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FINAL

Total Maximum Daily Load (TMDL) for Residue in the Waters of Jordan Creek in Juneau, Alaska

May 2005

Contents

Figures

Tables

Total Maximum Daily Load for

Residue in the Waters

of Jordan Creek in Juneau, Alaska

TMDL AT A GLANCE:

Water Quality-limited?	Yes
Hydrologic Unit Code:	19010301
Criteria of Concern:	Residues (debris)
Designated Uses Affected:	Water supply; growth and propagation of fish, shellfish and other aquatic life and wildlife; recreation and water recreation
Major Source(s):	Littering and urban runoff from residential and commercial development
Loading Capacity:	Zero(0); the standard for residues prohibits deposits on or in the streambeds and streambanks
Wasteload Allocation:	Zero (0); nonpoint sources only
Load Allocation:	Zero (0) residues above natural condition
Margin of Safety:	Zero (0)

Executive Summary

Jordan Creek is located in the City and Borough of Juneau (CBJ), at the northern end of the Southeast Alaska panhandle. The state of Alaska included Jordan Creek on its 1998 303(d) list as water quality limited by sediment, dissolved oxygen (DO), and residue (debris) and identified roads, recreation, urban development, and stormwater runoff as pollutant sources. Jordan Creek remains on the 2003 303(d) list for non-attainment of the applicable standards for those pollutants. A Total Maximum Daily Load (TMDL) is established in this document to meet the requirements of Section 303(d)(1)(C) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA) implementing regulations (40 CFR Part 130), which require the establishment of a TMDL for the achievement of water quality standards when a waterbody is water quality limited. A TMDL is composed of the sum of individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background loads. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. A TMDL represents the amount of a pollutant the waterbody can assimilate while maintaining compliance with applicable water quality standards.

This document addresses only the debris impairment to the creek; a separate TMDL has been developed to address the dissolved oxygen and sediment impairments. It is important to note that the term *debris* used in this document refers only to human-caused residues, and should not be confused with naturally-occurring woody debris. The major source of debris in the watershed is littering and improperly stored garbage near the creek. The debris typically consists of plastics, wood scraps, metal, household garbage,

and paper. The debris enters the Jordan Creek watercourse directly from littering or indirectly from stormwater runoff, snowmelt, wind, and wildlife (bears).

Jordan Creek does not fully support its designated uses of water recreation and growth and propagation of fish, shellfish, and other aquatic life and wildlife due to elevated instream debris levels. The presence of debris detracts from recreation and can introduce contaminants to the water column. Debris deposited within the stream can also block culverts and fish passage, which inhibits the designated use of growth and propagation of fish. Blocked culverts have been observed at number of street crossings along Jordan Creek, especially common before the annual spring cleanup.

Since the water quality standard for debris does not allow for any unpermitted, human-caused inputs to the system, the TMDL for debris in Jordan Creek is set to zero. Similarly, the loading capacity and waste load allocation are also set to zero, and the margin of safety is implicit in the TMDL. Due to the nature of debris impairment, the main focus of this TMDL is to develop strategies for reducing the presence of debris in Jordan Creek. Solving the debris problem in Jordan Creek is twofold – prevention of nonpoint sources of debris, and cleanup activities. A number of actions – including increased public awareness of the importance of Jordan Creek as a resource, increased number and use of appropriate garbage receptacles, and increased enforcement of local ordinances, can significantly reduce the amount of debris input into the stream. However, as it is not practical to expect that all debris will be controlled even with the best preventative measures, cleanup activities will likely be an integral, ongoing part of the solution to the debris problem in Jordan Creek.

1. Overview

Section 303(d)(1)(C) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA) implementing regulations (40 CFR Part 130) require the establishment of a Total Maximum Daily Load (TMDL) for the achievement of state water quality standards when a waterbody is water quality limited. A TMDL identifies the amount of pollution control needed to maintain compliance with standards and includes an appropriate margin of safety. The focus of the TMDL is reduction of pollutant inputs to a level (or "load") that fully supports the designated uses of a given waterbody. The mechanisms used to address water quality problems after the TMDL is developed can include a combination of best management practices and/or effluent limits and monitoring required through National Pollutant Discharge Elimination System permits.

The state of Alaska included Jordan Creek on its 1998 303(d) list as water quality-limited due to sediment, low dissolved oxygen and residue (in the form of debris). The creek (Alaska ID Number 111-50-10620) appears for the first time on the 1998 list, and is currently classified as a Category 5 waterbody[1]. Alaska's Final 2002/2003 Integrated Water Quality Monitoring Report states:

> *"Jordan Creek was Section 303(d) listed in 1998 and remains on the 2003 Section 303(d) list for non-attainment of the Sediment, Residues and Dissolved Gas standards for sediment, debris, and low dissolved oxygen (DO). Coho salmon have dropped from an average of 250 adult returns to 54 in 1996 and 18 in 1997. It has been one of the most productive small streams in Juneau and Southeast Alaska for coho salmon but has experienced a rapid decline. There are serious sediment problems in the stream with poor survival of salmon eggs and low oxygen readings in the substrate that are in violation of water quality standards. The stream is largely spring fed and cannot transport large volumes of sediment like higher gradient systems. The headwaters of the stream have been manipulated with ditches replacing more productive habitat and with ponds being filled in. There is a problem with iron floc that was not present 10 years ago. The stream corridor is under rapid development and the lower section of the creek regularly goes dry. Macroinvertebrate bioassessment sampling shows the stream has low diversity and experienced declines over the 1994 to 1996 period.*"

Pollutant sources identified on the 303(d) list are land development and road runoff. This document establishes a TMDL to address the debris impairment in Jordan Creek. Sediment and low dissolved oxygen TMDLs will be established in a separate document.

The following sections provide general background information on the Jordan Creek watershed.

1.1 Location

Jordan Creek is located in the City and Borough of Juneau (CBJ), at the northern end of the Southeast Alaska panhandle. It flows along a north to south axis on the east side of the Mendenhall Valley, formed by the retreat of the Mendenhall Glacier (Figure 1-1). The Jordan Creek watershed drains into Gastineau Channel through a large-diameter culvert that crosses beneath the runway of the Juneau International Airport (Figure 1-2). Watershed boundaries are delineated in Figure 1-3.

[1]Category 5 Waterbody: This category constitutes the Clean Water Act Section 303(d) list of waters impaired by a pollutant(s) for which one or more TMDLs are needed.

