SOA 2011-02

Priest Rapids Coordinating Committee Hatchery Subcommittee Statement of Agreement on Monitoring & Evaluation (M&E) Objective for Spawning Distribution of Hatchery-Origin Summer Chinook

Submitted to PRCC Hatchery Subcommittee: _3-18-2011 (previous drafts reviewed 2/11 & 3/12)
Approved by PRCC Hatchery Subcommittee: _3-18-2011_______________________________

Statement

The Priest Rapids Coordinating Committee Hatchery Subcommittee (PRCC HSC) agrees with and approves of the following statements:

1. Hatchery supplementation programs should attempt, to the greatest degree practicable, to replicate the spawning distribution of the target population over time; however, in the Methow River Basin there is concern that exact replication of hatchery and natural origin summer Chinook spawner distribution may have an adverse impact on ESA-listed spring Chinook. Based on current spawner abundance and distribution data, and population status for summer Chinook and ESA-listed spring Chinook in the Methow River Basin and concern for impacts to listed spring Chinook, 100% match between the distribution of natural and hatchery origin summer Chinook may not be warranted or desired.

2. M&E objective #2 of the Grant County PUD Hatchery M&E plan, which addresses the relationship between distribution of natural origin spawners and hatchery origin spawners, is written as a hypothesis to compare the means of the two spawning distributions. However the quantitative objectives for hatchery programs do identify the goal of no difference between the hatchery and wild fish spawning distribution.

3. The HSC will develop a revised M&E objective relative to spawning distribution for summer Chinook in the Methow Basin for use in designing Grant PUD acclimation strategies.

4. This SOA establishes the current distribution of hatchery origin summer Chinook (as measured during the past 5 years) as the anticipated hatchery origin summer Chinook spawner distribution for summer Chinook returning from Grant PUD's summer Chinook salmon acclimated at Carlton Pond and represents the base-line spawner distribution for evaluating the performance of the hatchery program (i.e., M&E plan check-ins). It is acknowledged that this distribution is lower in the River than the spawning distribution of natural origin summer Chinook salmon, and if there are significant changes to this distribution, adaptive management will be triggered to address the issue.

Background

The quantitative objectives for hatchery programs of no difference between the hatchery and wild fish spawning distribution is endorsed by the HSC; however, based upon an assessment of summer Chinook and ESA-listed spring Chinook abundance and spawner distribution, it was determined that an increase in summer Chinook spawning abundance in the upper most range of natural origin summer Chinook distribution or potentially above the current range may pose an unknown and potentially adverse impact to ESA-listed spring Chinook. Due to the concern for spring Chinook, the HSC has endorsed an acclimation site in the Methow Basin that is lower in the basin than may be required to attain exact replication of natural and hatchery origin summer Chinook spawner distribution.

The primary site endorsed by the HSC for Grant PUD overwinter acclimation of summer Chinook is the Carlton Pond, and is the current acclimation and release site for the existing summer Chinook supplementation program funded and owned by Chelan PUD. Currently Douglas and Chelan PUDs use the hypalon-lined Carlton Pond for spring-time acclimation of summer Chinook. Because current data indicates that spawning distribution of hatchery summer Chinook from the existing program is lower in the Methow River than natural origin spawners, expectations are that the overwinter acclimation of Grant PUD's 278,000 summer Chinook at Carlton Pond would continue to return hatchery origin summer Chinook that result in different spawning distributions for hatchery and natural summer Chinook.

Among the quantitative objectives for the hatchery program, the hatchery fish spawning distribution should be the same as the natural origin fish spawning distribution and the M&E objectives for summer Chinook is a hypothesis that hatchery spawner distribution will equal natural spawner distribution; therefore, the HSC felt that this SOA was necessary in order to revise the quantitative objective for hatchery summer Chinook salmon and clarify the intent of this particular M&E objective relative to the siting of a new acclimation facility.

Quantitative Objectives from the HGMP

Table 1. Metrics for quantitative objectives of summer Chinook hatchery programs. The quantitative objectives for the program are identified in Table 2.

Metric	Definition or calculation	Why important
Release number and size (M&E Indicators 6.1 and 6.2)	Total number and weight of juveniles released	Necessary to assess whether or not the program is meeting mitigation production levels consistent with the Settlement Agreement. Life-stage specific survivals will also be measured to determine if each component is meeting expected survival standards.
Proportion of natural influence (PNI) (M&E Indicator 7.1)	Proportion of total selection (hatchery and natural) that is due to natural selection. Calculated as pNOB/(pNOB + pHOS)	Helps determine size of programs, type of programs, management of hatchery broodstock, management of fish of different origins on the spawning grounds

