CHAPTER 1: OVERVIEW

I. PLAN RATIONALE

The importance of wetland functions and values have been well documented through scientific study. Although there is much variability among wetlands, typical wetland values include:

- Providing highly productive ecosystems that support an abundance of fish and wildlife;
- Regulating and modulating surface water flows through retention of excess runoff and release of this water over extended dry periods;
- Protection from erosion and reducing the velocity of flood waters from erosion or waves;
- Purifying water through uptake of nutrients, through settling of particles, and as a sink for toxic substances; and
- Atmospheric regulation by a wetlands ability to store carbon within its peat biomass. When wetlands are drained or cleared, that carbon is released into the atmosphere as carbon dioxide, a greenhouse gas, which may affect global climates.

Recognizing the values, such as unique vegetation, wildlife and aesthetics associated with wetlands, people have often designated these features as open space, parkland, and conservation areas. Consequently, the natural benefits and functions of wetlands have been extended to include such uses as recreation and aesthetics, water supply, and protection from natural hazards. Because of these additional use values, the demand for urban development of land adjacent to and within wetlands has increased considerably. Indeed, most remaining undeveloped large tracts of land, especially within the Anchorage Bowl, are wetland areas. These are typically the only large areas now available for residential and commercial infilling development.

If not properly planned, this urban development can adversely impact wetlands and other watercourses or water bodies creating issues, such as flooding, in developed areas. Construction of housing, industrial or commercial establishments may require dewatering, dredging, or discharge of fill materials. Construction of transportation corridors frequently alters natural drainage patterns. These changes, in turn, have the potential to modify natural movements of water, damage or destroy fish and wildlife habitat, adversely affect biological productivity, reduce flood storage capacity, or alter nutrient exchange characteristics. The latter effect can lead to degradation of a downstream surface water supply or a subsurface aquifer.

Concern was originally expressed in the early 1980s that the growing demand for human development was causing the alteration of local wetland areas at an alarming rate. The need to balance existing wetland values and functions with expanding development infrastructure needs was strongly identified in the Anchorage Coastal Management Program (1979). This balance was a key theme of the original 1982 Anchorage Wetlands Management Plan (AWMP) and the earlier Anchorage 208 Areawide Water Quality Management Plan (1979). A proper balancing of these conflicting needs required an understanding of wetland functions and values, plus complete and accurate maps of wetland locations. Both of these actions were presented and addressed in the original 1982 Anchorage Wetlands Management Plan and updated for both the 1996 and 2012 AWMP.

II. ANCHORAGE WETLANDS MANAGEMENT PLAN: PURPOSE AND GOALS

The Anchorage Wetlands Management Plan provides a basis of knowledge for freshwater wetlands within the Municipality such that sound land use decisions can be made to the benefit of the community and the environment.

The **purpose** of the Anchorage Wetlands Management Plan is threefold:

1. to provide accurate mapping and assessment of freshwater wetlands within the Municipality;
2. provide a hierarchy of values for wetland units based on function;
3. to derive management strategies that balance wetland integrity and function while allowing development that would not cause more than minimal adverse impacts.

The primary **goals** of the Plan are:

Goal A. To identify and provide protection for wetlands that support important ecological and hydrological functions.

Goal B. To ensure that development in wetlands minimizes water quality degradation and maintains wetland hydrologic functions.

Goal C. To provide a balance between protection of higher value sites and the development of lower value areas.

Goal D. To provide for timely and predictable authorization of development projects in low-value wetlands and to maintain use of the General Permits.

At its conception, the 1982 AWMP was adopted to address consistency with and supplement the following related wetland goals from the Anchorage Coastal Management Plan (1979):

Goal E. To protect the basic natural functions served by coastal marshes, freshwater marshes and wetlands.

Goal F. To prevent public liabilities associated with development in these areas.