NA COVE

NORTH

WAYDELICH CR

AUKE NU CR

AUKE LAKE

MONTANA CREEK

MENDENHALL RIVER

JORDAN CREEK

JUNEAU INTERNATIONAL AIRPORT

JORDAN CREEK WATERSHED
FIGURE 1-2

AUKE BAY

FRITZ COVE

SWITZER CR

LEMON CR

BAYVIEW SUBDIVISION

SALMON CR

FISH CREEK

FALLS CR

GASTINEAU

JUNEAU

GOLD CR

STEPHENS PASSAGE

D O U G L A S

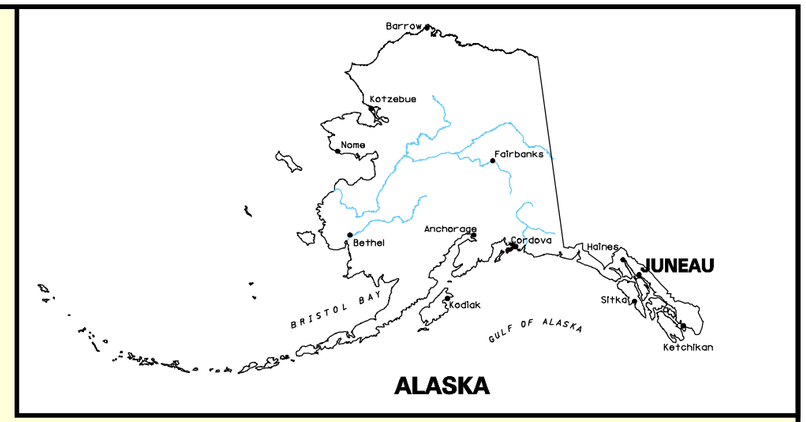
I S L A N D

LAWSON CR

CHANNEL

DOUGLAS

0 .5 1.0 2.0 MILES



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(907) 586-4447

LOCATION OF JORDAN CREEK WATERSHED

Figure **1–1**

MENDENHALL RIVER

MONTANA CREEK

JUNEAU INTERNATIONAL AIRPORT

EGAN DRIVE

DUCK CREEK

JORDAN CREEK

THUNDER MOUNTAIN

EAST VALLEY RESERVOIR

GLACIER VALLEY ELEMENTARY SCHOOL

FLOYD-DRYDEN MIDDLE SCHOOL

NORTH

500 0 500 1000 1500 2000 FEET

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JORDAN CREEK WATERSHED

Figure **1-2**

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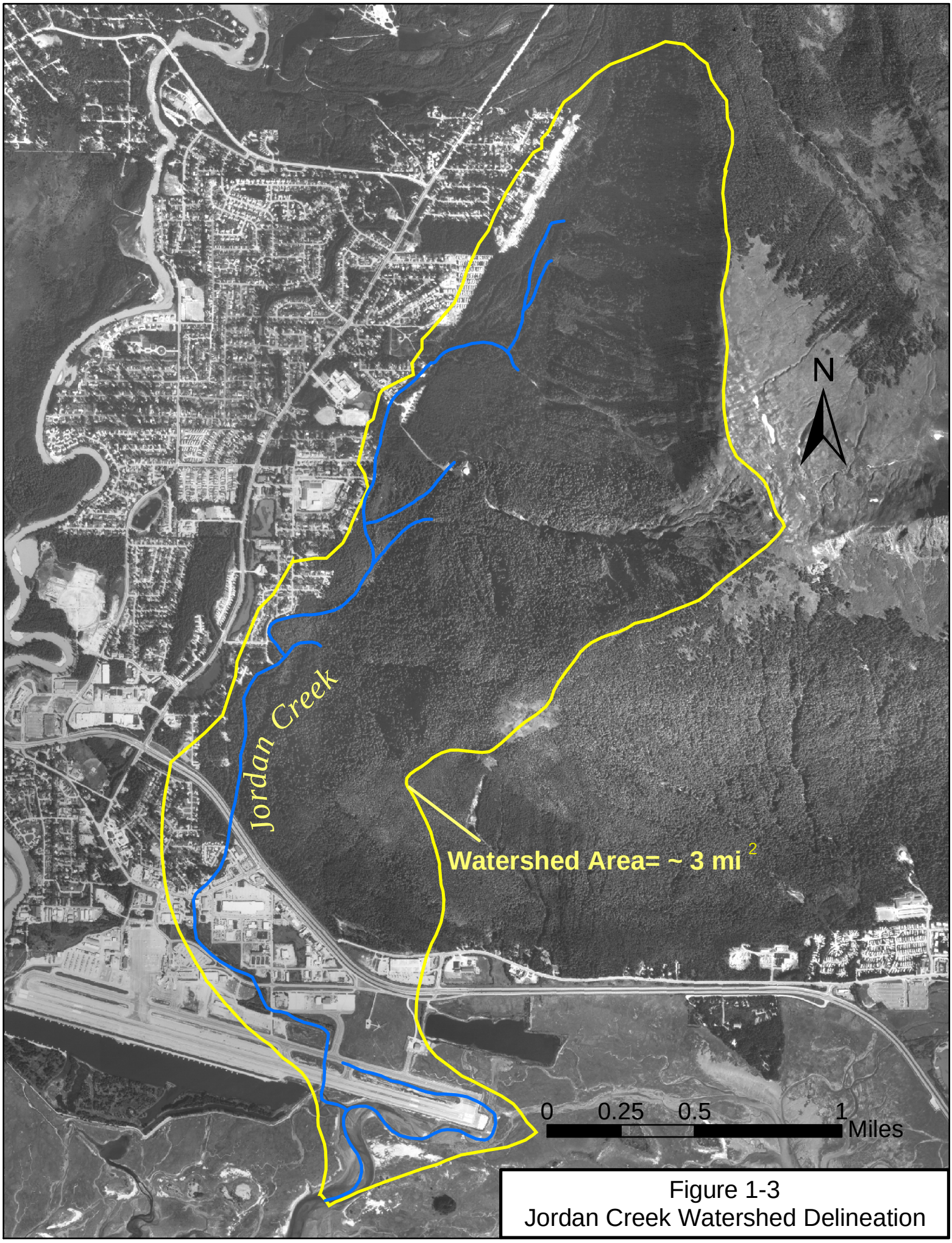


Figure 1-3
Jordan Creek Watershed Delineation

1.2 Population

Based on 2000 census data, the population of the City and Borough of Juneau is 30,711. Jordan Creek lies within the most densely populated area of Juneau, the Mendenhall Valley, which has an estimated population of roughly 13,000. About 4,364 people reside within the Jordan Creek watershed (Alaska Department of Labor and Workforce Development). The first subdivisions were developed in the Mendenhall Valley in 1961, and the population in that area has grown from a few homes scattered along the highway to a large suburban area filling most of the valley floor. Projected growth for the valley over the next 15 years is lower than that of the remaining borough, mainly due to lack of easily developed land (Kittleson & Associates).

