March 3, 2015

MEMORANDUM

TO: **Fish and Wildlife Committee members**

FROM: **Council staff**

SUBJECT: **Follow-up review action for Accord Project #2008-471-00, *Upper Columbia Nutrient Supplementation***

BACKGROUND:

Presenter: Mark Fritsch, project implementation manager

Summary: Council staff recommends that the Fish and Wildlife Committee not support any further implementation of this project until a study design meets science review criteria.

Relevance The proposed action will recommend that this Accord project no longer be funded for implementation until there is a favorably reviewed study design. The total project cost is $2,020,768 (e.g., ranges from $199,964 to $247,336 per year) in expense funds for Fiscal Years 2008 through 2017. Costs to date (FY 2009- 2014) are about $992,111. The current contract (FY 2014 is $229,676) runs from May 1, 2014 to March 31, 2015. In addition there is a contract request for $672,656 (CR-284986) starting April 1, 2015 and ending March 31, 2016. Since 2011, roughly half of the project's expenses have been paid under another Yakama Nation Accord Project #2009-006-00, *Program Coordination and Administration*.

Workplan: Individual project follow-up reviews are a sub element of project reviews in the workplan tasks.

Background: On June 16, 2009, the Council received a Columbia Basin Fish Accord proposal from the Yakama Nation, #2008-471-00, *Upper Columbia*

Nutrient Supplementation. The project's goal is to quantify and evaluate nutrient status and availability for salmonids in the Methow River Subbasin. The project has a coordinated and replicated sampling regime for each food chain level. Nutrient, chlorophyll, and invertebrate sampling will be done monthly at each site from April through September. Additional fish sampling is planned for the next three years, including diet analysis, growth rates, and stable isotope work. Annual sampling will be implemented for two to three years pre-treatment to assess the nature and extent of nutrient limitation, and will continue for up to five years to evaluate experimental nutrient addition, if warranted by the results of the initial sampling.

On July 10, 2009, the Independent Scientific Review Panel requested additional information about the study design from the Yakama Nation in order to determine whether the proposal met scientific criteria (ISRP document 2009-27). The ISRP recommended incorporating more appropriate methods for some aspects of the study in order to make the proposed approach technically sound. No public comment has been received on the ISRP review.

On October 23, 2009 the Council received a response from the Bonneville Power Administration, and on December 2, 2009, the Council received the ISRP's review (ISRP document 2009-50). The ISRP found that the proposal *does not meet scientific criteria.*

In February 2010, it was brought to the ISRP's attention that their review contained responses and comments for a proposal submitted by the Shoshone-Bannock Tribe for nutrient enhancement in the Salmon River Subbasin (#2008-904-00; see ISRP 2009-53). It had been submitted at about the same time as the Yakama Nation proposal.

The ISRP re-examined their proposal and found that they had mistakenly made some comments on the Yakama proposal that were actually meant for the Shoshone-Bannock Tribes' proposal. However, the ISRP's primary points about the Yakama's proposal were correct, so the ISRP's final recommendation of *does not meet scientific review criteria* is unchanged.

To help them address the ISRP's concerns, Yakama Nation representatives held a conference call with the ISRP on February 22, 2010.

On March 15, 2010, the Council received a submittal from Bonneville addressing the ISRP's concerns. On April 12, 2010, the Council received the final ISRP review (ISRP document 2010-8).

The ISRP found that the Yakama Nation's response made considerable progress in addressing their concerns and concluded that the Yakama Nation's revised narrative *meets scientific review criteria (in part)*.

The ISRP believes a useful nutrient experiment can be conducted on the Twisp River, assuming a complete study plan is developed and includes the following critical project components:

- identification of the form in which nutrients will be added
- power analyses of the detection of a response in fish production
- detail regarding the stable isotope work
- securing permits for sampling fish

The Council concurs with the ISRP and feels that these issues can be addressed over the next two to three years as the Yakama Nation gathers pre-treatment data. The information can then be included in an updated study plan. An updated study plan is expected to be completed and submitted to the ISRP for review by early 2013.

Based on this understanding, on May 12, 2010, the Council recommended that Bonneville fund the pre-treatment activities and implement the nutrient enrichment portion of the study plan, contingent upon a favorable scientific review.

