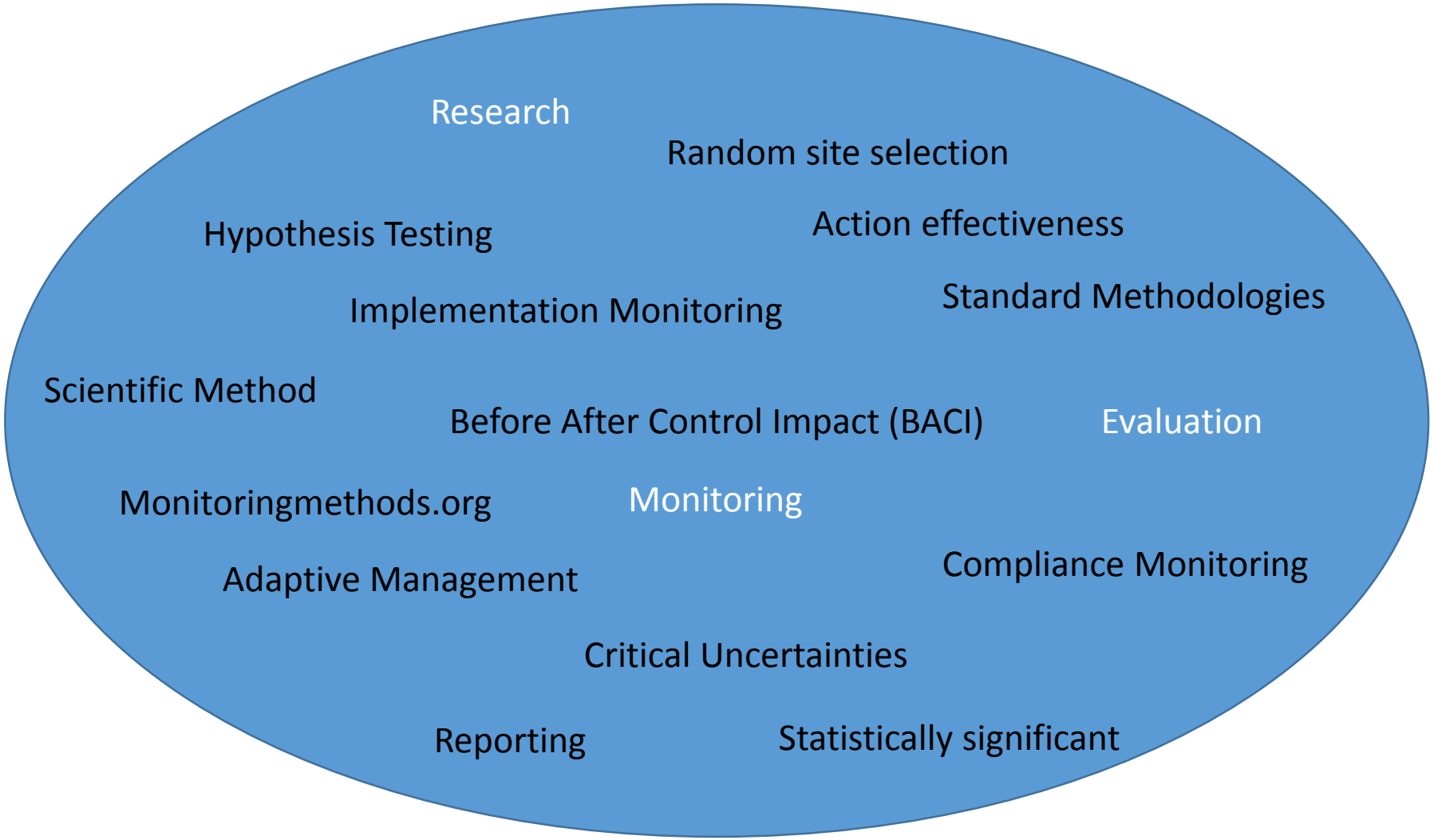
503-222-5161
800-452-5161
Fax: 503-820-2370