1.3 Topography

The Mendenhall Valley is a glacial valley bounded on the east side by Thunder Mountain and on the west side by Mount McGinnis and Auke Mountain. The upper end of the valley is bounded by the Mendenhall Glacier and its terminus lake, and the lower end opens onto the tidal flats of Gastineau Channel. The main area of the valley is fairly flat, with steep mountain slopes rising up on both sides. Jordan Creek is located along the base of Thunder Mountain on the east side of the valley, with flat, generally developed terrain to the west. The main creek channel flows through muskegs, with spruce forests to its east, with the western slopes of Thunder Mountain rising steeply above to altitudes exceeding 2,800 feet. The creek drops about sixty feet in elevation as it travels along its 3.8 mile course from its headwaters south of the Mendenhall Glacier to its mouth in Gastineau Channel.

Prior to the formation of the Mendenhall River, Jordan Creek and nearby Duck Creek were the major outflow channels for meltwater from the Mendenhall Glacier. When the glacier retreated into the Mendenhall Lake basin (between 1750 and 1900), overflow waters formed the Mendenhall River, and Jordan Creek and Duck Creek became smaller streams only fed by groundwater and surface runoff (Host and Neal 2003, Koski and Lorenz 1999).

1.4 Land Use

Jordan Creek traverses a mix of developed and undeveloped land. The east side of the creek from the headwaters to Egan Drive is mostly undeveloped forest interspersed with small wetland areas. The west side of the creek along this same stretch is more developed, mainly with residential housing. South of Egan Drive, the creek has higher density residential and commercial development on both sides. Jordan Creek flows through the Juneau International Airport property, beneath the runway in a large diameter culvert, then on through the wetlands and tidal flats area, and finally discharges into Gastineau Channel. Table 1-1 shows the land use distribution within the Jordan Creek watershed.

Table 1-1. Land Use distribution in Jordan Creek watershed, by Land Use category

Land Use	Area (acres)	Percent of Total Area
Residential	31.1	2%
Commercial	111.4	6%
Industrial	102.1	5%
Forested/Rural Reserve	1654.5	87%
Total	1899.1	

