CHAPTER 2: RESOURCE INVENTORY AND ANALYSIS

I. RESOURCE INVENTORY

A. 1982 PLAN

Wetland sites within the Municipality of Anchorage were first located primarily by aerial photography dated from September, 1979. Wetlands were mapped for all lands that were not owned by the military, State Park, and National Forest Service within the Anchorage Bowl, Eagle River-Eklutna, and Girdwood Valley areas. Limited ground-truthing work was conducted in the summer of 1980 to verify the relationship between photo images and wetland boundaries. Wetland areas were delineated based on the most current wetland delineation methodology used by the Corps of Engineers at that time.

B. 1996 PLAN

For the 1996 plan, the original wetland base maps were updated using methods similar to those used in 1982. With a few exceptions, most freshwater wetlands in all privately owned, (not generally within State Park, National Forest, and military lands), from Eklutna to Portage were identified, mapped, and assessed. A subset of new wetlands identified by staff was added to the wetland map updates. All boundaries of the original wetland areas were revisited and/or adjusted to reflect actual conditions and any new verified wetland areas were incorporated into the maps. In addition, all sites filled since the 1982 plan were deleted or redrawn to reflect partial-filling, and new wetland boundaries were mapped for the 1996 Anchorage Wetland Management Plan. The 1996 wetland data set was loaded into and managed with GIS software.

C. 2012 PLAN

Since the 1996 plan, wetlands mapping has been updated as GIS technology has advanced. A 2004 project with the municipal Watershed Management Section resulted in printed and digital copies of the Anchorage Wetlands Atlas, which updated wetland coverage for the Anchorage Bowl and brought stream and other waterbody features into a more readily accessible format. That map was further revised in 2008 to include previously unmapped sites based on updated hydric soil information for the Anchorage Hillside. Volume 2: Eagle River was first produced in 2008, with updated wetland maps based on hydric soil information for Chugiak/Eagle River. A Turnagain Arm volume will be produced in the future as funding allows.

The 2008 Anchorage and Eagle River Wetlands Atlas can be found at the following link:
http://wms.geonorth.com/library/LibraryMaps.aspx

Wetland boundaries are available as a layer online under the Advanced Mapper tool at:
http://munimaps.muni.org/mox52/advanced.cfm?&action=mox52_if_frameset

Note that wetland maps produced by the Municipality are not all inclusive. Wetland boundaries depicted on municipally produced maps are approximate. It is not possible to map all wetlands, especially on private property, without the ability to ground-truth suspected features. To obtain the most accurate information,

it is incumbent on individual landowners to request a Jurisdictional Determination and/or wetland delineation from the Corps of Engineers or hire a professional wetland scientist to make a determination for submission to the Corps. The Municipality of Anchorage, Long-Range Planning staff is responsible for maintaining wetland maps and datasets to service the Municipality. For the most accurate, up-to-date wetlands mapping information, contact the municipal Long-Range Planning Section staff at 343-7921.

For the 2012 Anchorage Wetlands Management Plan update, GIS data have been incorporated using the 2008 Wetlands Atlas boundaries as base data; field work confirmed certain areas of hydric soils as wetlands, Corps of Engineers jurisdictional determinations were mapped, and developed areas were removed from the coverage. Maps produced for this update used 2010 aerial photography, LIDAR and topographic information as further references. Site visits and field-work were conducted primarily in the 2010 field season using the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Alaska Region, Version 2.0 (COE, 2007). As a joint effort by the Municipality of Anchorage's Community Development Department, the EPA and the Corps of Engineers staff, management strategies for existing and new wetland units were drafted updating information from the 1996 plan.

II. RESOURCE ANALYSIS

A. Background

Actual values and the significance of various functions performed by wetlands vary widely within and between sites and within the different subareas of the Municipality. Because of these individual variations, the Municipality undertook a wetland resource analysis that is documented in Chapter 4 of the original 1982 plan. The results of this 1982 resource analysis produced information used to develop high, moderate, and low scenarios of wetland management for the Municipality. The Municipality ultimately adopted the moderate management level, and each subsequent plan's wetland designations reflect this level.

