



TRIBAL (SHELL)FISH HATCHERIES AND CLIMATE CHANGE ADAPTATION

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Chugach Regional Resources Commission
Alutiiq Pride Shellfish Hatchery



ALUTIIQ PRIDE SHELLFISH HATCHERY SEWARD, AK





Ocean Acidification & Shellfish Research
Laboratory at the Alutiiq Pride Shellfish Hatchery

Seward, Alaska



APSH in relation to Resurrection Bay



APSH: Quick Facts



- The hatchery opened in 1992.
- CRRC opened the hatchery to develop a region-wide mariculture program.
- The State of Alaska's genetic policy requires stocks to stay within their larval drift zones.
- APSH's main sources of funding come from a BIA 638 compact contract, seed sales and research grants.

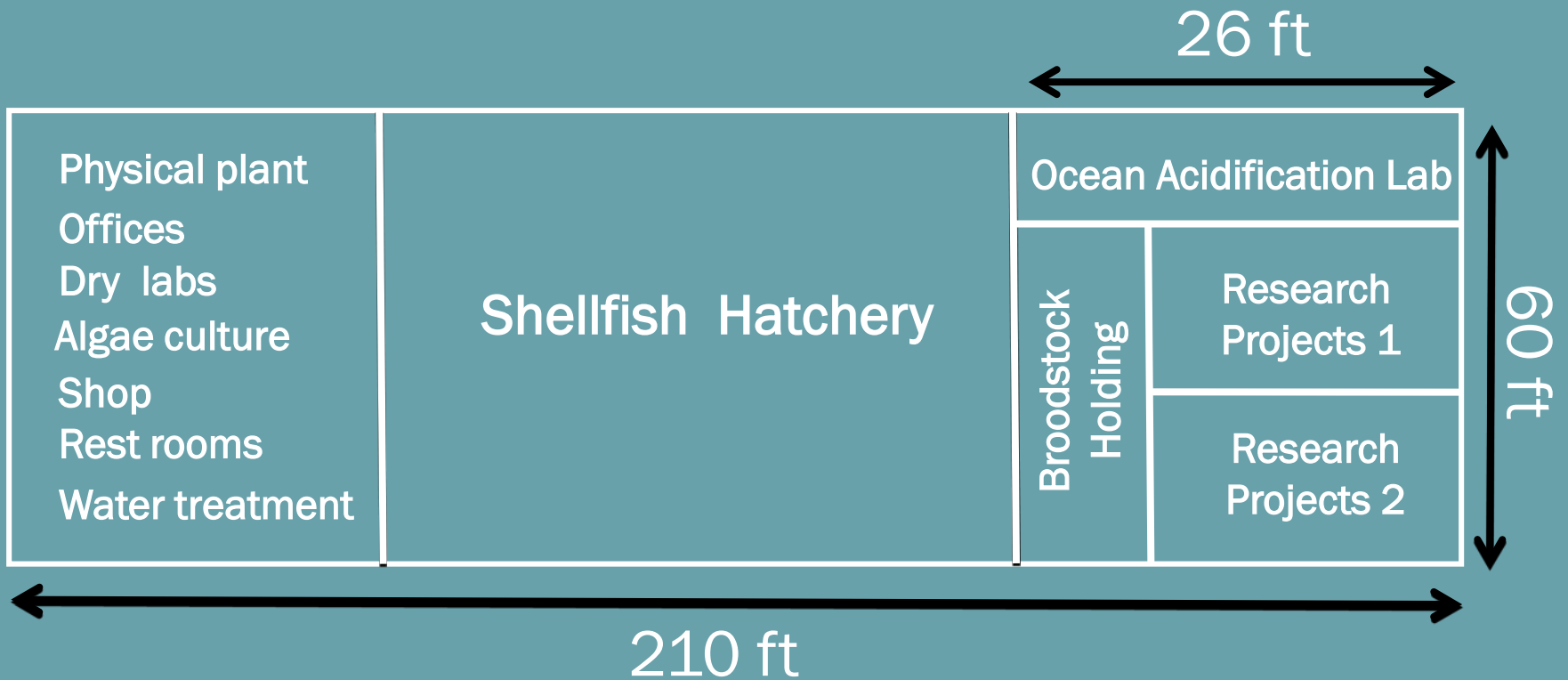
Animals grown at APSH



Littleneck clams

- (1) Pacific oyster *Crassostrea gigas*
- (2) Geoduck clams *Panopea generosa*
- (3) Basket cockle *Clinocardium nuttallii*
- (4) Pacific Razor clam *Siliqua patula*