While the Anchorage Coastal Management Plan dealt with management of the Municipality's *tidally influenced wetlands,* the Anchorage Wetlands Management Plan process focuses on the *freshwater wetlands* within the Municipality. The Anchorage Wetlands Management Plan has served as the basis for decision-making involving wetland development and/or protection since its adoption by the Anchorage Assembly in 1982.

At the time the Anchorage Wetlands Management Plan was adopted, the Municipality was in the early stages of a population and housing construction boom. A high level of residential and commercial development continued through the mid-1980s, especially in the Anchorage Bowl and on the lower Hillside where large, mostly un-platted tracts of land were utilized for community expansion. Much of this expansion was accommodated in wetland areas. It was primarily in response to this development boom and shortage of available, developable land that the Municipality prepared the 1982 Wetlands Plan.

III. PREVIOUS ANCHORAGE WETLANDS MANAGEMENT PLANS

The stated purpose of the original 1982 Wetlands Plan was to provide a balance between protection of higher value sites and the development of lower value areas. As evidenced from information compiled over the years, the Wetlands Plan has essentially helped to facilitate land use planning within the Municipality.

In order to guide development within lower valued "C" designated wetlands, the Municipality applied for and obtained two General Permits from the Corps of Engineers in 1983. These permits, one for roads and the other for structures, were necessary to facilitate more timely and predictable local processing of permits for community expansion during the boom period of the mid-1980s. The General Permits are administered by the Municipality of Anchorage's Community Development Department. Municipal permit processing time has averaged 3-10 days, whereas an Individual 404 Permit from the Corps of Engineers averages 3-6 months. Because of our area's short construction season, the General Permits were a vital tool in facilitating the 1980s boom. The first General Permits were issued for a period of five years and were renewed by the Corps of Engineers through June 1993. The Municipality then operated through December of 1993 with an Interim General Permit issued by the Corps of Engineers. The General Permits have since been renewed in 5-year cycles, most recently in 2010. Since obtaining the General Permits, the Municipality has permitted for development in approximately 1,200 acres.

The 1996 Wetlands Plan calculated the success of the previous plans' implementation based on an analysis of wetland fills in the Anchorage Bowl, up to that time period. In the U.S. Fish and Wildlife Service's Anchorage Wetland Trends Study (1993), a review of aerial photography revealed that 9,958 acres of wetlands (including intertidal sites) were filled between 1950 and 1990; 8,200 acres of which were filled between 1950 and 1976 (the Pre-Clean Water Act era). Between 1983 and 1990, a total of 2,143 acres were permitted; and 965 acres were actually filled. This period included the boom years when the Wetlands Plan was adopted and implemented. As outlined in the U.S. Fish and Wildlife Service's trends study, it appeared that the Wetlands Plans had provided proper guidance for the balance between permitting and protection, as evidenced in the decrease of wetland acreage filled after the plans' implementation.

Data compiled by the Corps of Engineers indicate that over 2,200 acres of wetlands were permitted for fill between 1976 and 2004, which covers the post-Clean Water Act era. The majority of these permits were issued for projects within the Anchorage Bowl. It should be noted that many of these permits were never, or only partially, used and some sites remained unfilled, or partially filled.

From these studies comparing wetlands acreage filled during the pre- and post- AWMP implementation eras, it can be concluded that the original Wetlands Plan systematically directed wetland fill projects into lower value sites and minimized fill in higher value areas. In addition, mitigation measures, including avoidance, minimization and compensation, were required during the Corps of Engineers permit process. Although wetland acreage was lost during the terms of the plans, the evidence points to an effective purpose and implementation of the Anchorage Wetlands Management Plan.

This 2012 update is intended to further the goals of the original plan. Wherever possible, it incorporates management details to extend protection and minimize impacts to higher value areas and to facilitate development in low value sites in a manner that also minimizes impacts.