Since adoption of the 1982 Anchorage Wetlands Management Plan, wetlands evaluation procedures and general knowledge of wetland functions have advanced considerably. The local understanding of the Municipality's individual wetland functions and values has also increased. It became apparent that resource evaluations contained in the 1982 plan were too subjective, inexact, and did not adequately represent each of the Municipality's wetlands. A new local wetland resource evaluation was therefore conducted for the 1996 plan.

The 1996 resource evaluation used the Anchorage Wetlands Assessment Methodology, (AWAM) which was developed by the Municipality and customized specifically for the greater Anchorage area. The methodology was developed in conjunction with federal and state resource agencies, and with additional peer review from resource evaluation experts from the U.S. Fish and Wildlife Service Western Field Office. The AWAM was adopted as part of the 1996 Anchorage Wetlands Management Plan, which contains a copy of the original version. The most recent copy of the Anchorage Wetlands Assessment Methodology is available online at:
http://www.muni.org/Departments/OCPD/Planning/Physical/EnvPlanning/Pages/CreditDebitMethod.aspx.

Actual field work sheets for each wetland site evaluation are on file with the Municipality of Anchorage's Community Development Department. For the 2012 plan update, the Anchorage Wetlands Assessment Methodology was applied only to select sites not previously mapped or assessed. Those scores generated preliminary designations, which are presented in **Table 4** – Wetland Management Strategies and discussed in Chapter 4 of this plan.

The Anchorage Wetlands Assessment Methodology evaluates four wetland functions:

1. Hydrology,
2. Habitat,
3. Species Occurrence, and
4. Social Function.

Each category includes factors that address the most common wetland functions:

1. Sediment trapping (filtering for water quality);
2. Flood retention (flood and/or stormwater attenuation);
3. Erosion control;
4. Nutrient retention, and transport;
5. Fish, wildlife, and plant habitats; and
6. Recreation and heritage values.

Unlike the resource analysis contained in the original plan, the 1996 assessment method did not weight individual functions, nor did it add the four scores into a single total score for each site. Instead, each of the four category scores was listed independently. Evaluating scores in this manner facilitates the understanding of a site's ability to perform each of the key wetland functions. Adding the scores from each category to a single total would merge values, confuse the evaluation process, and obscure a site's specific wetland functions.

In order to place the assessment into proper perspective, wetland scores from each of the Municipality's three subareas (Anchorage Bowl, Chugiak-Eagle River, and Turnagain Arm) were grouped and compared only by each subarea. This method was appropriate since wetland areas within each of these subareas are noticeably different from each other; and the data are more meaningful if these associations are kept separate.

Throughout the Municipality, there are fairly simple wetland assemblages along most small streams and feeder tributaries. Turnagain Arm wetlands are characterized by lower plant diversity and are dominated by the coastal Sitka spruce-western hemlock forest community. There are also a few patterned ground bogs in the Girdwood Valley. Anchorage Bowl wetlands include large-scale, very diverse, patterned ground bogs and riparian complexes, mixed open meadows, and black spruce thickets. In the Chugiak-Eagle River subarea, there is a mix of wetland types with none being dominant. Along Eagle River, there is a mosaic of large open floodplain wetlands, old sloughs and river terraces and black spruce bogs. Large bog-like complexes exist adjacent to larger lakes in the northern area of the Municipality. Throughout the Municipality, wetland functions related to fish and wildlife habitat and biological productivity become reduced in significance with distance from tidewater and, especially, with increases in elevation.

B. Range of Wetland Scores

The basis for wetland designations (i.e., “A,” “B,” “C”) is derived from a site’s Anchorage Wetlands Assessment Methodology (AWAM) scores. Past plans defined the rationale behind decisions made on designations (see 1996 AWMP, Chapter 2). The four wetland function scores for each site served as the key indicators and basis for individual wetland designations. Final designations were reached using a combination of the scores, knowledge of on-site conditions (especially when these were weakly reflected or delineated in the AWAM assessments), and other parameters such as platting, zoning, existence of infrastructure, floodplain, coastal zone designations, and relation of site to local drainage studies. In no case, however, did the other site parameters alone determine a site's designation. They were always secondary to the main assessment scores and on-site conditions.

