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Marine Invasive Species Learning as a Component of Bering Sea Days, St. Paul Island

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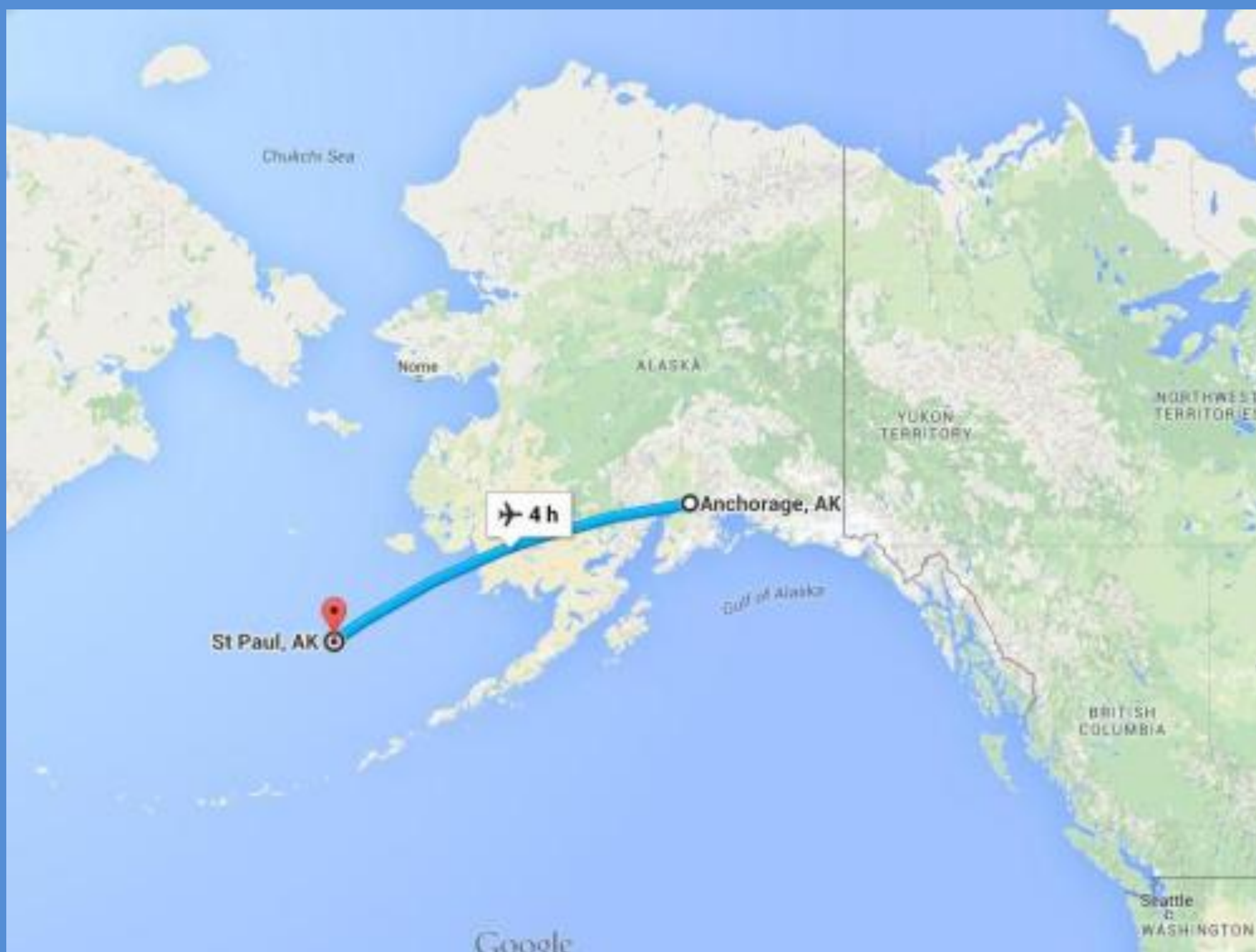
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Introduction

Bering Sea Days is a week long education program held at the school on St. Paul Island (see map), with visiting scientists leading classes and field trips on a range of subjects. The 10th Annual Bering Sea Days was held October 9-14, 2017. The Arctic Council adopted the Arctic Invasive Alien Species (ARIAS) Strategy and Action Plan in 2017, recommending monitoring for invasive species as human activities increase in the Arctic. Community-based monitoring is encouraged as a method to expand invasive species monitoring in the Arctic. We worked with the St Paul School District and Aleut Community of St. Paul Island to begin community-based invasive species monitoring on St. Paul and integrate new lessons on invasive species into Bering Sea Days.



Location of St. Paul Island, Alaska with direction and flight time from Anchorage, Alaska.
<https://birdingforlife.wordpress.com/tag/st-paul-island/>

Objectives

- ❖ Establish marine invasive species monitoring in an Arctic coastal community in support of the objectives of the Arctic Council ARIAS Strategy using the Smithsonian Environmental Research Center's Plate Watch Program.
- ❖ Implement an educational outreach component of the Alaska Center for Conservation Science Bering Sea Marine Invasive Species Risk Assessment.
- ❖ Develop a set of lessons for the K-12 Bering Sea Days science learning event, focused on marine invertebrate fouling communities.

Acknowledgements:

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The findings and conclusions in the paper are those of the authors and do not necessarily represent the views or official position of the Department of Commerce, the National Oceanic and Atmospheric Administration, or the National Marine Fisheries Service.