IV. WETLAND ISSUES AND NEEDS

The original 1982 Anchorage Wetlands Management Plan ordinance required that the plan be revised at least once every ten years. For the 1996 revision, an extensive examination of alternative revision scenarios and methods was undertaken. On the basis of that examination, it was determined that a full review of all wetland designations was needed and issues relevant to reauthorizing the Municipality's General Permits would also be addressed. Thus, wetland evaluations were updated, wetland designations were reviewed and modified, when appropriate, and maps and management strategies were revised and updated at that time.

The original goals of the 1982 and subsequent 1996 Plans have not changed and remain inherent in this Plan update. The following needs were identified and provide some rationale behind the 2012 update:

Need A. To minimize alterations to wetlands that modify natural movements of both surface and subsurface water, damage fish and wildlife habitats, adversely affect biological productivity, reduce flood storage capacity, or alter nutrient exchange characteristics.

Need B. To provide for the demand for community expansion, including residential and institutional housing, commercial and industrial establishments, and transportation corridors on a land base that is largely wetlands.

Need C. To update the Anchorage Wetlands Management Plan with new information, including a review of all wetland designations, as appropriate.

Therefore, the chief objectives of this Plan update (2012) are:

1. Where appropriate, review and revise all wetland designations, incorporating new information.
2. To address and modify, aspects of the original plan which are outdated or which have proven ineffective.
3. To upgrade the management strategy information and guidance.
4. In anticipation of the next reauthorization (for 2015), update information relative to the General Permit based on a updated subset of lower value wetlands.
5. To produce updated wetland maps for the entire Municipality, which account for filled wetlands and detail new or revised wetland boundaries.

Chapter 4 of the 2012 AWMP presents updated wetland designations, management strategies, and definitions, as appropriate. As in the previous Anchorage Wetlands Management Plans, only freshwater wetlands have been addressed and most sites on Alaska State Park and National Forest lands and navigable waters have been excluded from this study. The following lands are included since they are preserved by the State: State of Alaska, Division of Parks and Outdoor Recreation, Eagle River Greenbelt and the Alaska Department of Fish and Game, Anchorage Coastal Wildlife Refuge at Potter Marsh.

Those military wetlands contiguous with or adjacent to private or other public wetlands, or located in areas of previous permit activity, especially at the boundaries of private wetlands with shared infrastructure, have been included in this plan. Most other military lands have been excluded because of U.S. Executive Order 11990 (the Protection of Wetlands). The Municipality has no authorization on military lands yet; military properties are subject to the Clean Water Act, Section 404 regulations.

All wetland sites delineated in previous plans have been reviewed here, as have sites that were not previously mapped. Updates in Geographic Information System (GIS) technology have allowed staff to map and quantify wetland acreage more accurately than before. Wetland delineations are based on the previous plan boundaries, new hydric soil information, updated aerial photography, and follow the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Alaska Region, Version 2.0 (COE, 2007) for field determinations.

V. BOUNDARY DESCRIPTION AND STUDY AREA

The following is a general biophysical description of the area covered in this plan. The study area for the Anchorage Wetlands Management Plan includes the jurisdiction of the Municipality of Anchorage, which is bounded by the Chugach State Park on the east and extends from the Knik River to Portage, and by the Matanuska-Susitna Borough to the north and west, the Kenai Borough to the south and includes several small watersheds eastward along Turnagain Arm (Figure 1). As outlined earlier, Alaska State Park and National Forest wetlands were excluded from this plan. Federal military lands were generally excluded from the study area, but some wetlands that were positioned on both military and adjacent non-military properties were classified and mapped.

Within the study area, there are three distinct subareas:

1. Anchorage Bowl,
2. Chugiak-Eagle River (including Eklutna), and
3. Turnagain Arm.

The Anchorage Bowl and Chugiak- Eagle River subareas lie on a glacial plain, which slopes north and west from the mountains of Chugach State Park. These subareas are drained mainly by Eagle River and by Ship, Campbell, Chester, Fish, Potter, and Rabbit Creeks. The plain is generally less than 400 feet in elevation above sea level with very low topographic relief. The Girdwood Valley occupies a fluvial valley drained by Glacier and California Creeks. The mouth of that valley is at sea level and rises gently in elevation inland of the Seward Highway. Other communities along Turnagain Arm including Indian, Bird, and Portage, have terrain similar to the Girdwood Valley.

