

# A new model determines freshwater and dissolved organic carbon discharge to the Gulf of Alaska

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Amid ongoing climate change, understanding how and where carbon is moving across ecosystems has become a top research priority. This type of "carbon accounting" helps scientists determine where the planet is sequestering and releasing atmosphere-warming carbon compounds and

is especially important at the boundaries between different ecosystems.

In a new study, Edwards et al. investigate how rivers in western Canada and southeast Alaska transport dissolved [organic carbon](#) and fresh water into the Gulf of Alaska. The study region, which spans from northern British Columbia to the southwestern corner of the Yukon Territory, represents an incredibly complex confluence of glaciers, forests, mountains, and plateaus with river systems that drain into bays, fjords, and channels before reaching the Pacific Ocean.

To build the model of carbon flux, the researchers combined a [digital elevation model](#) with estimated shapes of watershed boundaries and glacier extents as well as gridded data representing mean monthly runoff. To calculate the total amount of freshwater runoff, they used a distributed climate water balance model calibrated with measurements taken from watersheds in the study area.

The team calculated that overall, the region exports 430 cubic kilometers of [fresh water](#) and 1.17 teragrams of dissolved organic carbon annually to the Pacific Ocean. Their model shows that watershed type, location, and [flow rate](#) are important variables that control the spatial and temporal patterns of carbon flux. The scientists say that despite the region's immense size and importance for both commercial fishing and climate, the Gulf of Alaska has been chronically understudied compared with other sections of the North American coastline. The new results highlight the significance of the region and provide a starting point for unraveling the complexity of the dynamic ecosystems and their effect on climate and humanity.

**More information:** Rick T. Edwards et al. Riverine Dissolved Organic Carbon and Freshwater Export in the Eastern Gulf of Alaska, *Journal of Geophysical Research: Biogeosciences* (2020). [DOI: 10.1029/2020JG005725](#)

David Shultz. Determining Dissolved Organic Carbon Flows into the Gulf of Alaska, *Eos* (2021). [DOI: 10.1029/2021EO153233](https://doi.org/10.1029/2021EO153233)

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