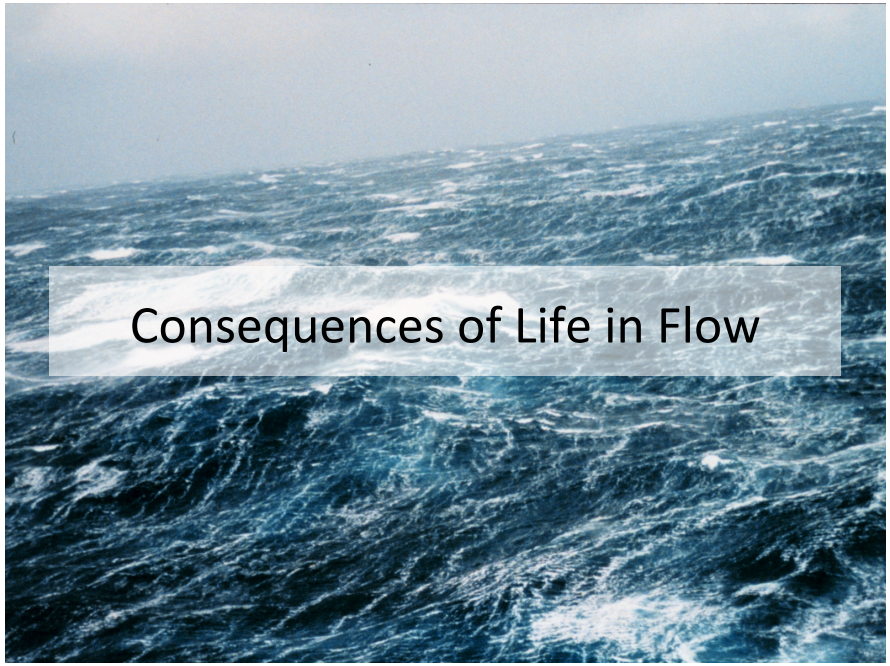

Flow & Life in the Ocean

1. Physics and Life in Flow
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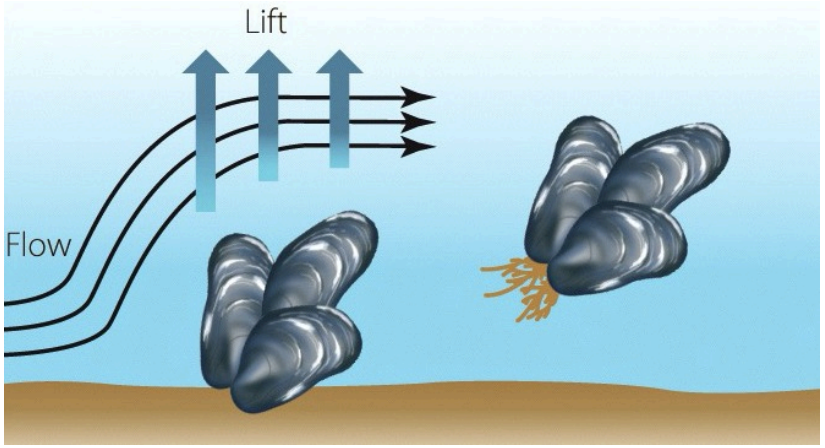
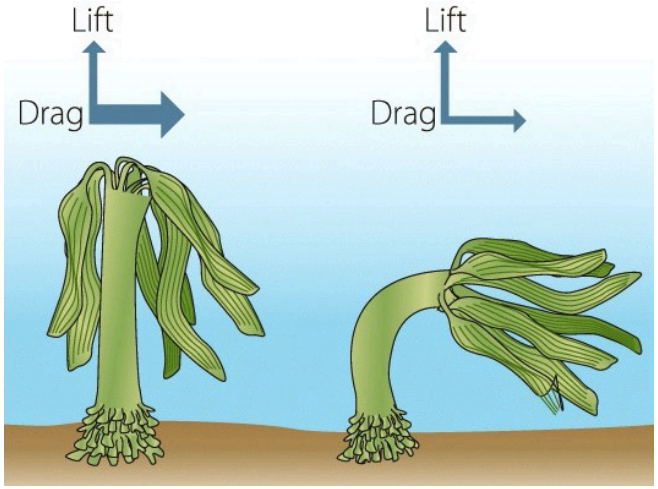
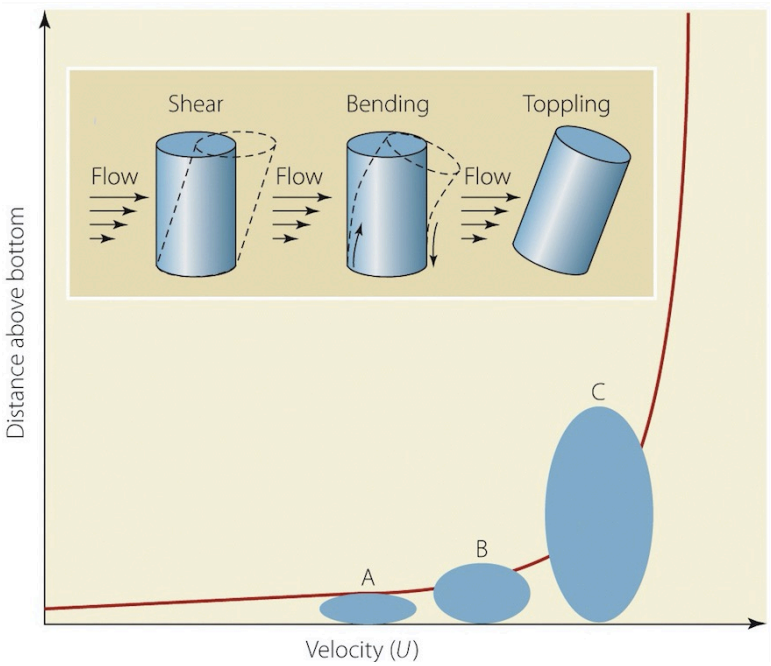
5. Flow & Predation
6. Flow & Large-Scale Processes