VI. PHYSICAL SETTING

The types of wetlands that are present in the Anchorage study area are strongly determined by the climate, geology, soils, and hydrology of the region. A description of these factors follows.

A. CLIMATE

The climate within the Anchorage study area is extremely variable from north to south and from lower to higher elevations. Rainfall increases with elevation in the Chugach Mountains and to the southeast of the Anchorage Bowl along Turnagain Arm. According to the Western Regional Climate Center website, mean annual precipitation in the western portion of the Anchorage Bowl is about 15.87 inches but, rapidly increases to 26.81 inches in the mountainous areas above 2,000 feet in elevation. In the Girdwood subarea, annual precipitation is 44.35 inches. By comparison, in Eklutna the annual precipitation is 11.89 inches. Mean annual temperatures in Anchorage are about 37°F, with summer temperatures ranging from about 49° to 63°F and winter temperatures ranging from about 10° to 23°F. Newman and Branton (1972)

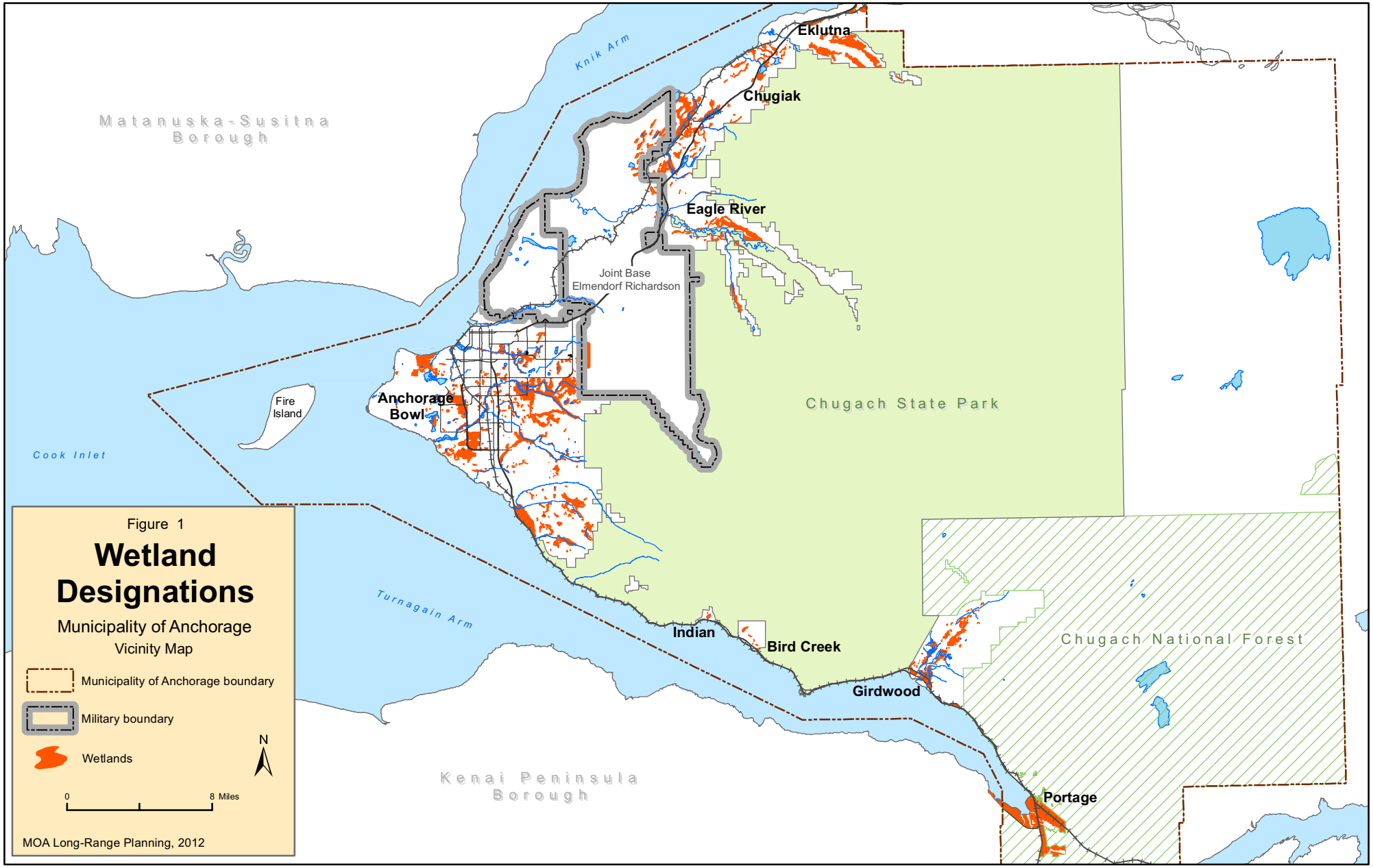
Figure 1
Wetland Designations
Municipality of Anchorage
Vicinity Map
Municipality of Anchorage boundary
Military boundary
Wetlands
N
0
8 Miles
MOA Long-Range Planning, 2012
Matanuska-Susitna Borough
Knik Arm
Eklutna
Chugiak
Eagle River
Joint Base Elmendorf Richardson
Fire Island
Anchorage Bowl
Cook Inlet
Chugach State Park
Turnagain Arm
Indian
Bird Creek
Girdwood
Chugach National Forest
Kenai Peninsula Borough
Portage

