

# Seasonal variation in aragonite saturation state in surface waters of Puget Sound – A pilot study



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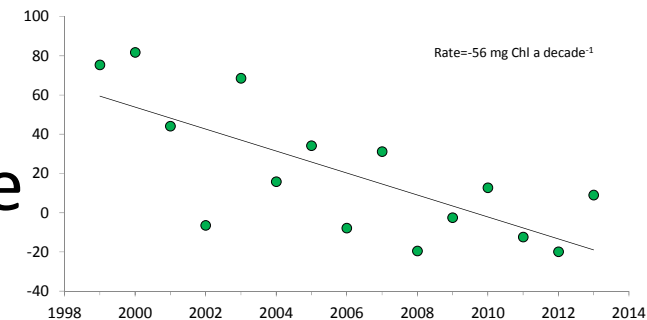
# Logistics of adding alkalinity (ALK), dissolved inorganic carbon (DIC) to Ecology's long-term monitoring program



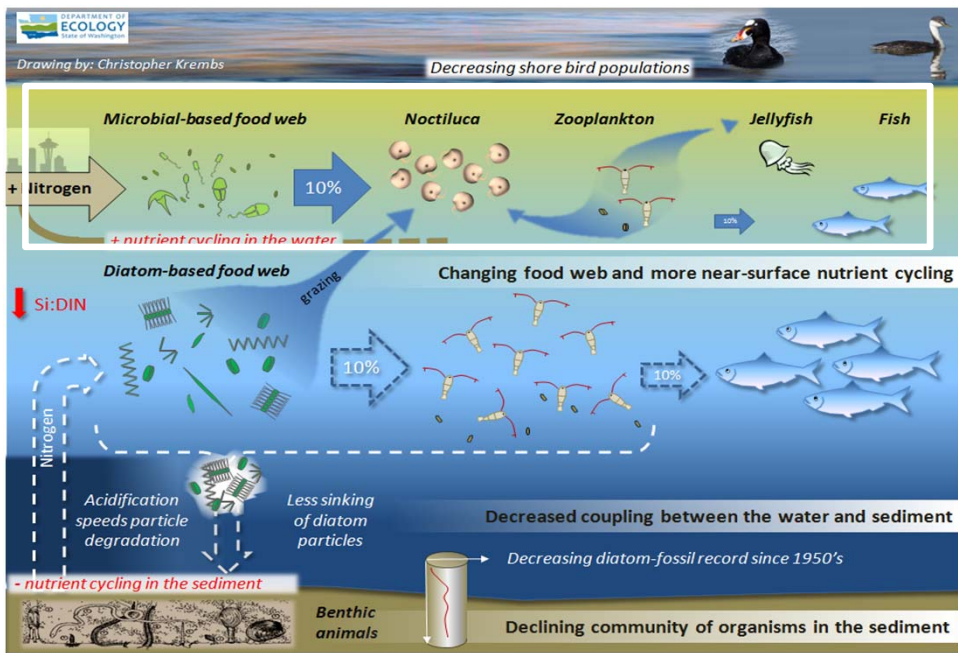
Marine stations occupied monthly (float plane, boat)

- Grab samples – chlorophyll, nutrients
- Profiles – temperature, salinity, DO, pH, in situ fluorescence

