

# Pacific Salmon Commission



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To: Barry Rosenberger, Chair Fraser River Panel  
Lorraine Loomis, Vice Chair Fraser River Panel

From: Mike Lapointe, Pacific Salmon Commission staff

cc: Fraser River Panel members, Mark Saunders

Date: November 19, 2010

Re: Uses and value of Qualark Acoustics program.

Our file: 63001

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The purpose of this memo is to review the potential uses and value of the Qualark Acoustic program to provide a basis for discussions about the future funding of the program.

## Historical Context

Experimental work began at Qualark in 1993, in part following a statement in the 1992 Pearse Larkin review that suggested that additional acoustic sites upstream of Mission could be of assistance in regulating in-river fisheries:

"If bands along the length of the river are to successively harvest the stocks moving upstream, accurate counts of escapement will be needed at several points, not just at Mission. For example, echo-sounding near Hell's Gate, and above and below the confluence with the Thompson would enable more precise regulation than is presently possible." (see technical appendix p. 31-32).

During this first experimental phase the Qualark program generated estimates using sideward looking split beam acoustic technology deployed initially from the right (west) and then left (east) banks. Associated with this work was an experimental program in the Thompson River just downstream of Spences Bridge to validate sideward looking acoustic methods using combined acoustic and video images. At Qualark there was a continual refinement of methods over this period. The comparisons between Qualark estimates and Mission projections during this period revealed very similar patterns of daily abundance for most periods (Mission projections = Mission escapement less catches between Mission and Qualark and any stocks whose tributaries left the Fraser downstream of Qualark). During this period of comparisons, Mission estimates were based on single beam technology from a transecting vessel only. The Qualark program was disbanded in 1998.

Coincident with the work at Qualark a joint PSC-DFO team began investigating potential biases at Mission and some of the methodologies developed at Qualark (e.g. Split-beam technology and sideward looking systems) were gradually implemented at Mission. Thus, the experimental work at Qualark and expertise of DFO science both contributed to significant improvements to methodology at Mission.

In 2005, non-random sampling of species composition in river gillnet test fisheries resulted in a substantial overestimate of sockeye passage at Mission during the in-season period. Coincidentally, following the first two years of fund distribution from the Southern Boundary Restoration and Enhancement Fund (SEF), the SEF committee became concerned about the variety of projects associated with various assessment activities in the Fraser River watershed and were seeking advice that could be used to help judge the relative merits of alternative projects. To support this request the SEF funded a DFO led study to develop a stock assessment framework in 2006. They also funded a PSC staff led workshop on Hydroacoustics in 2006 to assist with the framework development. The workshop reviewed various aspects of hydroacoustics applications to management of salmon with particular emphasis on studies related to Fraser River populations. The workshop was well attended by PSC and DFO staff, Fraser River Panel and Technical Committee members, private sector hydroacoustic experts and First Nations. The workshop included 3 round table discussions on: (1) information gaps in Fraser River sockeye management, (2) potential applications of future hydroacoustic technology developments, (3) the need to develop programs to obtain estimates of sockeye abundance at sites upstream of Mission. The discussions in roundtable 3 resulted in considerable support for the development of an upstream acoustic site on the mainstem Fraser River.

While there were a number of potential benefits of an upstream site that varied depending on location, there was clear recognition of the potential scientific and management benefits for revisiting Qualark as a method of providing

in-season feedback on potential biases in Mission estimates. This consensus prompted the following concluding remark from Larry Rutter: "Rutter compared the limited benefits of spending another million dollars at Mission vs. spending that amount on a second site and wondered why there were no proposals for upstream sites yet. Bolstering confidence in Mission estimates seems to be a top priority, so there should be resolve to get a second site going as soon as possible. If Qualark can be set up quickly and offers so many benefits, it seems we should do it, he concluded."

Two proposals came from DFO to the PSC's Southern Enhancement fund for Qualark for the 2007 and 2008 seasons. Unfortunately, neither of these proposals were successful in obtaining funding

Similarly, in 2006 Brian Riddell presented a "concept proposal" to DFO Senior management to develop a new in-river assessment program integrating conventional and radio tagging, tagging platforms (fish wheels), re-development of Qualark using Didson technology, mark recovery through telemetry and fishery sampling, and the use of mark-recapture estimation. The proposal was intended to address recurring issues within the Fraser sockeye and would build on the extensive radio tagging project conducted in 2006. Infrastructure costs to re-activate the Qualark program in 2007 were funded jointly through DFO and Pacific Salmon Foundation and the SEF funded some of the telemetry and fishwheel tagging platforms. The Pacific Salmon Endowment Fund provided significant funds when the SEF was unable to support it. While most of the Qualark site re-development repeated the earlier work in the 1990's, DIDSON, rather than split beam technology was deployed as the primary tool for estimation (species identification at Qualark still uses drift gillnet sampling). The full proposal was implemented in 2008 and 2009 and was reviewed in April 2010 (June 4, 2010 report with Pacific Salmon Foundation). Operational funding for the Qualark program for 2009 and 2010 came from DFO. Because of the need to test the DIDSON technology, Qualark was viewed as a science-based feasibility study in its first two years of operation, but after 2009 some have argued that Qualark has passed the feasibility phase and should be considered an operational program. However, alterations to the program have been made each year to address issues as they are discovered.

### **Uses and Value of Qualark.**

In 2008 and 2009, daily Qualark and Mission projections showed remarkably similar patterns of daily sockeye abundance, although test fisheries at both sites faced some challenges in 2009 relating to the random sampling of species composition when pink salmon became the dominant species. In early part of the 2010 season, daily estimates from the two sites tracked each other very well, but then began to diverge later in the season. Below we outline the uses and value of Qualark from a PSC staff perspective based on this recent experience. We discuss some potential values to DFO, but there could be additional benefits and uses to DFO that we are unaware of.

