Interagency Ecological Program Scientific Advisory Group Review of the Delta Juvenile Fishes Monitoring Program

June 4-5, 2013

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Preamble:

- **We think that this an important program that the Bay-Delta cannot afford to lose momentum; it is, however, opportune/critical time for transition to understand how system "works" or doesn't "work" to support salmon and other key species in changing Bay-Delta**
- **Although the Background Report and accompanying materials are a LOT to absorb in a couple of weeks, we're uniformly impressed the quality and insight of the Report, the preparation and presentations and the prospects and impetus for change.**
- **New studies, such as acoustic route and survival estimation, and modeling, are impressive.**

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Preamble (2):

- **Value of the incredible IEP monitoring long-term time series is irrefutable, and backward compatibility is essential, but the SAG believes that it is time to revisit program objectives in terms of changing needs, system changes and future development and climate change.**
- **It would worthwhile to make more clear how, when and where DJFMP and DJSSS data fit/contribute to ESA salmon recovery?**
- **We may have gone somewhat deeply into the "weeds" and not had a full understanding of the constraints and institutional mandates and arrangements; so, we encourage feedback on our interpretations.**

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Preamble (3):

- **It's clear that the program addresses real-time management, ESA and other mandates, but it's not clearly laid out the connections between monitoring and data demands; recognizing that the program is ~two pieces, they don't appear to be integrated**

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1. **Are goals and objectives explicitly clear and identified?**

Objective 1: Document the long-term abundance and distribution of juvenile Chinook salmon in the Delta

- The key goal is to understand the factors that affect the within-Delta or early-ocean survival of salmon in the Delta; distribution and abundance are two response variables that could be used, in part, to address that goal
- While consistent with overall IEP goal, adequate synthesis, interpretation and evolution of the program to address mechanisms of survival and performance is lagging because of the continued uncertainties associated with abundance and distribution
- Absolute abundance does not appear to be the critical index; relative abundance to management questions (e.g., route, etc.) is sufficient? But, two key uncertainties could lead to bias in trends over time:
  - Inadequate understanding of gear efficiency
  - Habitat sampling unrepresentative
  - Timing?

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1. Are goals and objectives explicitly clear and identified?

Objective 2: Comprehensively monitor throughout the year to document the presence of all races of juvenile salmon

(see Obj. 1)

Objective 3: Intensively monitor juvenile Chinook salmon during the fall and winter months for use in managing water project operations (DCC gates and water export levels) on a real-time basis

- It's clear that they have effectively implemented the monitoring required to make real-time management decisions, but it is unclear whether and how consistently that information was used, and whether an implemented action met the objectives; operational triggers for DCC appear to be a bit of a moving target between D-1641 and NMFS BO
- need to re-evaluate the importance of this objective to the overall program goal, ESA and water quality standards
- Thus, there is little evidence that the assumptions behind the management actions [flow diversion] are valid, i.e., does real-time monitoring lead to effective management actions for fish protection, that involve IEP monitoring but obviously go beyond that, to bigger regulatory and management activities

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1. Are goals and objectives explicitly clear and identified?

Objective 4: Document the abundance and distribution of steelhead
(see Obj. 1)
Objective 5: Document the abundance and distribution of non-salmonid species
(see Obj. 1)

Objective 6: Identify the factors influencing salmonid survival in the Delta such as route, flow, exports, and other covariates (DJSSS)

- Program has made some real advances in measuring survival, although underlying mechanism are still very uncertain other than absolute entrainment at the export faciltiies
- Very valid assumptions of dominant covariates that could explain survival rates but need evidence and evaluate alternative covariates, e.g., flow isn't killing fish, but corresponds to redistribution to unknown predation sinks

<u>Recommendations:</u>

- Need to incorporate causal mechanisms into objective statements.
- Move beyond dominant focus on flows as important variable; now have evidence to incorporate predation, habitat limitation and other factors.

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2. **Does the sampling design, techniques and types of data gathered help answer each study question/objective?**
3. **Are the programs providing adequate sampling in time and space to fulfill study objectives?**

Objective 1: Document the long-term abundance and distribution of juvenile Chinook salmon in the Delta

- Three uncertainties need to be addressed:
  - Hatchery:wild
  - Race
  - Bias and precision of estimating wild component by race
- Issues:
  - Assumption that sampled sites represent fish distribution and abundance through Delta
  - Unknown catchability
  - Unclear how they are scaling/expanding density

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2. **Does the sampling design, techniques and types of data gathered help answer each study question/objective?**
3. **Are the programs providing adequate sampling in time and space to fulfill study objectives?**

