

**Alaska Hatchery Research Program Science Panel meeting September 13,
2019**

ADF&G Anchorage Office, Aerie Conference Room

Summarized meeting notes and decision points

Attendees

An asterisk (*) indicates attendance by teleconference.

Science Panel

Milo Adkison, University of Alaska
*David Bernard, ADF&G (retired)
John Burke, Southern Southeast
Regional Aquaculture
Association (SSRAA; retired)
John H. Clark, ADF&G (retired)
Chris Habicht, ADF&G
*Jeff Hard, Northwest Fisheries
Science Center, National
Marine Fisheries Service
(NMFS; retired)
*Ron Josephson, ADF&G (retired)
Sam Rabung, ADF&G
William (Bill) Smoker, University of
Alaska (retired)
William (Bill) Templin, ADF&G
*Alex Wertheimer, NMFS (retired)
*Peter Westley, University of Alaska

Finance Committee

Eric Prestegard, Douglas Island Pink and
Chum Corporation (DIPAC)
Steve Reifentstahl, Northern Southeast
Regional Aquaculture Association
(NSRAA), former Science Panel
Member

Other Attendees

*Dave Gaudet – Consultant David Gaudet
Fisheries Services, contracted by
PSPA and Alaska Fisheries
Development Foundation as a
Technical Facilitator for Marine
Stewardship Council certification
Garold V. “Flip” Pryor, ADF&G
*Glenn Reed, Pacific Seafood Processors
Association (PSPA)
Kyle Shedd, ADF&G
Erica Chenoweth, ADF&G

Budget status

- **Sam R.** Proforma budget up-to-date and available
 - Project will still be in the red in FY22 due to processor payments suspension
- 2016 Pink Salmon Disaster Funding is earmarked and coming soon, but not yet available: \$2.5M, to be spent in 4 years (timer started when decisions were made in July 2019). Processors see this funding as replacement for their contributions

- **Chris H.** worked with Cordova Otolith Lab for projected costs to analyze otolith samples through 2019 collections (\$317K more than shown in the May Proforma). Calculated costs for adding the fry genetic analyses (additional \$234K) and estimated the cost to genetically analyze useful adult samples through 2019 collections (additional \$1,248K). **Flip Pryor** confirmed these values were included in the updated Proforma
- Potential future funding sources were discussed
 - National Pacific Research Board (NPRB) and Saltonstall-Kennedy (SK) Grant Program
 - NPRB has a new rolling submission schedule to keep in mind for application timing
 - NPRB might be a good choice for PWS Pink F2 work since they've funded that project in earlier phases. Not enough time to acquire funding for the 2020 field season, should it happen
 - Application timing is important; would need funding to last beyond Disaster Funds and to coincide with the project reporting of F2 work
- Northern Fund
 - Relatively easy to work with administratively; not as vulnerable to State of Alaska budget volatility; will be a good funding source for SEAK chum genotyping

Extrapolating fitness results from samples to streams

- Kyle Shedd presented two reports (Notebooks as HTML files)
- **Report 1: Stockdale Sampling Questions Revisited (representativeness of samples)**
 - Reviewed 6 different estimates of total escapement for Stockdale 2014 including 4 different genetic methods
 - Depending on the model, between 12-20% of the stream's total estimated escapement was sampled in 2014. This provides for opportunities for non-representative sampling.
 - The RRS estimate and methods for Stockdale 2014 stratified by sex was reviewed
 - We found male RRS ~ 0.28 and female RRS ~ 0.42; when population estimates stratified and combined RRS hatchery vs. natural = 0.36.
 - Examined potentially confounding variables (covariates) that could bias RRS were tested and modeled in a number of ways and presented
 - Sample Date – when parents were sampled matters. If higher numbers are sampled early and late in the season and not as many in the middle; could be exacerbating the difference between hatchery and wild RRS due to run timing differences
 - When we compare RRS for hatchery- and natural-origin fish by sample month of the parents (August - early, September - late), we find that hatchery-origin fish produce an average of ~39-40% as many offspring as natural-origin parents. Sample date (timing)

matters (see plot), but we still see differences in RS between hatchery- and natural-origin fish when we compare within early- and late-run groups.

