

**Western Alaska Salmon Stock Identification Project**  
**Joint Meeting of Advisory Panel and Technical Committee**  
**23 April, 2010**  
**Westmark Hotel**  
**Anchorage, Alaska**

**Chair:** Eric Volk, ADFG

**Call to Order:** 0830

**Attending:** (Name and affiliation)

Tim Baker, ADFG  
Doug Eggers, ADFG  
Chris Habicht, ADFG  
Marc Witteveen, ADFG  
Lisa Creelman, public  
Guy Wade, BBSRI  
Matt Nemeth, ADFG  
Dani Evenson, ADFG  
Dick Jacobsen, Aleut Corp  
Jim Jasper, ADFG  
Heather Hildebrand, ADFG  
Nick Decovich, ADFG  
Steve Brown, CAMF  
Pat Martin, CAMF  
Sam Cotton, AEB  
Jill Klein, YRDFA  
Paige Drobny, TCC  
Bill Templin, ADFG  
Andrew Munro, ADFG  
Chuck McCallum, Lake and Penn Borough  
Michael Link, BBNA/BBSRI/LGL  
Milo Adkison, UAF-Fisheries, Technical Committee  
Jennifer Hooper, AVCP  
Art Nelson, BSFA  
Michael Sloan, Kawerak  
Loretta Bullard, Kawerak  
Beth Stewart, AEB

**Missing:**

Robin Waples, Technical Committee  
Bruce Weir, Technical Committee  
Tom Quinn, Technical Committee

## Agenda

1. Welcome and introductions
2. Review and approval of agenda
3. Presentation of current project status
  - A. Project budget update
  - B. Project timeline
    - i. Current status
    - ii. Any changes?
  - C. Status of project components
    - i. SNP discovery
      - a. Sockeye salmon
      - b. Chum salmon
    - ii. Baseline analyses
      - a. Sockeye salmon
      - b. Chum salmon
    - iii. Fishery sampling review 2006-2009
      - a. Final report status
      - b. Overview
    - iv. Statistical analysis development
      - a. Hierarchical MSA model
      - b. Regional allocation MSA model
    - v. Technical documents
4. Review and approval of minutes from September, 2009 meeting
5. Scheduling of next meeting

## Notes

1. *Welcome and introductions*
  - A. The meeting began with Eric Volk (EV; chair) welcoming everyone and each person introducing themselves. EV welcomed Milo Adkison (MA) as only attending member of Technical Committee (TC).
  - B. EV announced effort will be made to make sure all TC members will be in attendance in future meetings.
2. *Review and approval of agenda*
  - A. Comments and questions:
  - B. EV: Add in after Item 4 – “How will we receive AP input?” Suggests providing summary documents (sampling) to AP within one month. List will be distributed to regions and then to AP. This will outline plan for sub-sampling fishery collections.
  - C. John Hilsinger requested that ADF&G sample sockeye salmon from SE District mainland commercial or test fishery. Sampling would not be paid for with WASSIP funds. Samples were part of original WASSIP plan, but few were collected.
  - D. Agenda was approved with no other modifications
3. *Presentation of current project status*
  - A. Project budget update

EV: We received \$750K last year and we have used that money for sockeye salmon SNP development. Another \$750K is in the preliminary budget for FY11. This will complete our funding gaps for WASSIP. At this writing, the specific time frame for spending these funds is unknown.

B. Project timeline

i. Current status

Bill Templin (BT) – Project is on time. We completed 4 years of sampling. We could not proceed with analysis until all samples collected per MOU. Sockeye salmon baseline will be completed by June 2010 (30K fish). By the end of June 2010 we should have all chum salmon SNPs in house. Chum salmon baseline work to be complete in September 2010. By this time, we should know what mixtures we will be running, and will start mixtures by October 2010. Final report will be complete by June 2012. A total of 30K samples for each baseline and 150K for mixed fisheries will be analyzed when it's complete.

**ACTION ITEM: Timeline will be distributed**

ii. Any change?

No. The expected completion date is still summer 2012

C. Status of project components

i. SNP discovery

a. Sockeye salmon

1) Chris Habicht (CH) presented slides on sockeye salmon SNP discovery.

Introduced by saying that the first \$750K was spent on SNP development.

Highlighted the criteria for selecting 96 SNPs from the 124 developed SNPs. Among the criteria used for locus selection were lab performance (cluster separation and tightness), population genetic assumptions (Hardy-Weinberg equilibrium and locus-locus linkage), and useful for MSA (among and within regions and among populations where current discrimination is poor). Selection of loci was highly weighted by lab performance and population genetic assumptions.