Long-term historical context, data storage and dissemination



# Monitoring plan

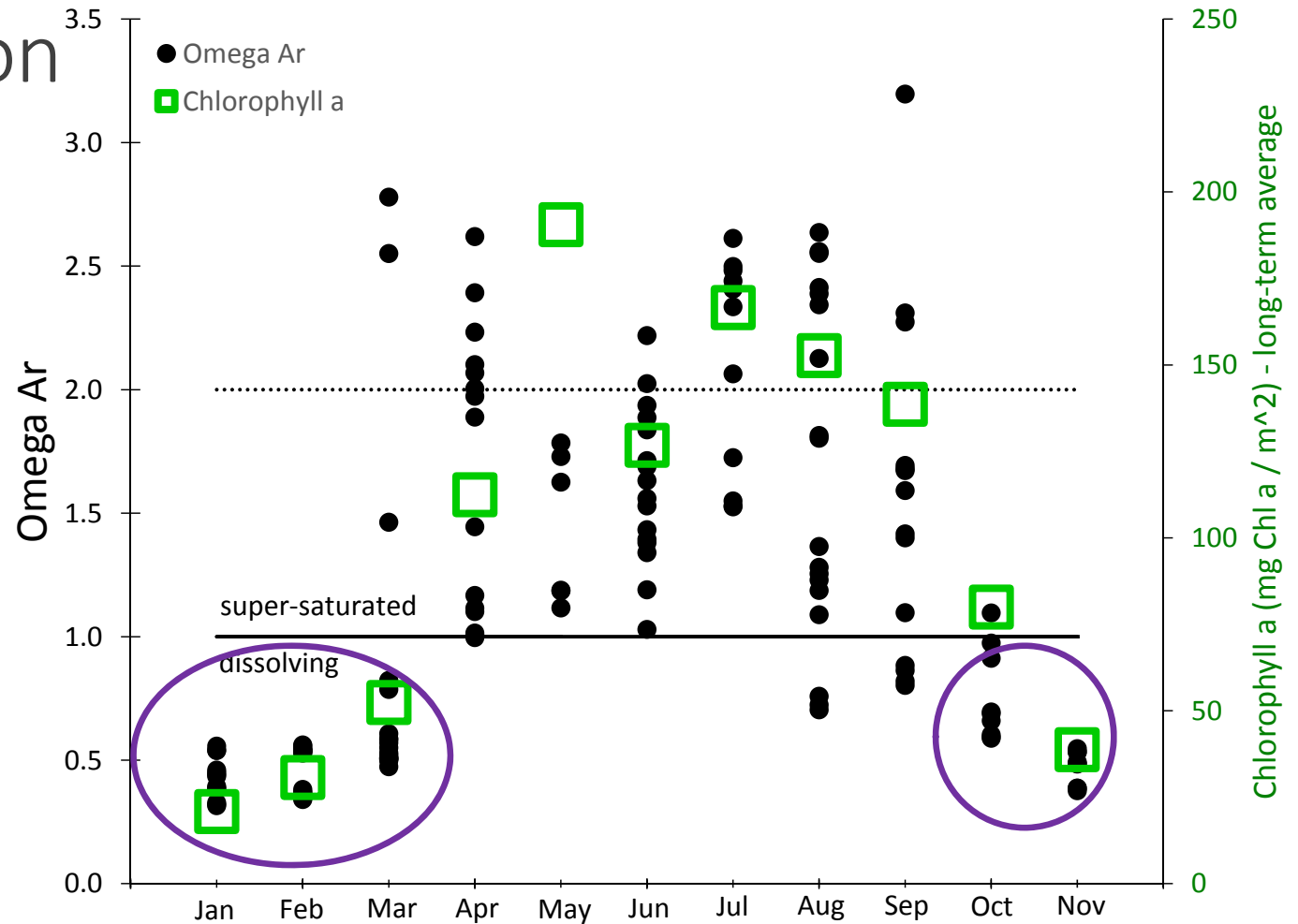


● Marine Waters Alkalinity Stations

# Seasonal variation in surface $\Omega_{arag}$

$$\Omega_{arag} = \frac{[Ca^{2+}][CO_3^{2-}]}{K_{sp,CaCO_3}}$$

Vary with pH, salinity, temperature, Si, P...



