

1.0 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) has partnered with the City and Borough of Juneau (CBJ) and the Federal Highway Administration (FHWA) to prepare an Environmental Impact Statement (EIS) to determine the location, conceptual design, and environmental consequences of a proposed second Gastineau Channel crossing to connect mainland Juneau with North Douglas Island, identified as the Juneau Second Channel Crossing (JSCC) project.

The purpose of this *Project Development Summary Report* is to comprehensively review the preliminary results of the JSCC EIS scoping activities conducted to date, in combination with preliminary engineering and environmental baseline conditions/studies, in order to assess current conditions within the project study area and document preliminary findings. The *Project Development Summary Report* is not a Draft EIS, but will be used as the basis for further EIS activities. This *Report* includes the results of agency and public scoping comments as well as preliminary investigations for the proposed project. Only preliminary data associated with initial project development activities is included, with some sections containing little or no detailed data compilation.

This *Report* is intended to serve as a phased milestone document with basic summary information to provide the basis for further evaluation and development of the range of alternatives and preliminary screening criteria for subsequent project development activities. The intent is not to develop corridors or specific alignment alternatives at this time, only to identify a refined range of “representative” crossing concepts. The assessment will discuss the logic or reasonableness of carrying forward previously studied crossing alternatives and identify refined crossing concept potentials. Variables include physical and environmental constraints, preliminary engineering/design constraints, crossing types (i.e., fixed and movable span bridge types, with and without embankment approach options), updated ranges of approximate costs, advantages and disadvantages of representative crossing concept areas, and specific elements unique to each crossing area.

The general outline for the report is structured as follows:

- Project Description/ Purpose and Need Statement
- Summary of the 1984 City and Borough of Juneau *Second Gastineau Channel Crossing Feasibility Study*
- Baseline Engineering Conditions/Studies
 - Preliminary Design Criteria
 - Gastineau Channel Navigational Issues
 - Gastineau Channel Vessel Monitoring Program
 - Preliminary Bridge Horizontal and Vertical Clearance Considerations
- Baseline Environmental Conditions /Studies
 - Social, Economic, Natural, and Physical
- Preliminary Scoping Activities
 - Scoping Program/ Preliminary Scoping Report
 - Preliminary Scoping Results
- Planned Transportation Improvements Within the Project Study Area
- Preliminary Transportation Planning Assessment
- Comparison of Previously Studied Alternatives to Current Conditions
- The Next Steps

2.0 Project Description/ Purpose and Need Statement

The Juneau Second Channel Crossing project study area includes an approximate nine mile segment of the Gastineau Channel from the vicinity of Salmon Creek on the east to the vicinity of the Mendenhall Peninsula/North Douglas Island on the west, as shown in Figure 2.1. The project area is generally bounded on the north by Egan Drive on the Juneau mainland, and on the south by North Douglas Highway on Douglas Island. Dominant features within the core project study area include the Mendenhall Wetlands State Game Refuge (MWSGR), Gastineau Channel, Mendenhall Peninsula, Mendenhall River, and the Juneau International Airport (JIA).

2.1 Purpose and Need Statement

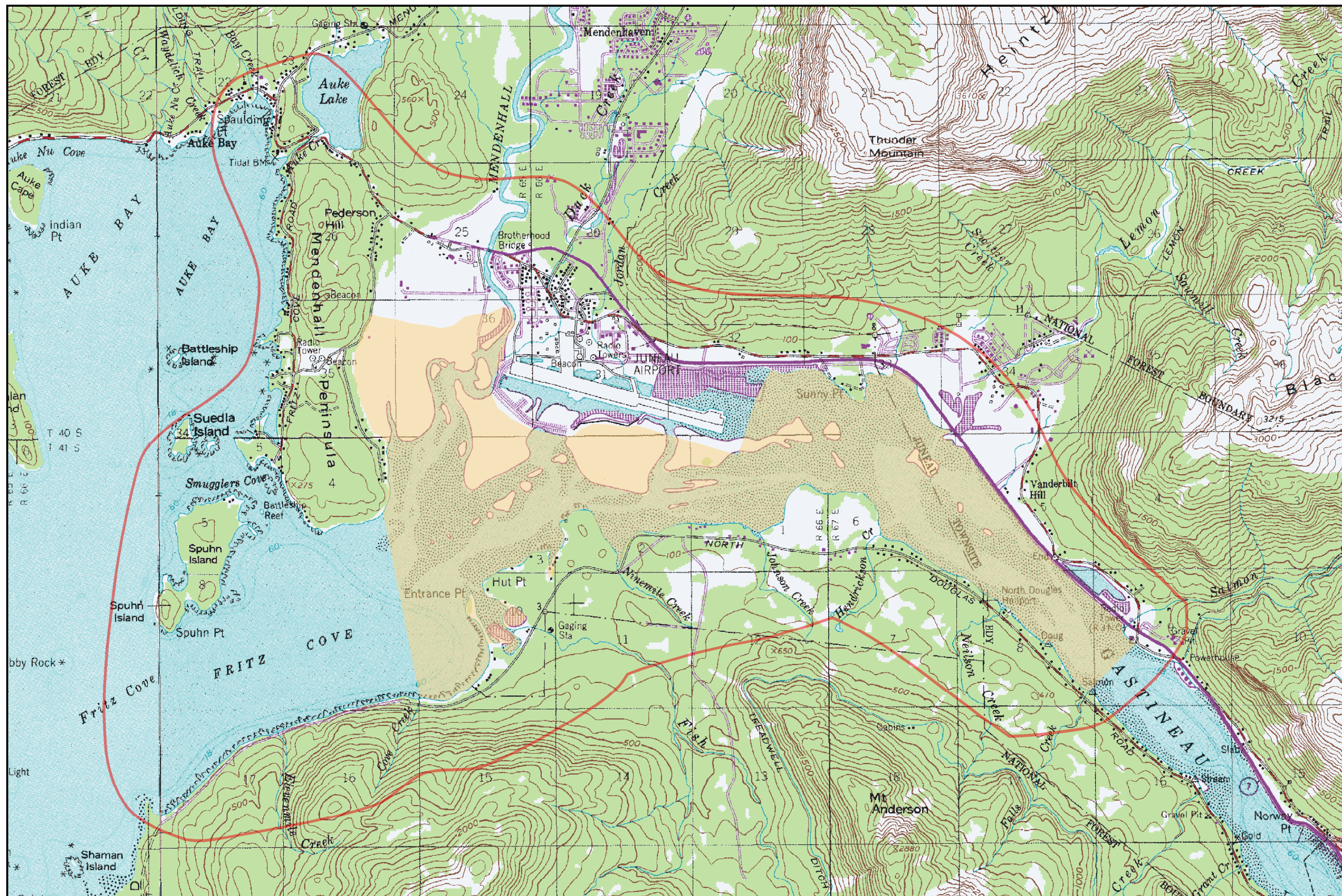
In accordance with 40 CFR 15002.13, the purpose and need objectives for a project should be developed to clearly define the problems or “needs” that the proposed “action” (project) is intended to satisfy. The purpose and need statement is a critical component of project development in that it establishes the basis for:

- Why transportation improvements or the proposed action is necessary
- What happens without the proposed action and the foundation for the No-Build alternative assessment
- Development and identification of reasonable alternatives to be analyzed in direct response to purpose and need objectives, and
- Selection of the preferred alternative

The purpose of the Juneau Second Channel Crossing project is to improve access between the Mendenhall Valley on mainland Juneau and North Douglas Island with a transportation facility across the Gastineau Channel for vehicles, pedestrians, and bicyclists that is cost reasonable¹ and efficiently meets the existing and future transportation needs of the Juneau community. Primary needs identified for the project include:

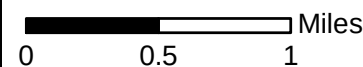
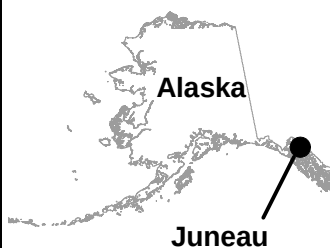
- Improved Access and Travel Efficiency
 - Improve network connectivity for shorter travel times, recreational access, and non-motorized trips
- Redundant Access for Public Safety and Emergency Response
 - Improve access for public safety and emergency response
- Planned Growth Areas
 - Locate the Second Channel Crossing to efficiently serve the CBJ planned “New Growth Areas” on Douglas Island

¹ DOT&PF systematically evaluates and prioritizes all projects state-wide to determine whether the cost is reasonable, given the transportation parameters involved, needs served, economic and safety benefits, funding source(s), and projected financial capability to provide the funds. Cost is defined as total project cost, or life-cycle cost, and includes initial construction cost, along with long-term operation and maintenance costs.



Legend

-  Study Area
-  Mendenhall Wetlands State Game Refuge



Date: 3/2/2004 Author: HDR Alaska, Inc (PM)

File: figure 1 Project Study Area.mxd

Data: USGS



Juneau
Second Channel
Crossing

Juneau Second Channel Crossing

Figure 2.1
Project Study Area

The Second Channel Crossing project is locally inspired and has been pursued by the City and Borough of Juneau for several decades. The CBJ, following its own transportation priorities from approved plans, requested re-direction of congressionally earmarked funds from an extension of the North Douglas Highway to this project, the Second Channel Crossing. The Assembly of the City and Borough of Juneau on April 2, 2001, unanimously passed a “Resolution Urging the Congress to Reallocate Highway Appropriations for a Second Channel Crossing Project” (Resolution Serial Number 2092). The resolution requested funding to be allocated for the “Second Channel Crossing Project for the purpose of updating and undertaking the environmental studies necessary to assess the project and related efforts as part of the Area Wide Transportation Plan.”

Congress did redirect the funding through the FY 2002 federal Department of Transportation Appropriations Act, which states:

Sec. 340. Item 1348 of the table contained in Section 1602 of the Transportation Equity Act for the 21st Century is amended by striking ‘Extend West Douglas Road’ and inserting ‘Construct Gastineau Channel Second Crossing to Douglas Island’

2.1.1 Improved Access and Travel Efficiency

The City and Borough of Juneau (CBJ) has identified a need to improve transportation access between the Mendenhall Valley and North Douglas Island. The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Highway Administration (FHWA), is evaluating alternatives to meet this need.

Only one road (Egan Drive) connects the Mendenhall Valley with downtown Juneau (both on the mainland), only one bridge (Douglas Bridge) near downtown connects the mainland with Douglas Island, and only one road (North Douglas Highway) provides access to North Douglas Island. These roads and bridge:

- Route all traffic between mainland Juneau and Douglas Island through the 10th Avenue and Egan Drive intersection and across the existing Douglas Bridge.
- Require long travel times between the Mendenhall Valley and North Douglas Island. This is inefficient and inconvenient for travel between two points that are geographically only two miles apart, yet require travel of up to 20 miles one-way.
- Leave no alternative access route between Mendenhall Valley and Douglas Island for area-wide safety and emergency response. The Juneau police station, primary fire stations serving North Douglas, and the hospital are located on mainland Juneau. This single access network is subject to closures due to catastrophic events such as avalanches, landslides, and bridge failure and more routine closures due to automobile accidents, fires, and road maintenance/construction activities.

Improving access between mainland Juneau and North Douglas Island is important to travel and public safety within the CBJ. The 2001 CBJ Area Wide Transportation Plan (AWTP) presents the Second Channel Crossing as a priority project to address area-wide transportation deficiencies. The AWTP states that, “*for all modes of travel, connections within sub-areas and between sub-areas are currently deficient. The Second Channel Crossing is one of the top near-term priorities to address this deficiency*”. The AWTP recommends:

- *Complete an Environmental Impact Statement for a second Gastineau Channel crossing for motor vehicles, bicycles, and pedestrians.*
- *A second crossing of Gastineau Channel would directly link the North Douglas Highway to the rest of the CBJ road network. The proposed crossing would improve access between the Mendenhall Valley and Douglas Island for various trip purposes, including recreation, shopping, commuting, goods movement and travel to the airport and ferry terminal. It would also provide a second route for emergency vehicles crossing Gastineau Channel.*
- *The connectivity benefits of a Second Crossing are significant. The congestion relief benefits to the existing bridge would not be as significant but could still be important. The Second Crossing would not eliminate the need for future improvements at these intersections.*

The 1996 CBJ Comprehensive Plan includes both general direction about transportation issues and explicit direction regarding the Second Channel Crossing project. The Plan states:

- *It is critical that the CBJ provide an efficient roadway system which facilitates traffic within and between major population centers, including the Valley, Auke Bay, and Douglas Island, as well as to and within downtown.*
- *To insure a smoothly functioning transportation system, the CBJ must address some serious transportation problems within and between major concentrations of population. The areas most affected by projected growth, and therefore most subject to increased congestion, include downtown Juneau, Lemon/Switzer Creek, Mendenhall Valley/Auke Bay and Douglas Island.*
- *It is recommended that further attention be paid to identification of additional corridors, beginning with the Second Crossing. Locating this corridor is a critical decision for the community given that the existing crossing is not centrally located with respect to either the Mendenhall Valley or West Douglas.*

A key objective of the Second Channel Crossing project is improved access to recreational facilities. Part of the attractiveness of living in Juneau is its recreational opportunities. A 2003 survey conducted specifically for the Second Crossing project revealed that 77% of people who travel to North Douglas do so for recreational purposes or to visit friends and family. Hiking was identified as the most popular recreational activity for Juneau residents in the CBJ's 1995 Parks and Recreation Survey. Over half of the residents responded that hiking was one of their favorite recreational activities. Fishing and reading were second and third in popularity. When asked what outdoor recreation facilities were needed in Juneau, residents most often responded with the need for additional walking/hiking trails and bicycle trails.

Based on the 1996 *Juneau Parks and Recreation Comprehensive Plan*, seven recreation service parks, 15 natural area parks, two conservation area parks, and the Mendenhall Wetlands State Game Refuge are located within the project study area. Of particular importance, according to the plan, is the need to provide improved access to three key recreational facilities located on North Douglas:

- CBJ's Eaglecrest Ski Area (skiing and hiking activities)
- CBJ's North Douglas Boat Launch (fishing, kayaking, commercial boat chartering, and

- boating activities)
- Outer Point (hiking, fishing, picnicking, and hunting activities)

Access to these recreation sites is inconvenient to the majority of residents living in the Juneau community due to lengthy travel times along the existing road network. These facilities are significant resources to the Juneau community and Eaglecrest serves as a regional ski destination. The Eaglecrest Board of Directors passed a resolution in October 1996 supporting the need for improved access to North Douglas with a Second Channel Crossing to enhance recreational opportunities on Douglas Island and to support its economic vitality. Juneau's economy is heavily dependent upon access to recreational facilities, as demonstrated by its recreational hiking, biking, kayaking, and fishing tourism related businesses.

A Second Channel Crossing would also implement a component of the *1997 CBJ Non-Motorized Transportation Plan* by providing improved connectivity for bicyclists and pedestrians and enhancing access to North Douglas' recreational attractions. Currently, there is no practical connection between North Douglas Island and the Mendenhall Valley area for bicycles and pedestrians, because the existing bridge is too far out of the way for all but the most dedicated cyclists.

2.1.2 Redundant Access for Public Safety and Emergency Response

There are two primary need categories related to redundant access and public safety/emergency response:

- Redundant access for public safety
- Reduced emergency response times.

Redundant Access for Public Safety

Juneau is principally a linear city, with nodes of development along a transportation system that is limited to an area between ocean waters and steep mountainsides. Juneau's population is scattered into several subareas, with approximately 50 percent of the population residing in the Mendenhall Valley.

The Lemon Creek area and Mendenhall Valley are the principal areas where development occurs on the mainland and are located along an approximate 10-mile segment of Egan Drive. Historic downtown is the location of the state capitol, cultural, social, and commercial enterprises, port facilities, and dense residential development. Downtown Juneau is fully built out and has no additional land for new growth other than demolishing existing buildings or increasing the allowable density of the existing land parcels. The CBJ's primary residential, industrial, and shopping centers are located in the more recently developed Lemon Creek and Mendenhall Valley. The Juneau police station recently relocated to Lemon Creek. Access to the area's only hospital, Bartlett Regional Hospital, is from the Salmon Creek intersection, approximately midway between downtown and the Lemon Creek area. Between downtown and the Salmon Creek intersection, there is a 1-mile segment of Egan Drive where no parallel or alternate route exists due to steep topography and existing commercial and residential development. Similarly, the existing Douglas Bridge is the only surface transportation link to Douglas Island, home to approximately one-fifth of the Borough population, with no alternative access. On North Douglas Island there is only one primary road, North Douglas Highway.

The term "redundant access" means more than one transportation route between two points. Redundant access provided by a second crossing would provide for emergency access in case Egan Drive, Douglas Bridge or North Douglas Highway was closed due to fire, automobile accident, or other emergency closure. Redundant access would allow ambulances to reach the hospital, police officers to have mobility across the community, and fire services to have assurance of reaching their destinations rapidly with all

required equipment. In addition to these types of emergencies, there is also a need for redundant access in case of a catastrophic or area-wide disaster, such as an avalanche, earthquake and/or tsunami, ship collision with the existing bridge, or terrorist act. Redundant access would provide needed mobility for not only emergency services but also disaster relief crews and other official responders, particularly if Egan Drive, Douglas Bridge, or the North Douglas Highway were damaged or otherwise closed.

A Second Channel Crossing would also provide an alternate transportation route during maintenance or construction improvements to the existing Douglas Bridge, Egan Drive, or North Douglas Highway, improving safety and traffic operation conditions. Juneau has grown to the point where providing redundant routes for public safety is a reasonable expectation of area residents. These concerns are not theoretical but are based on past occurrences, as described below.

Fire. In 1996, a large fire in a wharf structure, in the stretch where there is no alternative access, shut down Egan Drive between Salmon Creek and downtown for several hours. This effectively cut off emergency response for other fires, crimes, and trips to the hospital by both emergency response and private vehicles. The same type of scenario could occur again on Egan Drive, North Douglas Highway, or the existing Douglas Bridge.

Avalanches and Landslides. Avalanche risk along Egan Drive is well substantiated. CBJ, in Assembly Ordinance Serial Number 87-49, adopted official “Landslide and Avalanche Area” maps showing “Severe” and “Moderate” landslide/avalanche areas. These were based on formal avalanche studies and historical accounts of property damage, road closure, and near misses. Egan Drive at and northwest of Aurora harbor is within the “Severe” zone, and this zone extends from high onto the mountain slopes into Gastineau Channel. Historical accounts of large avalanches indicate the road could be closed by large flows of snow or by debris (trees, homes) blown into the highway by the hurricane-force “powderblast” that accompanies certain types of avalanches. As examples, snow debris was reported reaching tidewater or closing the road in this area in 1890, 1917, 1926, and 1935. In 1962 and 1985, powderblast moved and damaged utilities, homes, and vehicles in the area. As indication of the tremendous forces involved, the 1962 powderblast carried completely across Gastineau Channel and up to elevation 750 feet on Douglas Island. The 1985 event was analyzed by experts and determined to represent only 25%-30% of the avalanche path’s capability. Egan Drive could also be closed by mass wasting (mud and rock flows) from Mt. Juneau. Avalanche or mass wasting closure would have the same effect on emergency response as the 1996 fire, and the disruption to emergency services and transportation could last much longer.

Douglas Bridge Closures. Planned shutdowns for maintenance or repair work on the Douglas Bridge are necessary since this is the only connector between the mainland and Douglas Island. Surface transportation closures hinder emergency services and could endanger lives. The bridge has been shutdown for periods of up to 30 minutes during past bridge construction projects and the Department’s maintenance and repair work in 1996 and 1998. Planned closures will also be necessary in the future.

Accidents have resulted in long bridge closures. In 2003, a snow plow truck struck an expansion plate and jackknifed across the bridge, blocking all traffic movements. The bridge remained closed for over two hours while state transportation crews towed the truck and cut off the damaged part of the expansion plate.

Reduced Emergency Response Times

The Juneau Police and Fire Chiefs have stated that the Second Channel Crossing is a high priority for their departments because it will improve response times. The Juneau Police Department has an average response to calls of less than 5 minutes and 30 seconds, and the city’s goal is to retain this response time. The National Fire Protection Association (NFPA) sets the standards at a 4 minute maximum response

time. The Capital City Fire/Rescue (CCF/R) Department (professional and volunteer fire fighters) strive to meet this standard (Etheridge 2003), but as a whole CCF/R had an actual average response time of about 5 minutes in 2001 for both structure fires and EMS calls.

Computer modeling indicated that the CCF/R responded to the majority of all 2001 fire and EMS incidents within an 8-minute period, according to a CCF/R review. The exceptions were mostly along North Douglas Highway. Example runs by CCF/R from the Juneau Fire Station (nearest fire station) to points along North Douglas Highway indicated average travel times of 4:28 to the mile 4 marker, 6:36 to the mile 6 marker, 9:05 to Sundown Road, and 15:10 to Eaglecrest Lodge (Etheridge 2003). An estimated 1,000 residents along North Douglas Highway live more than 5 miles from the nearest fire station and therefore are considered effectively unprotected. These residents therefore have higher homeowner insurance rates, making them the largest block of CBJ residents affected by this increased risk.

While ambulance calls focus on initial response time and stabilizing a patient, they typically also require time to transport a patient from the scene to Bartlett Regional Hospital. For North Douglas Highway, this additional time is approximately equal to the outbound time to get back to Egan Drive and then an estimated 3-4 additional minutes to reach Bartlett Regional Hospital.

According to the Juneau Police Department, routine patrols are concentrated within the most heavily populated parts of CBJ—downtown, Lemon Creek area, and the Mendenhall Valley. Police calls to North Douglas and Fish Creek Road (Eaglecrest) take 20 minutes or more for response from the police station. The police department has expressed a need for better access for emergency response and to efficiently increase preventative patrols. As a popular recreation area, the western end of North Douglas Highway (Fish Creek Park, boat launch ramp, Outer Point) and Eaglecrest are known as areas that sometime attract drag racing, van “surfing,” drunken driving, and other hazards on the road. A goal is to have better access for prevention and response to these types of incidents (Browning 2003).

2.1.3 Planned Growth Areas

The CBJ Comprehensive Plan and AWTP identify the Second Channel Crossing as a key factor in the planned development of “New Growth Areas” on North and West Douglas Island. The CBJ has approximately 4600 acres of land holdings that are slated for long term disposal according to the 1999 CBJ Land Management Plan. The North and West Douglas New Growth Areas comprise 35% and 43%, respectively, of the CBJ’s available land or 78% of the total land holdings the CBJ has for future growth. The West Douglas area is designated as the key “New Growth Area”. Land use and transportation modeling show that substantial development will not occur on West Douglas without a strategically located second crossing to provide improved access.

The CBJ Comprehensive Plan describes New Growth areas as the preferred future community form:

- *Compact growth in urban area is preferable because there the use of land is more efficient, urban services are more economically provided and maintained; adverse environmental impacts are minimized; and the majority of residents who prefer a high level of services are better served.... Development of new growth areas as satellite communities [is] the most desirable way to accommodate growth outside the urban area.*

The Comprehensive Plan also points toward the need for additional property for commercial and industrial development potential:

- *It is advisable to have more than a 15-year supply of vacant land in some categories,*

especially commercial and industrial, to facilitate long-range planning for needed public services and facilities...

- *The major port facilities for commercial and industrial goods and materials are located on the southern part of the downtown waterfront. Because of geography and development pattern of that area, room for expansion is limited. In addition, traveling up the Gastineau Channel is a significant detour for most barge traffic. Truck traffic to and from the port adds to the noise and congestion in the downtown area.*

Under discussion of transportation goals by sub-area in the CBJ Comprehensive Plan, “Implementing Action” 4.4.23 for Douglas Island states:

- Renew municipal support for construction of a second channel crossing to encourage use of north and west Douglas Island. Evaluate the economic, environmental, and engineering feasibility of a channel crossing to the Mendenhall Valley.

The Comprehensive Plan identifies and encourages expansion of the two “New Growth” areas on Douglas Island:

- *North Douglas Island*
The North Douglas boat launch facility may be a suitable location for a small boat harbor, barge docks, and other water-dependent industrial facilities.
- *West Douglas Island*
Encourage and facilitate the development of a New Growth area in West Douglas (beyond the end of the existing road).

In 1997, CBJ joined with Goldbelt, Inc., the local Native corporation, in creating the *West Douglas Conceptual Plan*, a mutual planning effort for CBJ and Goldbelt lands. Although the Plan was not formally adopted by the Borough, it serves as a planning tool for the designated New Growth Area on West Douglas. The New Growth area is located on the northwest side of Douglas Island beyond the present end of North Douglas Highway. It extends as a belt approximately 1 mile wide and 8.5 miles long. Goldbelt, Inc.’s property covers 1,740 acres along the shoreline and CBJ lands comprises 3,434 acres immediately inland of the Goldbelt property. Most of the area is on a bench bounded on the west by Stephens Passage and on the east by the high mountain ridges of the Tongass National Forest.

The development nodes identified in the West Douglas Conceptual Plan include:

- *Development Area 1 (Peterson Creek):*
This development area is located approximately two miles beyond Outer Point and covers about 120 acres, including one-half mile of beach frontage. A hotel or cultural center tourist attraction and/or office/commercial would “anchor” the area, with minimal marine use. The Plan recommends that Development Area 1-A include significant housing (up to 700 units) and a supporting commercial core. This area would support a population of approximately 2,500. Development Area 1-B is located on the upland side of the proposed road, just north of Development Area 1-A. It includes the proposed 200-acre Totem Creek Golf Course, which CBJ granted a conditional permit for development in April 2003, and adjacent, dispersed housing.
- *Development Area 2 (Inner Point):*
Area 2 is located at Inner Point (about two miles along the shoreline further southeast of Area 1-

A) and covers approximately 50 to 70 acres. Marine and commercial/industrial uses, including a deepwater port and dock of up to 1,000 feet, are planned for this area to support mining, fisheries, and fuel storage/transshipment. Use is also possible by government research vessels. The potential for marine activity is positive due to deep water depth and storm protection. Most development in this area is expected to be of either waterfront industrial or waterfront commercial nature. Possible developments include a dock, barge landing facility, boat launch, breakwater, ice plant, fish processing facility, fueling service, and fuel storage facility.

- *Development Area 3:*

Area 3 is located less than a mile beyond Inner Point and covers approximately 80 acres. The area would be developed primarily for residential purposes (600 units) with some recreational zones, which may include public camping, beach access, RV accommodations, and a public marina. A target population of 2,000 is assumed for this area.

- *Development Area 4:*

Area 4 covers approximately 100 acres located nearly 10 miles southeast of Outer Point (along the shoreline). This area is not expected to be developed for many years due to extensive road and utility development costs, and the need to cross environmentally sensitive lands at Hilda Creek. Because it will be separated from other commercial centers, it will likely support commercial and industrial activity in addition to a major housing component (750 units). Area 4 would support a population of approximately 3,000.

Without a Second Channel Crossing, it is unlikely that large amounts of new housing or employment will occur on Douglas Island. A Second Channel Crossing could provide the utility infrastructure and the access, along with reducing the travel distance, to allow West Douglas to develop.

3.0 Summary of the 1984 CBJ Second Gastineau Channel Crossing Feasibility Study

In 1984, the City and Borough of Juneau (CBJ) conducted the *Second Gastineau Channel Crossing Feasibility Study (1984 Feasibility Study)* in order to evaluate potential crossing areas for a new bridge to connect mainland Juneau with North Douglas Island. This previous *Study*, although somewhat dated, provides a preliminary basis for the current JSCC project in regards to baseline engineering and environmental data, project study area, and the potential feasibility of various crossing concepts. The *1984 Feasibility Study* evaluated 14 crossing alternatives and a “No-Crossing” or “No-Build” alternative. These fifteen alternatives were based on analyses and studies of data related to population growth, land use, environmental conditions, traffic projections and existing and planned transportation facilities, engineering, and public policy (funding, regulatory requirements, and policy constraints).

This section presents a review and summary of the 14 previously considered crossing alternatives, the No-Crossing alternative, and the rationale for the development of those alternatives. With this base of information, similarities to the current JSCC project can be evaluated in order to capture the value invested in the *1984 Feasibility Study* and to serve as a preliminary guide for current project development. Figure 3.1 shows the general project study area and alignment concepts from the *1984 Second Gastineau Channel Crossing Feasibility Study*.

3.1 Factors Influencing Alternatives Development

The *1984 Feasibility Study* established several factors that were considered in the development and preliminary evaluation of crossing alternatives. These factors describe the existing (1984) conditions of the project area that would have implications for the development of a new crossing of Gastineau Channel. The analysis of these factors, as presented in the *1984 Feasibility Study*, is provided in the following paragraphs.

3.1.1 Population Growth

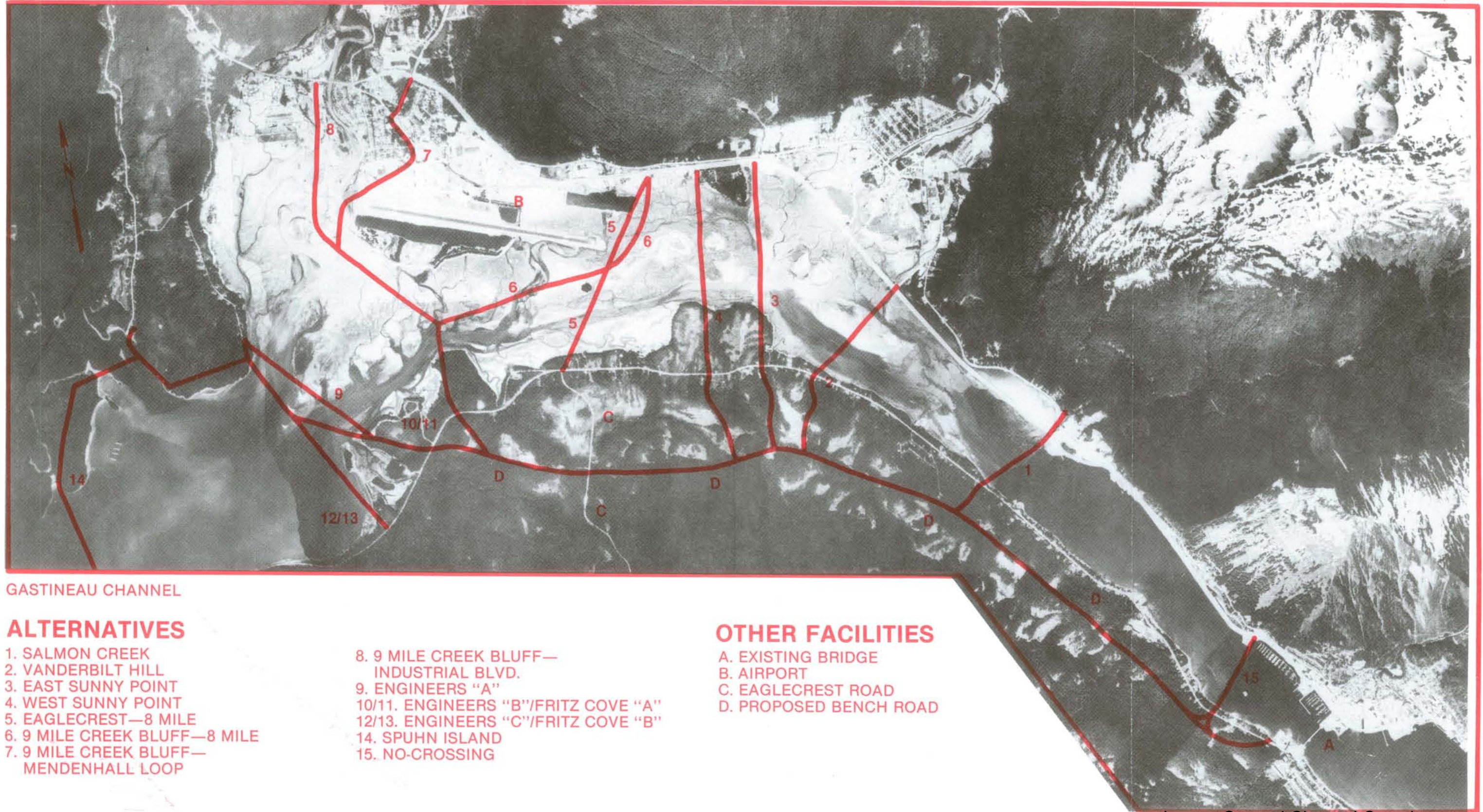
Anticipated population growth in the CBJ is a major factor in determining the long-term feasibility of a new crossing of Gastineau Channel. The *1984 Feasibility Study* characterized the rate and distribution of population growth based on population projections, development trends, exiting and planned infrastructure, public interest (based on public opinion research), and available land. The analysis identified North Douglas as a growth area, but in order for high rates of growth to occur in North Douglas, a substantial investment in infrastructure improvements would have to be made, in particular to upgrading the transportation system and extending the community water and sewer service.

3.1.2 Land Use

Land use implications of a new channel crossing include the relationship to the CBJ Comprehensive Plan, the need for acquisition of lands for right-of-way, and constraints imposed by the Mendenhall Wetlands State Game Refuge (MWSGR) and other land uses in the project area. Existing land uses on Douglas Island and Mainland Juneau were identified to characterize current transportation needs, and potential new development in the North Douglas area was characterized to demonstrate the future transportation needs in that area. Potential impacts to neighborhoods (e.g., from noise, traffic, secondary growth, etc.) were a major consideration in developing alternatives for a new channel crossing.

MAP E-3 ORIGINAL ALTERNATIVES

Mosaic Prepared By:
WALKER-ALASKA AERIAL SURVEYS, INC.



GASTINEAU CHANNEL

ALTERNATIVES

1. SALMON CREEK
2. VANDERBILT HILL
3. EAST SUNNY POINT
4. WEST SUNNY POINT
5. EAGLECREST—8 MILE
6. 9 MILE CREEK BLUFF—8 MILE
7. 9 MILE CREEK BLUFF—MENDENHALL LOOP

8. 9 MILE CREEK BLUFF—INDUSTRIAL BLVD.
9. ENGINEERS "A"
- 10/11. ENGINEERS "B"/FRITZ COVE "A"
- 12/13. ENGINEERS "C"/FRITZ COVE "B"
14. SPUHN ISLAND
15. NO-CROSSING

OTHER FACILITIES

- A. EXISTING BRIDGE
- B. AIRPORT
- C. EAGLECREST ROAD
- D. PROPOSED BENCH ROAD

Juneau Second Channel Crossing
Figure 3.1
1984 Alternatives

3.1.3 Environment

In considering environmental impacts of a new channel crossing, the *1984 Feasibility Study* evaluated human use of the environment, impacts to wetland productivity, impact on fish and wildlife habitat, impact on uplands, aesthetics, noise and pollution, and impacts on the management of MWSGR.

Impacts on human use of the environment that were considered included impacts to the MWSGR and on navigation in Gastineau Channel. Fritz Cove is an important commercial and recreational fishery. Continued access of fishing boats from downtown Juneau to Fritz Cove was an important consideration. Accommodating access to MWSGR was also identified as a consideration for alternatives development and project design.

Wetland productivity could be affected by removal or fill of wetlands and changes to the system hydraulics from the crossing. The type of structure used in the crossing could affect hydraulics of the area and change the balance of fresh and salt waters and the movement of nutrients by flowing water, having a deleterious effect on wetland productivity.

Locations of important resting and feeding habitat for waterfowl, nesting habitat for terns and bald eagles, and anadromous fish streams were important considerations in identifying locations for crossing alternatives. The potential for a bridge to impact views of the MWSGR, Mendenhall Glacier, and Gastineau Channel were also an important consideration. Noise impacts and pollution associated with highway development were considered in the evaluation of crossing alternatives.

3.1.4 Transportation

The transportation needs and benefits associated with crossing alternatives were evaluated based on the projections for population growth (described above) and future plans for capital improvements and traffic management on Egan Drive and the Douglas road system. Consideration was also given to improvement plans and opportunities associated with the airport, port facilities, and boat harbors.

Anticipated growth on North Douglas was used to develop traffic forecasts. Traffic forecasts and projections for peak hour volumes were then evaluated with planned improvements to the transportation system to help identify beneficial locations of a second crossing. Although planned improvements identified at the time would address some specific congestion problems, the *1984 Feasibility Study* concluded that no major capacity-increasing projects were programmed. Considering the traffic projections with the planned improvements, the *1984 Feasibility Study* went on to conclude that the capacity problems on the existing bridge would worsen.

Improvements to and expansion of the Juneau International Airport were cited as an important consideration for identifying a crossing location at either end of the airport.

Potential industrial expansion of North Douglas could include port development there, which would also affect the need and benefits of the crossing alternatives with respect to location. Similarly, other boat harbor plans for North Douglas were a consideration in evaluating alternative crossing locations.

3.1.5 Engineering

The engineering analysis conducted for the *1984 Feasibility Study* examined different types of crossing structures, the physical setting of the project area, Gastineau Channel hydraulics, terrain and geologic constraints, right-of-way acquisition requirements, and costs. These factors were used to develop alternatives that were technically feasible.

The *1984 Feasibility Study* considered a variety of structure types that could be constructed; i.e., earth or rock-filled roadways, short span bridges or trestles, medium span bridges, long span bridges, movable bridges, floating bridges, and tunnels. After an examination of the project area, costs, hydrology, climatic conditions, use, and aesthetics, the engineering analysis concluded that a combination of medium span bridges and fill would best serve the requirements of a new crossing location (an exception was made for the Spuhn Island Alternative where the distance from Douglas Island to Spuhn Island would require a long span bridge).

Preliminary hydraulic analyses of Gastineau Channel and Mendenhall River were performed to determine waterway opening requirements in order to maintain suitable conditions for navigation and fish passage at alternative channel crossing sites. An analysis of terrain was used to locate alternatives that would take advantage of terrain features, which would minimize embankment fill in the intertidal zone and the length of bridge spans across channels.

The physical setting, including geologic features and soil types, were used to evaluate crossing options and identify issues that should be considered during project design. Right-of-way acquisition requirements were considered in very general terms for use in the cost analysis. Construction costs were developed for each alternative for comparison purpose.

3.1.6 Public Policy

The following public policy concerns associated with a new channel crossing were identified in the *1984 Feasibility Study*:

1. Need for a comprehensive plan for North Douglas
2. Project funding
3. Regulatory requirements (permits, authorizations)
4. Policy constraints (i.e., jurisdictional issues, political considerations, and public perception)

Each alternative was evaluated with respect to public policy considerations.

3.2 Review of 1984 Alternatives

This section briefly summarizes the fifteen crossing alternatives contained in the *1984 Feasibility Study*. Descriptions of, and the rationales for, the development of these alternatives with respect to the factors above are presented. The analyses of potential land use and environmental impacts, transportation benefits, engineering costs and requirements, and regulatory implications of each alternative came directly from the *1984 Feasibility Study* (i.e., none of the 1984 conclusions were verified or updated for this *Report*). All cost figures are in 1984 dollars. Below is a summary of the alternatives:

Alternative 1--Salmon Creek

The Salmon Creek alternative extended from Egan Drive at Salmon Creek to the North Douglas Highway (or possibly to a new Bench Road). It would be located two and one-half miles northwest from the existing Douglas Bridge, serving almost the same purpose as would a new bridge at the existing site. New development in North Douglas would access the bridge via North Douglas Highway (or the new Bench Road). The benefit of this route to North Douglas development was determined to be minimal due to lengthy travel times from the Mendenhall Valley.

Effects of the Salmon Creek alternative on the Mendenhall Wetlands State Game Refuge (MWSGR) could be kept to a minimum, as long as hydraulic flows were taken into consideration during design. Potential impacts to Salmon Creek, and anadromous fish stream, could be avoided by routing the

alternative to avoid the stream. This route would require approximately 1,600 feet of fill, which would likely affect wetlands productivity.

Some congestion on the existing bridge would probably be relieved following construction of this alternative; however, a significant amount of congestion relief would occur only if a Bench Road were also constructed on Douglas Island. Travel times between the valley and North Douglas would not be significantly reduced as a result of the Salmon Creek alternative.

This alternative was estimated to cost approximately \$10 million to construct, not including the Bench Road or major intersection improvements. It would require construction of a medium span bridge approximately 990 feet long.

Construction of the Salmon Creek route would result in permanent disruption of the existing neighborhood on the North Douglas side of the crossing. This alternative could avoid crossing MWSGR lands; therefore, a Section 4(f) statement would not be necessary, although the need for an Environmental Impact Statement (EIS) was identified. No political or regulatory problems or delays were anticipated.

Advantages: *Minimal land acquisition required, low impact on MWSGR, relatively low likelihood of regulatory problems, low cost/narrow crossing location.*

Disadvantages: *Minimal benefit to North Douglas development, minimal traffic congestion benefits unless Bench Road is also constructed, no reduction in travel times, disruption of neighborhood on Douglas Island.*

Alternative 2--Vanderbilt Hill Road

The Vanderbilt Hill alternative extended from the present Lemon Creek intersection at Egan Drive to the North Douglas Highway, approximately four miles northwest from the existing Douglas Bridge. It would require the acquisition of private lands on the Douglas Island side of the channel, but would connect directly with the Vanderbilt Hill Road intersection on the mainland side, requiring only public lands there.

This route crossed the mouth of Vanderbilt Creek, an anadromous fish stream, necessitating special design and construction considerations. The route would span the MWSGR with approximately 3,000 feet of fill and 1,000 feet of bridge. It was estimated that much of the area at this crossing location was inundated during a large portion of the tidal cycle and likely had a lower productivity value than areas that were exposed for longer periods. Several culverts would be required to maintain hydraulic flow. This crossing would be highly visible from Egan Drive, but primarily against a backdrop of existing structures (e.g., the present Douglas Bridge, large buildings, two radio towers), not interfering with a natural vista.

The Vanderbilt Hill alternative would share many of the same transportation aspects as the Salmon Creek alternative. Some relief of North Douglas traffic congestion on the existing bridge would probably occur, particularly if the route were constructed in conjunction with a Bench Road. As with the Salmon Creek route, travel times between the Mendenhall Valley and North Douglas would not be significantly reduced with this alternative.

The cost of this crossing was estimated at approximately \$10 million, and the length of the bridge span would be approximately 990 feet. This alternative would require at least a four-way intersection at the site of the present Vanderbilt Hill Road intersection.

Construction of the Vanderbilt Hill alternative would result in permanent disruption of existing neighborhoods on the North Douglas side of the crossing. Unlike the Salmon Creek route, this alternative

would cross directly over MWSGR lands, which would require the preparation of a Section 4(f) Statement in conjunction with the EIS. Aside from concerns related to the MWSGR and Section 4(f) implications, the 1984 *Feasibility Study* concluded that this alternative would likely not present significant regulatory problems. No political problems or delays were anticipated.

Advantages: *Minimal land acquisition required, relatively low likelihood of regulatory problems, low cost.*

Disadvantages: *Minimal traffic congestion benefits unless Bench Road is also constructed, impact on MWSGR and an anadromous fish stream, high visibility, minimal reduction in travel times, disruption of neighborhood on Douglas Island.*

Alternative 3--East Sunny Point

The East Sunny Point alternative extended from the east side of Sunny Point to the North Douglas Highway via Hendrickson Point on Douglas Island, a location approximately five miles northwest from the existing Douglas Bridge. It would require acquisition of some private lands on Douglas Island (which could possibly be limited to a single private lot, depending on design), but most of the property needed for the alternative on Douglas Island was owned by CBJ. The intersection with Egan Drive would be at an existing intersection and would require no acquisition of private lands.

The East Sunny Point route would require approximately 4,200 feet of fill in the MWSGR. This area is near a popular turnout for access and viewing, as well as a small interpretive site. This crossing would be highly visible from the turnout, from Egan Drive, and from the east side of Sunny Point, a developing residential area. The construction of this alternative would not likely impact any anadromous streams. Mallards use this area along the southwest side of Egan Drive for nesting, and placement of fill in this area could eliminate nesting sites and/or change the hydrology of the area enough to render nesting habitat unsuitable, particularly on the upstream side of the channel crossing.

The East Sunny Point route would create a larger diversion of North Douglas- and valley-generated traffic away from the North Douglas Highway than would the Salmon Creek or Vanderbilt Hill routes. This route would have a meaningful (beneficial) impact on traffic loads on the existing bridge, and would shorten travel times between the valley and North Douglas substantially.

This crossing was estimated to cost slightly more than \$11 million and would include a bridge span of approximately 990 feet. A four-way intersection at the site of the present Switzer Creek intersection would be required, and would likely need substantial additional upgrading in the future due to increased congestion.

Construction of the East Sunny Point alternative would result in permanent disruption of an existing neighborhood on the North Douglas side of the crossing. This alternative would cross the MWSGR in an area where waterfowl nesting has been observed and plant productivity is high. In addition, the high visibility of this alternative makes it subject to a significant amount of public objection. Because of its relatively low cost, this route would not likely involve political problems or delays.

Advantages: *Substantial benefit to North Douglas development, traffic congestion benefits, reduced travel times, minimal land acquisition required, low cost.*

Disadvantages: *Impact on MWSGR, high visibility, disruption of neighborhood on Douglas Island, relatively high likelihood of regulatory problems.*

Alternative 4--West Sunny Point

The West Sunny Point alternative extended from the west side of Sunny Point to a point located at about mile six on the North Douglas Highway, or about six miles northwest from the existing Douglas Bridge. Like the East Sunny Point route, this alternative would require limited acquisition of private lands on Douglas Island, consisting of a strip of privately owned land one lot deep along the highway and one private dwelling. It would also require CBJ-owned land. At the time of the *1984 Feasibility Study*, land ownership on the mainland side of the crossing (at Egan Drive) had not been determined; however, there were no structures or improvements on the land needed for the crossing.