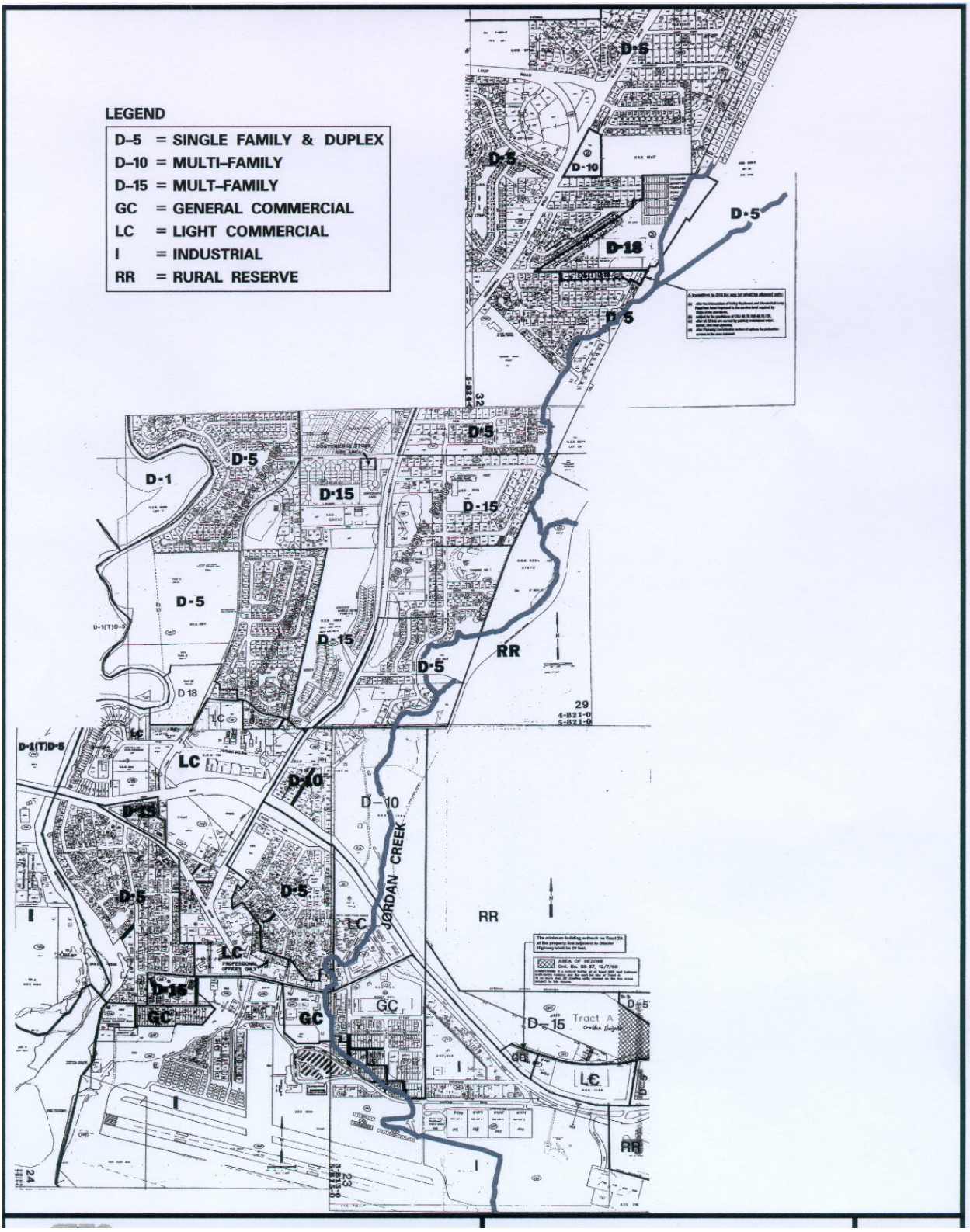


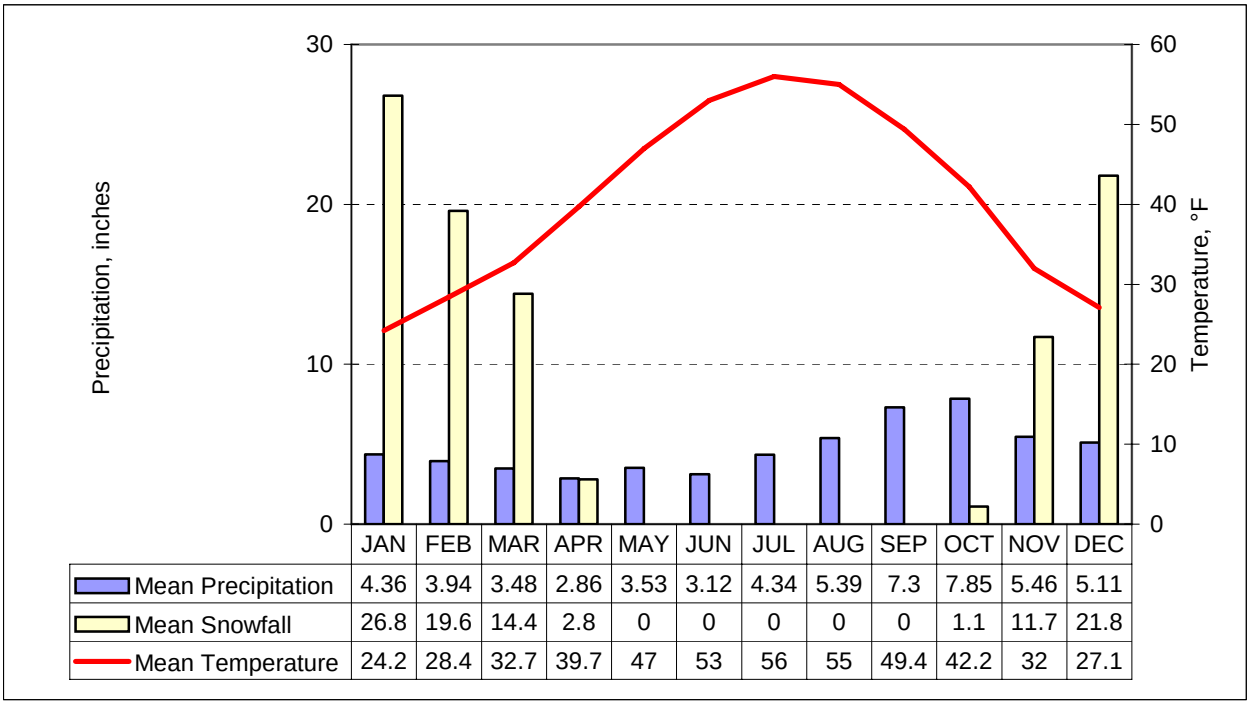
Figure 1-4. Area Land Use in the Jordan Creek watershed

With the exception of the Si'it Tuan housing development just north of Thunder Mountain Trailer Park and the Coho Park housing development off of Amalga Street, development along the creek is restricted to its west side until it crosses Egan Drive. The undeveloped east side of the creek, bordering Thunder Mountain, provides little in the way of debris input to the system

1.5 Climate

Jordan Creek is located in the Maritime zone, characterized by moderate temperatures, significant precipitation and generally cool, wet conditions year round. Juneau International Airport (the nearest site with historical weather data) has an average annual temperature of 41°F, average annual precipitation of 53 inches, average annual total snowfall of 94 inches and a peak average snow depth of 18 inches. Frequent warming trends influenced by the maritime climate contribute to freeze-thaw conditions throughout the winter. The upper portion of the Mendenhall Valley (near the Jordan Creek headwaters) tends to have slightly less precipitation than the airport area.

Summer temperatures average around 55°F. Autumn begins in early September and ends in late October with temperatures falling in September and snowfalls increasing in November. Winter lasts from November to early April, with the coldest temperatures typically occurring in January. Winter temperatures average around 28°F. Spring begins in late April with moderate precipitation and increasing temperatures. Figure 1-5 presents a summary of monthly averages for rainfall, snowfall and temperature at the Juneau International Airport (National Weather Service Station 504100), based on the period of record at the station from January 1950 to May 2004.



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean Precipitation	4.36	3.94	3.48	2.86	3.53	3.12	4.34	5.39	7.3	7.85	5.46	5.11
Mean Snowfall	26.8	19.6	14.4	2.8	0	0	0	0	0	1.1	11.7	21.8
Mean Temperature	24.2	28.4	32.7	39.7	47	53	56	55	49.4	42.2	32	27.1

Figure 1-5. Monthly average precipitation and temperatures at Juneau International Airport

1.6 Hydrology

Jordan Creek flows along a north to south axis on the east side of the Mendenhall Valley. The creek is about 3.8 miles in length, ranging from 5 to 20 feet wide, 4 inches to 6 feet deep, with an average gradient of approximately 0.28% and mild meanders throughout most of its length (Mendenhall Valley Drainage Study, 1996). The watershed totals about 1,900 acres or 2.97 square miles. The headwaters of Jordan Creek are spring fed from subsurface drainage off Thunder Mountain and surface runoff during rainfall events. There are two major tributaries at the source area, one along Thunder Mountain Trailer Court that is man-made, collecting surface runoff from the trailer park and the neighboring Si'it Tuan housing to the north, and the other in a groundwater seepage area a few hundred feet to the east. An additional tributary enters downstream of that area, on the east side of the creek between Dudley Street and Jennifer Drive, where runoff from Thunder Mountain that has been diverted under the East Valley Reservoir access road has become channelized. Aerial photos and maps of the area before reservoir construction do not show this tributary, so it is probable that before the diversion of the creek occurred, the water from that area traveled to the creek in a more dispersed manner.

Like most of Southeast Alaska, surface water resources in Jordan Creek are influenced by the maritime climate of the northern Pacific Ocean and the Gulf of Alaska. Some of the world's highest runoff rates per unit of area can occur in Southeast Alaska. Jordan Creek has two seasonal periods with high runoff: a spring snowmelt period of moderately high flows, and a fall rainfall period. High water can occur throughout the year, but the highest instantaneous peak discharges are most prevalent in the fall months. Low water periods tend to occur in early spring and mid-summer.

