CALIFORNIA COOPERATIVE SNOW SURVEYS

ESTABLISHED 1929

65th ANNUAL MEETING OF THE CALIFORNIA COOPERATIVE SNOW SURVEYS PROGRAM

November 6, 2019, 4:00 – 5:00 PM, Paso Robles, CA

Breakout Session Notes

Airborne Snow Observatory (ASO)

Attendees: Fred Pierson, Bruce McGurk, Pat Hayes, Steve Haugen, Andrew Hedrick, Mark Robertson, Marco Bell, Wes Monier, Ty Brandt, Michelle Campbell, Tom Painter, Gordan Enas, Sean de Guzman, Cale Nasca, Jennifer Fromm, Forest Cannon, MD Haque

- Group all in agreement that ASO should all fall under the umbrella of DWR similar to how CCSS is operated. This is due to the fact that the program is being operated by the State government so that it is an unbiased source.
- Group all in agreement that the current structure of ASO is successful from data acquisition, data processing, and modeling
- ASO is no longer a pilot project and is now in full operational mode. It is not just another tool with information.
- Group agrees that a "Procedure Manual" for ASO will be helpful. It would contain information such as how to request flights, expected timing of data releases, standardized data products, etc.
- ASO is multi-benefit and will drive research and development for snow science, hydrology, forest management, water supply, etc.
- Group agrees that the need for the ASO program needs to be communicated by others than just reservoir operators and water users. Need exists for others in the public to communicate the need to have a larger base.
- Currently everyone is waiting on the Governor's Water Resiliency Portfolio to be released.
- There was discussion about Oroville and how ASO can use that as leverage. ASO can be used as a vehicle for emergency preparedness. February 2017 was a warm AR with no snow over the Feather basin. You could have at least known what antecedent conditions existed prior to the storm and measured after the storm. Events similar to this could drive R&D.
- Cooperators came up with the idea to draft a collaborative letter with all of their signatures on it explaining the benefits of ASO and why it is absolutely necessary for their operations. They plan to include real-life scenarios they used in their reservoir operation decisions that added benefits such as vacating storage in preparation of storms, diverting water to groundwater recharge basins etc.
- Reservoir operators asked what could be the bare minimum that need to be made WY2020 operations successful, and all agreed at least one full flight is needed near peak snowpack, but they really need at least a few flights so that the models do not deviate too far from reality.

Modeling

Attendees: Pete Fickenscher, Ned Bair, Ashok Bathulla, John King, Maury Ross, Jolyne Lea, Kathryn Koczot, Leanne Lestak, Jeremey Hill, Jordon Thoennes, Brian Walker, Raphael Motagally

- Ashok and John from DWR talked about the models used in forecasting (regression models), and the work that is being done on the PRMS, iSnobal, and HEC-HMS.
- Ned Bair from UC Santa Barbara talked about his background and the research work he has done on snow albedo and its impact on snowmelt. Based on his experience, he thinks albedo is very important in snowmelt modeling and has asked DWR if they have any information on albedo coming from ASO flights.

- Brian from USACE talked about the models that they use for their water supply modeling. They go to model is CWMS and HEC-HMS. USACE relies mostly on CNRFC for the precipitation and temperature inputs into their models. Gridded temperature index method was primarily used in their snowmelt models.
- Jolyne from NRCS talked about a new system that uses machine learning (ML) and artificial intelligence (AI) to learn from past hydrometeorological data and come up with a new set of regression equations. This system is currently being tested. The system is computationally intensive and uses R-script to implement some of the methods. She also noted that they currently use simple models because they have 850 forecast points and only four people to do it.
- Leanne from UC Colorado talked about the real-time spatial SWE product they have which is issued twice a month in winter and spring. The product is based on their SWE regression model. The issues they have right now and are focusing on improving are: 1) improve the accuracy of SWE, and 2) reduce the time it takes to put a report out. This product uses ASO flights data, CoCoRAHS, SNODAS, and DWR snow sensors.