The mainland side of the crossing would intersect Egan Drive at a highly productive spring feeding site for the Vancouver Canada Goose and other waterfowl. The alternative would likely permanently eliminate this important foraging habitat. It would also transect a popular hunting area, and would likely result in the closure of substantial portions of the MWSGR to hunting. This crossing would be highly visible from Egan Drive to both eastbound and westbound drivers, creating an undesirable visual impact. This crossing would also have a substantial impact on the view of residents of the west side of Sunny Point.

The West Sunny Point alternative would provide substantial travel time reductions between the valley and North Douglas. This route could also divert traffic from the North Douglas Highway headed to downtown Juneau, as an alternative to using the existing Douglas Bridge.

This crossing was estimated to cost slightly less than \$11 million. It would include a bridge span of approximately 990 feet. A new intersection at Egan Drive would be required, and would be located in an area where a complex of roads and intersections currently exist. Consolidation of the existing intersections would likely need to be considered. Construction of the West Sunny Point alternative would result in permanent disruption of the Sunny Point neighborhood, and would substantially impact the MWSGR. It was expected that a significant amount of public objection would occur with regards to this crossing alternative. Because of its relatively low cost, delays or tradeoffs from competing projects were considered unlikely.

Advantages: *Substantial benefit to North Douglas development, traffic congestion benefits, substantially reduced travel times, low cost.*

Disadvantages: *Substantial impacts on MWSGR and an anadromous fish stream, fairly complex land acquisition required, high visibility, disruption of neighborhood on mainland, relatively high likelihood of regulatory problems.*

Alternative 5--Eaglecrest - 8 Mile Egan

This alternative extended from the Eaglecrest Road intersection with North Douglas Highway to Egan Drive (8 mile) on the mainland. The Douglas Island side of the crossing would be located about six and one-half miles from the existing bridge, and the mainland side would be located approximately six miles from the existing bridge. At the time of the *1984 Feasibility Study*, land ownership on the mainland side of the crossing (at Egan Drive) had not been determined; however, there were no structures or improvements on the land needed for the crossing. The Eaglecrest Road area, which was identified in the Comprehensive Plan as a potential new development area, would benefit from this alternative.

The route would span the MWSGR with approximately 7,000 feet of fill, and would impact highly productive wetlands, which provide good waterfowl habitat. Like the East and West Sunny Point alternatives, the mainland side of the crossing would intersect Egan Drive in an area used by mallards for nesting and by the Vancouver Canada Goose and other waterfowl for foraging. The Eaglecrest-8 Mile

Egan alternative would also impact a popular hunting area, and would likely result in the closure of substantial portions of the MWSGR to hunting. This crossing would be highly visible from Egan Drive and from the west side of Sunny Point; however, it would be located close to the airport and viewed against a backdrop of the airport runway and other structures already present in the vicinity.

The Eaglecrest-8 Mile Egan alternative would divert a majority of North Douglas traffic away from the North Douglas Highway between the existing bridge and Eaglecrest Road. This route would have a pronounced affect on the transportation in the entire area, particularly if built in connection with a Bench Road, and would provide substantial travel time reductions to and from most destinations in the Juneau area. A “loop concept” comprised of Egan Drive, a Bench Road, the existing bridge, and this alternative (serving as a minor arterial) would channel traffic from collector routes such as Mendenhall Loop Road and those connecting the North Douglas Highway to the Bench Road to other arterials and on to various destinations. The four legs of the loop would therefore work together to divert congestion from each other.

This crossing was estimated to cost between \$12 and \$18 million, with fill or trestles and a bridge span of 1,000 feet. A three-way, controlled intersection at Egan Drive would be required. This alternative would require fill at its approach to Douglas Island to assure adequate clearance height over the channel, and construction on fill as the crossing approaches Egan Drive in the vicinity of the airport runway.

Construction of the Eaglecrest-8 Mile Egan alternative would result in some permanent disruption of an existing neighborhood on Douglas Island, although construction of the Bench Road would mitigate those effects. This alternative could produce strong public opposition due to impacts on the MWSGR and waterfowl habitat. Because of its relatively low cost, this route would not likely involve political problems or delays.

Advantages: Substantial benefit to North Douglas development, substantial traffic congestion benefits, substantially reduced travel times, low cost, benefits to Eaglecrest development area.

Disadvantages: Substantial impacts on MWSGR, fairly complex land acquisition required, high visibility, disruption of neighborhood on Douglas Island, relatively high likelihood of regulatory problems.

Alternative 6--Nine Mile Creek Bluff to 8 Mile Egan

This alternative extended from the vicinity of Nine Mile Creek on Douglas Island to Egan Drive on the mainland. The Douglas Island side of the crossing would be located about seven miles from the existing Douglas Bridge, while the mainland side would be located approximately six miles from the existing bridge. This route would require construction across the Eaglecrest Rock Quarry to an intersection with Eaglecrest Road about a mile inland from the Eaglecrest Road-North Douglas Highway intersection. It would make use of CBJ-owned right-of-way on uplands near Nine Mile Creek Bluff on Douglas Island. At the time of the 1984 *Feasibility Study*, land ownership on the mainland side of the crossing (at Egan Drive) had not been determined; however, there were no structures or improvements on the land needed for the crossing. Development areas in the vicinity of Eaglecrest Road on Douglas Island would be well-served by this alternative.

The Nine Mile Creek Bluff-8 Mile Egan route would remove upland spruce/hemlock forest area on Douglas Island. It would span the MWSGR with approximately 11,000 feet of fill, and would impact highly productive wetlands that provide good waterfowl habitat. The mainland side of the crossing would intersect Egan Drive in an area utilized by mallards for nesting and by the Vancouver Canada Goose and other waterfowl for foraging, and would impact a popular hunting area. Construction of this route would

also have additional impacts on the MWSGR, with a longer fill area parallel to the airport runway and a crossing of Jordan Creek that would also require additional fill. Jordan Creek is a designated anadromous fish stream, and would require special consideration if this alternative were chosen. Due to the length and location of this route, special modeling to ensure proper maintenance of hydraulic flow in impacted wetland areas would likely be required. Visibility of this alternative would be similar to that of the Eaglecrest-8 Mile Egan alternative.

This route shares nearly all of the transportation aspects of the Eaglecrest-8 Mile Egan route, including the applicability of the loop concept. The Douglas Island terminus of this alternative extends further towards potential new development areas than does the previous alternative, which strengthens the loop concept slightly. New North Douglas traffic would be diverted about a mile to the west of Eaglecrest Road, creating a neutral or positive impact on residential settings located on the downtown side of the proposed alignment.

This crossing was estimated to cost approximately \$12 million, with a bridge span of 770 feet across the channel, plus a 110-foot bridge across Jordan Creek parallel to the airport runway. A controlled intersection would be required where this route would cross the North Douglas Highway, and another intersection may be required where it meets Eaglecrest Road. Like the Eaglecrest-8 Mile Egan route, this alternative would require construction on fill where the alternative parallels the runway and then around the runway to Egan Drive.

This alternative would substantially impact the MWSGR, and is expected to produce even stronger public support for its protection than the Eaglecrest-8 Mile Egan route since it also crosses Jordan Creek. Regulatory delays and complexities would be likely. Because of its relatively low cost, this route would not likely involve political problems or delays.

Advantages: Substantial benefit to North Douglas development, substantial traffic congestion benefits, substantially reduced travel times, low cost, benefits to Eaglecrest development area.

Disadvantages: Substantial impacts on MWSGR and an anadromous fish stream, fairly complex land acquisition required, high visibility, disruption of neighborhood on Douglas Island, relatively high likelihood of regulatory problems.

Alternative 7--Nine Mile Creek Bluff to Mendenhall Loop/Egan Drive Intersection

This alternative initiated at the same point on Douglas Island as the Nine Mile Creek Bluff-8 Mile Egan alternative, requiring construction across the Eaglecrest Rock Quarry from an intersection with Eaglecrest Road about a mile from the Eaglecrest Road-North Douglas Highway intersection. It would follow an alignment across the channel to the west of the airport (east of the Mendenhall River) and would then extend to the Old Glacier Highway, intersecting Mendenhall Loop Road at the existing traffic light on Egan Drive. On the mainland side of the crossing, this route would require right-of-way acquisition through the rapidly growing commercial area from the intersection of Alex Holden Way along the Glacier Highway and Mendenhall Loop Road to Egan Drive. Land acquisition costs for this alternative was projected to be the most expensive of all the alternatives proposed, based on increasing property values in the commercial area and the need to acquire airport land.

The Nine Mile Creek Bluff-Mendenhall Loop route would span the MWSGR with approximately 2,500 feet of fill, and would closely parallel Duck Creek along the border of the airport property. This route would also impact waterfowl habitat along the edge of the float plane pond, and the presence of the crossing would substantially decrease the recreational experience (hiking, bird watching) of the area.

This route would form the most direct leg of the loop concept of all the proposed alternatives, and would provide a direct link between North Douglas and the Mendenhall Valley. Of all the alternatives proposed in the *1984 Feasibility Study*, this alternative would provide the greatest reduction of travel time between the valley and North Douglas. Construction of this route would require the abandonment of 300 feet of existing airport runway in order to conform to Federal Aviation Administration (FAA) clearance requirements.

The Nine Mile Creek Bluff-Mendenhall Loop route was estimated to cost approximately \$11 million. It would require a single bridge span of about 770 feet across the channel. A controlled intersection would be required where this route would cross the North Douglas Highway, and another intersection may be required where it meets Eaglecrest Road. On the mainland, this route would require the eventual construction of a grade-separated interchange at the intersection of Mendenhall Loop Road and Egan Drive, an intersection that had then been programmed by DOT&PF independent of a new crossing. Construction of this crossing would require a 300-foot extension to the east end of the airport runway, widening of Mendenhall Loop Road between the traffic light and Glacier Highway, and additional upgrades to Glacier Highway beyond that planned in existing DOT&PF appropriations.

This route would have similar impacts on Douglas Island neighborhoods as the Nine Mile Creek Bluff-8 Mile Egan alternative, but would also significantly impact existing neighborhoods and commercial areas near the airport on the mainland. Construction of a four-lane minor arterial through this area would disrupt adjacent residences, although commercial interests could benefit. The Nine Mile Creek Bluff-Mendenhall Loop Road alternative would impact the MWSGR to a lesser extent than other routes near the airport. However, it would impact popular public recreational areas, and objections might also be raised over potential environmental impacts to Duck Creek. Because of its relatively low cost, this route would not likely involve political problems or delays.

Advantages: *Substantial benefit to North Douglas development, substantial traffic congestion benefits, substantially reduced travel times, low cost, potential benefits to commercial interests on mainland.*

Disadvantages: *Substantial impacts on MWSGR and a stream of concern, costly land acquisition required, high visibility, disruption of neighborhoods on Douglas Island and mainland, impacts to the Juneau International Airport, relatively high likelihood of regulatory problems.*

Alternative 8--Nine Mile Creek to Industrial Boulevard

This alternative initiated at the same point on Douglas Island as the other Nine Mile Creek Bluff alternatives, and would follow the same alignment across the channel until it reached the Mendenhall River at the southwest corner of the airport runway. This route would cross the Mendenhall River, follow the river until it intersected with the southern tip of Industrial Boulevard, and then follow Industrial Boulevard to its intersection with the Glacier Highway. On the mainland side of the crossing, land acquisition for the right-of-way could be complex. The commercial and industrial nature of the zoning in this area creates high land values for at least part of the right-of-way and any additional lands required for the route.

The Nine Mile Creek Bluff-Industrial Boulevard alternative would span the MWSGR with approximately 5,600 feet of fill. In addition, this route would require construction of a bridge across the Mendenhall River, a designated anadromous fish stream. Construction of this alternative would probably not affect hunting in this area, although it is likely that hunting would be curtailed to protect private property. All other environmental concerns involved in the Nine Mile Creek Bluff-Mendenhall Loop Road would also apply to this alternative.

This route would be an effective leg in the loop concept, but would not have the direct loop benefits of the Nine Mile Creek Bluff-Mendenhall Loop Road alternative. This alternative would require that traffic from Mendenhall Loop Road and other Egan Drive collector roads be split between that headed towards Douglas Island and that headed towards downtown. A substantial amount of North Douglas traffic would be diverted from new growth areas and some existing areas of development by this crossing alignment. This route would eventually result in congestion on the Glacier Highway between the Industrial Boulevard and Mendenhall Loop Road intersections.

The Nine Mile Creek Bluff-Industrial Boulevard route was estimated to cost approximately \$13 million. It would have a bridge span of about 770 feet across the channel and a bridge span of about 330 feet across the Mendenhall River. A controlled intersection would be required where this route would cross the North Douglas Highway, and another intersection may be required where it meets Eaglecrest Road. On the mainland, this route would require the eventual widening of the Glacier Highway between Industrial Boulevard and the Mendenhall Loop Road intersection, a cost included in the overall cost stated above.

Construction of this crossing would have similar impacts on Douglas Island neighborhoods as the Nine Mile Creek Bluff-Mendenhall Loop Road alternative. On the mainland, only commercial and industrial interests would be impacted by this route (potentially in a positive manner), as there are no neighborhoods in the Industrial Boulevard area. The Nine Mile Creek Bluff-Industrial Boulevard alternative would impact the MWSGR to a similar extent as other routes near the airport. However, the longer length of this route, and the presence of a bridge over the Mendenhall River is likely to result in more objections and regulatory delays than those for the Nine Mile Creek Bluff-Mendenhall Loop Road alternative.

Advantages: Substantial benefit to North Douglas development, substantial traffic congestion benefits, substantially reduced travel times, low cost.

Disadvantages: Substantial impacts on MWSGR, river crossing required, fairly complex and costly land acquisition required, high visibility, relatively high likelihood of regulatory problems.

Alternative 9--Engineer's Cutoff "A"

This alternative initiated at Hut Point on North Douglas Island and joined with Engineer's Cutoff Road at its terminus on Mendenhall Peninsula. It consisted of two bridges, one to cross Gastineau Channel and one to cross the Mendenhall River. This alternative would traverse a section of CBJ-owned land on North Douglas and would either border along or require condemnation of several lots within the Bayview Subdivision. The alignment would pass through tracts of land designated for Fish Creek Park. This route would serve the potential new growth areas on North Douglas Island, including CBJ-owned lands around Eaglecrest Road and Goldbelt-owned lands on North/West Douglas Island.

The Engineer's Cutoff "A" alternative would span the MWSGR with approximately 2,300 feet of fill. It would affect areas of waterfowl low tide foraging activities, wetland productivity, recreation, and hunting. Its proximity to the mouth of Fish Creek, a heavily-utilized anadromous fish stream located on Douglas Island, would require careful design considerations. On the mainland, this route would cross the mouth of the Mendenhall River with a large bridge. The general area of this route is a popular waterfowl foraging area, which could be adversely impacted by the presence of the crossing. In addition, this route could impact bottom habitat in the area, including crab habitat.

The route would divert new development traffic from the North Douglas Highway; however, if a Bench Road were also constructed, this route would likely do little to divert downtown-bound traffic from the existing bridge. This route would primarily offer a valuable alternative to the existing bridge for travel

between North/West Douglas Island and the mainland (Mendenhall Valley) for commercial and recreational needs.

The Engineer's Cutoff "A" route would cost slightly more than \$38 million, with a total bridge span of about 2,500 feet across the channel and Mendenhall River. This cost included \$2.5 million for required highway widening on the Mendenhall Peninsula and Douglas Island.

This alternative would not provide for the extension of Engineer's Cutoff Road, but it would nonetheless impact the Engineer's Cutoff neighborhood on the mainland's Mendenhall Peninsula, as well as a portion of the Bayview Subdivision on North Douglas Island. The crossing would virtually block the view of the Chilkat Mountains for many of the subdivision residents, and the increased traffic and noise would raise objections. Substantial objections to this route from residents of the Bayview Subdivision and Engineer's Cutoff Road area and supporters of the MWSGR could be expected. With its high costs, this route would likely be subject to delays.

Advantages: Traffic congestion benefits (uncertain amount), reduced travel times.

Disadvantages: Relatively high impact on MWSGR and an anadromous fish stream, river crossing required, fairly complex land acquisition, high visibility, relatively high likelihood of regulatory problems, high cost.

Alternative 10--Engineer's Cutoff "B"

This alternative is similar to Engineer's Cutoff "A" with a shift to the west in the alignment as it crosses Gastineau Channel. This route would then extend up the eastern side of the peninsula and intersect with the existing Engineer's Cutoff Road.

The land use, environmental, traffic, and engineering impacts of the Engineer's Cutoff "B" alternative would be similar to those described for Engineer's Cutoff "A." Engineer's Cutoff "B" would, however, include an extension of Engineer's Cutoff Road and could encourage new development in that area. This alternative was estimated to cost approximately \$38 million, which includes \$2.5 million for required highway widening on the Mendenhall Peninsula and Douglas Island. Environmental impacts, public opposition, and high costs associated with Engineer's Cutoff "B" would be the same as those for Engineer's Cutoff "A."

Advantages: Traffic congestion benefits (uncertain amount), reduced travel times.

Disadvantages: Relatively high impact on MWSGR and an anadromous fish stream, river crossing required, fairly complex land acquisition, high visibility, relatively high likelihood of regulatory problems, high cost.

Alternative 11--Fritz Cove "A"

This alternative would be identical to the Engineer's Cutoff "B" route, except it would proceed up the Fritz Cove Road side of the Mendenhall Peninsula. Right-of-way would be required through CBJ-owned lands in order to connect to Fritz Cove Road. Right-of-way would also likely be required for the additional improvements needed for Fritz Cove Road, particularly at its intersection with the Glacier Highway. Acquisition of lands for this right-of-way could be costly, as this area is developed and zoned as Rural Residential and Low Density Residential.

The Fritz Cove "A" route would impact the MWSGR in the same manner as the Engineer's Cutoff "A" and "B" alternatives, but would also require construction of a section of roadway from the Mendenhall

Peninsula end of the crossing to the present terminus of Fritz Cove Road. Heavy sedimentation could be expected during the construction stages of this route.

Transportation and traffic advantages and disadvantages for this alternative would be similar to those for the Engineer's Cutoff "A" and "B" routes, except that even longer travel distances required by this route present an additional disadvantage.

The Fritz Cove "A" route was estimated to cost slightly less than \$40 million. Public objections to the construction of this alternative would be similar to those of the Engineer's Cutoff "A" and "B" routes, and with its high costs, this route would likely be subject to delays.

Advantages: *Reduced travel times.*

Disadvantages: *Relatively high impact on MWSGR and an anadromous fish stream, river crossing required, fairly complex and costly land acquisition, high visibility, relatively high likelihood of regulatory problems, high cost.*

Alternative 12--Engineer's Cutoff "C"

This route is the same as Engineer's Cutoff "B" except that its connection with North Douglas Highway would be located west of Entrance Point. Fill requirements for Entrance Point would likely increase costs and environmental impacts to a certain degree. In addition, the impact of this route on Fish Creek Park would be cause for concern. This alternative would cost over \$41 million.

Advantages: *Traffic congestion benefits (uncertain amount), reduced travel times.*

Disadvantages: *Relatively high impact on MWSGR and an anadromous fish stream, river crossing required, fairly complex land acquisition, high visibility, relatively high likelihood of regulatory problems, high cost.*

Alternative 13--Fritz Cove "B"

This route is the same as Fritz Cove "A" except that its connection with North Douglas Highway would be located west of Entrance Point. Fill requirements for Entrance Point would likely increase costs and environmental impacts to a certain degree. In addition, the impact of this route on Fish Creek Park would be cause for concern. This alternative was estimated to cost approximately \$43 million.

Advantages: *Reduced travel times.*

Disadvantages: *Relatively high impact on MWSGR and an anadromous fish stream, river crossing required, fairly complex and costly land acquisition, high visibility, relatively high likelihood of regulatory problems, high cost.*

Alternative 14--Douglas Island to Spuhn Island to Mendenhall Peninsula

This route initiated on Douglas Island at the approximate location of Eleven Mile Creek, cross to Spuhn Island and traverse it, and then cross to the Mendenhall Peninsula at Smuggler's Cove. Of all the alternatives, the Spuhn Island alternative would be the furthest distance away from areas of new development in the vicinity of Eaglecrest Road to the Mendenhall Valley. This route would be the same distance from new development areas on the north/west side of Douglas Island to the valley as the Eaglecrest Road – 8 Mile Egan alternative and about one mile closer than the Nine mile Creek Bluff – 8 Mile Egan route. Land acquisitions would include private land on Spuhn Island and in the Smuggler's Cove area, as well as the additional right-of-way required to improve Fritz Cove Road to handle the

additional traffic.

This alternative would require the construction of either a high-level bridge or a floating bridge with an opening section from North Douglas to Spuhn Island in order not to block boat traffic. The bridge from Spuhn Island to the Mendenhall Peninsula would also likely be a high-level bridge, and would have a substantial impact on the views for residents of Smuggler's Cove.

The Spuhn Island alternative would have similar transportation advantages and disadvantage to the Fritz Cove routes, and would do little to divert traffic from the existing Douglas Bridge. This route would, however, serve North/West Douglas shopping needs and Mendenhall Valley recreation needs.

This route was estimated to cost over \$200 million, with a single arch span of just over a mile in length extending from Douglas Island to Spuhn Island and another span about 2,000 feet in length extending from Spuhn Island to the Mendenhall Peninsula. The environmental impacts of this route would be similar to those of the Fritz Cove alternatives already described. Due to the high cost of this route, it would be subject to extreme political tradeoffs, and the project schedule could be expected to extend over a decade or more.

Advantages: *Reduced travel times.*

Disadvantages: *Relatively high impact on MWSGR and an anadromous fish stream, fairly complex and costly land acquisition, high visibility, relatively high likelihood of regulatory problems, extremely high cost.*

Alternative 15--No-Crossing (No-Build) Alternative

The No-Crossing alternative would entail improvements to the Douglas Island road system and the existing bridge. Improvements could include reconfiguration of the existing bridge, widening of the North Douglas Highway, and/or construction of a Bench Road parallel to the North Douglas Highway but at an elevation of approximately 500 feet. This alternative would require land acquisition for sufficient right-of-way to allow widening of the North Douglas Highway to handle new traffic that would result from North Douglas Island development. If the No-Crossing (No-Build) alternative were chosen, it is likely that commercial development would occur in order to serve new residential development on North Douglas, as access to commercial areas in the valley would not be made more convenient to residents on the island. This could result in duplication of commercial services. Fire, police, and ambulance services would be required to meet the needs of new growth on North Douglas, an expenditure which could be delayed if a channel crossing were constructed that provided convenient access to the Mendenhall Fire Station and State Trooper office.

The No-Crossing alternative would have little or no impact on the MWSGR or Fritz Cove. The additional right-of-way required would remove some timber land from production. Construction of the proposed Bench Road could cause substantial impacts on fish streams, downhill property owners, and the surface hydrology of the area.

Growth on North/West Douglas Island will create new capacity and congestion problems on the North Douglas Highway and the existing bridge, with limited options available for alleviation of these issues. Without the construction of a Bench Road, the North Douglas Highway would have to be widened, which would result in the condemnation of a number of dwellings and the reduction of a very large number of lots. Congestion on the bridge will increase as a result of growth on North/West Douglas Island. While bridge reconfiguration will be required, the construction of a Bench Road could preclude the widening of the North Douglas Highway for some time, as it would alleviate congestion on the North Douglas

Highway immediately.

Construction of a Bench Road was estimated to cost about \$2 million per mile, or \$14 million for a seven mile segment. Widening of the North Douglas Highway would cost about \$1 million per mile, or \$7 million for seven miles. The costs of bridge reconfiguration and potential reconstruction of the Douglas Island intersection were not thoroughly examined. The No-Crossing alternative would disrupt traffic and travel time because of congestion on the existing Douglas Bridge. Construction of a Bench Road would help ease congestion up to the bridge and could assist in preserving the rural nature of existing neighborhoods on the North Douglas Highway, while widening of the North Douglas Highway would ease congestion at the expense of substantial neighborhood disruption. Public objection to the increase in traffic on the North Douglas Highway is expected. The improvements involved in the No-Crossing alternative could range from \$7 to \$22 million, making it a low-to-medium cost alternative that would likely be subject to some political tradeoffs and delays.

Advantages: *No impact on MWSGR, no effect on aesthetics, relatively low likelihood of regulatory problems, low to medium cost.*

Disadvantages: *No reduction in travel times, disruption of traffic during construction (except Bench Road) and extensive disruption of residences along the North Douglas Highway, if widened.*

3.3 Summary and Conclusion of 1984 Feasibility Study Alternatives

The 1984 Feasibility Study provided a comparative evaluation of the alternatives using a set of criteria based on the five factors considered during alternatives development: land use, environmental issues, transportation, engineering, and public policy. Alternatives were scored relative to one another, rather than on an arbitrary scale, as shown in Table 3-1.

Table 3-1: Relative Ranking of the 1984 Alternatives

Rank	Score	Alternative
1	218	Eaglecrest Road – 8 Mile Egan (Alternative 5)
2	214	Nine Mile Creek Bluff – 8 Mile Egan (Alternative 6)
3	204	Nine Mile Creek Bluff – Mendenhall Loop Rd. (Alternative 7)
4	202	West Sunny Point (Alternative 4)
5	194	East Sunny Point (Alternative 3)
6	193	Nine Mile Creek Bluff – Industrial Boulevard (Alternative 8)
7	177	Vanderbilt Hill (Alternative 2)
8	172	Salmon Creek (Alternative 1)
9	147	Engineer’s Cutoff “A” (Alternative 9)
10	141	Engineer’s Cutoff “B” (Alternative 10)
11	133	Engineer’s Cutoff “C” (Alternative 12)
12	126	No-Crossing Alternative (Alternative 15)
13	101	Fritz Cove “A” (Alternative 11)
14	100	Fritz Cove “B” (Alternative 13)
15	78	Douglas Island - Spuhn Island – Mendenhall Peninsula (Alternative 14)

The *1984 Feasibility Study* recognized three general types of alternatives in this evaluation: 1) a No-Crossing alternative, 2) a crossing as far away from the center of the wetlands as is practical, and 3) a crossing that utilizes the shortest route across the wetlands. The *Study* then compared the three highest ranking alternatives in each of those categories: the No-Crossing alternative, the Engineer's Cutoff "C" alternative, and the Eaglecrest Road – 8 Mile Egan alternative. The *1984 Feasibility Study* team ultimately recommended that Alternative 5 (Eaglecrest Road – 8 Mile Egan) as be pursued. If, based on future studies, this alternative was determined to not be feasible due to impacts to the MWSGR, the *Study* recommended that Alternative 9 (Engineer's Cutoff "A") be pursued.

4.0 Baseline Engineering Conditions/Studies

Baseline engineering studies were conducted during 2003 and 2004, as part of the Juneau Second Channel Crossing (JSCC) project, to update and characterize conditions within the project area that could affect the design of a crossing structure. The studies resulted in the development of preliminary design criteria, identification of navigation issues in Gastineau Channel, characterization of vessels transiting Gastineau Channel, and a preliminary assessment of vertical and horizontal clearances for a new bridge crossing. This section summarizes the results of those studies.

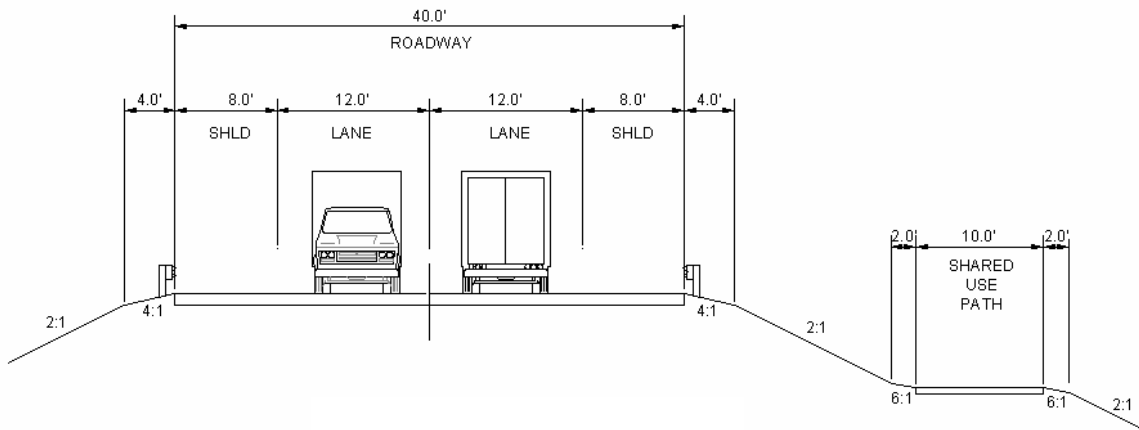
4.1 Preliminary Design Criteria

The *Preliminary Design Criteria Technical Memorandum* (January 2004) prepared for the JSCC project describes the basic design criteria required for the development of potential crossing “types”, including tunnels, fixed bridges, bascule (movable span) bridges, floating bridges, and approach roadways. Following is a brief summary of this memorandum.

4.1.1 Roadways

Three existing roadways have significant relevance to the JSCC project. They include the North Douglas Highway, Egan Drive (including Glacier Highway west of Brotherhood Bridge to Fritz Cove Road) and the existing Douglas Bridge over the Gastineau Channel. Potential second crossing locations would connect Egan Drive/Glacier Highway with North Douglas Highway. Figure 4.1 shows a roadway typical section that would be used to connect the Second Crossing with this existing transportation network.

Figure 4.1: Roadway Typical Section



4.1.2 Bridges

A number of different bridge types could potentially be suitable for a second crossing of the Gastineau Channel, depending on location. They include fixed bridges, movable bridges, suspension bridges, and floating bridges. Regardless of the bridge type, all structures that cross the channel should consider not only the initial cost of the structure but also operation and maintenance costs, life-cycle costs, aesthetics, and the potential for future widening. Additional criteria to be determined are discussed below.

A fixed bridge that provides similar vertical clearance as the existing Douglas Bridge will likely be acceptable to the U.S. Coast Guard. Lesser heights may be acceptable based on waterway user studies and further USCG consultation. The existing Douglas Bridge has a vertical clearance of 51 feet above the Mean High Water (MHW). The width of the navigation channel for the Second Crossing depends on its final location but is anticipated to be between 100 ft and 150 ft wide.

A fixed bridge is a structure that provides a specific clearance over the waterway that it is crossing. The bridge must provide the full vertical and horizontal clearance set by the USCG over the navigation channel. Once constructed, there is little ability to change the vertical clearance in the future.

Two situations warrant consideration of a movable bridge. First, alignments close to the airport may not be capable of providing the full vertical clearance because the FAA imposes airspace restriction in and around the Juneau International Airport. In these situations, a movable span bridge may be required to satisfy both the airspace restrictions and provide a navigation channel. Secondly, if it is desirable to provide unrestricted clearance over the navigation channel for future considerations, then a movable bridge should be considered.

Floating bridges can be feasible when crossing over bodies of water that have water depths greater than 150 feet. For this project that will be limited to alternatives that cross Fritz Cove. A modern floating bridge consists of a series of cellular concrete pontoons post-tensioned together to form a continuous buoyant structure. The riding surface may be placed directly on top of the pontoons, or more suitably for a marine environment, on a conventional bridge superstructure built above the pontoons. Ship passage can be accommodated by providing a draw type movable span near the center of the floating bridge or by providing a navigation channel near the shore on the fixed approaches to the floating bridge. Specific design criteria for a floating bridge depends greatly on site characteristics and will be developed in the future if a floating bridge is still a consideration.

All bridges should be designed using the current version of the AASHTO LRFD Bridge Design Specifications. All movable bridges should also be designed to the requirements of the AASHTO Standard Specifications for Movable Highway Bridges. All floating bridges should be designed in accordance with the Washington State Department of Transportation floating bridge design standards. A representative bridge typical section is shown in Figure 4.2.

Figure 4.2: Bridge Typical Section

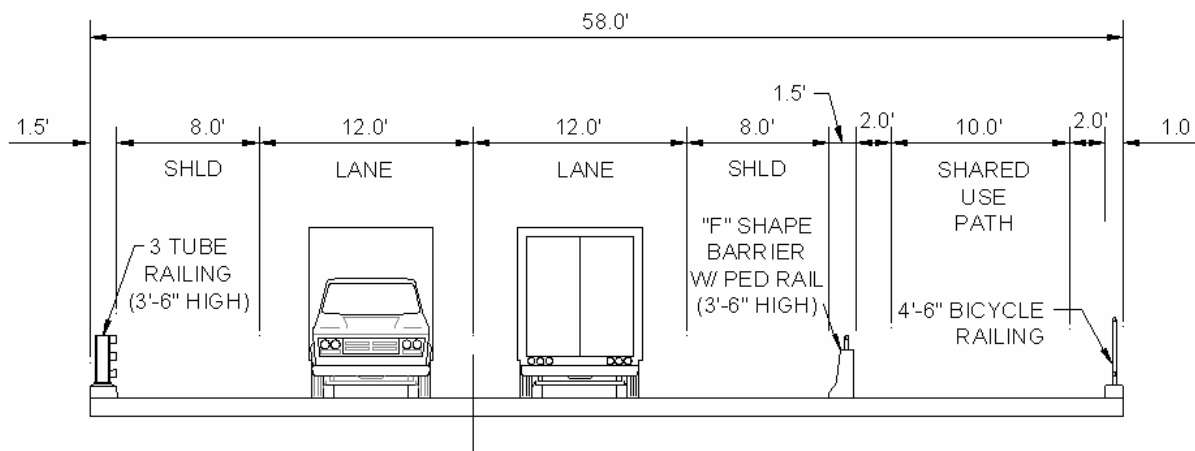
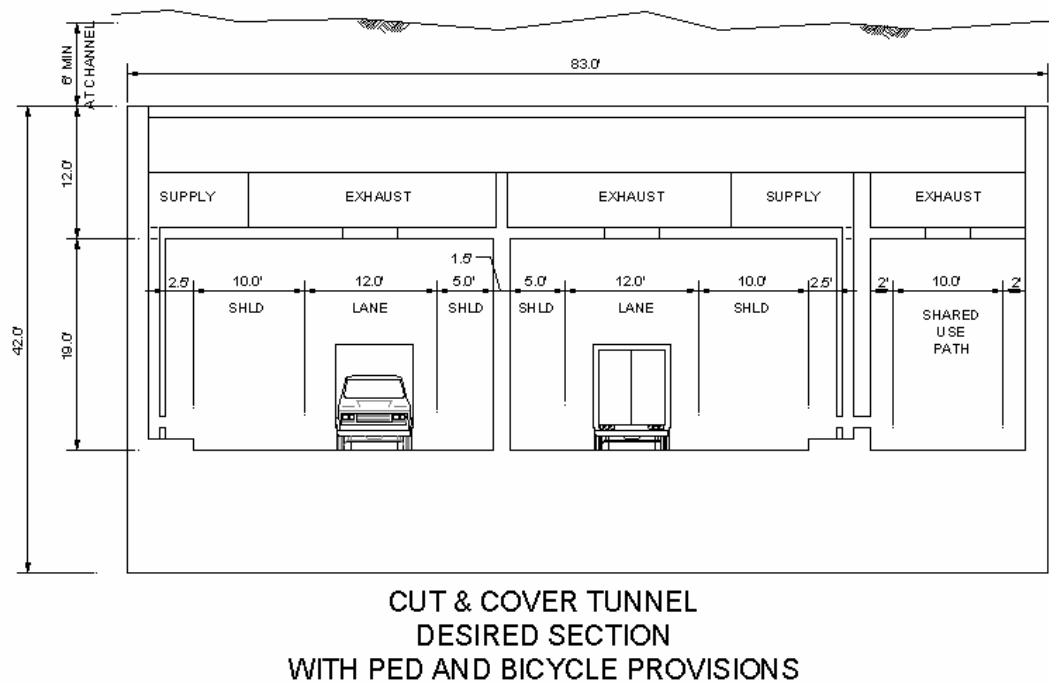


Figure 4.4: Tunnel Typical Section with Separated Pedestrian/Bicycle Provisions



4.2 Gastineau Channel Navigation Issues

The *Preliminary Navigation Issues Technical Memorandum* (November 2003) describes the navigational characteristics of Gastineau Channel within the study area and other aspects of navigation that should be considered during the development of bridge crossing options.

Gastineau Channel separates mainland Juneau from Douglas Island and provides a marine transportation corridor between downtown Juneau and Fritz Cove. Gastineau Channel is a navigable water body, as defined by the Rivers and Harbors Act that runs between Fritz Cove, at the mouth of the Mendenhall River, over the Mendenhall Bar (see Figure 4.5), and southeasterly to the end of Douglas Island where it connects with Stephen Passage. The Rivers and Harbors Act, 2 March 1945 (House Doc. 325, 77th Congress, 1st Session) as adopted, provides for a channel from Juneau to Fritz Cove, approximately 5.5 miles long and 75 feet wide with a depth of 0.0 feet MLLW (see Figure 4.6).

Figure 4.5: Gastineau Channel and Taku Inlet

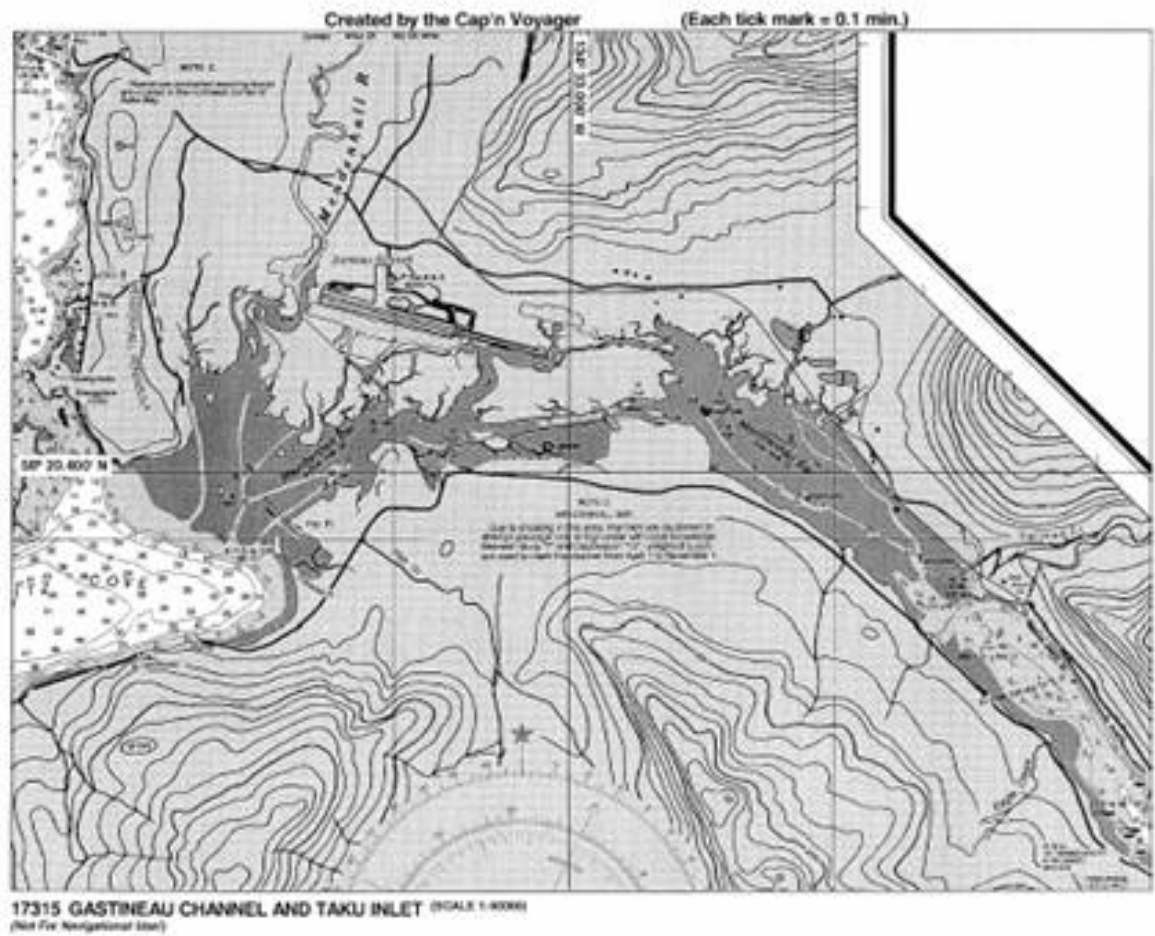
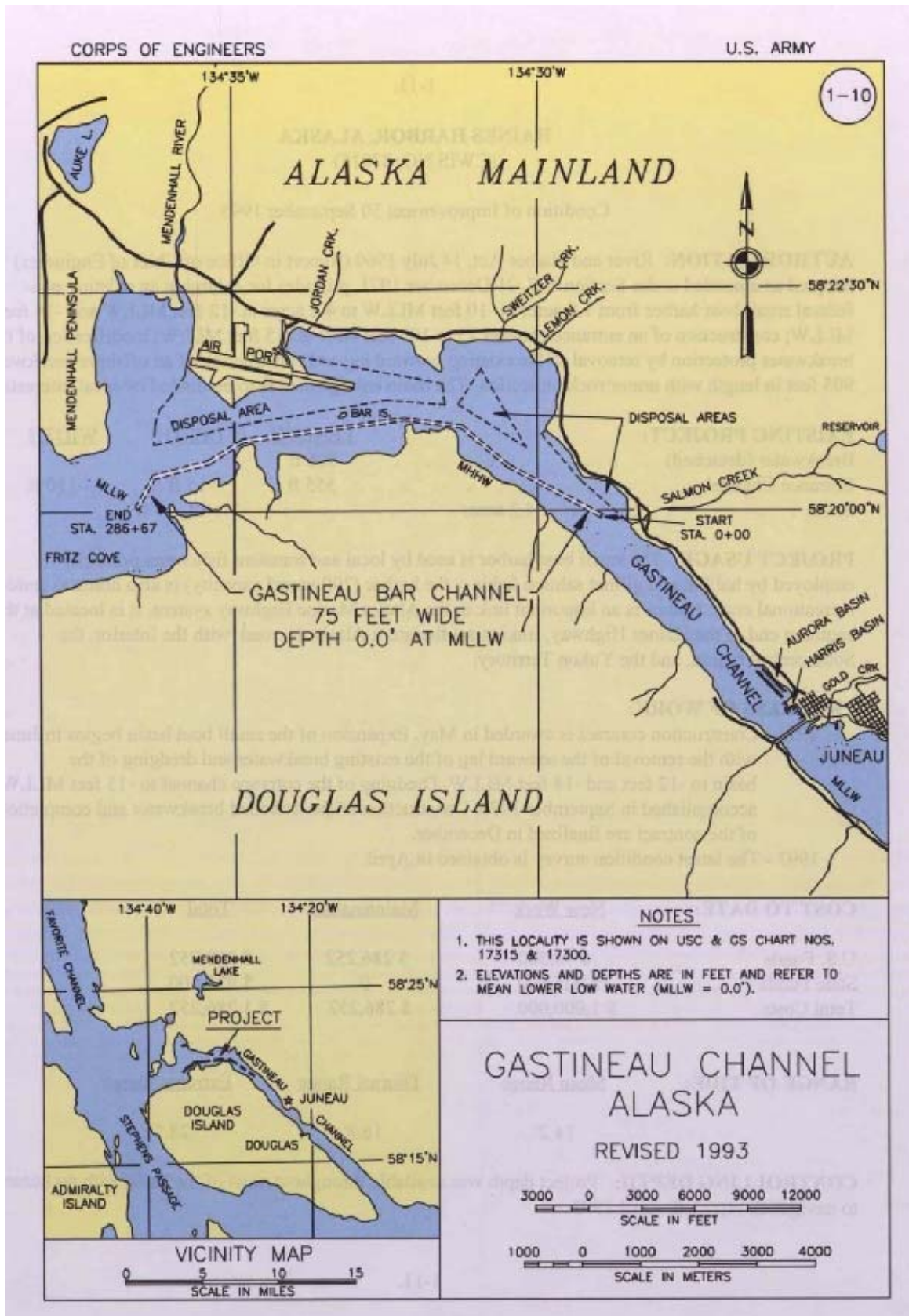


Figure 4.6: ACOE Published Gastineau Channel Navigational Information



Near Salmon Creek, water depths are approximately 25 feet decreasing to less than 20 feet, and in some places less than 5 feet at high tide within the bar area, but increase to over 200 feet in Fritz Cove. The tides in the area can vary as much as 25 feet; however, typical tidal range is between a Mean Higher High Water (MHHW) elevation of +16.3 feet and a Mean Lower Low Water (MLLW) elevation of 0 feet (Shannon & Wilson, October 2003).

Currently, the Douglas Bridge is the only bridge crossing of Gastineau Channel. It crosses the channel near downtown Juneau. The Douglas Bridge has a 490-foot horizontal clearance and a 51-foot vertical clearance at MHW for the middle 250 feet. Mariners traveling from downtown Juneau to Auke Bay can go north in Gastineau Channel and through Fritz Cove, or south around the southern tip of Douglas Island and then north through Stephens Passage. The Gastineau Channel route is approximately 10 statute miles long and involves passage over the Mendenhall Bar. The southern route around Douglas Island is approximately 30 statute miles long and involves greater exposure to winds and waves in Stephens Passage.