To clearly identify the Municipality's reasoning in the assignment of designations for each site, a separate report was produced, which outlined the key justifications used for every wetland designation. This report, entitled Anchorage Wetlands Management Plan-Background Information, Volume II, January, 1994, includes specific background information on the resource evaluation method and a justification and explanation section on wetland designations. The report is on file with the Municipality of Anchorage's Community Development Department.

To develop designation cut-off points within the range of wetland scores for each subarea, all scores from the new assessments were graphed by wetland function and by Municipality subarea. By this means, it was possible to identify groupings of scores in the general range of high, medium, and low totals. These natural groupings served as the break points for the identification of "A," "B," and "C" wetland sites. Most score cut-offs were close to the average scores calculated for wetlands under the original designations in the 1982 Plan. For example, the Anchorage Bowl wetlands originally classified in 1982 as "Preservation" averaged 108 points for the Hydrology category. The 1996 plan cut-off for "A" wetlands for the Hydrology function is a score greater than 100 points. That same score breakdown pattern was used for the 2012 plan update. Scores for sites not previously assessed in prior plans were evaluated and designated according to the guidelines previously used (see Chapter 4, section II.B. Wetland Designations).

As with previous plans, sites with very high scores for more than one function category were generally designated at least "B" and, most often, were given an "A" designation. These sites are important to public health and safety, and any fills are considered detrimental due to their potential impacts on hydrology and water quality functions.

Sites with a mid-range of scores typically reflect the "B" designation. Moderate scores were assigned to those sites where the wetland functions were not critical. However, most "B" sites provide at least periodic significant contributions to key wetland functions, usually on a more localized scale; i.e., within a watershed or drainage basin. Generally, cumulative losses associated with filling "B" wetlands would likely contribute to significant drainage basin or watershed water quality losses, flood problems, or loss of wildlife habitats and/or public uses.

Sites with low scores for more than one category were generally classified as "C." "C" wetland functions are not significant and are more often minimal or lacking. Individual and cumulative impacts from loss of "C" sites would be less than that of "A" or "B" wetlands, especially given the site-specific management strategies for "C" wetlands. Nevertheless, some sites with low scores were designated in a higher class if more than one significant species was present. Significant species are identified within the AWAM's Species Occurrence category.

For the 1996 plan, there were instances where the final wetland designations deviated from the general scoring break guidelines described earlier in this section. There were two main reasons for this.

First, in nearly all cases, these deviations occurred where the assessments did not accurately reflect existing on-site conditions. In such cases, final designations deviated to both higher and lower levels from the score break guidelines based on best professional judgments derived from knowledge of each site.

Second, many sites with score deviations included wetlands where the significant or higher value portions are concentrated on-site, either geographically or around a waterbody. With these particular sites, it seemed prudent to use the specifics in the management strategies to protect, or otherwise address, a high score or function.

Wetland areas along the central Little Campbell Creek watershed exemplify this second phenomenon, where black spruce wooded wetlands transition to Birch-Spruce riparian types along the channel. The outer edges of the black spruce woods were generally lower in value than the immediate riparian zone wetlands, a distinction not delineated separately or represented clearly within the assessment scores.

C. Wetlands Acreage Summary

For comparison, **Tables 1, 2 and 3** summarize acreage totals from each previous plan (1982 and 1996) and this current update in 2012. For a definition of "A," "B" and "C" designated wetlands, see Chapter 4, Section II.B. "D" and "P" classified wetland sites are defined in Chapter 4, Section I.B.

