

2015

Ocean Acidification in Maine (2015 State of the Bay Presentation)

Susie Arnold
Island Institute

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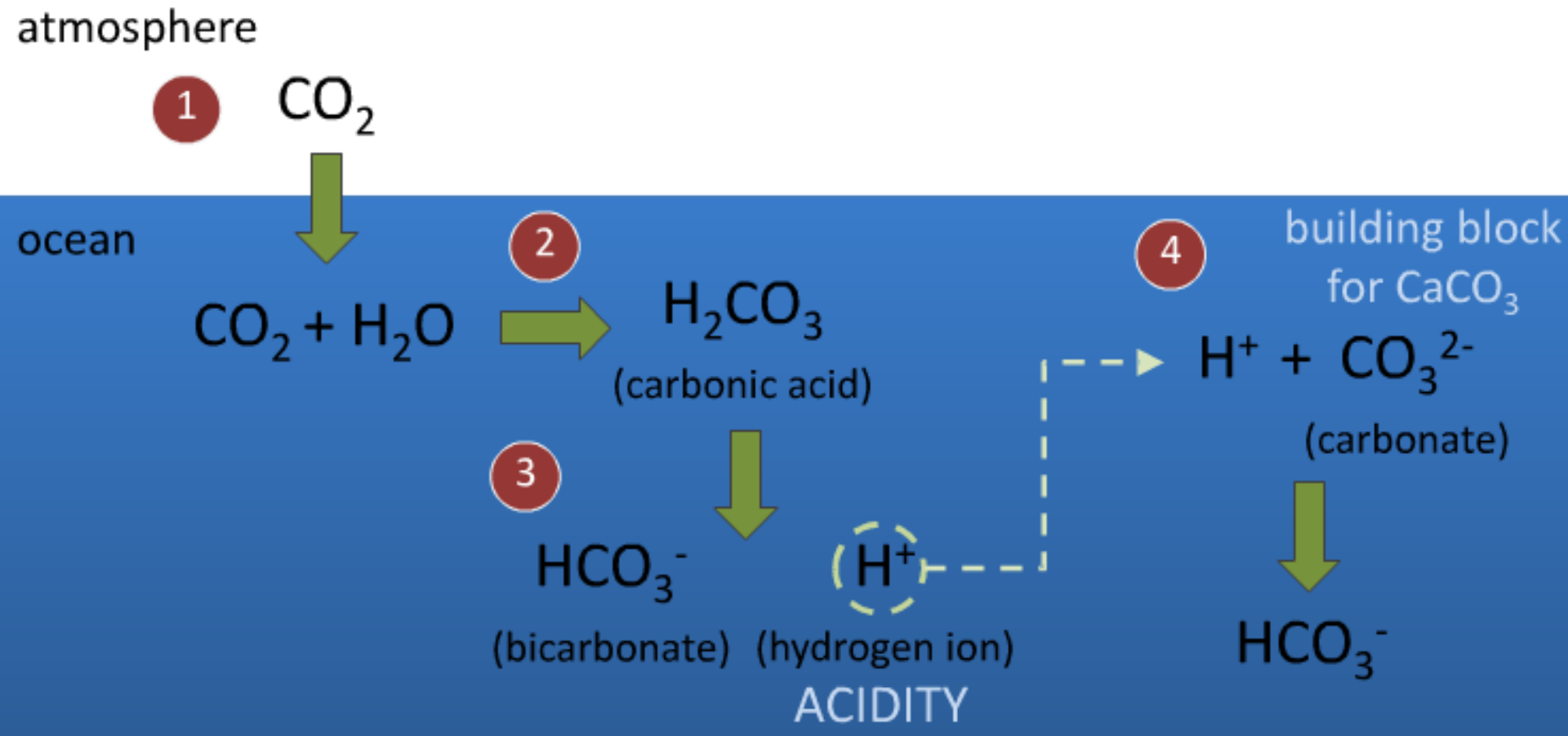
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Ocean Acidification



