Utah Lake Water Quality Study (ULWQS)
Science Panel
April 20, 11:30 AM to 1:00 PM
Virtual Meeting
Meeting Summary - FINAL

ATTENDANCE:
Science Panel Members: Mike Brett, Janice Brahney, Soren Brothers, Greg Carling, Mitch Hogsett, Ryan King, James Martin, Theron Miller, Michael Mills, and Hans Paerl

Steering Committee Members and Alternates: Scott Bird, Eric Ellis, Erica Gaddis, and Jay Olsen

Members of the Public: George Parrish, Tina Laidlaw, Renn Lambert, LaVere Merritt, Dan Potts, David Richards

Utah Division of Water Quality (DWQ) staff: Scott Daly and Jodi Gardberg

Technical Consultants: Kateri Salk and Mike Paul

Facilitation Team: Heather Bergman and Samuel Wallace

ACTION ITEMS

Who	Action Item	Due Date	Date Completed
Kateri Salk	Distribute the conceptual model and tracking document that outlines from what reports and studies the numbers in the conceptual model are coming.	May 1	May 3
	Review the Water Quality Data Portal to verify the reporting and detection limits for different constituents and develop a breakdown of when samples are below the reporting and detection limits.	May 15	
	Replace references to milligrams/liter to micrograms/liter in the Carbon, Nitrogen, Phosphorus (CNP) Study.	May 15	
Erica Gaddis	Distribute the email from the Division of Water Quality's quality assurance officer with information on the DWQ's phosphorus sampling method.	May 1	April 20
Theron Miller	Review the Water Quality Data Portal to verify that all of the Wasatch Front Water Quality Council data is in the portal, including samples collected in the winter.	May 15	
Janice Brahney	Share the sedimentation rate and composition data from the Paleo Study with Kateri Salk.	May 1	

Who	Action Item	Due Date	Date Completed
Scott Daly	Distribute the Bioassay Study Report and one-page factsheet to the Science Panel once it is complete.	May 1	
	Work with Theron Miller to set up an agenda item at a future Science Panel meeting to report the atmospheric deposition study results.	May 15	

DECISIONS AND APPROVALS
No formal decisions or approvals were made during this meeting.

CARBON, NITROGEN, AND PHOSPHORUS (CNP) BUDGET STUDY UPDATE
Kateri Salk, Tetra Tech, presented a brief overview of the CNP Budget Study. Her comments are summarized below.

- The last time Kateri Salk presented updates at a Science Panel meeting, she shared information on the literature review. Since then, she has moved onto the modeling portion of the project.
- There are three primary components of the modeling portion of the project:
    - A quantified conceptual model of nitrogen and phosphorus cycles in Utah Lake
    - An external mass balance of CNP for Utah Lake
    - Sedflux modeling of sediment-water fluxes of nutrients and oxygen

CNP BUDGET STUDY – CONCEPTUAL MODEL
Kateri Salk presented the CNP Budget Study conceptual models to the Science Panel. Her comments are summarized below.

- Kateri Salk developed the conceptual model of the nitrogen and phosphorus cycles in Utah Lake using existing knowledge from published studies and reports. The conceptual model is color-coded to show how much confidence there is for values derived directly from reports and studies on Utah Lake. She also marked when she derived values from the literature on other similar lakes but not Utah Lake directly.
- Kateri Salk will circulate the conceptual models. They are close to their final version of the conceptual models, pending any comments from the Science Panel.

Clarifying Questions
Science Panel members asked several clarifying questions about the CNP Budget Study conceptual model. Questions are indicated in italics with corresponding answers in plain text.

From what study did the values on nitrification and denitrification come?
Kateri Salk does not know the exact studies that the values come from on the spot, but she tracked what studies she used for different values in a separate document. She will distribute the tracking document that outlines from what reports and studies the numbers in the conceptual model are coming.

Science Panel Comments
Science Panel members provided comments on the CNP Budget Study conceptual model. Their comments are summarized below.

- The unit of measurement for the nitrogen fixation rate in the water column is in micrograms/liter-hour. The unit for the other rates in the nitrogen conceptual model is tons/year. The unit for the nitrogen fixation rate in the water column should be converted to tons/year to keep the units consistent.

CNP BUDGET STUDY – EXTERNAL MASS BALANCE
Kateri Salk presented the CNP Budget Study external mass balance data. Her comments are summarized below.