- Presumed emphasis on naturally-occurring salmon but no effort to effectively distinguish hatchery from wild Chinook; Not clear what relative abundance of unclipped salmon represents? Is it true that prior to 2007 only fin-clipped fish were Special Studies fish?
- Need rigorous statistical assessment of beach seine and mid-water trawl long-term data to evaluate study design in terms of power to detect change given sampling frequency, intensity, and representativeness
  - Recognize the need and challenges to take Delta data into whole life history context…HUGE effort; has this been done/proposed beyond S. Carlson's collation of hatchery releases?
  - Limitations of inference from beach seine are readily apparent
    - Unclear why beach seine site were chosen? Representative of discrete regional segments of juvenile salmon paths through Delta?
    - Non-random sites may not represent Delta as a whole; depending on use of data, e.g., can detect several orders of magnitude differences/change, but not useful for assessing habitat use that could contribute to restoration strategies
    - Revisit power of current and alternative averaging approach

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2. Does the sampling design, techniques and types of data gathered help answer each study question/objective?

3. Are the programs providing adequate sampling in time and space to fulfill study objectives?

- Need increased statistical expertise; consider full-time support for statistician to both evaluate long-term data but also contribute to statistically-powerful study design

- Chipps trawl sampling design needs to be reassessed
  - Assess assumption of fish distribution to measure catch probability
    - Spatial and temporal distribution
  - Gear efficiency
  - Use other gears (e.g., beach seine) to assess representativeness and bias of trawl catches

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4. **Are the monitoring programs generating sufficient information to meet ESA compliance?**
5. **Can the programs be used to assess ESA trends and abundance?**

Objective 1: Document the long-term abundance and distribution of juvenile Chinook salmon in the Delta

- Certainly some trend information for abundance and distribution but certainly could extract much more complete and relevant
- Can't show effectiveness of real-time (and other) monitoring for ESA compliance
  - Need to conduct rigorous assessment of long-term trends to focus sampling on certain times and places that provide greatest
  - Shift resources to concentrate on special studies that generate mechanistic understanding of limiting factors on ESA species
- Inadequate integration of long-term monitoring, real-time monitoring and special studies

Objective 2: Comprehensively monitor throughout the year to document the presence of all races of juvenile salmon

- Focus genetic sampling on spring run Chinook

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6. **Do the programs generate information on other species useful for understanding ecosystem processes?**

   Objective 4: Document the abundance and distribution of steelhead

   Objective 5: Document the abundance and distribution of non-salmonid species

- Objective 4 is likely unattainable goal for the program as currently designed
  - Sampling methodology and design inappropriate for steelhead
  - In-stream traps offer best chance of data on Delta entry
  - Special studies (acoustic tagging) viable for specific questions
- While there is obvious value in obtaining data and samples on Delta smelt and other key non-salmonids, the DJFMP and DJSSS should not be expected to meet the needs required to address their recovery. Differences in life history, ecology and population dynamics are only remotely overlapping with salmon.
- Given all the other programs that are specifically designed to address the non-salmonid, at-risk species, the real question is how does this program interface with those programs.

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7. Have the programs identified data limitations?

- Yes, partially; but need to revisit relative to whether they will contribute to objectives.
  - Hatchery:wild differentiation
  - Race identification; genetics is promising
  - Survival estimation
- Detection probability is being advanced (but does it resolve all problems)
- Lack of mechanistic data that addresses causal factors
  - Predation
  - Performance measures (growth and condition, food resources and consumption)
- Need to address non-representative nature of beach seine study design: recommend review Honey et al. (2004) and Brown and Michniuk (2007)
- Need to evaluate ability of predators to detect acoustic tags, which would overestimate mortality (Rub et al. 2012, NOAA Tech. Memo.; Bowles et al. 2010)
- Uncertainty associated with “predator hit”; need to validate

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8. **Is data disseminated to users in readably useable formats ion to users and in sufficient time periods?**

TELL US!!

9. **Are the programs analyzing the data in a manner that produces accurate interpretation?**

Synthesis is generally lacking, but it doesn't appear that there is adequate institutional support to do so?

10. **Are reports or peer-reviewed publications completed on frequent basis? What the measure for success?**

Are they supported to do this?

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11.What recommendations can be made to improve the program?

- Good, increasing publication record vastly improved over past performance; but, for human, funding and other resources involved in the program it is still less than optimum
- Need annual review that forces agency to assemble and review what they've learned and what leads to programs next focus
- How do Special Studies evolve and become funded, and how are the results from the Special Studies integrated into the monitoring
  - Bottom-up vs. top-down?
  - POD studies seem to exemplify how Special Studies can inform and improve monitoring
  - Need more feedback between Special Studies and monitoring
- Develop more explicit integration of monitoring and Special Studies
  - Clearly identify objectives and identify/prioritize knowledge gaps that can be used to focus Special Studies
  - Evaluate shifting support of selected Special Studies into monitoring program, e.g., acoustic