Spices in Puget Sound

and in

Seattle's Sewage Effluent

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with thanks to

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Kelsey McDuffee, Brittany Kimball, Liana Singh

UW School of Oceanography

and

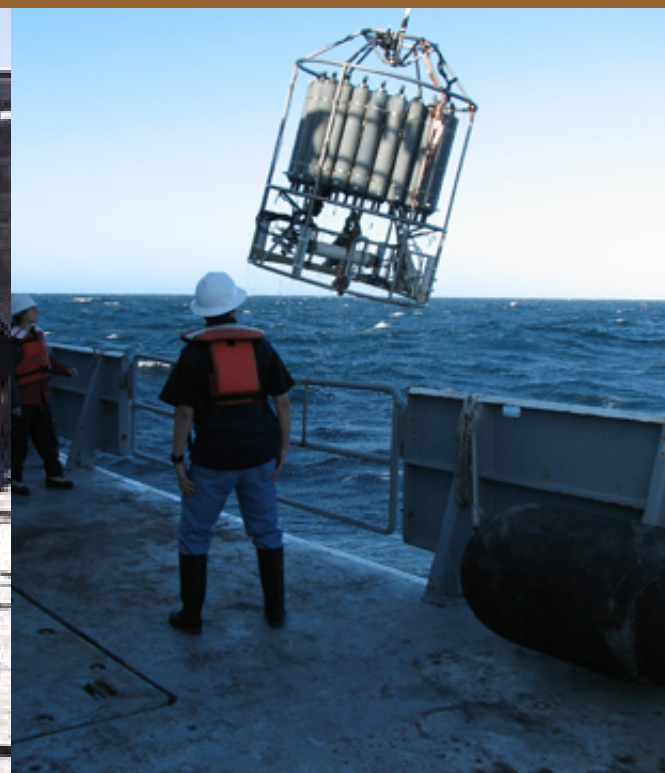
Rick Hammond & Randy Shuman - King County

The “take-home message”

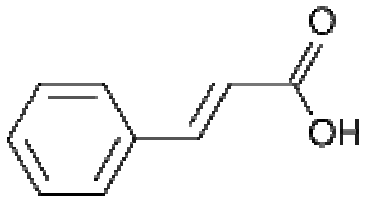
- Your kitchen is connected with Puget Sound
- PS ‘sees’ seasonal inputs of specific spices
- What you eat, so does the microbial life of Puget Sound
- Vanilla:Cinnamon ratio changes seasonally (we eat more cinnamon during the holidays, vanilla is in everything)
- eVanillin:Vanillin ratio also changes depending on how and when we bake