Research Plan and Habitat Priorities

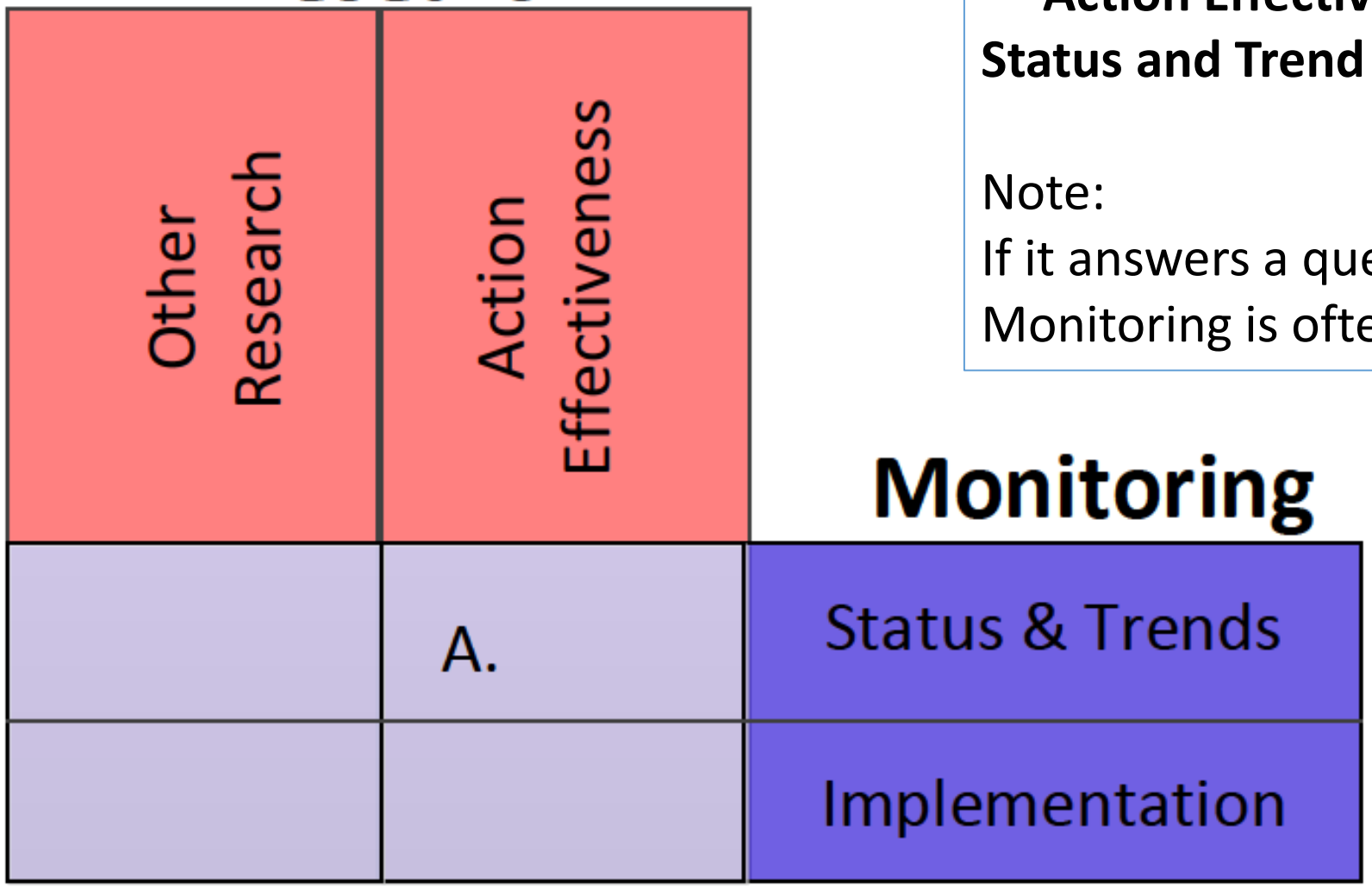
August, 2016



RM&E: Collecting information and gaining useful knowledge



Critical Uncertainties Research



Three purposes of RM&E:

Critical Uncertainties Research

Action Effectiveness

Status and Trend Monitoring

Note:
If it answers a question, it is research.
Monitoring is often part of research.

Should we prioritize research budgets by broad themes? Budgeted $180 million for habitat RM&E since 2004, $15.5 million in 2016

Fish propagation	35%
Tributary Habitat	17%
Hydrosystem flow and passage operations	13%
Monitoring and evaluation methods	12%
Population structure and diversity	11%
Harvest	4%
Mainstem habitat	3%
Estuary, plume, and ocean	3%
Predation	2%
Wildlife	1%
Climate change and human development	0%
	100%

2016, RM&E Priorities

Should we prioritize projects: matrix criteria?

1. The information is critical and unknown
2. The project can provide that information
3. The cost of the project is appropriate.
   (Can the project use existing data?)

Should we prioritize current project effectiveness over identifying new projects?

1. Are current projects producing desirable environmental and biological results?
2. Can we identify future actions that may improve biological results?

Should we prioritize tributary habitat critical uncertainties?

2006 Research Plan Critical Uncertainty	ISAB Progress	ISAB Criticality	RME Budgets 2004-2016
To what extent do tributary habitat restoration actions affect the survival, productivity, distribution, and abundance of native fish populations?	Medium	Priority	$40,725,422
Are the current procedures being used to identify limiting habitat factors accurate?	Medium	Priority	$29,116,133
What pattern and amount of habitat protection and restoration is needed to ensure long-term viability of fish and wildlife populations in the face of natural environmental variation as well as likely human impacts on habitat in the future?	Low	High	$19,233,685
What are the impacts of hydrosystem operations on mainstem habitats, including the freshwater tidal realm from Bonneville Dam to the salt wedge? How might hydrosystem operations be altered to recover mainstem habitats?	Low	High	$4,366,105

Can we prioritize tributary habitat critical uncertainties?

