hanks, Alison!

I think we should recommend adding at least one more station in the Sacramento River just upstream of Sutter Slough or downstream of the proposed CWF intakes. On the surface, this could be a very valuable tool both to understand the fish effects in the Delta, but also potentially inform operations in the long run. Having a fixed network will provide consistent data over varying hydrologic/operational conditions.

As we were discussing earlier, several of the pre-construction surveys for WaterFix require us to document the baseline conditions related to the survival (delta-wide and SacR reach near the intakes), predator density in the vicinity of the proposed intakes etc. I do not fully understand if this network would help with any of those studies. But, if they would assist in developing an understanding, we should definitely explore to work this into WaterFix monitoring plans. Also, remember that the WaterFix includes specific survival goals in the reach with the intakes, and the entire Delta – which would require something like this to assess consistently and objectively, in my opinion.

Regards,

Chandra

Chandra Sekhar Chilmakuri, Ph.D., P.E.

Principal Engineer

Office of General Manager, Bay Delta Initiatives

The Metropolitan Water District of Southern California

Direct: 916-650-2677

Cell: 916-335-3017

**From:** Collins,Alison L   
**Sent:** Wednesday, June 20, 2018 4:45 PM  
**To:** Arakawa,Stephen N; Neudeck,Randall D; Meisler,Marty; Sheehan,Rebecca D; Acuna,Shawn C; Nevills,Jennifer C; Fullerton,David K; Smith,Lynda A; Phillis,Corey C; Chilmakuri,Chandra Sekhar; Jennifer Pierre  
**Subject:** RE: DREAM Presentation and Core Array Discussion

Attached are the presentations that were given at the DREAMS (Delta Real-time Enhanced Acoustic Monitoring System) meeting yesterday along with a summary of what I learned.

-The contract for this ends on June 30th and the group is looking for feedback on this project before then. Check out the DREAMS website, which is an interactive shiny tool: <https://salmonsurvival.us/>, the username is: shinytest and password: usgs-dr3amer$ . If you have feedback let me know, I can coordinate this and send.

-everyone liked this tool and agreed that if it were to be implemented thee should be some sort of multi-agency group to discuss how it should be used, where receivers should be, how many fish should be tagged, etc-but no one volunteered to organize this and no one had a good answer to ‘what’s next’?

-this work was mostly funded by CDFW (~$1 million was routed via DWR to USGS), the purpose was for USGS to develop recommendations for a 21st century telemetry system

-It is a very cool tool but I am not sure how we would use it for management. USGS even said using raw real-time acoustic telemetry data for real-time operations is not scientifically defensible; this is because there is an unacceptable level of variance in the entrainment rate, travel time, and survival estimates due to small sample sizes of tagged fish and variability in daily-to-weekly timescales created by environmental conditions such as tides. This could be used to gain baseline level information on survival and see if/how survival changes with ecosystem restoration and new infrastructure projects such as CWF

-The Bayesian statistic modeling they developed (STARS Model: Survival, Travel Time, and Routing Simulation) allows acoustic tagging data to provide near-real-time information to managers because they are placing the real-time data in the context of the historical data via the model. This model estimates travel time, survival, and routing

-The STARS model only works if there are tagged fish in the system, so to use this for real-time operations would require fish to be tagged and released on a weekly (continuous) basis during the outmigration season.

-I wonder what the cost of implementing this program would be, real time receivers need to be bough, but labor will be the most expensive part; people are needed to tag fish on a weekly basis, and keep receivers up and running. Receiver download and running the model is mostly automated but there will need to be a database manager and someone who can trouble shoot when the system goes down

-This effort is not coordinated with other acoustic telemetry efforts. The project was really meant to design a new, advanced, monitoring system.

-Rachel Johnson (NOAA), Josh Israel (BOR), and Jonathan Nelson (CDFW) recognize the need for a more coordinated acoustic tagging and monitoring system and are in the very early stages of thinking about how to get a team together to discuss this and build what that coordinated system would be. One idea is to develop a technical team within IEP but they recognize that this is a member agency only group. They also thought about developing a group in CAMT, but I don’t’ think CAMT has the capacity to do this. This could maybe be done through CWF in some way. If we have ideas we should suggest these so that we can be involved.

Please let me know if you have any questions,

Alison

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Alison L. Collins, M.Sc. | The Metropolitan Water District of Southern California

Senior Resource Specialist

Bay-Delta Initiatives | 1121 L St., # 900, Sacramento, CA 95814  
PHONE: 916.650.2628 | E-MAIL: [acollins@mwdh2o.com](mailto:acollins@mwdh2o.com)

**From:** Collins,Alison L   
**Sent:** Tuesday, June 05, 2018 6:02 PM  
**To:** Arakawa,Stephen N; Neudeck,Randall D; Meisler,Marty; Rebecca D Sheehan; Acuna,Shawn C; Nevills,Jennifer C; Fullerton,David K; Smith,Lynda A; Phillis,Corey C; Chandra Chilmakuri ; Jennifer Pierre  
**Subject:** FW: DREAM Presentation and Core Array Discussion

All,

Attached is information about the Delta Real-Time Acoustic Monitoring (DREAM) Program and in the email below there is a poll to find time for an in-person to discuss this project. I will attend, but if you are interested in please fill out the poll or send any questions you have about the tool to me to bring up.