The mean monthly hydrograph for the USGS recording station at Egan Drive is shown in Figure 1-6. Mean monthly discharge is shown, as well as the maximum and minimum mean monthly discharge for each month over the record period of 1997-2003. The annual mean flow for the record period was 7.61 cubic feet per second (cfs). Instantaneous discharges as high as 150 cfs have been measured following heavy precipitation events, and as low as 0.3 cfs during dry spells.

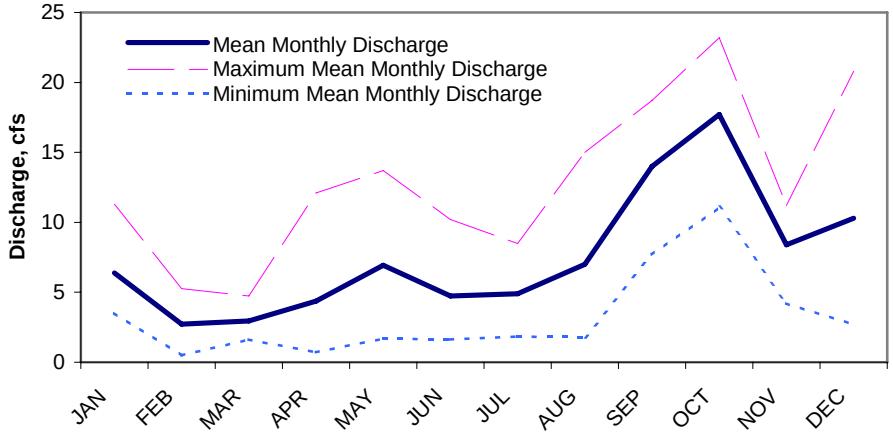


Figure 1-6. Mean Monthly Hydrograph for Jordan Creek, 1997-2003

Discharge information for other stations on Jordan Creek is limited to a small number of measurements taken during 1999 and 2000 for a USGS study of baseline characteristics of Jordan Creek. This information is useful for characterizing discharge along the creek, but is not extensive enough to allow development of additional hydrographs at the other stations.

1.7 Fish Populations

Jordan Creek has historically supported wild stocks of coho, chum and pink salmon, Dolly Varden and cutthroat trout. The stream was stocked with 3,000 eastern brook trout in 1953 and 4,800 coho salmon in 1970. There is spawning and rearing habitat throughout the system. Adult coho salmon generally enter Jordan Creek during high water periods in August through October, with the peak returns in mid-September through early October. Coho spawn throughout the system. Coho fry will spend one to three winters in the creek before migrating out to sea as smolts in May and June. Adult pink salmon enter into lower Jordan Creek between late June and mid-August. Most spawning activity occurs in the intertidal zone, and outmigration of fry occurs in late winter and early spring. Resident cutthroat trout generally spawn in May through early June in the headwater areas, and adult Dolly Varden usually spawn in October and November, hatching in March (ADF&G 1993).

According to the most recent stock assessment for coho salmon in Southeast Alaska, Jordan Creek "had peak survey counts that were within or above goal in all but one year during 1981-1994 but declined to below goal every year in 1996-2000 and were proportionally far below other Juneau roadside systems during that period." (Shaul et al., 2003). This report goes on to describe fluctuations in peak survey counts in following years, with counts within goal in 2001 and dramatically increased to nearly double the record for the previous 21 years in 2002. Peak survey counts in 2003 and 2004 dropped back down from the 2002 level and did not meet escapement goals (personal communication, Brian Glynn, Juneau Area Management Biologist). Shaul et al. (2003) speculates that "the recent history of highly variable escapements in Jordan Creek, combined with widely disparate smolt counts in 2001 and 2002, suggests that survival and smolt production from the system has recently been particularly sensitive to environmental conditions."

Debris in the creek has accumulated and at times has blocked culverts along Jordan Creek. Blocked culverts impede the passage of fish both upstream and downstream of the blockage. Debris in the creek also has the potential to introduce substances to the water that impair the overall water quality. Typical examples of this are old tires, scrap metal, lumber and old batteries.

2. Water Quality Standards and TMDL

Water quality standards designate the "uses" to be protected (e.g., water supply, recreation, aquatic life) and the "criteria" for their protection (e.g., how much of a pollutant can be present in a waterbody without impairing its designated uses). TMDLs are developed to meet applicable water quality standards, which may be expressed as numeric water quality criteria or narrative criteria for the support of designated uses. The TMDL target identifies the numeric goals or endpoints for the TMDL that equate to attainment of the water quality standards. The TMDL target may be equivalent to a numeric water quality standard where one exists, or it may represent a quantitative interpretation of a narrative standard. This section reviews the applicable water quality standards and identifies an appropriate TMDL target for calculation of the debris TMDL for Jordan Creek.

2.1 Applicable Water Quality Standards

Title 18, Chapter 70 of the Alaska Administrative Code (ACC) establishes water quality standards for the waters of Alaska, including the designated uses to be protected and the water quality criteria necessary to protect the uses. Designated uses established in the State of Alaska Water Quality Standards (18 AAC 70.020) for fresh waters of the state include (1) water supply, (2) water recreation, and (3) growth and propagation of fish, shellfish, other aquatic life, and wildlife, and are applicable to all fresh waters, unless specifically exempted. Residue water quality standards for all uses are applicable to Jordan Creek. These standards are presented in Table 2-1. The TMDL for residue in Jordan Creek is developed to meet all applicable criteria, the most stringent of which is the criteria for growth and propagation of fish, shellfish, other aquatic life, and wildlife.

Table 2-1. Alaska water quality standards for residues

Water Use	Description of Standard
(A) Water Supply	
(i) drinking, culinary and food processing	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.
(ii) agriculture, including irrigation and stock watering	May not be present in quantities to cause soil plugging or reduced crop yield, or to make the water unfit or unsafe for the use.
(iii) aquaculture	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use.
(iii) industrial	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use.
(B) Water Recreation	
(i) contact recreation	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines
(ii) secondary contact	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines
(C) Growth and Propagation of Fish, Shellfish, other Aquatic Life and Wildlife	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use, or cause acute or chronic problem levels as determined by bioassay or other appropriate methods. May not, alone or in combination with other substances, cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines

2.2 Designated Use Impacts

Jordan Creek does not fully support its designated uses of water recreation and growth and propagation of aquatic life and wildlife due to elevated instream debris levels. Although Jordan Creek is not currently used for drinking water, the designated use of water supply must also be protected per Alaska water quality standards.

