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Salish Sea Ecosystem Conference

2018 Salish Sea Ecosystem Conference
(Seattle, Wash.)

Apr 6th, 8:45 AM - 9:00 AM

Influence of sedimentary biogeochemistry on oxygen consumption and nutrient cycling in Bellingham Bay, Washington

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Merritt, Everitt G. and Shull, David, "Influence of sedimentary biogeochemistry on oxygen consumption and nutrient cycling in Bellingham Bay, Washington" (2018). *Salish Sea Ecosystem Conference*. 443. <https://cedar.wwu.edu/ssec/2018ssec/allsessions/443>

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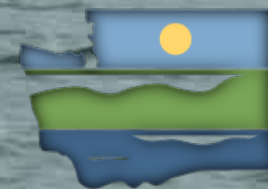
The influence of sedimentary biogeochemistry on oxygen and nutrient cycling in Bellingham Bay, Washington

Everitt G. Merritt

David H. Shull



Shannon Point
Marine Center

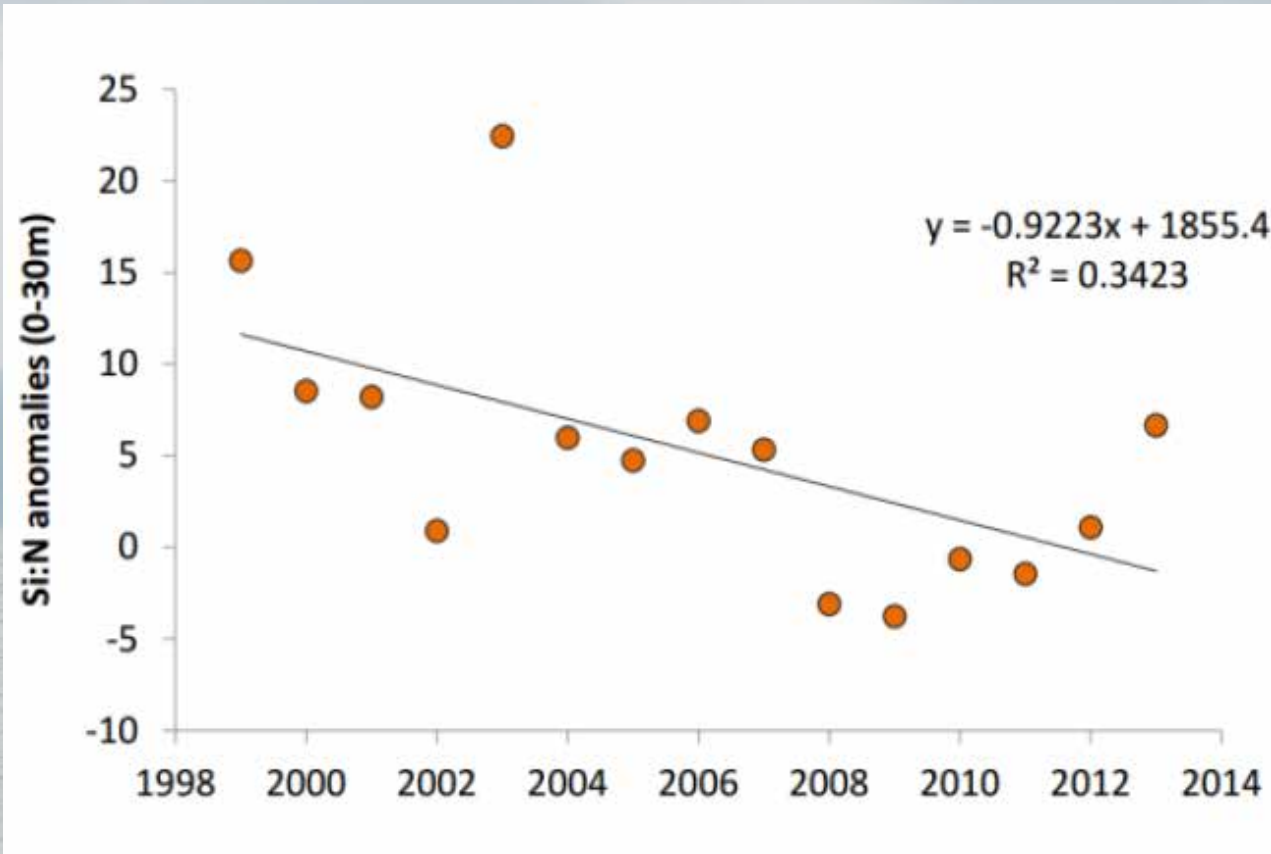


DEPARTMENT OF
ECOLOGY
State of Washington



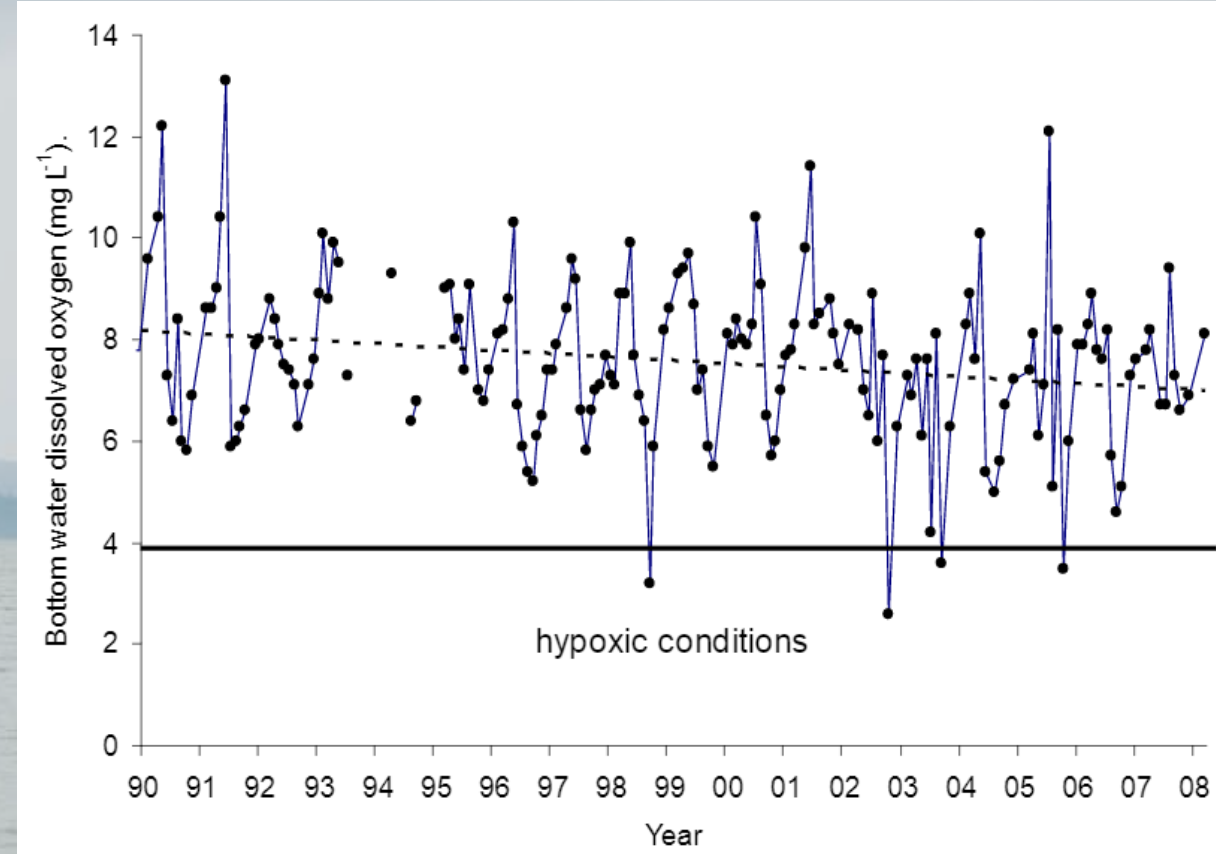
Increasing hypoxia and nitrogen concentration in the water column.

