



Belugas Out of Balance

Are there enough individuals of reproductive age in the Cook Inlet beluga population to promote recovery without human intervention?

RESEARCHER BIO:



Kaimyn O'Neill, BS

Kaimyn discovered her passion for genetics through her previous college coursework, and is now pursuing a career in marine conservation genetics! She is currently developing an epigenetic clock for Hector's dolphins and Maui dolphins for her master's thesis research with OSU and is using the same methods as the beluga epigenetic research.

TEACHER BIOS:



Erica Street - BA, MA

Erica teaches Biology, Chemistry, and Yoga at North Bend High School. She received her BA in Biology from Wells College and her MA in Math and Science Education from the University of California at Berkeley. This will be her 25th year of teaching.



Carisa Ketchen-BS, MSSE

Carisa teaches Biology, Chemistry, Anatomy, Marine Science, and AVID at Toledo Jr/Sr High School. She received her BS in Natural Science and Earth and Space systems from Lewis-Clark State College and a Masters in Science Education from Montana State University. This will be her 11th year of teaching.

CLASSROOM:

This unit is designed for high school students in 9th-12th grades. Functional for in person or virtual classrooms.

Science Standards:

[HS-LS2-1](#) (AST 1.4): Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

[HS-LS2-2](#) (AST 1.1): Plan and conduct an investigation that uses mathematical representations to support explanations about factors affecting biodiversity and populations in ecosystems of different scales.

Science & Engineering Practices: Use mathematical representations of phenomena or design solutions to support and revise explanations.

Disciplinary Core Ideas: LS2.A: Interdependent Relationships in Ecosystems Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease.

Crosscutting Concepts: Scale, Proportion, and Quantity The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.

Math Standards:

HD.MP4 Model with mathematics.

HS.MP.2 Reason abstractly and quantitatively.



Photo by Saanvi Vavilala on Unsplash

ANCHORING PHENOMENON:

Are Belugas still out of balance? Scientists from Oregon State University are researching a specific population of these whales that reside in Cook Inlet Alaska, using epigenetic techniques to find out if their current population and age structure is viable and sustainable. Students will learn about beluga ecology, how scientists analyze populations, and epigenetics, and will apply their new knowledge as they create an action plan for beluga stewardship.

THIS MARINE RESEARCH MATTERS:

Not all beluga populations are endangered. Scientists need an accurate picture of how the population structure is changing so that they can make informed decisions about management and stewardship. In the past, analyzing teeth from dead whales was the only way to assess age and approximate the age structure of the population. Epigenetic analysis is a game-changer because it allows age data to be collected before death.

OUR ORSEA PARTNERSHIP:

We all gained an appreciation for the challenges of studying vulnerable marine populations, and helping students engage with these issues in a scaffolded way. Students will gain a practical understanding of the challenges facing wildlife biologists. Together our ORSEA partnerships create meaningful, collaborative, and ongoing relationships that interconnect current research, meet education standards, and provide opportunities our students wouldn't have otherwise.

LEARNING PLAN COMPONENTS:

ENGAGE:

Introduce students to the anchoring phenomena that provides background information on the decline of the specific belugas that live in Cook Inlet Alaska.

[Beluga Introductory Video](#)

EXPLORE:

Students will complete the following three activities for interactive background information:

[Beluga Virtual Tour](#)

[Power of the Pyramids](#)

[Explore the Epigenome](#)

EXPLAIN:

Students will describe species at risk, the issues that cause them and determine/predict trends for the population at risk. An introduction of how researchers use epigenetics to determine age, gender, and genetic history to model and predict the future of this species.

[Epigenetic Clocks](#)

ELABORATE:

Students will apply their understanding of population pyramids and attempt to use it to analyze the structure of the Cook Inlet beluga population using the ages determined by the Oregon State researchers using epigenetic clock data.

[Beluga Population Pyramids](#)

EVALUATE:

Students will create an action plan that acknowledges the issues of this population, researches what practices are currently in place, how to potentially improve these practices, and what else can be done to ensure the survival and long-term success of the Cook Inlet beluga whale population.

[Action Plan](#)