External Mass Balance Overview

- For the external mass balance for CNP in Utah Lake, Kateri Salk pulled existing monitoring data from 2015 to 2020. Using the most recent data for the external mass balance creates a more accurate snapshot of Utah Lake's current state.
- The inputs to the external mass balance include:
  - Tributary loads from monitored watersheds
  - Tributary loads from unmonitored watersheds
  - Groundwater loads
  - Atmospheric loads (current values are from Brahney 2019 and the ULWQS Science Panel atmospheric deposition loading recommendation, which are subject to updates as new data comes in)
  - Precipitation for water balance (current values are from the Environmental Fluid Dynamics Code (EFDC)/Water Quality Analysis Program (WASP) output)
- The outputs to the external mass balance include:
  - The Jordan River
  - Evaporation for water balance (current values are from the EFDC/WASP output)
- The focus of today's meeting is on tributary loads in monitored watersheds. The first discussion point for the Science Panel is to consider how to compare and incorporate DWQ and Wasatch Front Water Quality Council (WFWQC) data into the external mass balance. The Science Panel CNP Study Task Group discussed this topic on April 16.
- The second discussion point is how to address discharge monitoring report (DMR) loads versus tributary loads. There are questions on how to address nutrient attenuation downstream if and when it occurs and how to address changing lake levels, particularly when lake levels result in inundated monitoring sites. The Science Panel will discuss the second point at a future meeting.

Utah Lake Monitoring Sites

- DWQ, WFWQC, or the wastewater treatment facilities monitor most of the Utah Lake watersheds. However, there are some unmonitored watersheds, particularly on the western side of the Lake. For these watersheds, Kateri Salk will need to generate load estimates.
- Some monitoring sites are below the Utah Lake compromise elevation.

Utah Lake Monitoring Methodology

- The watersheds around Utah Lake can be divided into three categories:
  - Watersheds without wastewater treatment plants, only monitored by DWQ
  - Watersheds without wastewater treatment plants, monitored by DWQ and WFWQC
  - Watersheds with wastewater treatment plants
- For watersheds without wastewater treatment plants, only monitored by DWQ, Tetra Tech will use DWQ's values directly for the external mass balance.
- For watersheds without wastewater treatment plants, monitored by DWQ and WFWQC, Tetra Tech will compare DWQ and WFWQC data and use one or both of the datasets for the external mass balance.

- For watersheds with wastewater treatment plants, Tetra Tech will compare the DWQ and WFWQC data and address the potential attenuation from wastewater treatment plant loading.
- DWQ and the WFWQC both monitor total phosphorus, total dissolved phosphorus, and total nitrogen. Regarding total nitrogen, WFWQC monitors Total Kjeldahl Nitrogen (TKN), so they will need to add nitrate and nitrite concentrations to their values to get total nitrogen. Additionally, the reporting limit for WFWQC's total nitrogen data is higher than DWQ's reporting limit for total nitrogen.
- Only DWQ measures total dissolved nitrogen, total organic carbon, and dissolved organic carbon.

Utah Lake Monitoring Data

- Kateri Salk plotted DWQ's and WFWQC's total nitrogen and total phosphorus data in relation to flow to compare the two data sets. She plotted the data for both watersheds with wastewater treatment plants and watersheds without wastewater treatment plants. The graphs show that there are three types of watersheds:
    - Watersheds where the DWQ and WFWQC data follow similar distributions
    - Watersheds with a truncated distribution for WFWQC data
    - Watersheds where there are few WFWQC samples
- There is a higher concentration of nutrients in watersheds with wastewater treatment plants, so detection limits are likely not an issue.
- There are monitoring sites below Utah Lake's compromise elevation for some of the watersheds with wastewater treatment plants. As a result, there is limited data from these monitoring sites. These monitoring sites exist in the Powell Slough, Mill Race, and Dry Creek – Spanish Fork Watersheds.

