6-Nov-19  
Into to FLARE Ad-Hoc Working Group Notes

* Intro by CCC
  + Science and technology center
  + 100 lakes with forecasts by 2021
  + Overview of FLARE and recruiting interested people/lakes
  + Basic requirements
    - Driver data (these could be modeled)
      * Daily inflow, temp, chemistry
      * Outflow and lake level
      * Met
    - GLM
      * Bathymetry
      * Water chem for calibration
    - Data assimilation
      * Sensors data with available download
  + Take the survey!
* Questions
* At what depths do the sensors need to be at?
  + At least one point (temp, DO, chla) to start
* What about taking sensors out over winter?
  + Can still run forecast without sensor data over winter which means data is not assimilated but can still run forecast
  + Is there flexibility to assimilate only when available?
    - YES, FLARE can also assimilate manual profiles and assimilate only when data is available
  + What data management/standardization are you thinking about?
    - FLARE meets EDI standards, which can be accessed through EDI’s API which has a common vocabulary
    - What about QUAHASI (sp?)
      * Different repo but have common language
    - Renato: forecasts are independent so data standardization is not as important. We will have lessons learned for data standardization to steer future forecasters though that can be adopted.
  + How much time is required by personnel at their individual sites or time from the VT side?
    - There will hopefully be 2 full-time techs to help individuals get FLARE running on their sites. Funding for software development to help make FLARE more robust before it is administered to other lakes
    - Hopefully after several lakes, it will be built in an automated way so that it can be easily jump-started at other institutions
  + Is the plan for code to be run individually or centrally?
    - Centrally (CCC)
    - All software is open source so this can be run locally (RF)
  + The benefit of this system is that it is open source and transparent so others can buy in and see the process (MH)
  + In the past, others have made forecasts without responding to end-users. The value of the FCR model is that you have a connection with what water quality variables are important to the managers. It is important to deliver forecast output in such a way that managers can effectively make decisions.
    - CCC: there are many others involved and a whole team focused on decision support, those at UMinnesota
  + How far into the biology can these forecasts go? Can you forecast biology without massive uncertainties?
    - Yes just developing the forecasts helps us to see how we can improve them by understanding the uncertainties. Comparing across lakes can help us understand more theory around the predictability of these response variables. GLEON allows for this scalability across lat/long gradients
  + After development of the first 3 or 4 lakes, could grad students be involved in the deployment of future ‘forecast setups’?
    - How can the forecasts do with less equipment? With this project we can help identify how little data we need
  + For locations with bad network access? Can you still forecast with big gaps in data?
    - We need most sites to be able to work well that don’t require too much manpower to troubleshoot sensors. The forecasting system has mechanisms to tolerate failures but we do need data to come through at around each week.
    - You can use noaa forecasts sometimes when real-time data fails for weather variables. Other variables don’t have proxies
  + What resolution is he noaa forecast?
    - 1 degree by 1 degree, we downscale
    - Are there interests in other weather forecasts?
      * We are open to suggestions but we use this because it is free and archived forecasts are available
      * There are some Canadian weather forecast products
        + Environment Canada model
      * ECMWF not publicly available but have archives
  + A lot of sensor data needs vetting. Will this need to be done before forecasting?
    - We have developed automated QAQC on the raw sensor data
    - These might need to be customized for site specific
      * Local institutions can provide these