Within the study area, Gastineau Channel comprises a significant portion of the Mendenhall Wetlands State Game Refuge (MWSGR). Major streams feeding into the channel within the study area include Salmon Creek, Lemon Creek, Jordan Creek, Mendenhall River, and Fish Creek. Shallow areas persist within this reach of the channel as a result of alluvial deposits, which make up the Mendenhall Bar.

At low tide, the northern reach of the channel becomes completely exposed except for the freshwater stream channels. Navigation in Gastineau Channel is restricted to high-tide passage only over the Mendenhall Bar. In its shallowest section (i.e., at Mendenhall Bar), the Gastineau Channel is dry at approximately 11 feet above MLLW. Passage across Mendenhall Bar for small craft is therefore possible only for a couple of hours each day during high tide. Mariners indicate that only small boats are likely to attempt the crossing at tides lower than 17 or 18 feet MLLW. High tides of 18 feet or higher occur approximately five times per month. Actual channel use is not well documented across the Gastineau Channel.

There are two public harbors in Gastineau Channel just north of the existing Douglas Bridge: Harris Harbor and Aurora Basin. There are 247 slips at Harris Harbor for ships ranging in size from 24 to 40 feet (length) and space for 75 transient vessels. There are 419 slips at Aurora Basin: 66 slips accommodate ships greater than 42 feet and 353 slips for vessels ranging in size from 24 to 32 feet. Aurora Basin can also accommodate 63 skiffs on the main float.² Auke Bay Harbor lies west of Mendenhall Peninsula and is separated from Aurora Basin and Harris Harbor by Gastineau Channel. It provides 20,000 feet of transient moorage in 3-day and 10-day slots.

In the fall of 2003, the McDowell Group conducted a survey of Gastineau Channel waterway users for the JSCC Project. Three telephone surveys were conducted: one of stall renters (202), one of commercial gillnetters (38), and one of commercial trollers (26). The surveys determine waterway users' frequency of travel through the Mendenhall Bar and their preferences for access, as well as their vessel specifications. Following are key findings from the survey:

- About two-thirds of respondents in all three user groups report transiting the Mendenhall Bar at least once in the past 12 months.
- Waterway users report an average number of between 3 and 4 trips across the Mendenhall bar in the past year.

² Telephone conversation between C. Snead, HDR Inc., and Betty Moore, Office Manager, CBJ Docks and Harbors, September 22, 2003.

Waterway Users Number of Times Crossing Mendenhall Bar in Past 12 Months

<i>User Group</i>	<i>Crossed Bar</i>	<i>Average</i>	<i>Median</i>
<i>Stall renters</i>	<i>66%</i>	<i>3.3 times</i>	<i>2.0 times</i>
<i>Commercial gillnetters</i>	<i>68%</i>	<i>3.4 times</i>	<i>3.0 times</i>
<i>Commercial trollers</i>	<i>65%</i>	<i>3.7 times</i>	<i>2.0 times</i>

Waterway users recommend an average vertical clearance ranging from 39 to 48 feet and an average horizontal clearance of 61 to 76 feet.

Waterway Users Recommended Clearance for Potential Bridge

<i>User Group</i>	<i>VERTICAL CLEARANCE</i>		<i>HORIZONTAL CLEARANCE</i>	
	<i>Average</i>	<i>Median</i>	<i>Average</i>	<i>Median</i>
<i>Stall renters</i>	<i>39 feet</i>	<i>35 feet</i>	<i>76 feet</i>	<i>60 feet</i>
<i>Commercial gillnetters</i>	<i>48 feet</i>	<i>45 feet</i>	<i>61 feet</i>	<i>50 feet</i>
<i>Commercial trollers</i>	<i>47 feet</i>	<i>50 feet</i>	<i>65 feet</i>	<i>50 feet</i>

In January and February 2003, the U.S. Coast Guard conducted a Waterways Analysis and Management System (WAMS) survey of ship operators, requesting their comments on aids to navigation, federal publications, and nautical charts for Gastineau Channel. Of the 35 surveys sent out, 16 were returned with responses. Only one survey respondent, a charter boat operator, commented on Mendenhall Bar and the need to dredge the channel there. All other responses focused on Gastineau Channel south of the JSCC study area.

Several attempts have been proposed over the past fifty years to improve navigability through the Mendenhall Bar area of the Gastineau Channel. In 1958, the U.S. Army Corps of Engineers (COE) conducted a hydrographic survey and pre-design investigations for dredging in the Gastineau Channel to give boats an all-tide channel. The channel dredging was authorized in a March 1945 resolution under the Rivers and Harbors Act to provide a navigable route from harbors in downtown Juneau to the preferred fishing areas in northern Stephens Passage. Channel dredging took place from August through October 1959 and from March through April 1960. The dredged channel was 75 feet wide.

By 1962, serious shoaling was apparent in the channel again as a result of side-slope sloughing and deposition from materials coming out of Jordan, Switzer, and Lemon Creeks. Additional field studies were conducted at that time and, in 1964, the COE's Waterways Experiment Station began a three-year study to develop a hydraulic model of Gastineau Channel. Based on the model study and other data collected, a proposal to redredge the channel was made by the COE in conjunction with the State Highway Department; however, the COE's Office of the Chief of Engineers rejected the proposal.

In 1978, the COE's Waterways Experiment Station completed a new survey report discussing the feasibility of opening and maintaining a channel through the Mendenhall Bar. This report and information obtained in previous studies determined that the expansive tidal flats and creek flows create a condition in which the southern portion of the channel "drains" faster than the northern portion, resulting in water elevation differences across the bar as the tide ebbs. This, combined with the nature of the material forming the bar, causes the side slopes of any dredged channel to become unstable and collapse into it. The report concluded that it is not feasible to maintain the channel without construction of extensive dikes and channel linings to divert ebbing tidal flows away from excavated channel side slopes and diverting Jordan, Switzer, and Lemon Creeks, or completely relocating the channel toward Douglas Island. The estimated costs of providing a new channel to 0.0 feet MLLW (in 1997 dollars³) ranges from

³ In response to a request by the CBJ Docks and Harbors Department for the COE to review the possibility of

over \$7 million to almost \$34 million. Annual costs of maintaining the channel could range from \$230,000 to over \$1 million.

In response to a request from the City and Borough of Juneau (CBJ) in 1984 to resume maintenance dredging of Gastineau Channel (letter from M.L. Teague, CBJ Manager, City and Borough of Juneau, to Neil Saling, Colonel, COE District Engineer, March 15, 1984), the COE, citing previous studies, explained that Gastineau Channel maintenance is not economically feasible (letter from Neil Saling, Colonel, COE District Engineer, to M.L. Teague, CBJ Manager, City and Borough of Juneau, April 10, 1984). The maintenance program for Gastineau Channel remains in deferred status based on those previous studies.

In 1997, the CBJ again requested resumption of maintenance dredging of Gastineau Channel (letter from Joseph L. Graham, CBJ Port Director, City and Borough of Juneau, to Commander, COE District Engineer, September 25, 1997), explaining that lack of adequate navigable access to the north is a “serious constraint” to economic development related to maritime facilities and operations in Juneau. The COE’s response, provided by Colonel Sheldon Jahn (letter from Sheldon Jahn, Colonel, COE District Engineer, to Joseph L. Graham, CBJ Port Director, City and Borough of Juneau, November 20, 1997), referenced the previous studies and acknowledged that economic conditions in the CBJ could have changed to the extent that a reevaluation of economic feasibility of maintenance dredging may be warranted. Col. Jahn recommended that the City and Borough of Juneau formally request the COE to conduct such a reevaluation or conduct the reevaluation itself. To date, no such request of the COE has been made or independent study initiated.

Although the COE has clearly indicated that it would reevaluate the economic feasibility of maintenance dredging in Gastineau Channel at the request of the CBJ, it is unclear if the COE or the CBJ would be willing to bear the associated dredging costs. The costs of opening and maintaining the channel could substantially exceed the economic benefit or gain to the community. If the dredging program did not resume, passage through the northern reach of Gastineau Channel would continue to be limited to small craft with approximately 5-foot draft or less, operating during high tides. The restricted use of the channel for shallow draft vessels should be a consideration in determining the navigational clearance requirements of a second bridge crossing.

Another important factor in considering future navigation is that portions of Southeast Alaska, including the project area, are undergoing land uplift at a relatively rapid rate as a result of glacial rebound or isostatic uplift. Uplift rates have been approximated at 0.04 to 0.05 feet per year. At this rate, uplift would increase by 4 to 5 feet over the next one hundred years. Eventually, due to isostatic uplift in the MWSGR and continued material deposition, the Mendenhall Bar may become impassable for all vessels.

4.3 Gastineau Channel Vessel Monitoring Study

In response to the lack of documented data on vessel utilization of the Gastineau Channel, DOT&PF conducted a vessel surveillance program during the 2004 season to characterize boat and vessel utilization of the Gastineau Channel over the Mendenhall Bar. The *Gastineau Channel Vessel Monitoring Technical Memorandum* (February 2005) describes the results of this vessel monitoring effort and includes general characteristics of marine vessel traffic transiting Gastineau Channel from downtown Juneau to the Fritz Cove/Auke Bay area.

resuming a dredging program for Gastineau Channel (letter from Joseph L. Graham, CBJ Port Director, to Commander, COE District Engineer, September 25, 1997), the COE conducted a present worth analysis in 1997 to update the estimated costs presented in the Waterways Experiment Station study of 1978.

The vessel monitoring program involved recording photographic images of vessel traffic through Gastineau Channel 24 hours per day (one photo every 15 seconds) during the period from April 6 through October 19, 2004. The objective of the investigation was to identify the individual characteristics of vessels that utilize the channel (type of vessel, height, and length) for the identification of future navigational issues during the period of time when the seasonal navigational buoys are in place. The U.S. Coast Guard (USCG) maintains and installs the seasonal navigational markers from April 1st to October 15th each year. A 3-D model was created to generate measurement grids based on camera position and features in the channel (e.g., channel markers). The measurement grids were then used to determine approximate dimensions of the vessels recorded in the surveillance program. The vessel data was compiled and analyzed to describe general characteristics of vessel traffic in Gastineau Channel.

Using the information from the photographs and grid analysis, data on each vessel captured in the visual surveillance program was entered into a database (Microsoft Excel spreadsheet). The database includes the following information from each representative photograph:

- Vessel reference or individual identification
- Image date and time
- Approximate tidal elevation
- General vessel type (e.g., sailboat, fishing troller, fishing gillnetter, recreation, commercial, other)
- Vessel height, including antennas, booms, masts, etc.

The monitoring program recorded 656 vessels transiting Gastineau Channel during the surveillance period. In 1998, the ACOE determined that the controlling depth for the channel was +10.2 feet MLLW about 100 feet south of day beacon 17 and the shallowest portion of the channel runs between day beacons 15 and 17 according to NOAA's *United States Coast Pilot 8* (see Figures 4.7 and 4.8). Today the channel continues to narrow and goes dry at about +11.0 feet according to local mariner experts. Because of this, vessels photographed when the channel was less than +11.0 feet were not included in the analysis. In addition, personal watercraft (jet skis, kayaks, etc.) and other vessels where vessel height was insignificant were also not included in this analysis. The net result was 523 vessels transiting the channel during the 2004 season, indicating that Gastineau Channel is an important navigable waterway.

Figure 4.7: ACOE Survey Vessel Aground at Low Tide, April 1998



Figure 4.8: A navigational aid marking a section of the channel near Bar Island, April 1998



The categories of vessels identified and the number of vessels recorded in each category are identified in Table 4-1. Recorded vessel heights for the commercial, recreation, sailboats, and No Data Recorded categories are characterized in Table 4-2.

Table 4-1: Types of Vessels Observed with a Channel Elevation of +11.0 feet or Greater

Vessel Type	Number of Vessels Observed
Commercial	89
Recreational (i.e., vessels that were not immediately distinguishable as a commercial fishing boat)	362
Sailboat	9
No Data Recorded* (commercial or recreational)	63
Total	523

*NDR: no data recorded; i.e., it was not readily apparent from the photograph whether the vessel was used for commercial fishing or recreation.

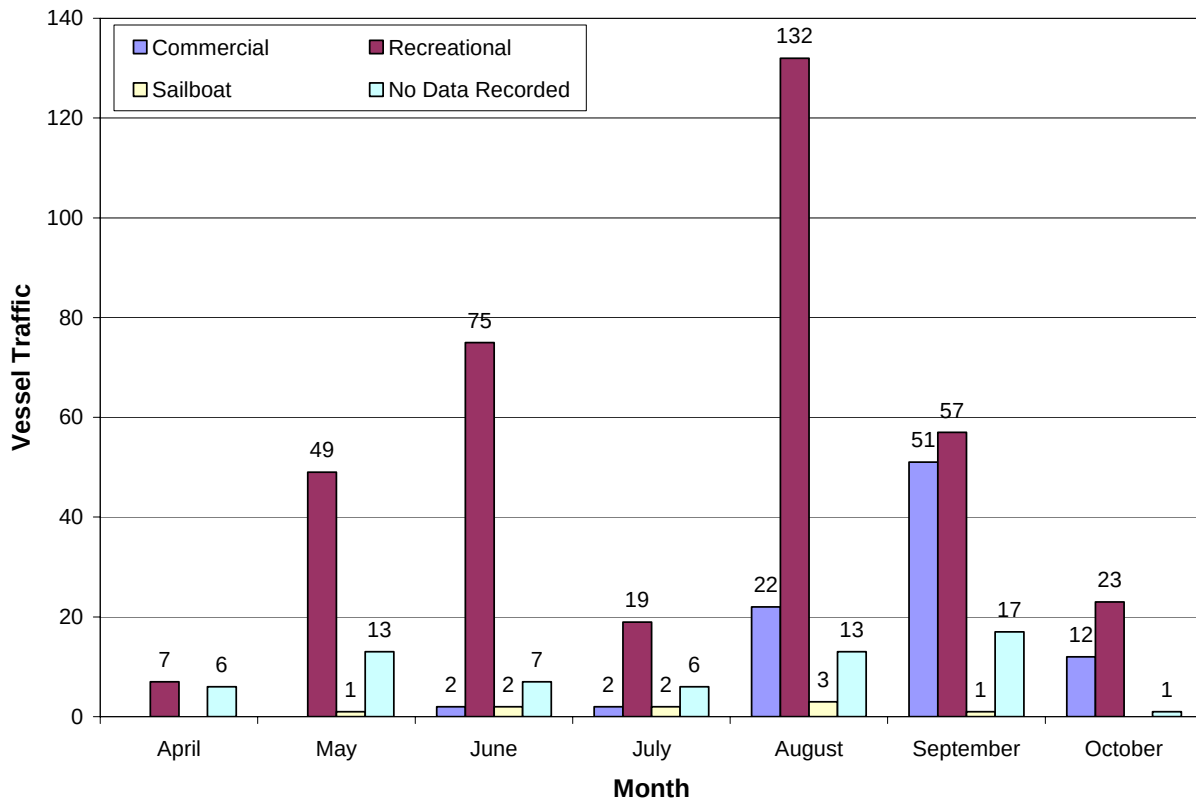
Table 4-2: Heights of Vessels Observed in the Surveillance Program with a Channel Elevation of +11.0 feet or Greater

Vessel Type	Number of Vessels					
	0-5 feet	6-10 feet	11-20 feet	21-30 feet	31-40 feet	41-50 feet
Commercial	1	1	13	31	41	2
Recreational	103	148	97	14	0	0
Sailboat	0	0	0	2	6	1
No Data Recorded	5	26	26	5	1	0
Total	109	175	136	52	48	3
Percent of Total	21%	33%	26%	10%	9%	1%

Based on the recorded heights of 523 vessels, approximately 20 percent of the vessels in Gastineau Channel are greater than 20 feet in height, approximately 59 percent are between 6 and 20 feet in height, and approximately 21 percent are less than or equal to 5 feet in height. The data also shows that 257 vessels (approximately 49 percent) transited the channel with the water elevation greater than or equal to +11.0 feet but less than +15.0 feet, and 266 vessels (approximately 51 percent) transited the channel with the water elevation equal to +15.0 feet or greater. With a dry channel condition of +11.0 feet, most boaters need at least 4-5 feet of water to safely clear the Mendenhall Bar.

Figure 4.9 presents monthly vessel traffic for the 523 vessels by vessel type throughout the monitoring period.

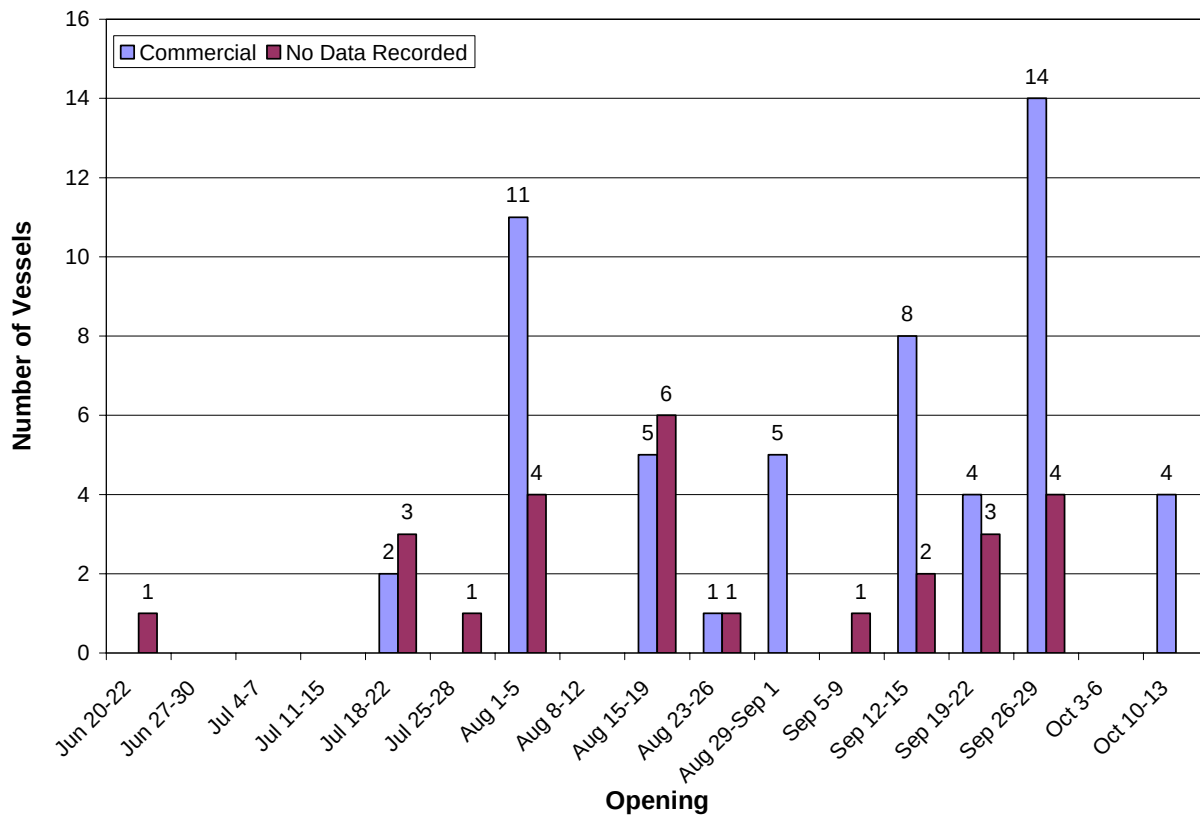
Figure 4.9: Vessel Traffic by Month



*Note: No data was recorded June 27 through July 18 and July 22 through July 26 due to computer malfunction.

Some of the recreational traffic is likely related to sport fishing, which is open year-round for all fish species. Commercial fishing vessels passing through Gastineau Channel likely make use of gillnet fishing openings. Gillnet fishing openings in the Juneau area in 2004 generally occurred from Sunday through Wednesday or Thursday every week from June 20 through October 13. The troller fishing openings varied by species, but the fishery was open continuously from April 22 to September 30. These dates would apply only to commercial fishing. Figure 4.10 shows the number of commercial vessels and NDR vessels (which could include commercial vessels) that transited Gastineau Channel during the 2004 gillnet fishing openings.

Figure 4.10: Commercial Vessel Traffic During Gillnet Fishing Openings*



*Note: No data was recorded June 27 through July 18 and July 22 through July 26 due to computer malfunction.

A total of 80 vessels—54 commercial vessels and 26 NDR vessels transited Gastineau Channel during the fishing open dates, representing approximately 61 percent of all commercial vessels and 41 percent of all NDR vessels in the channel during the surveillance period.

The net result of the vessel monitoring was that 523 vessels transiting the channel during the 2004 season had an average measured vessel height of 13.4 feet. Marine vessel operators traveling between downtown Juneau and the Fritz Cove/Auke Bay area often prefer to use the Gastineau Channel (i.e. via the Mendenhall Bar) because it provides for a shorter distance (saving time and fuel) and it is often safer than going around Douglas Island during strong winds. This average height is much shorter than the vessel heights reported in the *Juneau Second Channel Crossing Waterway User Survey* (McDowell Group, December 2003). Waterway users recommended an average desired vertical bridge clearance ranging from 39 to 48 feet—commercial gillnetters recommended on an average height of 48 feet and commercial trollers recommended an average height of 47 feet. Given that the ACOE has no plans to implement a Gastineau Channel dredging program, the Channel eventually may not be passable, except for shallow draft crafts or on high tide events.

If the channel becomes non-navigable, future ACOE dredging plans may be influenced by pressure from the local vessel operators to restore or maintain navigability to the Gastineau Channel. Therefore, proposed bridge vertical clearances should make reasonable accommodations for vessels observed transiting Gastineau Channel in this report, assuming that boat draft through the project area is maintained or only marginally reduced.

4.4 Preliminary Bridge Vertical and Horizontal Clearance Assessment

In order to determine preliminary Gastineau Channel navigational clearance requirements, a *Bridge Clearance Technical Memorandum* (February 2005) was prepared, which considers the horizontal and vertical clearance requirements of both the fixed and movable span bridge options for the JSCC project. This evaluation examined vessel owner survey data relating current clearance requirements for vessels using the Gastineau Channel gathered by McDowell Group, Inc. (Juneau Channel Crossing Waterway User Survey Results, December 2003), results of the Gastineau Channel vessel surveillance program conducted from April 6 through October 15, 2004 (*Gastineau Channel Vessel Monitoring Technical Memorandum*, February 2005), and a statistical approach of using this data to render recommended horizontal and vertical navigation clearances for the project. Supporting data from reports by the U.S. Coast Guard (*U.S. Coast Guard Survey Results, Juneau Second Channel Crossing*, December 2003) and Shannon & Wilson, Inc. (*Phase 1 Geotechnical Report, Juneau Second Channel Crossing*, October 2003) are also used.

The width of the waterway varies through the project area. However, the defined navigable channel width is recognized to be 75 feet (based on ACOE mapping). As stated in the *Preliminary Design Criteria Technical Memorandum* (October 2003), the minimum horizontal clearance recommended is 100 feet: 75 feet for channel width plus an additional 25 feet. This clearance is the clear distance between any channel obstructions (fendering, markers, etc.) and the actual span length over the navigation channel therefore will be larger.

There are several items that limit the practical maximum vertical clearance of the Second Crossing bridge. First, the existing Douglas Bridge (fixed bridge) has a vertical clearance of 51 feet above Mean High Water (MHW). While it would seem that exceeding this clearance with the second bridge would not allow any additional vessels to pass through the Gastineau Channel as they are already limited by the existing bridge, it should be noted that water depths at the Douglas Bridge site are considerably deeper than the depths at the majority of the crossing alternatives being considered. Next, the vertical height of vessels attempting to navigate the Mendenhall Bar is limited by the shallow water within the channel. Finally, the overall height of the bridge limits the vertical clearance. The proximity of the Juneau International Airport (JIA) limits how high the top of the bridge can be before it enters JIA airspace.

With this in mind and performing a statistical analysis of collected survey data, the preliminary recommended vertical clearance above MHW for the movable and fixed span bridge alternatives are 21 feet and 51 feet, respectively. The movable span, however, may enter JIA airspace when open, depending on the location of the Second Channel Crossing, causing additional vertical clearance problems or logistical issues in scheduling bridge openings and air traffic. Also, additional consultations with the USCG may allow for a lesser vertical clearance requirement than 51 feet for the fixed bridge option to meet the “reasonable needs of navigation”. The minimum horizontal bridge clearance for the proposed channel crossing is 100 feet. This value is the minimum distance to any face of bridge pier or fendering system. As such, the span length over the navigation channel for any bridge alternative is recommended to be at least 150 feet.

5.0 Baseline Environmental Conditions/Studies

The following section presents the preliminary baseline environmental conditions within the project study area that could affect the location and conceptual design of the Juneau Second Channel Crossing (JSCC) project.

5.1 Land Use

This section describes the existing land use patterns in the City and Borough of Juneau (CBJ), the current development trends, and the adopted land use plans and policies that guide development and change within the community. The project alternatives and their consistency with land use plans and policies will be addressed in future sections of the EIS.

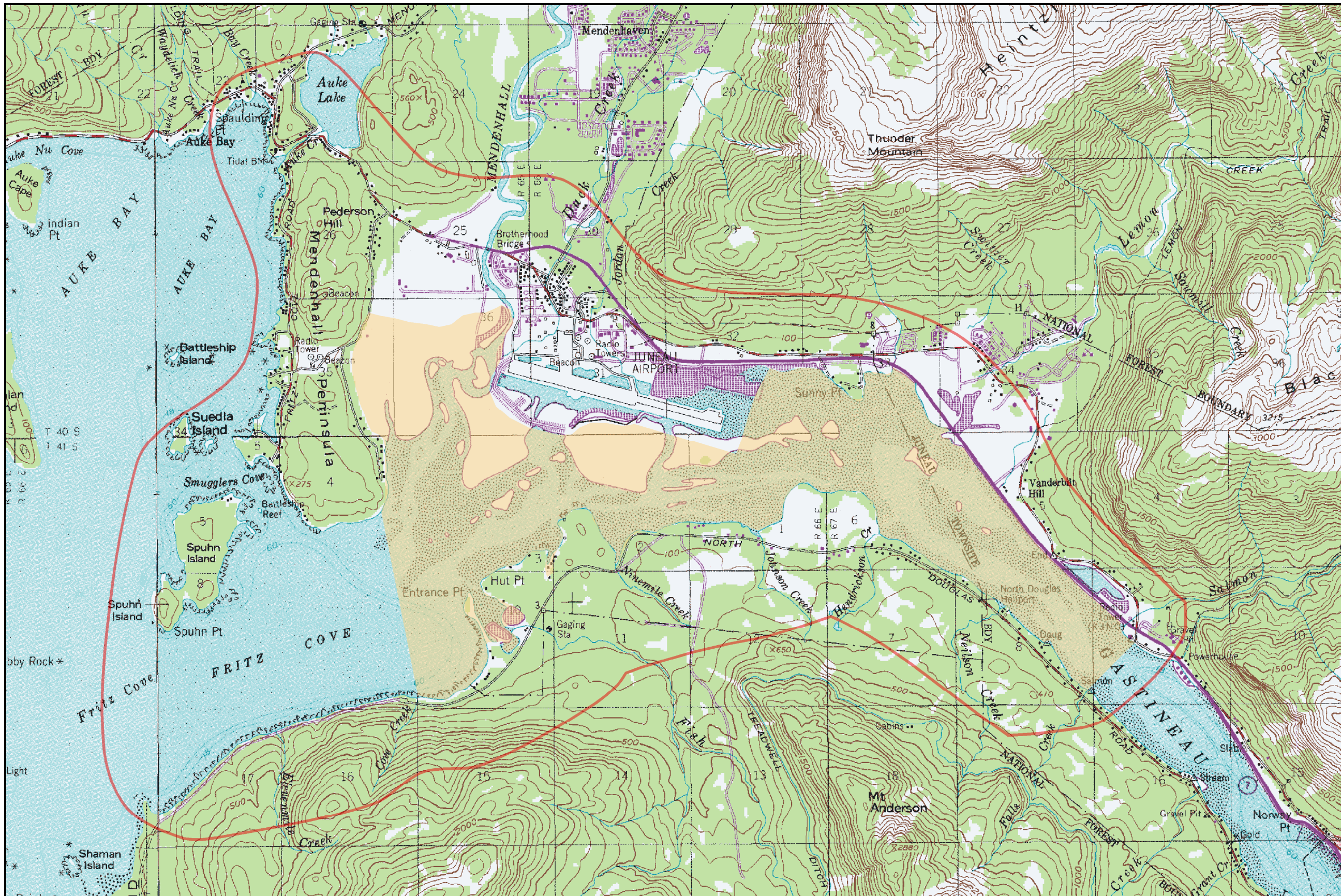
5.1.1 Overview of Existing Land Use

The JSCC project study area includes an approximate nine mile segment of the Gastineau Channel from the vicinity of Salmon Creek to the vicinity of the Mendenhall Peninsula/North Douglas Island, as shown in Figure 5.1. The core project area is generally bounded on the north by Egan Drive on the Juneau mainland, and on the south by North Douglas Highway on Douglas Island. Land uses vary widely within the vicinity of and adjacent to the core project study area, including residential, commercial, industrial, and recreational uses. The core project study area is dominated by the Mendenhall Wetlands State Game Refuge (MWSGR), Mendenhall Peninsula, and the Juneau International Airport (JIA).

Land development within the project study area is typified by lineal, coastal development due to steep mountainous terrain, with the exception of major development centers in the Mendenhall Valley, Lemon Creek area, and east of the project study area in downtown Juneau. Downtown is the location of the state capitol, associated office buildings, and dense residential development. Lemon Creek and Mendenhall Valley are the locations of primary residential and shopping centers in the borough. The existing Douglas Bridge is the only surface transportation link to Douglas Island, home to approximately one-fifth of the borough population, with no alternative access. Douglas Island land uses within the project study area are predominantly residential and recreational, with limited commercial development.

Land use and zoning are separate but related issues. Existing land use in a community refers to the actual use of the various parcels of land (e.g. residential, commercial, or vacant). It can also pertain to expected or planned future use. Zoning in a community is a planning function that indicates where elected officials, planning professionals, and the community as a whole believe various types of land use should be located. Zoning typically attempts to group similar land uses into zoning districts and separate them from incompatible land uses in other zoning districts (e.g. noisy industrial uses would be grouped in an industrial zone and separated from a quieter residential zone).

Figure 5.2 shows the existing land uses in the vicinity of the project study area. The CBJ land use pattern loosely follows area zoning. Within the project area, parcels zoned industrial lie west of the airport and are mostly used for lighter commercial purposes but include some industrial use as well. There are other industrial sites along Lemon Creek and near its mouth. Although the airport can be considered an industrial land use and CBJ zoning maps put it in an industrial zoning district, the CBJ land use database labels it “Public Building.” Commercial uses occur along the southeast side of Lemon Creek, near the mouth of Switzer Creek, at Auke Bay near the shoreline, and both immediately north and west of the airport.



Legend

- ⬮ Study Area
- Mendenhall Wetlands State Game Refuge

Alaska

Juneau

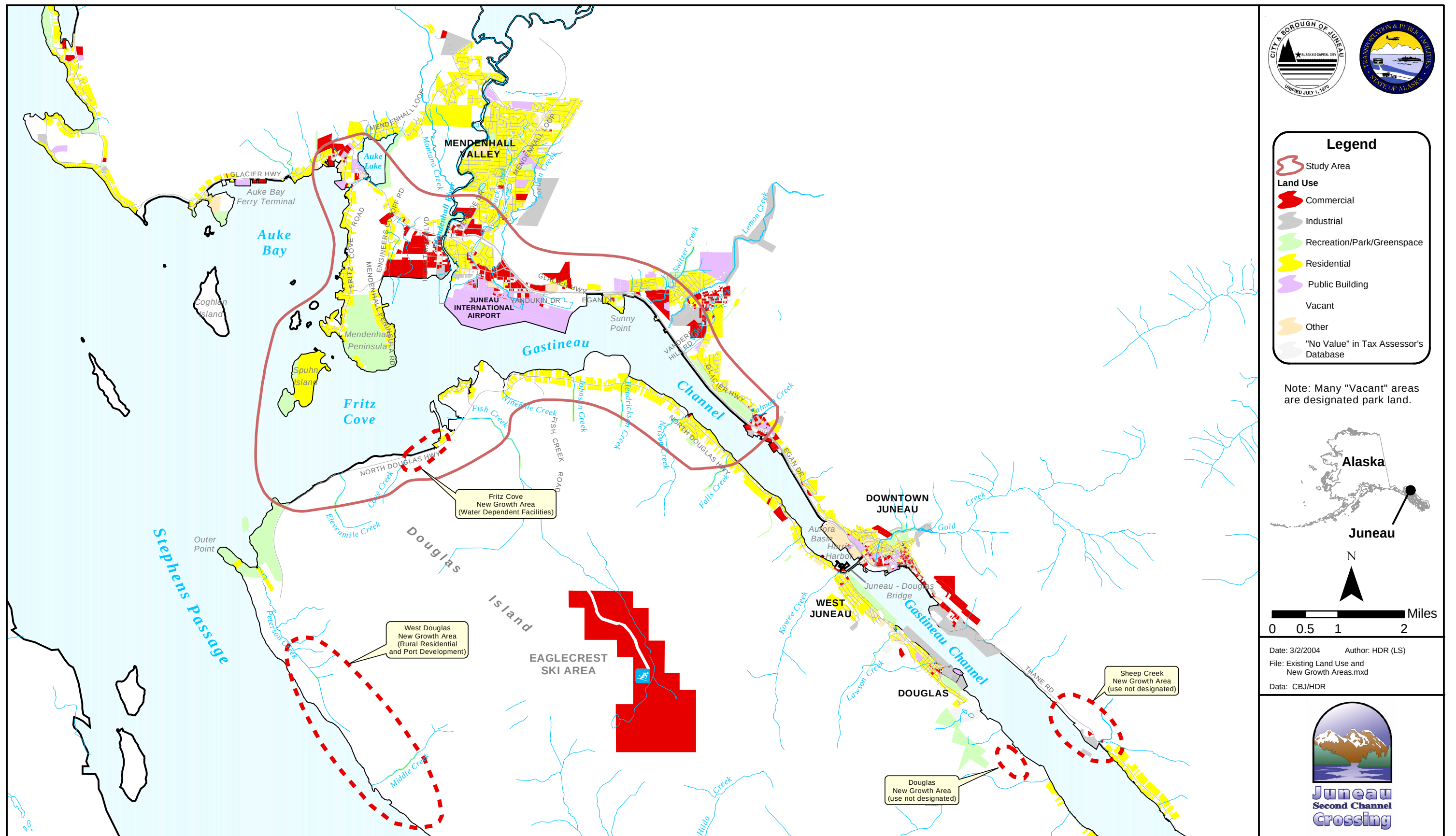
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Date: 3/2/2004 Author: HDR Alaska, Inc (PM)
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**Juneau
Second Channel
Crossing**

Juneau Second Channel Crossing

Figure 5.1
Project Study Area



Juneau Second Channel Crossing

Figure 5.2
Existing Land Use and New Growth Areas

Residential uses are most widespread in the Mendenhall Valley east of the Mendenhall River and in long strips along Old Glacier Highway, North Douglas Highway, and on either side of the Mendenhall Peninsula. Most vacant lands, particularly on the more developed mainland, are also somewhat marginal for construction of homes and businesses, with steep slopes, undulating terrain, wet soils, or a combination of all three. The largest areas of undeveloped land are on Douglas Island uphill of downtown Douglas and uphill of homes along North Douglas Highway, with another large tract on West Douglas. The following two projects on Douglas Island are currently in the active planning and permitting phases:

- Totem Creek Golf Course (TCGC) and clubhouse on West Douglas. CBJ granted an initial permit for development in April 2003 and entered into a 35-year land lease with TCGC in 2005.
- Eaglecrest Ski Area summer recreation and tourism. CBJ has a recent (2003) request for proposals for summer uses of the ski area. The form this summer use could take is not specified.

The Mendenhall Wetlands State Game Refuge (MWSGR) is the central land management feature of the project area. The refuge is approximately 3,800 acres in size and extends approximately 9 miles along the shores of the Gastineau Channel from Salmon Creek to the eastern side of the Mendenhall Peninsula—it is wholly encompassed within the core project area. The Alaska Legislature established the MWSGR in 1976 (Alaska Statute 16.20.034) to protect natural habitat and game populations, especially waterfowl, and to provide recreational opportunities. The State of Alaska Department of Fish and Game (ADF&G) manages the refuge habitat, wildlife, and human uses. The Alaska Department of Natural Resources (DNR) manages the surface and subsurface estate.

The Juneau International Airport (JIA) is located on the Mendenhall Glacier outwash plain, approximately 10 miles north of the center of downtown Juneau. The airport property comprises roughly 660 acres and is bounded by the MWSGR on three sides and by private property and public highways to the north. JIA was originally developed by the federal government to support military Air Corps operations, but control was transferred from the federal government to the City of Juneau in 1953.

5.1.2 Current Development Trends

Population and employment growth analysis conducted as part of this project allocated growth based on the availability of private and CBJ land and the relative attractiveness of the land and cost of development. Without a second crossing, most population growth is expected to occur in the area west and north of the Mendenhall River (including Auke Bay and out the road) and the Lemon Creek area (between Yandukin Drive and Vanderbilt Hill Road). These areas contain most of the available residential land that has access to employment sites on the north and east side of Gastineau Channel. Although there is significant developable land on Douglas Island, it is anticipated that capacity on the current Douglas Bridge (as controlled by the connecting intersections) would limit growth on Douglas Island. The bridge intersections are close to operating capacity during rush hours, and most current and prospective employment is located on the Juneau side of the channel. Consequently, residential development on Douglas Island is expected to be limited without a second crossing.

5.1.3 Land Use and Transportation Plans

The CBJ has adopted a number of plans related to land use. Some of the most important are:

- *Comprehensive Plan of the City and Borough of Juneau*, 1995 Update, adopted by the Assembly in November 1996, and published in November 1996.
- *City and Borough of Juneau Land Management Plan*, 1999 Update, September 1999, adopted by

Assembly Ordinance 99-11 on April 12, 1999.

- *City and Borough of Juneau Area Wide Transportation Plan, April 2001.*

A key land use plan that is related to the project but not formally adopted is the *1997 West Douglas Conceptual Plan*. Another planning document relevant to project is the *Mendenhall Wetlands State Game Refuge Management Plan* prepared by the ADF&G in 1990. These plans are described in the following paragraphs.

Comprehensive Plan of the City and Borough of Juneau

The CBJ Comprehensive Plan addresses the existing and future direction for the community on a broad range of issues, including land use, transportation, economic growth, environmental protection, recreation, and sustainability. It provides policies on these subjects that, together, attempt to balance these sometimes-competing community interests. While the CBJ Comprehensive Plan includes explicit intentions for the JSCC project for related new growth, it also provides for safeguards against uncontrolled growth and accommodates the desire for a community that is truly sustainable in terms of environmental, recreational, and aesthetic values; transportation; economics; and overall quality of life.

The Comprehensive Plan includes both general direction about transportation issues and explicit direction regarding the Juneau Second Channel Crossing project. The plan states:

- *It is critical that the CBJ provide an efficient roadway system that facilitates traffic within and between major population centers, including the Valley, Auke Bay, and Douglas Island, as well as to and within downtown.*
- *To ensure a smoothly functioning transportation system, the CBJ must address some serious transportation problems within and between major concentrations of population. The areas most affected by projected growth, and therefore most subject to increased congestion, include downtown Juneau, Lemon/Switzer Creek, Mendenhall Valley/Auke Bay and Douglas Island.*
- *It is recommended that further attention be paid to identification of additional corridors, beginning with the Second Crossing. Locating this corridor is a critical decision for the community given that the existing crossing is not centrally located with respect to either the Mendenhall Valley or West Douglas. Identifying the preferred location for the Second Crossing also benefits the evaluation of improvements to Egan Drive because a major intersection is needed where the connection to the Second Crossing intersects either Egan Drive or the Glacier Highway.*
- *Current transportation facilities are inadequate to support increased development of north and west Douglas Island.*

The Comprehensive Plan is explicit in linking the Juneau Second Channel Crossing with planned development of West Douglas Island. The Comprehensive Plan states that four of the most likely sites for new growth in the Juneau community are Echo Cove on the mainland, and west, south, and north Douglas Island. In the Comprehensive Plan, the West Douglas area is designated as the key “New Growth Area.” Policy 2.7 states, “It is the policy of the CBJ to encourage and facilitate the development of New Growth Areas.” The Comprehensive Plan defines a New Growth Area as:

- *Sites in rural areas potentially suitable for urban/suburban residential development –*

characterized by urban densities and a full complement of services and facilities, including water and sewer, recreational, educational and neighborhood commercial services. Non-residential uses such as port facilities or resource-related industrial development, may also be important.

The Comprehensive Plan describes compact development of New Growth Areas as the preferred future community form:

- *Compact growth in urban areas is preferable because there the use of land is more efficient, urban services are more economically provided and maintained; adverse environmental impacts are minimized; and the majority of residents who prefer a high level of services are better served... Development of new growth areas as satellite communities [is] the most desirable way to accommodate growth outside the urban area.*

The Comprehensive Plan also points toward the need for additional property for commercial and industrial development potential:

- *It is advisable to have more than a 15-year supply of vacant land in some categories, especially commercial and industrial, to facilitate long-range planning for needed public services and facilities.*
- *A shortage of marine industrial port facilities limits the number and type of services that can be located in Juneau.*
- *The major port facilities for commercial and industrial goods and materials are located on the southern part of the downtown waterfront. Because of geography and development pattern of that area, room for expansion is limited. In addition, traveling up the Gastineau Channel is a significant detour for most barge traffic. Truck traffic to and from the port adds to the noise and congestion in the downtown area.*

Going beyond these general goal statements, the Comprehensive Plan specifically calls for the JSCC project to connect North Douglas Island to the Mendenhall Valley, where most of Juneau's population resides. Under the discussion of transportation goals by sub-area, "Implementing Action" 4.4.23 for Douglas Island states:

- *Renew municipal support for construction of a second channel crossing to encourage use of north and west Douglas Island...Evaluate the economic, environmental, and engineering feasibility of a channel crossing to the Mendenhall Valley.*

The Comprehensive Plan indicates that the North Douglas Highway functions both as a through-road and neighborhood access road, with hundreds of connecting residential driveways, which "limits the use of the road as an arterial to serve potential new development further north and west." To resolve this problem, the plan recommends examining a parallel bench road or the Juneau Second Channel Crossing, or both:

- *The bench road is viewed as technically feasible although the route is crossed by several creeks, small valleys, and wetland areas. It may be possible to route increased traffic associated with new development across a second crossing, thereby eliminating the necessity of a bench road, or both options may be required.*

The Comprehensive Plan also recognizes that “there has been a dramatic increase in commercial tourist use of the North Douglas area in recent years,” and it suggests limits on commercial use in some areas while identifying and encouraging expansion of two New Growth Areas on Douglas Island:

- North Douglas Island
Fritz Cove adjacent to the North Douglas boat launch facility may be a suitable location for a small boat harbor, barge docks, and other water-dependent industrial facilities. Careful attention needs to be paid to environmental, demographic, economic, social, and engineering factors of such development.
- West Douglas Island
Encourage and facilitate the development of a New Growth Area in West Douglas (beyond the end of the existing road)... Minimize adverse impacts on wildlife habitat... Coordinate the state, federal, CBJ, and Goldbelt involvement in development of (the) new growth area.

The Comprehensive Plan addresses future land use in Chapters 5 (“Land Use”) and 6. Chapter 6 presents the Comprehensive Plan Maps, along with planning direction for each subarea. Subareas 3, 4, 5, and 9 overlap with the Juneau Second Channel Crossing study area. The paragraphs below indicate specific items from the subarea text that could affect the current project.

Subarea 3: Auke Bay, Mendenhall Peninsula, West Mendenhall Valley

Item 21 for this subarea directs CBJ to “reserve view corridors through height restrictions and building space requirements.” Nothing else in this section appears to affect the JSCC project.

Subarea 4: East Mendenhall Valley and Airport

Item 4 for this subarea provides direction to “limit airport expansion to (the) area designated in (the) Airport Master Plan and amendments....” Nothing else in this section appears to affect the JSCC project.

Subarea 5: Switzer, Lemon, and Salmon Creeks

Nothing listed for the subarea appears to affect the JSCC project.

Subarea 9: North and West Douglas Island

Item 6 for this subarea gives direction to “restrict any development” adjacent to Fish Creek Park that would impact the valuable estuarine habitat and recreational use of the area. Item 8 indicates that:

Fritz Cove adjacent to the North Douglas boat launch facility may be a suitable location for a small boat harbor, barge docks, and other water dependent industrial facilities.

Item 12 recognizes “the growth potential of both North and West Douglas” and the corollary “limitations of the North Douglas Highway” as an access route to any new development. The maps designate a New Growth Area on the western side of Douglas Island. Item 12 proposes an evaluation of a proposed “Bench Road” parallel to North Douglas Highway or a second Gastineau Channel crossing (or both). It indicates that the area for the second channel crossing is “in the vicinity of the airport.” It foresees the channel crossing and Bench Road projects as possible solutions to transportation problems created by development in North and West Douglas.

Three of the subarea maps show locations of potential Second Channel Crossings based on the 1984 *Feasibility Study*. Map 3 shows a crossing route at the southern tip of the Mendenhall Peninsula; Map 4 shows a crossing just east of the JIA runway connecting with Egan Drive to the east of Yandukin Drive (8-Mile Egan); and Map 9B shows two potential crossing routes on Douglas Island—one located between the Bayview subdivision and the mouth of Fish Creek (connection from Map 3) and one located at the intersection of North Douglas Highway and the Eaglecrest access road (connection from Map 4).