When chum salmon loci are selected, more latitude will be available to incorporate MSA usefulness because we will likely have more loci (development target 192 SNPs) to pare down to 96 SNPs.

This process will be documented in a TC report. We will be looking for input from the TC and the AP on methodology for chum salmon locus selection.

2) Questions and concerns:

*What is MSA?* Mixed Stock Analysis.

*Any Fraser River pops in backbone?* Definitely in old baseline, maybe not in backbone.

*Please clarify ascertainment.* This is the step where we select loci based on likely performance for MSA.

*How many in baseline vs. backbone?* The backbone contains samples from 36 collections from throughout the Pacific Rim for 124 loci whereas the baseline will contain samples from 350 collections from the WASSIP area (west of Cape Suckling and east of Russia) for the 96 selected loci.

*How did we find 79 new SNPs?* Three laboratories contributed the new loci: 54 were contracted by WASSIP and developed at the University of Washington, 20 were developed by the Columbia River Inter-Tribal Fish Commission and five were developed by the Department of Fisheries and Oceans, Canada. CH explained the transcriptome sequencing process used by the University of Washington.

*How does this process differ among labs?* The development labs were looking for different things at different stages. They filtered through a lot before they sent their list to us. Now we've continued the filtering process to get these final 96 SNPs.

*What about outliers on SDS plot?*

Outliers are due to high or low quality or quantity DNA for individual fish and are not important for locus selection.

*Why stair-step pattern on average cluster tightness rating?*

Some loci had very good cluster tightness, others were very poor, but the majority had a medium level of cluster tightness, hence the three "steps".

*How is the process different between our ascertainment tests and UW SNP discovery?* We use a more focused approach on lab performance; UW focus was more on finding variation among a handful of fish.

*How does Mike Garvin use linkage?* Linkage can be very useful.

However, in the locus selection process, we are identifying linkage to test if there is information in the phasing. If not, loci are discarded as redundant.

*What is the improvement in assigning a fish to a given pop from this process?* We've gained 20% efficiency in assigning a fish to a population in the limited ascertainment populations. We will test this with the full baseline when it is complete to see how much improvement they provide for groups of populations (reporting groups).

*F<sub>orca</sub> curve, % assignment is to population?* Yes and misallocation in *F<sub>orca</sub>* curve still goes to the right region. Since these simulations were done at the population level, this was a conservative test.

*Will this analysis look good in 5 years?* We may find more “golden SNPs” in 5 years, so it could continue to improve. This baseline will continue to differentiate among the populations we can do now and will likely have additional power.

Next steps – genotyping 31,000 individuals

*How did we choose baseline? Will it have South Peninsula?* Yes.

*Will outlier pops be left in the model?* Yes, but no fish are expected to allocate there.

*What is the cost difference between running 45 or 96 SNPs?* We get 4 times the information for twice the cost when running 96.96 chips versus 48.48 chips, so the cost per fish is about the same, but for twice as many loci.

*Will it take longer in lab?* Not significantly – we can run the same number of fish in the lab each day with either chip. Data handling takes a little bit longer.

*How many from the original set are we dropping?* 5.

10 minute break-10:00AM

b. Chum salmon-

- 1) CH acknowledged Tyler Dann and laboratory staff for all the sockeye salmon work presented in the morning and acknowledged Nick Decovich for the chum salmon presentation.
- 2) CH presented slides on chum salmon SNP discovery. Ascertainment and emphasis for locus development is heavily weighted toward distinguishing among coastal Western Alaska regions. The entire Pacific Rim will be represented both in the ascertainment and in the final baseline.
- 3) Questions and concerns:  
*36 new SNPs are in addition to what?* In addition to the existing set. CH- explains chart from University of Washington showing about 250 SNPs in pipeline and about 114 expected to come out of that pipeline. If we add the 114 to our existing set, we should have 197 to choose from.

*When will chum salmon baseline process be done?* September 2010. If not done by then, we'll start analyzing the sockeye salmon mixed fisheries.

*Will you perform SNP selection in pairs of chips? Yes*

Tim Baker (TB) described board report for Bristol Bay and offered to provide board report if you were interested in similar analysis.

PM- Suggested looking at the Cook Inlet board report for how samples can be stratified in time and space.

