

Alaska Hatchery Research Program Science Panel meeting November 22, 2021

Virtual meeting via Microsoft Teams

Summarized meeting notes and decision points

Attendees

Science Panel

Milo Adkison, University of Alaska
David Bernard, ADF&G (retired)
John Burke, ADF&G and Southern
Southeast Regional
Aquaculture Association
(SSRAA; retired from both)
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)
Bill Smoker, University of Alaska
(retired)
Bill Templin, ADF&G
Alex Wertheimer, NMFS (retired)
Peter Westley, University of Alaska

Other Attendees

Sam Rabung, ADF&G
Tommy Sheridan, Sheridan Consulting, LLC
Chance Gray, Sitka Sound Science Center
(SSSC)
Alex McCarrel, SSSC
Chris Barrows, Pacific Seafood Processors
Association
Kristen Gruenthal, ADF&G
Garold V. "Flip" Pryor, ADF&G
Erica Chenoweth, ADF&G
Ben Adams, Northern Southeast Regional
Aquaculture Association (NSRAA)
Mike Wells, Valdez Fisheries Development
Association (VFDA)
Geoff Clark, ADF&G (retired)
Tina Fairbanks, Kodiak Regional
Aquaculture Association (KRAA)
Ron Heintz, SSSC
Katie Harms, Douglas Island Pink and
Chum, Inc (DIPAC)
Eric Prestegard, DIPAC
Geoff Clark, Prince William Sound
Aquaculture Corporation (PWSAC)
Samuel May, PhD candidate, UW
Chris Barrows, Pacific Seafood Processors
Association (PSPA)
Charlie Waters (NMFS)
Scott Wagner, Northern Southeast Regional
Aquaculture Association (NSRAA)
Adam Zaleski, DIPAC

AHRP Meeting Minutes

- **May AHRP Meeting Minutes approved**
 - **Reminder of previous decision point** –Going forward, email comments on draft meeting minutes will be available for two weeks; after that time, the meeting minutes would be considered approved by the group and ready for posting to the public on the website

Budget Status

- **Flip P.** reviewed Proforma budget up-to-date and available
 - Project remains solvent through FY24
 - Pink Salmon Disaster funds continue to be applied to pink salmon work (genetics)
 - PNP and Processor funds are potential; might be smaller or not happen
 - Northern Fund grant for FY22
 - \$150,000 requested; application being reviewed
 - Discussion
 - The \$500,000 projected for GCL expenditure in FY23 should be shifted forward to FY24 for chum salmon work
 - Reminder of 2017 chum restart for generations potentially extending sampling dates out to 2027 (more discussion later); field work for original project was slated to end in 2023 (FY24)
 - Proforma dates refer to sampling work, with analysis following close behind, not a huge stretch beyond listed dates for analyses

Manuscript and Webpage Updates

- RRS paper – (reporting Hogan & Stockdale 2013–2016, *Evolutionary Applications*)
 - Successfully resubmitted, waiting for last round of reviews
 - Reviews expected to arrive in mid- to late-December and then will likely specify a turnaround or 30 days for final submission
 - Reviewer comments included
 - Impressed; excited to publish it; unique; unusual in terms of species and location/distribution
 - Editors requested authors go further into “what it all means”
 - Authors split the difference since it was designed as a methods paper, emphasizing it’s just a first look in terms of streams and generations, results in later publications will be much wider in scope/more complete
- Webpage Updates
 - Under Findings section: updated written reports (contractor summaries all up to date)
 - Under Results section: updated for all published papers so far
 - Under Business Meetings section: updated all meeting minutes
 - **Decision point:** Bill T. will work with Flip to get a couple links to the research upon the ADF&G main page under the “Highlights” section so that they’re easier to find in preparation for the upcoming March 10 Board of Fisheries Hatchery Committee meeting

2021 Contractor Report and 2022 Stream Sampling Options

- SEAK Stream sampling summary (chum salmon) – SSSC
 - **Ron Heintz** presented 2021 chum project field report
 - Overview of 3 streams sampled (Sawmill, Fish, Prospect) and methods
 - Reminder of SOP changes for 2021 included installing carcass weirs and conducting mark/recapture study to estimate the proportion of the run being sampled
 - Reviewed maps of streams and locations of carcass weirs
 - Note of stream bed shift into new channel for Sawmill Creek (potentially reducing spawning habitat)
 - Weather conditions were more “typical” SEAK summer conditions
 - Few surveys cancelled and a handful curtailed due to weather, especially at Prospect creek
 - Reviewed live chum counts over the season for all 3 streams
 - Preliminary statistical analysis of 13 years of live count data showing that patterns of live counts are tracking with what ADF&G says escapement is to the region, decent index of what escapement for region looks like
 - Scale data just received
 - Runs were dominated by 4-year-olds, some 3s and 4s
 - Prospect Creek, crew was experienced with scale collection, but damp conditions resulted in wax paper not drying and damaging scales, making some unreadable
 - Sex ratios in streams typical
 - Size of females in data set have been declining
 - Smallest age 4 chums ever collected, same trend for males since 2012
 - Carcass Weirs of limited value
 - Pink salmon carcasses overwhelmed numbers of Chum collected
 - Time spent sorting debris and pinks detracted from time spent looking for carcasses
 - Mark-Recapture Study results review
 - Chum did not congregate in staging areas as pinks typically do; potential bias in capturing more males (moved around more) than females (went straight to spawning grounds)
 - Beach seines were too lightweight to work in fast currents and shallow waters; switched to dip nets
 - Tension between mark/recapture efforts (large time investment for few samples tagged) and carcass sampling to maximize genetics samples
- Discussion (also covers agenda item: 2022 SEAK stream sampling- options to increase success).
 - Mark-recapture was a lot of effort for little reward; note protocol change that carcasses collected around mark-recapture site on marking days, can't always walk the full creek on those days; more analysis coming in December to help decide whether we do the same methods next year