Puget Sound



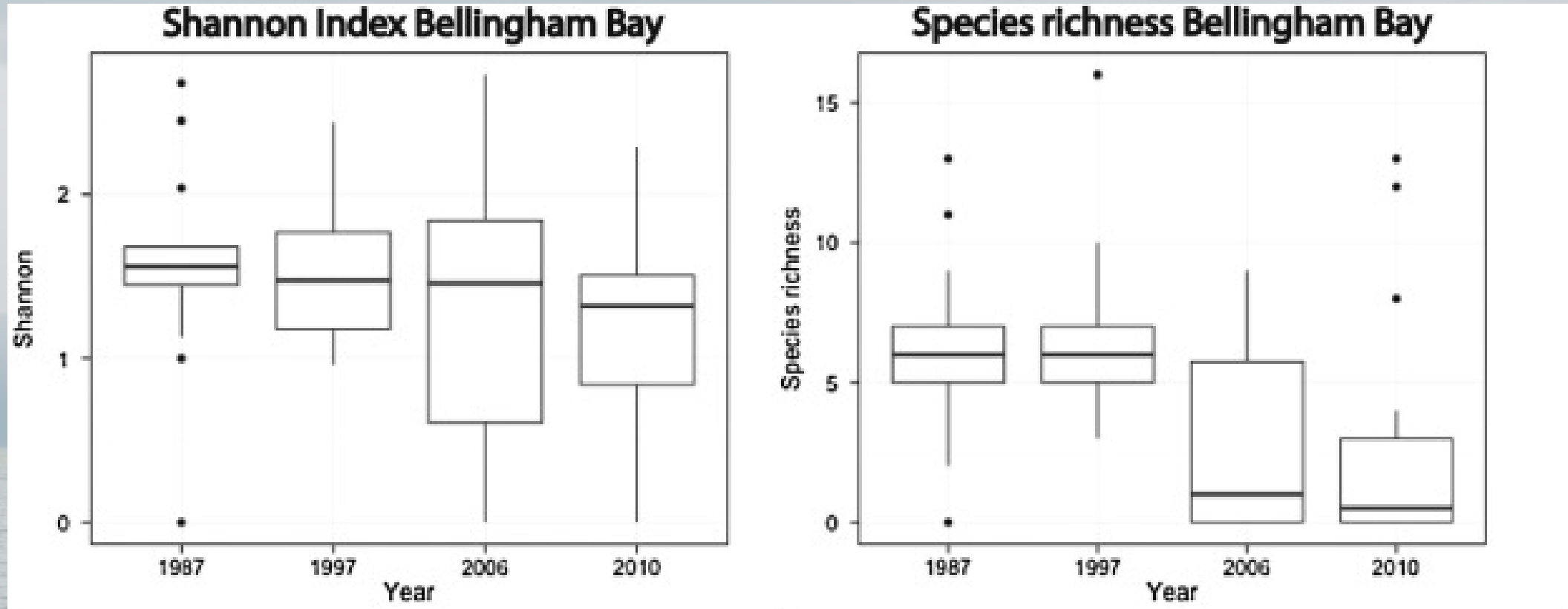
Krembs et al. 2014

Bellingham Bay



WSDE

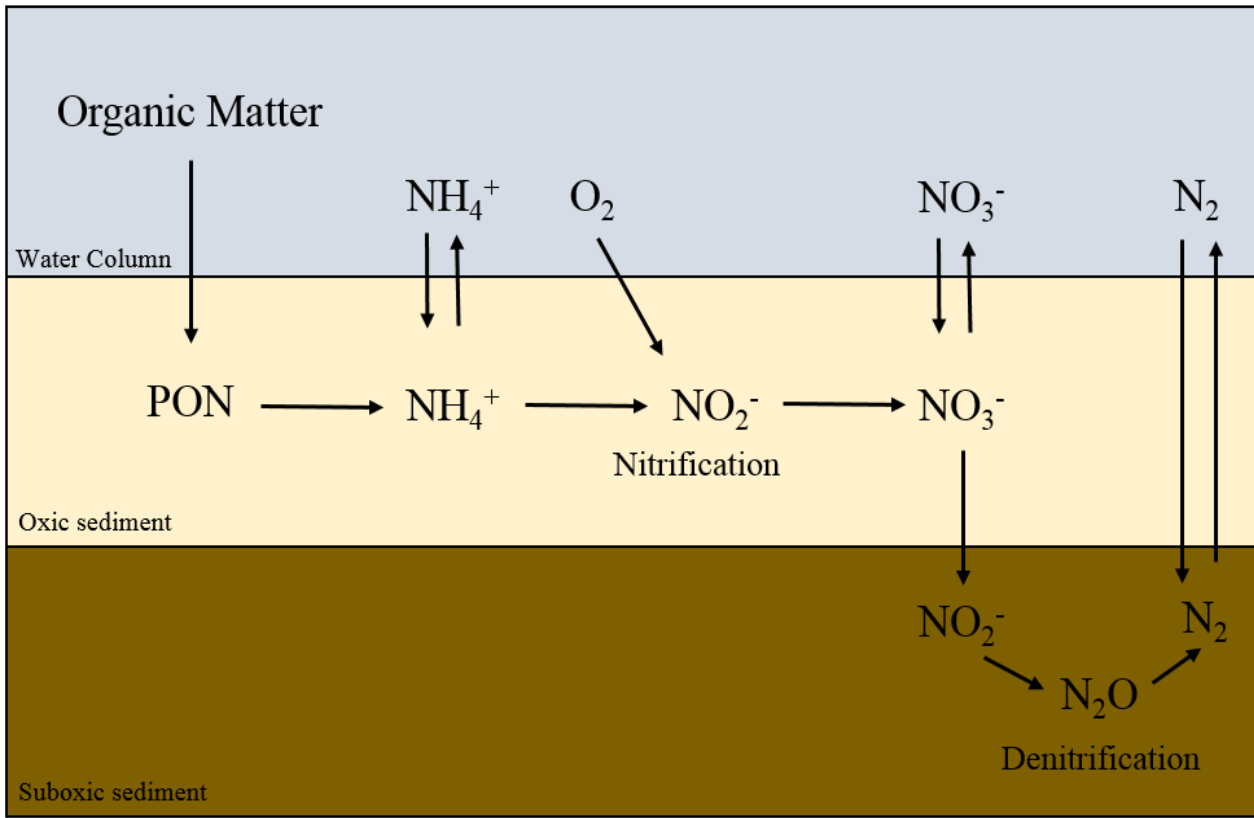
Decreasing habitat quality and foraminifera richness.



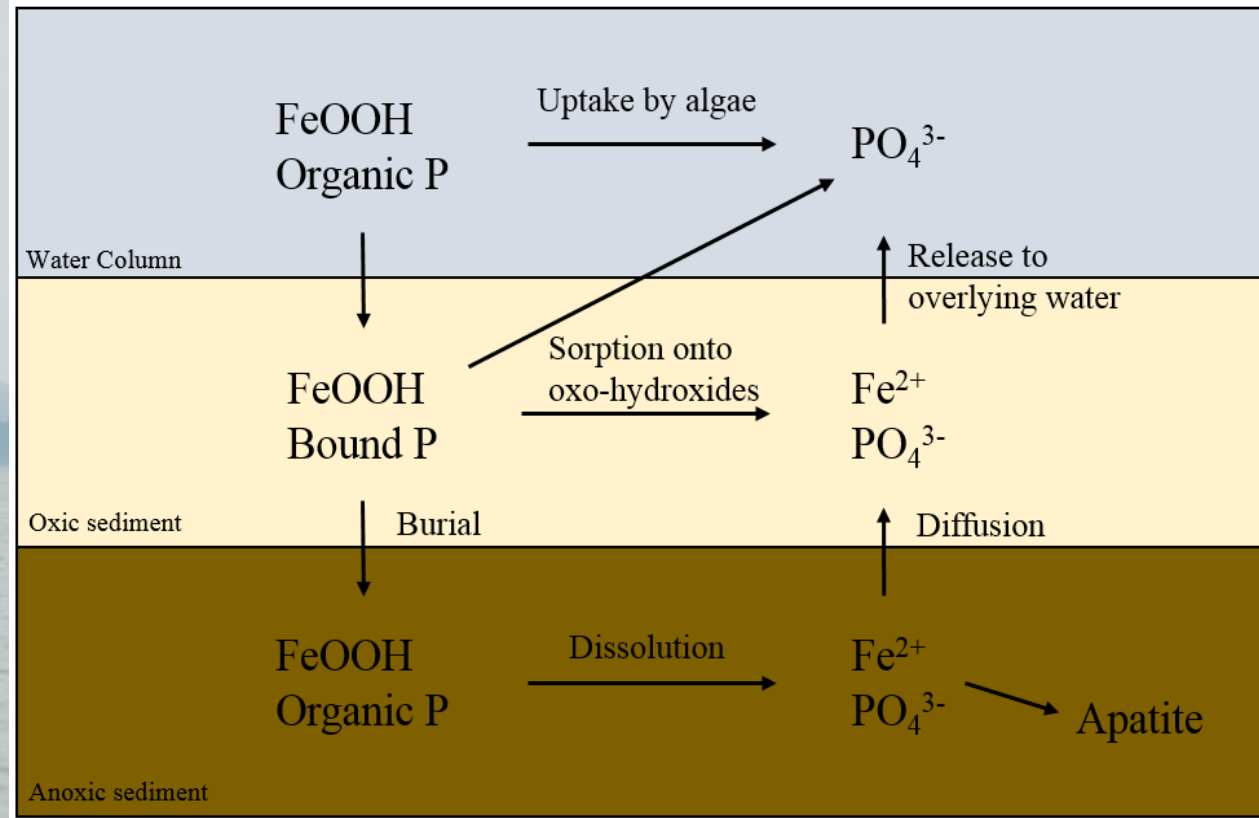
Nesbitt et al. 2015

Sediment acts as a recycling center.