On December 12, 2013, the Council received a response from the Yakama Nation addressing the condition placed on the project. On February 10, 2014, the ISRP provided their review (ISRP document 2014-2). The ISRP found that the proposal *does not meet scientific review criteria*, finding that "*any future proposal carefully consider the comments below, especially those related to experimental design and statistical analysis. Should a future proposal be developed, it should fully address the issues raised in this ISRP review and be presented as a stand-alone study proposal rather than combined with a progress report."*

On December 4, 2014 the Council received the submittal from the Yakama Nation intended to address the condition placed on the project as part of the Council decision made on May 12, 2010, and the previous ISRP review in February 2014 (ISRP document 2014-2).

On January 28, 2015 the Council received the ISRP review (ISRP document 2015-01). The ISRP found that the proposal *does not meet scientific review criteria*. The ISRP stated that "*Although a better understanding of food web response to various restoration actions remains a key knowledge gap across the Columbia Basin, the issues listed above indicate that Hancock Springs is not an appropriate location to conduct this type of research. Overall, the proponents have not*

provided a convincing argument that this project will provide new information that can be used by other researchers or managers".

Since 2012 the project has collected three years of pre-treatment data at the proposed new study site, Hancock Springs. In discussions with the Yakama Nation, they believe that they can reconcile the experimental design in consultation with the ISRP to take advantage of these data to provide information that will assist the region in understanding the mechanics of nutrient additions to fish abundance and productivity. The YN currently is correcting the flawed study design, and they believe that the corrected design should be able to deliver answers that the ISRP has sought regarding nutrient enhancement as a tool for salmon recovery (Attachment 1).

Based on the ISRP reviews, to date, the Council staff recommends that the Committee not support any further implementation of this project until a study design meets science review criteria. We understand that under the Accord commitments and procedures, Bonneville and the Yakama Nation may choose to revise and resubmit this project in the near future.

More Info: http://www.nwcouncil.org/fw/isrp/isrp2009-27/

http://www.nwcouncil.org/media/16525/200847100response.pdf

http://www.nwcouncil.org/fw/isrp/isrp2009-50/

http://www.nwcouncil.org/media/16528/200847100response2.pdf

http://www.nwcouncil.org/fw/isrp/isrp2010-8/

http://www.nwcouncil.org/media/16522/200847100Council.pdf

http://www.nwcouncil.org/media/6936705/ISRP2014-2.pdf

Attachment 1: Letter received from the Yakama Nation on March 2, 2015 regarding the ISRP's review (ISRP document 2015-1) of Accord Project #2008-471-00, *Upper Columbia Nutrient Supplementation*.

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

February 26, 2015

Mr. Phil Rockefeller, Chair
Northwest Power and Conservation Council
851 SW Sixth Avenue, Suite 1100
Portland, OR 97204

Re: Project #2008-471-00, *Upper Columbia Nutrient Supplementation*

Dear Chair Rockefeller,

On January 29, 2015, Yakama Nation Fisheries received ISRP comments on the captioned project proposal. We greatly value this constructive review and find many of their criticisms to have merit while, not surprisingly, we disagree with others. We appreciate the time and attention to detail that the ISRP invested into responding to our proposal narrative and hope that we can satisfactorily address the technical issues raised by the panel. The ISRP had valid criticisms of the fundamental experimental design, which we hope to reconcile in this document.

The ISRP comments seem to fall into three categories:

- The claimed project scope was not borne out in the study design
- Hancock Springs is not representative of typical salmon-producing streams
- The experimental design was flawed with respect to confounding variables and lack of independence between treatment and control effects.

Admittedly, the original project proposal described a context and grand aspirations that are beyond the scope of the proposed work. Nevertheless, the essential deliverable product is something the ISRP has called for and ostensibly supports, and which is valuable to both BPA and regional salmon recovery efforts. The second criticism implies a fundamental misunderstanding of project intent. Hancock Springs Creek Natural Lab (HSCNL) is not intended to reflect large and variable stream systems and was chosen for this study precisely because its unique, highly stable environment allows us to tease out complex food web responses that would be undetectable in large and variable systems. However, we acknowledge the ISRP's conclusion that the study design was flawed in failing to account for a spatial control. As a result, we propose in the comments that follow a modification that clearly describes changes to the study design and how they address the ISRP's technical merit issues.