- Note: this research has not yet been published

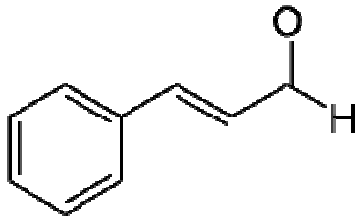
Student interests got us started



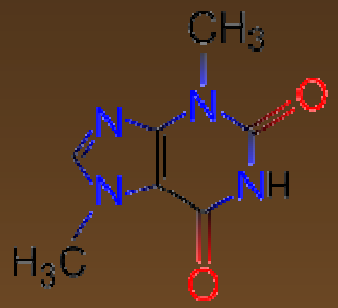
Some spices we measure



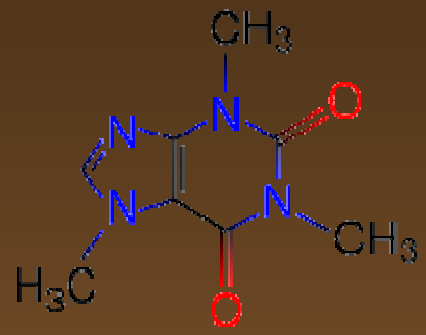
Cinnamic acid



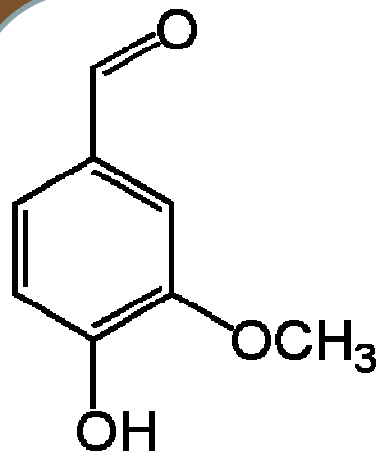
Cinnamaldehyde



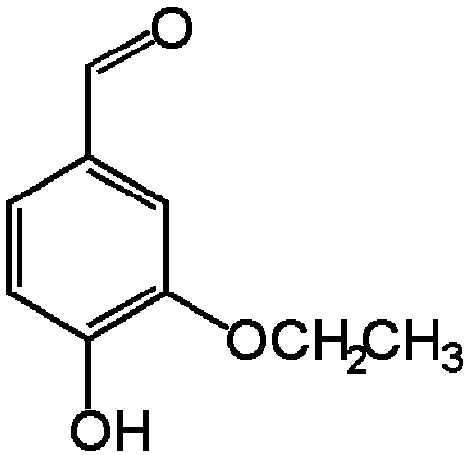
Theobromine



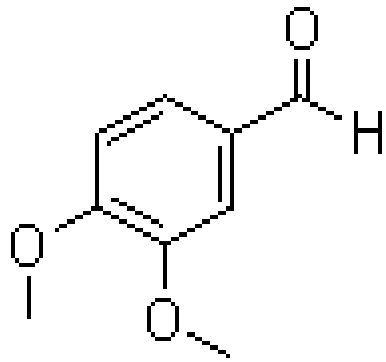
Caffeine



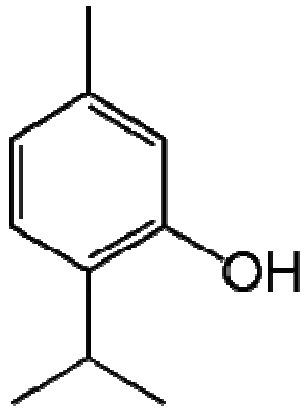
Vanillin



ethyl-vanillin
(3-ethoxy-4-hydroxy-benzaldehyde)