Nitrogen cycling

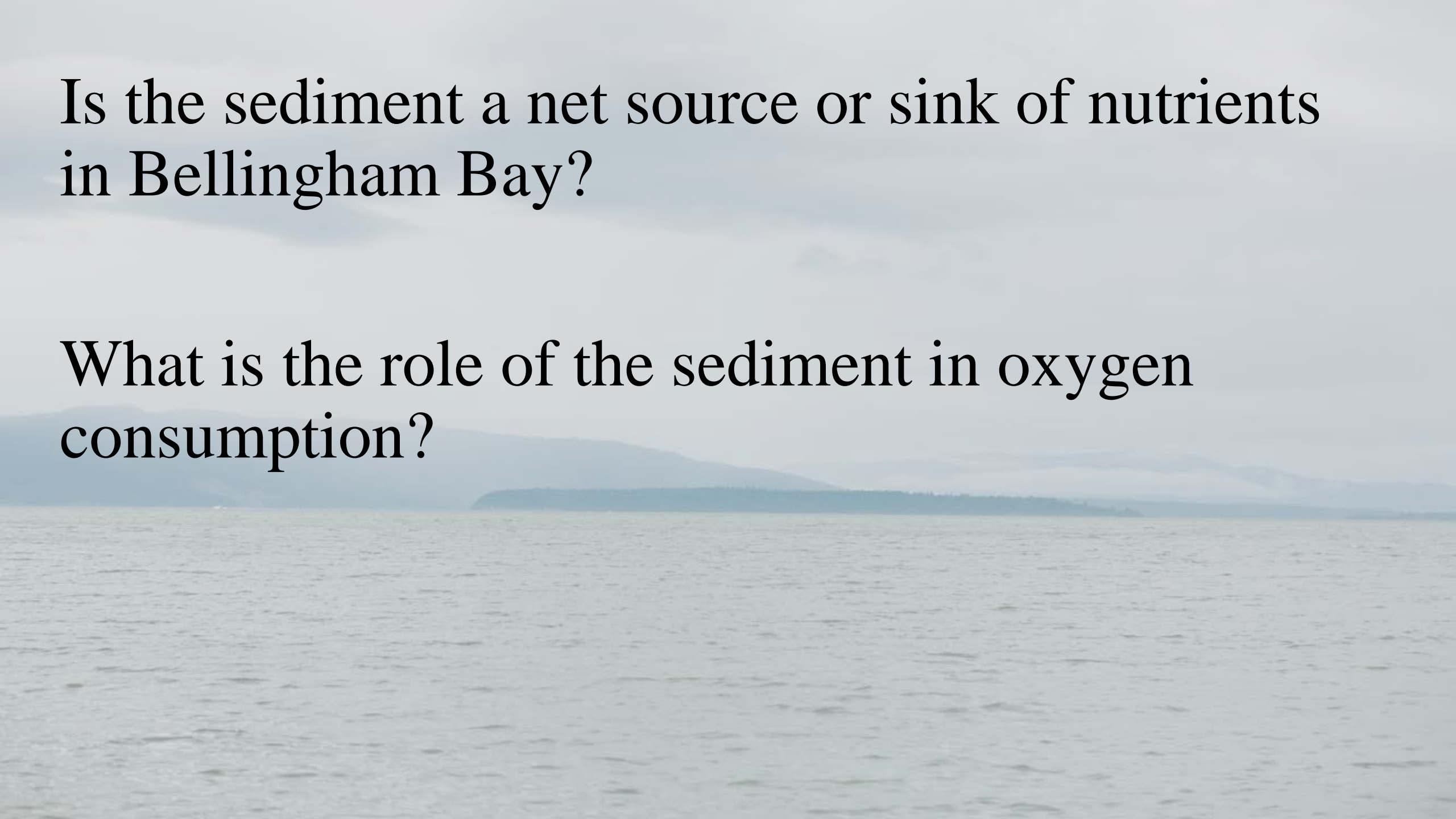


Phosphorous cycling



Is the sediment a net source or sink of nutrients
in Bellingham Bay?

What is the role of the sediment in oxygen
consumption?





Calculating nutrient and oxygen flux.

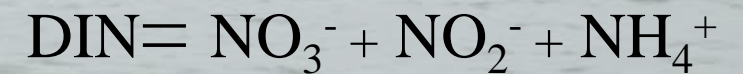


$$\frac{dc}{dt} * h = \text{Flux (mmol} \cdot \text{m}^{-2} \cdot \text{d}^{-1}\text{)}$$

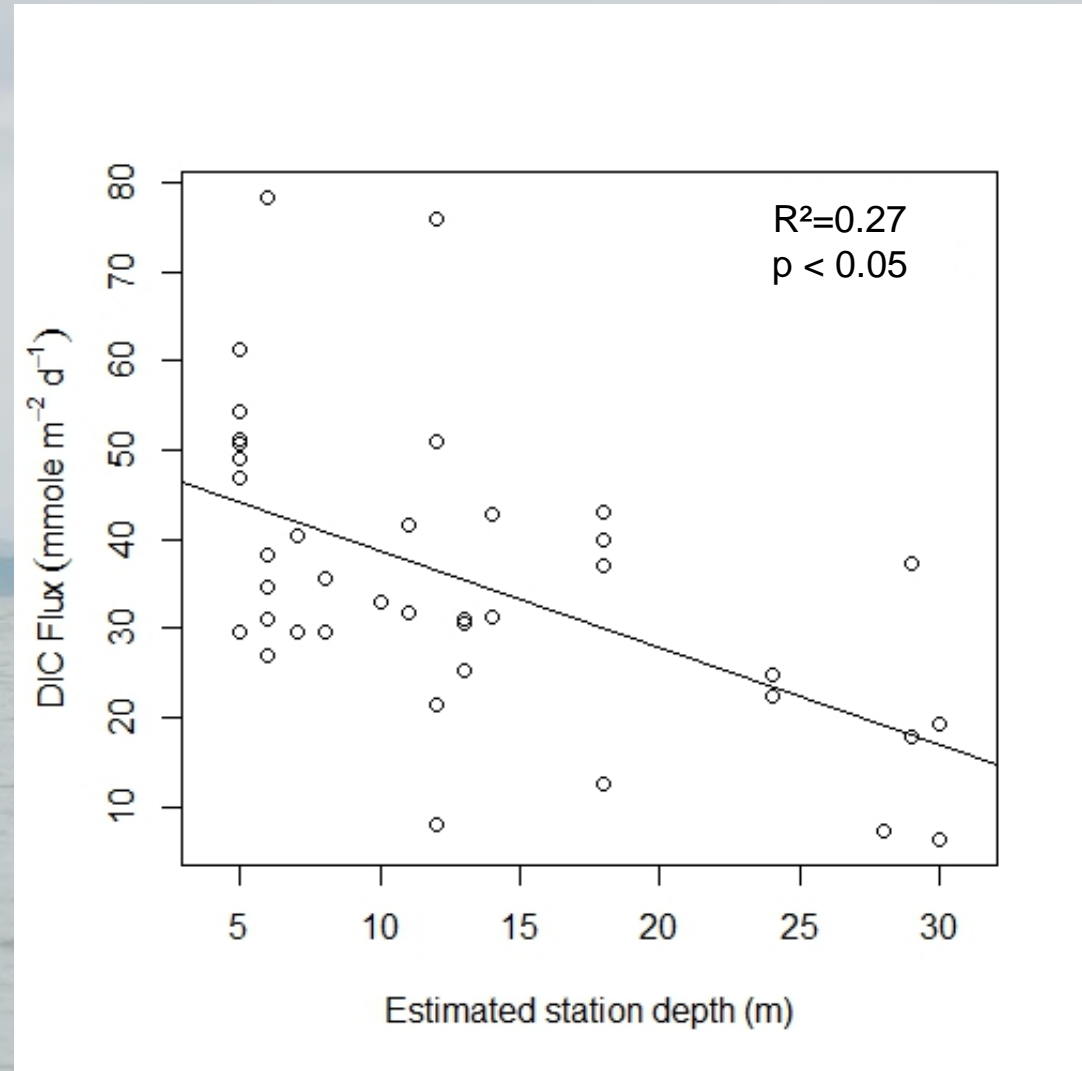
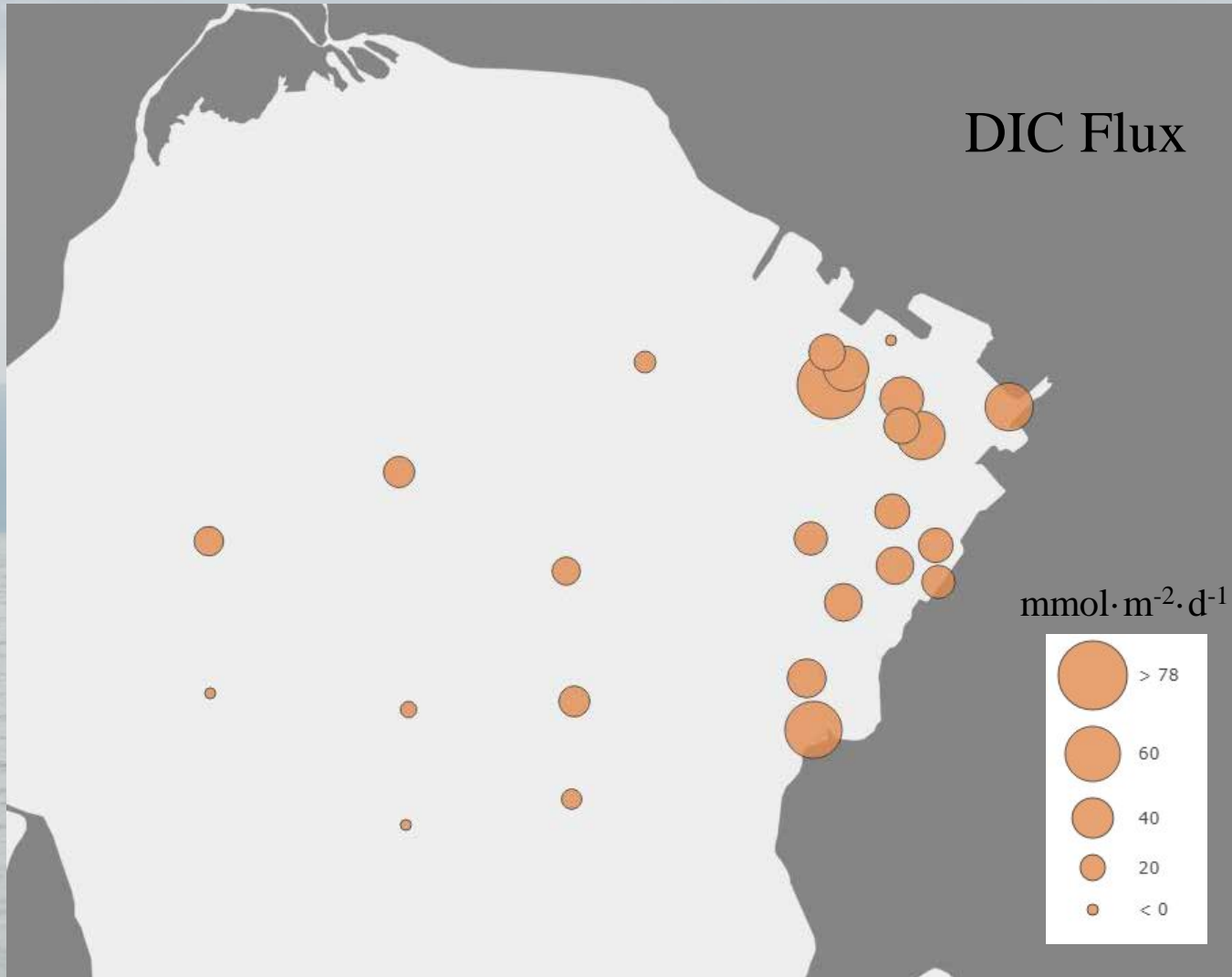
c= nutrient concentration