2016 Critical uncertainties developed primarily from ISAB review

Critical Uncertainties

1. Do investments in tributary habitat restoration mitigate for degraded mainstem habitat and passage conditions?	1.1 To what extent do tributary habitat restoration actions improve the survival, productivity, distribution, and abundance of native fish populations?	1.1.1 How much does improving habitat including eliminating barriers (removing dams and culverts, or transporting migrating fish above dams) increase carrying capacity and contribute to recovering important fish populations?
		1.1.2 To what extent is an increase in carrying capacity usurped by non-native invasive species, preventing recovery of native fish and wildlife populations?
2.What additional habitat restoration projects should be implemented?	2.1 What combinations of protected and restored aquatic, riparian and upland habitat are most effective at meeting the life cycle needs and sustaining populations of fish and wildlife in tributaries?	
	2.2 Do some restoration efforts provide resilience to buffer against climate events and recover native species of interest?	2.2.1 How can habitat restoration activities or hydrosystem operations modify groundwater-surface water interactions and floodplain habitats to provide refuges during extreme events and improve overall survival, productivity, distribution, and abundance of anadromous and resident native fish populations?

Judge Simon's and NOAA's 3 levels of uncertainty about the effectiveness of habitat investments:

"There are several layers of uncertainty in predicting benefits from habitat improvement. First, it is uncertain how much improvement to habitat quality each project will provide. Second, it is uncertain whether habitat quality improvements ("HQIs") will translate into improvements in survival and overall condition during the portion of the fish's life cycle in that habitat. And third, it is uncertain whether habitat improvements will correlate to improvements in survival over the full life cycle of the fish, resulting in greater numbers of fish returning to spawn." P. 66

Habitat research:

Three categories of effectiveness uncertainty associated with improving fish habitat.

Uncertainty 1: Habitat Improvement

Did the project improve the habitat quality and quantity for fish? Does this persist over time?

