Name_____

DATA Nugget

Working together to monitor ocean acidification

Featured scientists: Chugach Region Ocean Monitoring community members with Alutiiq Pride Marine Institute. Written by Melissa Kjelvik.

Research Background:

Subsistence living is an important part of culture in the Chugach region of Alaska. For many people, fishing and gathering food are part of everyday life. This lifestyle has been around for thousands of years and is especially important in remote Alaska Native communities. Along the coast, subsistence living includes collecting seafood like shrimp, clams, fish, and kelp from the ocean, as well as harvesting plants and animals on land.



Water sampling at a boat harbor. Photo Credit: Vicki Heisser

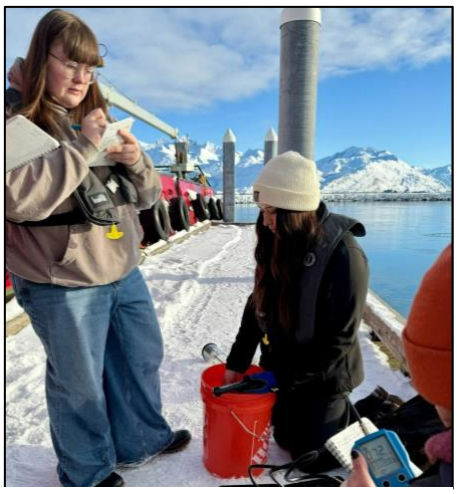
With strong ties to the environment, people who gather their own food are often very aware of changes in the environment and are careful to not overharvest. Recently, people living in the Chugach region have noticed changes in the ocean environment and are concerned about how these changes might affect their way of life. If communities can no longer harvest local resources for food, the impacts would be significant both culturally and economically.

One concern in this area is **ocean acidification**. Scientists have found that seawater is becoming more acidic in many areas around the world. This change is linked to human activities that release large amounts of carbon dioxide into the atmosphere. While most of this carbon dioxide remains in the air, about one-third of it is absorbed by the oceans. When carbon dioxide dissolves in seawater, it reacts with water to form carbonic acid. If more and more carbon dioxide is absorbed by the ocean, the water will become increasingly acidic.

Unfortunately, even small changes in ocean acidity can harm marine life. Animals that form shells, such as molluscs, clams, shrimp, and crabs are important for marine ecosystems, but very vulnerable. Acidic water can weaken their shells, making it harder for them to grow and survive. On top of that, the minerals needed for them to build and strengthen their shells, such as **aragonite**, become less available in acidic water.

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Based on concerns from local residents, Alutiiq Pride Marine Institute (APMI) started a community monitoring program that continues today. APMI started by finding environmental samplers in their region. These community members were trained to follow standard protocols for collecting data and water samples. Samplers go to the same site many times each year and then send the water samples to the APMI lab to be analyzed.



Community samplers going out in the winter. Photo Credit: Vicki Heisser

One variable that APMI looks at is **aragonite saturation** levels. When a sample has a saturation value above 1, there is aragonite available in the water for animals to build shells. When the saturation is below 0, there is not enough aragonite to build shells, and they can become very weak. Animals that build shells are most likely to survive when the saturation level is 3 or greater.

Their goal is to work together to document patterns in ocean acidification. APMI shares their results with the communities so they can have conversations about how the changing ocean will affect their lifestyle.

Scientific Question: How are aragonite levels changing in ocean water across Chugach communities? Which communities might be impacted by ocean acidification and its effects on shellfish?

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Scientific Data:

Use the data below to answer the scientific question:

Sampling Site	Year	Average aragonite saturation
Cordova	2022	1.14
Cordova	2023	1.53
Cordova	2024	1.68
Port Graham	2023	1.56
Port Graham	2024	1.32
Seldovia	2023	1.38
Seldovia	2024	1.65
Seward	2018	1.58
Seward	2019	1.44
Seward	2020	1.58
Seward	2021	1.61
Seward	2022	1.74
Seward	2023	1.41
Seward	2024	1.27

Note: Aragonite saturation levels above 3 are ideal for organisms with shells. Values below 1 will cause shells to become weak.

What data will you graph to answer the question?

Independent variables(s): _____

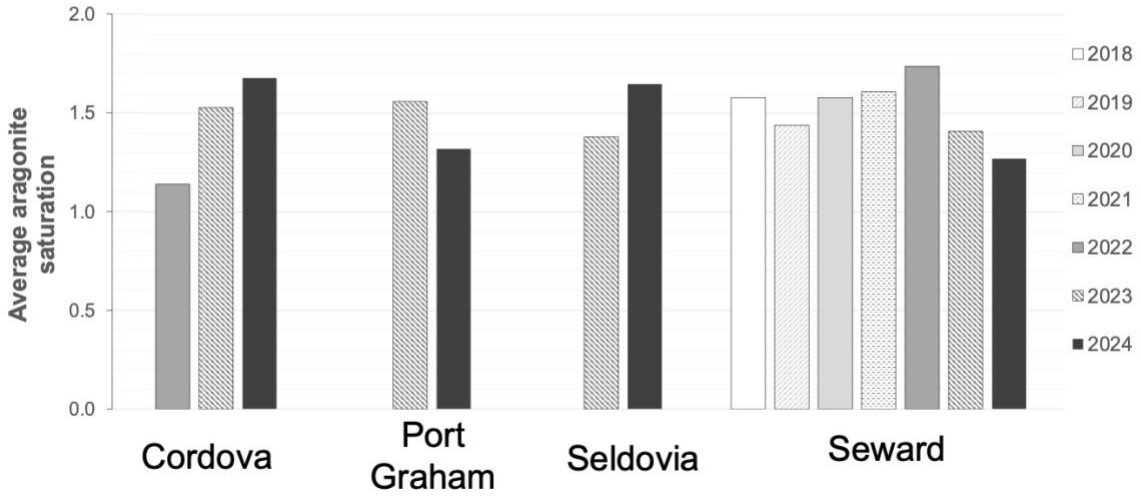
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Dependent variable: _____

_____

Name_____

Draw your graph below: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see and write one sentence describing what you see next to each arrow.



Interpret the data:

Make a claim that answers the scientific question.

What evidence was used to write your claim? Reference specific parts of the table or graph.

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about aragonite and ocean acidification.

Name_____

Apply this research: Partnerships between residents who live in communities and research labs have lots of benefits. Community members provide input on what is important for them to know about their environment. By having trained samplers in many communities, more data can be collected.

Imagine you are starting an environmental monitoring program in your community. What would be the focus of your monitoring? What research questions would you be addressing?

What data should be collected as a part of your monitoring program?

Independent variable(s): _____

Dependent variable(s): _____

For each variable, explain why you included it and how it could be measured.