



ULWQS Science Panel Atmospheric Deposition Results

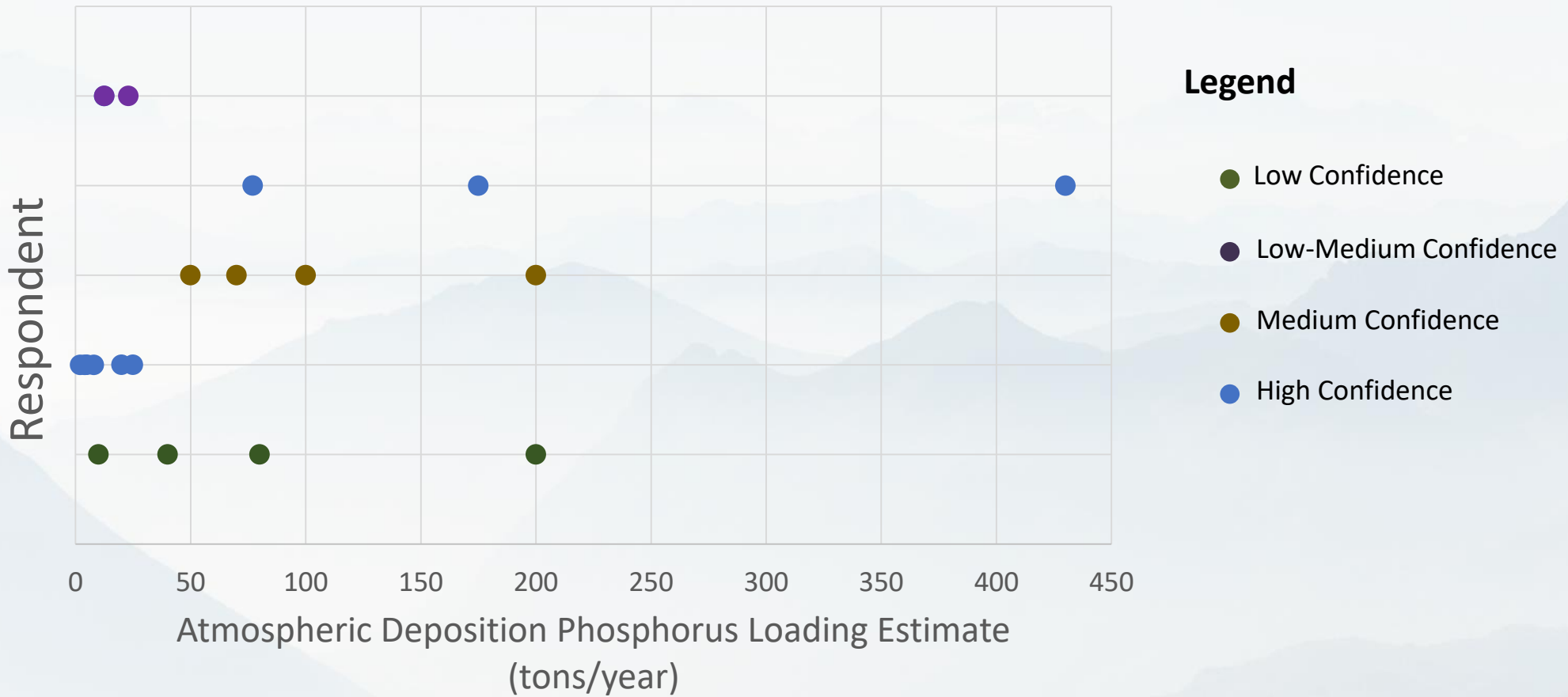
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Science Panel Atmospheric Deposition Survey Results



ULWQS Science Panel Atmospheric Deposition Phosphorus Loading Estimates



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Low AD P (Tons/Year)	Best AD P (Tons/Year)	High AD P (Tons/Year)
50-70	50-100	200
2-4	5-8	20-25
10	40-80	200
77	175	430
12.5	12.5	23

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Science Panel Comments

- Dust and regional fires are episodic. Wetter years will have low deposition rates, so it is important to have these years as brackets. Although wetter years may become less frequent, it is important to have historical context.
- For context, two tons/year translates to 8 mg/m²/year and four to 16 mg/m²/year. The Sierra Nevadas (Spain) near the Sahara Desert, the largest dust source in the world, and receive about 16 mg/m²/year of phosphorus. Two tons/year is also greater than deposition rates near an open pit phosphorus mine (Munroe 2014, Munroe et al. 2020, Munroe et al. 2015)
- 25 tons is similar to the highest average recorded phosphorus deposition in areas that receive intense ash deposition (which can be 50x more enriched in phosphorus compared to vegetation). 25 tons/year translates to 105 mg/m²/year, which is orders of magnitude higher than the global mean of 60 mg/m²/year.
- The WFWQC study's estimate is conservative based on their bulk sampling methods, collection of substantial data from Bird Island, and because they lost their important sampler near the gravel pit after 2017.

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Science Panel Comments

- The method used by Brahney (2019) for interpolating phosphorus fluxes across Utah Lake using a decay equation may underestimate phosphorus deposition.
- The high atmospheric deposition values are attributed to local dust sources, which are given too much weight in the studies by Miller, Miller, and Williams. The loads in the middle of the lake are likely lower than the edges of the lake. Some decay equation should be used, but maybe not such an aggressive decay equation as was used by Brahney (2019).
- The sheer number of samples collected by Wood Miller suggests a low annual phosphorus atmospheric loading estimate of 77 tons/year.
- Forty samples from 2017 near the active gravel pit indicate a high annual phosphorus atmospheric loading estimate of 430 tons/year.

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Science Panel Comments

- It is more useful to discuss flux before calculating the load since both are important measures.
 - A shoreline flux of 60 mg-TP/year appears to be a baseline flux as measured by the ULWQS. This flux translates to a max load of 12.5 tonnes TP/year at compromise level assuming 50% of the shoreline flux across the lake.

Additional Questions

- What is the speciation of total phosphorus?
- What is the total suspended solids, volatile suspended solids, and fixed suspended solids in the bulk samples?
- How do Utah Lake fluxes measured by Wasatch Front Water Quality Council compare to other studies?