

## **Kachemak Onboard Oceanography Program Addressing Education Standards**

The Center for Alaskan Coastal Studies is committed to the excellence in its school education programs embodied in national and state standards for content, teaching methods, and assessment. Meeting these standards will require a long-term process of systemic reform and our cooperation with teachers, school systems and education support communities. Our field-based program presents students with powerful experiential learning opportunities, however preparation and follow-up are critical to ensure the student achieves understanding of the concept. We also recognize that while single teaching activities and units can address multiple objectives in relation to content, full understanding of the concept described by each standard will likely require repeated exposure to the concept in a variety of ways.

As a first step, we have identified state science content standards that our Kachemak Oceanography program currently targets. We welcome feed-back from teachers as to the pre- and post-field trip activities they use to address these learning objectives. We plan to compile this information into a resource for other teachers and educators.

At the core of the national science standards is the promotion of inquiry-based science. They recommend less emphasis on knowing scientific facts and information and more emphasis on understanding scientific concepts and developing abilities of inquiry. In terms of learning activities, they recommend less emphasis on activities that demonstrate and verify science content and more emphasis on activities that investigate and analyze science questions; less emphasis on getting an answer and more emphasis on using evidence and strategies for developing or revising an explanation; less emphasis on providing answers to questions about science content and more emphasis on communicating science explanations. Our programs have embraced this philosophy.

The Kachemak Bay Oceanography programs are extended inquiries into the question of which physical and biological characteristics of the ocean environment are related to the requirements of different marine invertebrates during their life cycle. The shorter program focuses more on Tanner crabs which occur naturally in Kachemak Bay. The longer program focuses more on the Pacific oyster which is not a native species but which is farmed in Kachemak Bay. Students review the biological and chemical requirements of the species and develop their inquiry skills by collecting information and comparative data in a variety of ways. They develop and investigate a series of science questions: Where in the bay is the desirable range of salinity, pH, and water temperatures for crabs and oysters and the plankton upon which they depend for food? How do the currents in Kachemak Bay move the plankton, including crab larvae, around in the bay? As they collect and eventually analyze their data, they use the evidence to develop and communicate the explanation of the factors that predict the best conditions for growth and survival of crabs and oysters.

The Alaska Science Standards are comprised of broad content standards in the areas of specific content (facts, concepts, principles, and theories), skills of scientific inquiry, the nature and history of science, and the application of scientific knowledge and skills to make reasoned decisions about the use of science and scientific innovations.

## Alaska State Standards Addressed

The Kachemak Bay Onboard Oceanography program is an extended science inquiry that addresses the following Alaska State Science Content Standards (**areas of emphasis are shown in bold**):

Students will:

**A-14 Understand the interdependence of living things and their environment** (component of Interdependence)

**B-1 Use the processes of science: these processes include observing, classifying, measuring, interpreting data, inferring, communicating,** controlling variables, developing models and theories, hypothesizing, predicting, and experimenting.

**B-2 Design and conduct scientific investigations using appropriate instruments.**

Students will also have exposure to additional Alaska State Science Standards:

Students will:

**A-4 Understand observable natural events such as tides, weather, seasons, and moon phases in terms of the structure and motion of the earth** (Earth)

**A-9 Understand the transfers and transformations of matter and energy that link living things and their physical environment, from molecules to ecosystems** (Flow of Matter and Energy)

**A-15 Use science to understand and describe the local environment** (Local Knowledge)

**B-6 Employ strict adherence to safety procedures in conducting scientific investigations.**

**D-3 Recommend solutions to everyday problems by applying scientific knowledge and skills.**