How would being in water influence an alga?

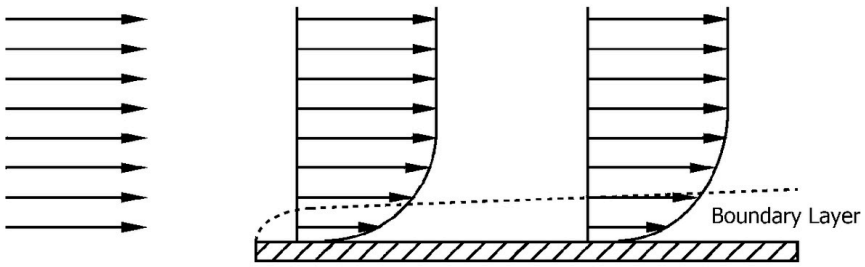


How would being in water influence an alga?





What problems and solutions are caused by “sticky” surfaces?



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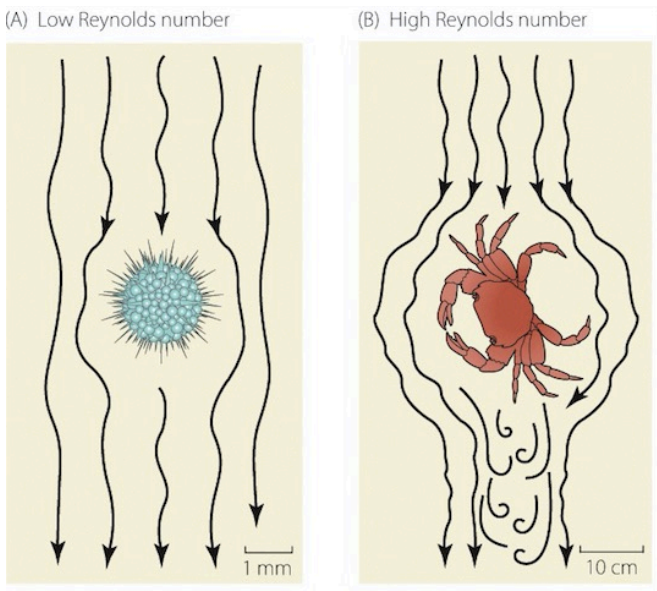
How does living in water change the life of a copepod?