BT - Expect smaller information content in chum salmon due to biology of species.

*Can we use sockeye salmon method for chum salmon SNP selection?*  
Yes.

*Looking for 192 SNPs for chum salmon?* Yes, because chum salmon are less divergent than sockeye salmon.

*Do you expect to see the same tapering off for chum salmon as you did in sockeye salmon?* I would expect to see fewer high-information SNPs and many SNPs with similar levels of information. We are eliminating more loci with chum salmon than we did with sockeye salmon, so that should help us select loci most important to WASSIP.

*What would be more important to include?* Put a heavy emphasis on lab performance for the sockeye salmon SNPs. Hopefully, we will have more loci that perform well in the lab with chum salmon, so that we can high-grade loci that distinguish among populations of interest to WASSIP.

*Should we do the same for chum salmon?* We will need everyone's feedback by September in order to make sure that the areas that need to be addressed for chum salmon are being considered.

**ACTION ITEM: Will send out the white paper to everyone for their comments.**

PM - Described chum salmon SNP selection poster by University of Washington for chum salmon. Proposed we show that selection process (as well as ours) to the TC.

CH said that is good, but we are most interested in how SNPs work in our lab.

ii. Baseline analyses- discussed this section above under SNP Discovery

iii. Fishery sampling review 2006-2009

a. Final report status- presented by Doug Eggers (DE)

1) Overview-

DE presented slides on fishery collections. There were 567 strata and 320K samples collected over 4 yrs. We anticipate analyzing about 160K for SNPs. Slides included a color-coded table and figure for each region showing what was scheduled to be collected and what was

actually collected. CH clarified that we will be analyzing chum salmon for years 2007 to 2009 and sockeye salmon for years 2006 to 2008.

2) Questions and concerns:

i. Many questions ensued and can be generally divided into four categories: A) strata not sampled or under-sampled, B) detail of the strata not adequate to determine if strata were sampled, C) use of data outside of WASSIP, and D) lack of metadata

A) Many of the strata not sampled or under-sampled were due to lack of fishery or low catches coupled with difficult logistics. Among the ones discussed were: Bear River (no catch in 2008), Tooksook and Mekoryuk (low harvests). Norton Sound chum salmon (low catches that are spatially widely distributed). CH noted that when we have 400 fish per strata, we are good, yellow (200) is fairly good, and less good for other colors. Explained how small catches relate to problem sampling areas. PM stated that the premise of WASSIP is that there is year to year variability, therefore we sampled multiple years. It is therefore duplicitous for the Department to say one decade that these are small catches, and one decade that every fish counts. PM asked if the Department felt that small catches are irrelevant.

B) The detail of strata was not adequate to determine if strata were sampled in the marine waters of Y1. PM expressed frustration that he has been asking for this detail since the early stages of WASSIP and is still not seeing it. Due to the lack of detail, it was not clear whether the commercial fisheries outside the Black River are represented in the samples. These need to be included in the study, because they are in the MOU. The spreadsheet should not add Y1 marine to Black River harvests. A discussion followed on whether Y1 marine can be separated from Black River. Dani Evenson (DEv) said it was possible and that she would get back with group. She thinks it will be all Y1 marine, less the Black River. TB- discrepancies due to year to year differences in fish present. DEv- Just spoke with Larry DuBois about Y1 marine. We have Kotlik, but it is hard to know where samples were actually caught once they reach the processor. Arranged by stat area.

**ACTION ITEM DE** will look into when and how the Y1 marine water catches were sampled and get back to group.

**ACTION ITEM EV** We will pull report together and address issues (e.g. pull out Y1 marine) report will be distributed as soon as possible.

