

## Cook Inlet RCAC and partners study belugas and their prey

Sue Saupe, Director of Science and Research, presented findings of a beluga whale winter habitat and prey project on behalf of the project team, including herself, Drs. Dana Wetzel and John Reynolds of Mote Marine Laboratories, and Mr. Mark Willette of the Alaska Department of Fish and Game. The study focused on assessing prey availability in suspected winter feeding areas and hydrocarbons in potential prey species. The study is also incorporating results of an earlier study that analyzed hydrocarbon contaminants in archived Cook Inlet beluga whale tissues and in known beluga summer habitats and prey. Results of the winter prey component of the study are preliminary, since they had not yet been peer reviewed or provided to the Kenai Peninsula Borough, the funding entity. Sue's presentation of the earlier beluga whale tissue and summer prey work is summarized here and the winter prey study results will be presented in a following newsletter.

Sue provided a review of the Cook Inlet beluga whale listing under the Endangered Species Act and reviewed earlier work by Cook Inlet RCAC and others on Cook Inlet hydrocarbons to provide a background to the beluga winter prey and habitat studies. Sue talked about Cook Inlet RCAC's mandates to detect oil industry contaminants and showed CIRCAC data in the context of other Gulf of Alaska data to improve interpretations of concentration and source data in the marine environment. Cook Inlet RCAC's earlier studies provide overviews of hydrocarbons, in Cook Inlet sediments, water column, and the tissues of several lower trophic level organisms for areas far from, nearby, and in the center of oil industry operations – including samples collected from within the mixing zones of major produced water discharges. The focus of these hydrocarbon studies has been on PAHs.

PAHs are polycyclic aromatic hydrocarbons, which are considered to be the most toxic of components of oil. Fingerprinting can help determine the type and source of PAHs in the environment. In Cook Inlet, PAHs can be naturally sourced (e.g. seeps, coal, peat, and forest fires), from small and large fuel spills, from non-point sourced run-off from roads and parking lots and the combustion of fossil fuels and from federal and state permitted discharges, such as from municipal wastewater treatment facilities and oil and gas exploration and production activities.

As background, Sue summarized some of the concerns and knowledge about Cook Inlet beluga whales, which are listed as an endangered species, and what is being done to fill data gaps to help determine what might be limiting their recovery. Some of the issues that led to the development of the studies on contaminants in beluga whales, their habitat, and their prey include:

- Cook Inlet's belugas are a genetically distinct, geographically isolated population and their critical habitat includes the entire nearshore environment in Cook Inlet and the entire marine habitat in the upper Inlet.
- Although other contaminants are commonly assessed in marine mammals, historically very few PAH analyses had been done worldwide due to the belief that their PAH-metabolizing enzyme system would keep them from accumulating in tissues, although a few recent studies on belugas elsewhere (e.g. St. Lawrence Seaway) showed that PAH analytes can accumulate in tissues.
- In comparison to belugas from elsewhere in the world (including Alaska), for most cases, Cook Inlet beluga whale tissues show the lowest concentrations for PCBs, pesticides, and heavy metals.
- Cook Inlet belugas use habitats where both point and non-point discharges occur and are thus exposed to PAHs.
- There is little data available on the PAH concentrations of the major fish prey of Cook Inlet beluga whales.
- Although a lot is known about major late spring, summer, and fall beluga prey based on feeding observations and stomach content analyses, there is very little known about their winter feeding areas and prey.



*Photo by CoE*

Our recent beluga whale studies were developed to begin filling data gaps identified in the beluga whale Conservation Plan regarding contaminants in beluga whales and their prey; specifically, analyses of PAHs in archived beluga tissues and in their habitat and prey.

In 2008 and 2009, Cook Inlet RCAC worked with Mote Marine Labs to analyze all archived Cook Inlet beluga whale tissue samples for PAHs. The results showed that although most tissues had non-detectable concentrations of PAHs, a few PAH analytes had accumulated in some of the whales. These detectable concentrations were low but they indicate that those whales'enzyme systems did not metabolize all of the PAHs that the whales were exposed to, either through direct exposure or via their prey.

The other components of the study were designed to assess PAHs in their environment and prey. Summer prey, including salmon and eulachon, were collected from several known summer feeding areas in the upper Inlet and analyses showed that PAH analytes were detected. It was not possible to pinpoint the PAH sources, since these fish are anadromous and in most cases traveled long distances before reaching the streams.

While the data regarding PAHs in Cook Inlet beluga whales and their prey do not prove that PAHs are inhibiting recovery, they do indicate that further study is warranted and that analyses of PAHs and their metabolites should be standard analyses for any future whale tissues samples.