t= time

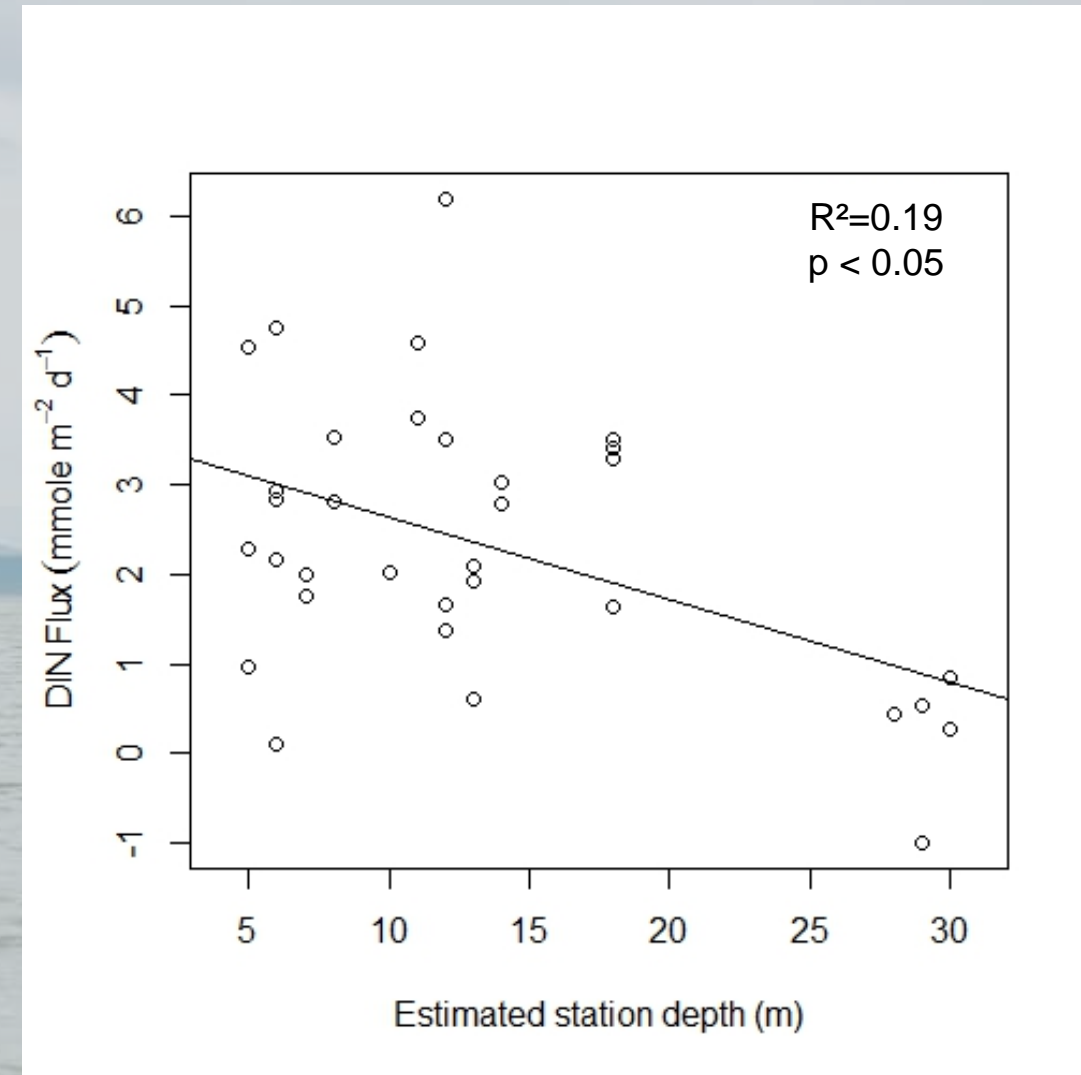
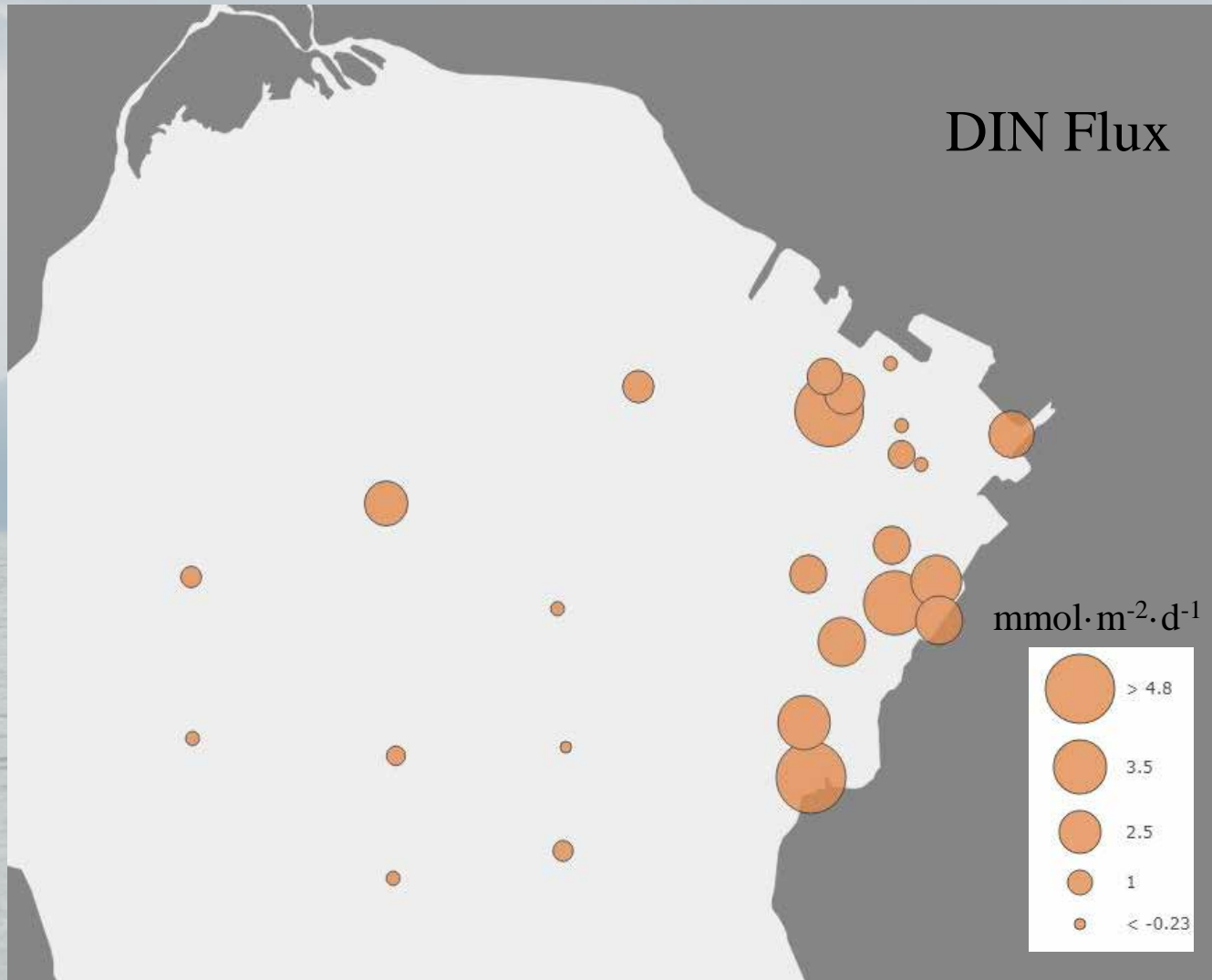
h= height of overlying water