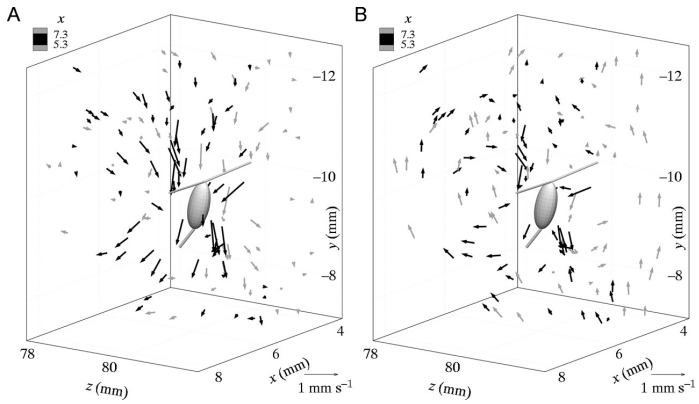


Reynolds Number

Re = inertial forces / viscous forces

- Re > 1, intertial forces dominate
  - Fish, crabs, whales, macrofauna
- Re <0, viscous forces dominate
  - Plankton, larvae, microfauna

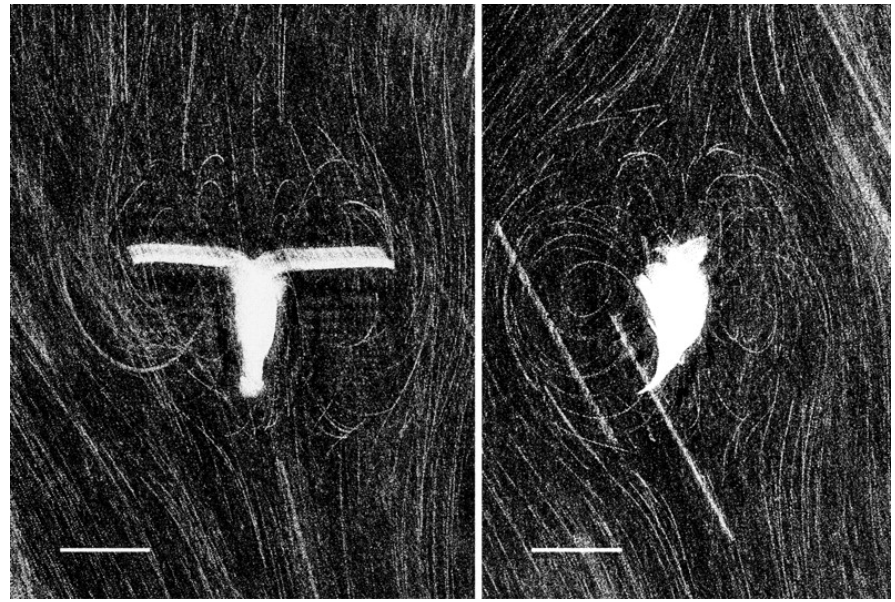
How does living in water change the life of a copepod?



What the world looks like to us

What the world looks like to a copepod

Malkiel et al. 2003



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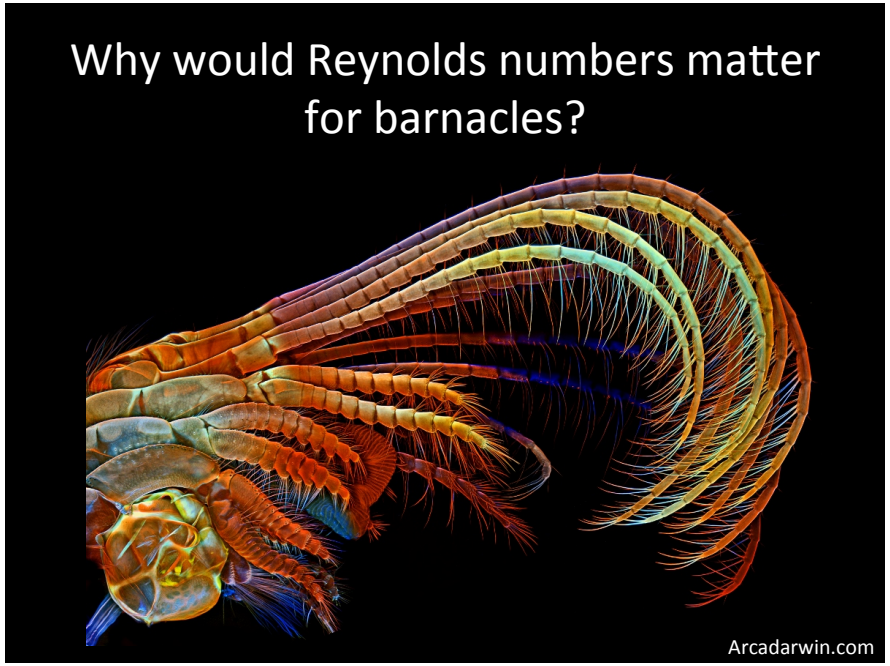
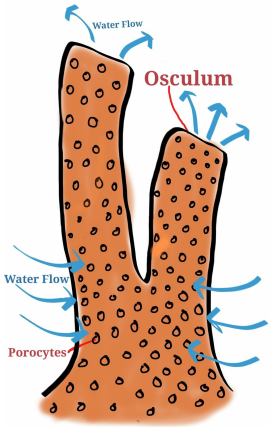
Alamy CEEYFN