- (5) Littleneck clam *Protothaca staminea*
- (6) Purple hinge rock scallop *Crassodoma gigantea*
- (7) Blue King crab *Paralithodes platypus*
- (8) Red King crab *Paralithodes camtschaticus*
- (9) California sea cucumber *Parastichopus californicus*
- (10) Pinto Abalone *Haliotis kamtschatkana*

Hatchery Floor Plan



Hatchery Layout

Water Filtration



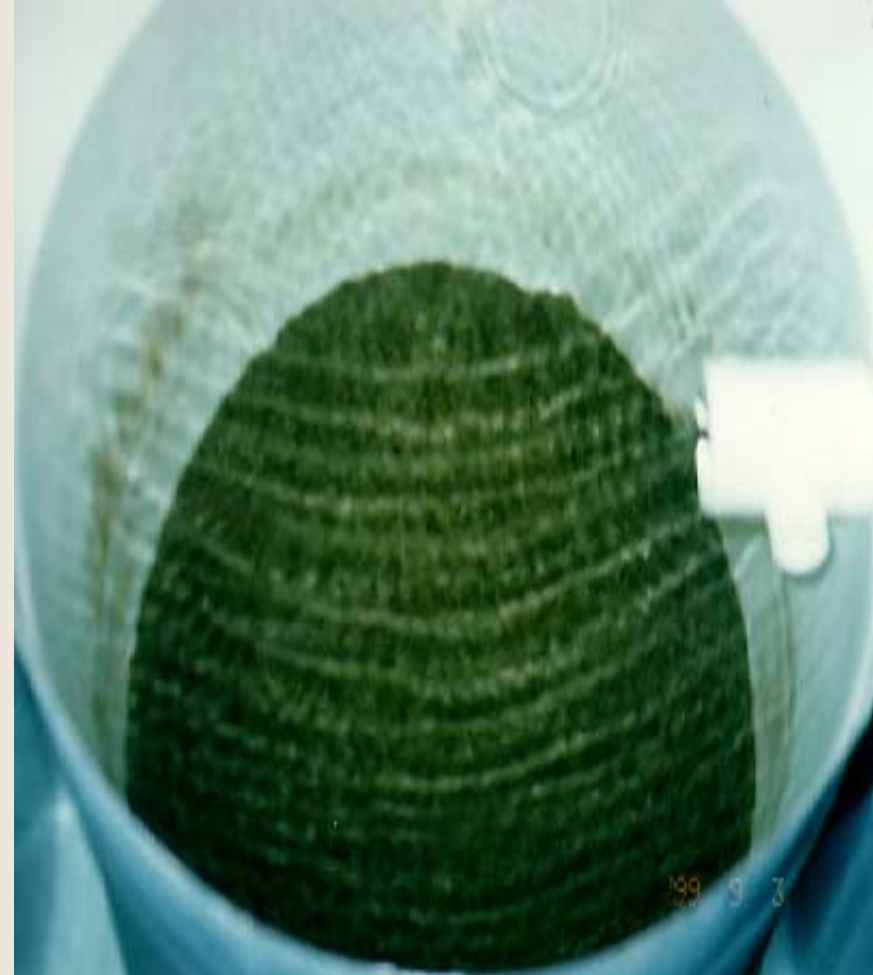
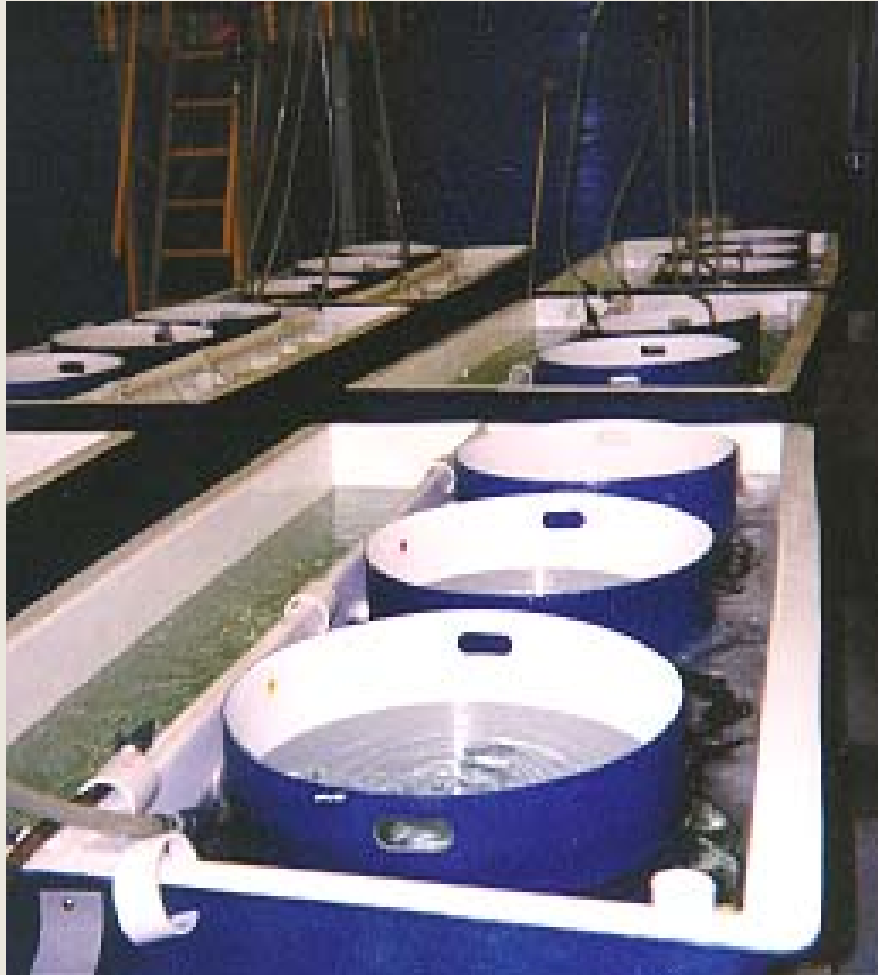
Water Sterilization