CNP Budget Study Task Group Discussion Takeaways

- The CNP Budget Study Task Group discussed the DWQ and WFWQC monitoring data on April 16. The Science Panel members on the CNP Budget Study Task Group are James Martin, Ryan King, Mike Brett, Mitch Hogsett, and Theron Miller. The key takeaways from that conversation were that:
    - The reporting limit is a challenge for WFWQC samples in watersheds without wastewater treatment plants, particularly for total nitrogen concentrations.
    - The DWQ sampling is more comprehensive for some watersheds.
    - Concentrations and flows are often but not always equivalent, and discrepancies could be a function of bias or limited sampling.
- The preliminary decisions on how to use and incorporate data in the external mass balance were to:
    - Use both DWQ and WFWQC data in the watersheds where they have comparable concentrations and flows (most monitored watersheds)
    - Use DWQ data only in watersheds where total nitrogen concentrations were below the detection limit for the WFWQC method (Provo River, Hobble Creek, and Spanish Fork River Watersheds)
    - Follow up on the data in watersheds with discrepancies between the DWQ and WFWQC data (Lindon Drain and Spanish Fork River Watersheds) before deciding on which data to use
- Another takeaway from that meeting was that when a watershed is missing data, it does not mean there is no flow. When there is missing data, the plan is to interpolate the data to generate a load estimate, either using the nearest neighbor or linear interpolation approach.

- Action items from the CNP Budget Study Task Group meeting are for Theron Miller, WFWQC, to follow up on the WFWQC total nitrogen methodology because they measure TKN. They may need to add nitrate and nitrite values to their TKN measurements to generate total nitrogen. Theron will also provide information on the WFWQC flow methodology and review whether the latitude/longitude coordinates for the WFWQC monitoring sites are accurate, particularly for monitoring sites under the compromise elevation.

Next Steps – Addressing Attenuation

- The next discussion point for the CNP Budget Study Task Group is how to address the attenuation of nutrients. That discussion will involve comparing wastewater treatment plan DMR data to tributary monitoring data.
- There are several different set of circumstances for comparing wastewater treatment plant DMR data and tributary monitoring data:
    - When the wastewater treatment plant is far away from Utah Lake, the tributary data is likely a better representation of the lake load.
    - When the wastewater treatment plant is close to Utah Lake and the tributary site is above the compromise elevation, it might be useful to compare the DMR data and tributary data.
    - When the wastewater treatment plant is close to Utah Lake and the tributary site is below compromise elevation, there will need to be a determination of what constitutes loading "to the lake." There will also need to be an analysis of the transect from the wastewater treatment plant to the downstream site to determine whether attenuation is occurring.

Clarifying Questions

Science Panel members asked several clarifying questions about the CNP Budget Study external mass balance. Questions are indicated in italics with corresponding answers in plain text.

DWQ's phosphorus detection limit is about 20 micrograms/liter, which is fairly high. Why is the phosphorus detection limit so high? Is the high detection limit related to how they construct the calibration curve?

DWQ has had ongoing discussions about detection limits with the state laboratory that processes their samples. Erica Gaddis, DWQ, will distribute the email from the DWQ quality assurance officer with information on the DWQ's phosphorus sampling method to provide more information on the question.

Science Panel Comments

Science Panel members provided comments on the CNP Budget Study external mass balance. Their comments are summarized below.

- Detection limits and reporting limits are two different limits. Detection limits are lower than reporting limits. Reporting limits are a policy decision to multiply the detection limit by some factor to make the data results more definitive.
- The only time total phosphorus concentrations were below the reporting limit was in the watersheds without wastewater treatment plants. When the concentrations are low, the anticipated results are that the loads entering Utah Lake are also small. The result that the total phosphorus loads rarely fall below the reporting limit of 20 micrograms/liter is surprising.

- It would be helpful to have a breakdown of the reporting and detection limits for all the measured constituents and if there have been any major method changes over time. This information will have important implications for the external mass balance.
- Kateri Salk noted the data results when they were above the detection limit and below the reporting limit and when they were under the detection limit. The Water Quality Portal includes the reporting limit for each constituent but may not provide the detection limit.
- According to the dataset underlying the analysis, the detection limit and reporting limit for total phosphorous has been three micrograms/liter over the past five years. The three micrograms/liter detection limit is different than the previously stated 20 micrograms/ liter detection limit. Kateri Salk will review the Water Quality Data Portal to verify the reporting and detection limits for different constituents and develop a breakdown of when samples are below the reporting and detection limits.
- DWQ is currently considering changing the lower reporting limit from three micrograms/liter to 10 micrograms/liter. The state laboratory has achieved a detection limit of three micrograms/liter because they have been running samples twice. More information on DWQ's method and reporting limits is in the email from the DWQ quality assurance officer that Erica Gaddis will distribute.
- In the past five years of data, the detection limit has not changed. The consistency of the detection limit will make it easier to develop a method for reporting non-detects.
- The CNP Budget Study Task Group did not discuss attenuation at their last meeting. Attenuation is an important topic that the Task Group and Science Panel will discuss at a future meeting. WFWQC has made an intentional effort to collect samples in the winter. Theron Miller will review the Water Quality Data Portal to verify that all of the WFWQC data is in the portal, including samples collected in the winter.
- It is better to use micrograms rather than milligrams as a unit of measurement. Science Panel members supported using micrograms over milligrams in the CNP Budget Study.

