Hatchery Group DQO Step 6

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Background – Basis for Step 6 Approach

- Three categories of hatcheries
  - harvest augmentation – 11 questions
  - supplementation – 25 questions
  - conservation – 5 questions
  - 65 performance measures
- No "decision rules" developed:
  - no standards to justify statistical requirements
  - few "if-then" relationships

Background – Basis for Step 6 Approach

- Questions and multiple scales:
  - Small scale – all facilities?
    - productivity
  - Large scale – expandable?
    - relative reproductive success

Questions at a smaller scale:

- Effect of supplementation on productivity of the targeted natural population?
- Productivity – juveniles per adult
- Many possible approaches:
  - interchangeable data types
  - data types drive, in part, evaluation/sampling designs
- "Buffet" approach

Questions at a smaller scale:

Productivity – Juveniles per adult

		Adult Escapement		
		Weir	Video	Redd Count
Juvenile Abundance	Screw Trap			
	Electrofishing			
	Seining			
	Snorkeling			

Questions at a smaller scale:

Productivity – Juveniles per adult - CV

		Adult Escapement		
		Weir	Video	Redd Count
Juvenile Abundance	Screw Trap	0.2-0.3	0.15-0.3	0.25-1.1
	Electrofishing			
	Seining			
	Snorkeling			

Questions at a smaller scale:

Productivity – Juveniles per adult - Bias

		Adult Escapement		
		Weir	Video	Redd Count
Juvenile Abundance	Screw Trap	-2/-1	-2/-1	-2/0
	Electrofishing			
	Seining			
	Snorkeling			

Questions at a smaller scale:

Productivity – Juveniles per adult - Bias

		Adult Escapement		
		Weir	Video	Redd Count
Juvenile Abundance	Screw Trap	$500,000	$400,000	$250,000
	Electrofishing			
	Seining			
	Snorkeling			

Questions at a smaller scale:

- Issues with the "buffet"
  - large range of variances
  - different combinations = different designs
  - difficult to find efficiencies
- Benefits of the "buffet"
  - "High" design = lowest variance
  - "Low" design = ICA cost vs. precision
  - combinations for every appetite

Questions at a larger scale:

- Relative reproductive success
- Straying

Relative Reproductive Success

- Definition
- Why are we interested?
- Sample everywhere or stratify and expand:
  - proportion NOR in broodstock
  - composition of escapement
  - AHA

Relative Reproductive Success

- High design:
  - genetic parentage analysis
  - sample adults and progeny
  - assign juveniles/adults to parents
  - test effectiveness hypotheses and random mating
  - 3 strata x 2 replications = 6 sites
  - duration = dependent on contrast and age of program

Relative Reproductive Success

- Low design:
  - inference via treatment/reference and/or before/after
  - progeny/adults
  - change in productivity
  - 3 strata x 2 replications + reference = 12 sites
  - duration – minimum two-three generations

Relative Reproductive Success

- Tradeoffs:
  - assumptions regarding local variation
  - ability to test random mating
  - parent/offspring regression
  - number of sites/site selection

Relative Reproductive Success

- Cost:
  - identical sampling infrastructure
  - identical tagging
  - average annual cost:
    - genetic parentage analysis =
      - infrastructure operation 250k
      - assay and analysis $57,000
      - $307,000 x 6 = $1,842,000
    - BACI = $250,000 x 12 = $3,000,000

Relative Reproductive Success

- Cost:
  - Duration:
    - contrast
    - opportunistic vs. continuous

Relative Reproductive Success

- Result:
  - High
    - relative reproductive success
    - fewer assumptions
    - random versus assortative mating
    - relatively less additional value
  - Low
    - change in productivity
    - more assumptions
    - relatively large additional value

Next Steps:

- Populate matrices with representative data.
- High-Low designs for other questions.
- Assess ongoing projects – populate strata; assess quality relative to high versus low design criteria.
- Find synergies:
  - within designs
  - between groups

Straying

- Definition
- Why are we interested?
- Number/Location/Composition
- Sample everywhere or stratify and expand:
  - distance
  - stream order
  - habitat quality
  - hatchery influence
  - species composition

Straying

High design:

- multiple categories per strata = 231 sites
- replication via EMAP = 20 additional
- multiple pass carcass surveys (chinook)
- high tag rates (rotating)
- cost dependent on existing effort within/among strata
- duration dependent on contrast

Straying

Moderate design:

- fewer categories per strata = 176 sites
- replication via EMAP = 10 additional
- multiple pass carcass surveys (chinook)
- high tag rates (rotating)
- cost dependent on existing effort within/among strata
- duration dependent on contrast

Straying

Low design:

- fewer strata = 84 sites
- replication via EMAP = 10 additional
- multiple pass carcass surveys (chinook)
- high tag rates (rotating)
- cost dependent on existing effort within/among strata
- duration dependent on contrast

Straying

Tradeoffs:

- fewer categories/strata = less representation
- lower replication = longer duration

Straying

Cost:

- survey (annual) existing cost +:
  - high design (97@25k) = $2,425,000
  - moderate design (69@30k) = $2,070,000
  - low design (38@35k) = $1,330,000
- duration – decreases as a function of effort:
  - annual
  - opportunistic

Straying

Result:

- stray rates (within CRB) via expansion
- location of strays
- factors correlated with straying
- composition of populations
- other?