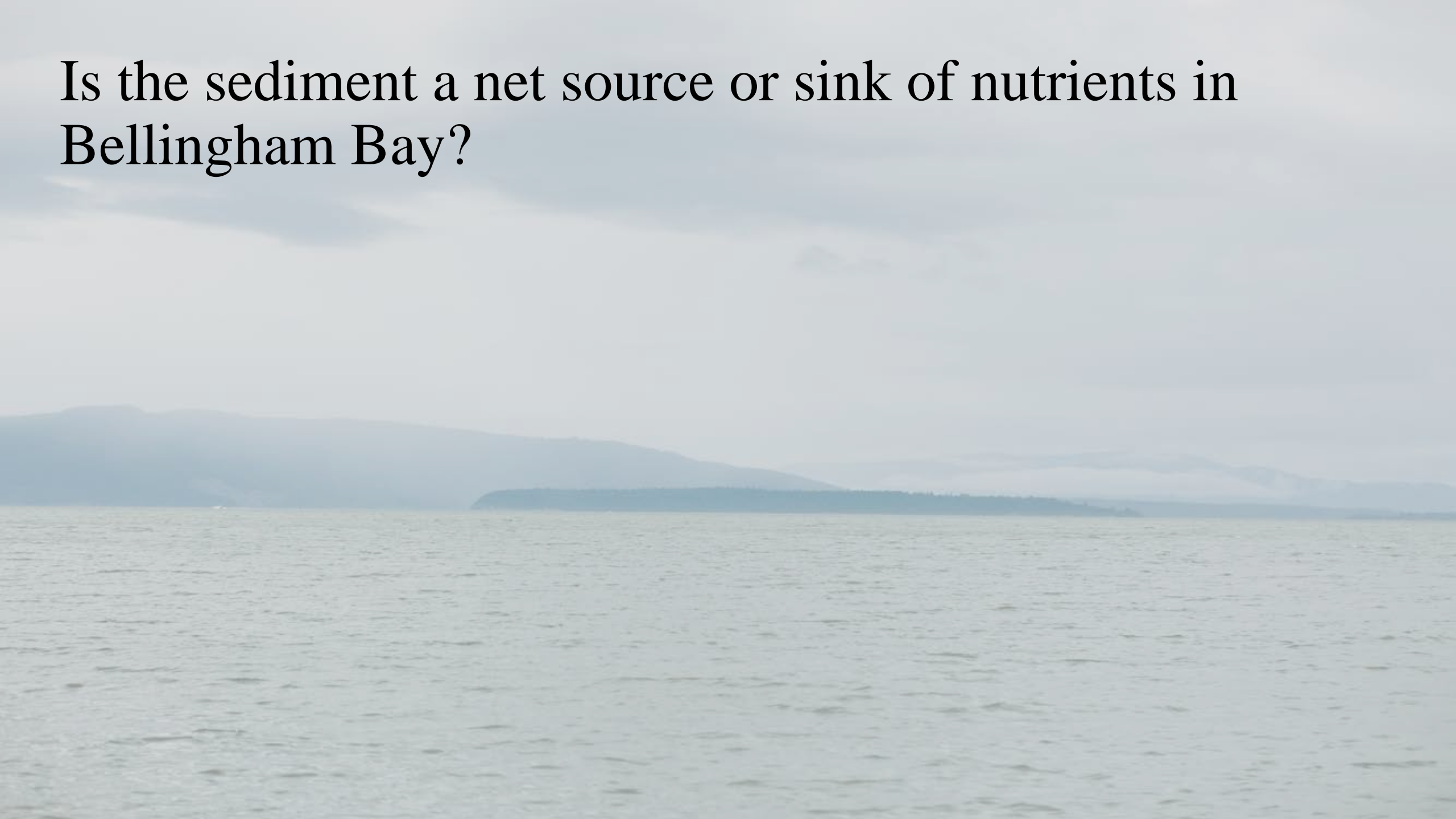
DIC flux decreases with depth.



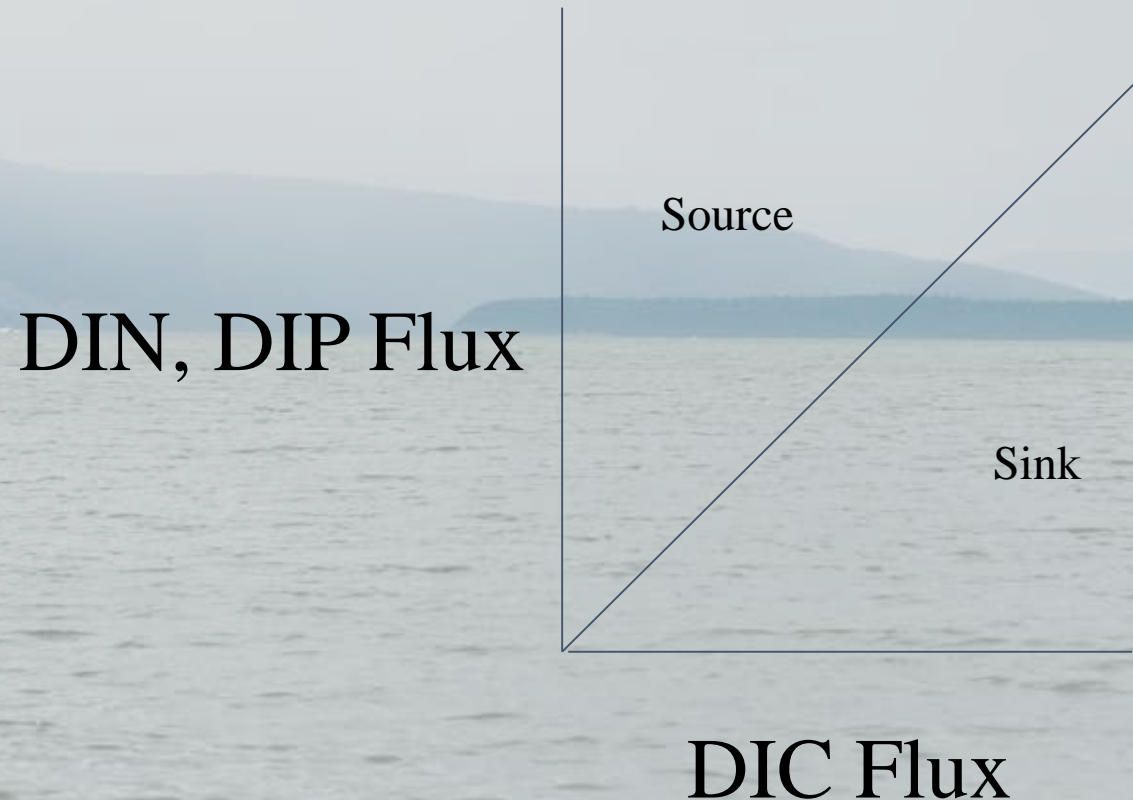
DIN flux decreases with depth.