Veratraldehyde

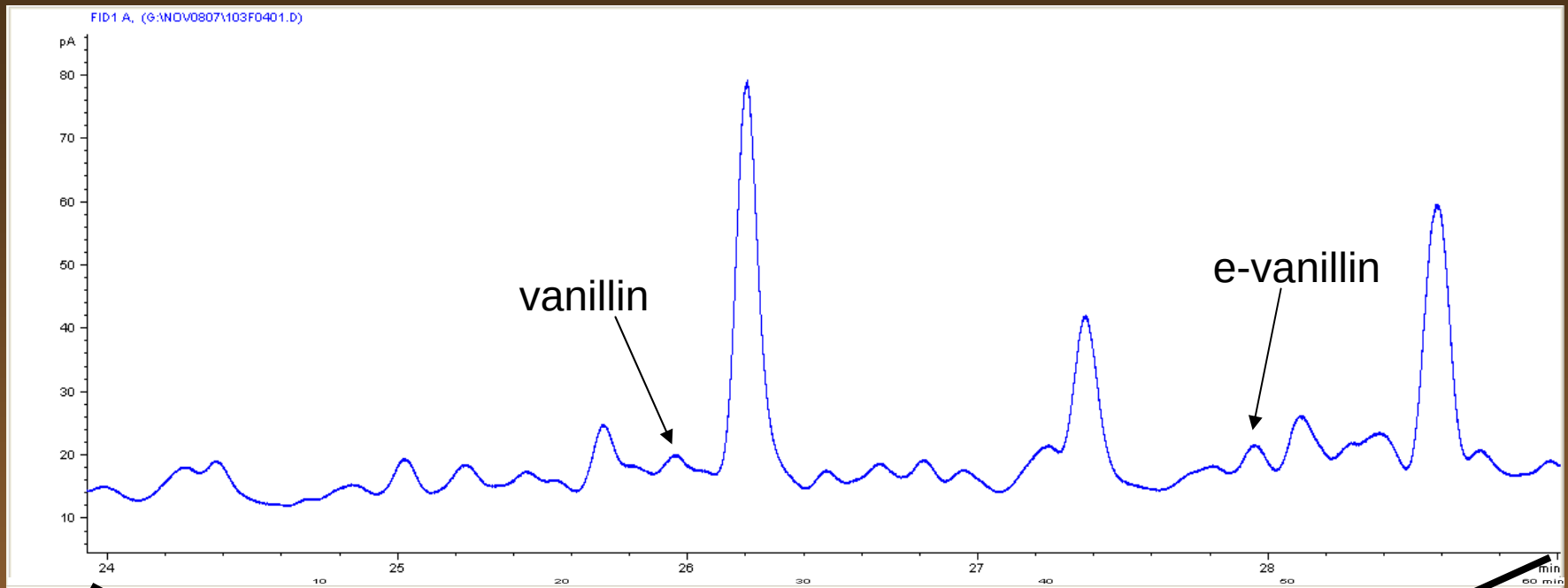


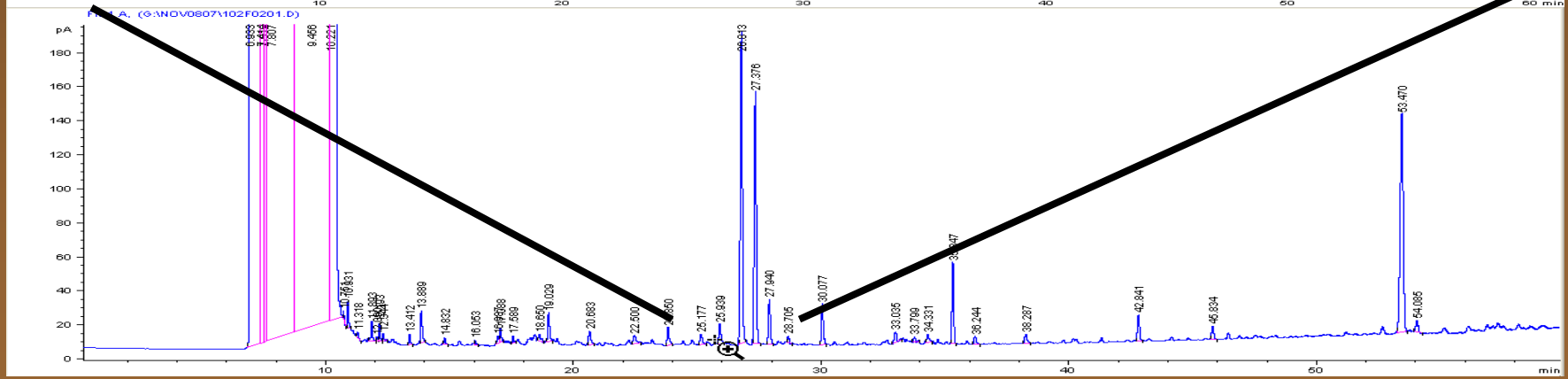
Thymol

How we measure spices

- Many are just lignin phenols in their monomer configuration

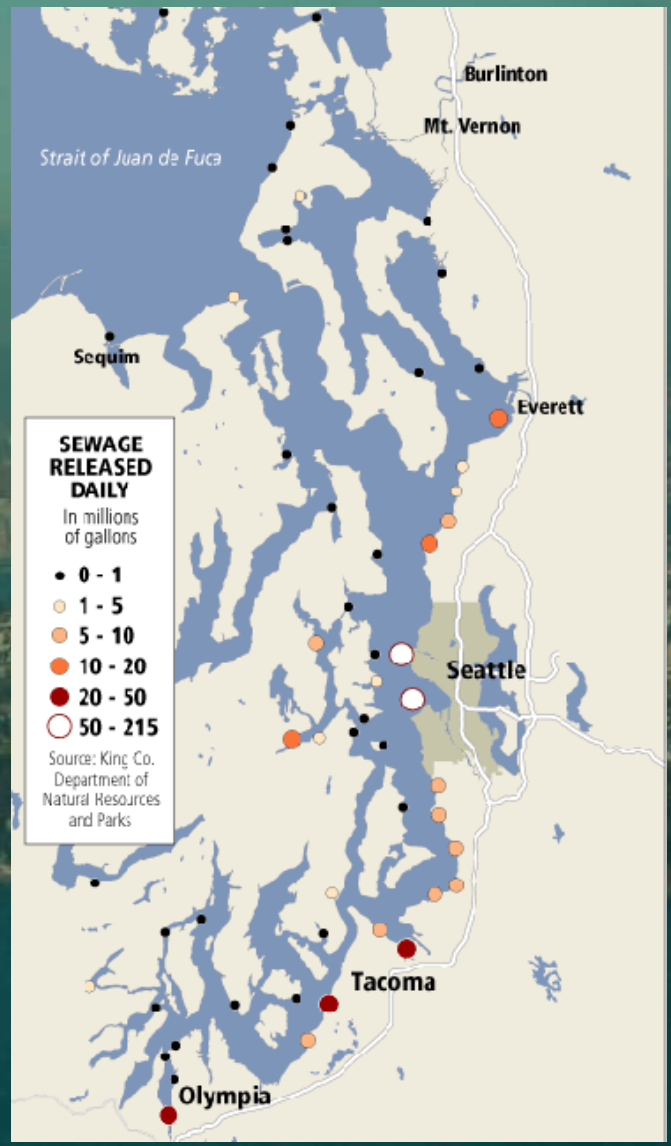