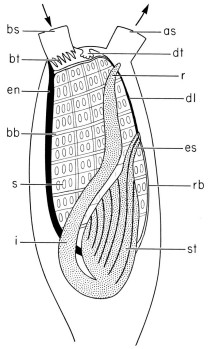
Why would Reynolds numbers matter for barnacles?



Different Feeding Modes

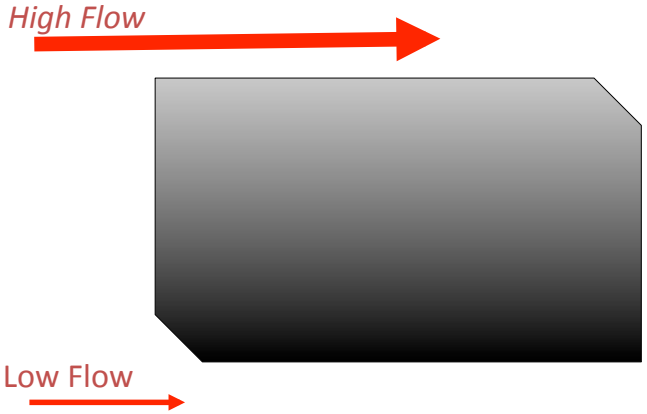


Passive Filter Feeding



Active Filter Feeding

What kinds of filter feeders would I find where on this wall?



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Why does the intertidal exhibit this difference?

Wave exposed

Wave protected

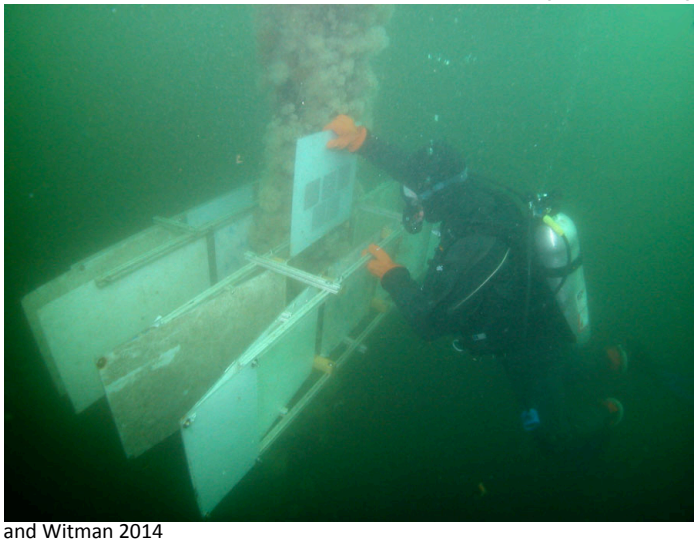
Flow & Exploitative Competition

Flow & Exploitative Competition

Flow & Exploitative Competition

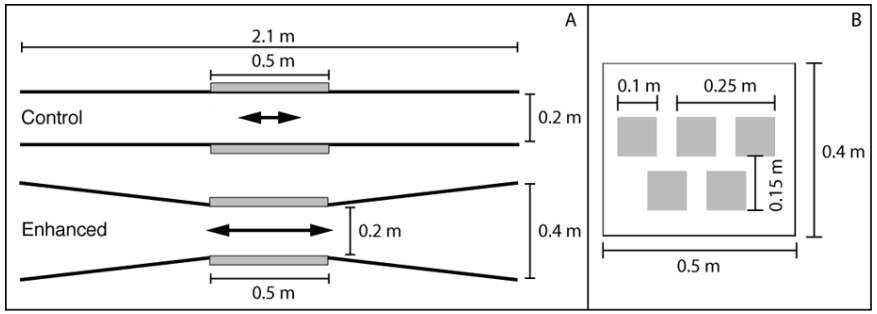
Flow and Interference Competition

Net Increases in Biodiversity – Why?