The presence of debris detracts from recreation and can introduce contaminants to the water column. Potentially hazardous debris, such as fuel containers, has been observed and documented within Jordan Creek. Debris from household garbage can attract undesirable wildlife and promote nuisance bears, a chronic problem in the upper reaches of Jordan Creek.

Debris deposited within the stream can block culverts and fish passage, which inhibits the designated use of growth and propagation of fish. Blocked culverts have been observed at number of street crossings along Jordan Creek, especially common before the annual spring cleanup. There are a number of culverts along Jordan Creek that naturally collect debris (logs, etc.), and anthropogenic sources of debris have been documented to add to the problem.

2.3 TMDL

The TMDL target is the numeric endpoint used to evaluate the loading capacity and load reductions needed to attain water quality standards. In the case of debris in Jordan Creek, the TMDL target is zero, with no debris or solid waste allowed in the stream channel or on its banks.

3. Data Analysis

Unlike most numeric TMDLs where specific loadings are calculated, the data available regarding debris in Jordan Creek is largely qualitative. According to the guidelines used by the Alaska Department of Environmental Conservation (ADEC), the best professional judgment of a resource agency professional or other credible source can be used to determine whether a waterbody persistently exceeds water quality standards or designated uses (e.g. fish habitat, recreational areas) are adversely affected. Direct monitoring data, photographs and videos, and written reports within the last 5 years are additional guidelines ADEC uses to determine whether a waterbody is impaired or water quality limited for 303(d) listing purposes.

3.1 Data Inventory

Several agencies have conducted water quality measurements in Jordan Creek over the last 40 years, but none have measured debris in a manner that allows a comparison over time. Photographic records of some of the litter cleanup activities in 2002 and 2004 have been provided by the Mendenhall Watershed Partnership. Additional photos are on record from the Waterbody Assessment prepared for CBJ in 2002. The photos indicate that debris is found throughout the creek, but is most concentrated in the headwater areas near Thunder Mountain Trailer park and in the commercial zone near McDonalds and other businesses. Photos are found in Appendix A.

The 2004 Litter Free Cleanup on May 8, 2004 yielded 8,000 to 10,000 pounds of garbage from the Jordan Creek watershed, with approximately 150 volunteers performing the work. Some debris was still present in the creek after this effort, but it was a substantial improvement in all areas.

4. Pollutant Sources

The types of residue observed along Jordan Creek include dimensional lumber scraps, plywood, paper, plastics, household garbage, glass, metals and car batteries. On October 3, 2004 an abandoned pickup truck was discovered in the creek off the end of Valley Boulevard. The Alaska Department of Environmental Conservation filed a pollution incident report when petroleum sheens were observed discharging from the vehicle. Incidents such as this are difficult to avoid given the proximity of the creek to a number of roads (Valley Boulevard, Dudley Street, Forest Lane, Nancy Street). In some cases, residents and street maintenance personnel have put up barriers such as large rocks, but in other cases, there is no physical barrier to prevent direct access to the creek. This also increases access to allow use of the creek as a dumping ground for junk such as old tires.

4.1 Point Sources

Point sources, which are permitted dischargers into the waterbody, do not exist in this case. Discharge of debris into surface waters is prohibited in the State of Alaska, so no permits have been issued for this activity.

4.2 Nonpoint and Natural Sources

The debris impairment discussed in this document refers only to human-caused residues, and should not be confused with naturally-occurring woody debris which is important to maintain instream habitat. Therefore, there is no background or natural source of residue and solid waste in the watershed. The primary sources of debris in the creek are littering and improperly stored garbage near the creek. Most debris in Jordan Creek appears to be a product of direct input from residential, commercial, and industrial areas or indirect inputs brought into the creek by wind, snowmelt, runoff, or wildlife. In some areas, snow removal activities on streets, parking lots, and driveways cause debris to be placed in the flood plain and on the banks of the creek.

The undeveloped east side of Jordan Creek along Thunder Mountain provides excellent bear habitat. Improperly stored garbage has been documented as a prime bear attractant and has been a source of concern both from a public safety and a litter problem. The City and Borough has maintained records of bear sightings and problem bears in the Mendenhall Valley. Records show that many of the bear sightings are in the more densely populated areas that lie at the edge of the forest, such as Thunder Mountain Trailer Park. Most trailer residents do not have garages or outbuildings, and find it difficult to keep trash indoors between weekly collections. Household garbage pulled into the creek or its banks because of improperly stored garbage is a substantial source of debris in the upper Jordan Creek watershed. In addition to bears, dogs also play a role in pulling unsecured garbage into the creek.

5. Analytical Approach

The debris impairment to Jordan Creek does not fit the model for the typical loading capacity determination because the nature of debris does not lend well to quantitative analysis. However, because Alaska water quality standards do not allow for any debris delivered to a stream, no loading calculation is necessary. Therefore, the TMDL is set to zero, and this document focuses on implementation of strategies that will help keep debris out of the creek and allow it to meet the applicable water quality standards.

5.1 Wasteload Allocation

The wasteload allocation is the portion of the TMDL that is allocated to point sources. Discharge of debris into surface waters is prohibited in the State of Alaska, so the wasteload allocation for debris in Jordan Creek is also zero.

5.2 Load Allocation

The load allocation is the portion of the TMDL that is allocated to nonpoint sources and background levels. Since there are no background sources of debris and water quality standards do not allow for any debris inputs, the load allocation for debris in Jordan Creek is also zero.

5.3 Loading Capacity

Loading capacity is the ability of the receiving waters to assimilate a given pollutant, in the case residue in the form of debris. The debris loading capacity for Jordan Creek is derived directly from the water quality standards, which require no unpermitted, human-caused debris to be deposited within the stream. As such, the loading capacity of Jordan Creek for debris is zero.

5.4 Margin of Safety

CWA Section 303(d) requires that a TMDL incorporate a margin of safety (MOS) to account for any uncertainty or lack of knowledge concerning the relationship between pollutant loading and water quality. The MOS can be implicit (e.g. incorporated into the TMDL analysis through conservative assumptions) or explicit (e.g. expressed in the TMDL as a portion of the loadings) or a combination of both. Because the loading capacity determined from water quality standards allows no debris in the stream, there is neither a load or wasteload of debris allocated for Jordan Creek, and the explicit MOS is set to zero.