We look forward to the opportunity for further consultation with the ISRP and Council as we attempt to address unanswered questions about the value of nutrient enhancement in salmon recovery. This project has produced three years of extensive baseline information on food web dynamics in Hancock Springs. It is ready now to enter the treatment phase of the experiment to examine in detail the response of the food web, particularly the fish components, to artificial nutrient enhancement.

We believe that, working with the ISRP, we can develop a study design that meets the panel's standard of scientific merit. In view of the ISAB's recent report on density-dependence and carrying capacity in salmonid habitats, it seems that the potential for nutrient enhancement to address capacity constraints related to food production should be thoroughly and exhaustively examined. As in any field experiment, Hancock Springs and this proposed study may have their limitations, but if the purpose of this study contributes to understanding the value of nutrient enhancement as a general tool in salmon recovery, then let the implementation, learning, adaptation, and refinement of study methods begin now.

Sincerely,

Steven S. Parker
Technical Services Coordinator
Yakama Nation Fisheries

cc: Bill Maslen, BPA
Tony Grover, NPCC
Mark Fritsch, NPCC
Stacy Horton, NPCC
Paul Ward, YNF

Upper Columbia Nutrient Supplementation Project

John Jorgensen
Lucius Caldwell
Kristen Kirkby
Teresa Fish

Project History

- Project was initiated in the Twisp River, which had preclusive problems
  - High degree of system variability in a river of this size impedes quantification of trophic pathways
  - Not able to capture enough fish to quantify treatment effects on ESA listed species
- Moved to Hancock Springs
  - Reduced level of ecosystem variability
  - Increased organismal densities
  - Increased fish catchability → improved abundance, biomass and production estimates
  - Increased ability to quantify trophic routing mechanisms linking treatment to fish production

Natural-source Marine Derived Nutrient inputs have been reduced in the PNW

Table 7 presents the historic and current run biomass (kg) and nutrient contribution for the Pacific salmon in the Pacific Northwest. Numbers in 000's

Historic Runs		Biomass (kg)		Nitrogen (kg)		Phosphorous (kg)		Change in Biomass	Change in nitrogen (kg)	Change in Phosphorous (kg)
		Historic	Current	Historic	Current	Historic	Current			
Puget Sound	Low	36,861	9,141	1,119	278	132	33	1,252	841	99
	High	78,989		2,399		284		2,682	2,399	284
Wash. Coast	Low	8,575	387	260	12	31	1	291	248	30
	High	24,132		733		87		820	733	87
Columbia	Low	75,808	583	2,302	18	272	2	2,574	2,284	270
	High	101,632	1,820	3,087	55	365	7	3,451	3,032	358
Ore. Coast	Low	9,943	329	302	10	36	1	338	292	35
	High	20,922	996	635	30	75	4	711	605	71
California	Low	24,882	1,404	756	43	89	5	845	713	84
	High	28,623		869		103		972	869	103
Totals	Low	156,069	11,843	4,853	360	574	43	5,427	4,493	531
	High	254,298	13,747	6,854	418	810	49	7,664	6,436	761