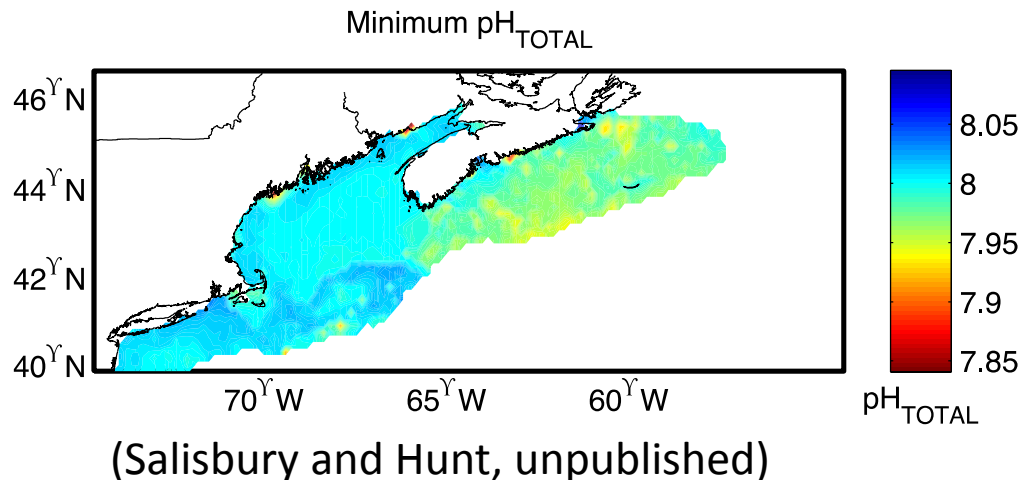
The Gulf of Maine is uniquely susceptible

Limnol. Oceanogr., 58(1), 2013, 325–342
© 2013, by the Association for the Sciences of Limnology and Oceanography, Inc.
doi:10.4319/lo.2013.58.1.0325

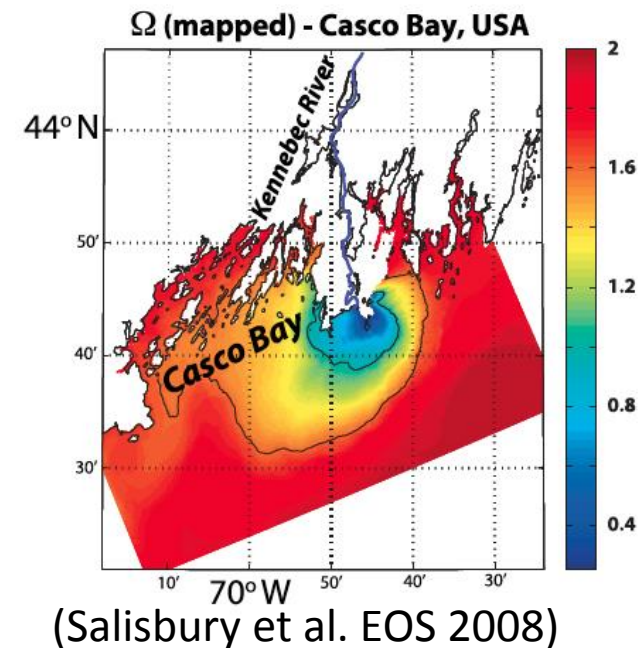
The marine inorganic carbon system along the Gulf of Mexico and Atlantic coasts of the United States: Insights from a transregional coastal carbon study

Zhaohui Aleck Wang,^{a,*} Rik Wanninkhof,^b Wei-Jun Cai,^c Robert H. Byrne,^d Xiping Hu,^e Tsung-Hung Peng,^b and Wei-Jen Huang^c