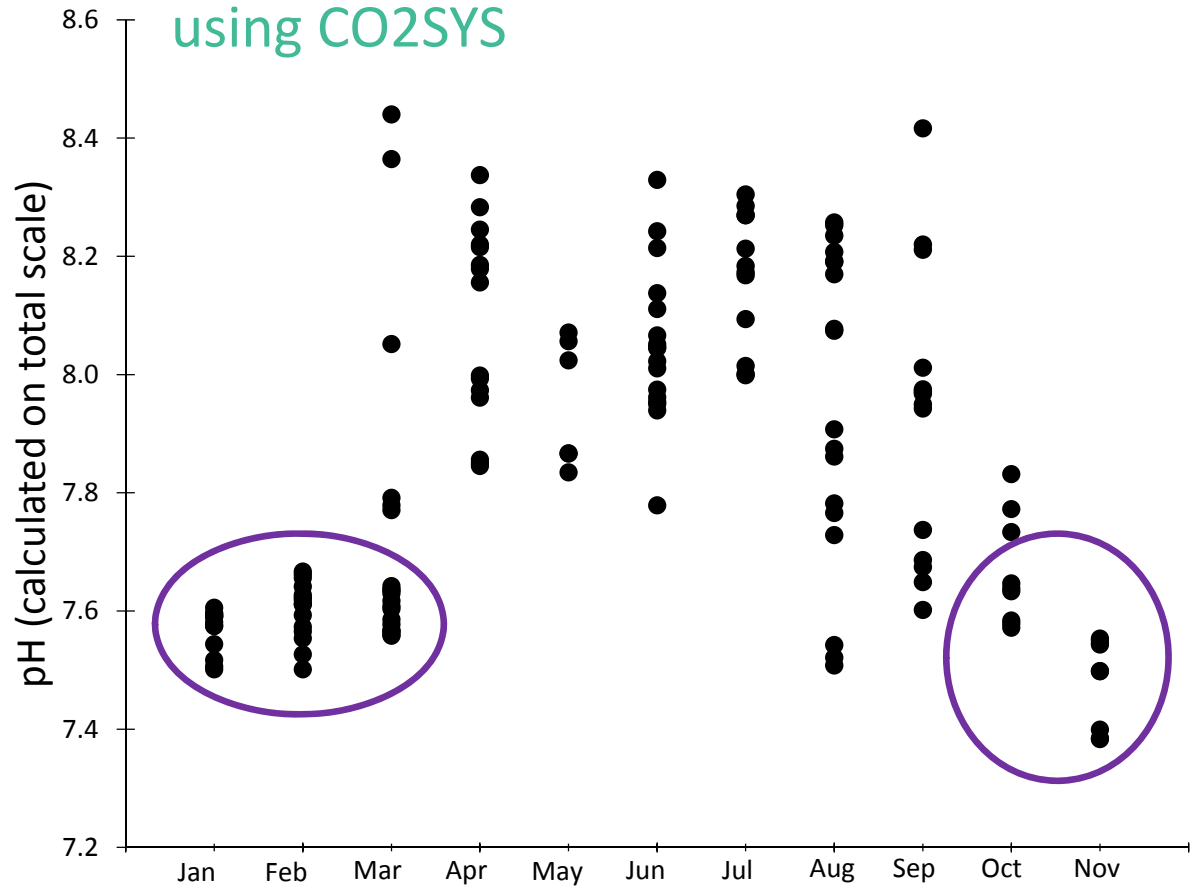
# Surface pH variation

Same seasonal pattern as  $\Omega_{\text{arag}}$  ...