5.5 Seasonal Variation

There is some seasonal variation in the debris loading into Jordan Creek. Debris input is generally lower in the winter since snow and ice reduce runoff that can carry debris from the watershed into the creek. In addition, hibernation of bears in the winter also reduces the amount of household garbage pulled into the creek by wildlife during those months. Spring snowmelt brings higher loading to the creek, as increased runoff transports debris accumulated throughout the winter from the streambank into the creek. Warmer weather also increases pedestrian and vehicle traffic in the residential and commercial areas where littering is common. After spring snowmelt, low-flow conditions combined with debris in the creek can (and have in the past) lead to culvert blockages and impediments to fish passage. As this time of year coincides with out-migration of salmon, debris buildup can be especially detrimental during the late spring/early summer timeframe. Seasonal variation is thus incorporated by timing education, enforcement, and cleanup activities to coincide with key periods in the lifecycle of fish.

6. Implementation

Solving the debris problem in Jordan Creek is twofold – prevention of nonpoint sources of debris, and cleanup activities. A number of actions – including increased public awareness of the importance of Jordan Creek as a resource, increased number and use of appropriate garbage receptacles, and increased enforcement of local ordinances, can significantly reduce the amount of debris input into the stream.

However, as it is not practical to expect that all debris will be controlled even with the best preventative measures, cleanup activities will likely be an integral, ongoing part of the solution to the debris problem in Jordan Creek.

There are a number of local groups that are concerned with the health of Jordan Creek and have already started working towards the goal of reducing debris and other pollutants in the stream, including the Mendenhall Watershed Partnership (MWP). MWP is a nonprofit group formed in 1998 which coordinates restoration projects, volunteer activities, and public education and out reach for improvement of the Mendenhall Valley watersheds, including Jordan Creek. The MWP is currently developing a comprehensive recovery strategy for Jordan Creek.

Prevention

A change in public attitude and perception toward the importance of small stream systems such as these is critical in implementing this debris TMDL. Educational and outreach programs targeted at the two nearby schools (Glacier Valley Elementary School and Floyd Dryden Middle School) and residents of the Jordan Creek watershed are strongly recommended to foster a sense of ownership among the residents of the area. The nature trail area near Jennifer Drive, a great tool for education, could incorporate additional information plaques about specific habitat features and water quality. Additionally, neighborhoods could be encouraged to organize junk-hauling days, where residents could group together to make efficient and cost-effective trips to the landfill. Efforts of this type, combined with education about the creek ecosystem and preventative measures applied to keep bears out of garbage are the key to improving the debris loading in the creek.

In March 2002, the City and Borough of Juneau adopted an Urban Bear Ordinance designed to reduce the attractiveness of garbage to bears. Below is a brief summary of relevant provisions:

- Garbage cans may be put out to the curb for collection no sooner than 4 a.m. on pickup day.
- Other than after 4 a.m. on pickup day, garbage must be kept in a bear resistant container or enclosure (in a strong fully enclosed structure such as a garage, or otherwise bear resistant enclosure)
- Garbage cans must be labeled with an address.

If garbage has attracted bears and the resident or business fails to take steps to legally store the garbage, then they can be cited for maintaining a bear attraction nuisance, which carries a $50 fine for the first offense. An educational campaign that includes flyers about proper storage of garbage, radio advertisements, and a portion of the CBJ website devoted to garbage and bears, is promoted each spring and summer by CBJ and partner agencies and organizations.

A pilot program has been instituted by the local refuse collection company to test bear-resistant trash bins for individual residential use. The bins hold the same volume as three standard trash cans (96 gallons per bin) and have a latching mechanism for the lid that requires fine motor control (such as an opposable thumb) to operate. The bins have been in use for several months at two trailer parks closer to downtown Juneau; bears have knocked them over and batted them around but have not yet managed to get them open. The local refuse company will also rent these containers to residents outside of the pilot program for a monthly fee. Reducing the expense of providing these containers is one of their current goals. If there is success with these bins over the course of the bear season, they present a good opportunity reducing the debris at its source. The additional benefit would be to reduce bear traffic in the area, as the bears learn that garbage is not readily available. Use of these bear-resistant trash bins in trailer parks and residential areas without garages should be especially encouraged.

As an alternative to individual bear-proof trash receptacles which may be costly for residents, centrally located, bearproof garbage storage buildings may constructed in high-density residential areas. Since the

goal is to reduce the amount of debris entering Jordan Creek, an effort should be made to encourage facilities that are convenient and inexpensive. Entities seeking compensation/mitigation projects could provide bear-proof bins for use in Thunder Mountain Trailer Park and/or other high-density neighborhoods.

In conjunction with other garbage containment strategies, more stringent enforcement of local littering and garbage-related ordinances can help reduce the input of debris to the creek. CBJ has two ordinances that address garbage issues: 1. Nuisance abatement, and 2. Anti-litter ordinance. The nuisance abatement ordinance includes language specific to bear attractants and is described previously in this section. The anti-litter ordinance imposes a minimum $200 fine for the first conviction. Enforcement of these ordinances is conducted by CBJ enforcement personnel and the Juneau Police Department community service officers. Increased enforcement of both the nuisance and anti-litter ordinances is imperative to reducing debris in Jordan Creek. Creative measures such as reducing a garbage-related fine if the person agrees to pick up litter and/or invests in a bear-resistant container should be considered.

Placing more garbage receptacles that are easily visible within the commercially developed portion of Jordan Creek may help to cut down on littering. Centralized recycling containers, placed in convenient locations such as outside of grocery stores, may help to encourage recycling and reduce the amount of garbage that accumulates between weekly pickups. Bottle fees, as used in other states such as Oregon, could help offset the costs of increased recycling efforts and may encourage people to pick up bottles for monetary gain.

Cleanup activities:

Litter-Free, a non-profit organization committed to keeping Juneau clean and encouraging recycling, organizes a community-wide cleanup each Spring where residents and volunteers pick up garbage throughout the city. CBJ is committed to continuing this spring cleanup, and has included this event in the comprehensive plan and helps to fund the cleanup each year. The timing of this cleanup is important as it coincides with spring outmigration of salmon. MWP organizes an adopt-a-stream program to help keep defined reaches of streams in the Mendenhall Valley (including Jordan Creek) free of garbage and litter. These groups dedicated to a specific reach will also conduct trash pickups during the summer and fall months.