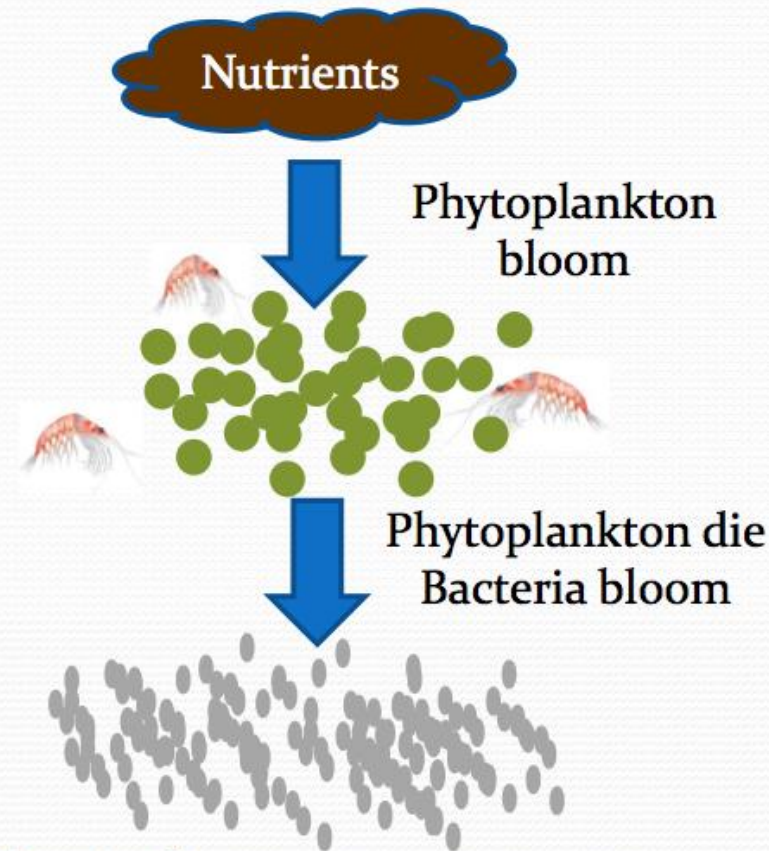
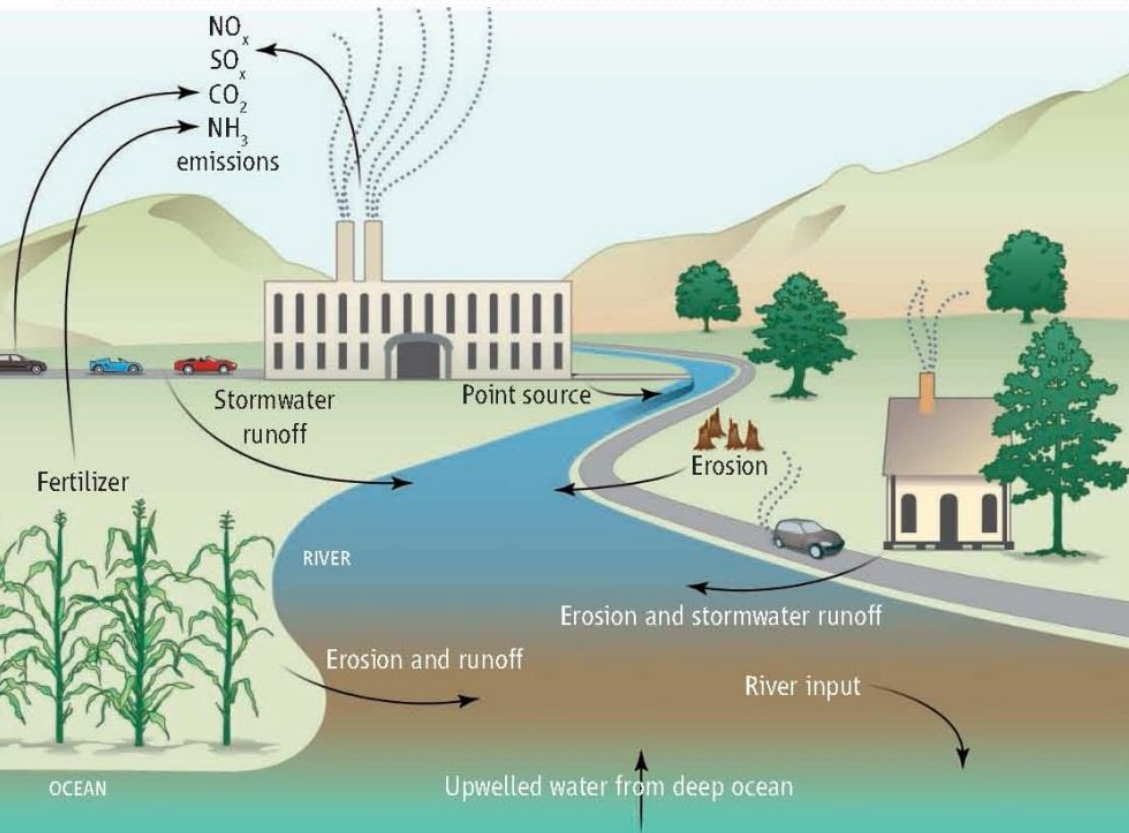
- Cold water absorbs CO₂ more readily
- Colder, fresher water entering GoM from Canada has a lower pH