*Lower in winter*

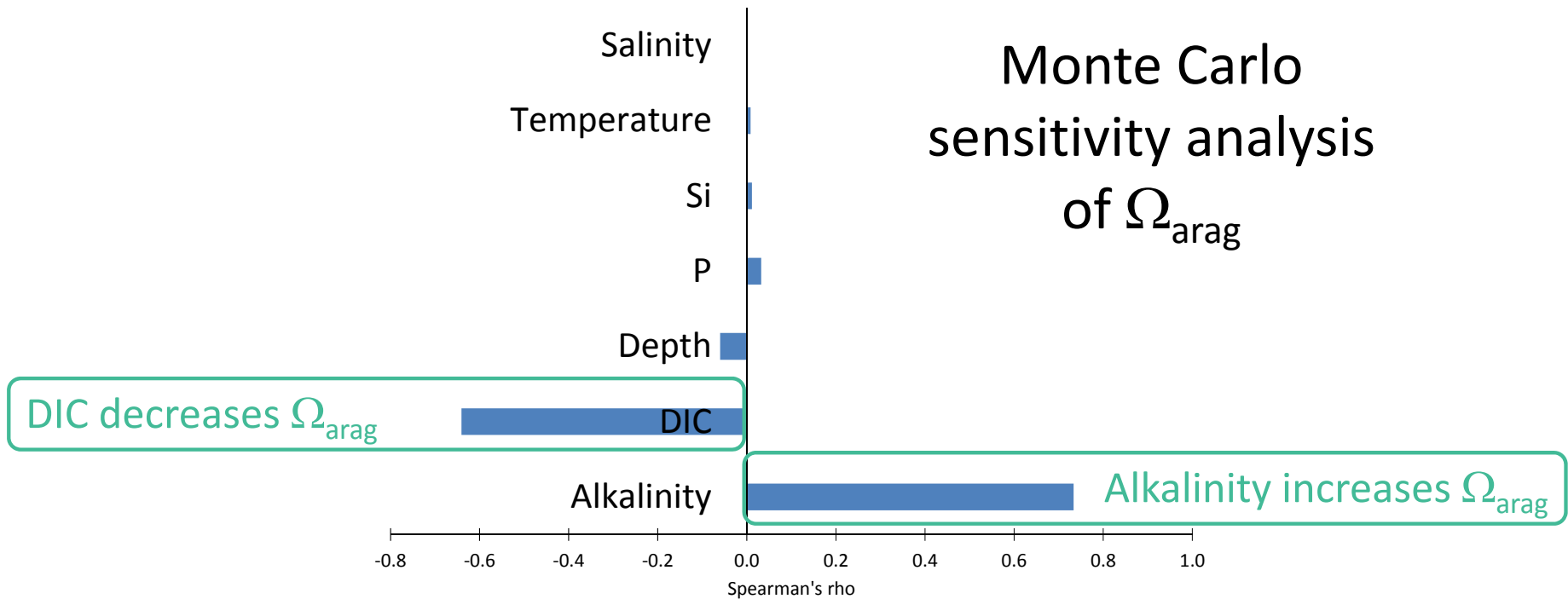
*Higher (and variable) in summer*

pH calculated from alkalinity and DIC using CO2SYS

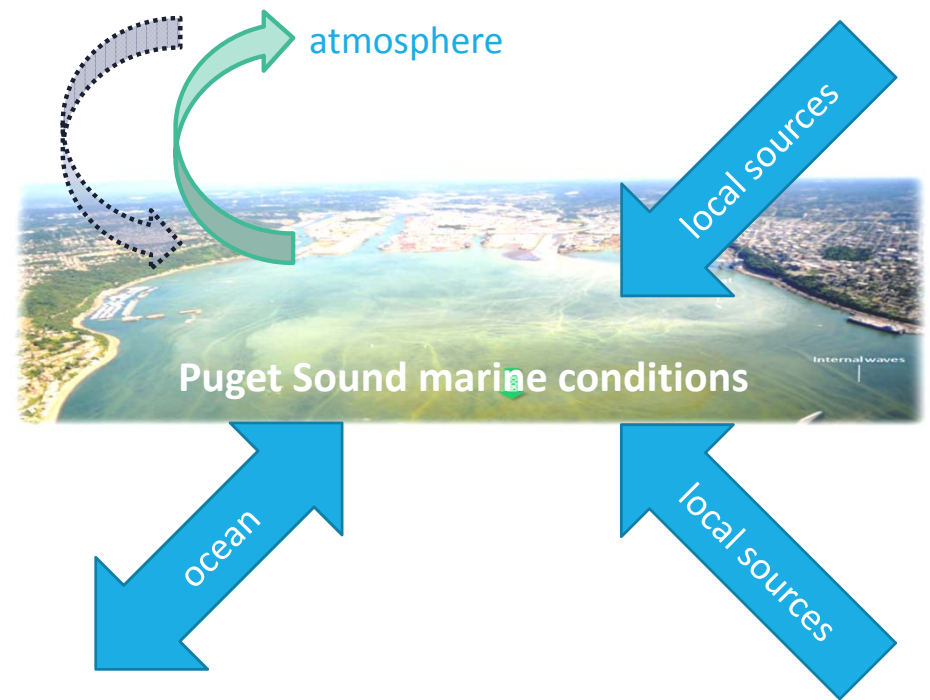
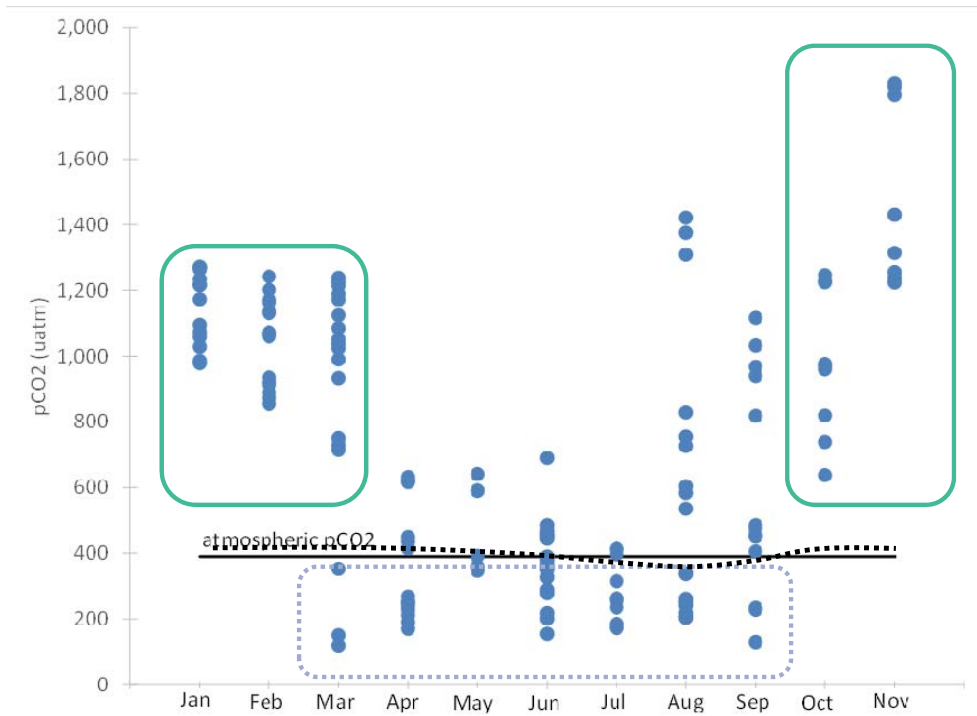