- C) Use of data outside of WASSIP: DJ asked whether these data could be used for bycatch issues. EV acknowledged the importance of bycatch and said that we are working on bycatch issues in another arena. BT said that ADF&G is working with NMFS on this issue.
  - D) Some folks thought there needs to be more metadata included in the table. Beth Stewart (BS) wanted to see clearer sampling table showing sample goals and why some were not met, instead of just relating it to actual catch. DE assured her that those details will be included in the report. EV suggested that the methods for selecting samples for analysis should be included in DE's report on mixture selection. Loretta Bullard (LB) asked why the subsistence fisheries in 06-08 for Norton Sound were not sampled better? TS- Practical matters made sampling some fisheries hard, but overall we did well. LB asked why Golovin was not sampled better in each year? DE responded that sample collection of subsistence fisheries was contracted to fishers, but that sometimes it didn't work out. EV said that the Department could not put employees out in each place.
- ii. Some questions were asked how these samples affect the performance of MSA. MA and BS asked if we have adequate escapement samples from Norton Sound. DE responded that there were adequate baseline samples from Norton Sound for WASSIP, but that additional samples were planned for future Norton Sound-specific work. EV commented that the question for the fishery report is not if the baseline is there, it's that the fishery was not sampled. BS noted that there were no samples at all for Golovin in some years, but pressing issue is that we need baseline data to address future fishery issues. Suggested including references to technical documents in the final report. The Norton Sound chum salmon runs have a longer history of being low, more so than the Yukon River. Want to make sure that the effort is still equal across all regions. Do you have baseline samples from these areas of really low runs? BS asked for these to be included in the baseline report. ND said that we have a current baseline report with Norton Sound chum salmon included and that within Norton Sound it is tough to distinguish among these baseline samples without the SNPs from UW. BT noted that references are available within the baseline report to where the stocks differ and how easy it is to distinguish them (Norton Sound/Yukon) apart. Mike Sloan said that effort should be made to look for Norton Sound SNPs. PM noted that a great deal of effort has been put into Norton Sound chum salmon genetic marker discovery.

EV said that we will take your comments into consideration and fix it for report. He took responsibility for not addressing Y1 issues sooner. We will make sure that all tables are clear in the report.

DE- One more comment, areas in red will have a finite population correction applied, and estimates will be precise because a large proportion of total catch was sampled.

PM- Also, boxes on charts were created ahead of time because of timing being important. Jim Jasper (JJ) is responsible for ability to get a lot of info out of incomplete sample sizes. JJ will talk about this later in the meeting.

Be back by 1:15pm.

iv. Statistical analysis development-

a. Hierarchical MSA model

- 1) JJ presented a PowerPoint on Hierarchical MSA model vs. Regional Allocation Model (RAM).

This model allows for dealing with small sample sizes. This requires the appropriate model, though. We have submitted the model to the TC, but they question how appropriate it is.

*What method will you use to tell if it is appropriate?* Do lots of simulations. Preliminary results say it reduces MSE. Need to test trade-off with bias and precision.

MA- You want to make sure there is a connection with prior strata to later strata. Must make sure the assumption of relatedness is met.

*You've pursued a review of this?* Yes, not convinced that it's 100% necessary but no indication that I'm doing anything wrong.

TB – Can use this method within a single season.

MA – May be more complicated. May need a structure across years to account for year to year variability.

JJ – Envisions 2-level hierarchy.

PM to MA- *Is this process robust enough to move forward?*

MA- You're putting me on the spot. Need more info.

EV – We need to get the white paper to the TC so they have enough info to comment.

PM – Wants to make sure we have a process to capture benefits, and make sure we don't have JJ spinning wheels.

*Would this be for both sockeye salmon and chum salmon?* It could be if chum salmon are as consistent as sockeye salmon.

*How much does the prior matter?*

TB – In Bristol Bay, we have 11 pops, so for a flat prior we'd take 11/100. But if you have a stock that is present at really low levels, the prior would be too high (8%). The prior can inflate the estimated contribution if the stock is not that identifiable. Need to set prior before you estimate so you don't influence the estimate. You need a process to develop a prior. We used previous year as prior.

*But you have seen cases where priors have changed results?*

Yes.....larger sample sizes help the issue.

*Can there be a way to weight the prior?* We can actually estimate the weight. Put a prior on the weight with a mean of 1.

*When you have a situation where you have missing samples, what is the difference between Pella-Masuda and this method?*

JJ- Explained the difference.

EV- The TC needs to communicate with tech folks via white paper . Maybe we should move on.

Chuck McCallum (CM)- I get it enough to say it's worthwhile to look into further.

b. Regional allocation MSA model-

1) JJ presents PowerPoint on the regional allocation model (RAM)

2) Comments and questions

*Are all examples using small number of populations in baseline, or did you use a large number of populations?* Explained the differing numbers of pops in each region.

*Specifically, was there a case where a prior shrank because you pooled to form regions?* Explain the difference between RAM and Pella-Masuda priors.

TB- Commented that misallocation could be an artifact of geographically proximate reporting regions.

JJ- Pointed out that misallocation seems to be a function of the number of pops in a reporting region.