Chromatographs look like this



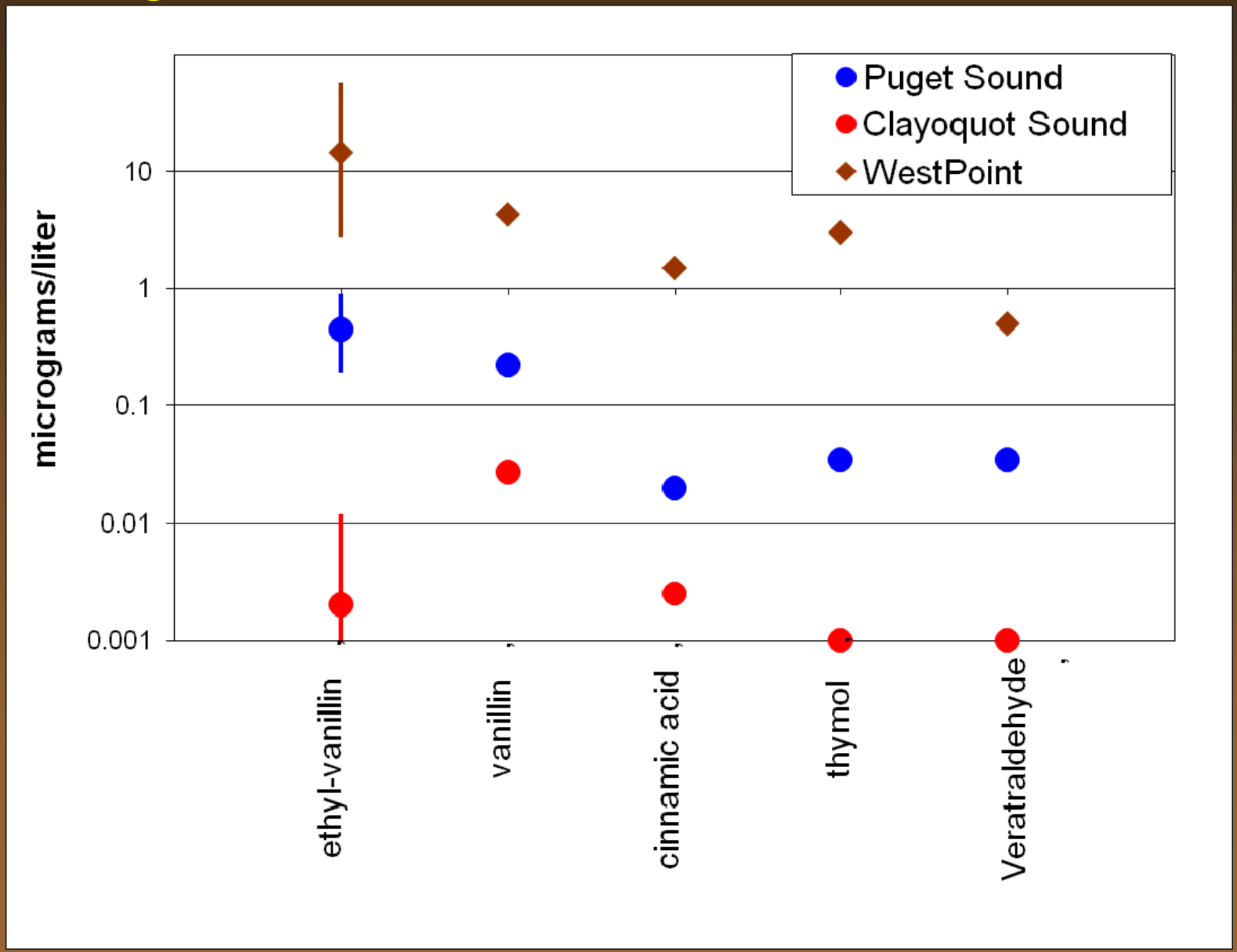


Sampling: Sink to Sound

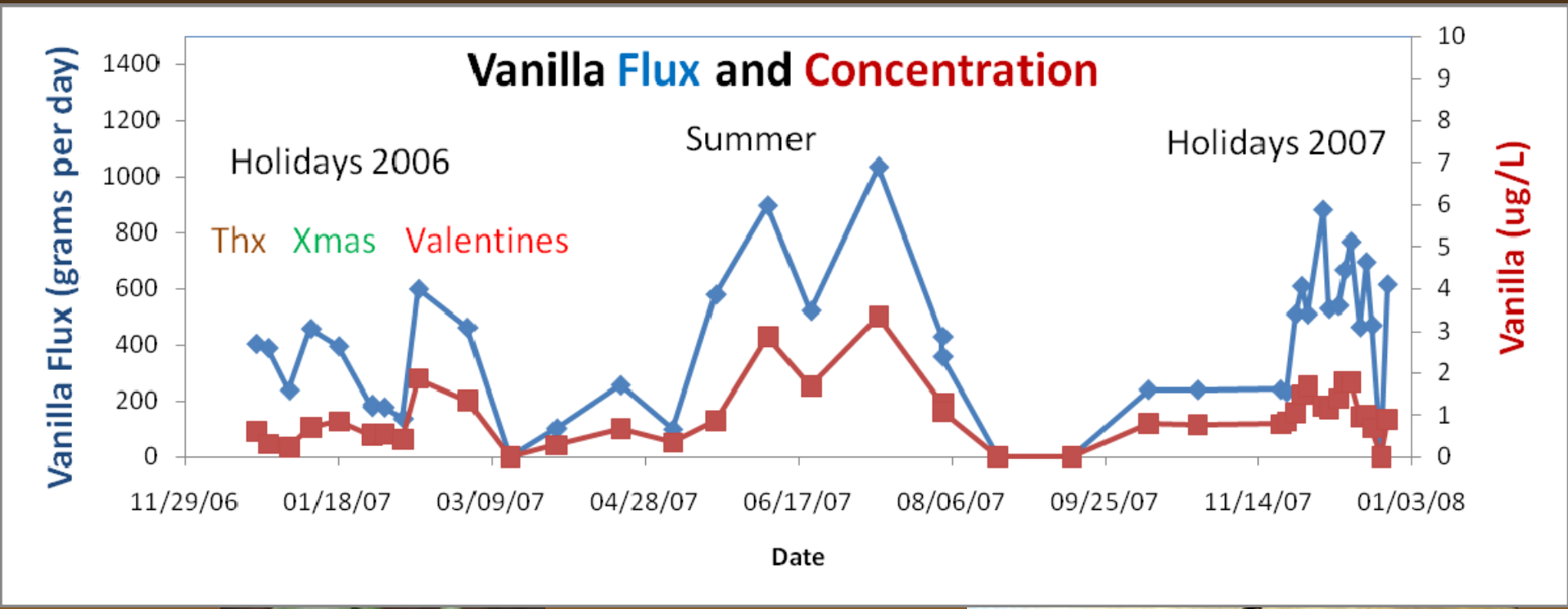
- Westpoint treatment plant
- Puget Sound
- Other marine locations
- Rivers and streams