Item 14, in conjunction with Item 12, indicates the CBJ’s intent to explore development of the New Growth Area at West Douglas:

The... west side of Douglas Island has... development potential, both for rural residential use and for port development...Encourage and facilitate the development of the New Growth Area in West Douglas... Minimize adverse effects to wildlife habitat...Coordinate the state, federal, CBJ, and Goldbelt (Inc.) involvement in development of the new growth area.

City and Borough of Juneau Land Management Plan

The 1999 *CBJ Land Management Plan* is principally a plan for use and disposal of land owned by the CBJ. The Land Management Plan indicates that CBJ owns approximately 23,000 acres and identifies 11 large tracts of land comprised of 9,051 acres for long-term disposal, as shown in Table 5-1.

Table 5-1: Proposed CBJ Parcels for Long Term Disposal

Location	Acres	Percent
Above the community of Douglas	164	2
At Lena Loop and Auke Rec By-Pass	336	4
On the tip of Mendenhall Peninsula	260	3
On Pederson Hill near Auke Lake	353	4
On Mendenhall Peninsula	407	4
On North Douglas between Grant Creek and Falls Creek	655	7
On North Douglas between Bonnie Brae and Fish Creek	2,171	24
Near the Auke Bay Ferry Terminal	310	3
Lemon Creek Gravel Pit	41	1
Lemon Creek west of Switzer Creek	920	10
On West Douglas	3,434	38
Total	9,051	100

Source: City and Borough of Juneau Land Management Plan (1999)

Approximately 70 percent of the CBJ land identified for long term disposal is on Douglas Island. Most of these lands are eventually slated for disposal, according the Land Management Plan.

Lack of access due to wetlands and steep terrain is a major hindrance in the development of many parcels, particularly on the mainland, due to the substantial investment required. Access roads to the majority of the sites are also necessary to enable and promote the development of the utility infrastructure. Most of these parcels will move to the list of properties for “immediate” disposal only when sewer systems are in place. Site development costs are an increasingly significant portion of housing construction costs in Juneau.

City and Borough of Juneau Area Wide Transportation Plan

The CBJ 2001 Area Wide Transportation Plan (AWTP) was drafted in order to “prepare surface transportation in Juneau for the new millennium.” It identified the biggest shortcomings of the existing

transportation system as bicycles, pedestrians, and transit. The AWTP shows that interconnecting all modes of travel was the next step in “building upon existing strengths and identifying changes and additions to the existing network that will better serve this community.” The following principles are what guided the work on the AWTP:

- Public safety is of paramount concern.
- Previous land use planning provided the starting point.
- Our community can offer an excellent quality of life to its residents.
- Surface transportation relies on interconnected modes of travel.
- The community’s transportation system must provide people with more transportation choices.
- Efficiency in the system should be improved.
- Transportation needs and environmental conversion should be balanced.
- Vehicles require facilities that work effectively.
- Bicycles provide a low-cost alternative to automobiles.
- Travel by foot is safe and convenient.
- Public transit has a significant role in moving people.
- Preparing for future use of all modes requires careful consideration now.
- Improving the transportation system can be costly.

The adopted AWTP presents the Second Channel Crossing as a near-term priority project to address area-wide transportation deficiencies. The plan states that, “for all modes of travel, connections within sub-areas and between sub-areas are currently deficient. The Second Channel Crossing is one of the top near-term priorities to address this deficiency” and recommends:

- *Complete an Environmental Impact Statement for a second Gastineau Channel crossing for motor vehicles, bicycles, and pedestrians.*
- *Pending completion of the EIS, construct second channel crossing from North Douglas Island. The crossing would provide improved connectivity for all modes of travel and secondary emergency access.*

A Second Channel Crossing would also implement the 1997 CBJ Non-Motorized Transportation Plan by providing improved connectivity for bicyclists and pedestrians and enhancing access to North Douglas’ recreational attractions. Currently, there is no practical connection between North Douglas Island and the Mendenhall Valley area for bicycles and pedestrians, because the existing bridge is too far out of the way for all but the most dedicated cyclists.

The Transportation Steering Committee, formed to guide the transportation plan, had five “Significant Committee Recommendations” that it addressed in greater detail in the AWTP. These recommendations were adopted as part of the AWTP by the CBJ Assembly. Two of these recommendations expand on the need for the Second Channel Crossing project:

- *A second crossing of Gastineau Channel would directly link the North Douglas Highway to the rest of the CBJ road network. The proposed crossing would improve access between the Mendenhall Valley and Douglas Island for various trip purposes, including recreation, shopping, commuting, goods movement and travel to the airport and ferry terminal. It would also provide a second route for emergency vehicles crossing Gastineau Channel...*

- *The connectivity benefits of a Second Crossing are significant. The congestion relief benefits to the existing bridge would not be as significant but could still be important. The Second Crossing would not eliminate the need for future improvements at these intersections.*

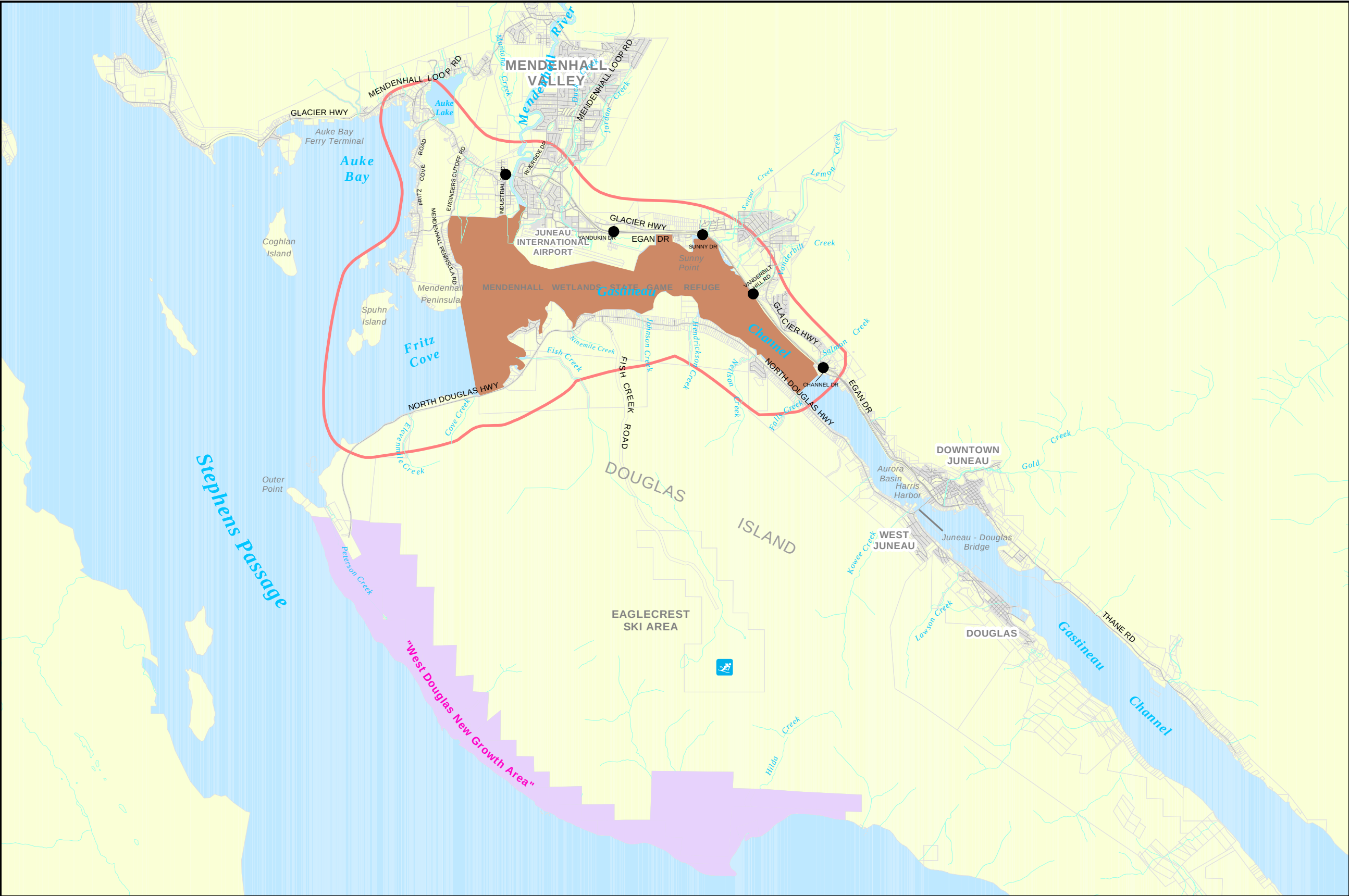
West Douglas Conceptual Plan

In 1997, CBJ joined with Goldbelt, Inc., the local Native corporation, in creating the *West Douglas Conceptual Plan*. The plan was a mutual planning effort for CBJ and Goldbelt lands, but was never officially adopted by the City and Borough of Juneau Assembly. The West Douglas New Growth Area, as shown in Figure 5.3, is located on the northwest side of Douglas Island beyond the present end of North Douglas Highway. It extends as a belt approximately 1 mile wide and 8.5 miles long along the west shore of the island. Most of the area is on a bench bounded on the west by Stephens Passage and on the east by the high mountain ridges of Douglas Island.

Goldbelt, Inc.'s property covers 1,740 acres along the shoreline, from Outer Point to approximately one mile south of Point Hilda averaging 1/4 and 1/2 mile in width. CBJ land covers 3,434 acres immediately inland of the Goldbelt property and is also relatively narrow (average 1/2 mile). Immediately upland is undeveloped US Forest Service land.

The *West Douglas Conceptual Plan* identified four nodes of 350 to 390 total acres of relatively dense development planned over approximately 8.5 miles of coastline and new road (extension of the North Douglas Highway). In compliance with the CBJ Comprehensive Plan, natural reserve areas would separate the four nodes. Figure 5.4 depicts the general plan layout. The development nodes include:

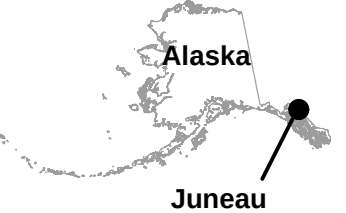
- **Development Area 1 (Peterson Creek):**
This development area is located approximately two miles beyond Outer Point and covers about 120 acres, including one-half mile of beach frontage. A hotel or cultural center tourist attraction and/or office/commercial would “anchor” the area, with minimal marine use. It is recommended that Development Area 1-A include significant housing (up to 700 units) and a supporting commercial core. Recommended acreage according to usage is: open park and public space (15 acres), commercial (15 acres), mixed use (15 acres), high-density housing (15 acres), medium-density housing (30 acres) and special uses (such as a lodge or office complex; 30 acres). This area would support a population of approximately 2,500. Development Area 1-B is located on the upland side of the proposed road, just north of Development Area 1-A. It includes the proposed 200-acre Totem Creek Golf Course, which CBJ granted a conditional permit for development in April 2003, and adjacent, dispersed housing. Residents are expected to utilize the commercial support of Area 1-A.
- **Development Area 2 (Inner Point):**
Area 2 is located at Inner Point (about two miles along the shoreline further southeast of Area 1-A) and covers approximately 50 to 70 acres. Marine and commercial/industrial uses, including a deepwater dock of up to 1,000 feet, are planned for this area to support mining, fisheries, and fuel storage/transshipment. Use is also possible by government research vessels. The potential for marine activity is positive due to deep water depth and storm protection. Most development in this area is expected to be of either waterfront industrial or waterfront commercial nature. Possible developments include a dock, barge landing, boat launch, breakwater, ice plant, fish processing facility, fueling service, and fuel storage facility.
- **Development Area 3:**
Area 3 is located less than a mile beyond Inner Point and covers approximately 80 acres. The





LEGEND

- West Douglas New Growth Area
- Study Area
- Mendenhall Wetlands State Game Refuge
- Logical Termini on Egan Drive



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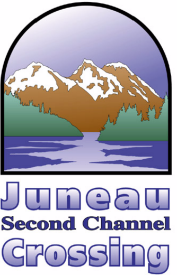


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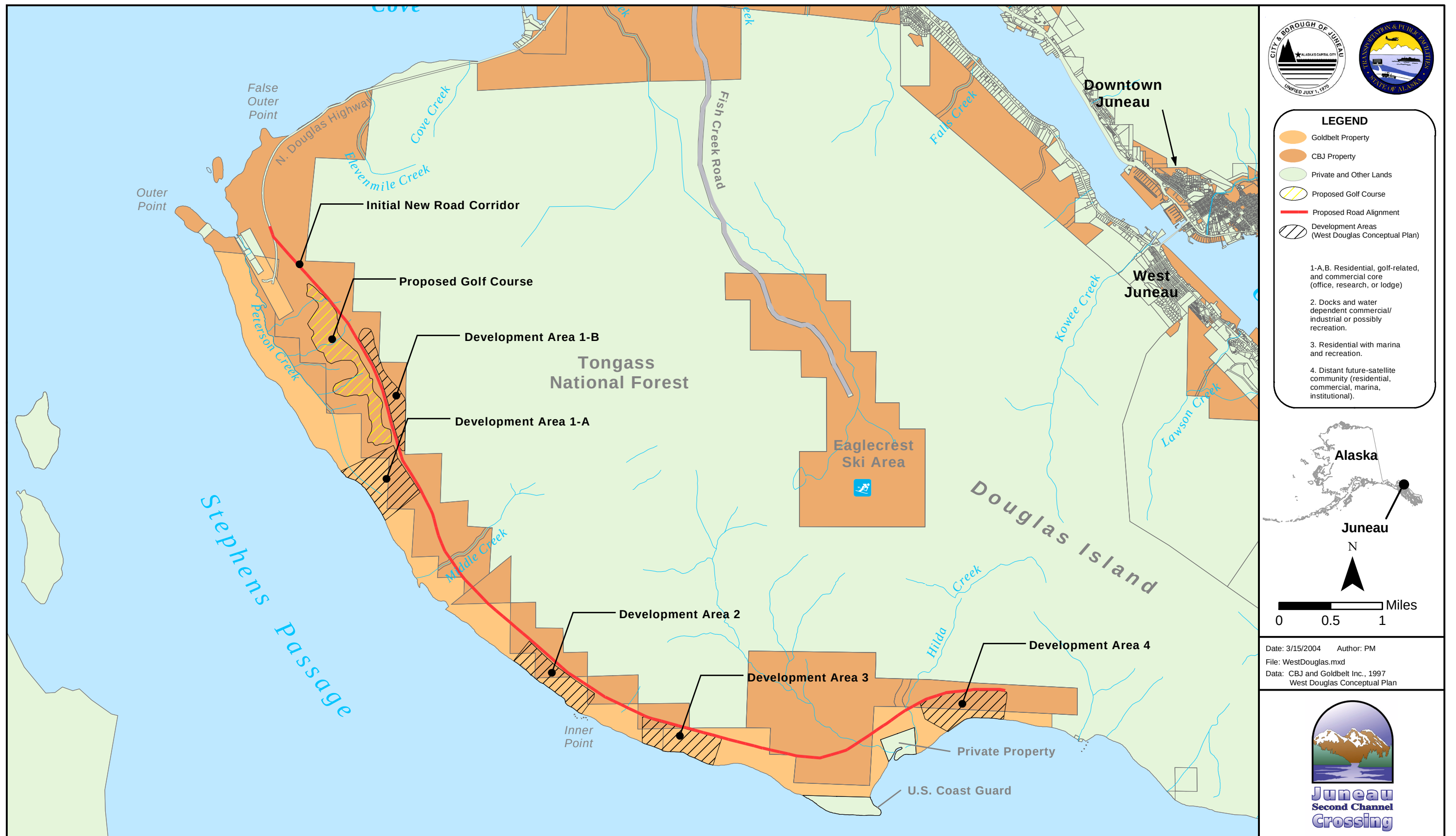
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Juneau
Second Channel
Crossing

Juneau Second Channel Crossing

Figure 5.3
West Douglas New Growth Area



Juneau Second Channel Crossing

Figure 5.4
West Douglas New Growth Area
Conceptual Plan

area would be developed primarily for residential purposes (600 units) with some recreational zones, which may include public camping, beach access, RV accommodations, and a public marina. Acreage and usage is assumed to match the following: open and public areas (10 acres), mixed use (commercial, housing; 15 acres), high-density housing (15 acres), medium-density housing (20 acres), low-density housing (20 acres), and special uses (RV, camping; 20 acres). A target population of 2,000 is assumed for this area.

- **Development Area 4:**

Area 4 covers approximately 100 acres located nearly 10 miles southeast of Outer Point (along the shoreline). This area is not expected to be developed for a number of years due to extensive road and utility development costs, and the need to cross environmentally sensitive lands at Hilda Creek. Because it will be separated from other commercial centers, it will likely support commercial and industrial activity in addition to a major housing component (750 units). Acreage and usage is expected to include: open and public areas (15 acres), mixed use (commercial, housing; 15 acres), high-density housing (15 acres), medium-density housing (25 acres), low-density housing (20 acres), and special uses (marina uses; 10 acres). Area 4 would support a population of approximately 3,000.

Mendenhall Wetlands State Game Refuge Management Plan

The *Mendenhall Wetlands State Game Refuge (MWSGR) Management Plan* was prepared by the ADF&G and ADNR in 1990, as stipulated in AS 16.20.034, and states that the two primary goals of the MWSGR are:

- “Fish and Wildlife Populations and Their Habitat: Manage the refuge to maintain and enhance fish and wildlife populations and their habitat. Minimize the degradation and loss of habitat values due to habitat fragmentation. Recognize cumulative impacts when considering effects of small incremental developments and actions affecting resources.
- “Public Use: Manage the refuge to maintain and enhance public use of fish, wildlife, and refuge lands.”

The MWSGR is shown in Figure 5.1. Primary human activities available on the refuge include waterfowl hunting, hiking, wildlife viewing and photography, boating, fishing, scientific and educational studies, and sightseeing.

The founding statute includes the following clauses:

The management plan adopted under (g) of this section must include provisions under which the City and Borough of Juneau may acquire land, by sale, exchange, or otherwise, for purposes of expanding the Juneau Municipal Airport, establishing additional transportation corridors, including water corridors, and establishing publicly owned and operated docking facilities.

In keeping with statutory language, the refuge management plan includes a provision specific to transportation corridors. It defines “transportation corridor” as “a designated passageway on land and/or water over which people and goods are conveyed.” The policy states:

The City and Borough of Juneau may acquire land for a public transportation corridor, including a water corridor, only after the following have been demonstrated: 1) that there is a significant public need for the corridor which cannot be met off-refuge; 2) that the use

of the refuge lands are avoided and minimized to the maximum extent feasible; 3) that public access to the refuge is maintained; and 4) that all unavoidable impacts to the refuge and to refuge resources are fully mitigated through restoration, replacement, and/or other compensation.

5.2 Farmlands

There are no prime and unique farmland in the State of Alaska and no farmland of state or local importance within the study area.

5.3 Social Environment

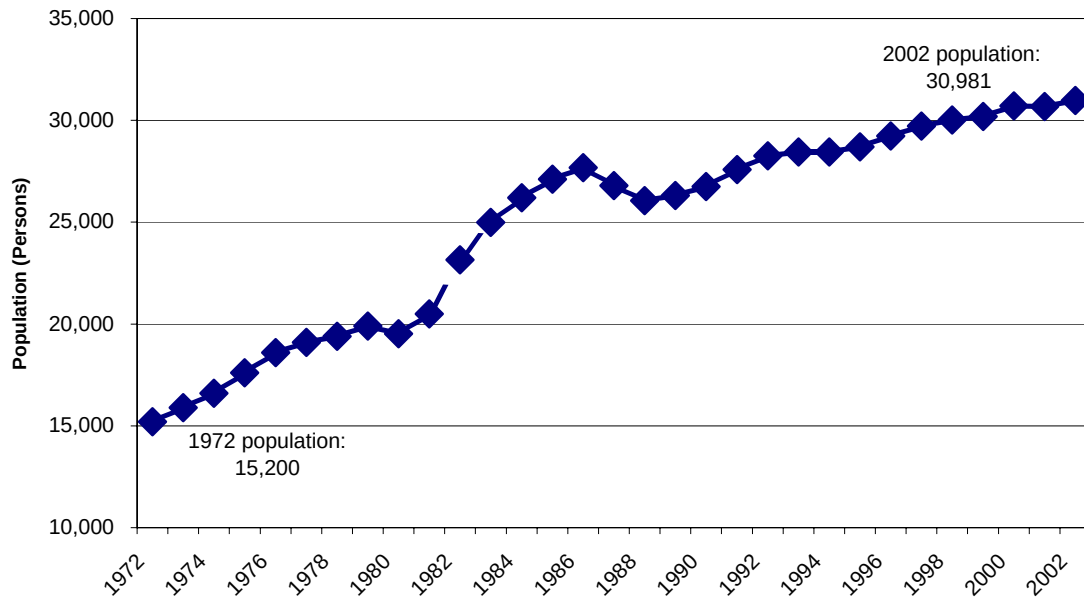
5.3.1 Population and Social Groups

Juneau and Douglas began as mining communities and were physically separated until 1935, when the first bridge was constructed across the Gastineau Channel. The communities and surrounding borough merged to form the City and Borough of Juneau in 1970, and, until 1986, the economy boomed with a large influx of residents and increases in government to keep pace, both statewide and in CBJ. This period included rapid construction of housing, and much of the development took place in the Mendenhall Valley, with residential development increasing along North Douglas Highway. The original Douglas Bridge was replaced with a wider bridge in 1981.

Area-Wide Population Trends

Over the 30 years from 1972 to 2002, Juneau's population has more than doubled, climbing from 15,200 residents to 30,981 residents (see Figure 5.5). The 30-year growth rate of 2.4 percent masks variability in year-to-year population change in Juneau (see Table 5-2). Annual population change has ranged from a high of +13 percent between 1981 and 1982, to a low of -3.2 percent between 1986 and 1987. In terms of number of residents, the most growth in a single year occurred in 1982 when Juneau's population increased by nearly 2,700 residents. The largest single year decline occurred in 1987—when Juneau's population declined by nearly 900 residents. From a long-term perspective, Juneau's rate of population growth has been slowing. Annual population growth rates averaged over the past 20 years equals 1.4 percent per year, and over the past 10 years, 0.9 percent per year. Over the past five years, the average of annual growth rates for Juneau is 0.8 percent per year (McDowell Group 2003).

Figure 5.5: City and Borough of Juneau Population, 1972-2002



Source: DOLWD 2003 and U.S. Census Bureau 2003

Table 5-2: City and Borough of Juneau Population, 1972 to 2002

Year	Population	Annual Change	Percentage Change
1972	15,200	NA	NA
1973	15,900	700	4.6%
1974	16,600	700	4.4%
1975	17,600	1,000	6.0%
1976	18,600	1,000	5.7%
1977	19,100	500	2.7%
1978	19,400	300	1.6%
1979	19,900	500	2.6%
1980	19,528	-372	-1.9%
1981	20,494	966	4.9%
1982	23,155	2,661	13.0%
1983	24,985	1,830	7.9%
1984	26,206	1,221	4.9%
1985	27,117	911	3.5%
1986	27,685	568	2.1%
1987	26,800	-885	-3.2%
1988	26,064	-736	-2.7%

Table 5-2 (continued)
City and Borough of Juneau Population, 1972 to 2002

Year	Population	Annual Change	Percentage Change
1989	26,305	241	0.9%
1990	26,751	446	1.7%
1991	27,579	828	3.1%
1992	28,253	674	2.4%
1993	28,448	195	0.7%
1994	28,454	6	0.0%
1995	28,700	246	0.9%
1996	29,230	530	1.8%
1997	29,713	483	1.7%
1998	30,021	308	1.0%
1999	30,189	168	0.6%
2000	30,711	522	1.7%
2001	30,675	-36	-0.1%
2002	30,981	306	1.0%

Source: DOLWD 2003; U.S. Census Bureau (1980, 1990, and 2000) 2003; and McDowell Group 2003.

Other noteworthy trends include a decline in average household size. In 1980, the average household size in Juneau was 2.74 persons. In 1990, the average was 2.66 and in 2000, the average declined further to 2.60 persons per household. Between 1990 and 2000, the average age of Juneau residents increased from 31.7 years to 35.3 years. Birth rates declined from about 20 births per thousand residents in the 1980s to about 13 births per thousand in 1999.

5.3.2 Study Area Demographics

Environmental Justice: Household Income and Race Demographics

Ensuring environmental justice requires examination of household incomes and race data. Executive Order 12898⁴ states:

Each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Executive Order 12898 also defines a “disproportionately high and adverse effect on minority and low-income populations” as follows:

An adverse effect that is predominantly borne by a minority population and/or a low-income population; or will be suffered by the minority population and/or low-income population, and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

⁴ *Federal Register*, February 11, 1994.

The Federal Highway Administration (FHWA) order “FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”⁵ contains the following definitions:

- **Low-Income:** A household income at or below the poverty guidelines of the U.S. Department of Health and Human Services
- **Minorities:**
 - Black (having origins in any of the black racial groups of Africa)
 - Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race)
 - Asian-American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands)
 - American Indian or Alaskan Native (having origins in any of the original people of North America and who maintain cultural identification through tribal affiliation or community recognition)

The project is currently too early in the project development phase to fully consider environmental justice issues, however, such potential impacts will be fully evaluated prior to the development of alignment alternatives.

5.3.3 Neighborhoods and Community Cohesion

According to CBJ planning documents, residents largely share a vision of Juneau as a desirable place to live, with the natural setting and surrounding wilderness, recreational opportunities, small population, and friendly people as contributing elements. The CBJ Comprehensive Plan states it is the policy of CBJ to “build a sustainable...community...,” defined as “meeting our needs without comprising the ability of future generations to meet their needs” (CBJ 1996). A “Transportation Vision” document prepared for CBJ (Walkable Communities, Inc. May 2000) in many ways is a community vision document, with many values not directly related to transportation—including friendly atmosphere, family values, safety (generally, and for pedestrians), natural setting, and prosperity. The document suggests that Juneau has many good points on which to build and fears becoming “another Anchorage,” but also suggests that its urbanization is moving away from the small-town feel focused on the sea and mountains that people particularly value.

Juneau has dense housing and some mixed residential-commercial use downtown. In the project area, neighborhoods may be roughly identified as follows:

- **North Douglas.** This area is identified principally by its geography and connection to North Douglas Highway. Residential development is strung along the highway from Falls Creek (across from Salmon Creek) to Fish Creek Park, a distance of slightly more than 4 miles. There are two residential subdivisions along this stretch of the highway: the inland Bonnie Brae subdivision and the coastal Bayview subdivision (off Sundown Road).. Virtually all homes are single family residences, some that back onto the MWSGR and Gastineau Channel, and some tucked into the forests. Some 700 residents in this area are represented by the North Douglas Neighborhood Association.
- **Lemon Creek.** The valley at the mouth of Lemon and Switzer Creeks is a development node for residential, commercial, industrial, and institutional uses. Residences in this area are loosely

⁵ FHWA, Order on FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, December 2, 1980.

associated by their location. This area extends to the southeast along the lower hill slopes above Twin Lakes Park to Salmon Creek. Most of this area is represented by the Lemon Creek Neighborhood Association, representing more than 3,700 residents.

- **Sunny Point.** Sunny Point is a very small isolated residential area on a peninsula that juts south from Egan Drive into the MWSGR. This area, with some 75 residents, is represented by the Sunny Point Neighborhood Association.
- **Airport Area.** A residential area east of Mendenhall River and between Glacier Highway and the airport forms a neighborhood loosely collected around commercial properties and the airport development. There is no organized neighborhood association in this area.
- **Mendenhall Loop East.** The east side of the Mendenhall River contains a substantial residential area. The southern portion of this development, growing out of the intersection of Mendenhall Loop Road and Glacier Highway, is within the project area. It borders on commercial/industrial and park properties and is similar in character to the airport area neighborhood discussed above but somewhat separated from it by Glacier Highway. The Riverbend Neighborhood Association represents the Riverbend subdivision in this area.
- **Mendenhall Peninsula.** The Mendenhall Peninsula is fringed with residential properties; however, steep topography has limited development of the peninsula's interior. The west side, facing Auke Bay and Fritz Cove, has water views, and many homes back up to the beach. Many homes above Fritz Cove Road have views over the lower neighbors to the ocean. Homes on the east side of the peninsula overlook wetlands of the MWSGR. There are fewer homes on the east side of the peninsula, and development is less dense. The peninsula area is not represented by a neighborhood association.

None of these neighborhood areas are principally characterized by ethnic or economic classes. Neighborhood cohesion is derived from the identity associated with geographic location and adjacent non-residential land uses.

5.3.4 Travel Patterns and Accessibility

Travel patterns and accessibility within the CBJ are determined by the road system and several nodes of development connected by the road system. The following eight areas provide a general breakdown of CBJ's road system and developed areas:

- **Mendenhall West.** Mendenhall Valley west of the Mendenhall River, Auke Bay, and all development to the west on Glacier Highway.
- **Mendenhall East.** Mendenhall Valley from the Mendenhall River to Yandukin Drive.
- **Lemon Creek.** Yandukin Drive to Vanderbilt Hill Road.
- **Salmon Creek.** Vanderbilt Hill Road to the 10th/Egan Drive intersection.
- **Downtown/Thane.** 10th/Egan Drive intersection to the end of Thane Road, including most of downtown Juneau.
- **Douglas.** Douglas Highway from the Douglas Bridge south and east to the end of the road at Douglas.
- **North Douglas.** North Douglas Highway from the west end of the Douglas Bridge to Fish Creek Road.

- **North and West Douglas.** North Douglas Highway from Fish Creek Road to end of the road.

While there are origins and destinations within each of these areas, this project is most concerned with the travel patterns that reflect origins and destinations between these areas on the main thoroughfares—Egan Drive and North Douglas Highway. Table 5-3 presents 2002 traffic volumes at key points along these highways.

Table 5-3: Average Daily Traffic Volumes (vehicles per day) in Juneau, 2004*

Egan Drive		Bridge	
Near Mendenhall River	12,000	Douglas Bridge	14,000
Between Yandukin Dr. and Sunny Point	27,000	Douglas Highway	
Lemon Creek, near Twin Lakes Park	25,000	Just west of Fish Creek Road	1,000
Between Salmon Cr. and downtown	25,000	Near Douglas Bridge to the NW	4,500
Downtown, SE of the Douglas Bridge	19,000	Near Douglas Bridge to the SE	11,500

*Traffic volumes rounded to the nearest 500 vehicles

The highest traffic volumes are on Egan Drive, a divided highway between downtown Juneau (a primary employment center) and the Mendenhall Valley (a primary residential center with commercial, airport, and university uses). Along Egan Drive in the Lemon Creek area are the hospital and police station, along with residential and some commercial properties. The Salmon Creek area also has both residences and commercial uses. As indicated in the table, the highest traffic volumes are between the East Mendenhall area and Lemon Creek. All volumes along this stretch of Egan Drive are well above volumes on the Douglas Bridge and on Douglas Highway, where the numbers of residents and employers are smaller.

A substantial volume of traffic crosses the Douglas Bridge, with most of the traffic going to and from the Douglas community, where there are both employers and residential areas. A smaller amount of traffic uses the North Douglas Highway, where there are several hundred residences and substantial recreation amenities, including Eaglecrest Ski Area (at Fish Creek Road), the North Douglas Boat Ramp, Fish Creek Park, and Outer Point parklands.

All existing traffic across the Douglas Bridge must pass through the Egan Drive and 10th Street intersection, one of the busiest intersections in Southeast Alaska, serving approximately 28,000 vehicles per day. The intersection experiences both AM and PM peak hour congestion.

The traffic patterns in CBJ are relatively direct lines between points along Egan Drive or points along Douglas Highway. However, the traffic patterns are relatively indirect for origins and destinations between Mendenhall Valley and North Douglas. Mendenhall Valley or Lemon Creek residents going to Eaglecrest Ski Area, or North Douglas residents going to the airport, for example, must travel in a direction away from their destination to cross the Douglas Bridge.

5.3.5 Community Services

This section addresses the main community services in the CBJ, including:

- Schools
- Medical Facilities
- Law Enforcement
- Fire and Emergency Medical Services (EMS)

Transit is addressed in Section 5.8, *Pedestrians, Bicycles, and Alternative Transportation*. Locations of community facilities and transit routes are shown on Figure 5.6. Fire and EMS locations are shown on Figure 5.7.

Schools

The Juneau School District serves 5,700 students. There are six main elementary schools, two middle schools, and one main high school in Juneau. Elementary schools cover grades K-5, middle schools cover grades 6-8, and high schools cover grades 9-12. There are also a charter school for grades K-5, a Montessori program, and an alternative high school. Table 5-4 shows attendance areas for the main school facilities within the Juneau Second Channel Crossing study area.

Table 5-4: School Boundaries for the Juneau Second Channel Crossing Study Area

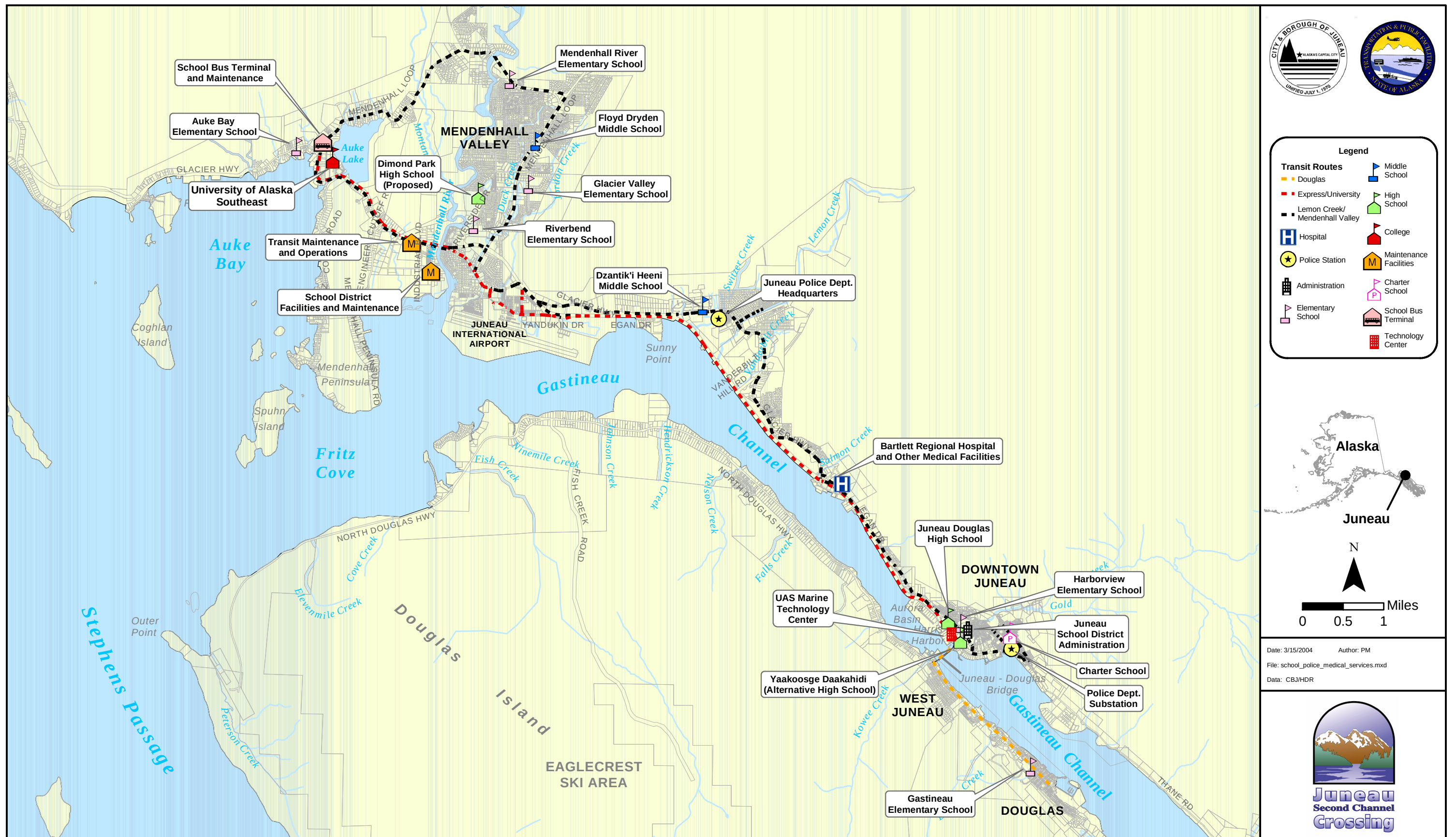
Neighborhood/Area	Elementary School	Middle School	High School
Auke Bay	Auke Bay School	Floyd Dryden Middle School	Juneau Douglas High School
Mendenhall Valley W. of Mendenhall R. & S. of Egan Dr.		Dzantik'i Heeni Middle School	
Mendenhall Valley E. of Mendenhall R. and E. of Mendenhall Loop. Rd	Glacier Valley School.	Floyd Dryden Middle School	
Mendenhall Valley E. of Mendenhall R. & W. of Mendenhall Loop. Rd.	Riverbend School		
Lemon Creek W. of Alaway Avenue		Dzantik'i Heeni Middle School	
Lemon Creek E. of Alaway Avenue	Harborview School		
Douglas Island	Gastineau School		

Sources: www.jsd.k12.ak.us, and www.juneauempire.com/stories/index.html "Assembly looks at more money for Valley school" 9/25/03

The school district is in the final stages of design for a second high school. It will be located at Dimond Park in Mendenhall Valley. It is currently anticipated to open in August 2008. This will involve establishing high school attendance boundaries for the first time. Under the current road system, presumably Douglas Island residents and downtown Juneau residents would attend Juneau Douglas High School and Mendenhall Valley and "out the road" residents would attend the new school.

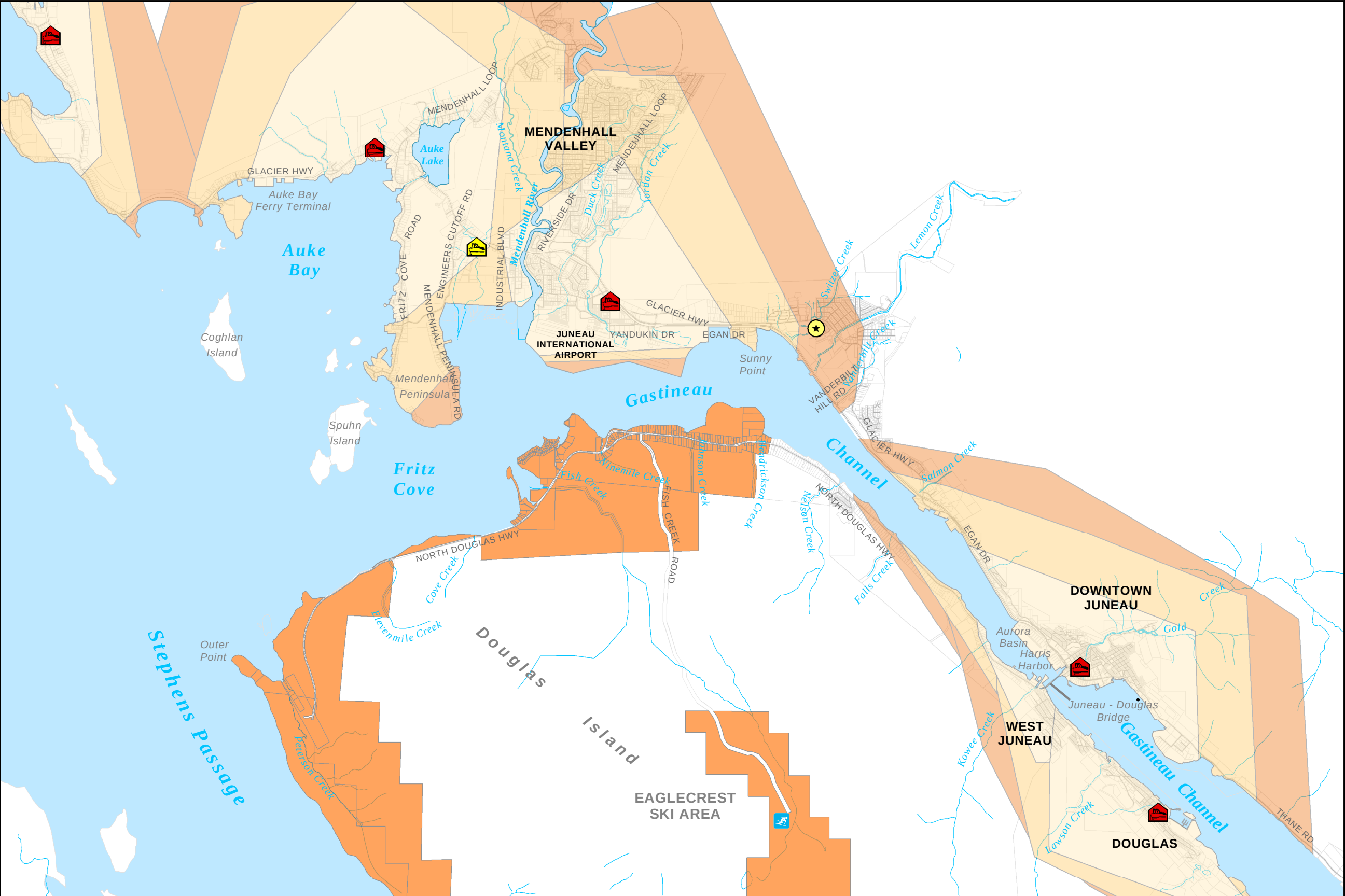
ABG Bus Lines provides school bus service under contract to the school district. ABG operates a fleet of 44 buses from its terminal and maintenance facility at the Auke Bay end of Mendenhall Loop Road. Most of the buses are full-size 65-passenger buses. They transport about 1,700 students in the morning and afternoon. Approximately 10 buses are in use all day for field trips and special education.

The University of Alaska Southeast (UAS) campus is located on the western side of Auke Lake. Approximately 700 full-time and 2,000 part-time students attend the university. It offers a variety of degree and certificate programs including masters and bachelor's degrees. A UAS Marine Technology Center is located near Aurora Basin and Harris Harbor.



Juneau Second Channel Crossing

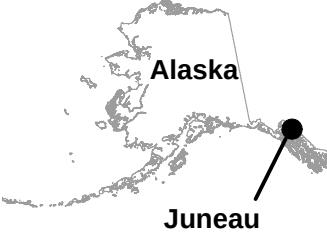
Figure 5.6
Community Services





Legend

-  Police Station
- Fire/EMS Services**
 -  Fire Station
 -  Fire Training Facility
- Modeled Fire Response Time**
 -  4 Minutes
 -  6 Minutes
 -  8 Minutes
-  Parcels considered by fire insurance rating organizations as unprotected. (More than 5 miles from fire station)



Alaska

Juneau

N



0 0.5 1 Miles

Date: 3/15/2004 Author: PM
File: firepoliceEMS.mxd
Data: CBJ/HDR
Emergency Services Education and Consulting Group, April 2002



Juneau
Second Channel
Crossing

Juneau Second Channel Crossing

Figure 5.7
Fire/EMS and Police Services

Medical Facilities

Bartlett Regional Hospital is the primary medical facility in Juneau. It serves not only Juneau (31,000 residents) but secondarily serves northern Southeast Alaska (approximately another 30,000 residents). The hospital sits on a 17-acre site near Salmon Creek and Twin Lakes, approximately halfway between the downtown and Mendenhall Valley population centers. Bartlett's campus includes a 56-bed hospital and several other buildings, plus Wildflower Court (a nursing home connected to the hospital but operated by a separate nonprofit organization) and the Southeast Alaska Regional Health Corporation (SEARHC) clinic funded by tribal organizations for the region's Alaska Native population. Bartlett Hospital includes more than 60 active doctors among some 430 total staff (374 FTE). The hospital is currently beginning a \$40 million renovation. Bartlett records about 9,000 patient days (inpatients) per year and 15,000 emergency room visits per year. It averages about 3,300 outpatients a month.

Law Enforcement

The Juneau Police Department service area covers all of CBJ (3,248 square miles and 31,000 residents). The department administers contracts for jail and animal control services. The department is authorized for 99 full and part-time positions, including 47 sworn officers. As a practical matter, officers typically work within the road system. Regular patrols generally do not extend west past the ferry dock in Auke Bay and are light at the western end of North Douglas Highway. There are four to five patrol officers on the streets around the clock, and there may be two or three additional police vehicles and parking officers on the streets during the day. More are brought on duty when necessary. Generally, police calls are for incidents on Egan Drive and other main roads; however, there are also frequent calls on North Douglas Highway, often at the boat launch. The police station is located on Alaway Avenue between Lemon Creek and Switzer Creek. There is one substation—a small office in City Hall in downtown Juneau—that is not continuously staffed.

The Alaska State Troopers have a Southeast Alaska base in Ketchikan but post two troopers in Juneau. This number has been higher in past years but has dropped, reducing the state law enforcement presence in Juneau. Typically, the troopers focus on smaller communities outside CBJ, but the CBJ police and troopers cooperate in some local law enforcement efforts (e.g. searches for missing persons). The CBJ police also receive assistance from the U.S. Coast Guard on rare occasions when marine transport is necessary.