Is the sediment a net source or sink of nutrients in Bellingham Bay?



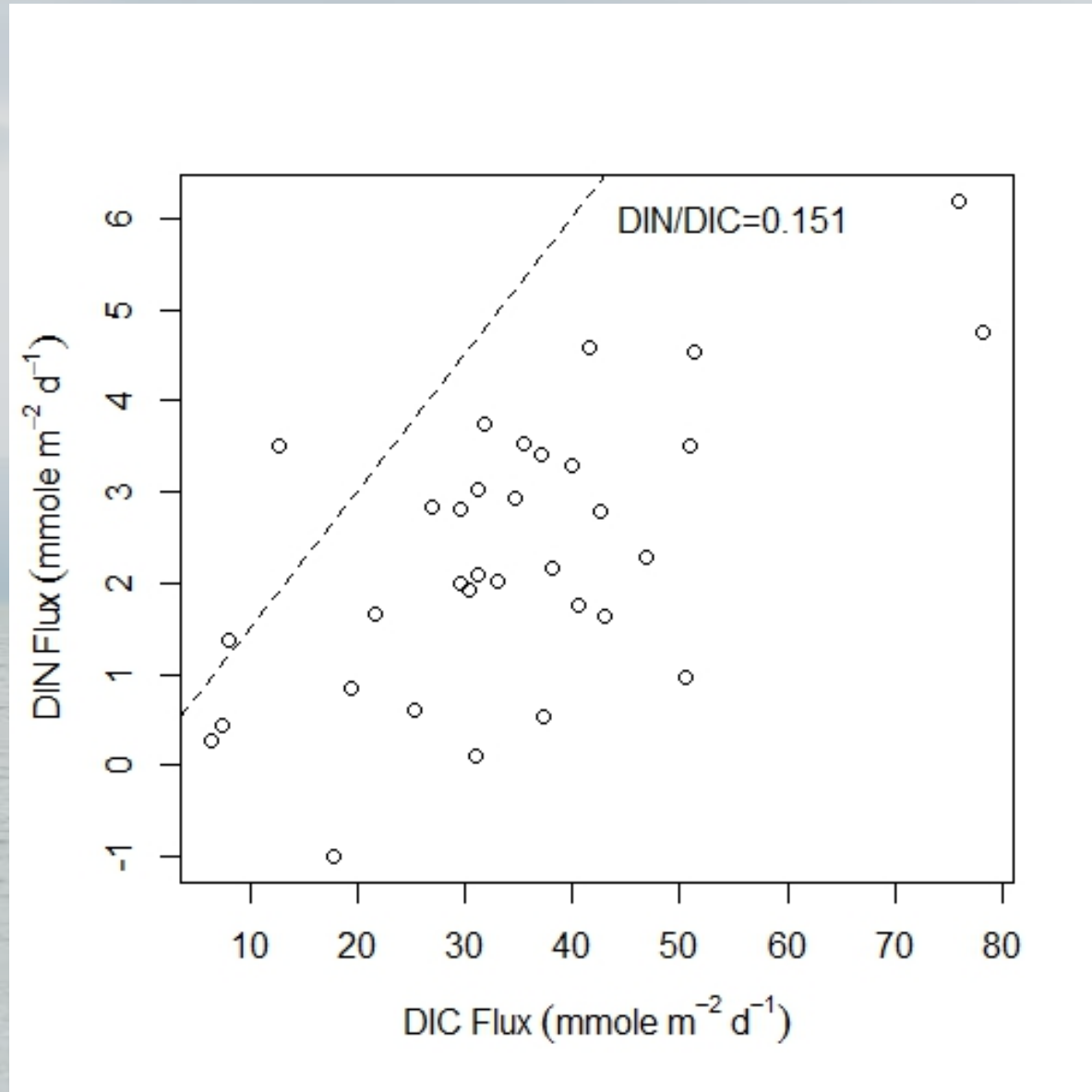
Is the sediment a net source or sink of nutrients in Bellingham Bay?



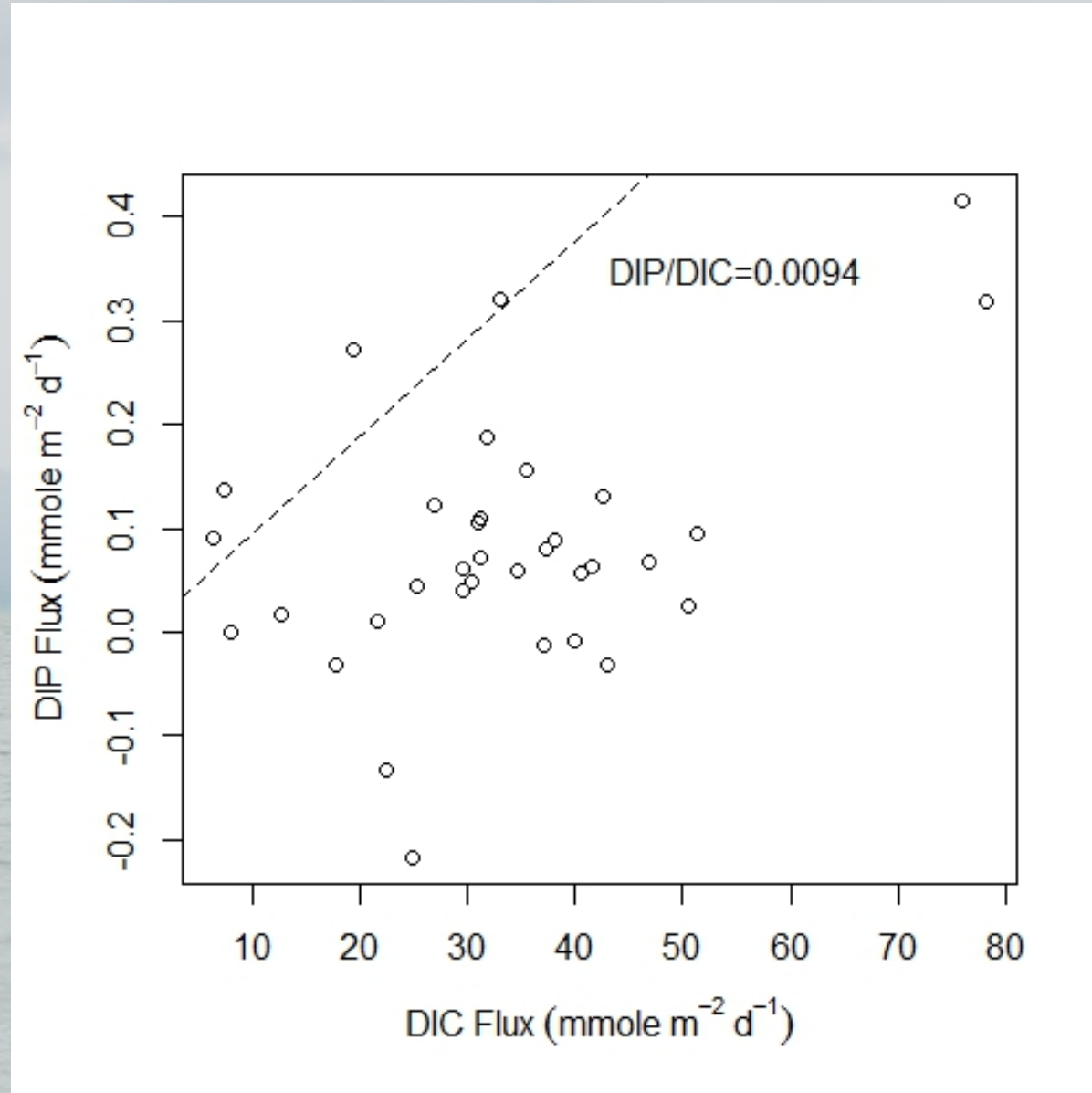
Redfield Ratio

C : N : P
106 : 16 : 1

Sediment is a net sink of nitrogen in Bellingham Bay.