NOTE: The wetlands acreage total for the current update appears to be much larger than what was presented in the 1996 plan. This discrepancy is mainly due to the inaccuracies of previous acreage estimates, which used out-of-date methods. In past years, municipal staff was not able to consistently use computer methods (GIS) to determine wetland acreage accurately; only gross estimates of wetland size were made, and hence, acreages were not accurate. With the advancement of GIS software, wetland acreage can now be determined with a greater degree of precision and confidence. Wetland maps were also updated to show previously unknown or unmapped wetlands, largely in the Eagle River valley and Turnagain Arm vicinity. Those additional acres balanced by historic wetland losses resulted in a net gain of wetland acreage overall. However, looking specifically at the "Developable" and "C" designations from 1982 to today, a consistent loss of wetland acres can be noted.

In the 1950s, it was estimated that over 18,000 acres of wetlands encompassed the **Anchorage Bowl** alone. Today, approximately 20,136 acres of wetlands are mapped and documented for the **entire Municipality**.

TABLE 1

1982 SUMMARY OF FRESHWATER WETLAND ACREAGE BY DESIGNATION

Designation	"Preservation"	"Conservation"	"Developable/Mixed Developable" Designation	"Special Study"	Total Acreage
Acreage Totals:	3,793	1,066	3,949	600	**9,408**

Source: Municipality of Anchorage, Community Development Department, 2011.

TABLE 2

1996 SUMMARY OF FRESHWATER WETLAND ACREAGE BY DESIGNATION AND SUBAREA

Subarea	"A" Designation	"B" Designation	"C" Designation	Total Acreage:
Anchorage Bowl	4,337	1,114	1,818	7,269
Eagle River to Eklutna	1,790	944	573	3,308
Turnagain Arm	468	113	134	716
TOTAL:	6,595	2,171	2,525	**11,292**

Source: Municipality of Anchorage, Community Development Department, 2011.

Note: Acreage figures are approximate. The Eagle River to Eklutna subarea does not include acreages for the Eagle River greenbelt and military land wetlands.

TABLE 3

2012 SUMMARY OF FRESHWATER WETLAND ACREAGE BY DESIGNATION AND SUBAREA

Subarea:	"A"	"B"	"C"	"D"	"P"	Total Acreage
	Acreage:					
Anchorage Bowl	5,124	753	637	448	63	**7,025**
Eagle River to Eklutna	5,064	2,430	436	97	1,788	**9,815**
Turnagain Arm	717	120	59	1,037	1,363	**3,296**
TOTAL	**10,905**	**3,303**	**1,132**	**1,582**	**3,214**	**20,136**

Source: Municipality of Anchorage, Community Development Department, 2011.

III. CUMULATIVE IMPACTS

The Anchorage Wetland Trends Study (1950-1990) conducted by the U.S. Fish and Wildlife Service (USFWS) in 1993 analyzed historic aerial photography and permitting documents to gain a rough understanding of wetland acreage trends. As mentioned, they determined that in 1950 approximately 18,903 acres of wetlands existed in just the Anchorage Bowl area. From the 1950s through 1990, almost 10,000 acres of wetlands in the Anchorage Bowl were filled or altered.

As discussed in the 1996 Anchorage Wetlands Management Plan, other studies by USFWS attempted to qualify the cumulative impacts from these fills over time on Anchorage area wildlife habitat and plant communities. In general, those studies summarize an overall trend of habitat loss for several of the most sensitive waterbird species (e.g., Hudsonian Godwit) that nest in patterned ground bogs within the Anchorage Bowl. The vegetation studies show that in several of the larger, more impacted bogs an overall drying trend is allowing brushier, scrub-shrub plant species/communities to intrude into originally wetter bog cores, primarily grass species such as *Calamagrostis Canadensis*, Bluejoint grass.

Other less documented, but probable or assumed cumulative impacts from wetland fills since the 1950s include trends toward reduced water quality in Anchorage Bowl streams, especially for sediment and the more ubiquitous metals such as iron or aluminum. In past decades, the Alaska Department of Fish and Game had documented reduced anadromous fish populations in several Anchorage Bowl streams, which initiated a fish habitat enhancement program and policy for the Anchorage Bowl. Local hydrologic changes within individual wetlands, such as blocked surface and subsurface drainages, have resulted in local flooding within area floodplains during marginal storm events. The extent to which these hydrologic functions have been altered is not well documented, but certainly wetland fills, especially those before the 1982 Plan adoption, have contributed to this effect.