Fire and EMS

Capital City Fire/Rescue (CCF/R) is made up of four separate fire protection districts with five stations: Douglas, Juneau, Glacier, Auke Bay, and Lynn Canal. The Auke Bay and Lynn Canal stations are in a single district. The four districts operate as a single fire department under a chief. There are professional and volunteer fire fighters in the system. CCFR also provides emergency medical services (EMS), which includes ambulance service throughout the road system and air medical evacuation (medevac) service to Bartlett Regional Hospital in Juneau from areas within about one hour's flying time. The medevac helicopter is operated from the Juneau International Airport but typically transports patients directly to Bartlett Regional Hospital. There are about 45 medevacs per year.

CBJ provides funding, equipment, and operational oversight to the four districts and the Hagevig Regional Fire Training Center.

Three of the fire stations are volunteer response stations that provide fire suppression and first response rescue. Two staffed stations, the Glacier and Juneau stations, provide emergency medical service and firefighting service to the bulk of the population. Each of these stations operates two ambulances and several pieces of fire apparatus. Airport rescue and firefighting service is operated from the Glacier station.

CCFR has 34 professional firefighters, of whom about one-third are on duty at two stations 24 hours per day. These firefighters are also emergency medical technicians (EMT). CCFR has approximately 120 volunteer firefighters on its roster. About 45 of these volunteers are trained emergency medical technicians (EMT I and EMT II levels).

The National Fire Protection Association sets the standards for fire operations nationwide by both volunteer and professional firefighting operations. Standard 1710, for professional operations, sets a four minute maximum response time as the standard. CCFR had an average response time of about 5 minutes in 2001 for both structure fires and EMS calls. Response to 90 percent of EMS calls was within about 10 minutes, and response to 90 percent of structure fire calls was within about 8 minutes. An April 2002 "Evaluation Review" for CCFR by Emergency Services Education and Consulting Group indicated that virtually all 2001 fire and EMS incidents fell within a modeled 8-minute response capability of the department (see Figure 5.7). The exceptions were about eight incidents in upper Lemon Creek, three incidents near Thane, and nine incidents along North Douglas Highway. While the Lemon Creek incidents were very close to the 8-minute response time, most of the North Douglas incidents were quite distant.

The Insurance Services Organization collects data about fire risk in communities nationwide and rates fire protection for use by insurance companies on a scale of 1-10, with 1 best and 10 meaning effectively "unprotected" from an insurance point of view. The rating is based on a standard examination of emergency communications (911, etc.), water supply and hydrants, and fire department equipment and training. Very few communities rate "1." CBJ was rated in June 2001 and has a split rating of 4/9. Properties within 5 miles of a fire station and within 1000 feet of a fire hydrant have the "4" rating. Those within 5 miles of a station but more than 1,000 feet from a hydrant have the "9" rating. Properties more than 5 miles from a fire station, regardless of access to a hydrant, are considered effectively unprotected and rate a "10." As shown in Figure 5.7, North Douglas properties west of Hendrickson Creek are considered unprotected.

5.3.6 Recreation

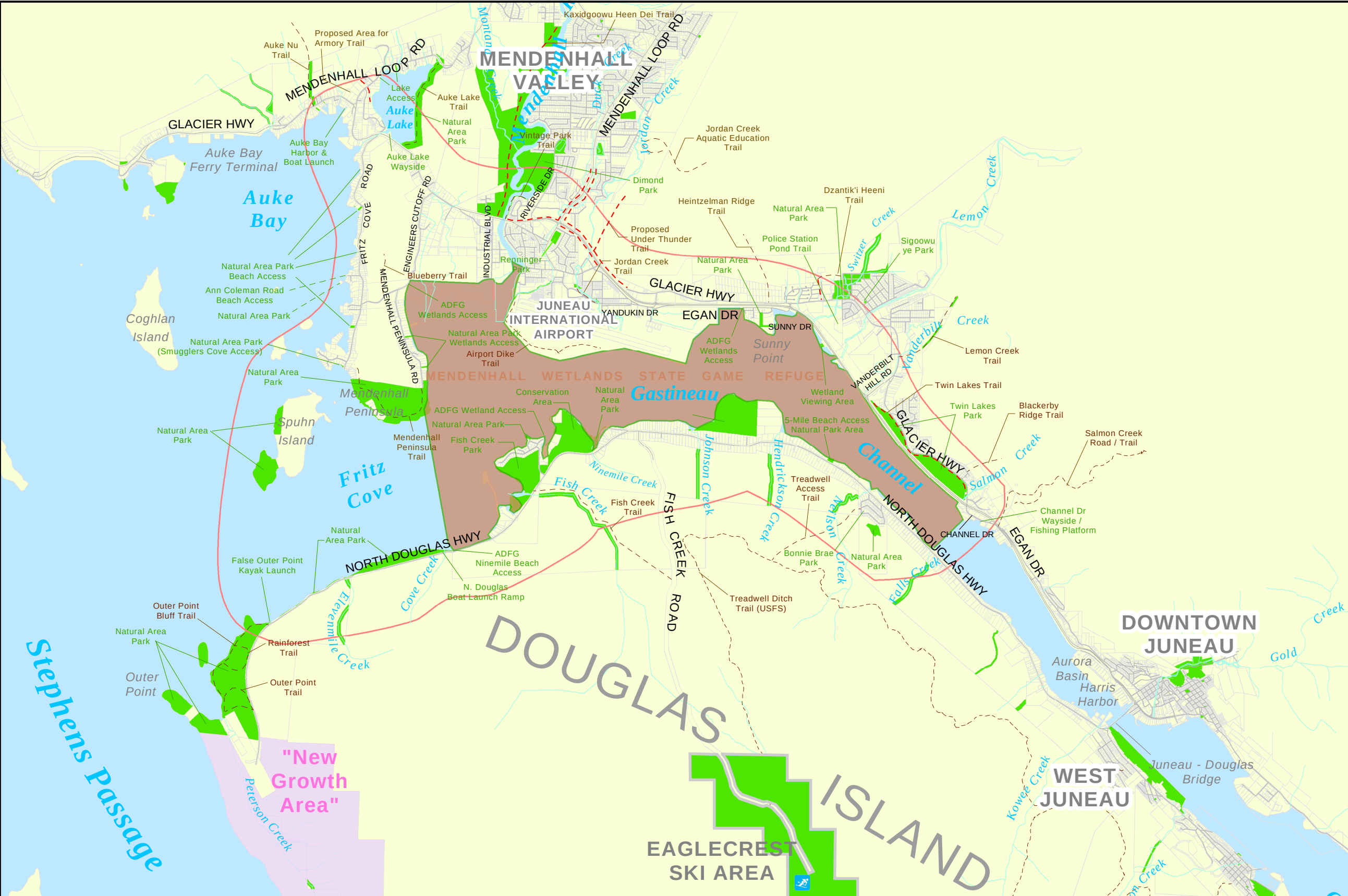
Recreation opportunities in CBJ take many forms. The main recreation pursuits within the study area are use of parks, use of trails, hunting and other uses within the MWSGR, and boating. A more detailed discussion of recreational lands are presented in the *Preliminary Section 4(f) Lands Inventory Technical Memorandum, December 2003* prepared separately for this project.

CBJ Parks

The Juneau Parks and Recreation Department is responsible for the planning, construction, and maintenance of all CBJ sports fields, tennis courts, basketball courts, playgrounds, paved pathways, parking lots, picnic areas, and parks. The Juneau park system includes three categories of parks. They are defined in the *Juneau Parks and Recreation Comprehensive Plan* (July 1996) as:

- *Recreation Service Parks.* For active recreation and programmed use.
- *Natural Area Parks.* Providing open space, access to water, and opportunities for passive and dispersed recreation activities.
- *Conservation Areas.* Set aside for the protection and management of the natural environment, with recreation as a secondary objective.

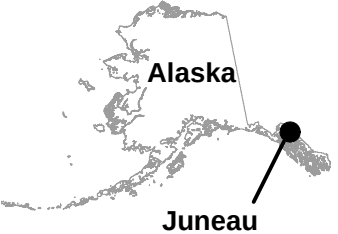
There are 7 recreation service parks, 15 natural area parks, and two conservation area parks in the study area, as shown in Table 5-5. These parks are shown on an area-wide map on Figure 5.8.






LEGEND

- Mendenhall Wetlands State Game Refuge
- Study Area
- Parks/Open Space/Greenbelt
- Trails
- Paved Separated Pathway
- Roads
- Streams
- Parcels



Alaska
Juneau



N

0 0.5 1 Miles

Date: 3/22/2004 Author: HDR Alaska, Inc (PM)
File: Recreational Lands.mxd
Data: CBJ/HDR



Juneau
Second Channel
Crossing

Juneau Second Channel Crossing

Figure 5.8
Recreation Lands

Table 5-5: CBJ Parklands in the Project Study Area

Park	Location	Acres	Activity/Facility
Recreation Service Parks			
Juneau Mainland			
<i>Auke Lake Wayside</i>	South end of Auke Lake	5	boat launch, restroom
<i>W. Mendenhall Greenbelt/ Brotherhood Park</i>	West side of Mendenhall River	348	paved Kaxdigoowu Heen Dei Trail; rafts and canoes
<i>Dimond Park</i>	1 mile N. of airport	58	ball fields and soccer; paved trail
<i>Renninger Park</i>	Between Egan Dr. & Glacier Hwy. E. of Duck Creek	3	skateboard park, restrooms
<i>Sigoowu Ye (Fun Place) Park</i>	Off Davis Street, Lemon Creek	0.33	picnic tables; play & exercise equipment
<i>Twin Lakes Park</i>	Between Old Glacier Hwy. & Egan Dr., Salmon Creek/ Vanderbilt Hill Rd.	6	paved trail; canoe; picnic, Planet Walk; play equipment
Douglas Island			
<i>Bonnie Brae Park</i>	North Douglas	0.15	playground
Natural Area Parks*			
Juneau Mainland			
<i>Auke Lake East Shoreline</i>	Eastern side of Auke Lake	57	lake buffer, trail
<i>Auke Nu/Spaulding Meadows Trail</i>	Trail corridor coincident with Forest Service right of way	NA	trail
<i>Mendenhall Peninsula Access Points</i>	Mendenhall Peninsula (8 beach access points)	~0.5 ea.	small trails
<i>Smugglers Cove Shoreline</i>	Mendenhall Peninsula, S. end	110	Mendenhall Peninsula Trail
<i>Smuggler's Cove Beach Access</i>	Mendenhall Penin., Fritz Cove Road Terminus	NA	small-boat/kayak launch; commercial use
<i>Spuhn Island</i>	two areas on island between Auke Bay & Fritz Cove	59	apparently natural
<i>Sunny Point</i>	Sunny Point (near Switzer Cr.)	NA	natural
<i>Switzer Creek</i>	Along Switzer Cr. near Lemon Cr.	NA	Dzantik'i Heeni Trail
Douglas Island			
<i>5-Mile Access</i>	North Douglas Highway	2	access to tidelands
<i>Bayview</i>	N. Douglas; tip of small peninsula, Bayview Subd.	NA	natural
<i>Bonnie Brae Subdivision</i>	North Douglas	NA	natural
<i>Fish Creek Park</i>	Fish Creek, North Douglas	72	trail to tidelands; fish & bird habitat; fishing (stocked); bird hunting (mostly in adjacent refuge)
<i>Johnson Creek Wetlands</i>	E. of Johnson Cr. on North Douglas	108	wetlands habitat
<i>Ninemile Creek</i>	North Douglas Island	16	tideland access (2 short trails)
<i>Outer Point</i>	Northwest Douglas Island	NA	3 developed trails; camping, picnicking, fishing; commercial use
Conservation Area Parks*			
Douglas Island			
<i>Creek corridors</i>	Falls, Neilson, Hendrickson, Johnson, Fish, & Elevenmile Creeks	varies	natural greenbelts 400 ft wide; Fish Cr corridor includes trail.
<i>North Douglas Island</i>	Northern tip of island, S. of airport	100	natural; wetlands & uplands

NA = not available.

* Natural Area Parks and Conservation Areas typically are not named. They are described by their geographic location.

Other Recreation Amenities

There are numerous public facilities outside of CBJ park lands that function completely or in part for recreation purposes within the study area, including trails, boat launch ramps, and the Eaglecrest Ski Area (see Table 5-6 and Figure 5.8). Most Juneau trail maintenance and several trail improvements have been provided by Trail Mix, Inc., a local non-profit, multi-agency trail group that manages trails for the CBJ, the State of Alaska, and the Tongass National Forest.

Table 5-6: Recreation Amenities in the Study Area

Recreation Trails Within the Study Area*			
<i>Trail</i>	<i>Location</i>	<i>Trail</i>	<i>Location</i>
Hiking Trail		Paved Path	
Juneau Mainland		Juneau Mainland	
<i>Airport Dike Trail.</i>	International airport, adjacent to state game refuge	<i>UA Southeast campus trails.</i>	paths through the U. of Alaska campus W. of Auke Lake
<i>Blackerby Ridge Trail</i>	Forest Service trail uphill of Twin Lakes.	<i>Armory Trail (proposed).</i>	600 ft of trail proposed NW of Auke Lake/university campus
<i>Blueberry Trail.</i>	Top of Mendenhall Peninsula N. of Engineers Cutoff Rd.; about 1 mi. long	<i>Vintage Park Trail.</i>	bicycle path E. of Mendenhall River, Glacier Hwy. N. to Riverside Elementary School.
<i>Heintzelman Ridge Trail.</i>	Forest Service Trail that begins uphill of Sunny Point.	<i>Kaxdigoowu Heen Dei Trail</i>	path near river, W. Mendenhall Greenbelt park. See "Parks."
<i>Jordan Creek Trail.</i>	N. of airport along and across Jordan Cr.	Separated Roadside Path	
<i>Lemon Creek Trail</i>	Forest Service trail SE of Lemon Cr.	Juneau Mainland	
<i>Salmon Creek Trail.</i>	Alaska Electric Light and Power dam access route at Salmon Cr.	<i>Egan Drive</i>	Jordan Creek to Mendenhall River area
<i>Treadwell Access Trail</i>	spur off the much longer Treadwell Ditch Trail on Douglas Island, to Bonnie Brae subdivision.	<i>Mendenhall Loop Road.</i>	both sides of Mendenhall Loop, E. side Mendenhall Valley.
<i>Under Thunder Trail.</i>	proposed trail east of Jordan Creek from Egan Drive northward.	<i>Dzantik'i Heeni Middle School.</i>	short separated path from Glacier Hwy. to the school
<i>Glacier Highway</i>	Twin Lakes Park bike path, W. of Salmon Cr. See "Parks."		
Other Recreation Facilities			
Juneau Mainland		Juneau Mainland	
<i>Ann Coleman Beach Access.</i>	A right-of-way off Ann Coleman Rd. on Mendenhall Peninsula provides access along a narrow isthmus to an island that is a park.	<i>Auke Bay Harbor Boat Ramp</i>	Serves recreational and working craft.
<i>Channel Drive Wayside/Dock</i>	Overlook of refuge. Fishing platform accessible by the disabled.	<i>On-Water Recreation Use</i>	Fritz Cove, Auke Bay, Gastineau Channel, Auke Lake, Twin Lakes, Mendenhall River.

Table 5-6 (continued)
Recreation Amenities in the Study Area

Recreation Trails Within the Study Area*			
Trail	Location	Trail	Location
Hiking Trail		Paved Path	
		Douglas Island	
Wetland Viewing Area	Large highway pullout/overlook/ interpretive site for refuge, off Egan Dr. between Switzer & Lemon Cr.	Eaglecrest Ski Area	Outside the primary study area, except for the access road. Lift service to 640 ac., plus Nordic skiing & hiking trails.
Police Station Pond	Alaway Drive. A small park-like area is part of the police station near Lemon Cr.	North Douglas Boat Ramp	On Fritz Cove. Used principally for recreation

* Trails may start within the study area but are located mostly outside the study area.

Mendenhall Wetlands State Game Refuge

According to the MWSGR Management Plan, the Mendenhall Wetlands are the “most popular area for public recreation in the Juneau area.” Waterfowl hunting, hiking, wildlife viewing and photography, boating, fishing, scientific and educational studies, and sightseeing are popular activities supporting approximately 20,000 user days annually (ADF&G 1990). Because the MWSGR does not have developed access of its own, much of the viewing and bird watching takes place from the refuge edges, for example from the Airport Dike Trail and developed Egan Drive overlooks noted above. Social trails from some of these points into the refuge indicate use of the refuge itself. ADF&G, the primary manager of the refuge, estimates 400 angler-days of fishing effort each year. Coho salmon is the most frequently taken fish, followed by cutthroat trout, sockeye salmon, and Dolly Varden. Waterfowl hunters spend over 2,000 hunter days/year and take over 3,000 ducks annually on the refuge.

CBJ parklands adjoining the refuge provide developed access to the refuge in some cases. ADF&G posts other refuge access points where public road rights-of-way intersect the refuge boundary. Known posted points of access that are not associated with other parks or trails are as follows:

Mainland Juneau:

- Engineers Cutoff Road, near the airport.
- Sunny Point Road, western end (Sunny Point).

Douglas Island:

- Bayview Subdivision, eastern end (Douglas Island).
- Ninemile Beach Access, east of North Douglas Highway boat ramp.

5.3.7 Section 4(f) and Section 6(f) Resources

Section 4(f)

Section 4(f) of the U.S. Department of Transportation (DOT) Act affords special protection to preserve public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Section 4(f) only applies to agencies within the federal DOT. In January 1983, as part of an overall recodification of the DOT Act, Section 4(f) was amended and codified in 49 U.S.C. Section 303. The wording in Section 303 reads as follows:

(a) It is the policy of the United States Government that special effort be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

(b) The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities.

(c) The Secretary may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, recreation area, refuge, or site) only if,

(1) There is no prudent and feasible alternative to using that land; and

(2) The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuges, or historic site resulting from the use.

The lead federal transportation agency determines the applicability of Section 4(f) for affected resources. At this preliminary stage of project development, only one Section 4(f) Determination of Applicability (DOA) has been prepared due to the significance of the resource as it relates to the development of the Second Crossing project—the Mendenhall Wetlands State Game Refuge. A Section 4(f) DOA package was submitted to the Federal Highway Administration (FHWA) on November 3, 2003. In a letter dated April 1, 2004, the FHWA determined that the provisions of Section 4(f) do apply to the MWSGR.

Additional DOAs will likely be required during future project development activities for other recreational resources within the project study area.

Section 6(f)

The Land and Water Conservation Fund Act of 1965 (LWCF Act) provides a mechanism for funding parks and recreation areas across the United States. Many communities, including the City and Borough of Juneau, have properties under their management that were acquired or developed using LWCF Act funds. Use of these properties for non-recreation purposes is considered a conversion of the intended use and, under the LWCF Act, is restricted. Section 6(f)(3) of the act states:

No property acquired or developed with assistance under this section shall, without the approval of the Secretary (of Interior), be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and or reasonably equivalent usefulness and location....

This restriction would apply if the Second Channel Crossing project proposed use of any of the CBJ's LWCF Act properties. There are two parks within the Juneau Second Channel Crossing project area—located on mainland Juneau—that are subject to Section 6(f). These are described below. A third location, Eaglecrest Ski Area on Douglas Island, is outside the project area but is included here because

access to the ski area is through the project area and because improved access to the ski area is part of the purpose of the project.

Twin Lakes Park. Twin Lakes Park is located in a narrow area between Old Glacier Highway and Egan Drive and runs from Salmon Creek to Vanderbilt Hill Road. The park includes two lakes, grassy hills, and a paved trail suitable for bikes, tricycles, and sidewalk chalk. There are regular and infant swings, picnic tables, the Planet Walk, a restroom (summer only), a boat and canoe launching area (the lakes are non-motorized), and drinking fountains. The park includes 6 acres of uplands and totals 69 acres, including the lakes. Part of the funding for the park was through the Land and Water Conservation Fund Act. Potential logical termini for the Second Channel Crossing project have been identified at the Intersections of Egan Drive with Channel Drive, just southeast of the park, and Vanderbilt Hill Road, just northwest of the park.

West Mendenhall Greenbelt/Brotherhood Park. This large park (348 acres) encompasses the western side of Mendenhall River from Glacier Highway upstream nearly to Mendenhall Loop Road. The park encompasses the lower portion of Montana Creek as well. Rafts and canoes are launched from Brotherhood Park. The Kaxdigoowu Heen Dei Trail runs the length of the greenbelt park. This wide paved bike path begins off Glacier Highway near Brotherhood Bridge (Mendenhall River) and follows the river and greenbelt park system (Recreation Service Park and Natural Area Park) 2.1 miles upstream on the western side of the river. It is well used by in-line skaters, cyclists, infant strollers, and pedestrians. There are parallel equestrian and unpaved walking paths. The trail connects via spur and bridge to Dimond Park on the east side of the river. A portion of the park was funded as a Land and Water Conservation Fund Act project. The southern edge of the park lies along the north side of Glacier Highway near the highway's intersection with Industrial Boulevard, one of the potential logical termini identified for the Second Channel Crossing project.

Eaglecrest Ski Area. Eaglecrest is the CBJ ski area and is located on Douglas Island seven miles from downtown Juneau. The ski area itself and associated trails are not within the boundaries of the Second Channel Crossing study area, although Fish Creek Road, which is the Eaglecrest access road, is within the study area. Any Second Channel Crossing alternative would affect access to Eaglecrest. Eaglecrest is owned by CBJ, is zoned "commercial," was funded partially as a Land and Water Conservation Fund Act project, and is promoted as a regional recreation destination. The ski area has 640 acres of groomed trails with beginner, intermediate, and expert runs and several lifts. There are also thousands of acres of ungroomed ski area open for skiing on either side of Eaglecrest's developed runs. In addition, Eaglecrest has 8 kilometers of groomed Nordic ski trails. The Cropley Lake Trail and Treadwell Ditch Trail are summer hiking trails partially or totally within the Eaglecrest boundaries. CBJ currently is seeking interested parties to expand the summer recreation use of the Eaglecrest area.

Although Second Channel Crossing alternatives have not yet been defined, the potential logical termini identified on the mainland side of Gastineau Channel indicate that some alternatives may lie close to Twin Lakes Park and Brotherhood Park. Because the parks lie inland of Glacier Highway/Egan Drive, and the project focus is principally seaward of Glacier Highway/Egan Drive, it does not appear necessary to convert any portion of lands protected by Section 6(f) of the LWCF Act. However, if the intersections noted above figure in the project alternatives, it will be necessary to attend to this land status. If preliminary design of intersections or interchanges indicates any need to expand inland outside the existing right-of-way at Industrial Way, Vanderbilt Hill Road, or Channel Drive, efforts should be made to avoid use of these park lands. Conversion of land use at Eaglecrest Ski Area is not anticipated under any alternative.

5.3.8 Subsistence

This section will be completed pending research and further analysis of subsistence activity in the project vicinity, including fishing in rivers, Gastineau Channel, Fritz Cove, as well as hunting and gathering, particularly on West Douglas Island. ANILCA Section 810 evaluation may be necessary as related to indirect subsistence impacts on federal lands (U.S. Forest Service) on West Douglas Island.

Subsistence is defined in the Alaska National Interest Lands Conservation Act, Section 803, as “the customary and traditional uses by rural Alaska residents of wild, renewable resources” for non-commercial purposes. However, federal law regulates subsistence on federal land, and state law regulates subsistence on state land, and the regulations differ. Federal law defines rural and non-rural areas, and a person must be a rural Alaska resident to participate in subsistence on federally-owned lands under federal subsistence regulations. Under state law however, all Alaska residents are eligible to participate in subsistence on state-owned lands, but only in state-defined subsistence use areas. Juneau is classified as non-rural (urban) under federal regulations and as a non-subsistence area under state regulations.

5.3.9 Utilities

Primary utilities in CBJ include water and sewer systems provided by CBJ Department of Public Works, electricity provided by Alaska Electric Light and Power, and telephone and cable TV lines provided by Alaska Communication System (phone only) and GCI. A more detailed discussion of utilities and mappings are presented in the *Preliminary Utility Systems Inventory and Opportunities Technical Memorandum, February 2004* prepared separately for this project. Following is a summary of primary utilities in the vicinity of the study area.

The main distribution lines for these utilities closely follow the road system, with major lines paralleling Egan Drive and Douglas Highway. The paragraphs below provide detail specific to each utility.

Water. Last Chance Basin well field above downtown Juneau is the primary water source for CBJ, with Salmon Creek providing a secondary source where it is dammed for electric power. There are nine storage tanks, three of them in the study area at Auke Lake, Lemon Creek, and Salmon Creek. The current water demand is about 3.75 million gallons per day. The main water transmission system consists primarily of 12-inch to 24-inch diameter piping along Glacier Highway and North Douglas Highway. Between the mainland and Douglas Island there is a 20-inch submarine line crossing Gastineau Channel near Salmon Creek and two 14-inch diameter pipes inside the Douglas Bridge.

Sewer System. CBJ uses the Mendenhall, Juneau-Douglas, and Auke Bay Wastewater Treatment Facilities. The Mendenhall Facility serves the study area from the hospital out to the Mendenhall Valley, and the Juneau Douglas Facility (located south of Juneau on Thane Road) serves the area from the hospital toward town and the Bonnie Brae Subdivision on North Douglas.

The Mendenhall Facility has greater excess capacity than the Juneau-Douglas Facility. The system for the Mendenhall Facility in the study area includes seven major sewage pump stations, while the Juneau Douglas Facility has six major sewage pump stations. Between the mainland and Douglas Island there is an 8-inch submarine force main that crosses Gastineau Channel near Salmon Creek to serve Bonnie Brae Subdivision. Bayview Subdivision on North Douglas has its own system: each home has an individual wastewater treatment plant that discharges to a collection system, and from there to Fritz Cove.

Electric, Telephone, and Cable TV Systems. These utilities cover virtually the entire road system in CBJ, mostly following the uphill side of Glacier Highway. On Douglas Island, they follow North Douglas Highway to the road’s end. From the West Juneau Substation, the line follows the channel side of the highway to the North Douglas Boat Launch and the mountain side from there to the end of the

highway, where it is intended to serve a submarine cable to the Greens Creek Mine and Hoonah.⁶ Connections between Juneau and Douglas Island are all made through or alongside the Douglas Bridge.

The primary sources of electricity are four hydroelectric plants, most of them located outside the community. However, the Salmon Creek Dam in the study area generates about 10 percent of CBJ's power. Most of Juneau's backup power comes from diesel plants located at the AEL&P Operations Center at Lemon Creek. The main transmission lines are 69 kV and 12.5 kV lines along Glacier Highway and North Douglas Highway. The electric substations in the study area include those at Salmon Creek, Lemon Creek, the airport, and Auke Lake. There is also a substation at West Juneau, from which power is conveyed along North Douglas Highway. Telephone multi-pair cables and cable television fiber optic lines and coaxial cables are routed through central offices located near each of the electric substations. Telephone and television cables typically are attached to AEL&P poles, with some sections of all of these utilities underground. Cable television distribution is through approximately mile 9 on North Douglas Highway, the limits of most housing.

5.4 Relocation

As a means of providing uniform and equitable treatment for those persons displaced by federal or federal aid projects, the federal government passed the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," and the "Uniform Relocation Act Amendments of 1987." This legislation provides for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal and federally assisted programs and establishes uniform and equitable land acquisition policies for federal and federally assisted programs. Whenever acquiring real property for a program or project by a federal agency results in displacing anyone, the agency is required to reimburse the displaced persons and provide relocation planning, assistance coordination, and advisory services. There are both businesses and residences within the study area.

Residents displaced by a federal program generally are relocated to existing housing in the community, although they may have to relocate elsewhere (i.e., to another neighborhood) within the community. Businesses are generally relocated to similar business settings. The cost of relocating is covered as part of the relocation process. In accordance with the law, all owners of acquired property, without discrimination, are compensated for their loss of property at fair market value and all displaced persons are moved at no expense to them.

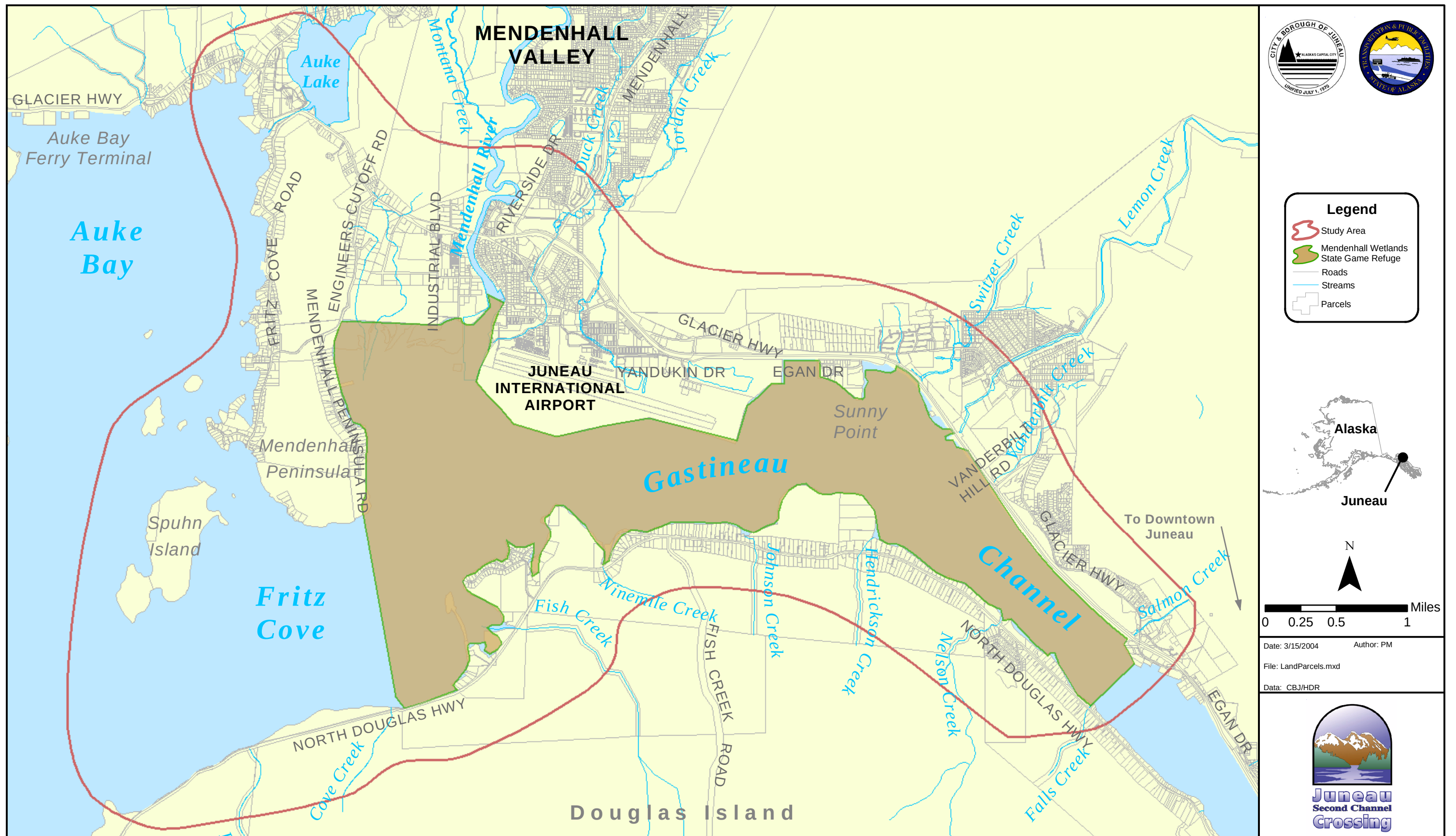
Once alternatives are developed, the potential for relocations will be better defined. There are most likely homes or businesses that may be affected by the project. Vacant housing and commercial sites are generally available in Juneau, should residential or business relocations be required. Figure 5.9 shows the land parcels and general parcel distributions within the vicinity of the project study area and Figure 5.10 (aerial base) shows existing development patterns.

5.5 Economic Environment

5.5.1 Economy and Economic Development

Juneau and Douglas began as gold mining communities in about 1880, when Alaska's first major gold discoveries occurred. The seat of government transferred from Sitka to Juneau in 1906, establishing "government" as an important industry. Juneau has remained the capital of Alaska since that time. Hard

⁶The reason the transmission line extends to the beach is so that it can connect to a new intertie, linking Juneau to the Greens Creek Mine and Hoonah. AEL&P, agent for the Southeast Conference, has prepared an Environmental Assessment under NEPA in cooperation with the U.S. Forest Service for the proposed intertie.



Juneau Second Channel Crossing

Figure 5.9
Land Parcels



Juneau Second Channel Crossing

Figure 5.10
Aerial Orthophotography

rock mining efforts peaked early in the twentieth century. The last of the original mines and mills closed in 1944 with the advent of World War II. As the community became established, fishing boats and fish processors established themselves in Juneau. Today, federal, state, and local governments together employ approximately 40 percent of Juneau workers. Tourism is the largest private employer and continues to grow, with multiple cruise ships in port at downtown Juneau most summer days. Commercial fishing and mining continue to play a role in Juneau's economy.

Juneau and Douglas remained relatively compact developments until the Trans Alaska Pipeline construction put Alaska's economy in high gear in the 1970s. Until 1986, the economy boomed with a large influx of residents and increases in government to keep pace, both statewide and in CBJ. This period included rapid construction of housing and expansion of retail trade, including large new stores and national chains, with much of the development in the Mendenhall Valley and other areas outside the traditional core communities.

Oil revenues dropped in the mid 1980s, and the Alaska and CBJ populations shrank. Since the 1986-1987 recession, Juneau's economy and population have grown slowly. State government employment has returned to its pre-recession levels (although state wages and purchasing power have declined in terms of real dollars). Most of the growth has been in the retail and service sectors—with that growth driven in part by tourism.

Since 1990, non-agricultural wage and salary employment (all employment except uniformed military and the self-employed, such as commercial fishermen) has increased by 3,200 jobs—about 23 percent. Over the same period, Juneau's population has increased by 4,200 residents, or 16 percent. In other words, employment has grown more than the population has in the same time period.

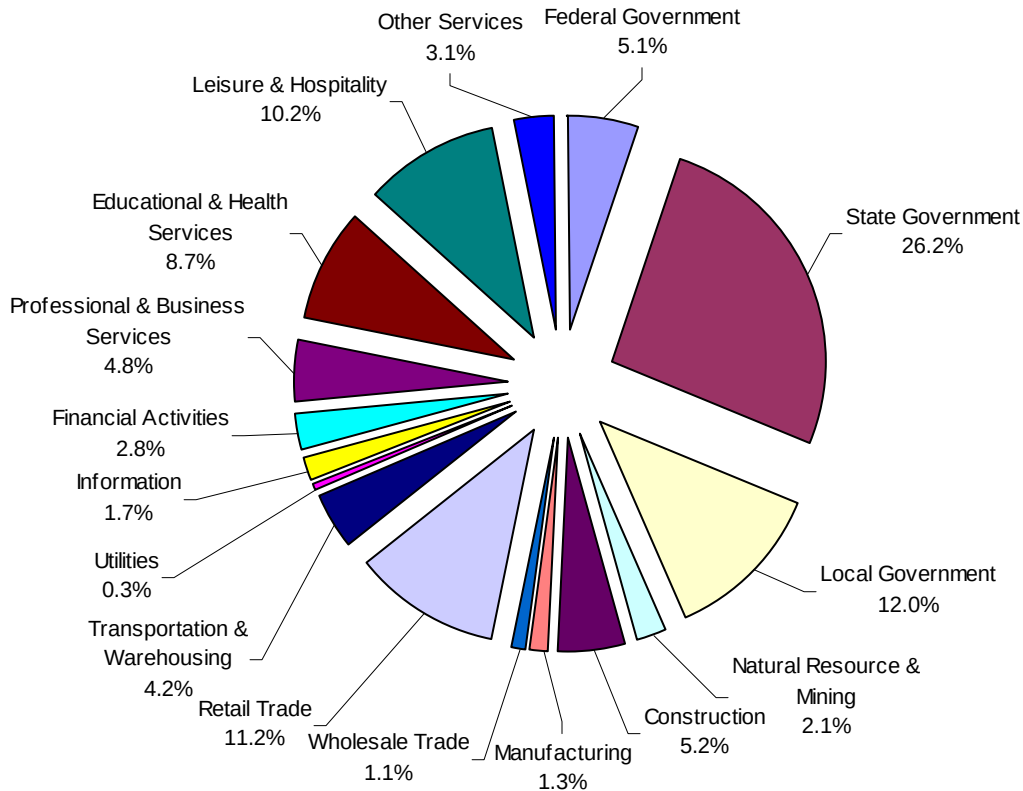
Between 1990 and the present, Juneau's "participation rate" has increased from approximately 52 percent to 56 percent, meaning that the number of jobs in the economy is now equal to about 56 percent of the total population. This suggests that a greater percentage of the population is employed than in the past. Contributing to this trend are declining real wages (forcing households to find supplemental income) and increasing part-time employment opportunities. This trend is likely to continue in the near-term.

5.5.2 Employment

Employment has been slowly rising in the last decade, from 14,122 in 1990 to 17,047 in 2000 and 17,331 in 2002 (DOLWD 2003). In this period, there was one minor decline (57 employment positions), in 1998.

Figure 5.11 illustrates the breakdown of employment for 2002. State government was (and has been) the largest employer, comprising of 26 percent all employment in the area. Local government employed 12 percent, 11 percent were employed in the retail trade industry, 10 percent were in leisure and hospitality, and 9 percent were employed in educational and health services. The remaining 32 percent of jobs were distributed throughout the remaining industries.

Figure 5.11: Employment in the City and Borough of Juneau by Industry, 2002



Source: DOLWD 2003

The following paragraphs provide additional information about the primary employment sectors.

State Government

State government is Juneau's largest employer, with approximately 4,500 jobs and \$182 million in annual payroll. While state government remains the community's dominant economic force, and while the actual number of employees is virtually unchanged, its relative importance in the Juneau economy has declined over the past 20 years. In 1981, state government directly accounted for 36 percent of all jobs in Juneau. Today it directly accounts for 26 percent of all employment (4,541 jobs out of 17,331). Similarly, state government accounted for 41 percent of all payroll in the economy 20 years ago, but now accounts for about 30 percent (see Table 5-7).

**Table 5-7: State Government Employment, Total Employment,
and Percent of Total Employment in Juneau, 1981 and 1991-2002**

Year	State Employment	Total Employment	Percentage State Employment
1981	4,141	11,496	36%
1992	4,530	14,518	31%
2002	4,541	17,331	26%

Source: DOLWD 2003.

State government employment has been driven primarily by available revenue. However, over the long-term, population growth statewide will determine state employment in the capital city. As population grows, so too does the demand for the kinds of public services provided by state government.

Tourism

The visitor industry is Juneau's second largest in terms of employment. The industry creates an annual average of approximately 1,600 jobs and \$30 million in payroll, according to the latest estimates. The visitor industry has been Juneau's only growth industry in recent years. Cruise ship passenger traffic to Juneau has grown from 87,000 visitors in 1982 to 750,000 in 2002. The economic impact of these visitors has increased at a similar pace; with cruise ship passengers now spending an estimated \$90 million in Juneau annually. Although little data is available, the trend in visitors arriving independently by highway, ferry, or air appears to have been flat in recent years, at about 150,000 per year.⁷

Federal Government

In 2002, the federal government accounted for about 900 jobs in Juneau (5 percent) and \$55 million in annual payroll (9 percent). The largest federal agencies in Juneau are the U.S. Coast Guard, the USDA Forest Service, and the National Oceanic & Atmospheric Administration. Federal employment in Juneau has been on a downward trend.

Mining

Natural resources and mining account for about 360 jobs in Juneau, nearly all at the Greens Creek Mine on Admiralty Island. Workers reside in Juneau and commute to the mine on a daily basis. An environmental impact statement has recently been completed on a project that will provide for expansion of the mine's tailings disposal facilities. The Kensington Mine development project, which recently received all necessary state permits, is also moving forward.

Seafood

Commercial fishing and seafood processing account for about 5 percent of Juneau's economy. Juneau residents held 541 commercial fishing permits and 412 crew licenses, according to the Commercial Fisheries Entry Commission (CFEC). These fishermen harvested 17.5 million pounds of seafood with an ex-vessel value of \$15 million (ex-vessel is the amount processors pay fishermen for their fish). Based on a commercial fishing employment model developed by the McDowell Group, this translates to the equivalent of about 300 year-round jobs and \$9 million in skipper and crew personal income in 2000.

In 2001, Juneau processor employment totaled an estimated 65 jobs, with an estimated \$1.8 million in payroll. Taku Smokeries accounts for about 80 percent of Juneau's seafood processing employment. While much of Alaska's processing sector has been struggling, Juneau's processing sector has been

⁷ Data from the Alaska Visitor Statistics Program (AVSP) indicate that about 691,000 independent visitors came to Alaska in the summer of 2002 (Northern Economics, 2003). AVSP data is not available by city.

growing. Douglas Island Pink and Chum (DIPAC), a salmon hatchery, is also part of Juneau's seafood industry, contributing salmon to be harvested in the local area. In 2001, DIPAC employed an average of 45 workers, with peak employment at 79.

5.5.3 CBJ Earnings

The U.S. Department of Commerce Bureau of Economic Analysis (BEA) defines personal income as income received by individuals from all sources. Total personal income is the sum of income for all residents of an area. Per capita personal income is defined as the total personal income of an area divided by the population of that area.

The most recent data available from the BEA Regional Economic Information System (REIS) indicate that total personal income steadily increased in CBJ from 1990 to 2001, from \$722 million to \$1,057 million (\$1.1 billion). Per capita personal income increased over the same period from \$26,696 to \$34,487, except for minor declines in 1996 (-0.1 percent) and 1999 (-0.5 percent).

5.6 Joint Development

There are no joint development projects associated with the JSCC Project.

5.7 Transportation

5.7.1 Aviation

Aviation activities within the study area originate from two primary locations: Juneau International Airport and the North Douglas Heliport. The physical and operational characteristics of these facilities are described in this section. A more detailed discussion of aviation issues are presented in the *Preliminary Aviation Issues Technical Memorandum, December 2003* prepared separately for this project.

Juneau International Airport

Airport Facilities

The CBJ owns and operates the Juneau International Airport (JIA), which is located 9 miles northwest of downtown Juneau. The airport property encompasses approximately 600 acres and includes one paved runway, a floatplane basin, taxiways and taxilanes, six main aircraft parking areas, a passenger terminal, vehicle parking, and access roads. The Airport Master Record, Federal Aviation Administration (FAA) Form 5010 lists the airport elevation as 21 feet above Mean Sea Level (MSL). There are also several helicopter operators at JIA run by air taxi operators, public service, and the military.

The airport's paved runway (Runway 08/26) is 8,456 feet long and 150 feet wide and is oriented in a predominantly east/west direction. Associated with the runway are a Runway Safety Area (RSA), an Object Free Area (OFA), and an Obstacle Free Zone (OFZ). Each of these areas extends beyond the area of the runway and is intended to protect aircraft during take-off and landing and in the event of an undershoot, overshoot, or excursion from the runway. The dimensions of the RSA, OFA, and OFZ at JIA do not currently meet FAA design criteria.

The floatplane basin at JIA is located approximately 575 feet south of the runway centerline. The basin is approximately 4,800 feet long and 450 feet wide.

A paved taxiway measuring 75 feet wide extends the full length of Runway 08/26. Five runway exit taxiways connect the runway to the parallel taxiway. Other taxiways and taxilanes provide circulation

and access to hangar areas.

There are six main aircraft parking aprons at JIA: two General Aviation (GA) aprons (west end and east end), the air carrier/air taxi apron surrounding the passenger terminal, the military apron (for operations by the Alaska Army National Guard), a helicopter apron, and a floatplane parking area.

The passenger terminal provides space for all ticketing functions, baggage handling, car rental facilities, a gift shop, a beverage cart, vending machines, restrooms, and shared offices of the U.S. Customs Service and Immigration and Naturalization Service on the first floor. The second floor includes aircraft boarding gates, security services, a restaurant, airport offices, security offices, and restrooms.

The vehicle parking lot consists of 90 short-term and 260 long-term public parking spaces. The parking lot nearly reaches capacity during the peak summer season and during holiday seasons (e.g., Christmas, New Years). The rental car parking lot has 130 designated spaces. An employee parking lot is located at the eastern end of the public parking lot and can accommodate up to 90 vehicles.

Access to JIA is primarily from Yandukin Drive, which connects the airport with Egan Drive. The airport can also be accessed via Shell Simmons Drive, which extends from Glacier Highway to the airport terminal.

In 1999, the CBJ issued an Airport Master Plan, which identified the need for a number of improvements and facility developments at JIA, including improvements to comply with the Federal Aviation Act and federal safety requirements, and to meet changing operational conditions and growing demand. The potential impacts of implementing these improvements are being evaluated by FAA in an Environmental Impact Statement (EIS). Specifically, the JIA EIS is addressing the following four major actions:

1. Bring the airport into compliance with RSA requirements.
2. Provide sufficient navigational lighting to improve pilot alignments with the runway during poor weather conditions.
3. Provide sufficient facilities to efficiently meet current and future airfield operational requirements, including a snow removal equipment building, fuel farm access road, and hangar and aircraft tie-down apron.
4. Implement a Wildlife Hazard Management Plan in accordance with Federal Aviation Regulation Part 139

The FAA issued the draft EIS for the proposed airport improvements in April 2005.