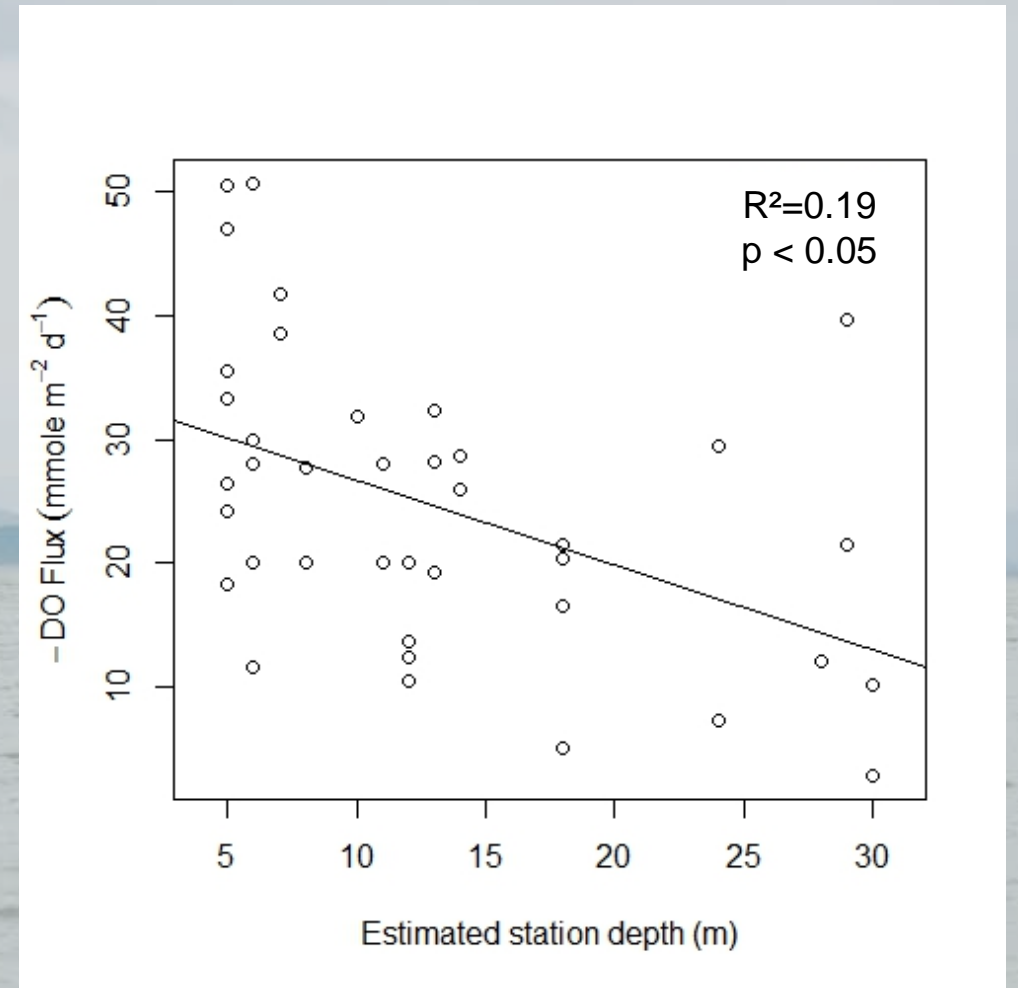
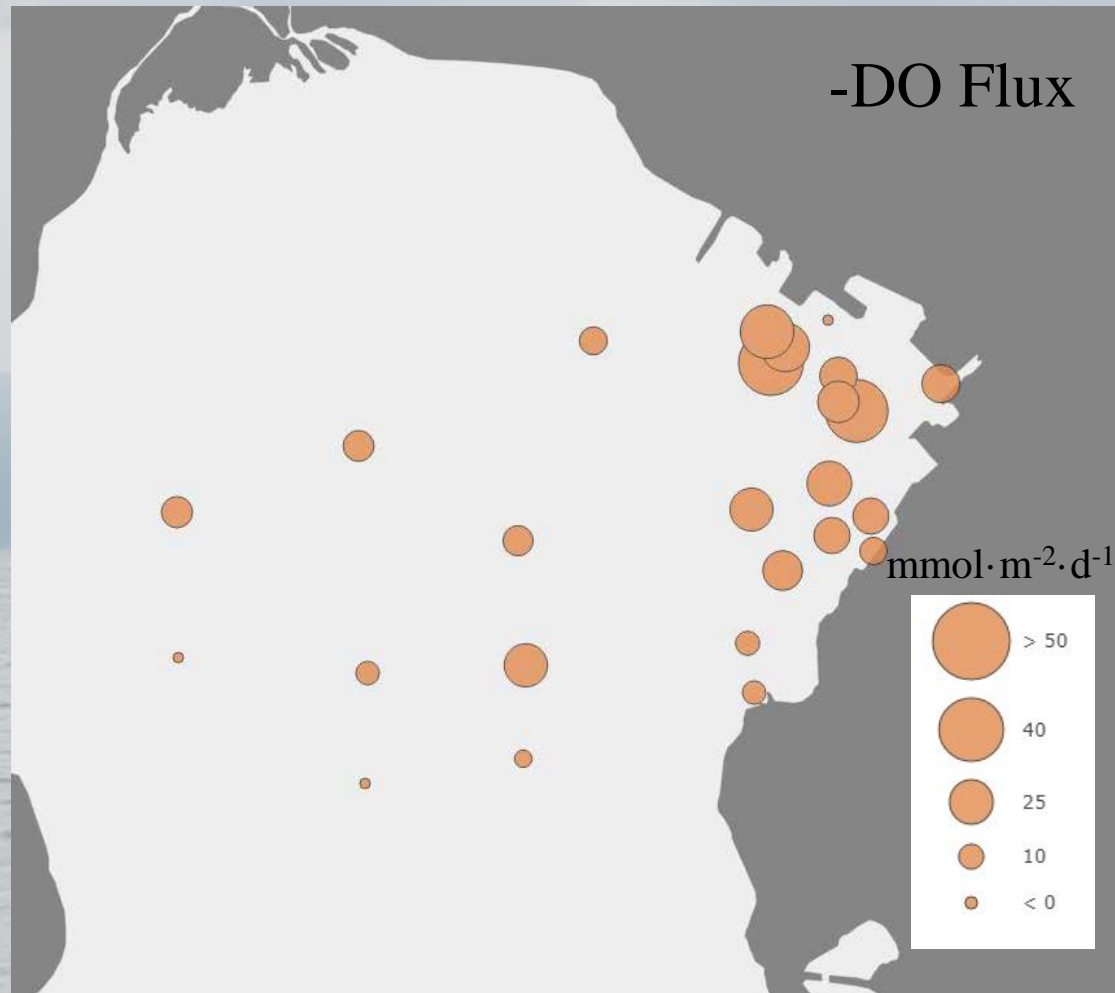
Sediment is a net sink of phosphorous in Bellingham Bay.



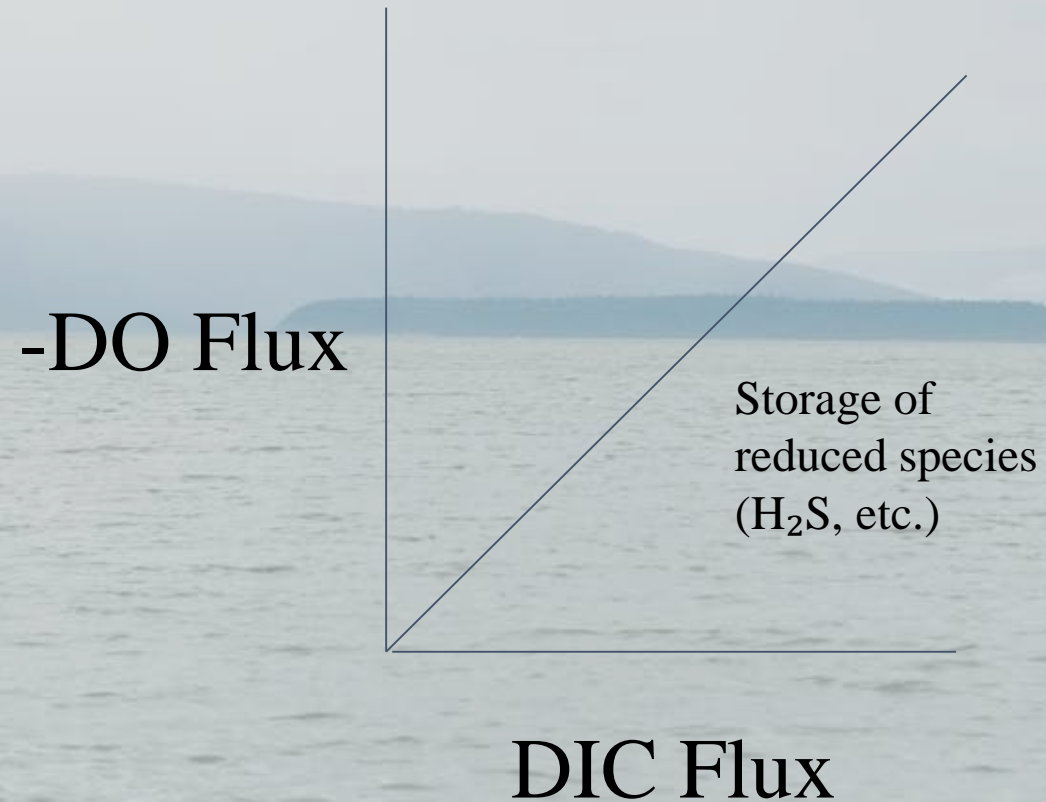
What is the role of sediment in oxygen consumption?