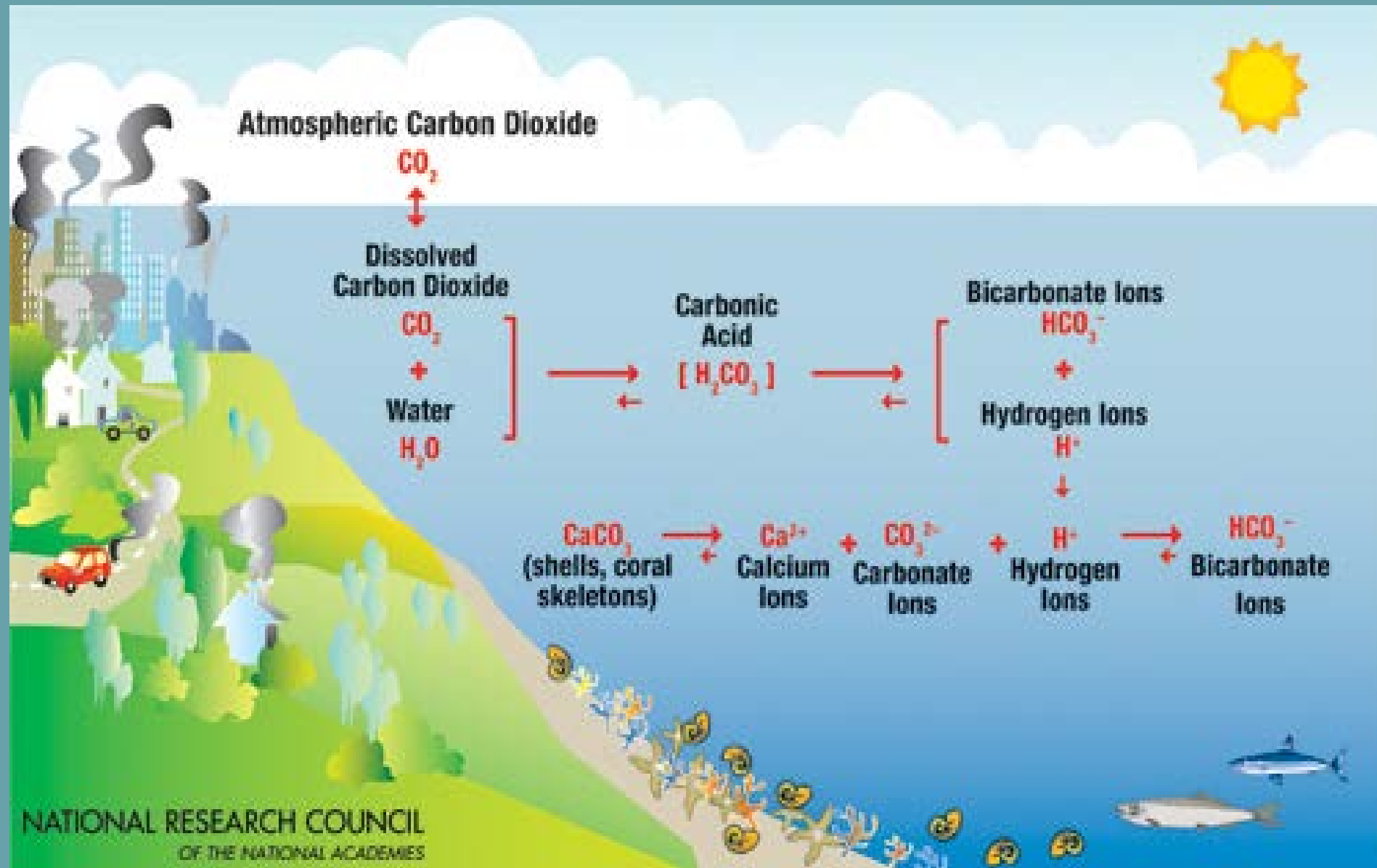
Algae Culture



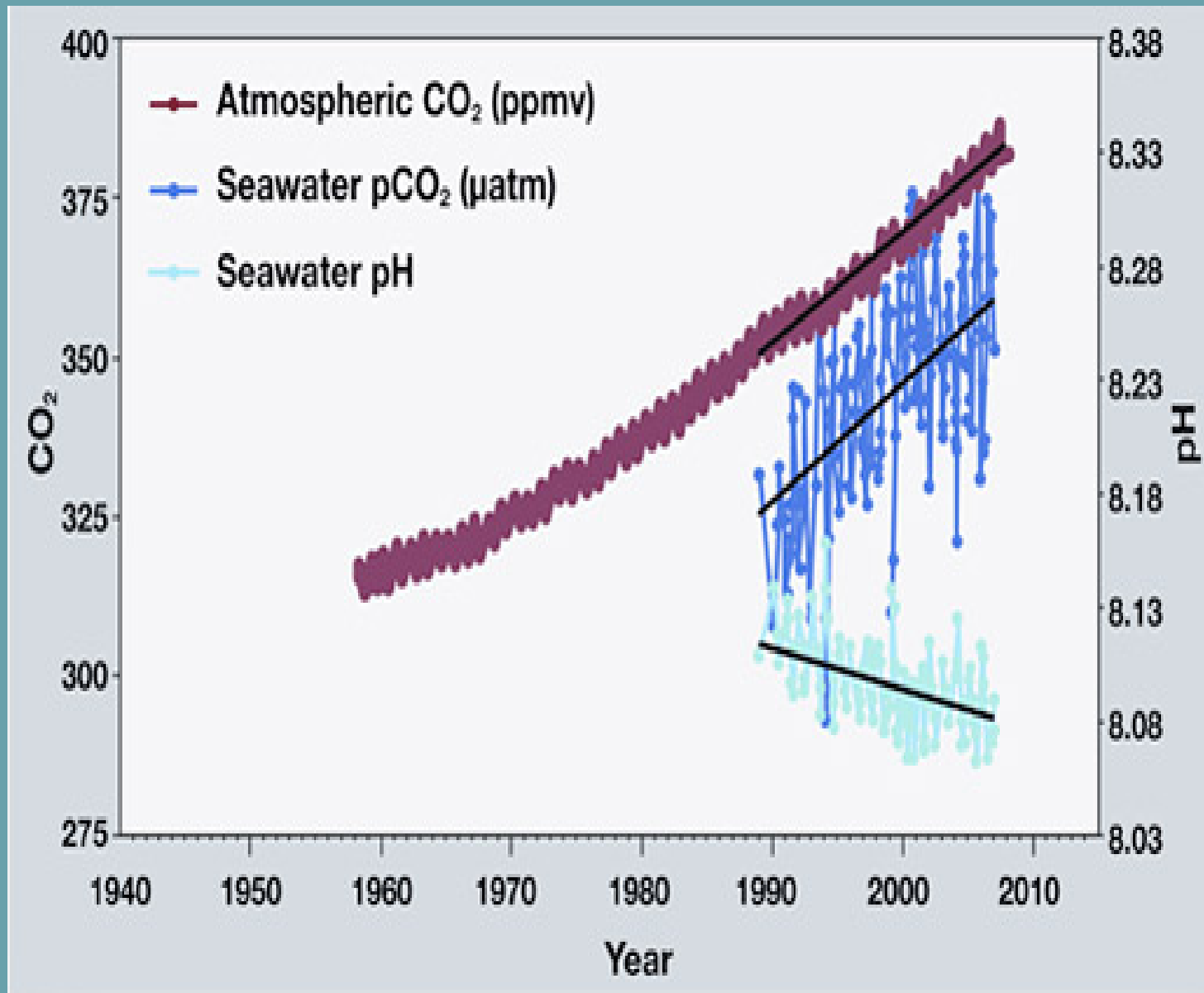
Larva Setting & Nursery Culture



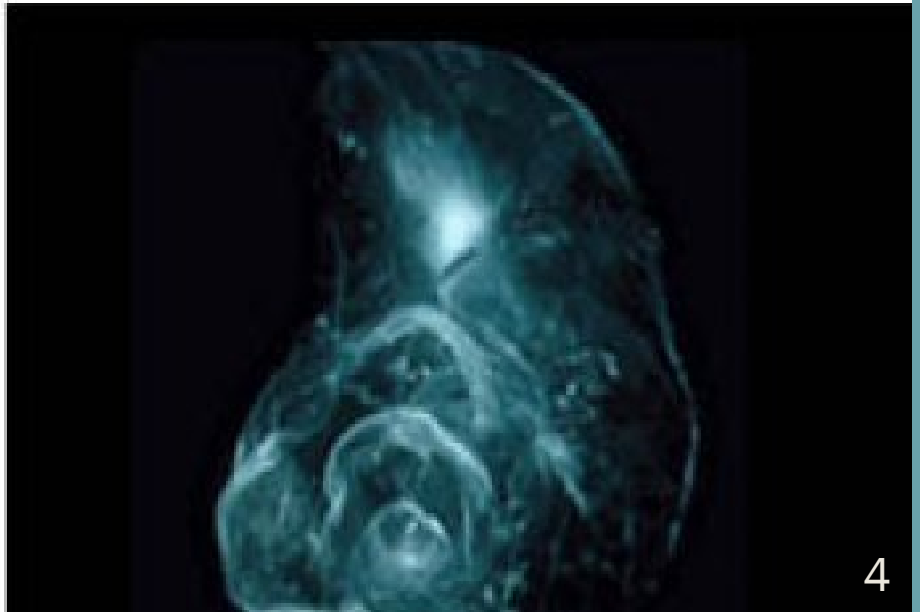
Ocean Acidification



Ocean Acidification