Airport Operations

The JIA is classified in the 2001-2005 National Plan of Integrated Airport Systems (NPIAS) as a Primary – Commercial Service airport serving medium distance routes of 500 to 1,500 miles, such as Seattle and Anchorage. The Alaska Aviation System Plan (AASP) identifies JIA as a Regional Center Airport (RCA). An RCA acts primarily as a regional access point and is a significant transfer and transshipment point for passengers and cargo to/from the region. As a Commercial Service airport, JIA must be certified under Federal Aviation Regulations (FAR) Part 139 and maintain compliance with Federal regulations for safety, security, compatible land use and obstructions (both on- and off-airport). The airport is used by both FAR 135 commuter and air taxi operators, as well as FAR Part 121 scheduled air carriers. U.S. Customs Service is available, which permits international arrivals at JIA. There are a significant number of helicopter operations at JIA by air taxi operators, public service, and the military.

In the past two decades, air traffic operations (either a takeoff or a landing) and passenger enplanements have increased significantly, and future traffic growth is expected. Statistics from the FAA Juneau air traffic control tower operator indicate 93,418 operations occurred in 1981, and FAA 5010 form reports 153,010 operations for 2002. Tourist activity creates a significant traffic peak during the summer months as hundreds of tourists and independent tourist travelers transfer between aircraft, Alaska Marine Highway System (AMHS) ferries, and cruise ships.

The airport has an operating air traffic control tower from 6:00 a.m. until 11:00 p.m. (local time) daily, year round. The air traffic control tower controllers provide landing and departure instructions for aircraft operating under both Instrument Flight Rules (IFR) and Visual Flight Rules (VFR). JIA does not have radar service due to the surrounding mountainous terrain. Several non-precision instrument approach procedures have been established to aid in landing during inclement weather.

The airspace surrounding JIA is classified as Class “D” airspace, which is approximately 6 nautical miles in diameter, and is centered on the airport, rising from the surface to 2,500 feet above MSL. To accommodate the non-precision Localizer Directional Aid (LDA) instrument approach from the west to Runway 08/26, Class “E” airspace extends west of the Class “D” airspace approximately 6 nautical miles and is approximately 4.5 nautical miles wide.

The FAR Part 77 (Objects Affecting Navigable Airspace) controls the height of every object in the vicinity of the airport that could reduce the safety and efficiency of airport operations and the surrounding airspace. The Part 77 imaginary surfaces and various height buffer zone contours around JIA are based on the existing runway threshold locations and the most stringent criteria, a 50:1 approach slope, to preserve future options for a precision instrument approach. This airspace restriction creates a fixed constraint to development of second crossing alternatives in the vicinity of the airport. Changes to the runway threshold locations that could result from implementation of the Airport Master Plan improvements could affect the dimensions and location of the JIA Part 77 airspace. The current JIA DEIS is being prepared for improvements stemming from the Master plan recommendations, and without specific proposed runway threshold locations, it is not possible to precisely determine the future JIA FAR Part 77 imaginary surfaces at this time.

North Douglas Heliport

Heliport Facilities

The North Douglas Heliport is located on Douglas Island approximately 2.5 miles southeast of JIA, midway between the Douglas Bridge and the northern tip of Douglas Island. It is privately owned by ERA Aviation, Inc. The heliport is used mostly for tourist excursions related to cruise ship passenger activities. The heliport is located on a permitted leaseholding within the MWSGR.

Operations

Helicopter flight near towers and bridges is typically conducted under visual flight rules and using “see-and-avoid” procedures. The FAR Part 77 imaginary surfaces for heliports are much less stringent than the imaginary surfaces for airports due to the vertical nature of helicopter flight. Furthermore, imaginary surfaces for heliports are only advisory in nature for privately owned heliports.

5.7.2 Marine Navigation

Marine navigation in the study area consists of vessel operations in Gastineau Channel. This section describes the general navigation characteristics of Gastineau Channel, users of the waterway, and harbor facilities that contribute to marine traffic in the area. A general overview of the Gastineau Channel at low tide conditions is shown on the aerial photograph in Figure 5.10. A more detailed discussion of

navigation issues are presented in the *Preliminary Navigation Issues Technical Memorandum*, November 2003 prepared separately for this project.

General Navigational Characteristics

Gastineau Channel separates mainland Juneau from Douglas Island and provides a marine transportation corridor between downtown Juneau and Fritz Cove for pleasure and commercial fishing boats. Mariners traveling from downtown Juneau to Auke Bay can go north in Gastineau Channel and through Fritz Cove, or south around the southern tip of Douglas Island and then north through Stephens Passage. The northern route is approximately 10 statute miles long and involves passage over the Mendenhall Bar, whereas the southern route is approximately 30 statute miles long and involves greater exposure to winds and waves in Stephens Passage.

The National Oceanic and Atmospheric Administration (NOAA) has calculated tidal datums for Juneau, Gastineau Channel, and Stephens Passage using tide ranges from 1983 through 2001 and the mean tide level from 1997 through 2001 (see Table 5-8).⁸

Table 5-8: Elevations of Tidal Data at Juneau, Gastineau Channel, and Stephens Passage

Highest observed water level (11/02/48)	24.4 feet
Mean Higher High Water (MHHW)	16.3 feet
Mean High Water (MHW)	15.3 feet
Mean Sea Level (MSL)	8.6 feet
Mean Tide Level	8.5 feet
Mean Low Water	1.6 feet
Mean Lower Low Water (MLLW)	0.0 feet
Lowest observed water level (01/01/91)	-5.4 feet
Source: NOAA, National Ocean Service, Tidal Bench Marks. April 21, 2003.	

The Douglas Bridge is the only bridge crossing of Gastineau Channel. It crosses the channel near the downtown area of Juneau. The Douglas Bridge has a 490-foot horizontal clearance and a 51-foot vertical clearance at MHW for the middle 250 feet.⁹

Navigation in Gastineau Channel is restricted to high-tide passage only by the Mendenhall Bar. In its shallowest section (i.e., at Mendenhall Bar), the channel bottom is 10.2 feet above MLLW.¹⁰ Passage across Mendenhall Bar is therefore possible only for a couple of hours each day (i.e., during high tide) for small craft. Mariners indicate no boat larger than a skiff is likely to attempt the crossing at tides lower than 17 or 18 feet. High tides of 18 feet or higher occur about five times per month. The U.S. Coast Guard (USCG) maintains markers in the channel from April 1 through October 15.¹¹

Improvements to navigation in Gastineau Channel through channel modification have been under consideration since the 1940s. In 1958, the U.S. Army Corps of Engineers (COE) conducted a hydrographic survey and predesign investigations for dredging in Gastineau Channel to give boats an all-tide channel. Channel dredging took place from August through October 1959 and from March through April 1960. The dredged channel was 75 feet wide.

⁸ NOAA, National Ocean Service, Tidal Bench Marks. April 21, 2003.

⁹ Gastineau Channel and Taku Inlet Navigational Chart, Chart #17315.

¹⁰ ACOE, Gastineau Channel, Alaska (CWIS NO. 72794), Condition of Improvement 30 September 1998.

¹¹ Telephone conversation between C. Snead, HDR Inc., and Commander Stephen Rothchild, USCG, Seventeenth Coast Guard District, September 11, 2003.

By 1962, serious shoaling was apparent in the channel again as a result of side-slope sloughing and deposition from materials coming out of Jordan, Switzer, and Lemon Creeks. The COE conducted additional field surveys, studies, and hydraulic modeling in the 1960s and 1970s to determine the feasibility of opening and maintaining a channel through the Mendenhall Bar. The COE concluded that it is not feasible to maintain the channel without construction of extensive dikes and channel linings to divert ebbing tidal flows away from excavated channel side slopes and diverting Jordan, Switzer, and Lemon Creeks, or completely relocating the channel toward Douglas Island. The estimated costs of providing a new channel to 0.0 feet MLLW (in 1997 dollars¹²) ranged from over \$7 million to almost \$34 million. Annual costs of maintaining the channel could range from \$230,000 to over \$1 million.

In response to requests from the CBJ in 1984 and 1997 to resume maintenance dredging of Gastineau Channel (letter from M.L. Teague, CBJ Manager to Neil Saling, Colonel, COE District Engineer, March 15, 1984; letter from Joseph L. Graham, CBJ Port Director, to Commander, COE District Engineer, September 25, 1997), the COE cited previous studies and explained that the anticipated costs of maintenance dredging are not economically feasible (letter from Neil Saling, Colonel, COE District Engineer, to M.L. Teague, CBJ Manager, April 10, 1984) and, more recently, that the economic feasibility is questionable (letter from Sheldon Jahn, Colonel, COE District Engineer, to Joseph L. Graham, CBJ Port Director, November 20, 1997).

Current Users

Within the study area, Gastineau Channel continues to be used by small skiffs and shallow draft vessels during favorable tides. These boats (including fishing vessels and sailboats) meet the 51 feet height restriction imposed by the Douglas Bridge at high tide, and choose the shorter route to northern destinations. More than half of the vessels berthed in the Juneau/Douglass complex have a shallow enough draft to use the channel; however, actual channel use is not well documented.

In August 2003, the USCG initiated a survey of ship operators to accurately characterize the number and types of vessels that cross Mendenhall Bar. Survey questionnaires were distributed to more than 700 potential respondents. Only 16 questionnaires were completed and returned. Of those respondents, four do not cross Mendenhall Bar and cited the dangers associated with shallow conditions there as a major concern. The 12 respondents who do cross the bar have vessels with an average length of 38 feet, an average beam of 11 feet, and an average draft of 4 feet. A more detailed discussion of survey results are presented in the *U.S. Coast Guard Survey Results Technical Memorandum, December 2003* prepared separately for this project.

Concurrent with the USCG survey, the McDowell Group conducted a household phone survey of waterway users in Juneau. Waterway users were divided into three categories for the survey: stall renters (202 respondents), commercial gillnetters (38 respondents), and commercial trollers (26 respondents). The results of the survey indicate that approximately two-thirds of respondents in all three user groups report transiting the Mendenhall Bar at least once in the past 12 months. Eighty-six percent of those who do not transit the bar cite shallow and unsafe conditions as a concern. Those waterway users who do transit Mendenhall Bar reported an average of 3 to 4 trips across the bar in the past year. More detailed information on the results of this survey is contained in *Juneau Second Channel Crossing Waterway User Survey Results, December 2003* prepared separately for this project.

¹² In response to a request by the CBJ Docks and Harbors Department for the COE to review the possibility of resuming a dredging program for Gastineau Channel (letter from Joseph L. Graham, CBJ Port Director, to Commander, COE District Engineer, September 25, 1997), the COE conducted a present worth analysis in 1997 to update the estimated costs presented in the Waterways Experiment Station study of 1978.

Harbor Facilities

There are two public harbors in Gastineau Channel just north of Douglas Bridge: Harris Harbor and Aurora Basin. There are 247 slips at Harris Harbor for craft ranging in size from 24 to 40 feet (length) and space for 75 transient vessels. There are 419 slips at Aurora Basin: Sixty-six slips accommodate crafts greater than 42 feet and 353 slips for vessels ranging in size from 24 to 32 feet. Aurora Basin can also accommodate 63 skiffs on the main float.¹³ Auke Bay Harbor lies west of Mendenhall Peninsula and is separated from Aurora Basin and Harris Harbor by Gastineau Channel. It provides 20,000 feet of transient moorage in 3-day and 10-day slots.

5.7.3 Vehicle Travel

Vehicle travel patterns, accessibility, and current traffic volumes in the study area are described in Section 5.3.4. This section summarizes safety issues associated with vehicular travel based on the existing accident database within the study area, briefly compares the study area with other roadways in the region, and identifies high accident areas. In addition, by analyzing historic accident data in the area, focus points for improved safety may be identified.

Accident Analysis

The DOT&PF's *Southeast Region 2003 Traffic and Safety Report* summarizes accident data for areas in the southeast region, including accident rates for the years 1999 to 2003 at intersections and roadway segments. The accident rate of a roadway is determined by calculating the number of accidents per million vehicles per mile, within a roadway segment or at an intersection. DOT&PF computed both weighted and unweighted accident rates. The weighted rate assigns a value to the severity of accident (property damage only to fatality) whereas the unweighted rate treats all the accidents the same.

Weighted rates attempt to identify locations of severe accidents; however, the severity of an accident may be considered random and can fluctuate from one year to the next. Unweighted rates vary less from year to year and provide a more persistent accident pattern. The DOT&PF considers an unweighted rate greater than 1.0 for any given roadway classifications to be significant and warrant attention.

Table 5-9 contains the available accident rate data, both unweighted and weighted, for intersections potentially affected by the proposed action, and the total number of accidents that have occurred over the three-year period (January 1999 through December 2003). Intersections are ranked in Table 5-9 based on the unweighted accident rate.

Table 5-9: 5-Year Intersection Accident Rates and Number of Accidents

Intersection	Unweighted Rate*	Weighted Rate**	Number of Accidents
Egan Dr. & Salmon Creek.	1.11	3.46	56
Egan Dr. & Sunny Dr.	1.10	3.42	56
Egan Dr. & Vanderbilt Hill Dr.	1.06	3.30	51
Egan Dr. & Mendenhall Loop	0.88	2.82	59
Egan Dr. & 10th St. (Douglas Bridge Terminus)	0.87	2.31	44
Egan Dr. & McNugget	0.87	2.90	55
Egan Dr. & Yandukin Dr.	0.69	2.20	39
Egan Dr. & Glacier Hwy. North	0.59	1.74	18
Glacier Hwy. & Backloop Road (Auke Bay)	0.56	1.41	8

¹³ Telephone conversation between C. Snead, HDR Inc., and Betty Moore, Office Manager, CBJ Docks and Harbors, September 22, 2003.

Table 5-9 (continued)
5-Year Intersection Accident Rates and Number of Accidents

Intersection	Unweighted Rate*	Weighted Rate**	Number of Accidents
Douglas Hwy. & North Douglas Hwy.	0.48	1.56	13
Egan Dr. & Riverside	0.46	1.29	18
Glacier Hwy. & Fritz Cove	0.34	1.57	7
Glacier Hwy. & Industrial Blvd.	0.31	0.93	8
Glacier Hwy. & Sherwood Lane	0.13	0.30	3
Glacier Hwy. & Engineer's Cutoff	0.04	0.22	1

Source: DOT&PF Southeast Region 2003 Traffic and Safety Report

* Accidents / Million Vehicle Miles

** Weighted Accident Number / Million Vehicle Miles, where weighted accident number is computed by multiplying the number of accidents with property damage only by 1, with minor (non-disabling) injury by 5, with major (disabling) injury by 25, and with fatality by 50.

There are two locations within the study area where DOT&PF may construct improvements over the next several years. One project would add a new interchange at the Sunny Drive/Egan Drive intersection, providing both an increase in safety and improved access. The other project would provide a reversible lane across the Douglas Bridge to improve traffic mobility and operation.

SE Regional Comparison

The SE regional unweighted accident rate for intersections range from 0.0 to 1.96 with an average of 0.46. Nine of the intersections within the Juneau Second Channel Crossing study area are above the regional average:

- Egan Drive and Yandukin Drive (1.69)
- Egan Drive and Salmon Creek (1.11)
- Egan Drive and Sunny Dr. (1.10)
- Egan Drive and Vanderbilt Hill (1.06)
- Egan Drive and Mendenhall Loop (0.88)
- Egan Drive and 10th Street (0.87)
- Egan Drive and Glacier Hwy. North (0.59)
- Glacier Highway and Backloop Road (0.56)
- Douglas Highway and North Douglas Highway (0.48)

There are eleven locations on Egan Drive within the JSCC project study area that have high accident rates.

- Egan Drive and Mendenhall Loop (59)
- Egan Drive and Sunny Dr. (56)
- Egan Drive and Salmon Creek (56)
- Egan Drive and McNugget (55)
- Egan Drive and Vanderbilt Hill (51)
- Egan Drive and 10th Street (44)
- Egan Drive and Yandukin Drive (39)
- Egan Drive and Highland Drive (24)
- Egan Drive and Glacier/Willoughby Avenue (23)
- Egan Drive and Glacier Highway North (18)
- Egan Drive and Riverside Drive (18)

5.8 Pedestrians, Bicycles, and Alternative Transportation

While there are many recreational hiking trails in and near the project area, this section focuses primarily on pedestrians and bicycle facilities in urbanized areas, as well as the transit system, all of which can substitute for transportation by automobile.

5.8.1 Pedestrians and Bicyclists

While the downtown areas of Juneau are heavily used by pedestrians, and have dense commercial and residential development that makes this practical, the project area is less conducive to pedestrian and bicycle use. There are several paved roadside and greenbelt trails in the project area, however that provide for pedestrian and bicycle trips. Roadside trails generally are in the road right-of-way but are separated by a buffer from the road itself. These trails function as recreation and transportation amenities. Many are listed by the names of the roads they parallel. The primary routes are:

- *Egan Drive.* There are separated paths on both sides of Egan Drive in the Jordan Creek to Mendenhall River area. A route is proposed seaward of Egan Drive along from this area to downtown Juneau.
- *Mendenhall Loop Road.* There are separated paths on both sides of Mendenhall Loop Road on the eastern side of Mendenhall Valley.
- *Glacier Highway.* Twin Lakes bike path, immediately west of Salmon Creek, parallels Glacier Highway. This trail is part of Twin Lakes Park.
- *Kaxdigoowu Heen Dei Trail.* This wide paved bike path begins off Glacier Highway near Brotherhood Bridge (Mendenhall River) and follows the river and greenbelt park system 2.1 miles upstream on the western side of the river.
- *Under Thunder Trail (proposed).* The “Under Thunder” Trail (named because it would run at the foot of Thunder Mountain) is a proposed trail east of Jordan Creek from Egan Drive northward. A corridor may be identified during the development of the JSCC project.

Two other trails at the airport are unpaved but serve pedestrian needs. The *Airport Dike Trail* runs around the western end and southern side of the runway on airport property. Although it does not physically enter the MWSGR, it is the principal trail for views across the refuge and includes refuge and wildlife interpretive signs. The *Jordan Creek Trail* is on airport property immediately north of the terminal. A short spur crossing Jordan Creek and connecting the Nugget Mall area to the airport is well used.

5.8.2 Transit

Capital Transit is CBJ’s bus and van transit system. Buses serve main office and shopping districts, the University of Alaska Southeast, the airport, and many residential areas. Transit routes are shown in Figure 5.6. There are designated bus stops, but buses may also be hailed at unmarked safe locations. Care-a-Van is an on-call van service designed principally to transport the elderly and disabled.

Juneau’s linear development pattern is conducive to transit. The main routes run from downtown Juneau to Mendenhall Valley via Egan Drive and/or Glacier Highway, with a turnaround via Mendenhall Loop Road. Downtown Douglas is served from downtown Juneau. Transfers between the Valley bus and Douglas bus are made at the Federal Building. There is no regular bus service on the North Douglas Highway, but North Douglas passengers may use the Care-a-Van service to connect with the regular bus system.

The Juneau-to-Mendenhall Valley buses and Juneau-to-Douglas buses run every 30 minutes from 7:00 a.m. to 6:30 p.m. Monday through Saturday. Express, hourly service between downtown and the Mendenhall Valley runs weekdays. Transfers between the Valley bus and Express bus are made at the Nugget Mall. New transit centers are planned for downtown Juneau and the Mendenhall Valley.

Ridership on the system has grown by 37 percent since 1995, and buses are often crowded. Juneau has a higher level of transit service than most communities of its size, and Capital Transit's ridership is among the highest in the nation for a comparable system. Care-A-Van ridership has increased by 25 percent since 1995. The bus fleet is composed of 16 buses, of which nine are handicap accessible. There are also eight vans. A bus maintenance and operations facility is located just west of the Mendenhall River.

5.8.3 Plans Addressing Pedestrians, Bicycles, and Transit

In CBJ transportation and comprehensive plans, pedestrian, bicycle, and transit (PBT) options to automobiles are prominent. The CBJ's 2001 Area Wide Transportation Plan (AWTP) lists 13 guiding principles for transportation planning, including six PBT-related principles. The plan includes descriptions of 68 transportation projects and programs on the "Priority Solution List," 24 of which are PBT projects, and another 28 include a PBT component (typically amenities as part of a road project). This results in a total of 52 projects, or 76 percent of the total, that address PBT options.

Projects focused on PBT options and specifically affecting the project area include:

- Construct coastal trail parallel to Egan Drive from Norway Point to Yandukin Drive (medium term).
- Construct a separated path parallel to Egan Drive from Sunny Point to Vanderbilt Hill Road (medium term).
- Widen and realign the path along Egan Drive (near term).
- Construct Under-Thunder pathway from Egan Drive northward (near term).
- Construct bike paths/lanes on Mendenhall Peninsula roads (medium term).

A "Transportation Vision" document (Walkable Communities, Inc., May 2000, for CBJ, as background for the AWTP) lays out a broad vision for the feel of the future Juneau, focusing on enhancements and connections for pedestrians, bicyclists, and transit users, particularly in community centers. Most roads are envisioned as lower-speed, with an emphasis on keeping traffic steady and efficient and making driving and parking pleasant. A light-gauge rail "Transit Greenway" system is proposed. This concept would use very small and relatively low-speed and high efficiency equipment in a greenbelt corridor to move people on replica mining cars or individual self-propelled trolley cars.

The CBJ "Transit Development Plan and Transit Improvement Program 2002" (CBJ 2002) addresses years 2003-2008. It lays out changes to the current transit system of fixed-route buses and the small, more-flexible Care-a-van para-transit system. It does not address the Transit Greenway concept.

A "Juneau Non-Motorized Transportation Plan" (CBJ 1997) lays out a linked system of bike lanes, multi-use pathways, and other non-motorized routes. It lists several policies adopted by CBJ. The following policies are those most related to the project area:

4.3.7 Require bicycle and pedestrian paths...in all new growth areas and planned unit developments.

4.3.10 Complete a continuous...bicycle/pedestrian pathway between the Mendenhall Valley and downtown Juneau.

These policies echo the "Comprehensive Plan of the City and Borough of Juneau" (CBJ 1996).

5.9 Geology, Topography, and Soils

Geology, topography, soils and mappings information is summarized below. A more detailed discussion of this information is presented in the *Phase I Geotechnical Report, October 2003* prepared earlier for this project.

5.9.1 Geology and Topography

Southeast Alaska has been shaped by tectonic activity, glacial ice, and erosion. Over thousands of years, glaciers, water, wind, and gravity have deposited consolidated and unconsolidated materials over the bedrock. Gastineau Channel, a deeply scoured fjord, separates the Juneau mainland from Douglas Island. U-shaped valleys carved by glaciers can be seen in the Mendenhall and Lemon River valleys (O'Clair et al. 1999; Shannon & Wilson, Inc. 2003).

Along the Juneau side of the Gastineau Channel, steep slopes have limited the amount of developable land to the Lemon Creek and Mendenhall River Valleys. Relief along the Douglas Island side of the channel is less dramatic due to uplifted marine terraces and relic alluvial fans.

During periods of low tide, the project area is dominated by intertidal flats that almost span Gastineau Channel. The tidal flats are located between the Mendenhall and Lemon Creek Valleys. During low tides, the channel waters are reduced to flowing through shallow troughs that meander through the flats. Gastineau Channel deepens as it approaches Fritz Cove to the northwest and toward the south as it approaches the Douglas Bridge.

Plate tectonics and isostatic rebound (uplift of land masses associated with retreat and unweighting of glacial ice) have caused marine and river terraces to rise as much as 500 feet above sea level (O'Clair et al. 1999). The current rate of uplift due to isostatic rebound in the Mendenhall Valley has been calculated at approximately 0.05 foot per year, or approximately 5 feet of uplift over 100 years (Shannon & Wilson, Inc. 2003). The rise of the continental plates due to plate collisions, tectonic uplift, and isostatic rebound has affected stream channel gradients in the area and has increased streambed scour over time (Neal and Host 1999).

5.9.2 Soils

The maritime climate of Southeast Alaska has little seasonal variation and is characterized by heavy precipitation and cool temperatures. Climate is perhaps the most influential soil-forming factor. The region's soils are typically saturated. The cool air temperatures result in slow decomposition of organic matter. The slow decomposition increases soil acidity and produces nutrient-poor soils.

Soils along Gastineau Channel and in adjacent valleys are formed in a mixture of glacial, marine, and colluvial materials. Glacially deposited till is present on benches and footslopes. Colluvial materials are also located along footslopes and are mostly comprised of decomposing bedrock and unconsolidated sediments. Steeper slopes have shallow soils with pockets of exposed bedrock and rock outcrops (Schoephoester and Furbush 1974; Shannon & Wilson, Inc. 2003).

Shoreline deposits along the channel consist of modern beach sediments, stream alluvium, muskegs, and colluvial materials. Modern beach sediments consist of sand and gravels and are commonly saturated. Alluvial materials are predominantly located near the Mendenhall Valley and Lemon Creek deltas (Shannon & Wilson, Inc. 2003).

Tidal flats are composed of medium textured sediments with pockets of gravel. The bottom substrate of Gastineau Channel consists of bedrock that is typically covered by a layer of densely packed glacial till and marine deposits. Depth and thickness of the layers vary greatly with respect to location along the channel (Shannon & Wilson, Inc. 2003).

5.9.3 Seismic Hazards

The southern coast of Alaska lies on a 2,900-mile-long seismically active boundary between the oceanic Pacific and continental North American plates. In the Twentieth Century, three of the ten largest earthquakes in the world have occurred along this plate boundary in Alaska (Hansen and Combellick 1998). Along Southeast Alaska, this plate boundary is manifested as the Queen Charlotte-Fairweather fault system (Shannon & Wilson, Inc. 2003). Another major fault in the region is the Chatham Strait fault. This fault runs up Stevens Passage in a north-south direction and joins the Denali fault in the north and the Queen Charlotte-Fairweather Fault in the south. Three smaller faults also run through the region (Shannon & Wilson, Inc. 2003).

5.10 Air Quality

5.10.1 Project Area Air Quality Status

The project area includes the developed areas of Mendenhall Valley and Lemon Creek, which have had air quality issues related to wood smoke and local road dust that were first documented in the 1980s. Particulate matter having a diameter less than 10 micrometers (PM_{10}) from wood smoke and road dust in the Mendenhall Valley exceeded National Ambient Air Quality Standards (NAAQS) in 1990. The Alaska Department of Environmental Conservation (ADEC) developed a wood smoke control program, which included burn bans and local enforcement. This all but eliminated the problem of exceeding PM_{10} standards related to woodstove use in the Mendenhall Valley. Exceeding PM_{10} standards related to road dust were eliminated after the CBJ conducted an extensive road-paving project in the area.

Although the Environmental Protection Agency (EPA) identifies the Mendenhall Valley as a non-attainment area for PM_{10} (EPA Air Data website accessed on 2/9/04, <http://www.epa.gov/air/data/>), the monitoring data dating back to 1993 indicates that the area has been in attainment with the NAAQS for PM_{10} since 1993. Its status as a non-attainment area will remain until ADEC issues a maintenance plan to EPA. Juneau is in attainment with all other NAAQS. During the alternatives development phase for the Second Crossing project, and depending on alternative locations, air quality modeling may be required to confirm attainment status.

Because ADEC assumed that much of the PM_{10} concentrations in the Mendenhall and Lemon Creek areas are attributable to particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), it established $PM_{2.5}$ monitoring sites in these areas in 1980 (Mendenhall Valley) and 1999 (Lemon Creek). Neither site has exceeded the NAAQS for $PM_{2.5}$.

5.10.2 Air Pollutants of Concern

Although ADEC continues to monitor for PM_{10} and $PM_{2.5}$ in Juneau, the monitoring data indicates that these pollutants are no longer a concern in the Mendenhall Valley and Lemon Creek areas. No other regulated air quality pollutants are a concern in the project area.

5.11 Noise

5.11.1 Regulatory Overview

The FHWA established Noise Abatement Criteria (NAC) to help determine the noise impacts associated with highway development projects. The NAC are noise levels assigned to various land uses (e.g., picnic areas, churches, commercial land, and undeveloped land) grouped by their sensitivity to traffic noise levels. The NAC represent the maximum traffic noise levels that allow uninterrupted use within each activity category. Table 5-10 lists the five land activity categories included in the NAC, and the average sound level (occurring over a 1-hour period, or $L_{eq}[h]$), associated with each activity category. Sound levels are reported in decibels using the A-weighted scale¹⁴ (dB[A]).

Table 5-10: Noise Abatement Criteria

Activity Category	$L_{eq}(h)$	Description of Activity Category
A	57 dB(A) (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 dB(A) (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 dB(A) (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	No Limit	Undeveloped Lands
E	52 dB(A) (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: FHWA, Federal-Aid Highway Program Manual 7-7-3, "Procedures for Abatement of Highway Traffic Noise and Construction Noise," dated August 1982.

The DOT&PF states that "the commitment to minimize noise impacts and enhance the noise environment must be fulfilled through prudent application of FHWA's noise regulations, 23 CFR Part 772, which is the primary regulatory authority regarding noise abatement criteria." According to FHWA regulation and DOT&PF policy,¹⁵ traffic noise impact occurs when the predicted noise levels on new roadway corridors:

- approach [i.e., are within 2 dB(A) of] or exceed the NAC or,
- substantially exceed [by 10 dB(A) or more] the existing noise level.

If an adverse impact (i.e., approaching or exceeding the NAC) would occur, then FHWA's regulations indicate that abatement must be considered.

5.11.2 Sensitive Receptors

The primary noise-sensitive receptors within the areas potentially affected by the project alternatives are residences, churches, the hospital, parks and recreation areas; i.e., Activity Categories B and C in Table 5-10. There are no Category A areas.

¹⁴ Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight". The A-weighted scale corresponds to the sensitivity range for human hearing.

¹⁵ DOT&PF, *Noise Abatement Policy*, March 1996.

5.11.3 Existing Noise Sources

Noise in the project area is generally attributed to transportation: airplanes, floatplanes, helicopters, boats and other watercraft, and automobiles. While these noise sources are present year-round, noise in the project area generally increases during the summer because these transportation activities increase with additional tourism and outdoor recreation activities that occur in the summer. General industrial and commercial activities in the area also contribute to the ambient noise levels.

5.12 Water Quality

EPA and ADEC implement Section 303(d) of the federal Clean Water Act. Waters designated under Section 303(d) are “water quality limited” surface waters. The listing is revised every two years. In Alaska, these water bodies are priority ranked based on the severity of the pollution, the feasibility of implementing a water body recovery plan, and other factors.

There are four tiers of priority for water bodies. Section 303(d) designated water bodies are priority ranked into two tiers (Tiers I and II) (ADEC 2002a) and are considered to have “impaired” water quality.

- o **Tier I:** ADEC has documentation to indicate that Section 303(d) list criteria are met. These water bodies have not yet undergone comprehensive water quality assessments.
- o **Tier II:** These water bodies have undergone comprehensive water quality assessments in order to determine the most effective methods for water quality restoration through application of water body recovery plans.

Two additional tiers (Tiers III and IV) are for water bodies that are not Section 303(d) listed (ADEC 2002a).

- o **Tier III:** These have an implemented water body recovery plan (such as an EPA-approved total maximum daily load, or TMDL, limit). These water bodies are priority ranked and tracked by ADEC until state water quality standards are achieved.
- o **Tier IV:** These water bodies are no longer considered to be water quality limited.

5.12.1 Factors Affecting Water Quality

Alaska water quality standards are set by policies in 18 AAC 70.015, the water quality criteria in 18 AAC 70.020(b), and the limits in 18 AAC 70.030. Perhaps the greatest factor that affects water quality in the project area is the urbanized development in the Mendenhall and Lemon River Valleys. The development in the river valleys has increased rates of surface runoff and has elevated runoff of pollutants.

Three water bodies in the project area are classified as impaired under Section 303(d) of the Federal Clean Water Act. The water bodies are: Duck, Jordan, and Pederson Hill Creeks. Duck Creek is a Tier II priority water body, and Jordan and Pederson Hill Creeks are Tier I priority water bodies. Two other water bodies, Lemon and Vanderbilt Creeks, are also water-quality limited but are not listed under Section 303(d). These water bodies are Tier III priority and will be tracked and monitored. Table 5-11 shows these five water bodies, and their pollutants and sources.

Table 5-11: Water Quality Limited Creeks in the Project Area

Impaired Water Body	Priority	Pollutant	Parent Impairment	Source
Duck Creek	Tier II	dissolved oxygen (DO)	organic enrichment/low DO	urban/road runoff and landfill
		debris	suspended solids	urban/road runoff and landfill
		metals		urban/road runoff and landfill
		fecal coliform	pathogens	urban/road runoff and landfill
		turbidity		urban/road runoff and landfill
		dissolved gas	organic enrichment/low DO	urban/road runoff and landfill
Jordan Creek	Tier I	debris	suspended solids	land development, road runoff
		DO	organic enrichment/low DO	land development, road runoff
		sediment	sediment/siltation	land development, road runoff
Pederson Hill Creek	Tier I	fecal coliform	pathogens	septic tanks
Lemon Creek	Tier III	turbidity		urban runoff and gravel mining
		sediment	sediment/siltation	urban runoff and gravel mining
Vanderbilt Creek	Tier III	turbidity		urban runoff
		debris	suspended solids	urban runoff
		sediment		urban runoff

Source: ADEC 2004

5.12.2 Duck Creek

Although Duck Creek is a relatively short stream, approximately 3 miles long, it provides important functions for storm drainage, flood control, fish and wildlife habitat, recreation opportunities, and aquatic education (Ward 2003; EPA 2002). Groundwater maintains the base flow of Duck Creek, which is clear but frequently displays an orange color due to exposed iron deposits (Bethers *et al.* 1995).

Urban runoff and non-point source pollutants affect the turbidity, heavy metal, hydrocarbon, and fecal coliform bacteria levels in Duck Creek (Koski and Lorenz 1999; EPA 2003). Duck Creek was placed on the Section 303(d) list for dissolved oxygen (DO), debris, metals, fecal coliform, turbidity, and dissolved gas (EPA 2003). Duck Creek is ranked as a Tier II priority. Sources that may be impairing the stream include an adjacent landfill and urban and roadside runoff. TMDL reports have been approved and established for the various impairment standards (EPA 2003).

5.12.3 Jordan Creek

Jordan Creek was placed on the Section 303(d) list in 1998 because sediment, debris, and DO were outside acceptable parameters. Coho salmon have dropped from an average of 250 adult returns from 1981 to 1995 to 54 in 1996 and 18 in 1997 (EPA 2003). Groundwater maintains the base flow of Jordan Creek, which is typically clear in the headwaters and develops a brownish tint midway to saltwater (Bethers *et al.* 1995). There have been no TMDLs reported to EPA from the state of Alaska, so Jordan Creek is still considered a Tier I priority (EPA 2003).

5.12.4 Pederson Hill Creek (Casa del Sol Creek)

Pederson Hill Creek was placed on the 1996 Section 303(d) list for fecal coliform. The adjacent residential area has not yet been hooked up to the city sewer system, and the existing septic systems in the area are thought to be failing. Pederson Hill Creek's water is clear with a brownish tint (Bethers *et al.* 1995). The water body is a Tier I priority; there are currently no TMDLs reported to the EPA (EPA 2003).

5.12.5 Lemon Creek

Lemon Creek Valley is close to downtown Juneau and has experienced extensive industrial and residential development. Hydrology of the valley has been altered by dredging and dike construction, and sediment loading has increased (ADF&G 1999). Lemon Creek drains from glaciers and is turbid with glacial silt from spring through fall and clear during cold winter months (Bethers *et al.* 1995).

Lemon Creek is considered a Tier III priority. Although it has water quality impairments, it is not listed under Section 303(d). The creek does have turbidity and sediment limitations. A water body recovery plan that included a TMDL was prepared for this water body in 1995. The EPA approved the TMDL. Water body recovery plan implementation began in 1995 (ADEC 2004b).

5.12.6 Vanderbilt Creek

Vanderbilt Creek, near Lemon Creek, was placed on the 1996 Section 303(d) list for turbidity, debris, sediment, and habitat modification. A water body recovery plan that included a TMDL was prepared in 1995. EPA approved the TMDL. Implementation of the water body recovery plan began during the fall of 1995. Vanderbilt Creek is now considered a Tier III water body, and its waters will be tracked and monitored (ADEC 2004b).

5.13 Permits

Federal, state, and local agencies typically require permits for construction projects. This section describes the authorizations that could be required for the Juneau Second Channel Crossing project. A list of anticipated environmental authorizations and permits for the JSCC project is contained in **Appendix A**.

A Section 9 permit from the USCG is required for a bridge over a navigable waterway such as Gastineau Channel. Under authority of Section 10 of the Rivers and Harbors Act, a permit is required from the COE for work or structures within or over a navigable waterway.

The COE requires permits for the placement of fill into waters of the United States, including wetlands, under the authority of Section 404 of the Clean Water Act. Interagency coordination is a substantial component of the Section 404 permit process.

Any ocean disposal of materials would require a COE permit under Section 103 of the Marine Protection, Research, and Sanctuaries Act. Because ocean disposal would likely occur within three miles of the shoreline (i.e., the “territorial seas,” which is within COE jurisdiction), it would also require permitting under Section 404 of the Clean Water Act.

Other federal agency consultation and clearance requirements generally include:

- Endangered Species Act Section 7 consultation with NOAA Fisheries and U.S. Fish and Wildlife Service (USFWS).
- Consultation with USFWS, NOAA Fisheries, and DNR under the Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act.

The FAA requires clearance for any project that would affect airport property or airspace in the vicinity of JIA.

The Fishway Act and the Anadromous Fish Act are Alaska Statutes that require projects to obtain a Fish Habitat Permit from DNR for certain activities in fish-bearing streams. Activities that may impact fish passage and all activities within anadromous fish streams require a Title 41 Fish Habitat Permit. In addition, ADF&G issues special area permits for projects affecting state game refuges.

ADEC will conduct a plan review of the proposed storm water conveyance and treatment systems for each alternative and issue a non-domestic wastewater disposal permit for the project. Compliance with the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities is required for all construction activities that result in ground disturbance of 1 acre or greater.

Any build alternative that falls within Alaska’s coastal zone is subject to consistency review by DNR and CBJ under the Alaska Coastal Management Program (ACMP) and the CBJ Coastal Management Plan. The ACMP requires that each project in Alaska’s coastal zone be reviewed to determine consistency with the statewide standards of the ACMP and the enforceable policies of the CBJ Coastal Management Plan.

Other state authorizations may include:

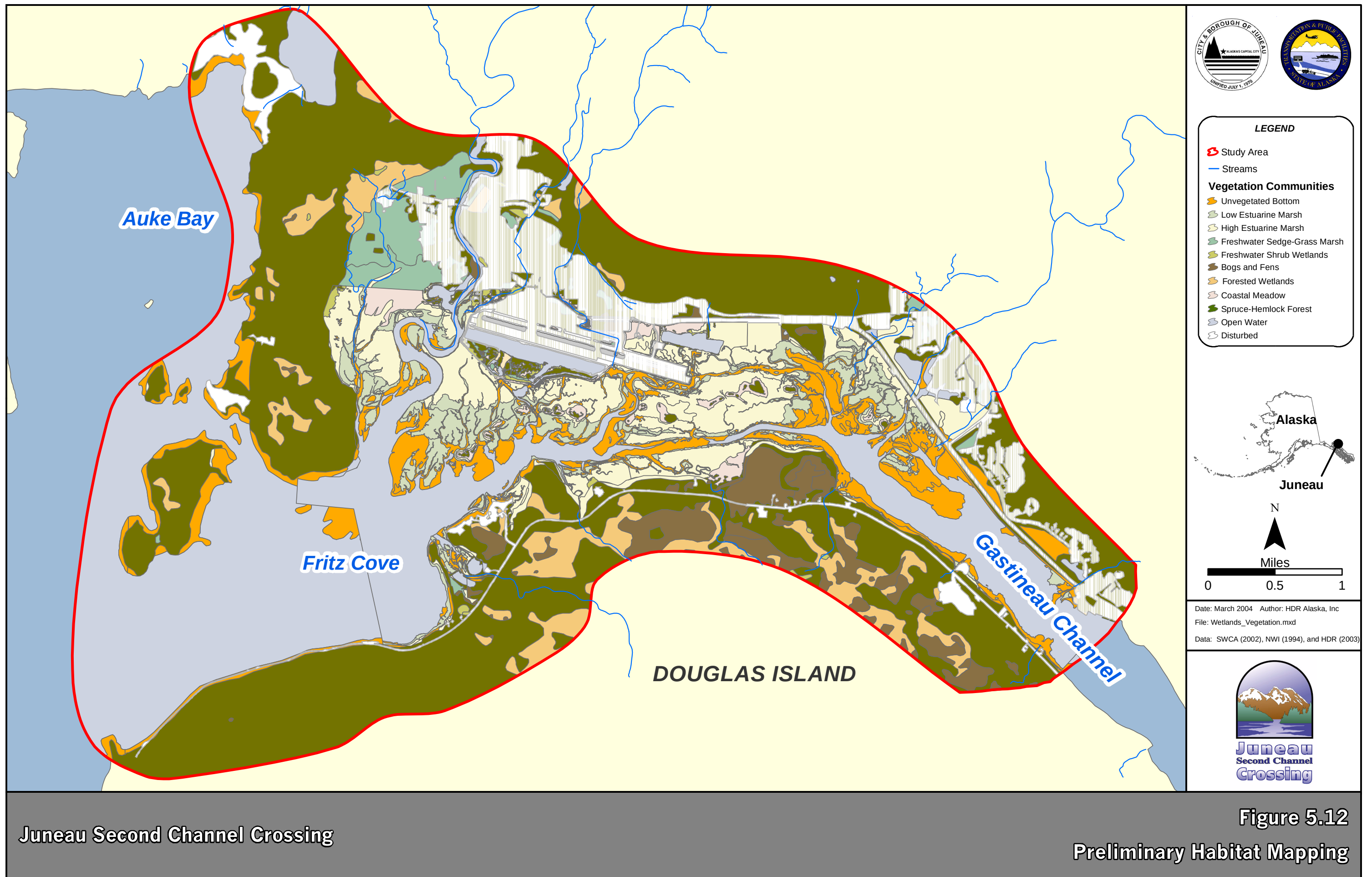
- National Historic Preservation Act Section 106 consultation with the State Historic Preservation Officer and tribal organizations.
- Section 401 Water Quality Certification from ADEC.

Both of these are state functions to satisfy federal law.

CBJ zoning, conditional use, and/or site development permits may be required. Changes to existing land uses (even if temporary, such as development of construction staging areas), often require local government review and approval of a zoning permit. Planned structures may also require a conditional use permit or variance, and modification of platted parcels would require a site development permit.

5.14 Wetlands and Upland Habitats

A variety of habitat types occur in and around the study area. These intertidal habitat types vary with respect to the salinity gradient and individual site processes such as sediment deposition, freshwater flow, and tidal inundation. There are six wetland habitat types and three upland habitat types within the study area, in addition to unvegetated intertidal flats, streams, and other open waters (see Figure 5.12). The representative plant species of the different habitats (see Table 5-12) are described in this section.



Wildlife use of these habitats as well as unvegetated habitats is discussed in Section 5.15.