The principal objective of a Delta-wide monitoring array is to provide a common operating platform for monitoring the behavior, route of passage, and survival of tagged fish throughout the Delta. DWR and USGS are developing a system to provide daily real-time forecasts of entrainment rates and through-Delta survival estimates for juvenile salmonids in the Sacramento – San Joaquin Delta based on acoustic telemetry data – the Delta Real-time Enhanced Acoustic Monitoring (DREAM) program. The foundation of the DREAM project is the CORE array of acoustic receivers located throughout the Delta. The Bayesian mark-recapture survival model is the heart of the DREAM data analysis components and is based off of the recent survival modeling work done by Russ Perry and used in the CWF BO. This model uses all of the complete capture histories stored on the DREAM modeling database to estimate route selection and survival model parameters. Scientists can use these parameter estimates to predict release group travel time, survival, and route selection as a function of Sacramento River discharge at Freeport and DCC gate position. Managers can leverage these parameter estimates using the STARS (Survival, Travel Time, and Routing Simulation) model, which allows users to forecast route selection, travel time, and survival in the Delta for operation scenarios or current conditions.

I think this tool is exciting and I look forward to learning more. However, we will have to really think about how this tool could be used to inform real-time water operations. Just because fish have entered the interior Delta does not mean that they will be entrained and export operations should remain flexible as long as loss/salvage does not exceed the ITL.

Please let me know if you have any questions,

Alison

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Alison L. Collins, M.Sc. | The Metropolitan Water District of Southern California

Senior Resource Specialist

Bay-Delta Initiatives | 1121 L St., # 900, Sacramento, CA 95814  
PHONE: 916.650.2628 | E-MAIL: [acollins@mwdh2o.com](mailto:acollins@mwdh2o.com)

**From:** McQuirk, Jacob@DWR [<mailto:Jacob.McQuirk@water.ca.gov>]   
**Sent:** Tuesday, June 05, 2018 4:30 PM  
**To:** [jrburau@usgs.gov](mailto:jrburau@usgs.gov); Russell W Perry; Israel,JA@USBR; Linander, Duane@Wildlife; Kundargi, Kenneth@Wildlife; Nelson, Jonathan@Wildlife; [rachel.johnson@noaa.gov](mailto:rachel.johnson@noaa.gov); [steve.lindley@noaa.gov](mailto:steve.lindley@noaa.gov); [cyril.michel@noaa.gov](mailto:cyril.michel@noaa.gov); Collins,Alison L; [arnold.ammann@NOAA.GOV](mailto:arnold.ammann@NOAA.GOV); [mworkman@ebaymud.com](mailto:mworkman@ebaymud.com); Eric Chapman ([edchapman@ucdavis.edu](mailto:edchapman@ucdavis.edu)); Donald Portz; Smith, David L ERDC  
**Cc:** Noah Adams ([nadams@usgs.gov](mailto:nadams@usgs.gov)); Chao, You Chen@DWR; Trang, Robert@DWR; Tolentino, Karen@DWR; Kwan, Simon@DWR; Mark Bowen ([mbowen@esassoc.com](mailto:mbowen@esassoc.com)); Reeves, Ryan@DWR; Reeve, Matthew@DWR; Reece, Kevin@DWR; Wilkinson, Chris@DWR; Harvey, Brett@DWR; Clark, Kevin@DWR; Hinojosa, Tracy@DWR; McLaughlin, William@DWR; Jones, Gardner@DWR; Jacobs, Brooke@Wildlife; Wilcox, Carl@Wildlife  
**Subject:** DREAM Presentation and Core Array Discussion

Hi Folks,

Please respond to the following Doodle Poll for a meeting on 6/19 or the morning of 6/20.  We will have Jon Burau and Russ Perry at the meeting to provide a presentation on the Delta Real-Time Enhanced Acoustic Monitoring program (DREAM).  We are entering the final stretch of the project and I’m offering this presentation and discussion prior to the end of my contract for the project.  Please see the attached informational handout on DREAM and pass this along to those I may have missed. We also plan to send additional information including information on a possible core array prior to the meeting.  Please complete the poll this week, so we can get a head count and set the time and place.

[https://doodle.com/poll/hxecprdwv5ufq26a](https://urldefense.proofpoint.com/v2/url?u=https-3A__doodle.com_poll_hxecprdwv5ufq26a&d=DwMFAg&c=4MN-UCSwHU2yVvIS1IA6wA&r=OX6RiggLD3_23XVc6AnJ4LrK8iANEN3-4hTzz1qEmNU&m=jOqI8rKRuttBZNe7TKTw0ucIKO1xjCUTHZWiFjO0UhE&s=1IyArx4qkFVIeiBib0e3z5GV8zse1FeCMsLSaRbkqKg&e=)

I look forward to an exciting presentation and good discussion on where we go from here.

Draft Basic Agenda (comments welcome)

DREAM Vision/Overview and Accomplishments (Burau)

DREAM Shiny App Demo (Perry)

Possible Permanent Nodes Map / Core Array (Perry)

Group Discussion

Next Steps

At the end of the handout you will see my name for questions, yet I don’t want to mislead folks that I will be able to answer your questions. We will collect questions for the meeting, so send them Karen Tolentino ([karen.tolentino@water.ca.gov](mailto:karen.tolentino@water.ca.gov)) with a copy to me.  If you can make the meeting in person that would be best, but we will attempt to provide an AV conference link for those that can’t. No guarantee we will get that set up, but we will try especially if you let us know you need to call in . Please also let Karen and I know the names and organizations for additional people this poll is forwarded to.

Thanks,

Jacob