

## 33. SURFACE FRESHWATER QUALITY AND SEDIMENT

### 33.1 Introduction

The surface water quality study in the Cook Inlet drainages was conducted to acquire baseline data on naturally occurring constituents in freshwater streams. The Cook Inlet study area is depicted on Figure 1-4 in Chapter 1.

Surface water was sampled at eight locations. These locations include freshwater streams listed in the *Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes — Southwestern Region* (Johnson and Weiss, 2006) and additional sites that coincide with sampling stations used in fish and hydrology studies. Station GS-21 located on Y Valley Creek was sampled multiple times in 2004 and 2005, station GS-22 located on Williams Creek was sampled multiple times in 2005 only, four locations in the Y Valley (stations SWQ1 through SWQ4) were sampled once each in 2006 and 2007, and stations PSC and PSD, located near Diamond Point and North Head, respectively, were sampled once in 2005. (See Figure 1-3c in Chapter 1 for the locations of the cited landmarks.) Overall, 25 water samples were collected. Samples were analyzed for physical and chemical parameters and inorganic constituents.

Sediment samples were collected from four sample locations in the study area (Y Valley Creek, Williams Creek, Diamond Point, and North Head) during May, July, and September in 2004 and 2005. Chapter 35 summarizes the stream sediment study in the Cook Inlet drainages study area.

### 33.2 Results and Discussion

The surface water quality study in the Cook Inlet drainages demonstrated that concentrations of nitrate plus nitrite (as nitrogen), phosphorus, aluminum, barium, iron, copper, zinc, lead, arsenic, nickel, molybdenum, and manganese were detectable in water samples. The water quality data were compared to the most stringent water quality criteria from the Alaska Department of Environmental Conservation. Where those criteria vary depending on site-specific hardness values, preliminary estimates were calculated and used for comparison. In most samples, the concentrations of individual trace elements were below the most stringent water quality criteria. Exceptions included aluminum, copper, lead, and zinc, all of which were present at levels above criteria in a small number of samples. Typically, samples with a low field pH had higher concentrations of metals.

Overall, at least one sample from each location had naturally occurring concentrations above the most stringent water quality criteria for at least one parameter in at least one sampling event. The parameters for which existing concentrations above estimated criteria were most common included aluminum and copper. The detected concentrations are ascribed to natural conditions and are documented as existing conditions at the time of the study.

Based on analysis of the field data and physical parameter data, surface water in the Cook Inlet drainages study area is characterized by low dissolved solids, slightly acidic pH, high dissolved oxygen, and seasonally variable temperatures and specific conductance.

No seasonal variations in concentrations of the major ions (i.e., calcium, magnesium, sodium, potassium, alkalinity as bicarbonate, chloride, and sulfate) were observed in the data from the one station (GS21) that was sampled during all four seasons. Based on an evaluation (in a piper plot) of major ion distribution, the streams in the study area are classified as calcium bicarbonate water.

### 33.3 REFERENCES

Johnson, J., and E. Weiss. 2006. Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes — Southwestern Region, Effective March 1, 2006. Alaska Department of Fish and Game and Alaska Department of Natural Resources.