# We need ALK and DIC to understand $\Omega_{\text{arag}}$

Monte Carlo  
sensitivity analysis  
of  $\Omega_{\text{arag}}$



# Water $p\text{CO}_2 >$ Air $p\text{CO}_2$ in winter – *local atmospheric sources and sinks*



# Acidification model development status

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## 1. Model setup and testing

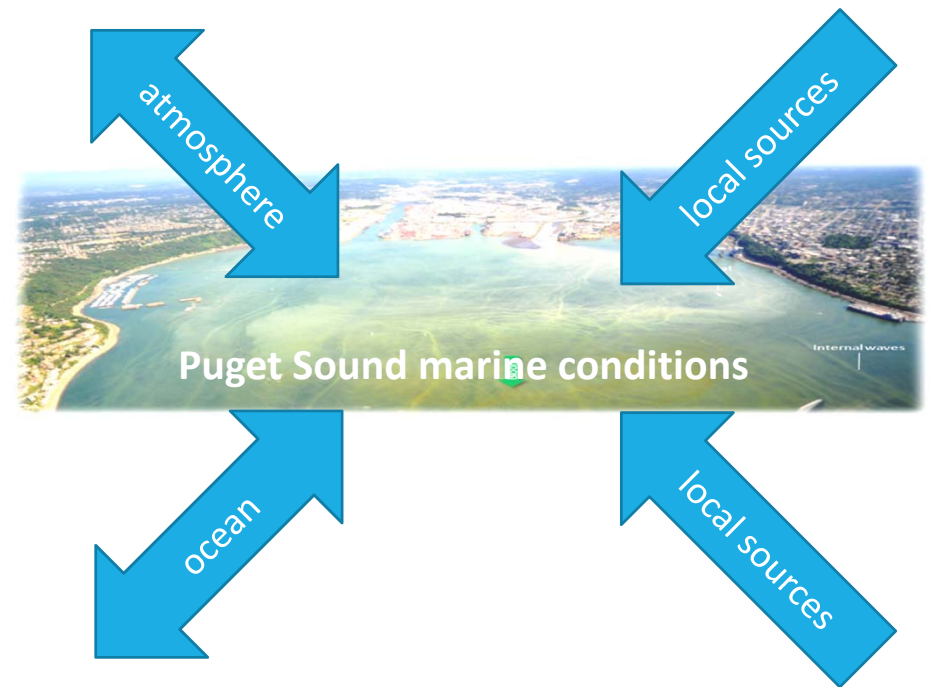
- Based on Salish Sea model
- Adding carbon system (ALK, DIC)

## 2. Calibration to marine data (spring 2016)

- Best available information

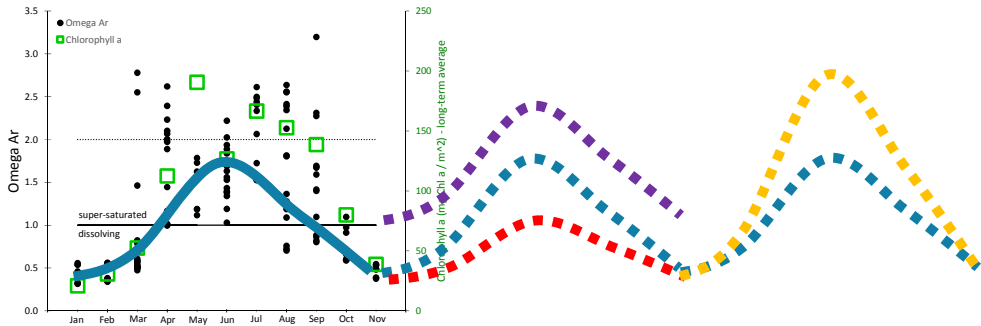
## 3. Alternative scenarios (2016)

- Present, historical, future conditions
- Evaluate relative influences





# Need to establish baseline $\Omega_{arag}$ soon. For your consideration... Now?



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Submitting Near-term Action  
*Would like MRAC support*

Need additional funding for Ecology marine monitoring

- Cruises/buoys also valuable