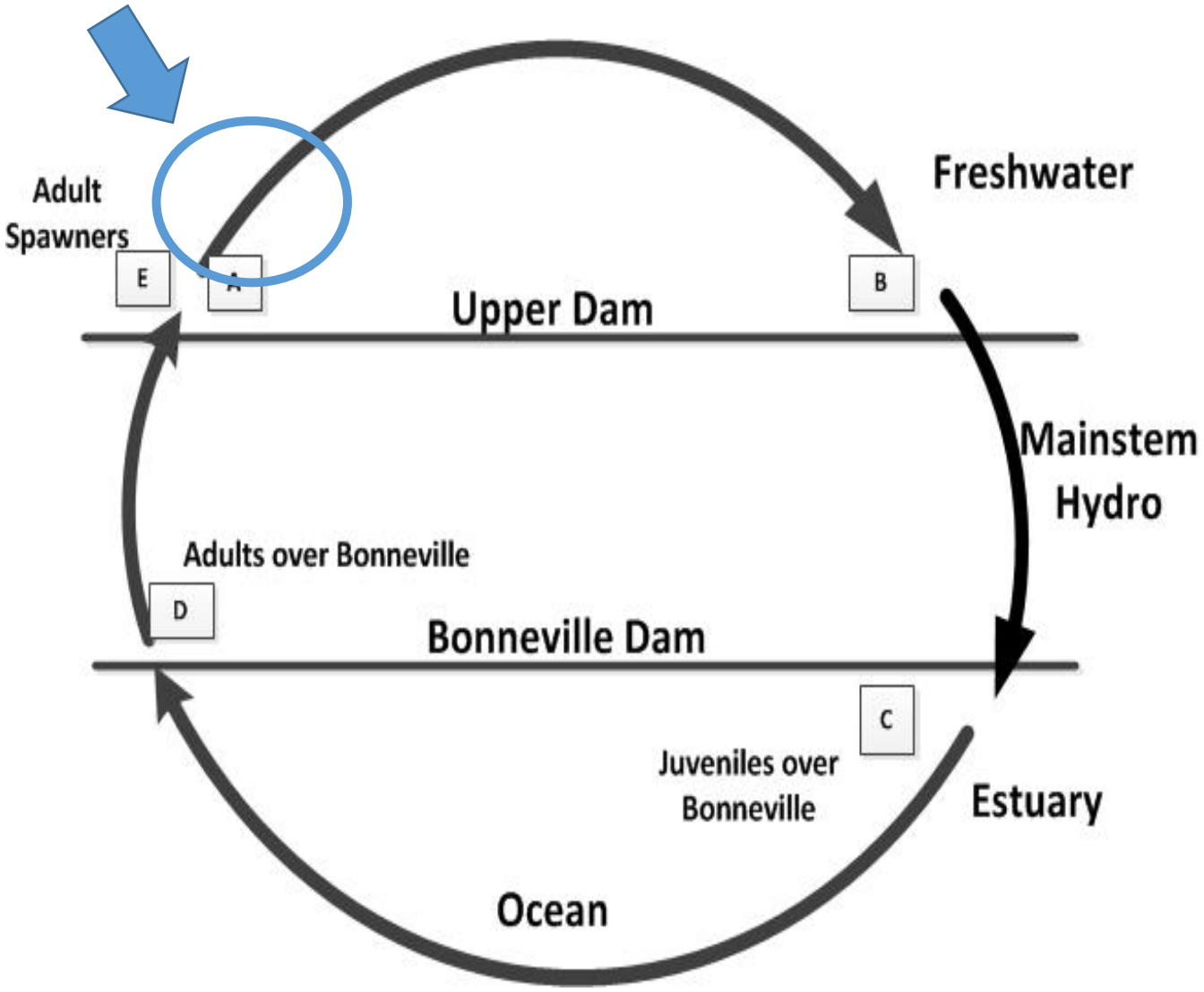
Uncertainty 2: Reach Productivity

Does the habitat improvement result in improved productivity from spawner to smolt?

Uncertainty 3: Population Response

Does the higher productivity result in higher population abundance?

