CSMEP Hatchery Subgroup

Monitoring Design Discussions

CSMEP Design Workshop
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- The suite of questions to be addressed for hatchery evaluations is extensive (particularly for supplementation hatcheries), and

- Monitoring must capture **full** suite of identified PMs to answer these questions for individual hatchery programs

- Yakima and NE Oregon monitoring design/protocols captures all PMs and addresses all questions at the hatchery program scale, but not likely feasible to monitor all hatcheries so intensively

- ESU scale integrated monitoring likely to measure some key PMS at each hatchery, while other PMs will measured only at set of representative (stratified) hatcheries

Selected Question:

- Does the productivity of hatchery and natural populations differ?

Associated key derived PMs:

1) Progeny-parent ratios
2) SARs
3) Reproductive success

- if the desired difference in the PMs is not achieved this then leads to the next level of causative questions (and associated PMs) as to why a hatchery productivity advantage is not achieved

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e.g. within hatchery survival, smolt migration success, SARs, age structure, etc

PM	Data Needs (by origin)	Method
1) Progeny-Parent Ratios	Raw PMs	
1a) adult:adult	- Adult abundance: (Harvest, Hydro mortality, Incidental harvest mort., Prespawning mortality) - # spawners - Age structure	- counts (weir, video, acoustic, sonar, MR) - statistical catch (HARVEST) - dam/interdam losses (HYDRO) - incidental harvest (HARVEST) - spawning ground surveys (preseason & spawning season) - broodstock spawners = count – prespawn mortality – broodstock collected – harvest above count site and spawners = redd * spawners/redd - bony structures, tags, scales, length at age relationship
1b) female:female	- Sex ratio	- visual observation, ultrasound
1c) smolts/female *	- smolt abundance by smolt age structure	- migrant traps or smolts = juv. abundance * juv to smolt survival (e.g. electroshocking, shocking, seining, etc.)

* smolt abundance estimates from anadromous females only (steelhead)

PM	Spatial Scale		Temporal Scales		
	Data Sampling	Reproductive Unit	Data Sampling	Analysis	PM Interpretation
1) PP ratios		Subpop. or Population	Annual		- 5 cohorts - approx. 10 years - one interdecadal oscillation - want observations over a wide range of environ.conditions and density contrasts
1a) adult:adult - adult abundance - # spawners - Age structure	- Counts over entire geographic range - Spawning areas - Spawning areas			1 generation	
1b) female:female - sex ratio	- spawning areas			1 generation	
1c) smolts/female - smolt abundance	- tributary mouth (subpopulation - river mouth (population) - in both cases before mixing with other smolt migrants			Oldest age of a smolt	

- Subpopulation: supplemented Core Area or trib within a population
- Subpopulation or population PMs can be rolled up as independent replicates to MPG & ESU level (if more than one subpop supplemented per population then aggregate to the population)

PM Change of Interest Hatchery PP/ Natural PP	Estimates of precision/accuracy	Analytical Approach	Potential Stratifications	Sampling Layout
1a) adult:adult - detect a 50% difference with 95% confidence	For PP variance dig into existing datasets from Imnaha, ISS	Paired comparisons (by stratification category)	- by species - by life history type - by prop of spawners of natural origin - by broodstock strategy - by release strategy - by seeding levels relative to carrying capacity	- mapping exercise (GIS) to determine optimal spatial arrangement of monitoring sites relative to spawning areas, stocking areas and stratification categories (ESU level assessment)
1b) female:female detect a 50% difference with 95% confidence				
1c) smolts/female (may be irrelevant for PP*, but for SARs comparison detect a 50% difference with 95% confidence over a time series	For SARs variance dig into datasets from ODFW (lots of hatchery, some for hatchery), CSS (wild), IDFG (wild)			

- Target for hatchery vs. natural PP is 2:1

* hatchery vs. natural smolts/female generally not an issue as hatchery production intended to be 5x to 9x times higher

PM	Data Needs (by origin)	Methods	PM change to evaluate	Estimates of precision/accuracy
2) SARS a) to Columbia R. mouth b) to BONN c) to LGR d) to tributary	Same as 1a and 1c	To separate 2a to 2d for specific stocks requires tagging and detections (HARVEST & HYDRO)	-	-
3) Reproductive Success	Adult:adult adult:juvenile	DNA pedigree of parent and progeny	Adult:adult - detect a 10% difference by cross-type with 95% confidence Adult:juv – detect a 25% difference by cross-type with 95% confidence	- dig into datasets from Hood, Little Sheep and Minter Ck (coho)

- 4 crosstypes (WW, WH, HW, HH)

Summary of Cross-Group Data Needs

Productivity PM	Data Need	Source	Spatial Scale	Temporal Scale
Progeny Parent Ratio	Statistical Catch by origin Incidental harvest Dam/interdam mortality	HARVEST HARVEST HYDRO	Population or Subpopulation	Annual
SARS	SARs at Col R. mouth, BONN, LGR	HARVEST HYDRO	Population or Subpopulation	Annual

- To address the question of relative productivity PMs are required for wild fish in supplemented streams that could theoretically be supplied by Status & Trends monitoring
- However, the level of information collected for general status and trends monitoring is currently insufficient, instead data collected for Hatcheries on supplemented streams feeds Status and Trends monitoring needs