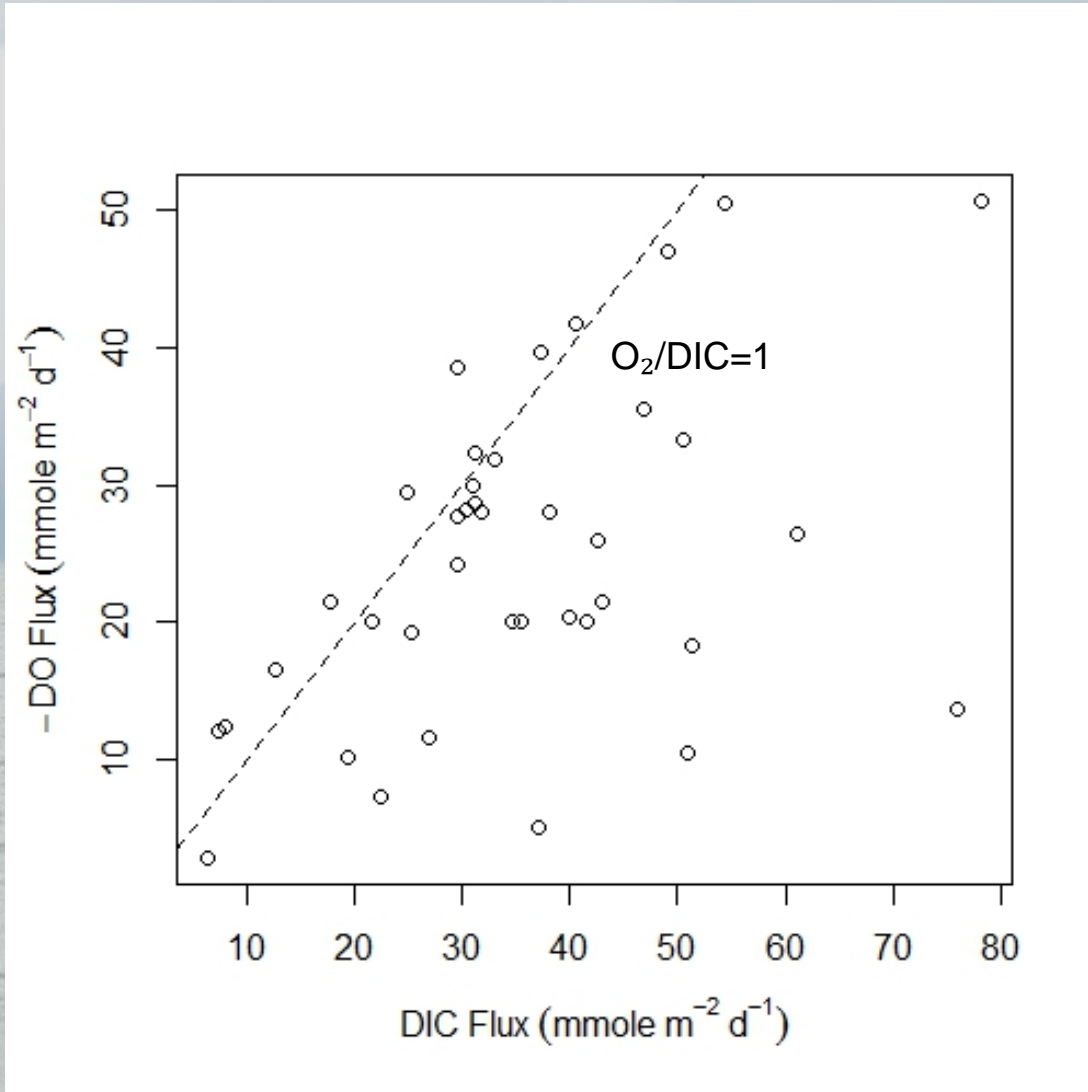
Sedimentary oxygen flux decreases with depth.



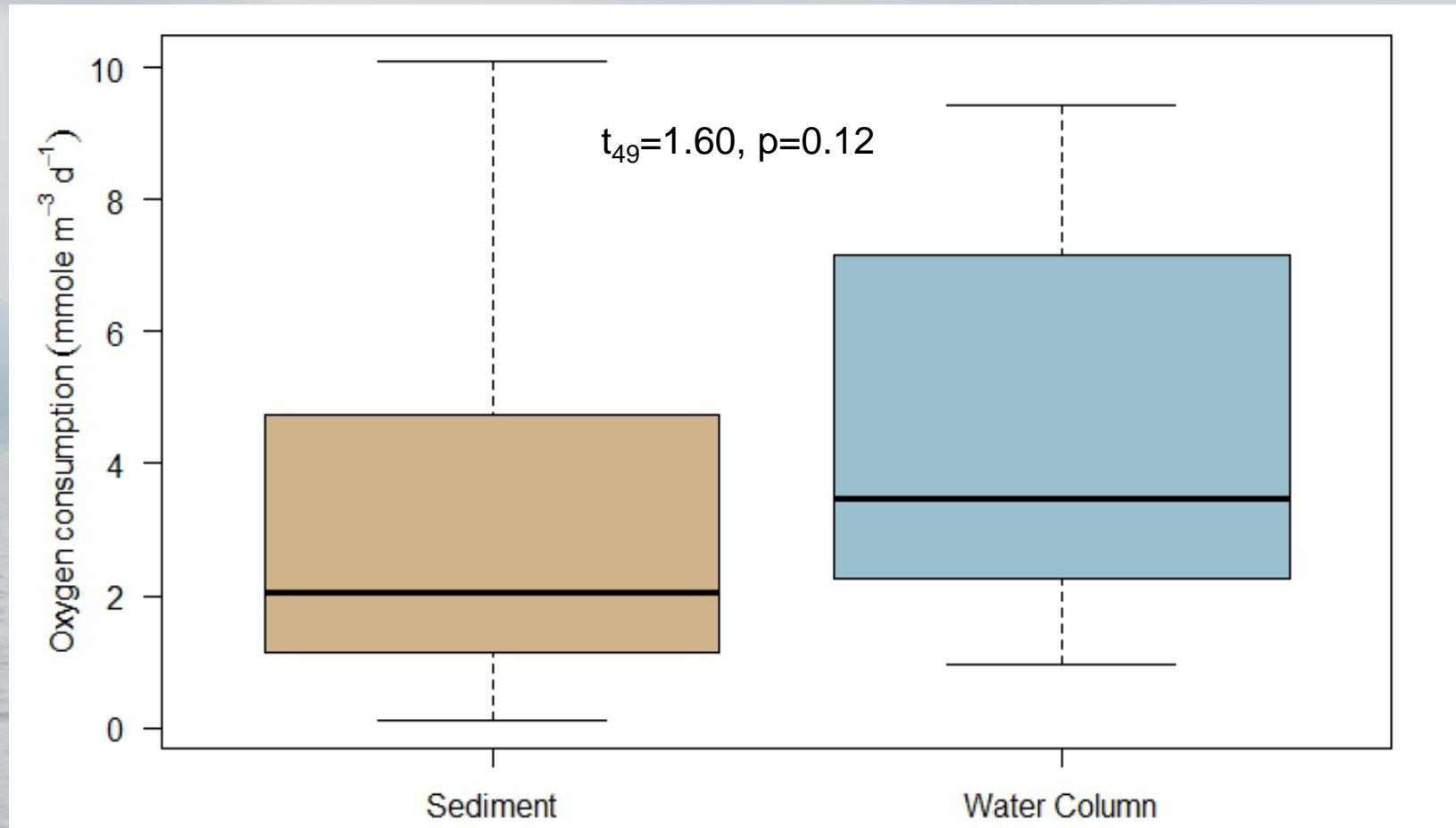
What is the role of sediment in oxygen regulation?



There is a storage of reduced compounds in Bellingham Bay sediments during hypoxic periods.



Oxygen consumption in the sediment is comparable to that of the water column.

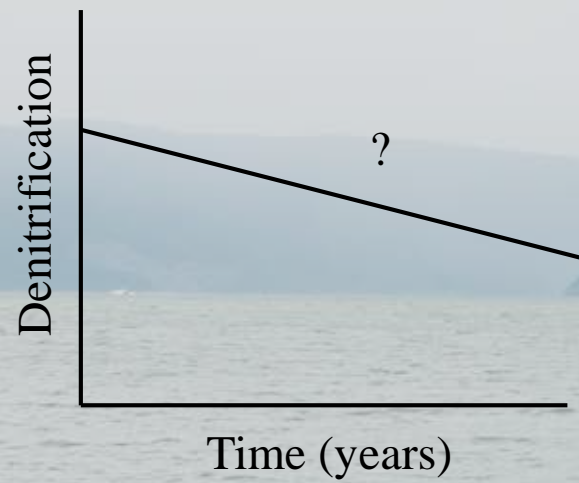




Sediment plays two important roles:

1. Sink for nitrogen and phosphorus
2. Consumer of water column oxygen

Future directions





This project would not have been possible without the support of:

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Horng-Yuh Lee, WWU

Margaret Shull, WWU