reported that the ratio of mean annual precipitation to mean annual evaporation is approximately 1:1 for the Anchorage Bowl and Eagle River subareas; therefore, the mean annual water balance in these areas is approximately zero. The water balance becomes increasingly negative (evaporation greater than precipitation) to the north and positive to the south of Anchorage. In contrast to the zero water balance in the Anchorage Bowl and Eagle River subareas, Patric and Black (1968) report a 19-inch surplus of rainfall over evapotranspiration at Girdwood.

The climate of Anchorage is considered to be more continental than maritime (Newman and Branton 1972). For the Anchorage Bowl, the climate tends to be a dry sub-humid type, and that of Girdwood is humid with little or no water deficiency. The effects of such climatic differences on wetland development in the Anchorage Bowl and Girdwood subareas are most obviously manifested in the varying forms and species of vegetation; these differences necessitated differentiating between the Anchorage Bowl and Girdwood subareas in the wetland classification.

Recent trends indicate an overall shift in climatic conditions from wet and cool to warmer and drier. These effects have been widely documented throughout the arctic regions and particularly in Alaska where large tracts of undeveloped lands have been nearly untouched by humans, an ideal scenario for scientific research. Studies on the nearby Kenai Peninsula have shown changes in wetland vegetation based on climatic differences. An increase in 1-2 degrees Celsius and a 40% decrease in mean annual water balance has resulted in an increase in woody and facultative species, waterbody shrinkage and wetland drying (Klein, et al; 2005). Casual observations over the years have shown similar trends in the Municipality as well.

B. GEOLOGY

Past glacial activities have formed the geomorphic setting of the Anchorage wetlands. The Municipality includes a low-elevation, flat plain that is bordered on the east by the abrupt mountain front of the Chugach Mountains. There are a series of ridges and isolated hills between the mountain front and the Anchorage plain. Surficial materials were deposited over much of the Anchorage Bowl and Eagle River areas during the most recent glacial period by:

- Glacial ice along the Chugach Mountain front and the Eagle River area; and
- Flowing water in streams and deltas (between the two glacial ice deposits and in the hummocky region between Point Woronzof and Point Campbell).