- Fresh water coming in from many rivers is more acidic
- Semi-enclosed shape may increase residence time



Input of nutrients can cause acidification of coastal waters- “coastal acidification”

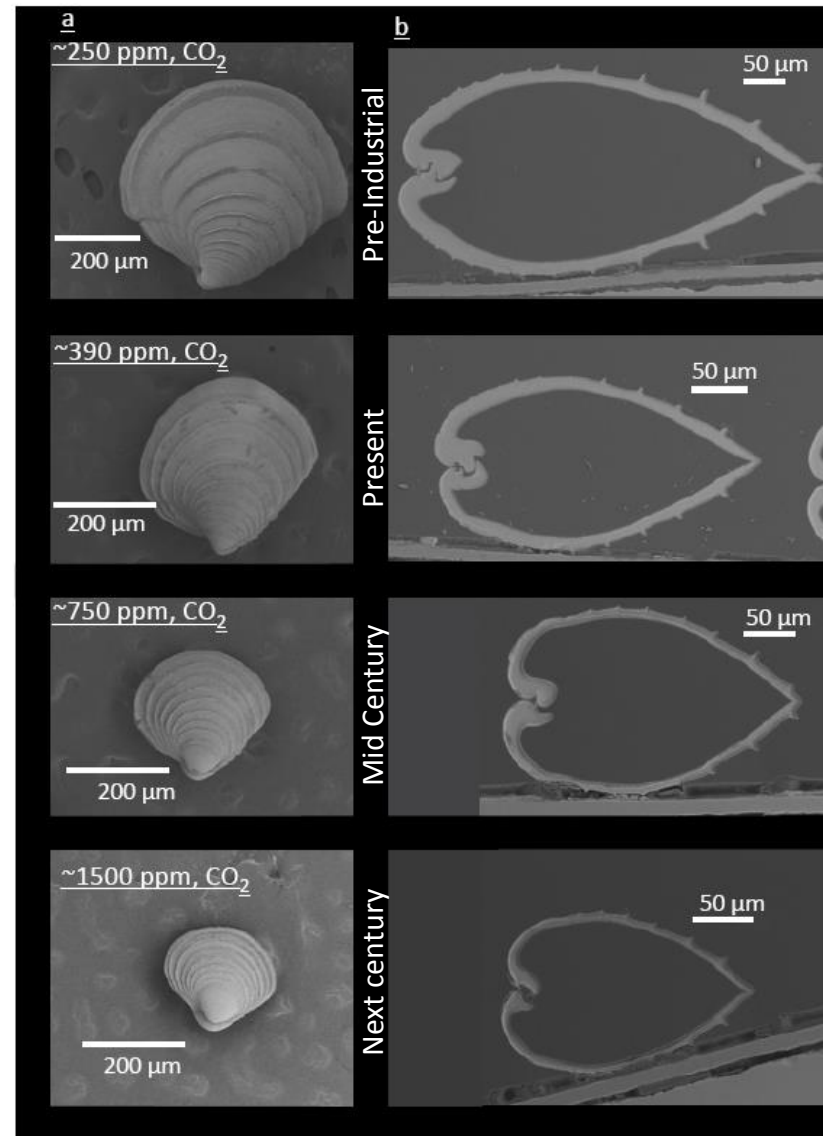
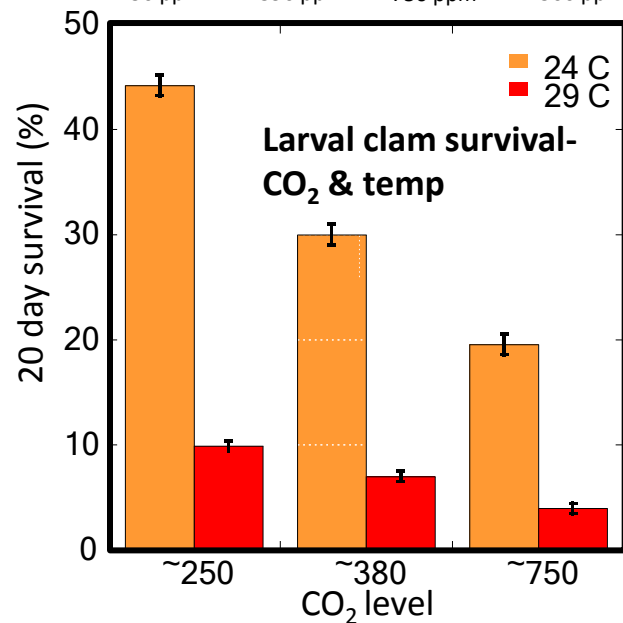
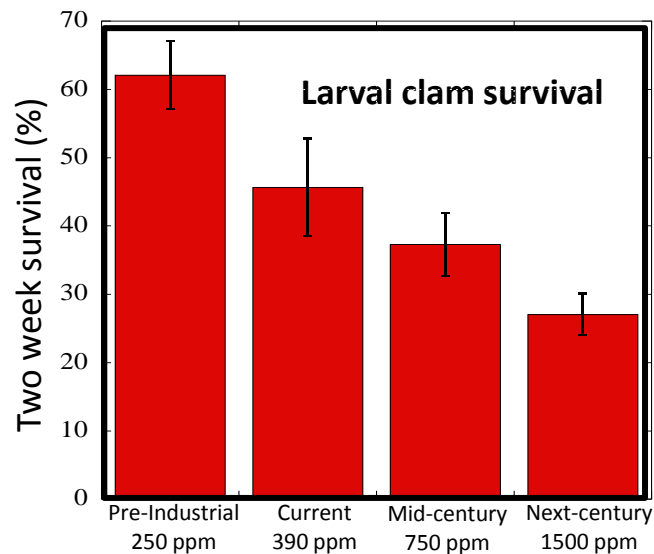


From Kelly et al. 2011. Science.