Metric	Definition or calculation	Why important
	pNOB=proportion of natural origin brood in the hatchery pHOS=proportion of hatchery origin spawners in the natural environment	
Hatchery SAR (M&E Indicator 4.1)	Smolt-adult return rate by brood year	Necessary monitoring to assess overall hatchery smolt survival. Essential for run-forecasting and out-year mitigation requirements.
Within hatchery survival (M&E Indicator 6.2)	Survival by life stage	Necessary monitoring to assess/maximize the efficacy of hatchery rearing and will guide future hatchery rearing strategies.
Escapement (M&E Indicator 1.1)	Number of adults that spawn in the natural environment	Under escapement can harm the viability of the population and over escapement can result in lost harvest opportunity and potentially reduced productivity
Stray rate (M&E Indicators 5.1, 5.2, and 5.3)	Three metrics for evaluating straying: Stray 1=percentage of hatchery release that strays to non-target spawning areas, Stray 2=percentage of a non-target spawning population that contains hatchery strays, Stray 3=percentage of non-target populations that stray into targeted population	Straying into non-target populations has the potential to reduce productivity of non-target populations and reduce between population diversity. Strays from other programs could impact the target population.
Relative productivity (M&E Indicators 1.1, 1.2, 1.3, and 4.1)	Productivity of hatchery and natural origin fish in the hatchery and the natural environment across generations. This includes: freshwater productivity (e.g., The number of juveniles / redd or juveniles / spawner. Juveniles may be measured at different life-stages such as parr, emigrants, or smolts), Hatchery and natural origin adult recruits/spawner and hatchery smolt-to-adult recruitment (SAR).	Critical factor in evaluating whether a hatchery is contributing to or reducing natural production. Evaluating productivity at different life-stages also helps assess the time and place of achievement of objectives (i.e. assess potential mining of adults).
Genetic Diversity (M&E Indicators 3.1, 3.2, and 3.3)	Allele frequency Effective population size	Genetic diversity within and between populations is associated with increased productivity and long-term fitness.
Biological characteristics of adult hatchery and natural origin offspring. (M&E Indicators 2.1, 2.2, 2.3, 3.4, and 3.5)	Size at age, age at maturation, return and spawn timing, sex ratio, fecundity, egg size, spawn location	Manifestations of genetic and environmental differences which could impact long-term fitness, viability and productivity. Utilized as a monitoring indicator to support management decisions based on assessment of biological significance.
Harvest	Number of fish to be harvested	Contributes value to commercial, subsistence, and

Metric	Definition or calculation	Why important
(M&E Indicator 8.1)	in all fisheries	recreational fisheries, and is important for spiritual reasons
Non-target taxa of concern (NTTOC)	% impact to a taxon baseline abundance, size, or distribution A risk assessment will be conducted that will identify which NTTOC, if any, will be monitored and will help inform the frequency and intensity of monitoring. The containment objectives need to be consistent with HCP objectives.	Allows for a proper balancing of target and non-target taxa benefits and costs

Table 2. Draft biological goals for integrated hatchery programs that will be used for evaluation of different hatchery strategies and presentation in HGMPs. PNI=proportion of natural influence, EN= spawning escapement of natural origin fish, K=the minimum number of spawners to produce the asymptotic number of recruits, R=recruitment productivity in recruits per spawner, A=number of adults, H= hatchery, E=spawning escapement (hatchery and natural origin fish combined), N=natural origin recruits, D= donor population, Ne=effective population size, RH=recruitment of hatchery fish, RHN=recruitment of hatchery fish in the natural environment, RN =recruitment of natural origin fish in the natural environment, B = hatchery broodstock, P = prespawn mortalities.

HGMP	Release # and size (see table 3)	PNI[1], (E relative to K)	E[2]	Genetic Diversity	Stray Rate	Relative Productivity	Biological characteristics	Harvest[3]
Summer Chinook	833,000 @ 13-17 fish/pound [278,000 in Methow]	1, (EN≥K)1 0.67, (E ≥K)1 0-1 (E<K)1	K	Allele freq. H = N = D (Ne/E)year x =(Ne/E)year y	<5% Between populations, <10% within population	RH*RHN*RN > RN*RN*RN	H=W (see table 1)	<A-K-B-P

[1] PNI values given in the table are initial estimates only and need to be defined on a program specific basis. The focus will be to maximize PNI while still fully seeding available habitat. The development of final PNI goals will require co-managers to evaluate what PNI values are realistically achievable in both the short and long-term using existing and future management tools. Ongoing discussion for management of spring Chinook salmon to be resolved in forthcoming ‘implementation plan’.
[2] An initial estimate of K was presented by HSRG
[3] Prioritize harvest of hatchery origin fish to meet PNI objectives

Figure A. Monitoring and Evaluation Objective 2 for Methow Summer Chinook (excerpted from Hatchery Genetic Management Plan for Methow Component of the Upper Columbia River Summer Chinook Program – Priest Rapids Project Mitigation, updated 9-30-2009)

Objective 2: Determine if the run timing, spawn timing, and spawning distribution of both the natural and hatchery components of the target population are similar.

2.1 Migration Timing (*Monitoring Indicator*)

Monitoring Questions:

Q1: Is the migration timing of hatchery and naturally produced fish from the same age class similar?

Hypothesis 2.1:

- Ho: Migration timing Hatchery Age X = Migration timing Naturally produced Age X
- Ha: Migration timing Hatchery Age X ≠ Migration timing Naturally produced Age X

Measured Variables:

- Ages of hatchery and naturally produced fish sampled via pit tags or stock assessment monitoring.
- Time (Julian date) of arrival at Bonneville, Priest Rapids, Wells, and within tributaries (e.g., Tumwater, Dryden, weirs).

2.2 Timing of Spawning (*Monitoring Indicator*)

Monitoring Questions:

Q1: Is the timing of spawning (measured as the time female salmon carcasses are observed) similar for hatchery and naturally produced fish?

Hypothesis 2.2:

- Ho: Spawn timing Hatchery = Spawn timing Naturally produced
- Ha: Spawn timing Hatchery ≠ Spawn timing Naturally produced

Measured Variables:

- Time (Julian date) of hatchery and naturally produced salmon carcasses observed on spawning grounds within defined reaches.

2.3 Distribution of Redds (*Monitoring Indicator*)

Monitoring Questions:

Q1: Is the distribution of redds similar for hatchery and naturally produced fish?

Hypothesis 2.3:

- Ho: Redd distribution Hatchery = Redd distribution Naturally produced
- Ha: Redd distribution Hatchery ≠ Redd distribution Naturally produced

Measured Variables:

- Location (GPS coordinate) of female salmon carcasses observed on spawning grounds.