CNP BUDGET STUDY – SEDFLUX MODEL

Kateri Salk presented an overview of the CNP Budget Study Sedflux model. Her comments are summarized below.

- The external mass balance is about what is coming in and out of Utah Lake. Sedflux is a mechanistic model that calculates the process and flux rates of elements across the sediment-water interface. The model calculates these rates for carbon, nitrogen, phosphorus, and other elements, like oxygen. There is an option to include sediment diagenesis in the model.
- The Sedflux model requires inputting user-supplied data. The model uses data on the water column conditions across time series as input data, the initial sediment conditions at the start of the model run, and rate-specific parameters for reaction networks. For the rate-specific parameters, modelers can use system-specific values or standard numbers.
- The data for the Sedflux model is on 6-hour increments, collected from May to October, from 2017 to 2019. The model inputs included data on dissolved oxygen, temperature, ammonium, nitrate, phosphate, dissolved organic carbon, salinity, and depth. The dissolved oxygen and temperature data are collected from high-frequency buoy data in the main basin (data from 2017-2019) and Provo Bay (data from 2018).
- The modelers collected the ammonium, nitrate, phosphate, and dissolved organic carbon concentration data from routine monitoring. They then averaged the values across different sites and conducted a linear interpolation between sampled dates to develop a time series.
- The modelers set the average salinity at 0.8 practical salinity units and the average depth at 3.26 meters for the main basin and 2.0 meters for Provo Bay.

- The modelers will use the default Sedflux values for the initial sediment conditions except dissolved phosphate in porewater. For dissolved phosphate in porewater, modelers will use 1.48 milligrams/liter for the main basin and 3.85 milligrams/liter for Provo Bay.
- The modelers set the reaction parameters at the default values, except for a handful of parameters derived from Su and von Stackleberg's (2020) EFDC/WASP Report.
- The modelers are missing data on organic matter load to the sediments (also known as the sinking rate). Kateri Salk was able to estimate the organic matter stoichiometry in the conceptual model, so at this point, they are missing data on the total rate of sinking organic matter. With information on the total sinking rate, modelers could use organic matter stoichiometry to estimate the nutrient fluxes.
- To generate estimates for the organic matter load to sediments, they used sinking rate data from a study on Wintergreen Lake at the Kellogg Biological Station. They ran four scenarios using this data:
    - Low sedimentation: the minimum rate of sinking, steady across the time series
    - Medium sedimentation: mean rate of sinking, steady across the time series
    - High sedimentation: the maximum rate of sinking, steady across the time series
    - Seasonal sedimentation: the minimum rate of sinking at the start of the time series, linear increase to the maximum rate by August, and then maintenance of the high rate for the rest of the time series
- The seasonal sedimentation is consistent with the phytoplankton biomass seasonal trends from the Analysis Report.
- Kateri Salk ran the model to look at the initial outputs. The outputs are preliminary, and Kateri Salk will continue to refine the model. The findings for different parameters are below:
    - The sediment oxygen demand rate was variable based on the sedimentation rates. Overall, the sediment oxygen demand peaked from mid-July through August in the main bay, which corresponds to the highest rates of phytoplankton production.
    - The ammonium flux had considerable variability based on the sedimentation rate. Overall, it was a net positive flux, meaning ammonium moved from the sediment to the water column. The ammonium flux peaked from mid-July through August and was comparable between the main basin and Provo Bay.
    - The nitrate flux was to the sediment early and late in the season and to the water column in mid-summer in the main basin. In Provo Bay, the nitrate flux was to the sediment for the entire season.
    - The denitrification rate was not variable based on the sedimentation rate. There was considerable variability across the season and years. Overall, the denitrification rate in Provo Bay was greater than the rate in the main basin.
    - The soluble reactive phosphorus (SRP) flux had considerable variability based on sedimentation. The seasonality of the sedimentation rate was important for the SRP flux. The SRP flux was from the sediment to the water column and was comparable between the main basin and Provo Bay.
- The values from the Sedflux model were compared to the values from Hogsett et al. (2019). The Sedflux rates for sediment oxygen demand and SRP flux were higher than those from Hogsett et al. (2019). The Sedflux rates for the ammonium and nitrate flux were closer to the Hogsett et al. (2019) values.
- The next steps for the Sedflux model are to explore sensitive parameters and initial conditions, such as water column depth, sediment oxygen demand-relevant parameters and inputs, and SRP-relevant parameters and inputs. Another next step is to compare the Sedflux rates with existing data on Utah Lake to help calibrate the model.