- Size - Body size (i.e. parent length) does not appear to have a strong effect (not significant with $\alpha = 0.05$), but on average, smaller fish produce slightly fewer offspring (91%) than larger fish. Thus, if sampling of parents based on size is not fully representative of escapement, there is relatively little potential for our estimates of RS (and RRS) for hatchery- vs. natural-origin to be biased. When we compare RRS for hatchery- and natural-origin fish by body size of the parents ($\leq 425\text{mm}$ - small, $> 425\text{mm}$ - large), we find that hatchery-origin fish produce an average of ~30-37% as many offspring as natural-origin parents. Body size has some effect (see plot), but we still see differences in RS between hatchery- and natural-origin fish when we compare within small and large size classes.
- Location - Spawning location (i.e. parent sample location in the intertidal vs. upstream) clearly has an effect on RS, with upstream fish producing 37% as many offspring on average as intertidal parents. Thus, if sampling location of parents is not fully representative of the spatial distribution of escapement, there is a potential for our estimates of RS (and RRS) for hatchery- vs. natural-origin to be biased. When we compare RRS for hatchery- and natural-origin fish by sample location of the parents (intertidal vs. upstream), we find that hatchery-origin fish produce an average of ~31-58% as many offspring as natural-origin parents depending on where the parents were sampled. Parent sample location clearly matters (see plot), but we still see differences in RS between hatchery- and natural-origin fish when we compare within intertidal and upstream groups.
- **Report 2: Stockdale Generalized Linear Models**
 - The purpose of these analyses were to follow up on the previous notebook, which looked at all of the individual variables piecemeal, which is not considered the most appropriate style of analysis, since they all push on the results in different ways, and fully consider all of the Stockdale Creek data holistically by model fitting reproductive success (RS) to generalized linear models (GLM's), as is commonly done in the literature
 - Confirmed no 1:1 relationship between variables; each variable adds a new piece to the puzzle and isn't redundant
 - Constructed a series of GLM's to model RS and use Akaike model selection to calculate variable weights, which helps identify which of the models contains the most information of RRS with fewest variables.
 - All the variables we collected are present in the "top" models
 - length, location sampled, date sampled, sex, and whether was hatchery or natural origin having some predictive power in terms of what is a fishes RRS

- The distributional assumption was negative binomial for these models; **Kyle S.** will look at a zero inflated negative binomial, which might give a slightly better fit.
- The origin variable popped out as about 47-48% all things else held equal; hatchery fish had 47-48% as many offspring assigned to them as wild fish

Discussion of the data included the following points

- The priority research question that came out of the original project concept meetings with hatchery operators back in 2011 was “what is the impact on fitness of wild pink and chum salmon due to straying of hatchery salmon”, RRS is a component of the mechanism by which reduced fitness could happen
- We are 15-20 generations into this hybridized production system. We measure reduced RRS in F1 of 50%, but still see high natural returns. The question is: why? F2 will be important to better understand.
- Interested in impact to productivity to wild systems. How does the RRS effect the escapement goals? RRS could weigh on the productivity of the system as a whole; for example, basing escapement goal of 10,000 assuming they’re wild but if some of those are hatchery fish, then will get lower production out of that system than expected
- Analysis timeline update: F2 generation for Hogan and Stockdale 2015/2017 results are coming out of the lab now, pending quality control crosschecks and lab has started on the Stockdale 2016/2018
- **Decision point** for December/January meeting (*note*: this is now scheduled for December 16th in Juneau) is to discuss sampling streams again in 2020 to increase power to examine F2 effects. Need to decide if sampling in 2020 will occur and, if so, what streams to include. As reference: sampling 3 streams in 2019 cost \$438K.
- **Decision point** was made to extract all of Stockdale hatchery fish in 2016 (only 235 more samples) now to leave door open for examining another F1 effect if we add 2020 as sampling year
- Questions about heritability of run timing differences between hatchery-wild; data shows heritability for natural, but not for hatchery-origin fish in Stockdale 2014/2016 analysis (based on parent-pair offspring data)
- The RRS from that GLM model is RRS of hatchery-wild fish that have similar sample collection dates, are of same size, sampled at same location, and that’s different than the RRS of typical hatchery fish versus a wild fish and that’s where the sampling scheme gets to be important; you might not get to a satisfactory estimate of the RRS of a typical fish, but what we do have is an estimate after accounting for confounding factors
- The one confounding factor we still need to consider is the differential harvest rate early and late into the run. This is important for the progeny generations. If run timing is heritable, then the hatchery and natural origin progeny may be differentially harvested, which would affect RRS back to the stream. One option proposed was to back up the analysis to calculate RRS when they enter PWS rather than when they enter the stream, as originally designed. To do this we would need to include exploitation of hatchery and natural fish. Potential methods and data to incorporate into these methods were discussed. There was a general consensus that this

type of analysis will be complex and require numerous assumptions but may be worth pursuing.

Approaches to reporting results discussion summary

- General agreement that we should be very careful about how we put the results out there. Important to have context for results: Potential effects of non-representative sampling and limited replication across streams and years.
- First publication could focus on RRS results to date and GLMs while mentioning potential effects of non-representative sampling and how to account for variables that might influence measure RRS, given sampling. This would set up methods for future reports.
- Authorship was discussed. AFS provides guidelines for authorship and there was a general consensus that it was a good guide for authorship of AHRP publications. At the last meeting, there was a general consensus that anyone who substantially contributes to the writing should be an author, and that all **SP members** can opt-in for authorship given their role in finding funding, developing the plans, developing original ideas and seeing the project through. At this meeting, this general consensus was reaffirmed.