Table 5-12: Representative Plant Species of Study Area Habitats

Habitat Type	Common Name	Scientific Name
Intertidal Estuarine Marsh	Arrowgrass	<i>Triglochin maritimum</i>
	Beach rye	<i>Leymus mollis</i>
	Canadian sandspurry	<i>Spergularia canadensis</i>
	Foxtail barley	<i>Hordeum jubatum</i>
	Gmelin saltweed	<i>Atriplex gmelini</i>
	Goosetongue	<i>Plantago maritima</i>
	Low chickweed	<i>Stellaria humifusa</i>
	Lyngbye sedge	<i>Carex lyngbyei</i>
	Meadow barley	<i>Hordeum brachyantherum</i>
	Pacific alkali grass	<i>Puccinellia nutkaensis</i>
	Red fescue	<i>Festuca rubra</i>
	Scurvy grass	<i>Cochlearia groenlandica</i>
	Sea milkwort	<i>Glaux maritima</i>
	Seabeach sandwort	<i>Honkenya peploides</i>
	Seablite	<i>Suaeda calceoliformis</i>
	Silverweed	<i>Argentina anserina</i>
Freshwater Sedge-Grass Marsh	Bluejoint reedgrass	<i>Calamagrostis canadensis</i>
	Cleavers	<i>Galium trifidum</i>
	Douglas' water-hemlock	<i>Cicuta douglasii</i>
	Lyngbye sedge	<i>Carex lyngbyei</i>
	Marsh cinquefoil	<i>Comarum palustre</i>
	Northern grass-of-Parnassus	<i>Parnassia palustris</i>
	Pacific water-parsley	<i>Oenanthe sarmentosa</i>
	Silverweed	<i>Argentina anserina</i>
	Spike bentgrass	<i>Agrostis exarata</i>
	Sweet gale	<i>Myrica gale</i>
	Tufted hairgrass	<i>Deschampsia caespitosa</i>
	Yellow marsh-marigold	<i>Caltha palustris</i>
Vegetated Pond	Bladderwort	<i>Utricularia macrorhiza</i>
	Ditch grass	<i>Ruppia maritima</i>
	Fineleaf pondweed	<i>Stuckenia filiformis</i>
	Mare's tail	<i>Hippuris tetraphylla</i>
	Pacific alkali grass	<i>Puccinellia nutkaensis</i>
Freshwater Shrub Wetland	Barclay willow	<i>Salix barclayi</i>
	Black cottonwood	<i>Populus balsamifera</i>
	Sitka alder	<i>Alnus viridis ssp. sinuata</i>
	Sitka willow	<i>Salix sitchensis</i>
Bogs and Fens	Shore pine	<i>Pinus contorta</i>
	Labrador tea	<i>Ledum palustre</i>
	Crowberry	<i>Empetrum nigrum</i>
	Bog blueberry	<i>Vaccinium uliginosum</i>

Table 5-12 (continued)
Representative Plant Species of Study Area Habitats

Habitat Type	Common Name	Scientific Name
Bogs and Fens	Lingonberry	<i>Vaccinium vitis-idaea</i>
	Bog rosemary	<i>Andromeda polifolia</i>
	Tufted clubrush	<i>Trichophorum caespitosum</i>
	Fewflower sedge	<i>Carex pauciflora</i>
	Tall cottongrass	<i>Eriophorum angustifolium</i>
	Sphagnum moss	<i>Sphagnum</i> species
Forested Wetland	Shore pine	<i>Pinus contorta</i>
	Sitka spruce	<i>Picea sitchensis</i>
	Western hemlock	<i>Tsuga heterophylla</i>
	Yellow cedar	<i>Chamaecyparis nootkatensis</i>
	Western red cedar	<i>Thuja plicata</i>
	False azalea	<i>Menziesia ferruginea</i>
	Oval-leaf blueberry	<i>Vaccinium ovalifolium</i>
	Yellow skunk cabbage	<i>Lysichiton americanum</i>
Coastal Meadow	Beach lovage	<i>Ligusticum scoticum</i>
	Beach pea	<i>Lathyrus japonicus</i> var. <i>maritimus</i>
	Beach rye	<i>Leymus mollis</i>
	Chocolate lily	<i>Fritillaria camschatcensis</i>
	Common red paintbrush	<i>Castilleja miniata</i>
	Cow parsnip	<i>Heracleum maximum</i>
	Fireweed	<i>Chamerion angustifolium</i>
	Foxtail barley	<i>Hordeum jubatum</i>
	Hemlock parsley	<i>Conioselinum gmelinii</i>
	Kneeling angelica	<i>Angelica genuflexa</i>
	Lyngbye sedge	<i>Carex lyngbyei</i>
	Nootka lupine	<i>Lupinus nootkatensis</i>
	Red fescue	<i>Festuca rubra</i>
	Sea-watch	<i>Angelica lucida</i>
	Tufted hairgrass	<i>Deschampsia caespitosa</i>
	Yarrow	<i>Achillea millefolium</i>
Spruce-Hemlock Forest	Sitka spruce	<i>Picea sitchensis</i>
	Western hemlock	<i>Tsuga heterophylla</i>
	Devil's club	<i>Oplopanax horridus</i>
	Oval-leaved blueberry	<i>Vaccinium ovalifolium</i>
	False azalea	<i>Menziesia ferruginea</i>
	Lady fern	<i>Athyrium filix-femina</i>
	Bunchberry	<i>Cornus canadensis</i>
	Five-leaf bramble	<i>Rubus pedatus</i>
	Fernleaf goldthread	<i>Coptis asplenifolia</i>

Sources: ADF&G 1999; O'Clair *et al.* 1992; Stone 1984; SWCA 2002a; SWCA 2002b; USFWS n.d.; Viereck *et al.* 1992; Watson 1979.

5.14.1 Wetlands

Regulatory Setting

Based on Executive Order 11990, all federal agencies must avoid and minimize harm to wetlands to the extent practicable when undertaking a major action such as issuing a permit or funding a project. Additionally, under the authority of Section 404 of the Clean Water Act, the COE regulates the discharge of fill material into waters of the U.S., including wetlands.

The COE and the EPA define wetlands as: “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...vegetation typically adapted for life in saturated soil conditions” (33 CFR 328, 40 CFR230). Under this definition, unvegetated water bodies such as streams, ponds, and marine waterways are not wetlands. They are discussed in Section 5.15.

Wetland Types

A variety of ecological functions take place in wetlands. There are six types of wetlands within the study area. This section describes each type of wetland and describes functions generally associated with each. Figure 5.12 shows the locations of the wetlands within the study area.

Intertidal Estuarine Marsh

The majority of the wetlands in the project area are located in the intertidal zones of Gastineau Channel between Fritz Cove and Salmon Creek. Intertidal areas are alternately inundated by saltwater and exposed. The frequency of submergence and exposure largely determines the type of vegetation and habitat. Few vascular plants can survive below the level of the extreme high water neap tide. In the Juneau area, this is approximately 13 feet above mean lower low water (MLLW). Below this level there is generally unvegetated sand or silt bottom.

The higher vegetated intertidal areas can be described as low estuarine marsh and the high estuarine marsh. The low estuarine marsh is dominated by Lyngbye sedge, goose tongue, and Pacific alkali grass. Other species include sea milkwort, Canadian sandspurry, seablite, silverweed, arrowgrass, low chickweed, foxtail barley, scurvy grass, and Gmelin saltweed. Taller grasses such as tufted hairgrass, beach rye, foxtail barley, meadow barley, red fescue, and seabeach sandwort dominate the high estuarine marsh.

Freshwater Sedge-Grass Marsh

The freshwater marsh wetlands support grasses and sedges that extend above the water. These wetlands are found on riverine terraces, and along the edges of lakes and ponds. They can be found on the west side of Mendenhall River, along Pederson Hill Creek, and on flat portions of Douglas Island (Stone 1984). Although freshwater marshes occur in fresh water, most of the sites are infrequently flooded by sea water during storm surges.

The freshwater sedge-grass marshes are dominated by Lyngbye sedge and common silverweed as well as grass species such as bluejoint reedgrass and spiked bentgrass. Other species include tufted hairgrass, cleavers, Pacific water-parsley, northern grass-of-Parnassus, sweet gale, yellow marsh-marigold, marsh cinquefoil, and Douglas’ water-hemlock (SWCA 2002a).

Vegetated Pond

Aquatic pond vegetation is located along the edges of shallow ponds west of the Mendenhall River and along the fringes of the floatplane ponds at JIA. The ponds have unconsolidated sandy or silty bottoms

and are flooded year-round (SWCA 2002a; Watson 1979). The natural, shallow ponds west of the river support species such as: bladderwort, alkali grass, mare's tail, fineleaf pondweed, and ditch grass (Watson 1979).

Freshwater Shrub Wetland

Freshwater shrub wetlands are located adjacent to the freshwater sedge-grass wetlands along permanent streams and near the floatplane ponds at JIA (SWCA 2002a). There are also freshwater shrub wetlands in lowland areas near Hendrickson and Fish Creeks on Douglas Island. The freshwater shrub willow community is dominated by Barclay and Sitka willow (SWCA 2002b). The freshwater willow community acts as a transition zone between the freshwater marshes and wooded plant communities. Shrub wetlands have poorly to moderately drained soils.

Bogs and Fens

Bogs and fens are open muskeg-type wetlands that are interspersed throughout the forest and usually contain small patches of forested or scrub wetlands. Sphagnum mosses and sedges dominate these types of wetland along with low shrubs and forbs. Muskegs in the study area range from nutrient-poor bogs to rich tall sedge fens. Bogs and fens are generally moderately sloped and typically remain wet and exhibit standing water throughout the year. Typical dominant species in these types of wetlands include stunted shore pine, Labrador tea, bog blueberry, lingonberry, crowberry, tufted clubrush, fewflower sedge, cottongrass, and mosses including sphagnum.

Forested Wetland

Forested wetlands are generally drier than other wetlands due to their locations on topographically higher or steeper sites, or because the substrates drain better internally. In the study area, the forested wetlands are primarily located at the head of Pederson Hill Creek and on the flatter parts of Douglas Island. Conifer species characterize these wetlands, although the trees may be stunted compared to trees found in better-drained forests. Species include shore pine, red and yellow cedar, western hemlock, and Sitka spruce. The understory includes blueberry, false azalea, skunk cabbage, and an herb ground cover.

Wetland Functions

Wetlands provide a variety of ecological functions depending on their setting within the landscape, and the wetland's size and type. The ecological functions of study area wetlands include (Adamus 1987):

- Regulating groundwater recharge, groundwater discharge and lateral flow
- Controlling surface water runoff
- Retaining sediments and toxicants
- Transforming and exporting nutrients
- Supporting riparian ecosystems
- Providing fish and wildlife habitat

The wetlands in the study area are generally estuarine and tidally influenced by the Gastineau Channel. The steep topography of the Juneau area creates a distinct break in slope between the wetlands and the surrounding mountains. The wetlands receive water from numerous streams, direct precipitation, overland runoff, and high tides. Although ecological functions are highly dependent on the location of the wetlands, generalized functional values for each wetland type are shown in Table 5-13.

Table 5-13: Functions of Wetland Types within the Study Area

	Intertidal Estuarine Marsh	Freshwater Sedge-grass Marsh	Vegetated Ponds	Freshwater Shrub Wetlands	Bogs and Fens	Forested Wetlands
Groundwater recharge	L	L	L	L	L	L
Groundwater Discharge & Lateral Flow	M	M	L	H	H	H
Surface Hydrologic Control	L	H	H	M	H	H
Sediment/Toxicant Retention	M	H	H	H	H	H
Nutrient Transformation & Export	H	M	L	M	M	M
Riparian Support	H	M	L	H	L	M
Fish Habitat	H	L	L	L	L	L
Wildlife Habitat	H	M	H	H	M	H
Regional Ecological Diversity	H	L	H	H	H	H
Erosion Sensitivity	L	L	L	L	L	L

Functional Values: High (H), Moderate (M), Low (L)

Based on data collected by: SWCA Environmental Consultants (2002a) and Juneau Wetlands Functions and Values (Adamus 1987).

Regulating Groundwater Recharge, Groundwater Discharge, and Lateral Flow

Groundwater recharge is the net downward vertical movement of surface water into an underlying aquifer. Recharge is rare in Southeast Alaska. Groundwater discharge is more likely and is the net upward vertical movement of groundwater from the aquifer to the surface. Discharge is important to fisheries because it helps maintain base flows for streams. In addition to groundwater recharge and discharge, lateral flow conditions may exist where groundwater flows horizontally through an area below the plant root zone. Lateral flow is common in estuarine wetlands with marine sediments (Adamus 1987).

Controlling Surface Water Runoff

By controlling surface water runoff, wetlands reduce the magnitude of peak flows and flood levels, delay the release of water to downstream areas immediately after storms, sustain stream flows during dry seasons, and reduce bank erosion and channel bed scour. This helps maintain drainage patterns, nutrient levels, and salinity levels. Constant salinity levels allow plant communities to thrive in particular parts of the intertidal zone. Freshwater flow in the study area supports the growth of Lyngbye sedge, a key wildlife resource, which grows best at salinities less than 10 parts per thousand (Adamus 1987).

Retaining Sediments and Toxicants

Sediment and toxicant removal refers to the removal of inorganic sediments (particularly finer materials) from aqueous solution and/or the removal of potentially toxic metals or hydrocarbons from solution. This may have considerable downstream benefits to water quality at the expense of habitat quality where this function is being performed (Adamus 1987).

Transforming and Exporting Nutrients

This function concerns a wetland's ability or potential ability to transform and/or export organic forms of nitrogen and phosphorous. In Juneau, organic forms of these nutrients have not accumulated to the point of negatively impacting water quality. In fact, they are essential for maintaining aquatic organisms. Removal of these nutrients would negatively impact the aquatic environment. However, when wetlands transform inorganic forms of nitrogen and phosphorous into organic forms they make them less available for algae growth downstream and more available for repeated cycling through the food web. This function can be detrimental in some areas and beneficial in others.

Supporting Riparian Ecosystems

Wetlands support riparian functions, regardless of whether they themselves are important fish habitats. Wetlands maintain naturally-occurring water temperatures critical for fish and invertebrate habitat and may produce plant material that is then exported to downstream ecosystems (Adamus 1987).

Providing Fish and Wildlife Habitat

An important wetland function is its ability to support fish and wildlife species. Estuarine and riparian wetlands provide important breeding, rearing, and foraging habitats for fish and their prey. They can also provide key staging and foraging areas for migratory birds, shorebirds, waterfowl, raptors, and passerines.

5.14.2 Upland Vegetation and Habitats

Upland plant communities in the project area can be divided into three major habitat types: coastal meadow, spruce-hemlock forest, and disturbed areas.

Coastal Meadow

Coastal meadows occupy large areas in and beyond the upper limits of the tidally influenced zones. Coastal meadows are generally composed of grass and forb communities. Generally, the grasses occupy areas that are only inundated during peak tides. Grass species include foxtail barley, red fescue, and tufted hairgrass. Coastal forb communities usually occur above areas of tide influence. Dominant forb species include beach rye, beach pea, yarrow, Nootka lupine, cow parsnip, sea-watch, kneeling angelica, beach lovage, hemlock parsley, Indian paintbrush, fireweed, and chocolate lily (SWCA 2002b). Lyngbye sedge is also found in the forb communities (ADF&G 1999). Woody plants, mosses, and lichen are absent from these habitats. Soils are mostly clays or fine silts.

Spruce-Hemlock Forest

The spruce-hemlock forest covers the majority of upland habitat within the study area. This community is dominated by an overstory of Sitka spruce and western hemlock. Depending on canopy cover, ground and shrub layers may include mosses, small herbs, ferns, blueberries, Devil's club, and false azalea (Watson 1984; SWCA 2002b; Viereck *et al.* 1992).

Spruce-hemlock forest is common in Southeast Alaska and is found at mostly low elevations on alluvial fans, floodplains, footslopes, and uplifted beaches, and at mid-elevations on steep slopes (Viereck *et al.* 1992). These communities occur on deep, well-drained, well-developed soils on interfluvies and on poorly drained, weakly developed soils on lowlands subject to flooding.

Disturbed Areas

This cover type comprises all habitats that are disturbed by human activities and do not represent natural conditions in the Juneau area. These areas support vegetation that may or may not be native to the Juneau area. Disturbed habitats include plant communities that colonize areas immediately after disturbance or

plant communities directly introduced by grass seeding and planting shrubs and trees.

5.15 Water Bodies, Wildlife, and Essential Fish Habitat

The principal water body in the project area is Gastineau Channel. Fritz Cove is located at the north end of the channel and Stephens Passage is located on the south end. There are approximately 20 streams within the project area that flow into the Gastineau Channel. Water resources in the project vicinity are influenced by the moist marine climate, orographic effects of the coast mountains, and wide tidal fluctuations. There are three types of water bodies within the study area: freshwater, brackish water, and saltwater. Freshwater systems are located where streams and wetlands are fed by groundwater and surface water. Creeks draining from the mountains are examples of freshwater systems. At the mouths of the creeks in the deltas, the freshwater becomes brackish as it mixes with the ocean water. Brackish systems are located at the mouth of the Mendenhall River, and streams such as Duck, Jordan, and Lemon Creeks. Saltwater systems are dominated by tidal activity and include Fritz Cove and Auke Bay. The portion of Gastineau Channel within the study area fluctuates between freshwater, brackish, and saltwater, depending on tide levels.

5.15.1 Water Bodies

Gastineau Channel

Gastineau Channel extends northwest to southeast, separating Douglas Island from the mainland of Southeast Alaska. The channel is approximately 16 miles long, of which approximately 6 miles is within the project area (Fritz Cove to Salmon Creek). The channel is relatively uniform in width, ranging from about 2,000 to 2,800 feet wide and bottom elevations range from about 10 above MLLW to about 60 feet below MLLW in the project area. Gastineau Channel is subject to extreme tidal fluctuations, with high tides of 18 feet or higher occurring about five times per month. Navigational characteristics of the channel and tidal datums are described in Section 5.7.2.

Mud and sandflat areas are present on both shores of the channel, and occur more extensively in the area between Fritz Cove (west) and the mouth of Salmon Creek (east). These are referred to as the Mendenhall Flats. The Mendenhall Flats and associated salt marsh areas formed as the result of the recession of three major glaciers: the Mendenhall Glacier, Thomas Glacier, and Lemon Glacier. As the glaciers retreated, water flowed from the melting ice, depositing sand and silt. Salt marsh wetlands developed on the sediments left by the glaciers (ADF&G 2003a). In the present climate regime, there has been a dramatic retreat of glaciers worldwide. However, there have been mini-ice ages when the glaciers have periodically advanced. Glacial activity and corresponding sea level changes have left a complex network of gravels, sands, silts, marine deposits, peat, and clay across the valley and estuary (Vigil-Agrimis 2002).

Much of the Mendenhall Flats is intertidal and submerged only at high tides. Some deeper channels exist, but are generally shallower than -20 feet MLLW. The estuarine flats are highly influenced by the discharge of freshwater; the largest freshwater inputs come from the Mendenhall River (Vigil-Agrimis 2002). At least 12 smaller streams also discharge to the flats.

Fritz Cove

Fritz Cove comprises the westernmost portion of the project area, occupying approximately 3 square miles at mean higher high water (MHHW). The cove is an estuary, and about 12 percent of it is characterized as intertidal habitat. The deepest area of the cove is about -345 feet (relative to MLLW). Most subtidal areas of the cove that are deeper than -65 feet MLLW are covered with glacial silt. In general, subsurface currents are weak, non-directional, and tidally derived (Stone and O'Clair 2001).

Fritz Cove is strongly influenced by freshwater; both the large, glacial Mendenhall River and non-glacial Fish Creek discharge to the head of the cove. The cove is shallow at its head adjacent to the Mendenhall Flats, gradually deepening toward the mouth. The deepest area of the cove is located due south of Spuhn Island (Stone and O'Clair 2002).

Temperature and salinity in Fritz Cove vary seasonally over a fairly narrow range. At elevations of –65 feet and –130 feet (relative to MLLW), temperatures ranged from 37 to 48 °F and salinities from 26,000 to 31,500 parts per million (ppm). More variance occurs in shallower depths and intertidal areas (Stone and O'Clair 2002).

Three other prominent features of the oceanography of Fritz Cove are:

- A strong primary phytoplankton bloom beginning in April (Ziemann *et al.* 1991) producing elevated dissolved oxygen concentrations in shallow water.
- Decreased surface salinity caused by large volumes of freshwater from the glacially fed Mendenhall River and development of a pronounced vertical gradient of salinity to –100 ft (relative to MLLW) or deeper between May and November (Bruce *et al.* 1977).
- Complete mixing of the water column in November caused by cooling of surface waters, decreased freshwater input, and surface mixing by storms (Bruce *et al.* 1977). The water column remains well mixed through March (Stone and O'Clair 2002).

Mendenhall River

The Mendenhall River is largely fed by meltwater from Mendenhall Glacier, which feeds into Mendenhall Lake. From the lake, the Mendenhall River flows south approximately 5.5 miles and enters Fritz Cove. The Mendenhall River watershed is approximately 100 square miles and ranges in elevation from sea level to nearly 7,000 feet (Vigil-Agrimis Inc. 2002). Glaciers cover a large portion of the upper Mendenhall River watershed, whereas the valley floor is relatively flat and occupied by residential or industrial developments. Peak flows and flooding of the river usually occur in late summer or fall when warmer summertime temperatures and associated snowmelt are combined with heavy rain. The amount of water flowing from Mendenhall Lake is the critical factor when determining the surface water supply for the valley below (Neal and Host 1999; Barnwell and Boning 1968). Stream gauging stations, established by the U.S. Geological Survey, measure a mean annual discharge of 1,164 cubic feet per second (cfs) (Vigil-Agrimis Inc. 2002). In 1998, a record Mendenhall River discharge of 12,400 cfs occurred. The recurrence interval for a flooding event of this magnitude was 10 years (Neal and Host 1999).

Other Water Bodies

Other smaller streams and creeks within the project area that flow into Gastineau Channel are shown in Figure 5.13. They are discussed further in Section 5.15.2, which addresses anadromous fish and their habitat.

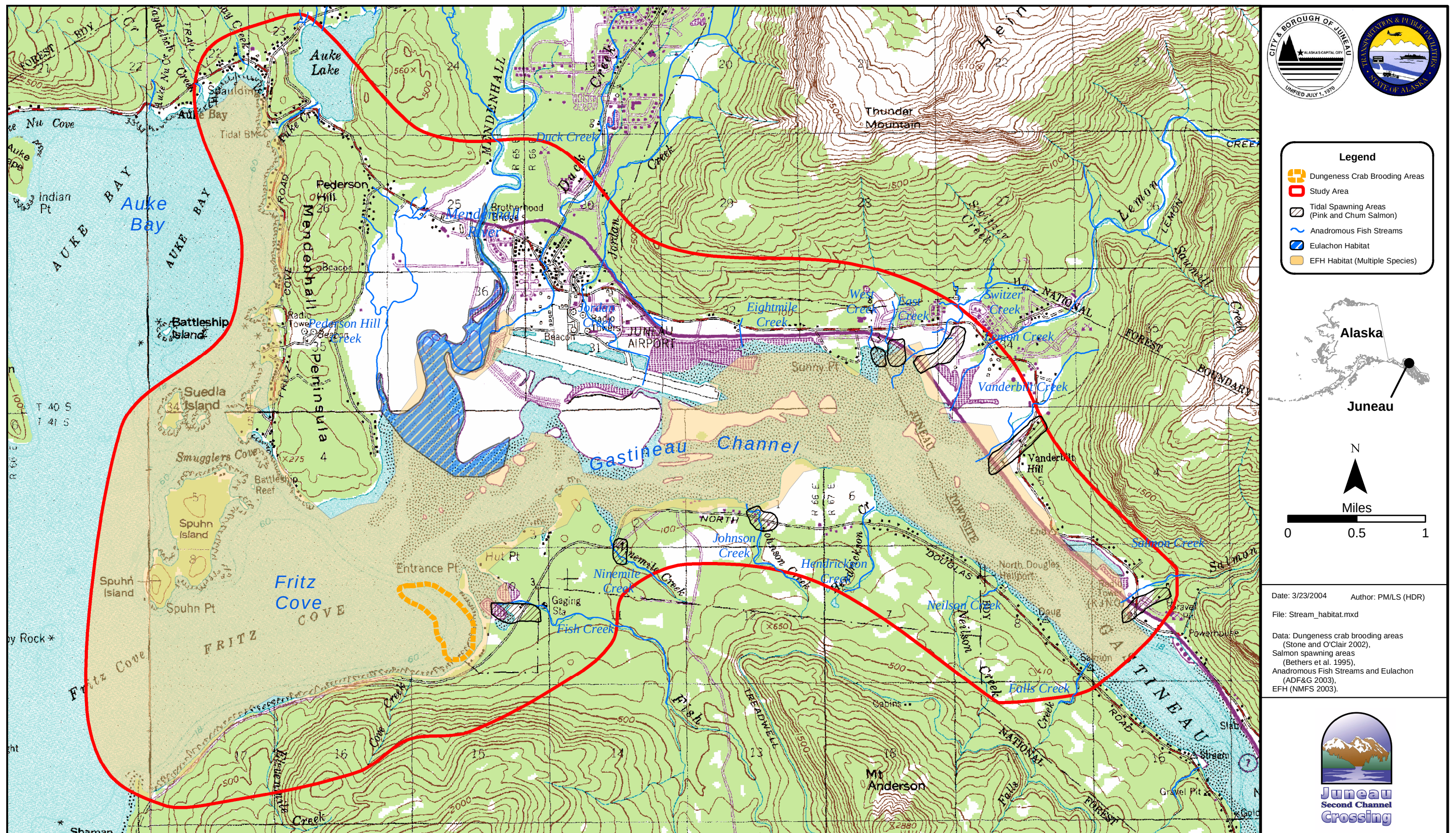
5.15.2 Aquatic Species

Anadromous Fish

Salmonids

The Mendenhall Flats, Fritz Cove, Gastineau Channel, and associated streams provide spawning, summer rearing, and overwintering habitat for seven species of anadromous salmonids:

- Coho salmon (*Oncorhynchus kisutch*)
- Pink salmon (*Oncorhynchus gorbuscha*)



Juneau Second Channel Crossing

Anadromous Fish Streams, Dungeness Crab Brooding Areas, and Essential Fish Habitat

Figure 5.13

- Chum salmon (*Oncorhynchus keta*)
- Sockeye salmon (*Oncorhynchus nerka*)
- Steelhead (*Oncorhynchus mykiss*)
- Chinook salmon (*Oncorhynchus tshawytsch*)
- Cutthroat trout (*Oncorhynchus clarki*)
- Dolly Varden char (*Salvelinus malma*)

Anadromous salmonids use and depend on both freshwater and marine habitats during their life stages. This section presents anadromous salmonid lifecycle information, concentrating on the use of tidal estuarine and marine habitats, but presents freshwater stock assessment data as well, to provide a sense of which creeks may be used extensively by fish.

The timing of the different life stages of these salmonids as they migrate, rear, or spawn in project area habitats is presented in Table 5-14. Except for the Mendenhall River, the project area lacks large river systems that produce great numbers of fish; therefore, much of the anadromous fish production is based on small runs in the many streams that discharge into the project area. Few of the streams contain all types of the anadromous species identified in the area. Rather, some species are present in almost all of the local streams. Table 5-15 shows the local streams in the project area, the anadromous salmonids known to be present, and estimated populations. Figure 5.13 shows the locations of all the anadromous streams within the study area. It should also be noted that Douglas Island Pink and Chum, Inc. (DIPAC), a salmon hatchery located along Gastineau Channel at Salmon Creek on the mainland, releases millions of juvenile pink, chum, coho, and chinook salmon annually into the project area. In 2001, DIPAC released 27 million chum, 1.7 million pink, 990,000 coho, and 560,000 chinook salmon. A portion of the resulting adult salmon stray into area streams and spawn (SWCA 2002b).

Table 5-14: Migratory Timing of Anadromous Salmonids Observed in the Project Area

Phase	Coho	Chinook*	Steelhead	Sockeye	Pink	Dolly Varden	Chum	Cutthroat
Adult Return	Aug-Sept	May-Jun	Apr-May	Jun-Aug	Jul-Aug	Jul-Sept	Jun-Aug	Aug-Oct
Spawn	Oct-Nov	July-Sept	May-Jun	Aug-Sept	Jul-Aug	Oct-Nov	Jul-Aug	May-Jun
Incubation/ Emergence	Nov-Apr	March-Apr	Jul-Aug	Sept-Mar	Aug-mar	Nov-Apr	Aug-Apr	Jul-Aug
Juvenile Rearing	1-3 yrs	1-2 yrs	2-4 yrs	2-3 yrs	None	3-4 yrs	None	2-4 yrs
Juvenile Outmigration	May-Jun	Apr-Jun	May-Jun	May-Jun	Apr-May	Apr-May	Apr-May	May-Jun
Adult Outmigration	None	None	May-Jun	None	None	Apr-May	None	May-Jun
Adult Overwinter	None	None	None	None	None	Oct-May	None	Oct-Jun

Source: Bethers *et al.* 1995; *Chinook data from Groot and Margolis (1991).

**Table 5-15: Streams Bearing Anadromous Salmonids in the Project Area,
and Existing Adult Escapement Data**

Stream	Species Present	Adult Escapement Data*	Comments
Duck Creek	Coho Pink Chum Dolly Varden Cutthroat	21-50 1 2 No data No data	Historically, up to 10,000 chum, now believed to be extinct
East Creek	Coho Pink Dolly Varden	No data	
Falls Creek	Dolly Varden Cutthroat	No data	
Fish Creek	Coho Pink Chum Chinook	1-244 320-56,140 107-5,366 1-356	Escapement data for chum and pink from 1960-1994; coho from 1978-1992; chinook from 1989-1994
Hendrickson Creek	Coho Pink Chum Dolly Varden Cutthroat	21 24-2,000 2	Data from 1983-1984 only
Johnson Creek	Coho Pink Chum Dolly Varden Cutthroat	0-53	Data from 1978-1990. No data for the other salmonids
Jordan Creek	Coho Pink Dolly Varden Cutthroat	31-785	Data from 1969-1994. No data for other salmonids
Lemon Creek	Coho Pink Chum Dolly Varden	0-15 8-11 1-1,210	Data from 1975-1994 for coho, 1980/81 for pink, 7 yrs of data between 1946-1989 for chum
Mendenhall River	Coho Pink Chum Sockeye Dolly Varden Cutthroat Steelhead	30,000	Estimated 15,000 salmon of all other species, except Dolly Varden. Surveys difficult in glacial water.
Neilson Creek	Coho Pink Dolly Varden	No data	
Ninemile Creek	Coho Chum Dolly Varden Cutthroat	2 4	Data limited to 1976 and 1984.
Pederson Hill Creek	Coho Pink Dolly Varden Cutthroat	No data	

Table 5-15 (continued)
Streams Bearing Anadromous Salmonids in the Project Area,
and Existing Adult Escapement Data

Stream	Species Present	Adult Escapement Data*	Comments
Salmon Creek	Coho Pink Chum Dolly Varden	0-2,600 0-26,681 20-14,729	Data from 1960s to 1990s
Switzer Creek	Coho Pink Chum Dolly Varden Cutthroat	7-227 0-485 0-342 up to 1,000	Data from 1974-1994. Dolly Varden counts incidental during salmon surveys
Vanderbilt Creek	Coho Pink Chum Dolly Varden	4-50 2-941 1	Data from 1978-1992
West Creek	Coho Pink Dolly Varden	30-471	Data from 1985 and 1994 only.

Source: Bethers *et al.* 1995. * Escapement data are usually 1-day counts during the spawning run.

Coho Salmon. Coho (silver) salmon enter spawning streams in the project area from August through October, usually during periods of high water. Adults typically hold in pools or lakes for several weeks until mature, and then move into shallow riffles with clean gravel to spawn. Spawning occurs in October and November, and eggs develop over the winter and hatch in early spring (Table 5-14). Most coho spawn in upper mainstem streams and tributaries, upstream of tidal influence, with the largest spawning populations in the Mendenhall River basin. However, small populations of coho salmon spawn in most of the streams that discharge to the Mendenhall Flats, Fritz Cove, and Gastineau Channel where there is access above tide and suitable spawning habitats. Coho salmon rear in freshwater for 1 to 3 years before migrating to marine habitats in May and June (Bethers *et al.* 1995). Because coho salmon rear in freshwater for over a year, important distinctions can be made between overwintering and summer rearing habitats. Coho typically rear during the summer in riffle and pool habitats in mainstem and tributary streams, and sometimes enter estuaries. Coho generally overwinter in deeper pools, spring-fed ponds, and intertidal areas, seeking waters protected from freezing. Coho salmon migrate to marine waters during the spring at a larger size than most other salmon species and generally do not spend large amounts of time in estuarine habitats, instead migrating directly to the ocean.

Studies during the 1990s found that an average of 6,000 juvenile coho salmon moved into Duck Creek to overwinter. The spawning of adult coho in the stream appeared unsuccessful in Duck Creek with no young-of-the-year fry observed, indicating that juvenile coho moved from other streams into Duck Creek. Overwintering survival was high, and spring smolt outmigrations ranged from 1,700 to 3,200 coho, indicating the importance of this stream for overwintering coho. Bishop *et al.* (1987) reported that Jordan Creek has the second highest density of overwintering juvenile coho of all streams sampled in the Juneau area. The extensive tidal wetlands at the mouth of the Mendenhall River are important to juvenile coho and other anadromous salmonid species for rearing and smoltification prior to outmigration to marine areas (Bethers *et al.* 1995). The flats also reportedly have been used by pre-smolt juveniles (ages 1 and 2) as summer rearing habitat. After spending the summer in the estuary, the juveniles return upstream to overwinter (Koski 2003).

Pink Salmon. Pink (humpback) salmon enter spawning streams from late June through mid-August (Table 5-14). Different stocks or runs frequently have different spawning times occurring in adjacent streams or even within the same stream. Most pink salmon spawn in the lower reaches, commonly within tidal freshwater portions of streams (Figure 5.13). Pink salmon have been observed to spawn in the tidal portions of eight streams in the project area, with adult escapements of over 10,000 fish recorded in Fish Creek (Tables 5-15 and 5-16). Eggs incubate during the fall and winter; fry emerge during the spring and immediately outmigrate to the estuary. Newly emigrant pink salmon fry are commonly observed in large numbers at river mouths, coves, and inlets where tidal currents are not strong. This can include non-natal streams such as Pederson Hill Creek, which is known to be very important springtime habitat for pink salmon from local streams, although the stream itself does not have a significant run (Bethers *et al.* 1995).

Table 5-16: Intertidal Spawning of Salmonids in the Project Area

Stream	Pink Salmon	Chum Salmon	Chinook Salmon
East Creek	◆		
Fish Creek	◆	◆	◆
Johnson Creek	◆	◆	
Ninemile Creek	◆	◆	
Salmon Creek	◆	◆	
Switzer Creek	◆	◆	
Vanderbilt Creek	◆	◆	
West Creek	◆		
◆ = present			

Source: Bethers *et al.* 1995.

Celewycz *et al.* (1994) determined that pink salmon disperse rapidly from Gastineau Channel, rearing more extensively in Auke Bay. In Auke Bay, there was a minor peak in outmigration in April. The catch then increased rapidly in the first week of May and peaked in mid-May. In Gastineau Channel, catch was low except for a single peak in early May. The residence times of pink salmon in Auke Bay are longer. At both locations, catch declined to near zero the week after peak catches, indicating a relatively rapid outmigration from estuarine areas. No sampling stations were situated in the Mendenhall Flats or Fritz Cove, so it is not known to what extent or duration pink salmon use these estuarine habitats.

Chum Salmon. Two types of chum (dog) salmon are present in project area streams—summer-run and fall-run. Summer chum enter freshwater in July and early August and spawn by the end of September. Fall chum salmon enter freshwater streams from September through November and spawn from October through December. Similar to pink salmon, chum salmon are known to spawn in the tidal portions of streams, but will more often spawn in upstream sections. Chum salmon have been documented to spawn in the tidal portions of six streams discharging to the project area (Table 5-16; Figure 5.13). Chum salmon fry generally emerge during March and April and immediately migrate to the estuary. Chum salmon fry tend to remain in estuaries longer than pink salmon. Escapements of over 1,000 fish have been observed in Fish Creek (Table 5-15; Bethers *et al.* 1995).

As with pink salmon, Celewycz *et al.* (1994) found that juvenile chum salmon reared more extensively in Auke Bay than in Gastineau Channel. Chum salmon fry first appeared in Auke Bay in early May, and a few were caught through June. No sampling occurred in the Mendenhall Flats area of the estuary.

Sockeye Salmon. Sockeye (red) salmon enter freshwater during June and July, usually passing through a nursery lake on their way to spawning streams in headwater tributaries. Sockeye also spawn in lake

outlets and along the lakeshores. Most spawning is completed by late August. Eggs incubate during the fall and winter, and young fry move into nursery lakes within the basin in early spring. Juvenile sockeye spend 2 to 3 years in a nursery lake before outmigrating to the estuary in the spring (Bethers *et al.* 1995). Similar to coho, sockeye juveniles are larger upon outmigration and spend little time in the estuary, and instead migrate directly to the ocean.

The only basin within the project area that has runs of sockeye salmon is the Mendenhall River. Sockeye salmon spawn in upper tributary streams, using Mendenhall Lake and Windfall Lake as juvenile nurseries. Several other stream basins outside of the project area, including Auke Lake, Eagle River, and Herbert River, also have sockeye stocks that may add juvenile outmigrants to the project area. Celewycz *et al.* (1994) captured only 29 juvenile sockeye salmon in Gastineau Channel, although sampling ceased in mid-June, which is likely before the end of the sockeye outmigration. NOAA Fisheries has reported the observation of large numbers of juvenile sockeye in the project area, but have not assessed the data (Koski 2003). No other information or data was identified for sockeye salmon.

Chinook Salmon. Chinook (king) salmon have a highly variable life history that includes freshwater incubation, emergence, and initial rearing of juveniles; migration to saltwater habitats for extended periods of feeding and growth; and return to natal waters for completion of maturation, spawning, and death. Fish Creek is the only stream within the project area known to contain chinook salmon. The DIPAC fish hatchery began introducing juvenile smolts in 1986 as part of the Juneau sportfishing enhancement program (Bethers *et al.* 1994). Stocking efforts in Fish Creek are ongoing with a plan to release 180,000 annually between 2005 and 2010 (ADF&G 2005).

Celewycz *et al.* (1994) determined the chinook migration period to be between mid-April to mid-June with smolts first appearing in nearshore estuarine water in early June. Chinook smolts were also found to be evenly distributed throughout Auke Bay and Gastineau Channel.

Cutthroat Trout. Anadromous cutthroat trout have a significantly different life history than the Pacific salmon species. Cutthroat trout are multiple spawners, usually spawning once per year for several years after reaching maturity. Cutthroat trout also do not migrate to the ocean, instead spending spring and summer periods in estuaries and overwintering in lakes. Mendenhall Lake is considered an important overwintering area for anadromous cutthroat trout and is likely used by fish from many natal streams in the project area. Spawning occurs from May through July, often in the headwaters of very small streams. The species rears in freshwater for 2 to 4 years before outmigrating. Resident stocks are also present in project area streams, most often identified above physical barriers (Bethers *et al.* 1995).

Very little information or data regarding anadromous cutthroat trout movements or populations are available. Fish trap data have documented cutthroat trout in many streams including Pederson Hill, Duck, Falls, Fish, Hendrickson, Johnson, Ninemile, and Switzer Creeks, and the Mendenhall River. The populations are reportedly resident in Hendrickson and Johnson Creeks although no barriers are present on these streams. A barrier is present in tidal portions of Falls Creek indicating that this population is likely resident (Bethers *et al.* 1995).

Steelhead Trout. Steelhead trout, which are the anadromous form of rainbow trout, enter spawning streams from mid-April through mid-May, and most spawning is completed by late June. Steelhead trout do not necessarily die after spawning; however, the proportion of repeat spawners usually constitutes only 35 percent or less of the spawning population. Juvenile steelhead rear in freshwater for 2 to 4 years before outmigrating. Steelhead are not known to use estuarine habitats for extensive periods, usually migrating directly to the ocean. Within streams that discharge to the project area, only the Mendenhall River basin is known to contain populations of steelhead. No other information was available on this

species.

Dolly Varden Char. Dolly Varden char spawn during October and November, but may enter spawning streams as early as July (Table 5-14). Similar to anadromous cutthroat trout, Dolly Varden have annual migrations to estuaries during the spring, may spawn more than once, and overwinter in lakes (Bethers *et al.* 1995). Char originating from a lake system conduct relatively simple annual migrations to and from the estuary, leaving the lake in the spring and returning in late summer and fall. Smolts, non spawners, as well as mature spawners conduct this migration, spending from a few days to several months feeding in the estuary before returning to the lake system. Char originating from non-lake systems conduct much more complex migrations. First year outmigrants leave their natal streams, usually in the spring, and enter and leave other non-lake systems until a lake is found. After spending the winter in the lake, non-spawning char migrate to sea in the spring and randomly enter other stream systems, migrating back to the lake to overwinter. Spawners outmigrate from the lake in the spring, but migrate directly to their natal streams without entering other streams on the way. After spawning, the survivors return directly to the lake system to overwinter (Armstrong 1984). Resident populations that do not migrate are also present in project area streams, usually above natural barriers. Eggs incubate over the winter and juveniles spend 3 or 4 years in freshwater before outmigrating (Bethers *et al.* 1995).

It is believed that most anadromous char in project area streams use Mendenhall Lake as an overwintering lake. As many as 30,000 Dolly Varden migrate to the lake annually (Bethers *et al.* 1995). Because char will enter and leave non-natal streams while feeding and seeking out a lake environment, assessing the populations of individual streams is difficult. However, because of these complex migratory behaviors, char are ubiquitous, present in almost all streams that contain salmonids in the project area (Table 5-15).

Other Anadromous Fish

Eulachon are a non-salmon anadromous species that spawn in the lower reaches of moderate to large streams. Spawning populations have been observed in the Mendenhall River. Two other forage fish species, Pacific sand lance and capelin, are present throughout the Mendenhall Flats, and are reportedly abundant near the Mendenhall River mouth. Both species can occupy low salinity waters and have been commonly documented in lower Jordan and Duck Creeks (Koski 2003). Sand lance and capelin are important forage species for numerous fish, waterfowl, and seabirds that inhabit the Mendenhall Flats (Robards *et al.* 1999; Armstrong, R., ADF&G, personal communication 8/14/03). Another forage species, Pacific herring, is seasonally abundant throughout the project area (Celewycz *et al.* 1994) and is known to overwinter in the area of Fritz Cove and Auke Bay (Carlson 1980).

Marine Fish

Data and information on marine fish species in the project area are limited. The NOAA Fisheries Auke Bay Laboratory has conducted trawl surveys at several stations within Fritz Cove and Gastineau Channel over the years (Carlson *et al.* 1982). Table 5-17 presents a list of all non-salmonid species observed from 1974 to 1981, and Table 5-18 presents the species composition and relative abundance data from beach seine sampling conducted in 1991.

The trawl survey data showed that nearly 30 species of marine fish have been observed in Fritz Cove, while only 9 species were observed in Gastineau Channel. Flatfishes were the dominant species in both areas, with starry flounder the dominant species. In Gastineau Channel, juvenile walleye pollock were also observed while adult pollock were principally caught in Fritz Cove (Carlson *et al.* 1982). In beach seine sampling conducted in 1991 at six stations in Gastineau Channel, a different species composition was observed. Here, eulachon dominated the catch followed by sculpins and flatfish (Celewycz *et al.* 1994). The difference in species composition may be the result of sampling more nearshore areas with the beach seine compared to offshore areas with the trawl surveys.

Table 5-17: Non-Salmonid Species Observed in Fritz Cove and Gastineau Channel

Species	Fritz Cove	Gastineau Channel
Spinycheek starsnout	◆	◆
Yellowtail rockfish	◆	
Black skate	◆	
Longnose skate	◆	
Flathead sole	◆	◆
Starry flounder	◆	
Rock sole	◆	
English sole	◆	
Dover sole	◆	
Yellowfin sole	◆	◆
Arrowtooth flounder	◆	
Rex sole	◆	
Alaska plaice	◆	
Walleye pollock	◆	◆
Pacific cod	◆	
Eulachon	◆	◆
Pacific herring	◆	
Ratfish	◆	
Wattled eelpout	◆	
Shortfin eelpout	◆	
Prickleback	◆	
Rose snailfish	◆	
Pacific staghorn sculpin	◆	◆
Great sculpin	◆	◆
Spinyhead sculpin	◆	◆
Silverspotted sculpin	◆	
Blackfin poacher	◆	
Sturgeon poacher	◆	◆
Greenling	◆	

◆ = present

Source: Carlson *et al.* 1982

Table 5-18: Relative Abundance of Non-Salmonid Fish in Gastineau Channel

Fish Family	Total Number
Sculpin (Pacific staghorn and Great)	114
Pacific herring	34
Eulachon	327
Sand lance	21
Gunnels (Pholidae)	33
Pricklebacks (Stichaeidae)	51
Flatfish (Pleuronectidae)	62
Greenlings (Hexagrammidae)	5

Source: Celewycz *et al.* 1994

Essential Fish Habitat

EFH Law

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act included new provisions concerning the identification and conservation of Essential Fish Habitat (EFH). The Magnuson-Stevens Act defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” NOAA Fisheries and regional Fishery Management Councils (Councils) must describe and identify EFH in fishery management plans (FMPs), minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH. Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NOAA Fisheries, and NOAA Fisheries must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH. Councils also have the authority to comment on federal or state agency actions that would adversely affect the habitat, including EFH, of managed species.

Marine EFH

Species for which marine EFH has been designated in the project area by NOAA Fisheries include (NOAA 2004a):

- Pacific salmon (chinook, coho, chum, pink, and sockeye)
- Walleye pollock
- Pacific cod
- Yelloweye rockfish
- Shortraker rockfish
- Roughey rockfish
- Dusky rockfish
- Pacific ocean perch
- Sablefish
- Sculpins
- Skates

Walleye pollock and Pacific cod are commonly documented in the project area; juveniles have been found in Gastineau Channel and in Auke Bay, adjacent to Fritz Cove. Adults of both species use Fritz Cove. Although not often documented in project area sampling, sablefish and the rockfish species use protected nearshore habitats, such as those found in Fritz Cove and the Mendenhall Flats, as juvenile rearing areas. Adult sablefish dwell in offshore waters, but juveniles have been documented in shallow protected areas where they spend their first winter. Occasionally, during large year classes, two-year-old fish will reside in many inshore areas during the summer (Clausen *et al.* 1998). Much less is known about the rockfishes. Smaller juveniles are often found in nearshore areas, particularly those associated with rocky substrates and areas of high relief. Recent research by NOAA Fisheries found that the juveniles of 12 species of rockfish have been observed in nearshore waters of Southeast Alaska (NOAA 2004b).

The NOAA Fisheries Auke Bay Laboratory has reported that the Mendenhall Flats provide productive habitat for several EFH forage fish species including sand lance, capelin, Pacific herring, and eulachon. Eulachon spawn in the lower Mendenhall River, and juvenile herring of the depressed Lynn Canal herring stock use the area as a nursery. Capelin have also been documented to spawn in the Mendenhall Flats (Koski 2003).

Anadromous Fish EFH

NOAA Fisheries designates as EFH all anadromous streams listed in the ADF&G *Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes*. Table 5-15 lists the anadromous fish streams.

The Mendenhall River has been designated as an EFH spawning stream for anadromous salmonids. NOAA Fisheries has found that the Mendenhall River is a very important juvenile habitat for five species of salmon and that coho, chum, pink, and sockeye salmon spawn and rear in the Mendenhall River basin (Koski 2003).

5.15.3 Marine Mammals

The marine waters of Gastineau Channel and Fritz Cove support humpback whales, Steller sea lions, and harbor seals. NOAA Fisheries lists the humpback whale as “endangered” and the Steller sea lion as “threatened.” Harbor seals are listed as a State of Alaska Species of Special Concern. These marine mammals are more thoroughly discussed in Section 5.20 *Threatened, Endangered, and Sensitive Species*.