Anchorage Bowl streams with more extensive and regular flooding problems, notably Little Campbell/Campbell, Chester, Fish, and Furrow Creeks, are also the watersheds with the most wetland fills and channel alterations. As an example, the Corps of Engineers' Environmental Assessment for the 1987 reauthorization of Anchorage's General Permits included an accounting of past General Permits issued in each Anchorage Bowl watershed. Of the 75 permits issued, 50 were in the Little Campbell/Campbell Creek watershed, 10 were in the Furrow Creek watershed, and six were located in the Chester Creek watershed. That trend generally held true with this current AWMP update. For the 2010 General Permit reauthorization, the Corps of Engineers reported the largest proportion of General Permit impacts were documented for Campbell, Chester Fish and Furrow Creeks.

Most of these streams are also listed as impaired by the state Department of Environmental Conservation (DEC). The following watercourses/waterbodies have high levels of fecal coliform bacteria: Campbell Creek and Lake, Chester Creek, Eagle River, Fish Creek, Furrow Creek, Little Campbell Creek, Little Rabbit Creek, Little Survival Creek, Ship Creek, University Lake, and Westchester Lagoon. Lake Hood and Spenard Lake have issues with low dissolved oxygen levels, whereas Ship Creek, downstream from the Glenn Highway, has higher levels of petroleum hydrocarbons, oil and grease. Alaska DEC programs assist local entities in reaching acceptable goals for water quality. Since the previous plans, the Municipality has generated a Watershed Management Plan for Little Campbell Creek and a pending update of the Chester Creek plan. These plans outline goals and action items to improve water quality, and resolve other stream related issues within these watersheds.

In direct response to these cumulative impacts analyses and summaries, the Municipality, with its Wetlands Plan revisions, and the Corps of Engineers in the General Permits reauthorizations, has taken steps to reverse or minimize degrading trends and address future cumulative impacts. These steps are incorporated as conditions on the new General Permits and as site-specific conditions and guidelines in **Table 4** of this

plan. Many of the enforceable policies of Chapter 4 address past and future cumulative impacts. For example, stream setbacks and site restrictions are incorporated into all riparian wetlands, especially those sensitive areas within the Little Campbell/Campbell Creek watersheds. Also, the management strategies for upper Hillside wetlands call for site fill restrictions to further minimize impacts in headwater wetlands.

The "C" wetlands have been grouped because of their generally low wetland values and functions. Only those wetlands which, if developed, would have minimal individual and cumulative environmental impacts are included in this designation. This determination of no more than minimal impacts from future developments is appropriate since most of the "C" wetlands have comparatively low scores for all wetland functions, as delineated in the wetland assessment methodology, and the functional loss of those wetlands would not accumulate to substantial proportions. After reviewing the scores and known site values of the "C" wetlands, it was determined that if the "C" sites were filled according to conditions of the General Permits and enforceable policies that the sum of their lost functions would not represent a more than minimal cumulative environmental impact. Since most "C" wetlands do not provide particularly unique or productive wildlife habitat or water quality functions, wildlife habitat within the Municipality will not be adversely impacted if and when these sites are filled.

In those instances where "C" sites have moderate scores, those wetland functions are identified and addressed in the management strategies through site-specific setbacks, timing restrictions, and Best Management Practices. The plan also attempts, through the use of expanded buffers and other methods, to address secondary impacts of "C" site fills on adjacent "A" or "B" sites. An attempt was made with this plan update to prevent confusion regarding the management of "C" designated stream setbacks. Where "C" wetlands were coincidental with streams, the stream setback area was upgraded to a higher "A" wetland designation, which complements the management strategy of these stream associated wetlands. "C" wetlands are not intended to be totally filled without efforts to address and minimize individual and cumulative impacts. Fill avoidance and minimization are incorporated into the general management and guidance for "C" sites.