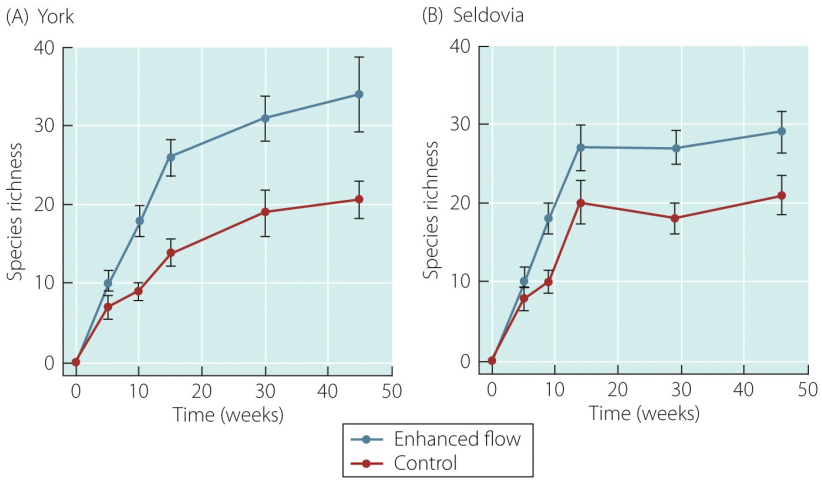
Palardy and Witman 2014

Net Increases in Biodiversity – Why?



Palardy and Witman 2014

Net Increases in Biodiversity – Why?



MARINE COMMUNITY ECOLOGY AND CONSERVATION, Figure 2.7
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Flow & Life in the Ocean

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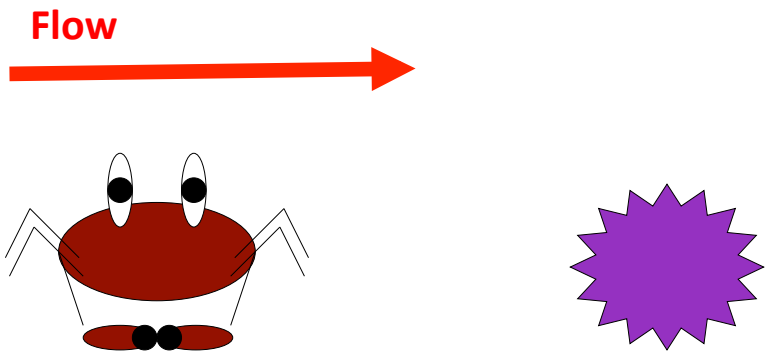
Who benefits from flow here?



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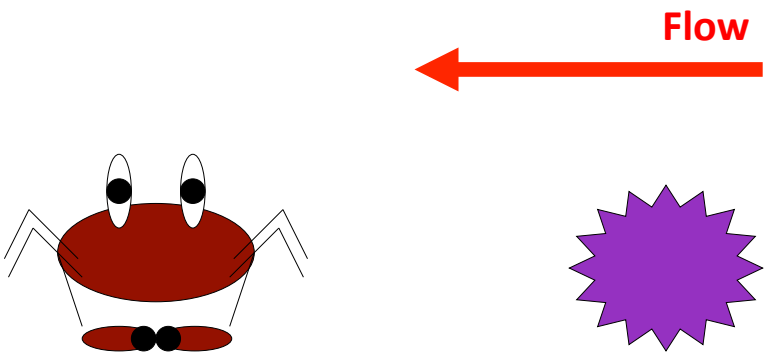