- Capturing fish adjacent to spawning areas is suboptimal
- Recapture rate was approx. 30 to 50% in each of the 3 streams; question for science panel is whether sampling level of 30-50% is high enough sampling proportion to provide usable F2 type results.
- Statistical power analysis and simulations for chum by Kyle will take longer than time available before January meeting, small possibility that other resources might be available to get it done sooner than later (Sam May availability?), but will be more complex than the work done for pinks
- Question of pursuing F2s is separate issue from finishing F1s from 2017 sampling restart in 2022, when high return of age 5s are expected
- Another unresolved issue is amount of effort to put into mark recapture
- Cost estimates for sampling: 2 streams approx. \$318,000 and for all 3 is \$443,000
- **Decision point: Science Panel** unanimously agrees to meet in January when more information will be available to address these unresolved issues (2022 sampling season and methods, F2 simulation work)

2021 Lab Reports

- PWS Otolith (Cordova) and MTAL (Juneau)
 - Bev Agler out of town; **Chris H.** reported things moving along nicely; they've retained people outside of normal season to keep processing AHRP
- Discussion of Otoliths brought up the question of using otolith markings (change every year) to help with uncertainties in scale aging
 - **Decision point: Bill T.** will get with Chris H. and Dion Oxman to look at this
 - Request was to potentially present that info in January meeting
 - Ron J. mentioned contacts potentially at DIPAC that could help before the next meeting with looking at that
 - Ann Reynolds another helpful ADFG contact
- Genetics - GCL
 - RRS - **Kristen G.** presented an overview of her and Kyle Shedd's latest RRS work (see digital notebook link)
 - Overview of analyses of parentage results for even and/or odd lineages of pink salmon in all pedigree streams in PWS
 - Newest results included are for Paddy, 2014 and 2016, and Stockdale, 2014 and 2016
 - Note: Due to 2020 otolith shipping issue, we do not have full otolith reads for Gilmour, Erb, and Paddy 2016 and 2018; RRS estimates are not available for Gilmour, Erb, and Paddy odd years, analyses on which are also pending re-pairing work
 - New even year (2014 brood year) analyses reported today include all potential offspring fish sampled for 2016; analyses will be revised once otolith heart re-pairing has been completed
 - Single-generation RRS (F1) are still <1 globally, with 22 of 28 (79%) of estimates significantly so. No new multigeneration (F2) results available.
 - Update on Otolith/Heart DWP-by-DWP genotype matching (see digital notebook)
 - **Kristen G.** presented her and Kyle Shedd's work on the first live test of samples (representing 48 affected DWP plates) run at GCL aiming to re-

pair GT-seq genotypes from otolith-derived DNA with GT-seq genotypes from heart-derived DNA due to the 2020 shipping snafu

- *Genetics – GCL Update on Otolith/Heart DWP-by-DWP genotype matching continued*
 - DNA from the otolith tissue of unknown origin was extracted using conventional Macherey-Nagel DNA kits, and then genotyped at 298 GT-seq loci
 - Given the wide otolith genotyping success rates, rigorous quality assurance measures at the individuals and plate level were tested and developed to retain as many individuals with confidence as possible
 - Stringent duplicate rate and duplicate rate difference cutoffs (see digital notebook)
 - Our ability to match otoliths back to hearts is DWP-specific
 - some DWPs were cleaner than others (otoliths were matched to one heart relatively cleanly)
 - other plates are messier (multiple matches for both tissues)
 - In instances where otolith matches were clean, but a heart matched more than one otolith (tissue from the same heart found on more than one otolith), further metrics were developed with carefully required cutoffs to identify matches
 - Otolith locations (starting and ending) were analyzed in each DWP to determine whether otolith/heart pair assignments made sense
 - In summary, we can re-pair the jumbled otoliths with their heart tissues using this method
 - whether additional otolith-heart pairs can be saved from each DWP (or whether they are worth saving) is unknown at this time, but hopes are high based on this data
 - Discussion
 - This was a bulk shipment of Gilmour 2016–18, Paddy 2016–17 and Herb 2016–17; 384 fish from each batch were run before the shipment; looks like 20% to 25% of otoliths shipped were potentially affected (quite a few were fine or only moderately affected)
 - Will evaluate all pieces of information moving forward to ensure that no systematic bias is introduced to the analysis by which samples are dropped, so far random
 - Being very conservative about making these matches; question will be how many we can lose and still have power for analysis; situation is wait and see; less about introducing error and more about losing power to detect differences
 - Transparency about this process; not all streams were affected, and the integrity of the project was not compromised. We anticipate minor losses in statistical power for some streams.
- Preliminary narrow-sense heritability estimation: Stockdale 2014–2016 (see digital notebook)