Gresh et al. 2000

Important Data Gaps

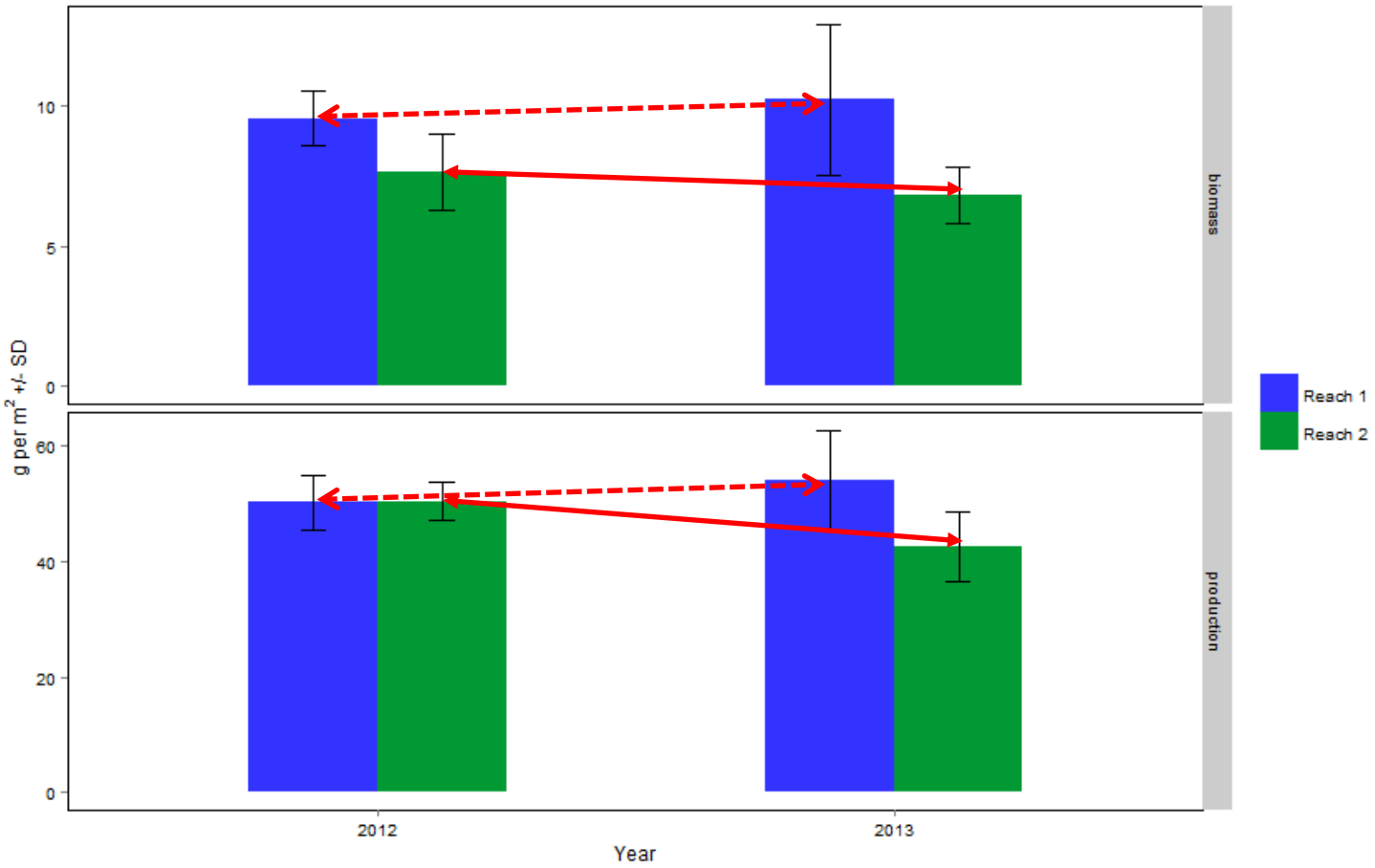
- Long-term effects of restoration treatments and their contributions to fish production are not understood (Kohler et al. 2012)
- Trophic routing mechanisms linking restoration actions with fish production remain elusive or nebulous (ISAB 2011, Naiman et al. 2012)
- Density dependence may limit fish abundance and productivity in the Columbia Basin (ISAB 2015)
  - Can nutrient supplementation play a role in expanding carrying capacity?

How this project addresses data gaps

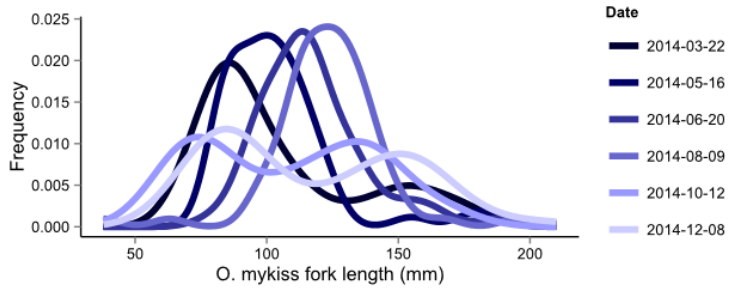
- Hancock Springs Creek (HSC) is an ecologically stable system that is biologically and logistically amenable to experimental study
- Intensively monitoring HSC before and after adding nutrients allows us to characterize energy flow webs at a fine scale and illuminate the potential contribution of nutrient enhancement to fish production
- Results from this fine scale approach will assist managers to understand mechanisms of energy transfer between trophic levels and assess the recovery value of nutrient enhancement