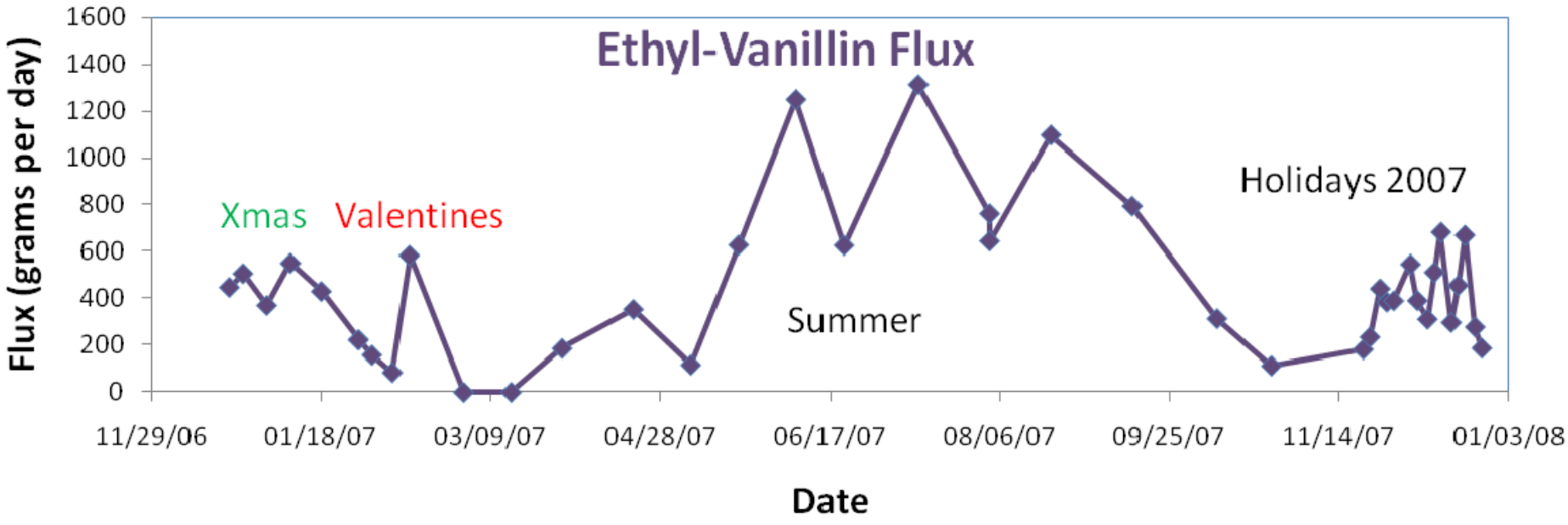
Average Concentrations in Marine Waters



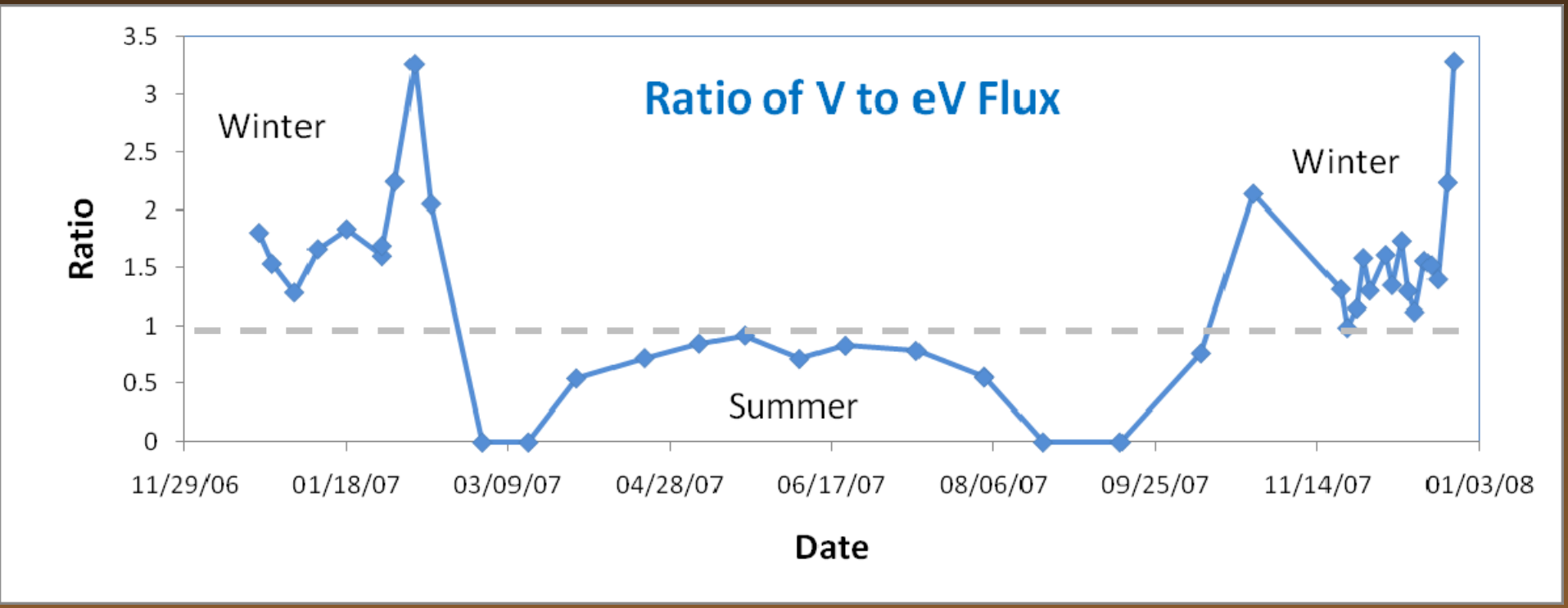
Data: temporal trends in Flux