Uncertainty #1 measure of success: Habitat Improvement

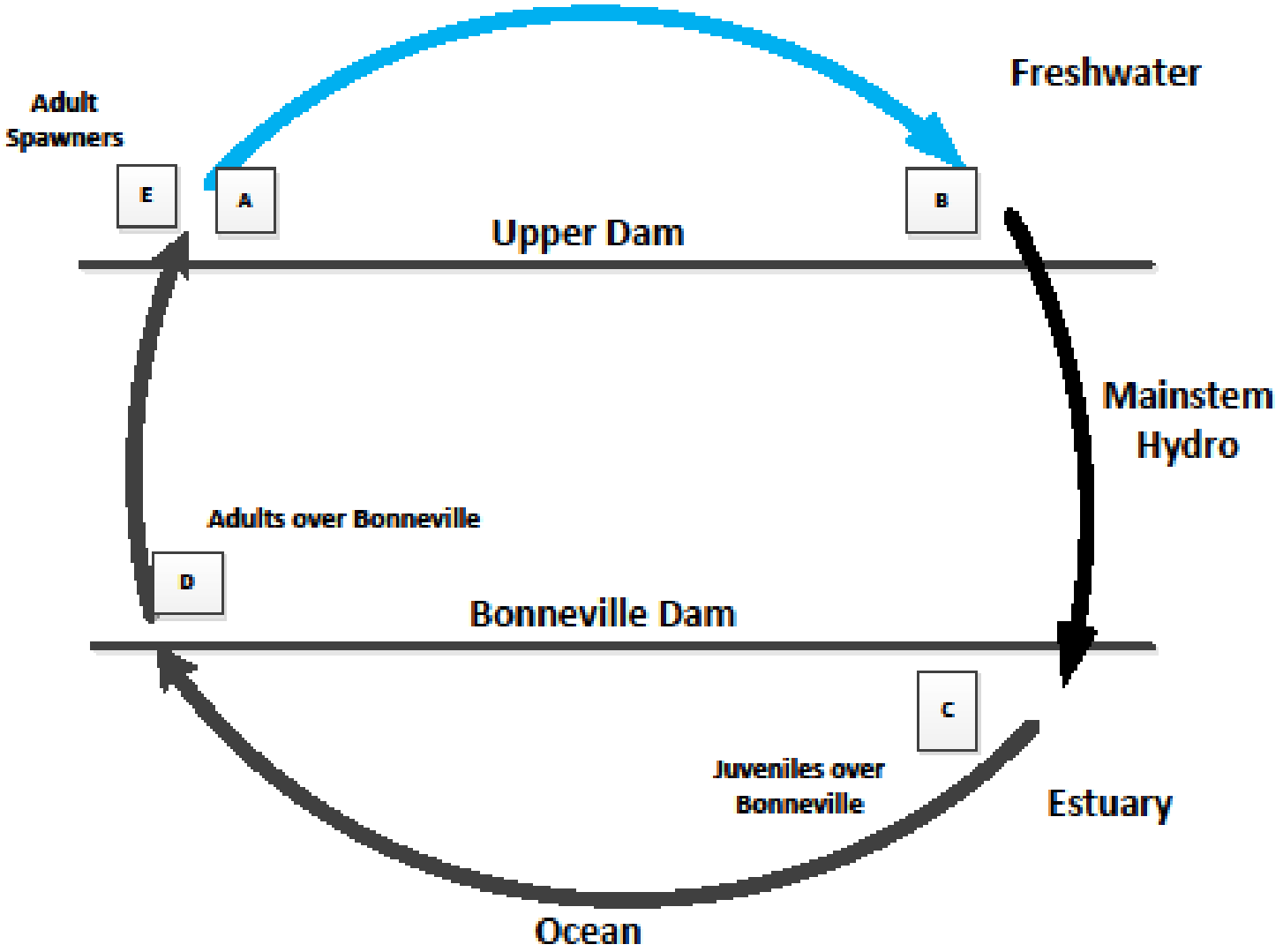


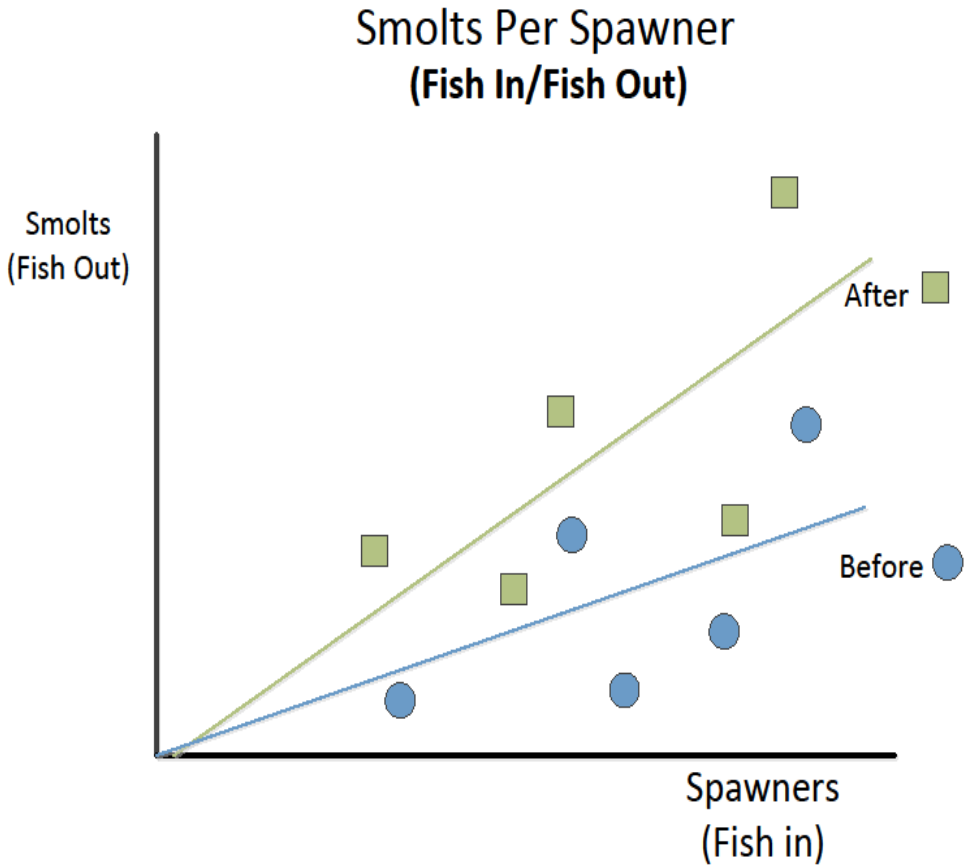
Metrics

- Lower temperature
- Greater complexity
- Juvenile presence and density
- Pool frequency and diversity
- Erosion reduction
- Floodplain width
- Slower flow velocity
- And more

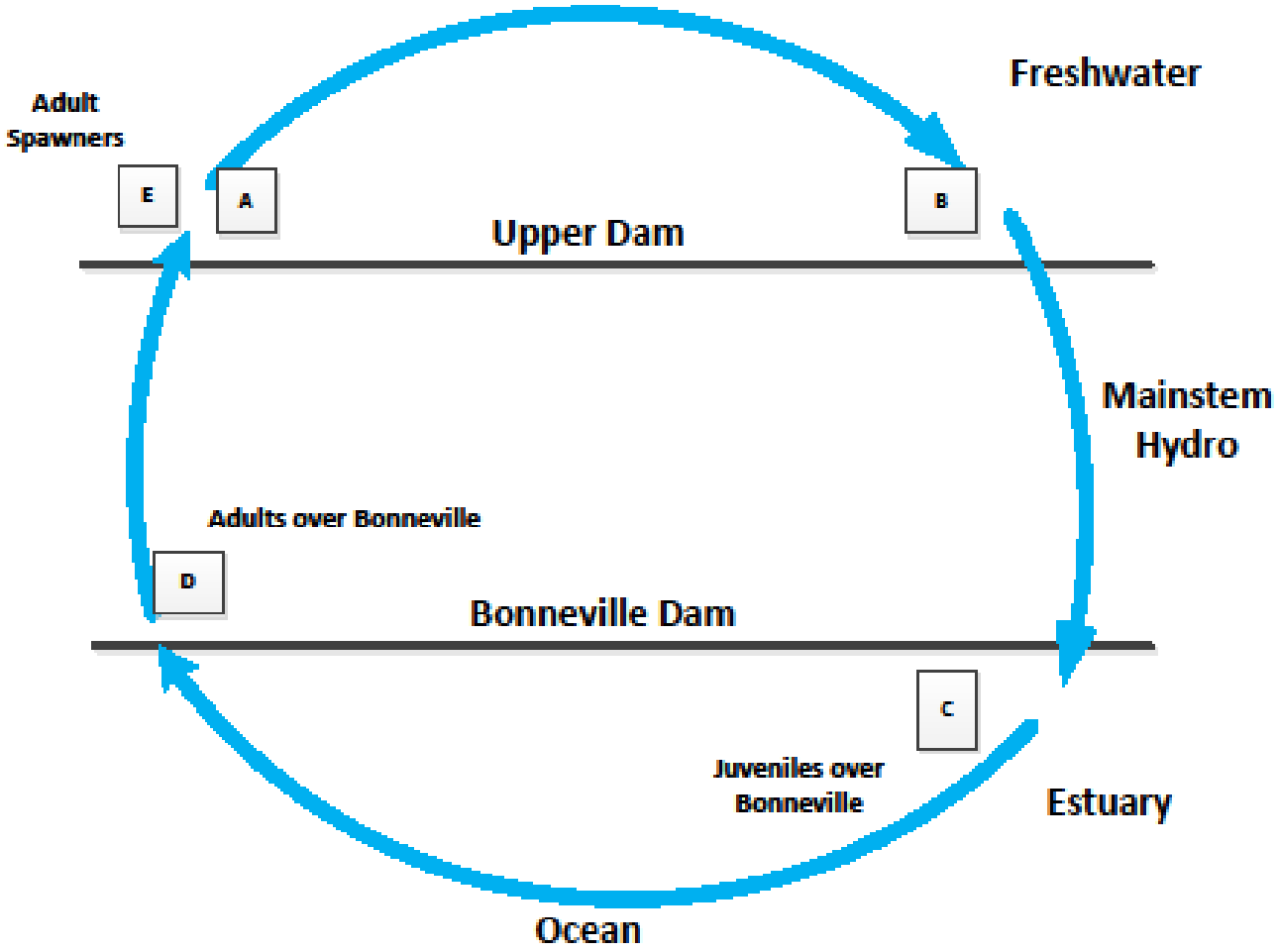
Uncertainty #2 measure of success: Productivity

