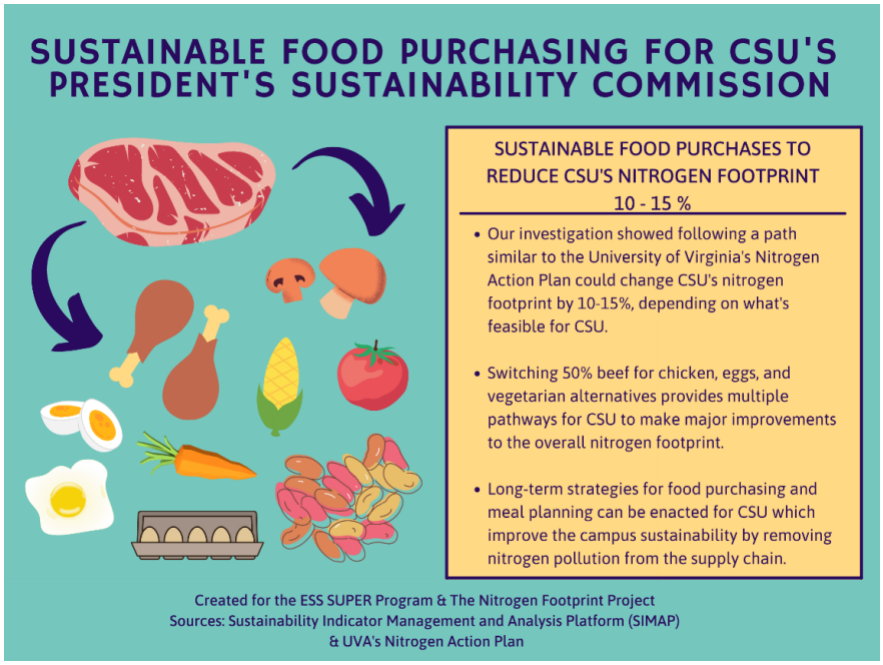
The Importance of Nitrogen Footprints

By Megan Pierson

Nitrogen pollution, despite wide reaching and severe environmental and health effects, does not receive anywhere near the same attention as carbon pollution. Carbon neutrality and footprint reduction is at the center of conversations on sustainability, where nitrogen is often absent. Unlike carbon, nitrogen neutrality is not possible in the same way. Nitrogen can be reduced by reducing the burning of fossil fuels, but nitrogen fertilizers are so important in agriculture all the food we consume has a footprint attached, especially with meat products. In our current food system, nitrogen pollution is unavoidable, but its consequences, such as aquatic dead zones, smog, and contaminated groundwater, cannot be ignored. This creates a uniquely challenging problem of trying to find the right balance between reducing nitrogen pollution and finding nitrogen offsets, without the same level of attention and concern that is extended to carbon reduction strategies.

One important and emerging tool to quantify nitrogen pollution and raise awareness is the nitrogen footprint. I am extremely proud to have worked on CSU's nitrogen footprint team for 2020. Nitrogen footprints estimate the total reactive nitrogen released into the environment within the bounds of a system. Nitrogen footprint calculations are relatively new, with its development and implementations only occurring in the last decade or so. Having figures to show the complete scope of emissions a great way to highlight areas of potential reduction. When all sources of pollution are compiled, it is easy to see which areas contribute the most, which is where reduction efforts should be based. Footprint data can be used to simulate how reactive nitrogen emissions would grow within a system, and how they would change if reduction strategies were implemented. These results and figures give validity to reduction



strategies and recommendations. Having actual, tangible figures is invaluable when discussing the future of reactive nitrogen management.

Figure 1. Infographic displaying potential reduction strategies for the CSU Nitrogen Footprint.

It may be easy to dismiss the effects of nitrogen until you can see exactly how much your institution is responsible for. Seeing nitrogen pollution quantified in definite terms with a footprint is a great motivating factor for change and a way to raise awareness. Footprints require people to create, and everyone involved gains a new conscientiousness about the effects of nitrogen. Results are easily summarized, and easy to distribute in quick infographics, like the ones another member of my team, Cody Sanford, created (Figure 1).

When creating the nitrogen footprint for 2020 at CSU, I worked mainly with the food footprint estimations, putting many hours of work into spreadsheets quantifying and categorizing different food purchases. This is where CSU plans to focus their reduction efforts since it is the source of 45% of the footprint (Figure 2). This footprint was only the third one of its type, and though it was not a normal year due to the shutdown, it contributed to a baseline of what is normal for CSU and understanding what kind of variability is expected year to year. This work has allowed us to develop and propose clear reduction strategies, and raise awareness of the importance of nitrogen pollution considerations.

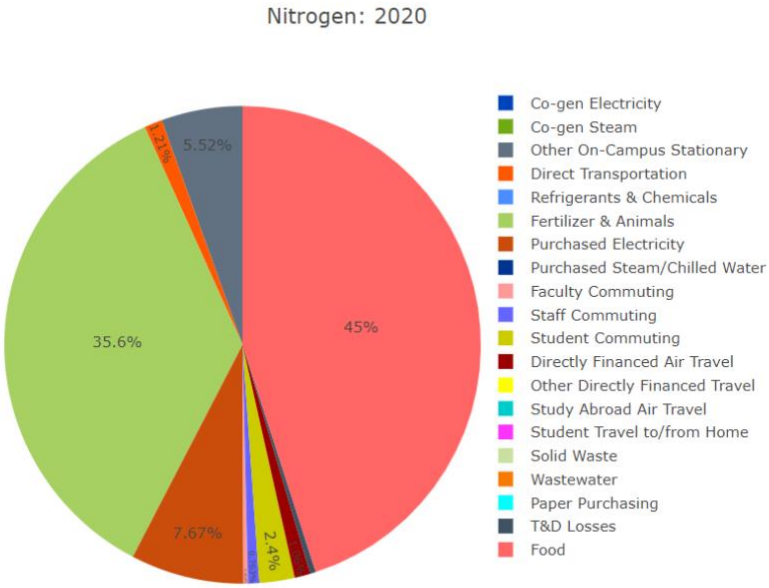


Figure 2. 2020 nitrogen footprint by category. SIMAP, 2021