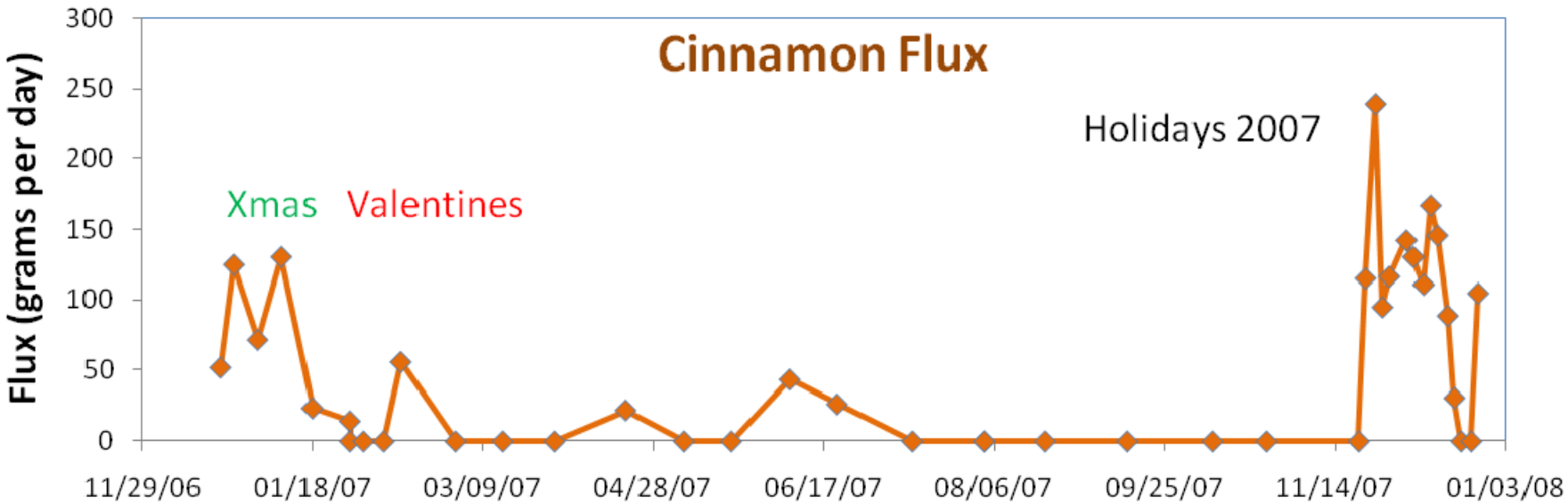
Ethyl-Vanillin



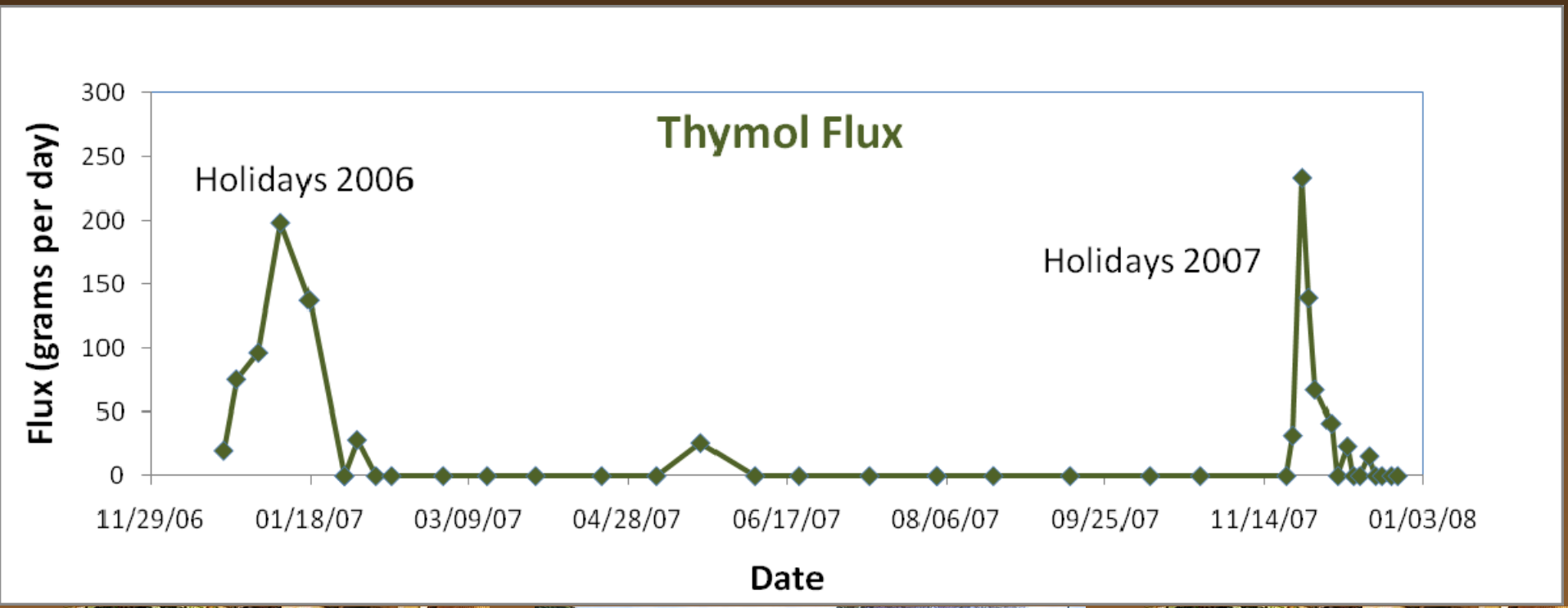
Ethyl-Vanillin



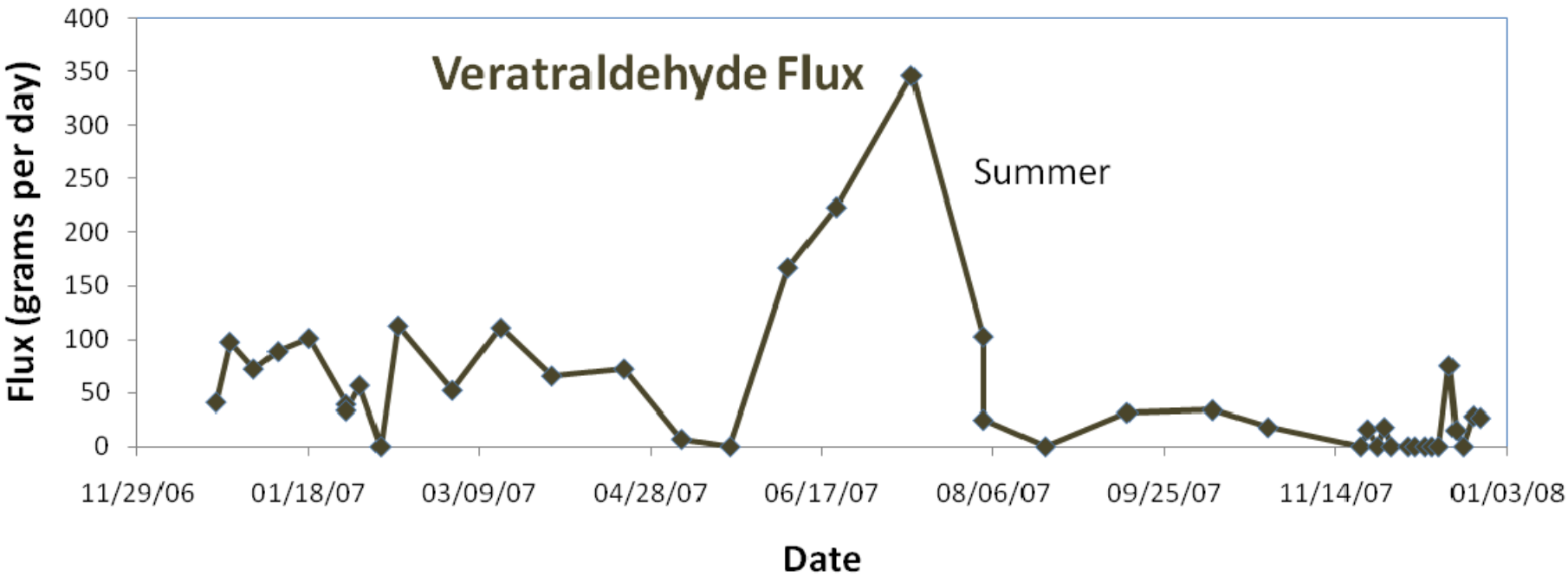
Cinnamon


Cinnamon Flux
Flux (grams per day)
300
250
200
150
100
50
0
Xmas
Valentines
Holidays 2007
11/29/06
01/18/07
03/09/07
04/28/07
06/17/07
08/06/07
09/25/07
11/14/07
01/03/08