Clarifying Questions
Science Panel members asked several clarifying questions about the CNP Budget Study Sedflux model. Questions are indicated in italics with corresponding answers in plain text.

Is it considered double counting to count the ammonium flux and the nitrate flux if the nitrate flux is dependent on the ammonium flux?
In the main basin, the nitrate flux went from the water column to the sediment early and late in the season and from the sediment to the water column in the mid-summer. The nitrate flux went from the water column to the sediment for the entire season in Provo Bay. This dynamic could be explained by denitrification to a certain extent. Nitrification and denitrification rates are included in the model, so it should not be considered double counting.

The nitrate flux from the sediment to the water column in the mid-summer is a surprising result. What is a possible explanation for these results? It may be dependent on the ammonium coming out.
The Hogsett et al. (2019) study found a positive nitrate flux from the sediment to the water column as well. It is a surprising result, but it is a result that Hogsett et al. (2019) observed in the system.

If Utah Lake traps 90% of the incoming phosphorus, doesn't the average net sediment phosphorus flux need to be negative?
The model output was tracking SRP specifically. It was not looking at total phosphorus.

What is the sedimentation rate being used in the model?
The sedimentation rates were directly from the literature. The total organic rate was 1.2-8.3 grams/meter^2/day. This value is divided into nitrogen and phosphorus fractions based on values in the conceptual model. The carbon fraction is estimated from the literature, and the value is 0.3-1.8 grams/meter^2/day.

Does the model include values for particulate organic nitrogen (PON), particulate organic carbon (POC), and particulate organic phosphorus (POP) in the sediments as initial conditions?
The model uses the porewater values. The units needed for the Sedflux model were not comparable to the existing data in Utah Lake.

Did the modelers use total dissolved nitrogen and total nitrogen to develop particulate matter organic concentrations to determine PON fluxes from the water column?
The flux values are not based on the concentrations; it is based on the sinking rates. The total dissolved nitrogen and total nitrogen data provide information on the water column concentrations but not the rate it enters into the sediment.

Science Panel Comments
Science Panel members provided comments on the CNP Budget Study Sedflux model. Their comments are summarized below.

- One thing to explore in the Sedflux model is to see how much initial conditions drive the model output. The modelers should run the model over longer periods to explore this dynamic and see how longer periods impact the flux rates.
- The average water depths in the model look like the depths when Utah Lake is at full level. The modelers are interested in exploring depth as a changing variable to see how depth impacts the different flux rates.
- The ULWQS Paleo Study has data on the sedimentation rate. The sedimentation rate from the Paleo Study could be incorporated into the Sedflux Model. Janice Brahney, Utah State

University, will share the sedimentation rate and composition data from the Paleo Study with Kateri Salk.
- An advantage of using the data from the Paleo Study is it integrates resuspension as well. There is a lot of non-organic resuspension occurring in Utah Lake, so it will be tricky to generate organic matter sinking rates compared to total sedimentation rates. It would be helpful to look at sediment burial efficiency if possible.

Public Questions
Members of the public asked questions on the CNP Budget Study. Questions are indicated in italics with corresponding answers in plain text.

What is the Utah headwater stream impaired versus unimpaired total phosphorus concentration?
The lower threshold is 0.035 milligrams/liter of total phosphorus, and the upper threshold is 0.08 milligrams/liter of total phosphorus. If the concentrations are below the lower level, the stream is considered unimpaired, and if the concentrations are above the upper limit, the stream is considered impaired. If the concentration is between the two levels, DWQ uses response variables to make a biological assessment of impairment.