Permitting and Site Access

Attendees: John Paasch, Sudhakar Talanki, Margaret Wood, Debbie Gaynor, Jeff Anderson, Peter Vorster, Matt Meadows, Lucas Marchese, Bryan Prestel, Ramesh Gautam

- USF informed that each permit does have expiration date, although, it is not specially mentioned on the document. Those permits issued back in 1960's being the earlier version, may not have specific expiration date. Nevertheless, USF is well aware that all permits are required to renew on time. They informed that they are working tirelessly to update/renew all permits.
- USF indicated that it may be a good idea to develop master permit template categorizing all snow courses, hyd-met stations, snow sensors, sheds, cabins, landing sites and road access, and then, file to all National Forests.
- DWR informed that it may be a great idea to hire student assistant and explore old records to get the bottom of each permit to make sure all sites/locations does have permit irrespective of expiration date. DWR to work with USF and upper management to identify budget and other logistics for this approach.
- USF advised to include access issues into the permit. Based on mutual discussions between DWR and USF, access modifications or upgrade can be done as far as permit applicant agrees to pay for the cost of road maintenance/upgrade. In future permit applications, this component is going to get incorporated into the permit. USF also informed that it is a great idea to identify all possible access roads including trails, alternate routes and their conditions into the application package.
- USF informed that fee for land use can be waived based on mutual benefit of the resources. Hence, USF advised to submit memo with application package requesting the waiver for land use fee. Nevertheless, fee related to cost recovery will not be waived.
- USF advised to look NEPA Handbook 1909.15, Chapter 30 for special terms and conditions of permitting issues for installation and operation as well as maintenance of sites within National Forests.
- It was also discussed to coordinate with other agencies such as National Interagency Fire Coordination, California Ski Association for the procedure on getting mutual benefit of installing additional fuel moistures and obtaining permit while getting waiver for fee associated to fuel moisture sensors.
- DWR informed that some of the sites are although described are within National Forests in the past, however while reviewing those sites, it was found that they are in private land. The team was curious to know the reason, the USF informed the cause could be due to the use of few decimal digits of latitude and longitude coordinates. Hence, a need was realized to develop metadata for all stations with consistent digits for latitude and longitude records.

Hydrometeorological Station Maintenance and Upgrades

Attendees: Bryan Prestel, Victor Hernandez, Erik Meyer, Kelly Martin, Rodney Silva, Dion Abellon, Dan Garrigue, Dotty Garrigue, James Brylawski, Rachel Hallnan, Jim Ward,

- Prior to this winter, DWR will be getting the Panther Gap station up and running. They will also be getting the instrumentation working as a temporary fix for this winter at Farewell Gap.
    - Expected completion will be by this winter of 2020.
- We all will explore keeping Farewell Gap, which there seems to be two options-1.) stay at the current location improving tower and base to spec and potentially add structural avalanche defenses like wedging upslope or at the concrete base; 2.) Move the tower downslope 0.5 mi and ~200 ft down to an area of reduced avalanche risk.
    - Expected completion would be no earlier than next fall/winter
- Explore transferring UC tokopah weather station and snow course to DWR. This would add another high elevation site to the Kaweah. Could this supplant the high elevation site at Farewell, or an addition?
    - Could be a longer-term goal depending on feasibility and desire of collaborators
- Discussed SHM30 vs SHM31 Heater options and possible issues
- Went over FTS Antenna gain with current Campbell radios. FTS antennae have lower gain than the Yagi antennae requiring higher gain settings in the transmitting radio to ensure proper signal strength and receiving via the GOES system.
- Yosemite Hydrology Team discussed current plans and would like to discuss DWR's and Yosemite's Role in a further discussion and meeting.

Snow Surveys

Attendees: Andrew Reising, John King, Lucas Marchese, Joshua Rhodes, Matt Meadows, Kelly Martin, Erik Meyer, Randall Osterhuber, Al Tafolla

- Discussions on current snow survey practice, status of several snow courses, and required maintenance were held.
- Kings River Water Association staff discussed on cabin maintenance needs and status of several snow courses in Kings River Basin.
- Multiple other snow courses in Stanislaus, American, Yuba, and Mono Lake basins were also discussed including accessing issues, maintenance requirements and cabin maintenance