Ocean Acidification



Ocean Acidification & Shellfish Research Laboratory



Ocean Acidification & Shellfish Research Lab



OA Sampling Sites on the Kenai Peninsula

Burke-o-lator

Invented by Burke Hales,
Oregon State University

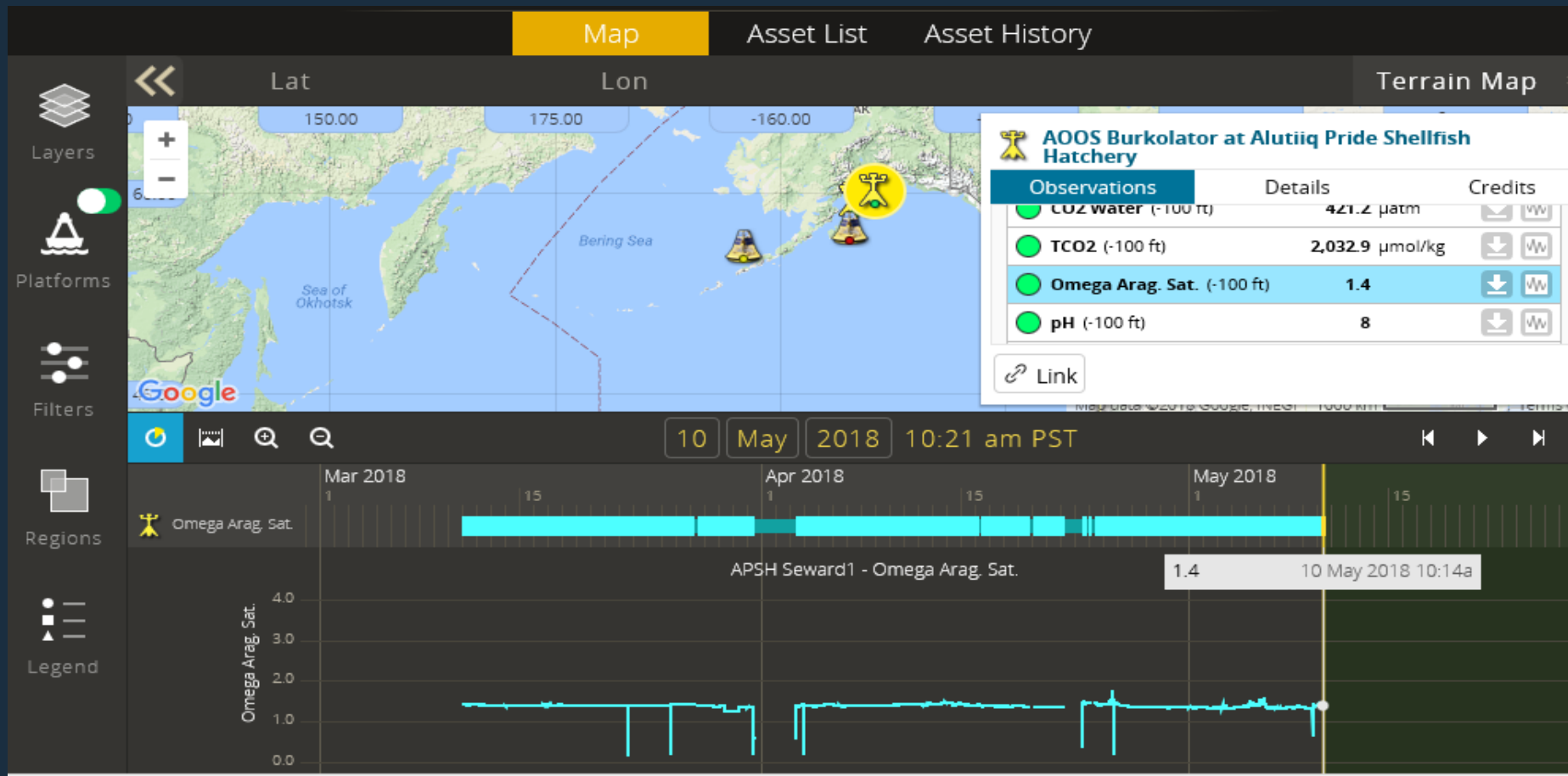
Allows the hatchery to
continuously monitor
multiple ocean
parameters,
distribute that data in
real time, test
discreet samples, and
dose the water tanks.



