Appendix C. Other Sources of Nitrogen Influx to the Salish Sea

Flux of ammonium-nitrogen from sediments

Sediment ammonium-N fluxes (Jnh4) for 2006, 2008, and 2014 were generally similar in magnitude throughout the Salish Sea, with some areas exhibiting slightly higher fluxes in 2006, as shown in Figure C1.

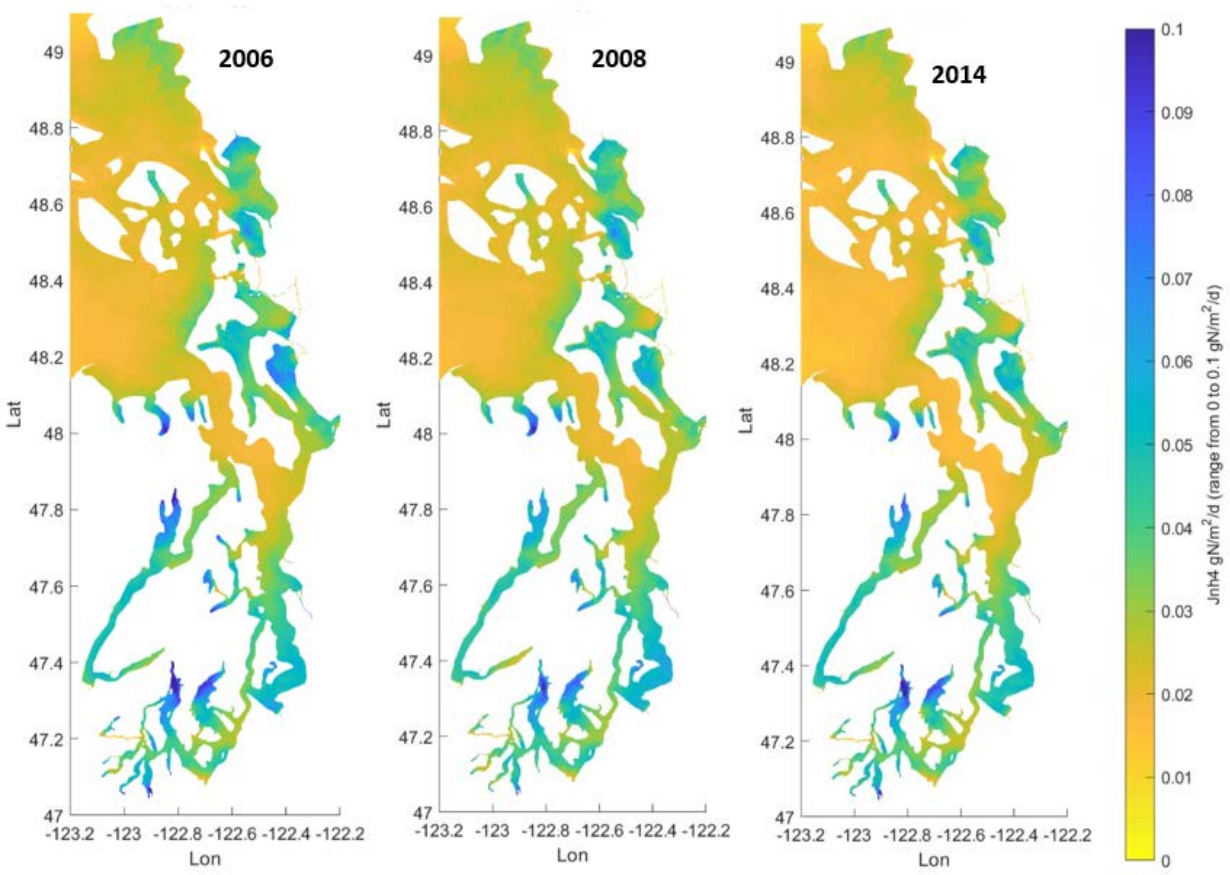

Figure C1. Sediment Flux for 2006, 2008 and 2014.

Atmospheric Deposition

Model inputs from the Puget Sound watersheds, derived from regressions based on observations, inherently include atmospheric deposition into those watersheds. The atmospheric nitrogen load that is deposited directly into Salish Sea waters has not yet been incorporated into the SSM runs reported here. Direct loading into Salish Sea wasters is estimated to be a much smaller portion of the load than deposition onto terrestrial surfaces and delivered to the estuary via runoff. Here we provide context to regional atmospheric deposition loadings used in the model, their data sources, and the relative contributions from deposition to land and water surfaces.

Observational data for atmospheric deposition is available via the National Atmospheric Deposition Program (NADP). The National Trends Network provides a long-term record of

acids and nutrients in precipitation. NADP publishes total nitrogen deposition (both wet and dry) annual maps (Figure C2) based on measured air concentrations, wet deposition data, and modeled deposition velocity and dry deposition data using the Community Multiscale Air Quality (CMAQ) model. Figure 6 illustrates total deposition of nitrogen throughout the United States for the year 2008 (NADP, 2018). Note that the western United States experiences generally lower nitrogen deposition rates than the eastern half of the nation. Urban corridors experience higher rates than surrounding areas, as is the case with the Puget Sound lowlands, experiencing around 7 kg-N/ha per year. Deposition on the Puget Sound waters is not shown in the NADP maps.

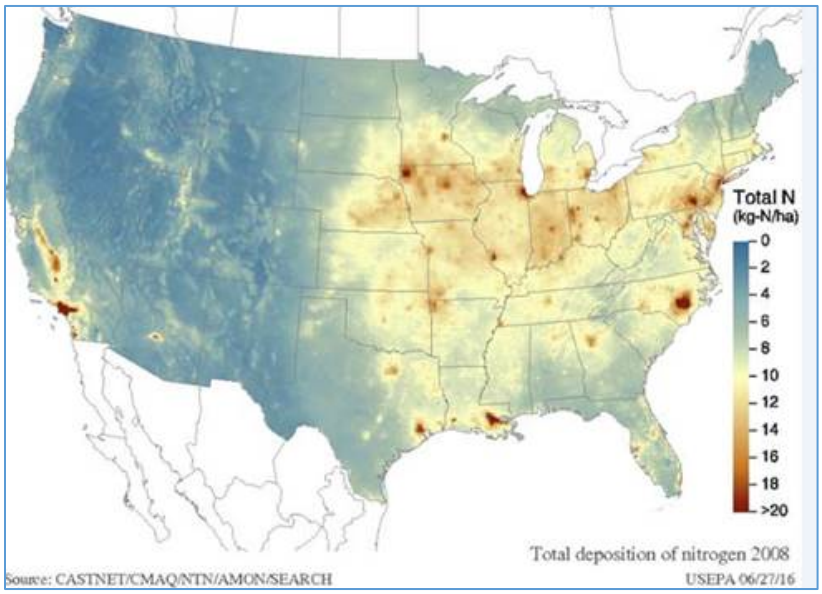

Figure C2. Total deposition of nitrogen in 2008 (NADP, 2018).

At the regional level, the Air Quality Forecasting for the Pacific Northwest (AIRPACT) provides atmospheric deposition data at a finer resolution (4 km). These regional estimates (AIRPACT, 2018) reveal a large difference in predicted deposition rates over Puget Sound lowlands (approximately 7 kg/ha/yr) and over the Puget Sound waters (1 kg/ha/yr). Future work will aim to incorporate the latter deposition over surface waters of the Salish Sea.