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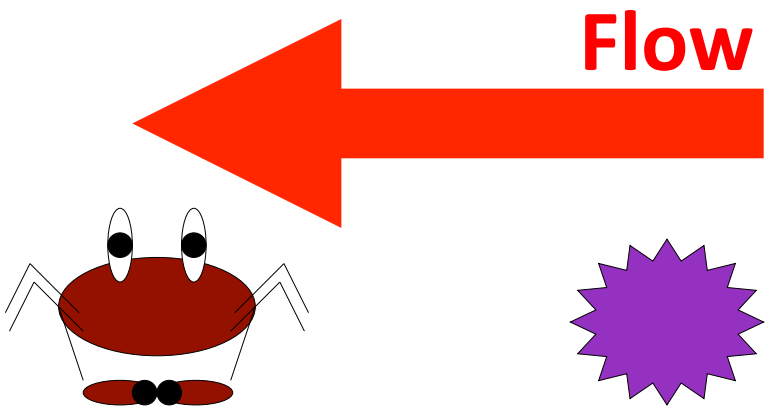
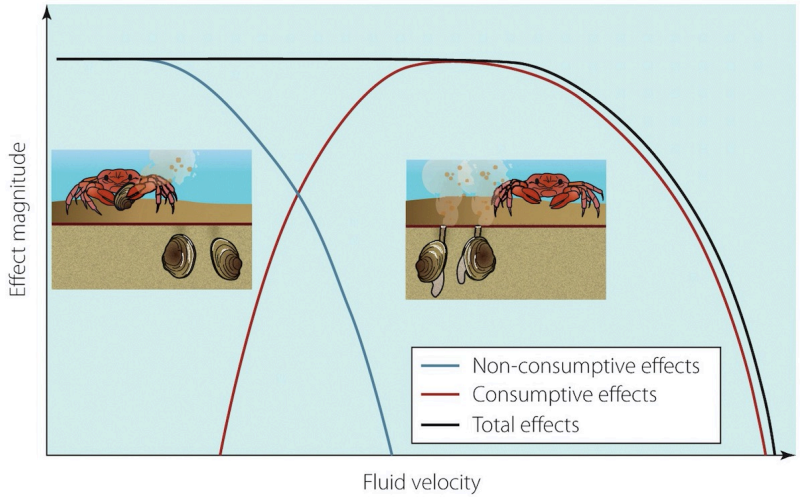


Relative Importance of Odor Plums Depends on Current Velocity



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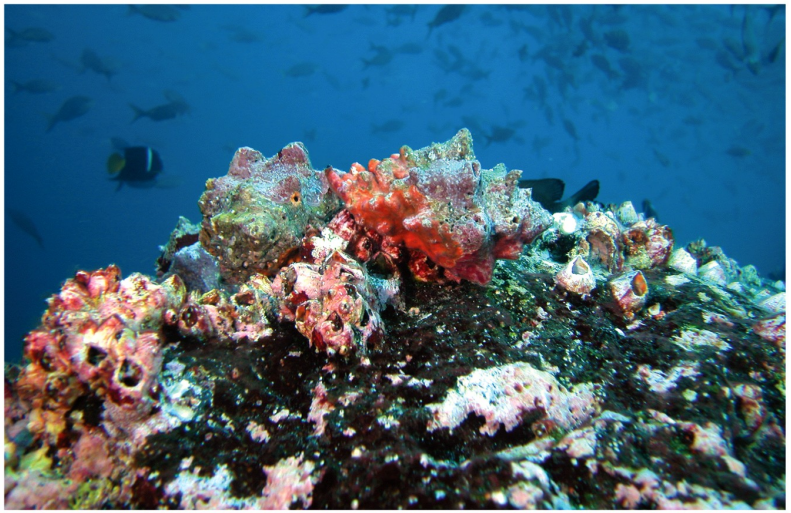
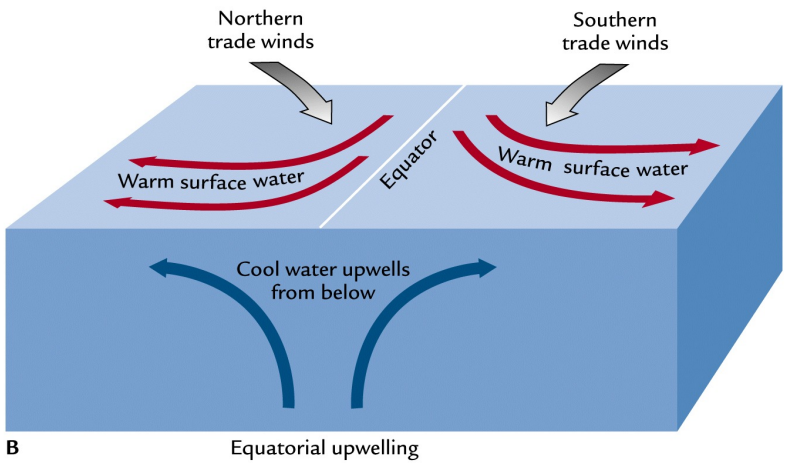
(C) Regulating Community Structure