Two Data Portals

1) <https://portal.aaos.org/real-time-sensors.php>

2) <http://www.ipacoa.org/>



Nearshore Sampling

2015 BIA grant: Monitoring for ocean acidification near coastal villages and communities in Southcentral Alaska: Building Capacity and Assessing Vulnerability

- Community involvement
- Integrates nearshore and offshore
- Fills potentially important data gaps
 - '64 earthquake, '89 oil spill, climate change



The kits contain:
Protocols, bottles, caps & cappers,
paint pens, thermometers, sample
logs, and fixative.



Alutiiq Pride Shellfish Hatchery
Ocean Acidification Existing & Proposed Network

APSH is now processing seawater samples collected on a weekly basis by citizen scientists from Alaska Native communities around Southcentral Alaska following established protocols using APSH produced field kits.

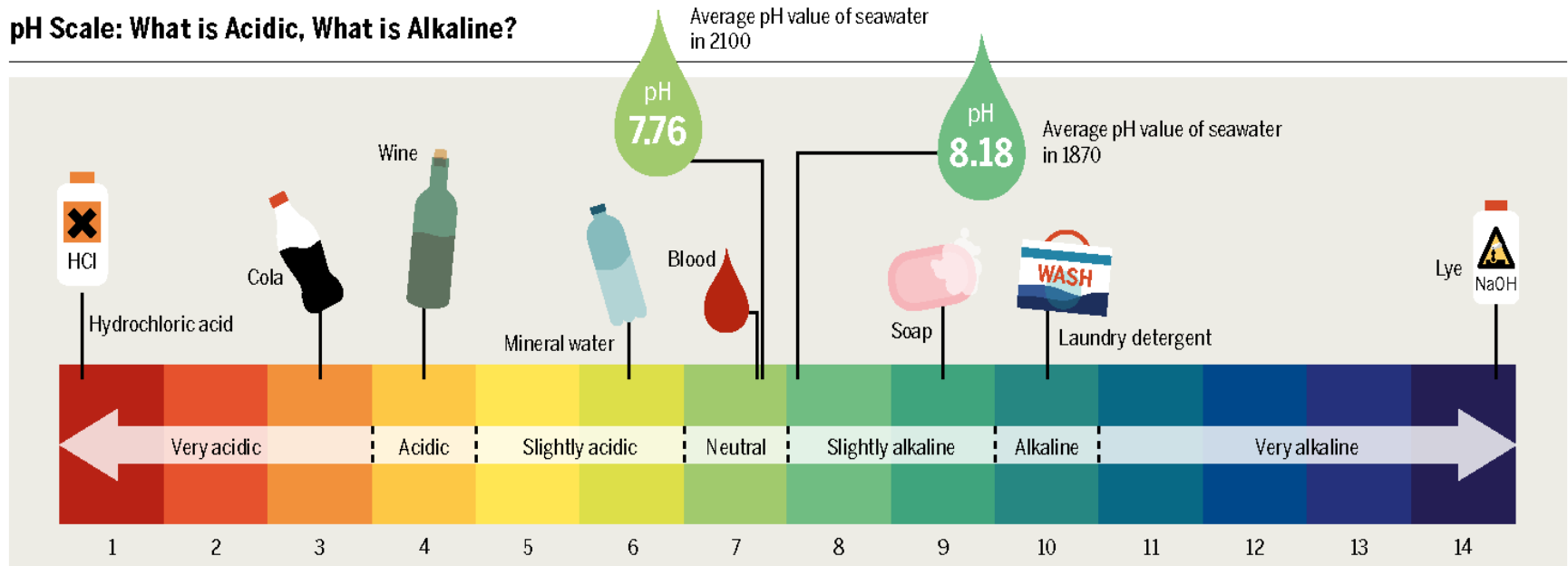
Pore Sampling



Pore sampling in Seldovia, Alaska

Climate Change Adaptation: Tank Dosing

pH Scale: What is Acidic, What is Alkaline?