First, a primary benefit of the Qualark site is that it provides in-season feedback on the Mission estimates. It is clear that the Qualark site offers advantages over the Mission site in relation to hydroacoustic estimation. The most important site characteristic is the narrower river channel and consistent high velocity flow that result in most fish traveling near shore where they can be estimated by 2 DIDSONs (1 on each bank). While it might be fair to characterize this in-season feedback as a security blanket in years like 2008 and 2009 when the correspondence of estimates for the two sites was excellent, in 2010 the divergence of estimates was sufficient to cause PSC staff to modify Mission estimates in-season based primarily on the Qualark observations. This in-season feedback is particularly critical while the final phases of improvements to Mission estimates are being developed, as it can be used to help determine the most appropriate sampling design for the mid-channel part of the river. Indeed, as both programs provide independent estimates, a quantitative approach (i.e. Bayesian) could incorporate both estimates in an average estimate that would be robust and have a smaller overall coefficient of variation than the traditional estimation from Mission on its own. Significant gains in management confidence would therefore be realized.

Second, in addition to this in-season feedback, estimates from Qualark have been used to support lower river estimates used in the estimation of differences between estimates (DBEs) used in the calculations of post-season estimates of total return. Thus in 2008 and 2009, the fact that Qualark estimates agreed with Mission estimates supported the assertion that the magnitude of the DBEs were not primarily the result of biases in the Mission estimates.

Third, biases resulting from species composition issues should be lower at Qualark than at Mission because fewer pink salmon spawn in areas upstream of Qualark. However, it appears from 2009 that Qualark will have some species composition challenges associated with the test fishery at that site. If these species composition challenges can be overcome there is the potential for the Qualark program to estimate the abundance of pink salmon bound for areas upstream of Mission. The feedback from Qualark may assist PSC staff in developing defensible estimates of Pink salmon passing Mission through a stratified acoustic/species composition sampling design. The estimates of

Pink salmon escapement may be important to the MSC certification process, given that upstream programs are no longer conducted.

Fourth from a DFO perspective, the agreement between Qualark and Mission should bolster confidence in the in-river catch estimates that are made for areas between the two sites, since these estimates are removed from the Mission estimates to generate a comparable time series.

Fifth, the Qualark estimates themselves may be used as an estimate of the abundance of fish entering the Fraser Canyon. This could be useful for planning DFO in-river fisheries upstream of Qualark.

### **Options for Future funding**

As stated in the budget memo provided to the Panel by PSC staff at the October post-season meeting we have obtained an estimate of the approximate annual operating cost of Qualark of \$300,000. This estimate includes approximately \$50,000 for the test fishery which presumably would be funded by Canada out of Larocque funds consistent with other test fisheries. This would leave \$250,000 remaining to be funded. One option for future funding of the program is to continue funding from DFO. Based on preliminary discussions with DFO staff, it appears unlikely that sufficient funds can be found within DFO's current operational budget. I have been told from Science Branch that Qualark is viewed as an operational program and thus is not appropriate to be funded from the Science program. This would leave the funding burden in the Stock Assessment Division, which would bring tradeoffs with other Fraser sockeye programs into play.

Of the five uses and values of Qualark, the first three relate to the bilateral mandate of the Fraser River Panel, thus there is a value to the Panel and PSC staff of Qualark continuing for some time in the future. In relation to the objective of providing in-season feedback on Mission estimates during the final phase of development, a 3-5 yr time frame will likely be needed. If funded through the PSC secretariat budget this would work out to \$125,000 per Party. However if PSC secretariat were to administer the Qualark program some administration fee could apply. Furthermore, in future years an additional staff member would likely be required to administer and operate the program. If the Panel agrees that Qualark should be considered for bilateral funding, PSC staff would need this direction to consider including it in our budget proposal that we will be submitting to the Finance and Administration Committee later this month. Therefore the Panel could consider holding a short teleconference to discuss this topic.

Lastly, when funding of Qualark has come up in the past, it has not been unusual for people to ask whether both Qualark and Mission are necessary. PSC staff have never viewed these two programs as being in competition with each other simply because the two sites offer difference capabilities with respect to fishery management objectives. The Mission site offer the following advantages with respect to fisheries management objectives:

- a) Consistency with historical data series (test fishing expansion factors and DBEs/Management adjustments).
- b) Downstream of confluence of virtually all Fraser River sockeye tributaries (exceptions: Pitt and Widgeon).
- c) Upstream of commercial fishery boundary (Area E) and downstream of largest First Nation's catch areas.
- d) Timeliness of estimates relative to location of catch allocations.

With respect to the above advantages, it is important to note that if Qualark was the only in-river site, the verification of test fishery abundances estimated in marine areas would be delayed another 2-3 days. For those not involved with the details of in-season management, this may not seem like much, but PSC staff are continually hearing from Panel members about the need for more accurate estimates in areas more seaward, closer to where the vast majority of catches are currently allocated in years when there are sufficient surpluses. Shifting to reliance on Qualark, would decrease the timeliness of verification when Panel feedback has suggested more timely estimates are needed. Thus PSC staff view Qualark and Mission as complementary, not as competitive alternatives. Note there is a more detailed memo that outlines the importance of the Mission site with respect to items a)-d) above which I can provide as requested. It was written as part of consultations with the Sumas First Nation related to the drift fishing interference that has occurred at the site.

I hope the above is helpful with respect to outlining pertinent issues about Qualark continued funding. Please note that if you require a teleconference please coordinate this through Jim Cave as I will be away from the office November 22-30.

Sincerely, Mike Lapointe,

Chief Biologist, Fisheries Management Division, Pacific Salmon Commission Staff