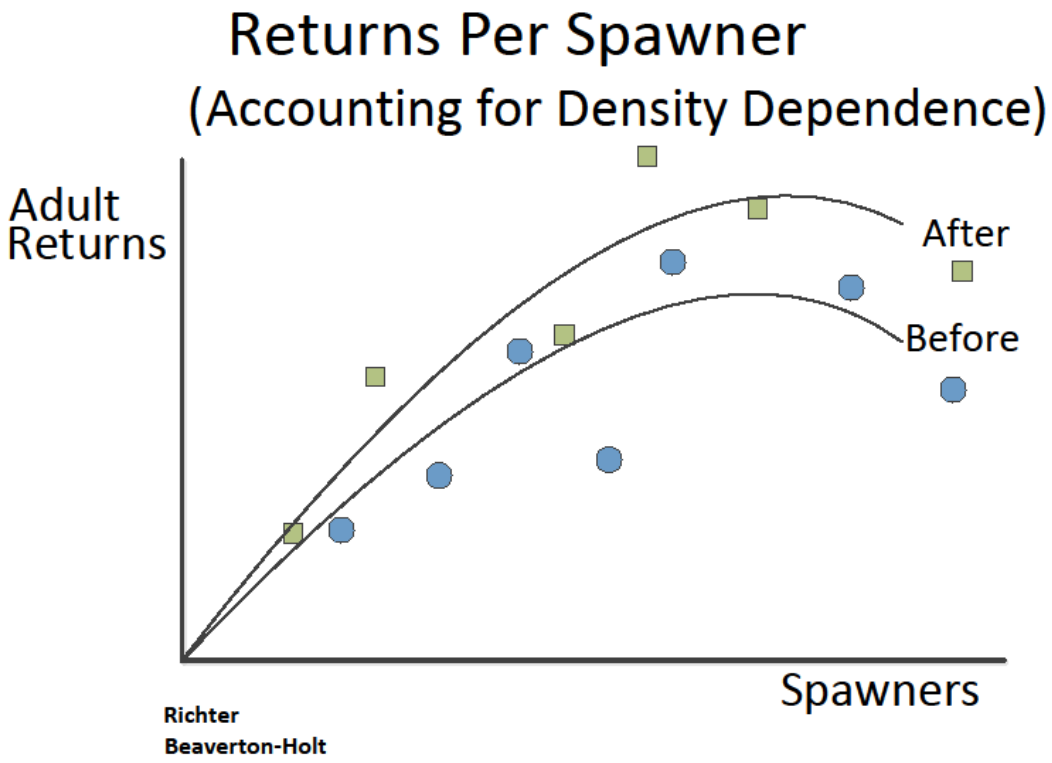
Increase in smolts (B) per spawner (A) and larger smolts





