



ENVIRONMENTAL BASELINE STUDIES

PRELIMINARY SUMMARY STUDIES PERFORMED BY PENTEC ENVIRONMENTAL/ HART CROWSER, INC.

1. MARINE WATER AND SEDIMENT QUALITY, PORT SITE

The objective of this work is to describe, based on available information, the physical oceanography and water quality of the marine study area in order to provide a physical context for biological conditions observed. Specifically this study has investigated and provides observations of the shape and depth of the Iliamna and Iniskin Estuary, the tidal range and currents, the observed and theoretical wave and ice-scour action in the vicinity, and a brief analysis of some of the inputs to and outputs from the bays. Iniskin and Iliamna bays (Figure Pentec-1) comprise one of several estuarine complexes and embayments along the west side of lower Cook Inlet and are collectively termed the Iniskin/Iliamna Estuary (IIE).

The study area includes all marine waters and shorelines of Iniskin and Iliamna bays, except for the inner portions of Iniskin and Cottonwood bays (Figure Pentec-1) because these areas are not likely to be affected by the proposed port and transportation development. A general description of Cook Inlet, focusing primarily on the lower west side, has also been developed to provide a regional context.

Basic water-quality data (temperature, salinity, turbidity) were gathered during more than 90 marine sampling events. Data on the background levels of trace organics and metals in area water, sediment, and animal tissues also were gathered.

Baseline concentrations of naturally occurring constituents (organics and metals) in IIE sediments and selected biotic tissues were determined. Sediments in IIE were analyzed for grain-size distribution and for a variety of naturally occurring constituents, including 18 inorganic substances, 18 polycyclic aromatic hydrocarbons (PAHs), and total organic carbon (TOC). Fifteen whole-body residue samples from nine invertebrate species, 14 whole-body residue samples from six species of finfish, and liver and muscle tissue from chum salmon were analyzed for nine inorganic substances.

2. MARINE BENTHOS, PORT SITE

Littoral (shallow water) and subtidal habitats in lower Cook Inlet represent important areas of diversity and productivity that support numerous species of ecological and economic importance. In addition, some species present appear to be relict arctic biota and have further importance in a biogeographical context. The IIE is known to support important ecological functions such as herring spawning and salmon, halibut, and king crab rearing, as well as considerable invertebrate and fish resources that in turn support a variety of marine birds and mammals. To evaluate the potential affects of port development alternatives, it is necessary to understand what specific resources are present in the study area and which could be affected by the transportation alternatives under consideration.

2.1 INTERTIDAL BENTHOS

This study described benthic (sediment-dwelling) marine flora and fauna in Iniskin and Iliamna bays based on existing literature and on field investigations conducted during August/September 2004, July 2005, and April 2006. Two stations sampled in this study were identical in location to those sampled under other programs during the late 1970s and by the present investigators in 1996, thus providing a substantial historical perspective. A stratified random approach was used to characterize biota in 5 to 10 one-quarter-square-meter quadrats at each of three elevations (upper, middle, lower) at seven rocky stations. A total of 259 quadrats have, to date, been quantified over the three-year period of the studies.

A small hand corer was used to characterize infauna (organisms living in the sea floor) at seven soft-bottom (sand/mud) intertidal stations. A total of 80 cores from 2004 and 2005 sampling were analyzed. In addition, five one-quarter-square-meter quadrats were excavated to a depth of approximately 30 centimeters and sieved for larger infauna such as clams, polychaetes, and spoon worms.

2.2 SUBTIDAL BENTHOS

In August 2004, subtidal benthos was characterized by replicated grab sampling and by scuba diver transects at six stations near or removed from potential port sites. A total of 17 grab samples were analyzed for subtidal infauna. Six qualitative reconnaissance dives in the IIE nearshore region were performed to survey the habitats and benthic assemblages in areas of interest.

3. NEARSHORE AND DEMERSAL FISH AND INVERTEBRATES, PORT SITE

The nearshore zones of the IIE are seasonally important for numerous species of fish and macroinvertebrates that use these habitats as rearing areas, migration corridors, spawning areas, and places of refuge from deepwater predators. The objectives of these studies is to characterize fish and motile invertebrates in areas that could be affected by port construction and operation (including access roads), to gather new information on specific habitats that may be at risk from port development, to document food web and ecological relationships among key species, and to investigate spawning by Pacific herring.

Fish and macroinvertebrate fauna in the IIE were described based on existing literature and on field investigations conducted during August and September 2004, May through August 2005, and April and May 2006. During field investigations, nearshore fish were sampled with a beach seine at 13 locations, and subtidal, demersal (near the bottom) areas were sampled with an otter trawl at seven locations in the IIE. In April and May 2006, herring-spawn surveys also were conducted.

A total of 108 beach seine sets and 50 otter trawl sets were conducted in the IIE over the three-year study period. Over 16,500 fish were captured, and over 16,000 macroinvertebrates were laboratory identified and counted during the study.