In order to foster education and to get school groups involved, a program could be started at Glacier Valley Elementary and Floyd Dryden Middle School to have each class pick up trash at least once a year, and track the amount and type of trash they remove. Additional community cleanup events could be promoted by encouraging local businesses and tourism groups to donate prizes or discounts on products for volunteers who help clean up.

7. Monitoring

A comprehensive, coordinated plan needs to be developed for water quality monitoring in the Jordan Creek watershed. MWP is currently developing a monitoring strategy for Jordan Creek which includes collaboration among various federal, state, and local groups, including USGS, University of Alaska Southeast, Discovery Southeast, CBJ, ADEC, ADF&G, and NMFS. As part of this monitoring strategy, agencies and volunteers should be encouraged to actively observe and note the presence of trash in and around water quality sampling locations. Regular inspection of culverts, especially during the spring and fall when salmon are outmigrating and spawning, should also be included in the monitoring program.

In the past, the type and amount of debris collected during cleanup events has not routinely been recorded (other than photographs). A standard form for tracking debris collected during the spring cleanup event was developed for Duck Creek, and could be used in Jordan Creek as well.

In addition to general monitoring, specific monitoring of sites where strategies have been implemented to reduce debris input into the stream should be monitored to evaluate effectiveness. CBJ maintains a database of bear complaints which can be helpful in evaluating programs targeting bear-related debris.

8. Public Comments

ADEC published a public notice on the proposed Jordan Creek TMDL for residue in the *Juneau Empire*, *What's Up* (a web-based, weekly compilation of conferences, training, and statewide events), and on the State of Alaska's website. A fact sheet describing the TMDL was also posted on ADEC's website along with the draft TMDL document. The public comment period was open from March 24 through April 22, 2005, and public meeting was held on April 8, 2005. In addition, ADEC directly sent electronic copies of the draft TMDL prior to the public notice period to key federal, state, and local agencies as well as environmental groups and other local organizations.

Minor comments were received from USEPA and Alaska Department of Natural Resources (ADNR) prior to the public notice draft of the TMDL. These comments were addressed and incorporated into the public review draft. No written comments were received during the public notice period, although a number of organizations attended the public meeting on April 8.

Although not formally required, the pre-public review draft TMDL comments are summarized below to demonstrate responsiveness to the public and stakeholders.

Comments received from USEPA:

Comment: Although loading capacity (LC) and margin of safety (MOS) are included in the table "TMDL at a Glance", no text is included on the LC or MOS in the narrative part of the TMDL.

Response: Two sections, 5.3 Loading Capacity and 5.4 Margin of Safety, were added to the narrative portion of the TMDL on page 15.

Comments received from ADNR:

Comment: Definition of "debris". This TMDL addresses non-attainment of the water quality standard for *residues*. The document clarifies that the issue is *debris* (or trash), and uses the term "debris" somewhat synonymously for residues. We recommend that the TMDL further clarify that the term "debris" refers only to human-caused, as opposed to natural sources of woody debris (often referred to as Large Woody Debris), which is important to maintain instream habitat.

Response: Text has been added in a number of locations throughout the text to clarify the definition of debris. Under Section 1.0 Overview, the following text was added:

> "It is important to note that the term *debris* used in this document refers only to human-caused residues, and should not be confused with naturally-occurring woody debris."

Under section 4.2 Nonpoint and Natural Sources, the following text has been added:

> "The debris impairment discussed in this document refers only to human-caused residues, and should not be confused with naturally-occurring woody debris which is important to maintain instream habitat. Therefore, there is no background or natural source of residue and solid waste in the watershed."

Comment: Stream identification and fish species present. Jordan Creek (Stream # 111-50-10620) is included in the *Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes – Southeastern Region, Effective January 15, 2005 (ADF&G Special Publication No. 04-06).* This stream supports populations of coho, pink and chum salmon, Dolly Varden and Cutthroat trout. The TMDL (page 3) incorrectly lists the stream as "Alaska ID Number 10301-004". Section 1.7 Fish Populations, should be updated to include chum salmon among the species present to reflect recent updates to the catalog.

Response: Text has been corrected in Section 1.7 to reflect the correct stream ID and fish species present.

Comment: Culvert blockage. Section 1.7 - Fish Populations identifies the problem of debris blocking culverts and impeding fish passage. Culverts are only identified for crossings at Yandukin Drive, Glacier Highway, Egan Drive and Amalga Street. There are additional culverts on Jordan Creek not identified, such as on airport property. Are the culverts identified in the TMDL of particular concern for debris blockage?

Response: A number of culverts along Jordan Creek may be suseptable to blockage from debris. Instead of attempting to list each culvert along the entire length of Jordan Creek, the discussion in this section has been generalized and the refrence to culverts at specific street crossing has been removed.

Comment: Wildlife. Page 2, 3rd paragraph, 3rd sentence refers to household garbage attracting undesirable wildlife and nuisance bears. While we agree that nuisance bears may be an issue, some clarification is needed. It should be noted that bears naturally occur in stream corridors, particularly during salmon runs. The main issue seems to be that bears get into garbage that isn't properly stored, and then the garbage gets into the stream. We recommend limiting the discussion of wildlife to the issue of bears as a vector for garbage to getting into the stream. In addition, the term "undesirable wildlife" needs some clarification or should be omitted entirely. Other than nuisance bears, what other wildlife is "undesirable" in the stream?

Response: The discussion referenced in the comment above has been shortened to eliminate the term "undesirable wildlife" and clarified to read:

> "The debris enters the Jordan Creek watercourse directly from littering or indirectly from stormwater runoff, snowmelt, wind, and wildlife (bears). "

Comment: Monitoring. Regular inspection of culverts for obstructions should be included in the management program.

Response: The following text has been added to Section 7 Monitoring:

> "Regular inspection of culverts, especially during the spring and fall when salmon are outmigrating and spawning, should also be included in the monitoring program."

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Appendix A: Photos of Debris Impairment to Jordan Creek

Section 1—Photos of debris in Jordan Creek in the spring after snowmelt, before cleanup events.

Typical metal debris in creek

Garbage dragged into the woods by bears

Debris caught behind a log

Garbage cans dragged into the creek

Potential hydrocarbon pollution

Truck stuck in creek and abandoned

Section 2 – Spring cleanup events with Glacier Valley School and Litter Free

Glacier Valley cleanup

Glacier Valley Cleanup

Final pile from Glacier Valley cleanup

cleanup event

MWP-sponsored picnic during Litter Free

Bag drop area for part of Litter Free cleanup

Finished product—clean reaches of stream