Methods

- ❖ An invasive species tag game based on “sharks and minnows” was developed with European green crab as the “minnows”, invading St. Paul from the mainland and currents and fish predators as the “sharks”. In the second round of play, European green crab are attached to boats that made them more difficult to tag, illustrating the effect of human vectors in facilitating the spread of invasive species.



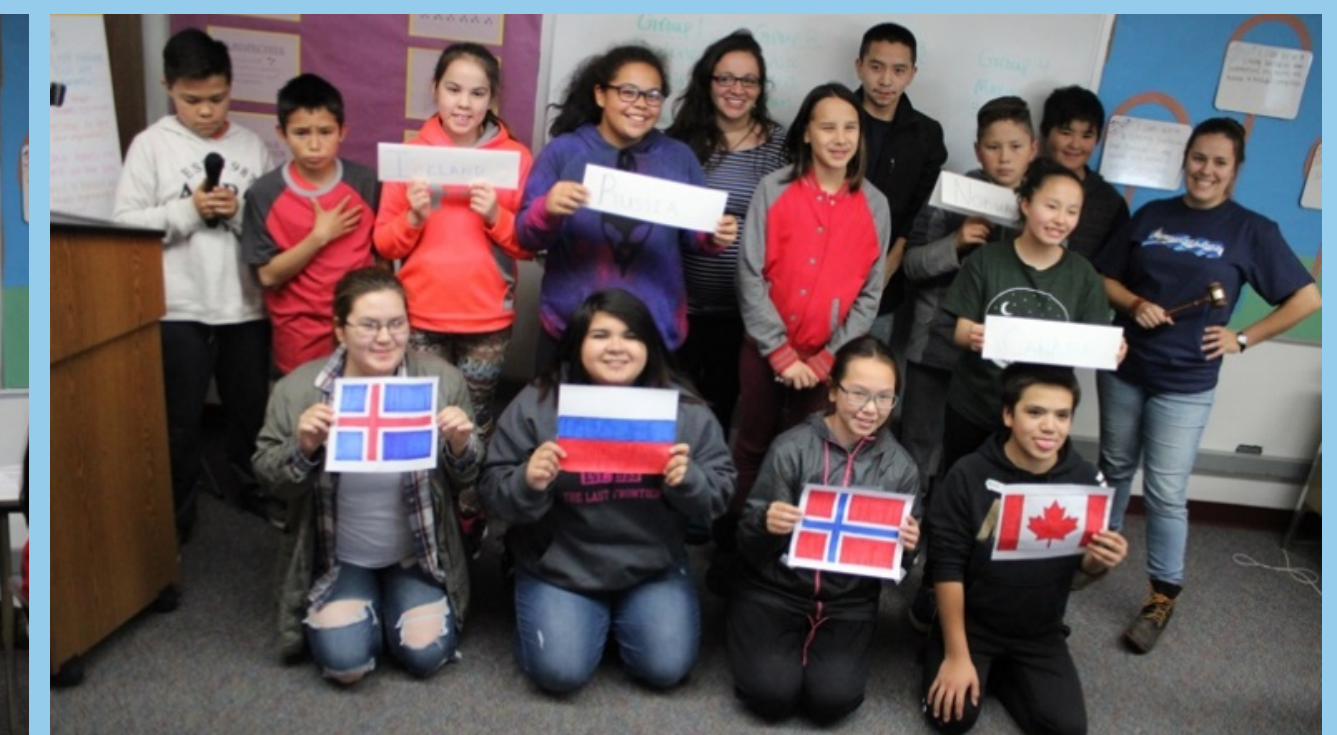
- ❖ An invertebrate lecture and laboratory worked with live native invertebrate organisms collected from St Paul, followed by a field trip to the harbor to collect physical data and learn about the Plate Watch program to monitor for marine invasive invertebrates.



- ❖ The ballast water invasive species forensic game involved each student sailing their “vessel” of hydrochloric acid to worldwide “ports”, and exchanging their “ballast”. One “infected” port contained hydrogen peroxide instead of hydrochloric acid that would reveal an infestation by turning pink instead of yellow. Based on their “log books” documenting the order of ports they visited, students were challenged to determine which was the “infested” port.



- ❖ An Arctic Council simulation placed 6-12 grade students into delegations from four of the eight Arctic Council nations: Iceland, Norway, The Russian Federation, and Canada. Delegations were tasked with negotiating a mock proposal about invasive species monitoring and ballast water reporting recommendations for the Arctic Region during a simulation of a working group meeting. Younger students learned about Arctic geography.



Outcomes

- ❖ A marine invasive species monitoring station for the Plate Watch program was established on St. Paul Island and integrated into the invasive invertebrate lesson, lab and field trip.
- ❖ An invasive species tag game based on a hypothetical green crab invasion was successfully held with the 4th and 5th graders
- ❖ An Arctic Council simulation was held with students in grades 6-12. Students participated as “representatives” from four of the eight Arctic States and learned how the Arctic Council is structured and how decisions about ballast water management in the Arctic might be made. Arctic geography lessons were held with Pre-K and 2nd and 3rd graders.
- ❖ Arctic geography lessons were held with Pre-K and 2nd and 3rd graders.
- ❖ An invasive species forensics game for spread of invasive species by ballast water from visiting different world ports developed by Kendra Bush St. Louis with the U.S. Fish and Wildlife Service was held for 4th and 5th graders and 6th through 12th graders.
- ❖ Students expressed understanding of the concepts taught in these lessons throughout the week demonstrating they had learned the teaching points of the exercises.