The difference may seem small, but the decline in the pH value from 1870 to 2100 would mean a 170 percent increase in acidity. Much smaller changes already pose problems for many sea creatures.

- Burke-o-lator gives us the capacity to measure water chemistry
- Adding soda ash increases the pH

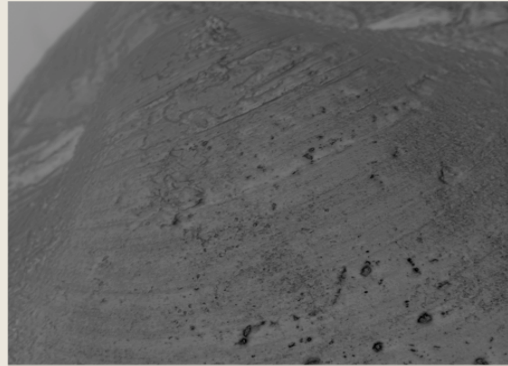
Climate Change & Traditional Foods

“While traditional foods restore physical health, they are also central to cultural and spiritual traditions. Healthy and productive people are the cornerstone of our healthy communities. The intrinsic value of harvesting and consuming local food in traditional ways cannot be over stated.”

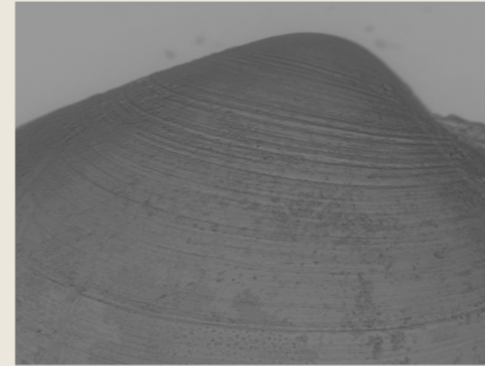
- Patrick Norman, Chief of Port Graham

A local statement is,
“when the tide is out, the table is set.”

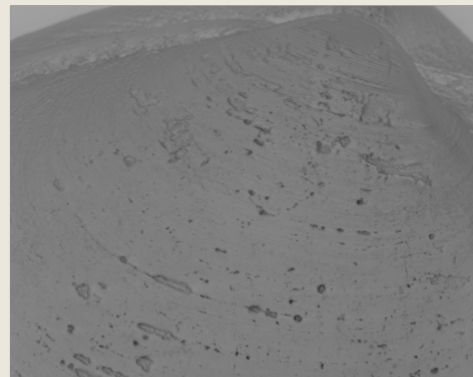
Arctic waters contain higher concentrations of carbon dioxide than tropical or temperate waters, making them more susceptible to **ocean acidification**.



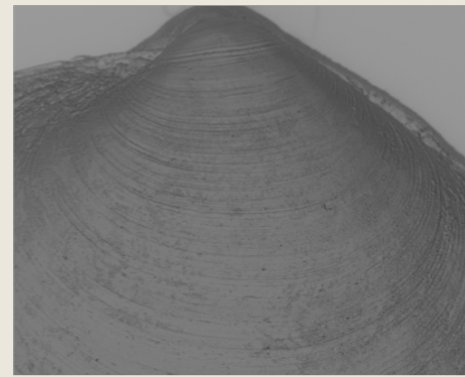
Dissolution of shell



Healthy shell



Dissolution of shell



Healthy shell

APSH Next Steps



Jeff Hetrick, *Director of APSH*

Expand sampling program to new communities

Compare sample results from across the state to identify patterns over space and time

Provide information to shellfish farmers, local residents, regulators, and policy makers

Determine what kind of additional adaptation(s) may be needed in the future

Kelp as a climate change mitigation technique



Thank you!

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