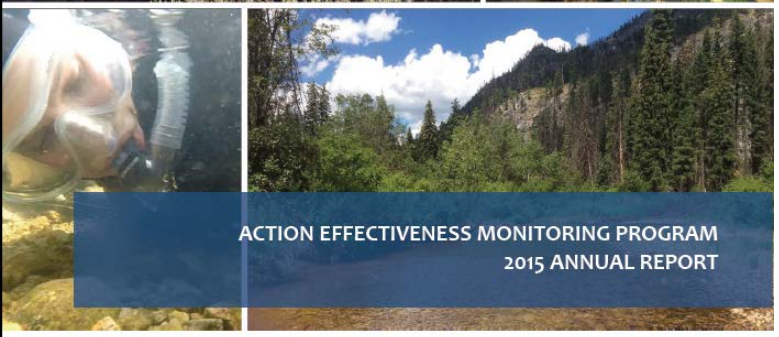
Uncertainty #3 measure of success: Abundance: Increase in returns (E) per spawner (A)

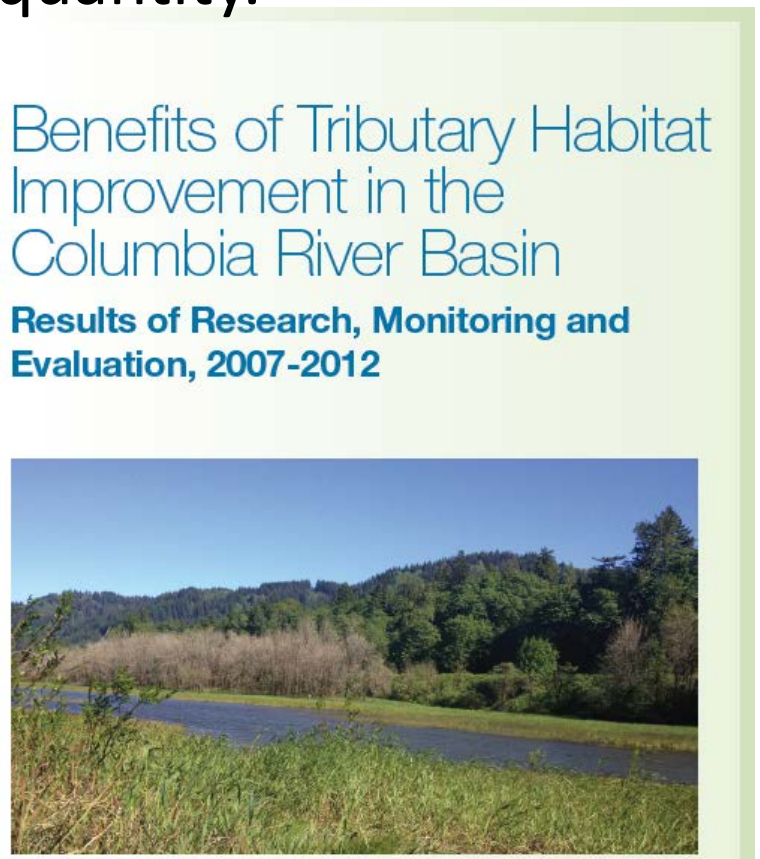




Uncertainty #1: Decades of habitat research have provided some answers.

Habitat projects generally improve habitat quality and quantity.





Primary Sources of Information

- Tetra Tech in Washington
- BiOp Report
- Action Effectiveness Monitoring

#1 Uncertainty: Since 2004 Tetra Tech in Washington Evaluated 9 habitat actions.