5.15.4 Amphibians

Some freshwater ponds in the Juneau area support breeding populations of western toads (*Bufo boreas*), wood frogs (*Rana sylvatica*), and rough-skinned newts (*Taricha granulosa*). The Columbia spotted frog (*Rana luteiventris*) and Pacific chorus frog (*Pseudacris regilla*) are also found in the Juneau and are suspected to have been introduced (Carstensen *et al.* 2003). Western toads breed in freshwater wetlands and move to terrestrial, non-forested areas to feed on insects and other small animals during adulthood (MacDonald 2003). The western toad breeds within the MWSGR (ADF&G 1990; Wilson 2003). Rough-skinned newts (*Taricha granulosa*) inhabit humid coastal forests where they live in small ponds and lakes. During the winter they use forested cover for foraging and overwintering below ground. The newts found in Juneau area ponds were likely introduced (MacDonald 2003; Carstensen 2004). Wood frogs inhabit a wide variety of habitat types including grassy meadows, open forest, muskegs, and tundra. Wood frogs are found throughout mainland Southeast Alaska (MacDonald 2003). They breed in shallow bodies of permanent or temporary water. Populations of wood frogs on Douglas Island are suspected transplants (MacDonald 2003).

5.15.5 Macroinvertebrates

Several species of macroinvertebrates, principally crabs, have been documented in the project area, as shown in Table 5-19. Fritz Cove is an area of high abundance for Dungeness crab; substantial recreational crab fisheries are present in the area, and crabs appear to use unique habitats present in the cove. A conservative estimate of the Dungeness population is about 10,000 adults (Stone, R.P. 2003). Ultrasonic biotelemetry studies conducted in Fritz Cove indicate that male and female crabs have different seasonal patterns of habitat use. Female crabs were generally below depths of 65 feet and relatively inactive over the winter; ovigerous crabs were typically buried in dense aggregations in loose sand. By late April, an abrupt movement to shallow water (<26 feet) occurred, and females remained in these areas until early June. This was coincident with spring phytoplankton blooms and initiation of larval hatching. Increased activity occurred through the summer, with crabs moving back into deeper water, presumably to forage. Male crabs occupied deep water over the winter (>130 feet) and then moved to shallower water (<80 feet), segregated from the females until late July. Males were most active in late summer, moving into deeper water (>100 feet) near the mouth of the cove through the fall. Crabs did not migrate out of the cove. Females typically moved only about 1 mile and males about 4.5 miles within the cove over the year (Stone and O’Clair 2001). Female crabs brood in the same area each year—an approximate 0.3-square-mile area in the southeastern portion of Fritz Cove. Brooding crabs aggregate in sediments conducive to enhanced exchange of oxygenated, near-bottom water with pore water

surrounding their embryos. Annual use of the main brooding area was documented over a 12-year period and emphasizes the importance of these areas (Stone and O'Clair 2002). The Dungeness crab brooding areas within the study area are shown in Figure 5.13. Stone (1999) also observed mass molting of hundreds to thousands of tanner crabs at the head of Fritz Cove during the spring.

Table 5-19: Macroinvertebrate Species Observed in the Project Area

Species	Fritz Cove	Gastineau Channel
Hermit crab	◆	◆
Tanner crab	◆	◆
Lyre crab	◆	◆
Red king crab	◆	
Dungeness crab	◆	
Pink shrimp	◆	◆
Sidestripe shrimp	◆	
Coonstripe shrimp	◆	
Brown shrimp	◆	◆
Octopus	◆	
◆ = present		

Source: Carlson *et al.* 1982

5.15.6 Birds

Three hundred bird species have been documented in the Juneau area, from Taku Inlet to Berners Bay (van Vliet *et al.* 2001). Bird species in the project area can be found in a variety of habitat types, including open waters, freshwater sedge-grass marsh, intertidal estuarine low and high marsh, ponds, freshwater shrub thicket, coastal meadow, bogs and fens, forested wetlands, and spruce/hemlock forest. The estuarine wetlands found throughout the project area produce abundant sources of food for many species of birds. Approximately 230 bird species have been observed within and adjacent to the Mendenhall wetlands, most of which occur during spring and fall migration and during the winter (Armstrong and Gordon 2002). The Mendenhall flats area is one of the few major concentration areas for wintering water birds in Southeast Alaska and among the most important wetland complexes for waterfowl in northern Southeast Alaska (ADF&G 1990).

A 'hotspots' bird survey was conducted from April 2002 to May 2003 on the Mendenhall wetlands in order to document areas of high bird concentrations at low tide throughout the year (*'Hotspots' Bird Survey of the Mendenhall Wetlands*). The survey found that the top hotspots of bird activity over the entire year were Mendenhall River mouth, Fritz Cove, the mudflats between the Mendenhall River mouth and the west end of Gastineau Channel, and the Salmon Creek estuary. These locations are shown in Figure 5.14. Total birds seen in these areas during fall surveys over 14 months ranged from 4890 to 8186. In addition to the top hotspots, secondary hotspots include the Fish Creek estuary, the west end of the low tide Gastineau Channel, a pond and adjacent sedge flats immediately south of the airport dike trail, and the Neilson Creek estuary (Armstrong *et al.* 2004).

Waterfowl, including Barrow's goldeneye, common goldeneye, greater scaup, white-winged scoter, bufflehead, common mergansers, surf scoters, Canada geese, and mallards, can be found wintering within the MWSGR. Waterfowl are most often seen along intertidal sloughs and in the Mendenhall River. Wintering waterfowl begin arriving in late August to feed on seeds from sedges, grasses, and other plants. Waterfowl are the most abundant wintering birds in the MWSGR, with surf scoters being the most abundant of all species (ADF&G 1990). The scoters feed primarily on mollusks but also may consume



LEGEND

Top Hotspots

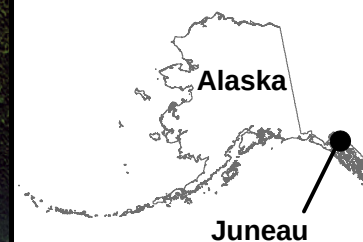
- 1 Fritz Cove
- 2 Mendenhall River Mouth
- 3 Western mudflat sand lance area
- 4 Salmon Creek estuary

2nd Tier Hotspots

- 1 Western Channel
- 2 Lower Fish Creek estuary
- 3 Sedge flats west of Otter Pond
- 4 Otter Pond
- 5 Nelson Creek estuary

Coldspots

- 1 Mendenhall River
- 2 Upper Mendenhall River
- 3 Upper Mendenhall River
- 4 Fish Creek pond
- 5 Fish Creek pond
- 6 Junk Car Slough
- 7 Phalarope Slough
- 8 Ninemile Creek estuary



Miles
0 0.25 0.5

Date: March 2004 Author: HDR Alaska, Inc
File: Hotspots.mxd

Data: Armstrong, Carstensen, and Willson (2004)



Juneau Second Channel Crossing

Figure 5.14
Low Tide Bird Concentration Areas

crustaceans, aquatic insects, small fish, echinoderms, marine worms, and plant material (Kaufman 1996). Most of the world's population of Vancouver Canada geese remains in Southeast Alaska year round, with an estimated 500 to 700 using the Mendenhall wetlands (Armstrong *et al.* 2004). Lesser Canada geese, white-fronted geese, and snow geese visit the Mendenhall wetlands during spring migration to feed on sedges and other vegetation (Cain *et al.* 1988). Breeding areas for waterfowl within the study area are limited to the floatplane basin and dredge ponds at JIA where, in recent years, northern shoveler, northern pintail, mallard, American wigeon, Canada goose, green and blue-winged teal, gadwall, and lesser scaup have nested (Armstrong and Gordon 2002). High concentrations of marbled murrelets are common in Fritz Cove during spring, summer, and winter (Armstrong and Gordon 2002). Marbled murrelets are opportunistic predators, feeding on a wide variety of crustaceans and small fishes (DeGange 1996).

During migration, the mouths of Jordan, Switzer, Salmon, and Lemon Creeks and the Mendenhall River are popular areas for mallards, pintails, green-winged teal, northern shovelers, and American wigeons (Watson 1979). After migration, the sedge meadow communities are used heavily by dabbling ducks, especially the areas southwest of the airport and near the Mendenhall River (Cain *et al.* 1988; Watson 1979). Broods of mallards are also found in freshwater marshes between Switzer Creek and Sunny Point (Watson 1979). While the MWSGR is open for hunting during the hunting season, many waterfowl species use the Lemon Creek valley wetlands and Auke Lake as refuge (ADF&G 1999; Armstrong *et al.* 2004). Harlequin ducks have been regularly observed in June near rocky areas bordering Lemon Creek where it crosses Egan Drive (Watson 1979).

Both the tundra and trumpeter swans can be found in the Mendenhall wetlands during spring and fall migration (Armstrong and Gordon 2002). During migration, swans use saltwater, estuaries, wetlands, lakes, and rivers for stopover locations. They feed on aquatic plants, sedges, rushes, algae, and terrestrial grasses (Kaufman 1996). Trumpeter swans have been observed feeding in the floatplane pond, Miller-Honsinger pond, and both the east and west finger ponds at JIA (Wilmoth *et al.* 2001; Armstrong *et al.* 2004).

The Mendenhall wetlands provide feeding and resting stopover grounds for many species of shorebirds, with the most common shorebirds being western sandpipers, spotted sandpipers, and least sandpipers (Armstrong *et al.* 2004; Cain *et al.* 1988; Watson 1979). Greater and lesser yellowlegs feed within the shallow areas of the floatplane basin, upper intertidal areas, upland marsh, and shallow ponds (SWCA 2002b). Short-billed and long-billed dowitchers and dunlins frequent the Mendenhall River slough along with the occasional buff-breasted sandpiper. In addition, semipalmated plover, black-bellied plover, semipalmated sandpiper, solitary sandpiper, least sandpiper, pectoral sandpiper, rock sandpiper, black turnstone, and Wilson's snipe are found within the study area (Armstrong *et al.* 2004; West 2002).

Peak shorebird numbers occur in the early spring and late summer during migration periods (Cain *et al.* 1988). During migration, many shorebirds use the mudflats at Lemon and Switzer Creeks. Spotted sandpipers nest along the shores of the gravel pit pond by the airport and by Switzer Creek (Watson 1979). Shorebirds also use the sedge meadows and, like the waterfowl, feed as the tide recedes. Species such as the Wilson's snipe use the high marsh communities for nesting, especially in areas where freshwater saturates the meadow. The Wilson's snipe can also be found in the marsh at the base of the Mendenhall Peninsula and in the upper reaches of Switzer Creek (Watson 1979).

Gulls and arctic terns can be found throughout the Mendenhall wetlands in great numbers. Four species of gulls are known to occur: glaucous-winged, mew, Bonaparte's, and herring gulls (Cain *et al.* 1988). Glaucous-winged and mew gulls are year-round residents in the Mendenhall flats, concentrating at the mouth of Salmon Creek in fall (Armstrong *et al.* 2004). Arctic terns are summer residents on the flats and can be found nesting on the mudflats at the mouths of sloughs and freshwater sources (ADF&G 1990).

A number of songbirds nest in the forested spruce “islands” within the Mendenhall flats and in forested areas of Douglas Island. Common ravens; northwestern crows; American robins; hermit thrushes; ruby and golden-crowned kinglets; and yellow, yellow-rumped, and Wilson’s warblers nest in patches of Sitka spruce in the project area. In addition, savannah sparrows nest in the high marsh areas (Watson 1979). Many songbird species hunt for insects in the upland marsh transition communities including red-winged blackbird, Lincoln’s and song sparrow, Lapland longspur, American pipet, orange-crowned warbler, and Wilson’s warbler (ADF&G 1990; Armstrong *et al.* 2004). Other species found in the adjacent forested areas include Steller jays, dark-eyed junco, pine siskins, common redpoll, red crossbill, chestnut-backed chickadee, and belted kingfisher. Blue grouse have been heard in the forests surrounding the Mendenhall wetlands (Watson 1979).

Twenty-one species of raptors have the potential to occur within the study area, eleven of which occur on a regular basis. Great-horned owls have been seen in the trees growing along the dikes in upland areas of the Mendenhall flats. Several of the dredge islands provide habitat and perches for northern harrier, merlin, and short-eared owl. In addition, American kestrels, red-tailed hawks, and peregrine falcons can be found hunting in the Mendenhall wetlands. Ospreys, Swainson’s hawks, and gyrfalcons are less common in the area but can also be found hunting in the wetlands during migration. Raptors such as northern harrier, red-tailed hawk, American kestrel, merlin, short-eared owl, and, rarely, Swainson’s and rough-legged hawks and gyrfalcon can be seen in the wetland area adjacent to the Temsco Helicopter landing pad at JIA. American kestrel, merlin, gyrfalcon, northern harrier and rough-legged hawk have been observed hunting adjacent to the Miller-Honsinger Pond (Armstrong *et al.* 2004). Northern pygmy-owls and northern goshawks are occasionally spotted along the Fish Creek trails or dredge ponds on Douglas Island. Bald eagles, great-horned owls, and sharp-shinned hawks are known to nest within the project area (Armstrong and Gordon 2002; Ferguson-Craig 2003).

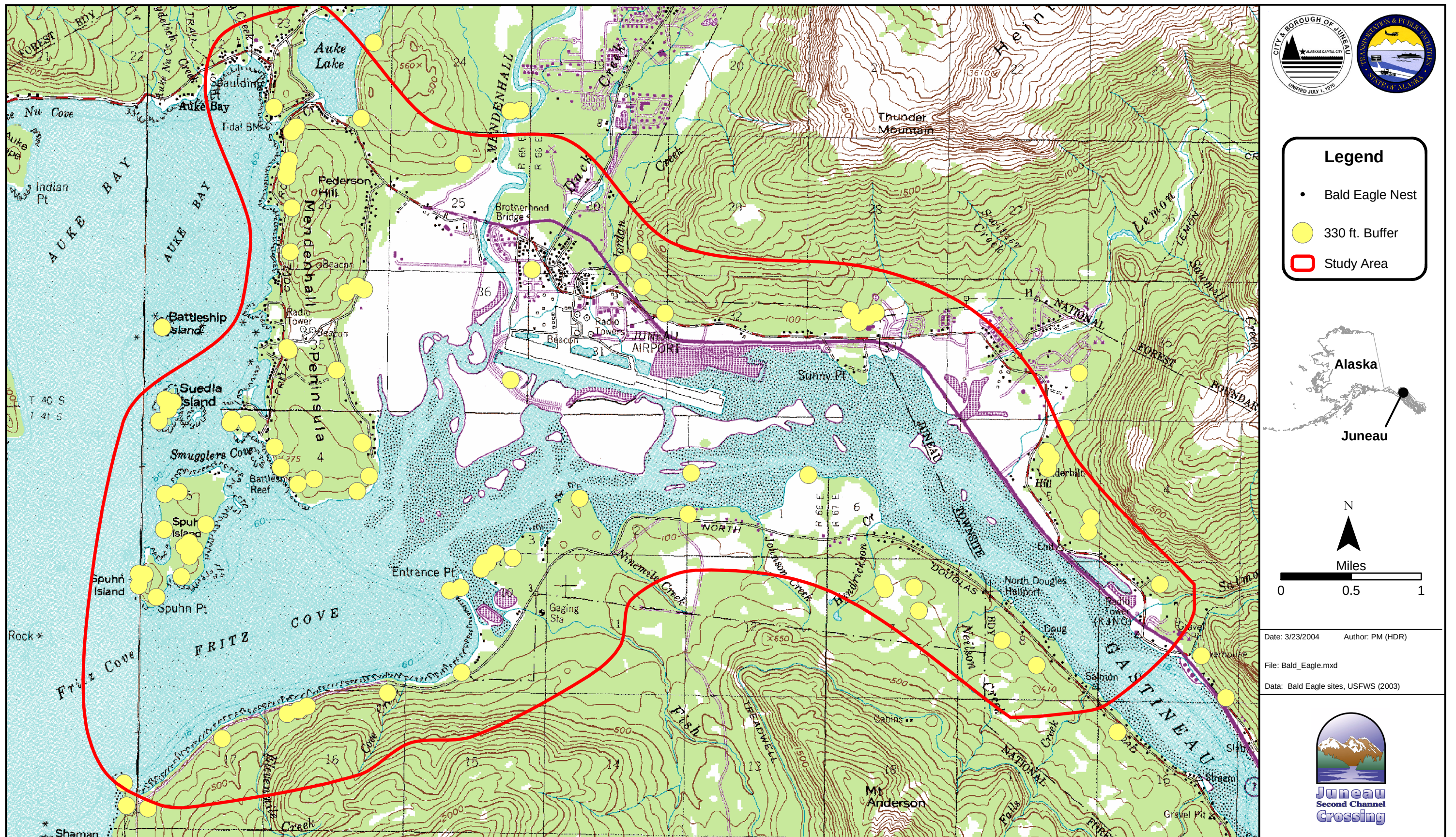
Bald Eagles

Bald eagles are protected under the Bald Eagle Protection Act of 1940, as amended. The Act prohibits the taking of bald eagles or their nests and eggs. Under this Act, taking is defined as “to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The USFWS enforces the Act by restricting land use in a 330 ft buffer around bald eagle nesting trees. Activities within this buffer require a consultation with the USFWS regarding the degree of potential impact and measures to avoid or minimize adverse effects.

A 1998 USFWS survey indicated that the bald eagle was the most consistently visible species in the Mendenhall wetlands. During the runs of eulachon and Pacific sandlance, groups of 100 or more bald eagles may be seen in the Mendenhall River area, usually during April and May (Armstrong *et al.* 2004). Eagles were observed congregating at the mouth of the river throughout the year during periods of low tide. In the fall, bald eagles leave the Mendenhall flats and concentrate at the confluence of the Chilkat and Tsirku Rivers, 18 miles north of Haines (Cain *et al.* 1988).

The USFWS observed that several pairs of nesting bald eagles use the wetlands as primary foraging ground. In 1988, twenty bald eagle nests were known to exist in the forested areas bordering the wetlands. It was estimated that 66 percent of the nests were active (Cain *et al.* 1988). In Southeast Alaska bald eagles generally nest in large spruce trees along the coast and rivers. Figure 5.15 shows the locations of 99 bald eagle nests in and around the project study area.

While nesting, bald eagles will generally not tolerate close activity. Most of the nests in the Juneau area are located further from the water than normal, which may indicate that local eagles have shifted farther inland to avoid disturbance by human activity (Cain *et al.* 1988).



Juneau Second Channel Crossing

Figure 5.15
Bald Eagle Nests

5.15.7 Land Mammals

Southeast Alaska is home to approximately 60 species of land mammals (MacDonald and Cook 1999). Many of these species are occasional visitors to the Mendenhall flats or live in adjacent areas. Portions of the project area are heavily influenced by human development, including highways, residential and commercial areas, and JIA, which likely limits abundance of large terrestrial mammals. The large terrestrial mammals that can be found around and within the study area are black bear, Sitka black-tailed deer, and wolves. They easily travel between the mainland and Douglas Island. There are no population estimates for these species in the Juneau area. The ADF&G identifies Sitka black-tailed deer and black bear as important species in the project area (Barten 2003).

Sitka Black-tailed Deer

The Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) is native to the wet coastal rainforests of Southeast Alaska. Sitka black-tailed deer are known to use many of the habitat types in the project area. They are commonly seen in the study area adjacent to Fritz Cove and Auke Lake, and along Lemon and Salmon Creeks. Deer have also been observed feeding on clover in grassy areas adjacent to the airport (Wilmoth et al. 2001).

Deer populations are dynamic and can fluctuate considerably depending on the severity of the winters. During summer, deer generally feed on herbaceous vegetation and the leaves of shrubs. During winter, deer find shelter and food in mixed-age old-growth spruce-hemlock forests. The forest canopy intercepts most of the snowfall, but still allows enough light for forage plants to grow. When snowfall is light, the deer prefer evergreen forbs such as bunchberry and trailing bramble. During periods of deep snow, woody browse such as blueberry, yellow cedar and hemlock, and arboreal lichens are used (ADF&G 2002).

In years with deep snow, Sitka black-tailed deer usually winter close to saltwater. However, deer are not commonly observed on the Mendenhall flats in the winter (Ferguson-Craig 2003). Some does may fawn in the coniferous beach fringe adjacent to or within the MWSGR (ADF&G 1990). North Douglas Island provides valuable winter habitat for black-tailed deer. The deer on Douglas Island summer high on the slopes and move to lower elevations during winter. The deer easily walk between Douglas Island and the mainland across the Mendenhall wetlands at low tide (MacDonald and Cook 1999). ADF&G manages deer hunting on Douglas Island. The deer populations within the study area provide food for wolves and bears.

Black Bear

Approximately 17,000 black bears (*Ursus americanus*) live in Southeast Alaska (O'Clair *et al.* 1999). They are predominantly associated with forests, but can be found from high-elevation alpine areas to coastal wetlands depending on the season. Black bears are commonly found within the study area and on Douglas Island. The black bear feeds on roots, berries, fish, carrion, small mammals, birds and bird eggs, insects, and garbage.

In the spring, black bears often move from the mountains into intertidal meadows where they feed on vegetation. Black bears are regularly sighted descending from Thunder Mountain, crossing Egan Drive, traversing to the Sunny Point residential area, and entering the Mendenhall flats (Enriquez 2003), and crossing Glacier Highway at the Mendenhall Peninsula (Neil Barten, ADF&G, personal communication 8/14/2003). These forays into the intertidal areas are of short duration (ADF&G 1990).

Other Species

Brown bears (*Ursus arctos*) occur along the entire coastal mainland of Southeast Alaska. They can generally be found outside of the Juneau area feeding on skunk-cabbages and sedges in the springtime and in salmon streams during the summer (O'Claire *et al.* 1992).

Another occasional visitor to the Juneau area is the Alexander Archipelago wolf (*Canis lupis*). The Alexander Archipelago wolf is found throughout the mainland of southeast Alaska and on most of the islands in the Alexander Archipelago south of Frederick Sound (MacDonald and Cook 1999). A pack of seven wolves utilize the south side of Douglas Island and a lone wolf has been spotted in the Mendenhall Lake area (Neil Barten, ADF&G, personal communication 8/14/2003).

Furbearing species in the study area include muskrat, river otter, mink, and short-tailed weasel (ADF&G 1990). Little is known about the abundance and distribution of these species. River otters are present in the floatplane pond and adjacent ponds at JIA throughout the winter (SWCA 2002b). Short-tailed weasels are associated with forested, brushy, and open country. They require a large home range of up to 40 acres where they can hunt mice, shrews, birds, fish, and insects. Muskrat, otter, and mink are associated with freshwater aquatic habitats, feeding on vegetation (the primary food of the muskrat), invertebrates, and fish. Mink travel along streams and sloughs, feeding on fish, invertebrates, and small rodents. Otter and mink also frequent shoreline and intertidal habitats in search of food (ADF&G 1990). The creeks, shoreline, and surrounding areas on Douglas Island are important habitat for weasel, marten, mink, and river otter (FHWA 1989).

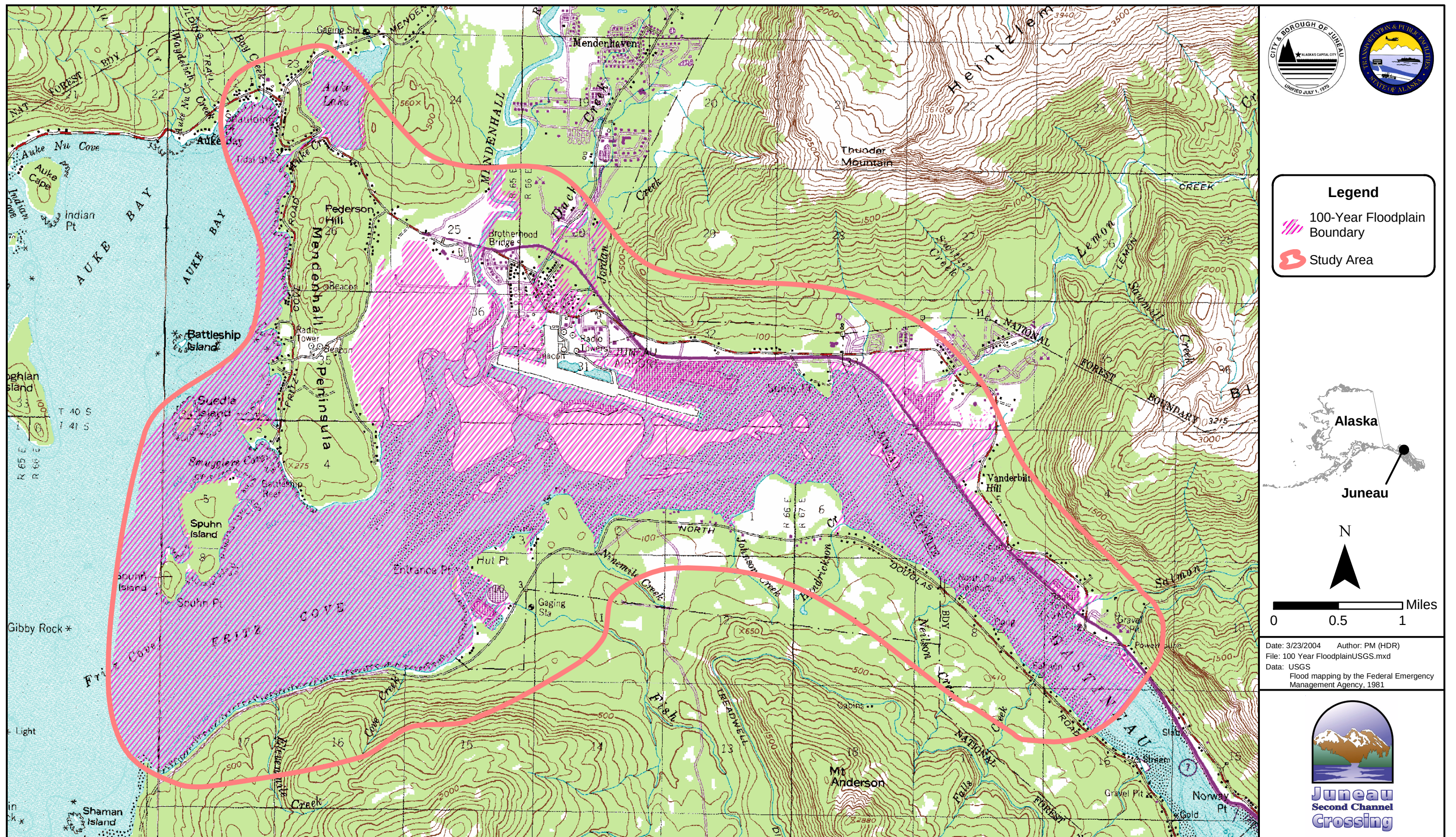
Other land mammals in the study area include snowshoe hare, red squirrel, deer mouse, porcupine, hoary marmot, little brown bat, long-tailed vole, and masked shrew (ADF&G 1990). Snowshoe hares occupy brushy areas, feeding on grasses, buds, twigs, and leaves during summer. In the winter they feed on spruce needles and the bark and buds of willows, cottonwoods, and alders. Red squirrels occur in groves of spruce where they feed on seeds and nest in trees. Deer mice inhabit timber and brush, foraging on dried seeds as well as insects, worms, and bird eggs. Porcupines inhabit forested areas and have a vegetarian diet consisting of leaves, buds and twigs of shrubs, trees, and forbs. Hoary marmots live in colonies and eat primarily grasses, flowering plants, berries, roots, mosses, and lichens. The little brown bat feeds on insects during the night and roosts in hollow trees. The vole feeds on grasses, bulbs, and small twig bark in brushy streambank areas, and shrews feed on insects.

5.16 Floodplains

Protection of floodplains and floodways is required by Executive Order 11988 "Floodplain Management," USDOT Order 5650.2 "Floodplain Management and Protection," and Federal-Aid Policy Guide 23 CFR 650 A. The purpose of these policies is to avoid and minimize highway encroachment within 100-year (base) floodplains and to avoid land use development that is incompatible with floodplain values. Base floodplains in the project area are shown in Figure 5.16.

Coastal and riverine floodplains are the two principal types of floodplains mapped within the project area. The coastal floodplains include Gastineau Channel, Fritz Cove, and Auke Bay. The riverine floodplains are located along rivers and creeks that enter Gastineau Channel in the project area. Flood hazard elevations are based on a one percent chance that flooding will occur in a given year. The area that has a one-percent chance of flooding is commonly referred to as the 100-year flood zone.

The Federal Emergency Management Agency (FEMA) mapped the coastal flood zone in 1981. The Flood Insurance Rate Maps indicate elevations of two types of flooding that may occur within the coastal flood zone: flooding by extreme high tides and flooding from extreme high tide plus wave action.



Juneau Second Channel Crossing

Figure 5.16
100-Year (Base) Floodplains

Flooding from extreme high tides occurs along the entire coastal area of Gastineau Channel. Extreme high tide flooding augmented by wave action is mapped along the south side of JIA, throughout the western end of Gastineau Channel, and at the mouth of Fritz Cove. The flooding zone is on average 23 feet above MLLW. Throughout the project area, there are zones where flood hazard factors have not been determined. However, updated coastal flood hazard mapping is available for the area between Spuhn Island and the Mendenhall Peninsula, near the mouth of Fish and Johnson Creeks on Douglas Island, and east of Salmon Creek.

FEMA has conducted detailed studies on Duck Creek, Jordan Creek, Mendenhall River, Lemon Creek, and Salmon Creek, all on the mainland. The following creeks in the study area have not had detailed flood hazard studies conducted: Elevenmile Creek, Cove Creek, Fish Creek, Ninemile Creek, Switzer Creek, West Creek, Johnson Creek, Hendrickson Creek, Neilson Creek, Falls Creek, East Creek, and Pederson Hill Creek.

5.17 Wild and Scenic Rivers

There are no designated Wild and Scenic Rivers with the project study area.

5.18 Coastal Barriers

There are no coastal barriers, as defined in the Coastal Barriers Act, within the State of Alaska.

5.19 Coastal Zone

Congress passed the Coastal Zone Management Act of 1972 to create a “partnership between state and local governments in the planning and management of coastal resources.” The Alaska Coastal Management Program (ACMP) provides statewide policy and guidance to projects proposed within the Alaska Coastal Boundary. District coastal management programs include a locally approved Coastal Management Plan consistent with the ACMP statewide development standards. Once approved, the local plan becomes part of the ACMP and mandates that state and federal agencies take actions on local permits consistent with the policies of the local plan and the statewide standards.

Nearly all the developable land in CBJ is within the coastal zone defined by the ACMP. Approval of the Coastal Management Plan (CMP) for the CBJ occurred in October 1986. The CMP includes enforceable policies concerning coastal development; recreation; energy facilities; transportation; utilities; fish and seafood processing; timber harvesting and processing; mining and mineral processing; subsistence; coastal habitats; air, land, and water quality; and historic, prehistoric, and archaeological resources. These policies require all feasible and prudent steps be taken to avoid alteration of water courses, wetlands, and intertidal marshes, and aesthetic degradation. The CMP also calls for preservation of important wildlife and other coastal resources and continued recreational access to the waterfront.

In 1992, the Juneau Wetlands Management Plan (JWMP) was incorporated into the Coastal Management Plan of the CBJ. The JWMP guides the modification of wetlands and requires mitigation for impacts resulting from development.

5.20 Threatened and Endangered Species, and Other Species of Concern

There are no species under the jurisdiction of the USFWS that are listed as threatened or endangered in the project area. However, NOAA Fisheries lists two species within the project area as endangered or threatened: the Steller sea lion and the humpback whale. Also, the State of Alaska designates the humpback whale as endangered and the Steller sea lion as a “species of special concern.” Both species

are additionally protected under the Marine Mammal Protection Act of 1972.

The USFWS also lists Birds of Conservation Concern (USFWS 2002), which are species considered to need conservation action. These species are listed in Table 5-20.

Table 5-20: Birds of Conservation Concern in Southeast Alaska

Yellow-billed Loon	Rock Sandpiper
Northern Goshawk (resident <i>laingi</i> subspecies only)	Short-billed Dowitcher
Peregrine Falcon (inc. resident <i>pealei</i> subspecies in AK)	Caspian Tern
Black Oystercatcher	Arctic Tern
Whimbrel	Marbled Murrelet (except where listed as Threatened)
Marbled Godwit (<i>beringiae</i> subspecies only)	Kittlitz's Murrelet
Black Turnstone	Yellow-billed Cuckoo
Surfbird	Rufous Hummingbird
Red Knot	Olive-sided Flycatcher
Horned Lark (<i>strigata</i> subspecies only)	

Source: USFWS 2002 and van Vliet *et al.* 2003.

Other species designated as “species of special concern” by the State of Alaska that may occur within the project area are the harbor seal, Queen Charlotte goshawk, American and arctic peregrine falcons, olive-sided flycatcher, and Townsend’s warbler.

5.20.1 Steller Sea Lion

Steller sea lions (*Eumetopias jubatus*) number between 100,000 and 140,000 worldwide. Approximately half live in Alaska. The western Alaska population of Steller sea lions, inhabiting the western Gulf of Alaska and Bering Sea, has declined substantially and is endangered. The eastern stock is the population of interest for this project, extending through the eastern Gulf of Alaska and along the coastal areas of Alaska, Canada, Washington, Oregon, and California. This stock was listed as threatened in 1990. According to a NOAA Fisheries stock report (NOAA 2002), the eastern stock is stable or increasing in the northern portion of its range (Southeast Alaska and British Columbia). For the Southeast Alaska population, there has been a growth trend, from 6,898 animals in 1982 to 9,862 in 2000.

Steller sea lions feed on a wide variety of prey such as pollock, flounder, herring, crab, rockfish, cod, salmon, squid, and octopus. They are also known to take harbor seal pups, although this represents only a supplemental component of their diet (NOAA 2003a). Feeding occurs from the intertidal zone to the continental shelf (Calkins 1994). Critical habitat has been defined in Southeast Alaska at major haulouts and major rookeries (50 CFR 226.202). There is no designated Steller sea lion critical habitat or major haulout site in the project area. The closest Steller sea lion major haulout is located 15 miles northwest of the study area on Benjamin Island, and it is designated critical habitat. This is a seasonal haulout used by up to 800 Steller sea lions between November and May (Thedinga 2003). The nearest rookery, also designated critical habitat, is White Sisters (islands) located on the west side of Chichagof Island (NOAA 2003b), 80 air miles west of the study area. This rookery is used by an average of 950 adult Steller sea lions during breeding season (NOAA 2004c). Steller sea lions have been observed along the western edges of Douglas Island and in Auke Bay and Fritz Cove. They have also been spotted in Gastineau Channel from Fritz Cove to the airport (Koski 2003).

Data regarding Steller sea lion use in the study area is limited, with only anecdotal information. Steller sea lions are rare within the project area. Occasionally, they can be spotted in Fritz Cove or in western portions of Gastineau Channel; however, their use of these areas is inconsistent and infrequent. It is

unlikely Steller sea lions would occur east of the boat launch on North Douglas Island (Gerke 2004).

NOAA Fisheries reports concerns about fishing-related injury and mortality, such as entanglement in fishing gear. Other causes of mortality are also reported (subsistence hunting, illegal shooting, elimination of sea lions for protection of aquaculture in British Columbia, etc.) (NOAA 2002). There is no indication of substantial problems related to construction.

5.20.2 Humpback Whale

Before the mechanization of commercial whaling, the population of humpback whales (*Megaptera novaeangliae*) was about 15,000. The International Whaling Commission (IWC) first protected humpback whales from commercial whaling in 1965, and such whaling ceased in the North Pacific. The whales were listed as endangered under the Endangered Species Act in 1973. The humpback whale is listed as “depleted” under the Marine Mammal Protection Act.

The Central North Pacific Stock, currently estimated at about 4,000 animals, is the group in question for this project. This stock of humpback whales generally winters in Hawaiian waters and summers along the North Pacific coast. Humpback whale distribution in summer is continuous from British Columbia to the Russian Far East, and humpbacks are present offshore in the Gulf of Alaska. The whales appear to return to the feeding areas where their mothers first brought them as calves, with evidence of some crossover to other areas, but only at a rate of approximately 1 percent. Humpback whales commonly feed and breed over shallow banks, but traverse the open ocean during migration. Humpback whales feed in the deeper channels of Southeast Alaska primarily between the months of April and November (O’Clair *et al.* 1997). They prey on small schooling fish such as herring and swarms of krill by using bubbles that concentrate prey, feeding in formation, herding prey, and lunge feeding (Zimmerman 1994).

More than 500 humpback whales inhabit the waters near Southeast Alaska during the summer (MacDonald and Cook 1999). A NOAA Fisheries stock report (NOAA 2002) indicates 404 individual whales have been documented in the portion of Southeast Alaska that includes Chatham Strait and waterways to the north. There is no designated critical habitat for humpback whales. In the Juneau area, humpback whales have been seen along Stephens Passage, west of Douglas Island. Gastineau Channel is shallow in the Mendenhall flats area and impedes passage of the whales. However, the tidal sloughs of Gastineau Channel are an important source of herring larvae for animals that feed in Fritz Cove and Auke Bay (SWCA 2002b). Humpback whales have been observed socially feeding in Fritz Cove (ADF&G 1990; NOAA 2003). Most Southeast Alaska humpback whales travel to Hawaiian waters during winter, and calving takes place there. An area from the north side of Douglas Island to Skull Island is an overwintering area for some humpback whales (NOAA 2003).

According to the NOAA Fisheries stock report (NOAA 2002), the Central North Pacific stock of humpbacks is the focus of a large whale watching industry in Hawaii and a growing whale watching industry in Alaska and British Columbia. Regulations concerning the minimum distance to keep from whales and how to operate vessels when in the vicinity of whales have been developed for Hawaiian waters in an attempt to minimize the impact of whale watching. In 2001, NMFS issued regulations to prohibit most approaches to humpback whales in Alaska to 100 yards (66 FR 29502; May 31, 2001). The growth of the whale watching industry is a concern to NOAA Fisheries, because preferred habitats could be abandoned if disturbance levels become too high (NOAA 2002). Noise is another related concern. Continual noise appears to be the primary concern, with noise from an Acoustic Thermometry of Ocean Climate program, the U.S. Navy’s Low Frequency Active sonar program, shipping, and whale watching cited by NOAA Fisheries. Incidental or short-term noises are not mentioned.

NOAA Fisheries has documented human-caused injury or mortality to this stock of whales. Entanglement or other injury caused by fishing gear and nets appears to be the primary issue. There is documentation of apparent injury to and death of humpback whale related to repeat underwater blasting in Newfoundland.

5.20.3 Harbor Seal

The harbor seal is listed as a species of special concern by ADF&G and is the most common marine mammal in the study area. Harbor seals inhabit coastal and estuarine areas ranging from Baja California north to the Bering Sea. They haul out on rocks, reefs, beaches, and drifting glacial ice, and feed in marine, estuarine, and occasionally fresh waters. In the study area, they frequent the mouth of the Mendenhall River and may occasionally use the sand islands as haulouts. They forage on benthic invertebrates and finfish. Harbor seals are generally non-migratory. Their local movements are associated with tides, weather, season, food availability, and reproduction.

5.20.4 Peregrine Falcon

All three subspecies of peregrine falcons are present in Southeast Alaska. The American peregrine falcon (*Falco peregrinus anatum*) and the arctic peregrine falcon (*F. p. tundrius*) are listed by the ADF&G as species of special concern. The Peale's peregrine falcon (*F. p. pealei*) is the only one known to nest in the region (SWCA 2002b); however, all three subspecies may occur on the mainland and Douglas Island during spring and fall migrations. Peregrine falcons feed in open areas, primarily on other birds, which they catch in the air. The peregrine falcon is considered rare in the area during spring and fall and does not occur there during the summer and winter (Armstrong and Gordon 2002).

5.20.5 Queen Charlotte Goshawk

The Queen Charlotte goshawk (*Accipiter gentiles laingi*) is an uncommon, secretive, forest dwelling raptor. It is a subspecies of the northern goshawk, and is listed by the ADF&G as a species of special concern (ADF&G 2003b).

The Queen Charlotte goshawk is the smallest and darkest of the three subspecies and occurs at low densities throughout the temperate rain forests of Southeast Alaska. Goshawks in Southeast Alaska have relatively large home ranges and use mature forests for foraging and loafing. Goshawks nest exclusively in old growth and mature forests. The Queen Charlotte goshawk is a year round resident of Southeast Alaska. Following the breeding season, adult females sometimes travel long distances to winter-use areas that are separate from their breeding grounds. Radio-tagged goshawks have been located near Fish Creek on Douglas Island (Flatten *et al.* 2001). Goshawks are known to feed on small and medium sized birds and mammals (ADF&G 2003b).

5.20.6 Olive-Sided Flycatcher

The olive-sided flycatcher (*Contopus cooperi*) is a bird that is listed as a species of special concern by the ADF&G (ADF&G 2003b). The olive-sided flycatcher is considered an indicator species of the coniferous forest biome throughout North America, although it is occasionally found in mixed deciduous/coniferous forests. This species is usually associated with openings, including muskegs, meadows, burned and logged areas; and water, including streams, beaver ponds, bogs, and lakes. The birds use dead tree snags or partially dead trees for perches for singing and hawking insects (Andres 1999). The olive-sided flycatcher is an occasional breeder in the Juneau area and is a rare spring visitor to the Mendenhall wetlands (Armstrong and Gordon 2002).

5.20.7 Townsend's Warbler

The Townsend's warbler (*Dendroica townsendi*) is listed as a species of special concern by the ADF&G (ADF&G 2003b), and they are abundant throughout Southeast Alaska. In Southeast Alaska, the Townsend's warbler can be found in coniferous forests and muskegs; post-breeding flocks occur in riparian red alders. Currently, there is a lack of information on population trends in Canada and Alaska. Populations of breeding birds may be susceptible to traditional timber harvesting methods (Andres 1999). The Townsend's warbler is considered to be common on the Juneau mainland and Douglas Island throughout the spring, summer, and fall (van Vliet *et al.* 2003).

Historic and Archaeological Resources

There are no properties on the National Register of Historic Places within the project study area. Investigation of the Alaska Heritage Resource Survey (AHRS) files and coordination with the State Historic Preservation Officer (SHPO), tribes, and the public has yet to be performed. It will be necessary to investigate locations in the field with a trained archaeologist or historian once alternatives have been identified.

5.21 Contamination

[NOTE: This section will be revised once alternatives are identified to describe only those sites that are within the ASTM search radii of the proposed corridors. Additional site reconnaissance will be conducted to provide more specific information related to the properties crossed by the project alternative alignments.]

A preliminary Environmental Site Assessment was performed for the study area in conformance with the scope of limitations of ASTM Practice E1527, with some exceptions made due to the broad scale of the study area at this phase of project development (Shannon & Wilson, Inc. 2004). The results of that assessment are summarized in this section. A more detailed discussion of contamination issues and mappings are presented in the *Preliminary Environmental Site Assessment Technical Memorandum, January 2004* prepared separately for this project.

Known and potential hazardous waste sites in the project area were identified through review of federal, state, and local agency records; aerial photographs; and a 1962 USGS topographic map encompassing the study area and vicinity. A reconnaissance of the project area was conducted on August 25 and 26, 2003.

The records search reviewed sites identified in the National Priorities List (NPL); Comprehensive Environmental Response, Compensation, and liability Information System (CERCLIS); Resource Conservation and Recovery Information System (RCRIS); and Alaska Department of Environmental Conservation (ADEC) lists of underground storage tanks (USTs), leaking underground storage tanks (LUSTs), contaminated sites, solid waste sites, and spill sites. The CBJ Water Department was also contacted to ascertain the availability of sanitary sewer and/or public water service in the project area and characterize the potential for groundwater contamination from potential septic leach fields. Aerial photographs from 1961 and 1997 and the 1962 USGS map were reviewed to characterize historic land use in the study area. The site reconnaissance identified current land use in the study area that could include hazardous materials use and/or hazardous wastes releases potentially affecting the project.

There are two CERCLIS sites within the project area: (1) E&L Auto, located at 10005 Crazy Horse Drive near Industrial Boulevard; and (2) The Juneau Airfield and Garrison, located at 1873 Shell-Simmons Drive, located on the east side of the Mendenhall River.

There are 43 Resource Conservation and Recovery Act (RCRA) handlers located within the project area. None of these sites are subject to corrective action.

There are 70 registered USTs and 44 LUSTs in the project area. ADEC lists 17 contaminated sites in the project area. There are no known spill sites of 100 gallons or more within the project area.

No additional sites were identified through local agency contact, aerial photograph review, or map review.

The site reconnaissance found a broad range of land uses in the study area; namely, commercial areas, residences, JIA, MWSGR, industrial facilities, and undeveloped areas. Based on physical observation and data research, the business, commercial, industrial and residential areas likely use heating oil fuel for heat, which may be contained in aboveground storage tanks (ASTs) or USTs that are not registered with ADEC. Because most of the potential residential heating oil tanks are aboveground and small, about 300 to 500 gallons, releases would most likely be detected at an early stage where the amount released would be limited.

5.22 Visual Environment

Visual impact assessments have yet to be performed for the project.

5.23 Energy

Energy use related to this project is fossil fuels used for transportation. Currently, people use automobiles to travel between Juneau and Douglas Island. Energy is also used by ships and boats in Gastineau Channel, which could be affected by alternatives that cross Gastineau Channel. Aircraft at JIA and the North Douglas Heliport also use fuel, but their fuel requirements are not likely to be affected by this project.

Fuel in the Juneau area is supplied to local suppliers by ship. Energy requirements are met by these local suppliers. Some air and marine craft are fueled outside CBJ in other communities or other states.