Can Utah Lake go below 0.035 milligrams/liter?
The Science Panel will be coming up with an answer to this question. There are no pre-determined decisions on the water quality standards of Utah Lake.

Public Discussion
Members of the public and Science Panel members discussed whether Utah Lake could go below the 0.035 milligrams/liter of total phosphorus if unimpaired headwater streams have a total phosphorus concentration up to 0.035 milligrams/liter. Their comments are summarized below.
- The lower threshold of the headwater numeric nutrient criteria for total phosphorus is 0.035 mg/L, and 0.08 mg/L total phosphorus is the upper threshold.
- Headwater streams start at the US Forest Service boundary. The headwater numeric nutrient criteria is a combined criterion that is regional (applies to 7,000 miles of stream), whereas the Utah Lake effort is a site-specific standard. There are currently no nutrient criteria for the tributaries to Utah Lake.
- There is a difference between water quality standards and natural conditions. The standard in the stream is not a natural condition; the standard is meant to be a level where the uses are still protected.
- DWQ is required to protect downstream uses. Lakes can be more sensitive than streams to nutrients. Utah Lake can have numeric nutrient criteria that are different than the numeric nutrient criteria for the tributaries. This is not to say that the standards will be different, but it is possible
- It will be difficult to achieve a concentration lower than 0.035 milligrams/liter of total phosphorus if 0.035 milligrams/liter of total phosphorus is a supporting concentration in the tributary without significant in-lake treatments. It is a question of achievability and implementation.
- Under the Clean Water Act, the downstream most sensitive water body drives water quality standards. The Science Panel is analyzing Utah Lake irrespective of the upstream tributaries.
- The Florida rulemaking response to comments includes a discussion on how stream water quality criteria relate to lake water quality criteria. More information on the discussion can be found on page 110 in the technical report at this link.

- The ULWQS Steering Committee will talk about feasibility during Phase 3 of the ULWQS.

OTHER STUDY UPDATES

Scott Daly, DWQ, provided updates on other Science Panel studies. His comments are summarized below.

- The Bioassay Study Task Group met with Zach Aanderud, BYU, to provide the last round of comments to the study. Zach is addressing a couple of minor issues in the report and is developing a one-page factsheet to accompany the report. Scott Daly will distribute the factsheet and report to the Science Panel once it is finished.
- The P-Binding Study Task Group is meeting on April 22. They will start discussing the literature review and sampling analysis plan for the study.
- DWQ is looking for a vehicle to accomplish the work of the Littoral Sediment Study. There should be more to report on the study soon.
- The request for proposals for the lake and watershed models is closing on Friday, April 23. Scott Daly will reach out to the independent Science members soon to participate in the proposal evaluation.
- The Timpanogos Special Service District (TSSD) deployed the mesocosm for their Mesocosm Study last week. The Science Panel will be reviewing the workplan for that Study soon.
- Mike Paul and Kateri Salk, from Tetra Tech, are putting together a framework document for combining information and generating numbers that will lead to developing the numeric nutrient criteria. They are re-drafting that document and will distribute that document to the ULWQS Steering Committee once it is ready.
- Over the next couple of months, the Science Panel will assess the available information and data to respond to the charge questions. Their answers will serve as an interim report on where things stand with the charge questions.

Public Comments

Members of the public provided comments. Their comments are summarized below.

- The Science Panel is making great progress. The Science Panel should not lose sight of the impacts that creating a reservoir on Utah Lake and installing a pump house at the outlet has had on Utah Lake. Dr. Brahney's work may help understand the impacts.

NEXT STEPS

- Before the next Science Panel meeting, Kateri Salk will meet with the CNP Study Task Group to make decisions related to the external mass balance. They will also follow up on the Sedflux model. Kateri Salk will provide a full update to the Science Panel at the next meeting.
- A master student finished the next phase of the Atmospheric Deposition Study. Theron Miller is synthesizing that dataset. Sometime over the next couple of months, Theron Miller will present the atmospheric deposition results to the Science Panel.
- Science Panel members indicated through a poll that they support continuing with the task groups to process and provide input on individual studies.
- Samuel Wallace will send out a Doodle to schedule the next Science Panel meeting.