Publications update

- Straying manuscripts
 - PWS – pink and chum
 - Is running late but very close to being finalized; general agreement based on quick reviews was that the product was good (Alex W., Milo A., Dave B., and Peter W.). Peter W. sees value in adding tables of raw data into the paper either in the main text or as appendices/supplemental materials; enough data should be included for someone to recreate the summary statistics.
 - **Bill T.** will send in his final comments Wednesday (9/18); **John H.C.** will also provide comments
 - SEAK – chum
 - Delayed; **Bill T.** is starting back up with review and will send out a draft to the SP by Sept. 20 after getting comments from **Ron. J.** on Sept. 18.
 - Ron J. initiated the report; Dave B. and Alex W. have contributed
 - **Decision Point:** Format will be a management brief in North American Journal of Fisheries Management.
 - **Alex W., Ron J., and Milo A.** will do review of final draft
 - RRS reports and publications
 - **Decision Point:** move forward with a paper using data from Stockdale and Hogan creeks (2013-2016) focusing on representativeness of sampling, investigating potential variables that might affect RRS, and results from modeling estimating RRS after accounting for variables that might affect

RRS. **Kyle S. and Emily L.** will be lead authors. **Milo A., Peter W., Alex W., John H. C., and Chris H.** will review and potentially be co-authors.

- **Decision Point:** Provide analyses that are both sex specific and non-sex specific (i.e. 3 estimates of unweighted RRS + the GLM results)
- **Kyle S.** will look into options for compensating Emily L. for her work: vendor, contract, or non-perm employee (update on 10/3/19, Emily has started as a short-term non-perm).
- Goal is to have a draft for AP review by the December/January meeting (12/16/19 meeting in Juneau).

Data Sharing

- All data or analyses shared with the public (including non-department members of the SP) are accessible through FOIA request.
 - Peter W. suggested that we have a running list of all analysis and papers we want first right of refusal on
- SP meetings:
 - Location and time, if requested, will be provided to anyone who asks
- **Chris H. and Peter W.** are working on “data sharing agreements”
 - Purpose of the document is to set up expectations for both the AHRP and for the requestor. For example: what data is requested, in what format, when will it be delivered, how should the AHRP be acknowledged, scope of the requestor’s analysis. This may end up being more of a cover letter accompanying the data than a signed agreement, given that the data are accessible through FOIA requests
 - **Decision Points:** Boiler plate language will be developed to go into acknowledgement section, not into body of manuscripts. Should include: Project origin, funding sources, SP role, and language that specifies that the lead author is responsible for maintaining a record of review comments/edits from the SP and share these with the public if requested. Consider writing two boiler plate language versions; one where SP involvement is substantial and another where it is minimal.
 - There was a general agreement that the review time frame developed by the SP in the AHRP Presentation and Publication Guidelines (6 weeks Sept. – April; 8 weeks May-Aug.) may be cumbersome, especially for presentations. **Chris H. and Peter W.** will propose revised review timeframes for consideration by the SP in the draft cover letter/data sharing agreement document
 - Document will be passed around before the next meeting.

Review of lab progress, revisit priorities and timeline

- 2015-2017 results out this December; lab doing QC crosscheck now
- 2016-18 Stockdale extracting now, results will be maybe out spring or summer
- Priority list remains the same as outlined in May meeting, except we will add hatchery-origin fish to the list from Stockdale 2018.

- Have brought in three borrowed PCNs to speed up DNA extractions and haven't needed to reach out to PWSAC for extra lab workers yet

Reference section/page for the website

- **Bill T. and Chris H.** are working on a document for the AHRP website (glossary, explanation of terms)
- General consensus was to get something up that can be elaborated on later; education tool versus how we use the terms in our research (start with how we use it and extend beyond that as time allows)
- Idea was floated that **Ron J.** would be good at writing down their concept of what the genesis of AHRP was, the process and ideas.

2019 synopsis

- **Bill T. and Chris H.** will update this document and get Flip something to work with
 - Requested that timelines of work products be included
 - Important for processors, stakeholders, and general public

Set date and topics for next meeting

- Doodle poll will be sent out by **Chris H.** to the panel for one week in December and one week in January to find date for next meeting. Meeting will be in Juneau. Update, the meeting is on Monday, December 16th in the Commissioner's Conference Room at ADF&G Headquarters in Juneau.
- Processors are (still) thinking about sending a new liaison, Abby Frederickson, to the AHRP meetings; want to establish some liaison no matter who it is
- Accumulate agenda topics as discuss over email; will circulate a draft agenda in early December that can be adapted – **Bill T./Chris H.**