*This method is supposed to improve Pella-Masuda?* Yes this is not an issue with sockeye salmon since they are so distinct. It is more applicable for chum salmon. JJ explained that competition among regions with differing number of populations "level the playing field".

PM- Said he asked BT about a year ago about few populations from a region inducing bias. Says it's good that you don't have to decrease number of populations in a region to make it equal to a region with fewer populations.

JJ-Long way to go before this could become the standard. We need others to review it and test it before we can all agree to use it for allocation.

*How will you gain confidence that this is appropriate?* Lots of simulations with real data and simulated data. One promise of hierarchical models is that it decreases the mean square error. There's a tradeoff between bias and precision.

BT-Even though our precision and accuracy would decrease as our sample size decreases, this would allow us to better deal with the issue. To allow each stratum to inform the others you can deal with these sizes better. We have two more meetings before we need to make the decision to go with this approach or not. After the TC reviews it we'll have a better idea of its appropriateness.

v. Technical documents-

a. EV moved to formalize process of Technical Documents and how to approve them.

BT- Explained history and need for Technical Documents. It allows ADFG to communicate with TC and documents the process. Currently 5 docs sent to TC. Those are now all commented on and available to the AP. Explained what each of the 5 was (original proposal, baselines, small proportions etc., temporal variation).

b. Comments and questions:

*Is there a reason to not make them available online?* No good reason, we are just are in the middle a web overhaul.

*There might be a WASSIP web page soon?* Maybe.....

PM- It'd be nice to have.

LB – Would be a good form of outreach.

EV- We should get the minutes out to stakeholders as well.

BS- Question on small sample size. It is hard to sample in Norton Sound year to year (baseline), wants ADFG to spend more on annual baseline sampling. Areas in the most trouble are places where it is hardest to work. Wants more focus on AYK.

EV- Do you want more fishery sampling?

BS – Yes. Wants more effort after 2011.

EV- We have much more escapement monitoring in AYK. We also need to sample consistently year to year.

BS- Even if you take samples and don't have money to run them. She is disappointed that we did not meet sample goals.

LB- If we had known that getting samples was difficult, we would have helped out with it.

*Is there some point when you want input on SNP selection process? This will have to happen before next AP meeting.*

**ACTION ITEM: BT- We will request input on the chum salmon SNP selection from the AP before next meeting.**

Art- Asked about next need from input from AP.

EV- We may need to consider lab flow when offering up tweaks to strata of mixture samples.

BT – We can make changes to strata now, but we need to do so soon and we can only make large scale changes. Small scale will be tough.

CH- Correct. We can't make changes to what has already been extracted. We can make small adjustments.

EV to PM- *will you have time this summer to review sampling report?*

PM- No, maybe in August.

BT- We will be extracting throughout the summer.

EV – Will be good to provide comments by next AP meeting due to time constraints.

EV- BT talked about sampling Southeast District Mainland (SEDM) fishery. Mark Witteveen gave overview of Southeast district mainland sampling program. Planning to implement WASSIP style sampling with test fishery so they can have sampling if there is no commercial fishery. Have funding to collect samples, but not to run them.

CM- There were lots of strata missed in WASSIP. Wondered how to reconcile use of test fishery when there was no fishery. Keen on watching how the process of this is trued up.

EV- I knew this would be challenging to bring up. This is not a WASSIP issue, but did not want anyone to be surprised by this effort. This is not a fill in or extension for WASSIP. This was informational.

*4. Review and approval of minutes from September, 2009 meeting*

BS moved to adopt minutes. CM seconded.

EV, hearing nothing, considered minutes adopted.

*5. Scheduling of next meeting*

EV- mentioned absence of 3 of 4 TC members. Usually try to make it 3<sup>rd</sup> weekend in September. We always have trouble getting Tom Quinn because of teaching.

**ACTION ITEM: EV will communicate with TC to find the best time for next meeting.**

BS- Said they have a similar system as the TC, thinks she would like to be present at the TC and just sit back and watch.

PM- Would prior weeks work? Prior weeks would be better for him.

**ACTION ITEM:** EV- Will try to shoot for week of Sept. 13<sup>th</sup>. Will get busy on finding dates and do it ASAP.

*Any last comments?*

DE – Needs to get report finished within about a month. Needs to have review done in that time.

**ACTION ITEM:** EV- we will distribute updated timeline and work on website. Would it be fair to say that should send docs to all AP members?

Unanimous yes.

Meeting adjourned at 3pm.