Thyme


Thymol Flux
Holidays 2006
Holidays 2007
Flux (grams per day)
300
250
200
150
100
50
0
11/29/06
01/18/07
03/09/07
04/28/07
06/17/07
08/06/07
09/25/07
11/14/07
01/03/08
Date

Veratraldehyde



Implications

What we eat winds up in Puget Sound…

- Ethyl-vanillin is not a natural compound yet it is the most abundant spice in the Sound
- The Sound is also loaded with caffeine and chocolate leftovers (King Co. work)
- Spices can be smelled by salmon and are present at concentrations higher than the ‘natural’ compounds flavoring the Sound

PS Winter Toffee Squares

- 1 cup butter, soft or melted
- 2/3 cup brown sugar
- 1/2 tsp natural vanilla
- 1 tsp artificial vanilla
- pinch cinnamon
- 1/16th of a ground up and dried waffle cone
- 2 cups flour
- 6 oz chocolate chips

Oven to 350, cream butter, sugar and spices, add flour slowly until well incorporated, press into a 9x11 plan in a thin layer, bake 20 minutes or until golden brown, melt chocolate and spread over the top, cut into bars while still warm. Serve with espresso.

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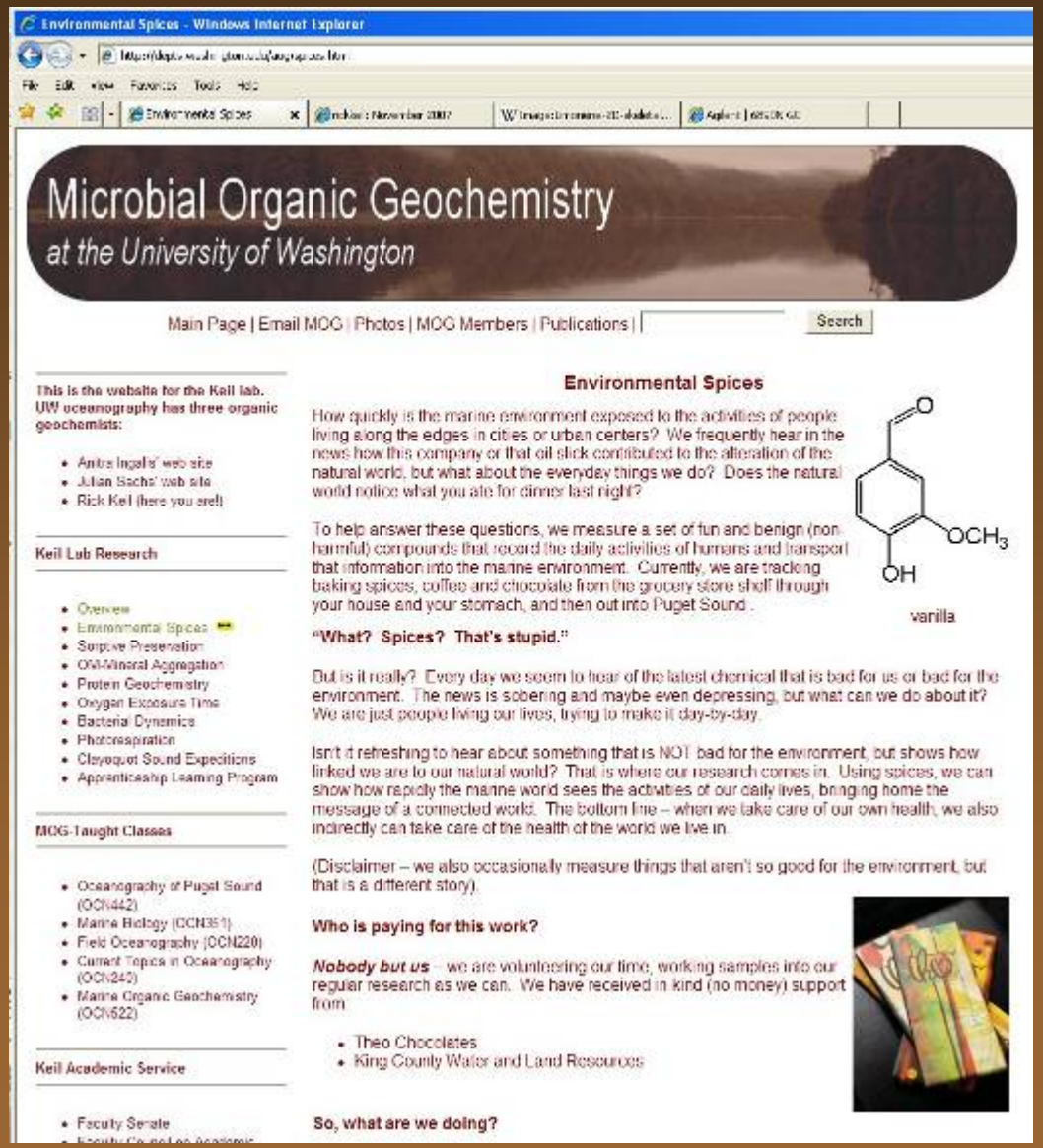
http://depts.washington.edu/aog/spices.html



THANKS