January 20, 2017

To: StreamNet Executive Committee

From: Dan Rawding

Subject: Hatchery Indicators

As a follow up to the November 8 StreamNet Executive Committee meeting, I met with NPCC Fish and Wildlife Program Director Grover and Council Member Norman regarding hatchery indicators on November 30. We were asked to consider the purpose and need of hatchery indicators along with rationale and process for the development of hatchery indicators. We considered the Council’s F&W program, existing coordinated assessments (CA) date exchange standard (DES) for natural origin indicators, and draft DES hatchery indicators previously developed by the CA work group. The CA DES is hierarchically organized with indicators at the top of the pyramid and metrics, which are required data and summaries to calculate the indicator, at the base of the pyramid. In order for CA data to be exchanged, the DES with all the metadata needs to be completed for mandatory fields.

The Columbia River Basin Fish and Wildlife Program 2014 (F&W Program) identified that in addition to natural origin indicators, hatchery origin indicators would be useful to inform progress on meeting mitigation objectives and recommended these be made electronically available (see appendix at the end of the memo). The possible indicators identified in the F&W program included in-hatchery survival (egg to smolt), juvenile production/releases, hatchery smolt-to-adult returns, and hatchery recruits per spawner. Except for the egg to smolt survival, these indicators are very similar to the natural origin indicators in CA and were developed from a broad regional group including state, tribal and federal co-managers and BPA. The three of us were generally supportive of the draft CA hatchery indicators but found some areas for improvement. Of the possible indictors listed above, we identified egg-smolt survival as a lower priority since it was not a mitigation measure. Also, we were mindful that the development of natural origin indicators was time consuming and had to be flexible to account for various levels of information. For example, we had many options in the development of RperS for natural origin fish. That is, natural origin recruits could be defined without harvest or with harvest depending on the amount of information available on harvest. We believe this is an important consideration in the development of RperS for hatchery fish.

***Juvenile Production.*** The primary purpose of this indicator is to document the numbers, size, release location, and broodstock name used in salmon and steelhead juvenile release numbers (e.g. production). This has relevance because many mitigation agreements have a target for number and size of juvenile releases. Most agencies maintain juvenile production information that is similar to the natural origin juvenile abundance indicator. ***Status:*** CA has a draft DES for this indicator for natural origin fish indicator, “juvenile outmigrants table” that will need to be adapted for hatchery origin juveniles.

***Hatchery SAR.*** CA developed a SAR metric to track variability in in-river and ocean survival depending on the site of the juvenile release/tagging and adult detection or abundance. This is also relevant because the NPCC has established a 2-6% SAR goal. Currently, PSMFC staff is working with FPC center staff to develop a DES to exchange all of the FPC wild SAR data. Since, FPC also calculates hatchery SAR, this information could easily be exchanged. ***Status:*** CA has a draft DES for this indicator that is ready for exchange of information.

**Hatchery Returns.** The purpose of this metric is similar to the NOSA metric in that its goal is to track the number of fish that return to the hatchery and their final disposition. This table is a combination of hatchery returns by age and origin of hatchery broodstock. As with juvenile production, these metrics and this indicator are collected by most agencies. ***Status:*** CA has a draft DES of a similar indicator “Hatchery Spawning Table” that will need adaptation.

**Hatchery RperS.** The purpose of this indicator is to evaluate the effectiveness of the hatchery program and measures by an accounting of total returns with or without harvest from all fish used as broodstock. This indicator requires the most work because it needs to account for freshwater and possibly marine harvest and hatchery fish spawning in the wild. So, RperS may have recruits that just include 1) hatchery returns, 2) hatchery returns plus hatchery fish spawning naturally, and 3) hatchery returns, naturally spawning hatchery fish, and harvested hatchery fish (Table 1). While we recognized that this indicator is important for mitigation evaluation, it requires the most additional work because much of the data is not currently summarized in this manner for many populations. Thus in the short-term this was a lower priority in our group discussion than the above 3. ***Status:*** CA has a draft DES for this indicator that is likely to need modification.

Table 1. Tabulation of sequence/feasibility of gathering hatchery Recruits per Spawner (RpS) Information.

|  |  |  |
| --- | --- | --- |
| **Sequence of data compilation** | **Metric** | **Comment on metric availability** |
| **1** | **Hr = Hatchery Rack returns** | **Currently Available for most Pops.** |
| **2** | **Hw = Hatchery fish that spawn in the wild** | **Partially Available in NOSA** |
| **3** | **Hhr = Hatchery fish harvested in river** | **Stock Dependent** |
| **4** | **Hho = Hatchery fish harvested in the ocean** | **Stock Dependent** |

* The metrics in the table above should sum to the total adult hatchery RpS.

**Appendix: Excepts for the Columbia River Basin Fish and Wildlife Program 2014**

**1. Refining program goals and quantitative objectives**

**a) Objectives for adult salmon and steelhead**

“The Council will work with the states, federal agencies, and tribes to identify specific indicators for Bonneville-funded hatchery programs that could be tracked and reported to inform progress on meeting mitigation objectives (i.e., harvest, supplementation, reintroduction, and conservation). Potential indicators that should be tracked include: contribution to hatchery broodstock, natural spawning, and harvest by hatchery. Potential indicators that could be tracked include: in-hatchery survival (egg to smolt); juvenile production/releases; hatchery smolt-to-adult returns and hatchery recruits per spawner. The Council, agencies, and tribes will work with the Coordinated Assessment (CA) partners, the Fish Passage Center and others as appropriate, to collect existing indicator information. The Council recognizes that the development of a “common data exchange standard” for hatchery indicator information (through the CA effort) is an ongoing process.” *-2014 NPCC F&W Program, page 33.*

**B. Fish Propagation Including Hatchery Programs Strategy**

**General measures for comprehensive research, monitoring, assessment and reporting on hatchery effectiveness**

“Hatchery program implementation, monitoring, and evaluation results for all hatchery programs in the Columbia River Basin should be made electronically available and hatchery operators and funders should coordinate annual summary presentations to the Council.”