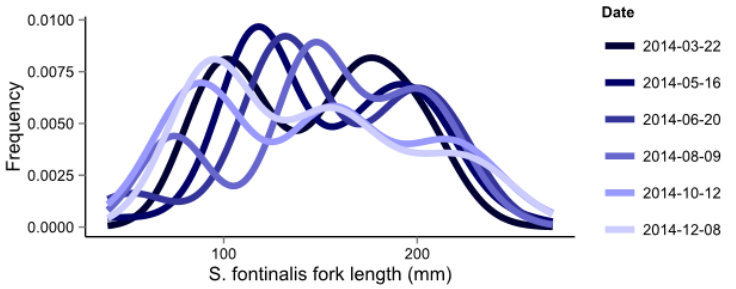
First Treatment: Channel Reconstruction

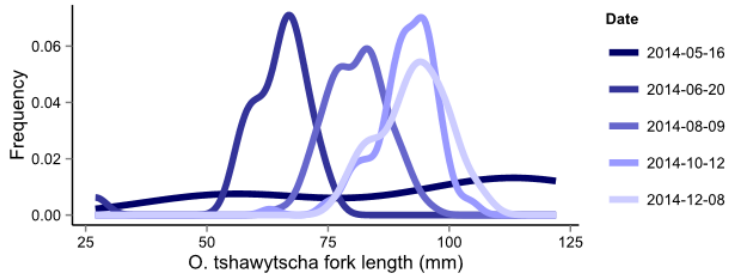
Aquatic Insect Production at HS in 2012 & 2013

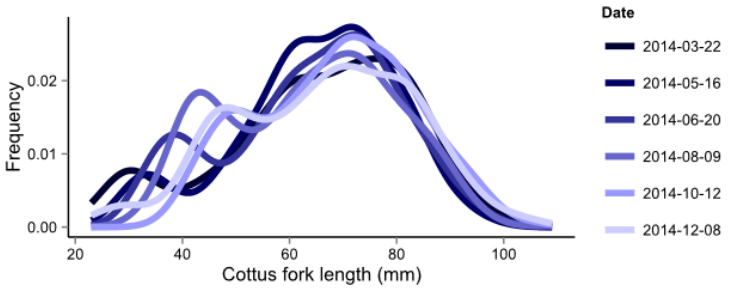


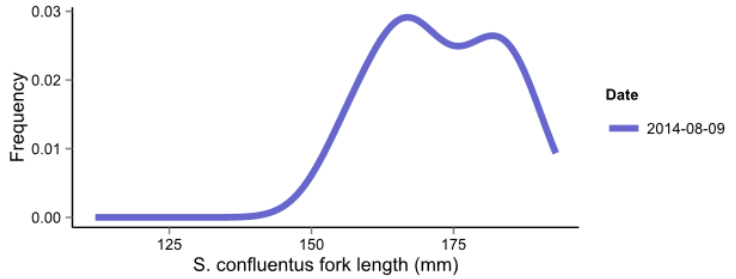
Intensive sampling at Hancock Springs Creek tracks fish cohorts & enables accurate production estimates