- **Kristen G.** presented her analyses to more fully explore the parent-pair offspring trio/triad data (i.e. cross data) in terms of spatiotemporal patterning and generate preliminary estimates of narrow-sense heritability (h^2) using three methods, including correlation, slope, and the animal model
 - This data set has 20 or more of each cross type, more complete information in terms of different types of crosses
 - Correlation between parent-offspring sample location and h^2 of sample location not yet available; GIS-based stream distance mapping is in progress by GCL staff Chase Jalbert
 - There is some evidence for heritability of body size, but it is sporadic and not overly consistent among methods.
 - Better evidence for heritability of sample date as a proxy for return time, especially between female parents and offspring. There is some inconsistency among estimation methods, however.
 - Reproductive Success correlation not detected – very little power as it requires triad assignments across two generations
- Discussion
 - Analysis next steps
 - Calculate confidence intervals
 - Reproductive success, theory says heritability low
 - Worth exploring some zero inflated models (ESCL or MGCB) can handle negative binomials
 - Might be worth revisiting the dyads; should be conditioning it on any fixed effects, can apply to the models
 - This analysis an example of what can come out of the data, analysis not funded by AHRP
 - Relevant to all of this is selection coefficients on these traits, not just how they respond in the evolutionary sense, but what are natural selection pressures acting on the traits you're looking at
 - Compare to other taxa, other systems, put it in context, Review reference recommended (Carlson and Seamons, 2008)
- General Discussion
 - Interest in heritability of homing or straying in natural origin fish; outside of the original scope of the program, but data collected from the program may provide insights/estimates
 - Questions that arose from the discussion
 - What is the natural stray rate and how does it vary among streams (derived from observed strays in sampled streams from sampled streams and extrapolated to all streams)?
 - Look for variables associated with variation in propensity to stray among both donor and recipient streams.
 - What are the RRS of stray natural-origin fish relative to homing natural fish (and also look to see if variables are associated the behavior of these two types of fish e.g. run timing)?

- **Decision point: Bill T.** will continue this discussion with interested members of the **SP** to establish timelines and priorities: Alex W., Jeff H., Dave B., Milo A. Chris H., Peter W., John B. and John H.

Outreach/presentation opportunities

- January 25–27, 2022, Alaska Marine Science Symposium, Virtual
 - **Kristen G.** submitted a presentation abstract titled: “Heritability estimation using large-scale pedigree reconstruction in Pink Salmon spawning in the wild”
- February 28–March 4, 2022, Hatchery-Wild Interaction Symposium, American Fisheries Society Meeting, Juneau with hybrid Virtual
 - Confirmed that **Kyle S.** and **Kristen G.** co-chairing
 - Details still being settled
 - Those interested in attending or presenting should contact them
- March 10, 2022, Board of Fisheries Hatchery Committee, Anchorage
 - Requests to plan an AHRP public outreach session before this meeting
 - A discussion will be started about what topics **SP** members think would be most useful to address at that public meeting

Other

- Other publications
 - Julia McMahon, finishing M.S. UAF Thesis has some chapters could be developed and published, with **Peter W.** currently
 - SP is welcome to be involved, reviewing or co-authoring before submission (looking at streams, differences in body size, run timing, different patterns and tagging data from Paddy and Erb)
 - Molly Payne, UAF M.S.
 - Thesis looking at chum salmon stray rates in SE to identify factors that make streams attractive to hatchery strays, Summer 2022 graduation
 - SP welcomes ideas of papers and collaborations, would be worthwhile constructing list of ideas and contacts in future meeting

Additional Items

- Discussion of field sampling for the F1’s from 2017 spawners at Fish, Prospect, and Sawmill (2022), F2’s from 2014 spawners at Fish Creek (2023 and 2024), and F2’s from the 2017 spawners at Fish, Prospect, and Sawmill (2025-2027)
 - Tabled by unanimous decision earlier in the meeting for January meeting, Date TBD
- Process for release of new results (Secondary analyses review by SP and Policy Development)
 - It was agreed that the existing model for SP review works for members
 - Milo A. remarked that he’s willing to comment on any stage of the process as a friendly set of eyes, at any point of the review process

- SP members are satisfied with reviewing during meetings in addition to online; substantial commentary provided in both forums
- GCL appreciates SP support in presenting results when they become available
- Planning the End Game
 - Need to plan transition from SP into ADF&G policy making activities
 - 2023, potential staff departures and retirement; holes in the process
 - **Decision Point: SP** will forward names of potential new members for consideration
 - 2024 certification date
 - **Decision point: SP** start building a list of papers and circulate it with a sense of priority