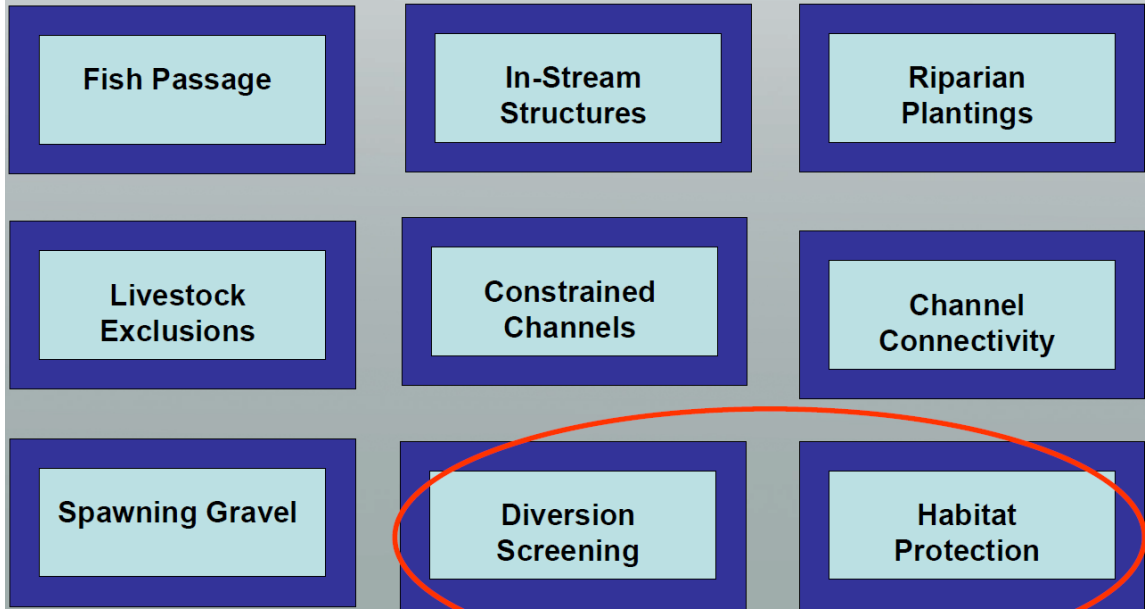
Significant Results from Monitoring

Significant Changes Detected to Date

- Fish Passage Projects - Juvenile Coho Density Increased (+438% by Year 5)
- Instream Structures – Mean Vertical Pool Profile Area Increased (Increased 108m^2 by Year 5)
- Livestock Exclusion Projects – Bank Erosion Decreased (-138% by Year 5)
- Floodplain Reconnection – Floodprone Width Increased (+845% in Year 3)
- Effective function established at Diversion Screens

"Some of the more successful project categories we have evaluated based on significant results are livestock exclusions and floodplain enhancement projects." p. 15 (2014)

Monitoring Categories



Benefits of Programmatic Approach

- **Before After Control Impact (BACI) with spatial and temporal replication – increases statistical power**
- **Sample size of 90 projects – no need to monitor every project**

- **Significant Results in the first 5 years**
- **Consistent methods and metrics across the program**
- **Evaluates projects on a regional scale through time**

Uncertainty #1: Action Effectiveness (AEM) in the Columbia Basin continues.

Table 5. MBACI study design status (Number of projects participating)

Restoration

Category	**Upper Columbia ESU**	**Mid Columbia ESU**	**Snake ESU**	**Total**	**Target**	**Needed**
1. Bank stabilization	2	2	0	4	10	6
2. Channel reconnection	4	6	3	13	15	2
3. Channel creation	2	1	1	3	15	12
4. Channel remeandering	1	1	6	8	15	7
5. Livestock fencing	0	0	7	7	10	3
6. Levee setback	4	5	4	13	15	2
7. Partial fish passage	0	2	3	5	10	5
Total				**54**	**90**	**36**

AEM Program, Annual Report 2016. Table shows that many more projects, 40 percent more, still needed.

Uncertainties #2 and #3:
Are habitat actions improving productivity and population abundance?

The major research project is ISEMP/CHaMP.
Budgeted since 2004: $65,619,478

From ISAB Review: 2 of 7 Critical Uncertainties for ISEMP

- To what extent do tributary habitat restoration actions affect the survival, productivity, distribution, and abundance of native fish populations?
- Are the current procedures being used to identify limiting habitat factors accurate?

Why haven't we seen answers to uncertainties #2 and #3?

1. Are ISEMP and CHaMP answering different questions?
2. Are the results there and simply not analyzed and reported yet?
3. Are the answers in the report but too complicated to understand?
4. Can these uncertainties even be answered?

From the Draft ISEMP/CHaMP 2015 Annual Combined Technical Report

Is the utility of this approach in doubt?

> "Results from the three IMWs are varying in their completeness, and at this stage in their implementation it is hard to draw conclusions about the usefulness of the IMW approach" p. 35

Was the value of beavers a major policy question?

> "As long as the location is amenable to the reintroduction of, or support for, beavers, these "natural engineers" do a remarkable job of restoring salmonid tributary habitat and populations." p. 36

From the Draft ISEMP/CHaMP 2015 Annual Combined Technical Report:

Did we need another Life Cycle Model (LCM)?

> "…the model (LCM) is ready to be used now in non-ISEMP watersheds and be incorporated into the development of regional decision-support tools." p. 37.

Can ISEMP/CHaMP reports be translated into a less technical language?

> "We have found the GRTS [Generalized Random Tessellation Stratified] approach to be flexible enough to incorporate shifts in effort and needs as we have learned more about the habitat in each watershed, but also that the precision of estimates for both status and trend, as quantified …." p. 13

Possible priorities for habitat research:

1. Apply the matrix criteria to every habitat research project.
2. Continue to focus on the effectiveness of current habitat investments.
3. Limit funding on new evaluations of habitat improvement (uncertainty #1), for example, livestock exclusion and floodplain enhancement.
4. Support fish-in/fish-out monitoring in some select subbasins where it currently exists and consider extending to additional subbasins (uncertainty #2).

Possible priorities for habitat research:

5. Support returns/spawner monitoring in some select subbasins where it currently exists and consider extending to additional subbasins. (uncertainty #3)
6. Call the question on ISEMP/CHaMP, what have they discovered, what will they deliver?

   "The Council will review the accomplishments of intensively monitored watersheds and the Integrated Status and Effectiveness Monitoring Project to ensure that it is cost-effective and produces useful results." 2014 Fish and Wildlife Program, p. 104
7. Which project will address uncertainties #2 and #3 in the future?

Other priorities for habitat research?

End of habitat section