Bacteria consume oxygen,
respire carbon dioxide

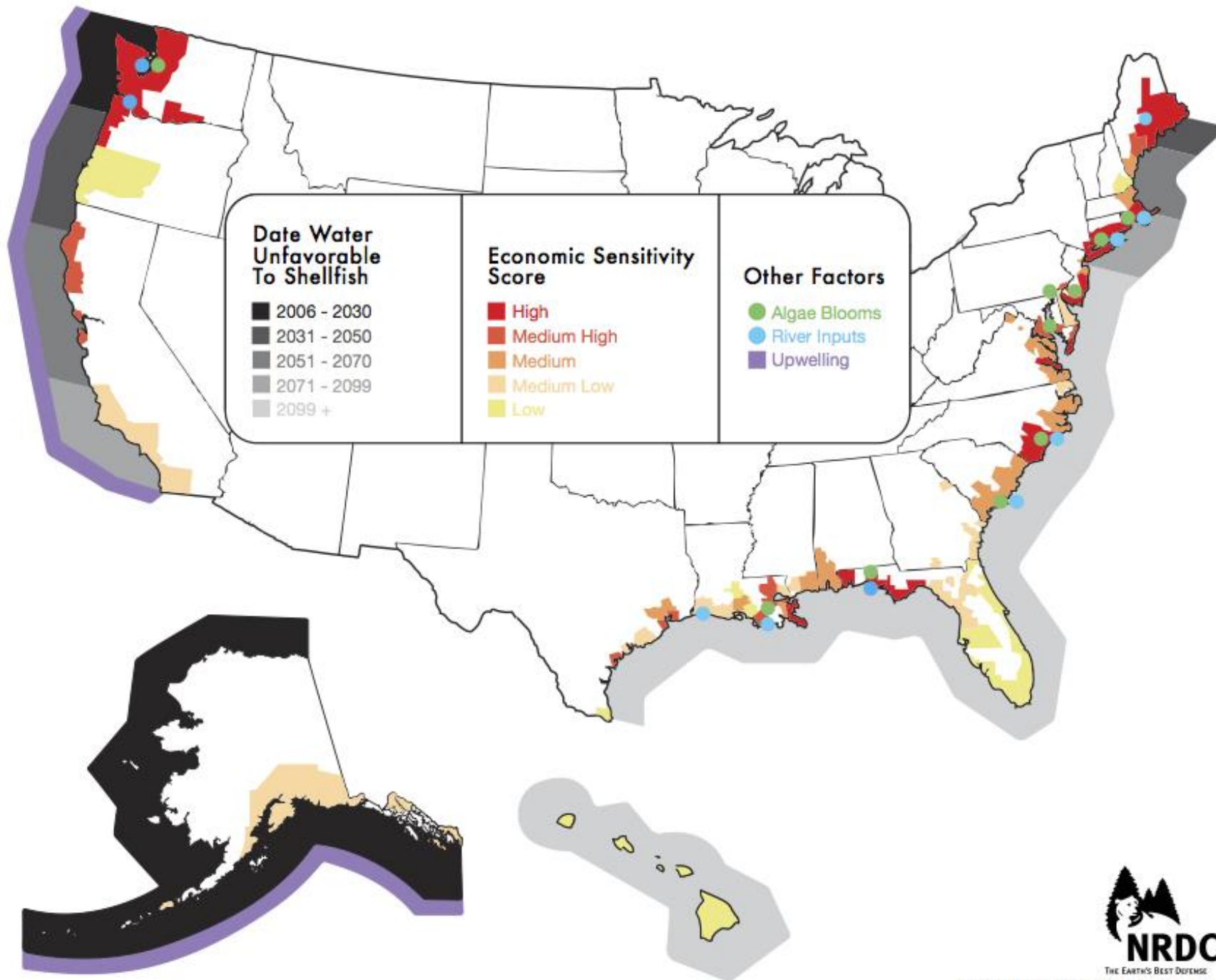
Ocean Acidification Is Already Happening