MARINE COMMUNITY ECOLOGY AND CONSERVATION, Figure 2.8 (Part 3)

Equatorial Upwelling



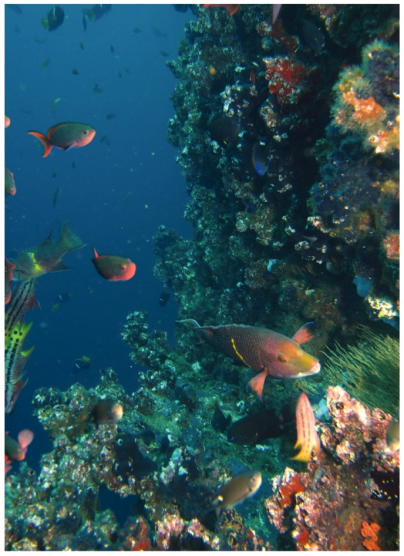
Ruddiman 2008

(C) Regulating Community Structure

MARINE COMMUNITY ECOLOGY AND CONSERVATION, **Figure 2.8 (Part 3)**

Regulating Community Structure

(B)



MARINE COMMUNITY ECOLOGY AND CONSERVATION, **Figure 2.8 (Part 2)**

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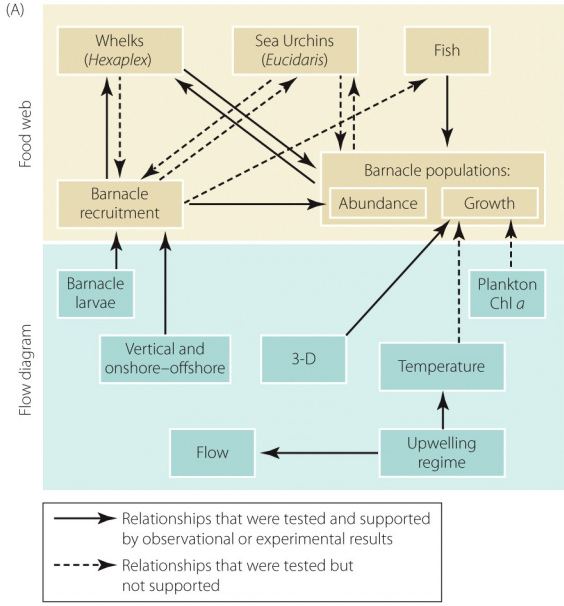
(A)



MARINE COMMUNITY ECOLOGY AND CONSERVATION, **Figure 2.8 (Part 1)**

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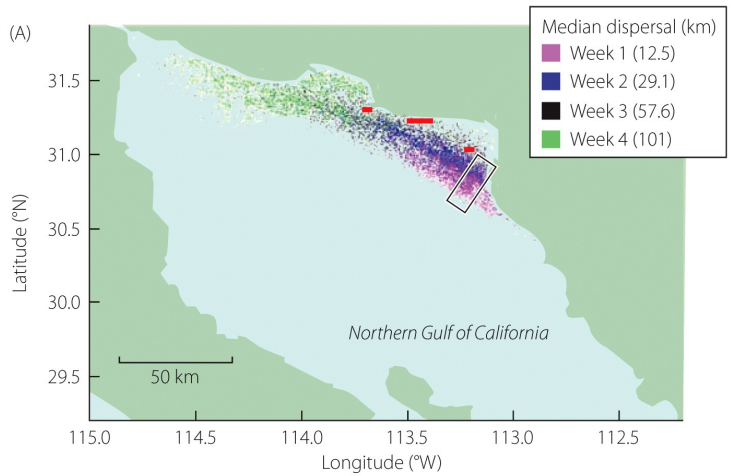
Large-Scale Movement of Particles in the Ocean