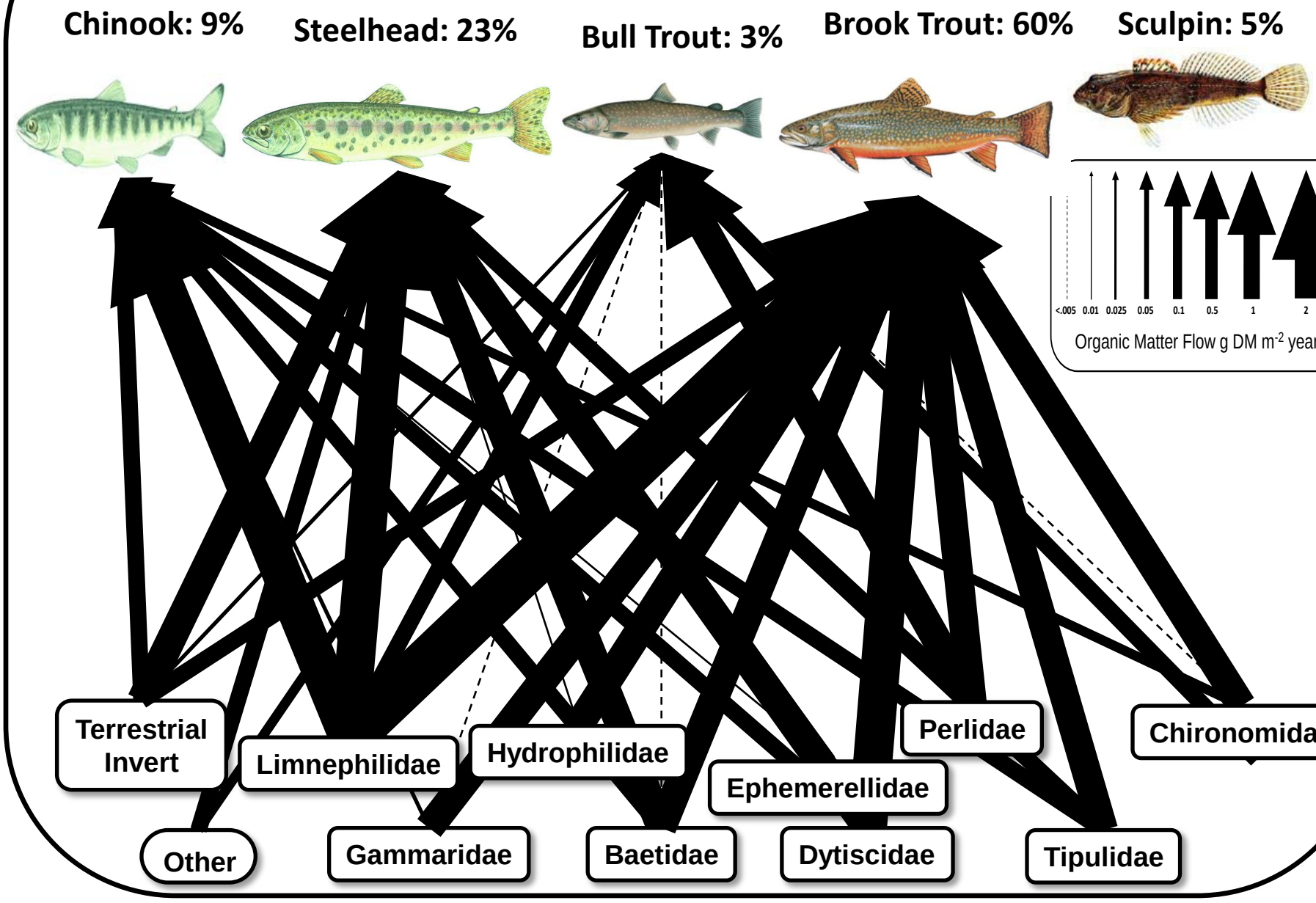






Reach 1- 2011 habitat restoration

Current



Modifications Based On Reviewers Comments

- Adding intrabasin spatial control stream
  - "Silver Bullet" control site remains elusive
  - Several potential spatial control sites are currently being considered
  - Each possible site offers benefits and drawbacks
  - Cost-benefit and logistical analyses are underway to determine the best-fit control site
- Concentrating efforts on Reach 1
  - Increased spatial resolution of benthic data → Increased statistical power and ability to detect treatment effects

Closing thoughts

- ISRP sees value in food web analysis; can study design be improved?
- Uncertainty about MDN effectiveness hampers its use as a recovery tool
- Density dependence/carrying capacity issue raises new questions about remedies
- Significant investment in pre-treatment phase; ready for treatment phase
- Refine methodology or scrap the project?