Past, present and future impacts
on hard clams-



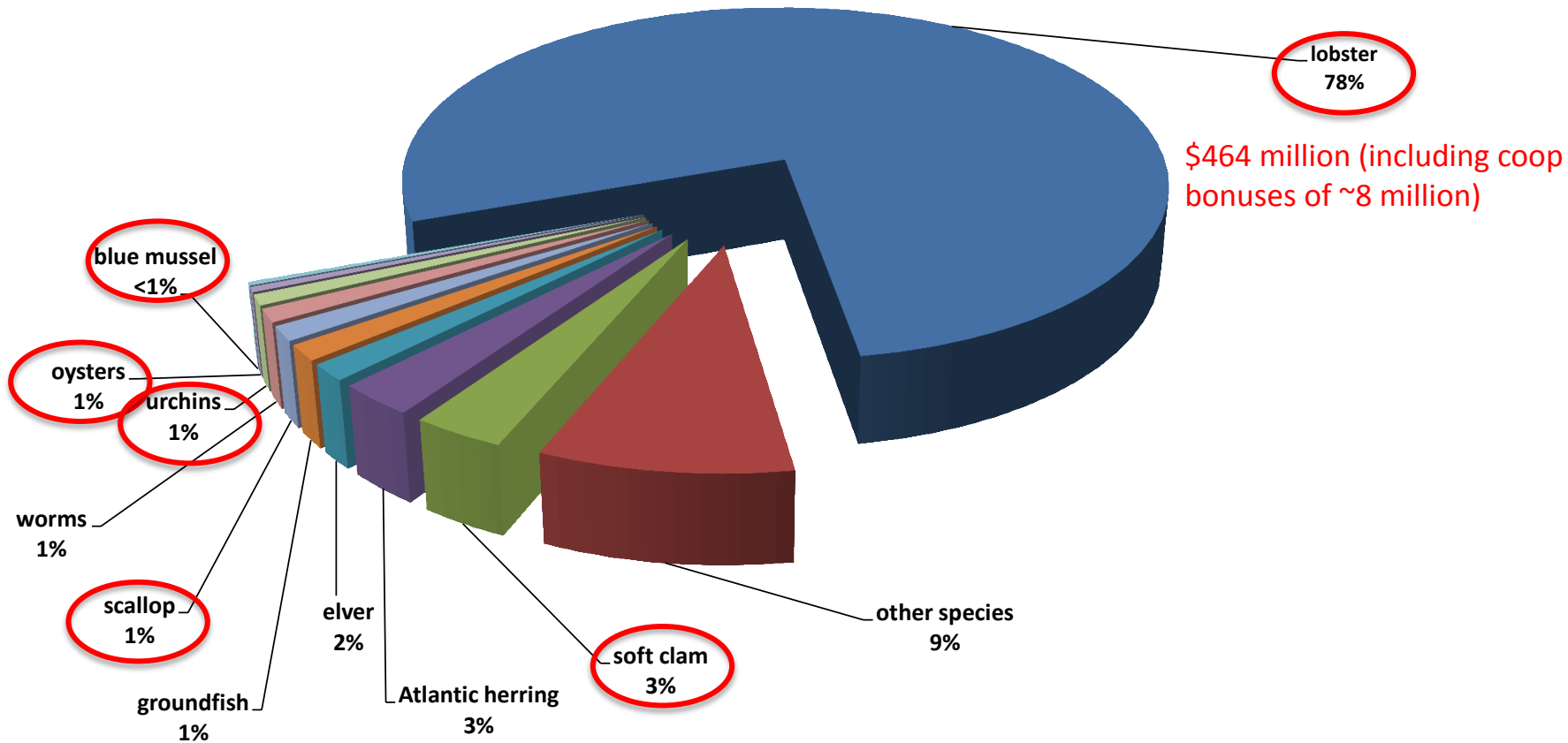
Juvenile clam growth

(Talmage and Gobler, 2010, 2011)



Preliminary 2014 Commercial Maine Landings by Ex-vessel Value

Total \$585,348,370 as of 2/25/15



\$464 million (including coop bonuses of ~8 million)

- over 85% of Maine's fisheries (by landings value) are shell producing species, including lobster, clams, urchins, scallops, oysters, and mussels
- ~7,700 active harvesters targeted shell-building species in 2014

Atmospheric CO₂ and more acidic fresh water raise acidity levels in the ocean.

Potential for marine vegetation to mitigate coastal ocean acidification and improve shellfish sustainability

More acidic ocean water is damaging to shell-forming organisms, threatening shellfisheries.

Seaweed absorbs CO₂, lowering acidity levels and creating a "halo" of improved water quality.

Sugar kelp and mussels

Improved water quality may mean increased shellfish production and higher profits.

Sell seaweed and shellfish for a win-win.

IN ADDITION to sugar kelp and mussels (above), two other natural pairings will be studied for potential benefits (at right).

Scale: $\mu\text{atm CO}_2$ in seawater

280

1,100

pre-industrial

year 2100 (est.)