MARINE COMMUNITY ECOLOGY AND CONSERVATION, Figure 2.10 (Part 1)
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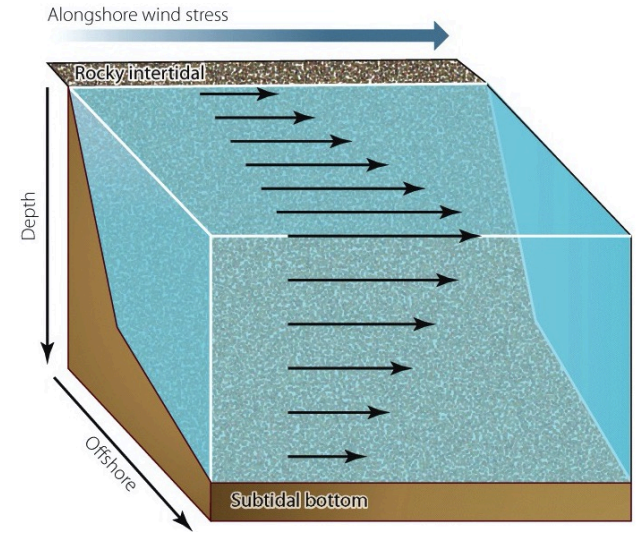
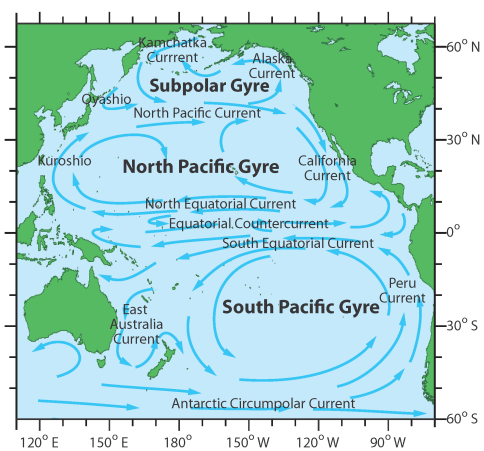
Coastal Boundary Layers & Dispersal

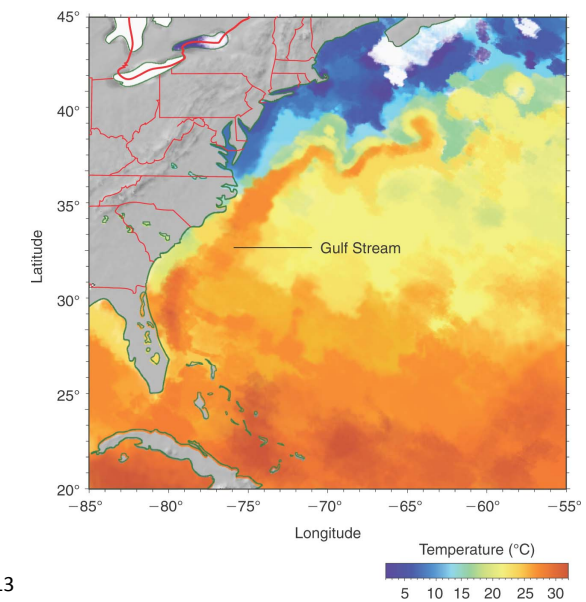


Biogeography Determined by Currents

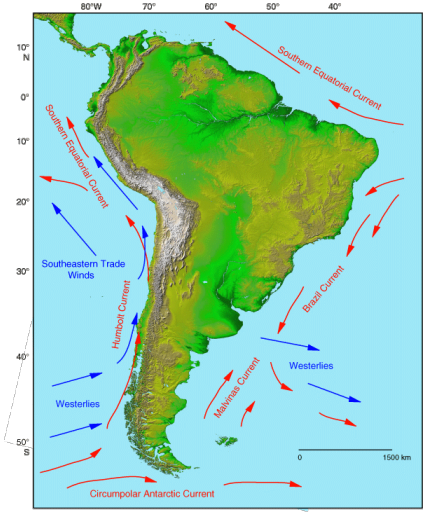


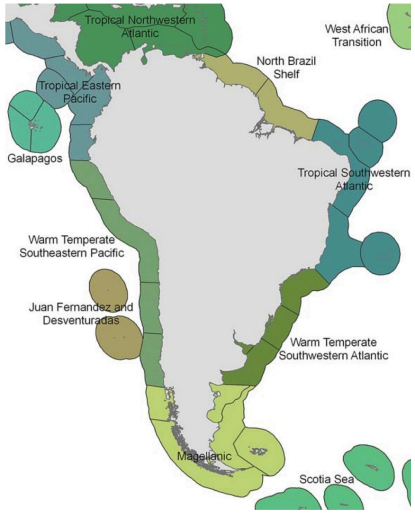
http://www.seos-project.eu/

Currents Separate Species Pools



Levinton 2013





Spalding et al 2010