Wetlands have developed mainly in the troughs and depressions found in the moraines and terraces, in the stream valley bottoms, and in areas overlying clays and fine silts. A generalized geologic map of Anchorage and vicinity (Schmoll and Dobrovolny 1972) shows the surficial deposits, including peat deposits thicker than two feet. From this map, it is possible to determine the types of substratum that underlie the peat-lands. They are:

- Bootlegger Cove Clay in the Campbell Lake area;
- Sand deposits in a wide, low-lying belt centered around Connor's Lake, underlain by Bootlegger Cove clay; and
- Alluvium in historic stream channels and on terraces along current streams.

C. SOILS

Soil types underlying wetlands in the Anchorage area were mapped by the USDA Natural Resources Conservation Service and presented in the Soil Survey of Anchorage Area, Alaska (USDA-NRCS, 2001). Approximately eighteen types of hydric soils, contributing to wetland formation, are prevalent in the

Municipality. Most of these hydric soils are characterized by a fairly thick organic layer, consisting "largely of organic residues accumulated as a result of incomplete decomposition of dead plant constituents due to the prevailing anaerobic conditions" (Stanek, 1977). Therefore, most of the Anchorage area wetlands identified in this study are generally considered peat-lands (frequently called muskegs in northern regions). Although the Anchorage soil survey does not provide specific measurements of the thickness of the peat deposits underlying these peat-lands, Stanek (1977) defines a peat soil as "more than 30 cm (12 inches) thick when drained or 45 cm (18 inches) when undrained, the ash content not more than 80 percent."

D. HYDROLOGY

Wetland types are determined in part by the hydrological characteristics of the area. These characteristics include inflow and outflow in addition to the evapotranspiration rate.

Surface water is abundant in the area with an average annual daily flow of 274 million gallons per day (mgd) discharging from Eagle River, 807 mgd discharging from Ship Creek, and 210 mgd from the South Fork of Campbell Creek (U.S. Geological Survey, 2011). Natural lakes are also abundant, but man-made Campbell, Westchester and University Lakes are the only known surface impoundments with continuous inflow and outflow (Zenone, 1976). Surface water is very important to the Municipality of Anchorage, with Eklutna Lake as the primary source of drinking water for most of the Municipality, Ship Creek, as a secondary source and numerous wells supplementing the remainder. Other lakes and streams provide fish and wildlife habitat as well as opportunity for recreation, private and commercial air transportation, and aesthetic value.

Groundwater occurs at depths of less than 50 feet throughout the Anchorage Bowl area and, in most areas, depth to groundwater is less than 10 feet. Two major aquifer systems have been identified by Cederstrom, et al. (1964): an upper unconfined aquifer and a lower artesian aquifer. The upper aquifer is composed of peat, glacial sand and gravel, varying in thickness from 10 to 50 feet and only moderately permeable. In wetland areas, this unconfined aquifer is composed principally of silt, clay, and peat and is only slightly permeable.

The artesian aquifer underlies most of the Anchorage area, but merges with the unconfined aquifer west of the Anchorage International Airport. The artesian aquifer is comprised of long, thin layers of sand and gravel, separated by confining layers of fine-grained glacial till. The artesian aquifer system is a major source of municipal groundwater supplies and most of the domestic supplies. The hydraulic head of the aquifer varies from 300 feet above sea level near the Chugach Mountains to less than 50 feet above sea level near the airport and the coastal area.

In the Eagle River area, a bedrock aquifer was reported by Zenone et al. (1974), but most well production comes from the unconsolidated sediments in alluvial fans. The relationship between the unconfined and artesian aquifers has not been defined, but water level elevations decline rapidly from 600 feet above sea level one mile east of Eagle River to 200 feet above sea level near Lower Fire Lake and the Glenn Highway.