3 AFFECTED ENVIRONMENT

3.1 Social and Economic Environment

3.1.1 Land Use

The Alaska Department of Transportation and Public Facilities (DOT&PF) updated the 2004 *Land Use and Coastal Management Technical Report* presented as Appendix F in the 2005 Supplemental Draft Environmental Impact Statement (Supplemental Draft EIS) and its addendum, presented in Appendix W of the 2006 Final Environmental Impact Statement (Final EIS). The 2014 *Land Use Technical Report*, Appendix DD of this Draft Supplemental Environmental Impact Statement (SEIS), presents new information from the 2008 *Tongass Land and Resource Management Plan* (TLRMP), Alaska Department of Fish and Game (ADF&G), City and Borough of Juneau (CBJ), Municipality of Skagway Borough, Haines Borough, National Oceanic and Atmospheric Administration, interviews conducted by Northern Economics, Inc., and personal communications with agency representatives. Additional contacts were made with federal, State, and local officials and private parties to update planning, land management, and land use information.

The project area includes federal, State, local, and private lands. Most of the federal lands are within the Tongass National Forest and are managed by the U.S. Forest Service (USFS). The other federal land in the study area is Klondike Gold Rush National Historical Park (NHP) in downtown Skagway, which is administered by the National Park Service (NPS). The principal discussion on Klondike Gold Rush NHP is provided in Section 3.1.1.2.

A majority of the State lands in the project area are within the Haines State Forest along West Lynn Canal and are managed by the Alaska Department of Natural Resources (ADNR) Division of Forestry. Local government lands are managed by the CBJ, Haines Borough, and the Municipality of Skagway Borough. Private lands include Native corporation holdings, Native allotments, private commercial, and private residential properties. Important changes in the project study area since preparation of the 2006 Final EIS are that the City of Skagway is now the Municipality of Skagway Borough, and the Kensington Mine is in production.

Figures 3-1 and 3-2 (all Chapter 3 figures are at the end of the chapter) depict land ownership on the northern and southern ends of Lynn Canal, respectively. Primary landowners and managers in the study area are described further in the following subsections.

3.1.1.1 United States Forest Service

Most of the lands in the study area are managed by the USFS as part of the Tongass National Forest. Management direction for these lands is set forth in the 2008 TLRMP (USFS, 2008b). The 2008 TLRMP updated the 1997 *Tongass Land and Resource Management Plan* (USFS, 1997b; referred to as the TLMP in the 2006 Final EIS). It guides natural resource decision making in the Tongass National Forest by establishing management standards and guidelines for a variety of activities, based on Land Use Designations (LUDs)[1]. Figure 3-3 identifies LUDs within the study area.

[1] An LUD is a management prescription allocated to specific areas of National Forest System land.

Three main LUD categories were established in the TLRMP: Non-Development (which maintains old-growth forest habitat), Development, and Overlay. Each LUD category consists of subcategories of LUD designations, which are described below. (Note that not all of these LUDs occur in the Lynn Canal corridor.)

Non-Development LUDs

- Wilderness LUD Group
  - Wilderness – Preserve essentially unmodified areas to provide opportunities for solitude and primitive recreation. Wilderness motorized access is "not permitted except where authorized by the Alaska National Interest Lands Conservation Act (ANILCA) or to access surrounded State and private land and valid mining claims subject to stipulations to protect Wilderness resources and values" (TLRMP, 2008, p. 3-22).
  - Wilderness National Monument – Manage monuments to provide opportunities for solitude and primitive recreation. Limit motorized access.
  - Non-Wilderness National Monument – Facilitate the development of mineral resources in a manner compatible with the National Monument purposes.
- Natural Setting LUD Group
  - LUD II – Maintain the wildland characteristics of these Congressionally designated roadless areas; permit fish and wildlife improvements and primitive recreation facilities; and permit roads for access for transportation needs identified by the State.
  - Old-Growth Habitat – Maintain old-growth forests in a natural or near-natural condition for wildlife and fish habitat. "New road construction is generally inconsistent with Old-Growth Habitat LUD objectives, but new roads may be constructed if no feasible alternative is available." (USFS, 2008b, p. 3-61)
  - Research Natural Areas – Manage areas for research and education and/or to maintain natural diversity of National Forest System lands.
  - Remote Recreation – Provide for recreation in remote natural settings outside Wilderness, where opportunities for solitude and self-reliance are high.
  - Semi-Remote Recreation – Provide for recreation and tourism in natural-appearing settings, where opportunities for solitude and self-reliance are moderate to high.
  - Enacted Municipal Watersheds – Manage municipal watersheds to meet State water quality standards for domestic water supply.
  - Special Interest Areas – Preserve areas with unique archaeological, historical, scenic, geological, botanical, or zoological values.
  - Wild, Scenic, and Recreational Rivers – Maintain and enhance the outstandingly remarkable values of river segments, which qualify a river to be classified as a Wild, Scenic, or Recreational River.

Development LUDs

- Modified Landscapes – Provide for natural-appearing landscapes while allowing timber harvest and a mix of resource activities, including mineral development.
- Scenic Viewsheds – Maintain scenic quality in areas viewed from popular land and marine travel routes and recreation areas, while permitting timber harvest.
- Experimental Forest – Provide opportunities for forest practices research and demonstration.

- Timber Production – Manage the area for industrial wood production. Promote conditions favorable for timber resources and for maximum long-term timber production.

Overlay LUDs

- Minerals – Encourage mineral exploration and development of areas with high mineral potential.
- Transportation and Utility Systems (TUS) – Emphasize existing and potential major public transportation and utility systems. Until constructed, manage according to the other land use designation indicated.

  Note: In awareness and anticipation of the Juneau Access Improvements (JAI) Project, the 2008 TLRMP and its predecessor, the 1997 TLMP, which is referenced in the 2006 Final EIS, designated the two possible road corridors (one on the east side and one on the west side of Lynn Canal) as TUS Overlay LUDs (USFS, 2008b, p. 3-128). These corridors are shown on Figures 3-3 and 3-4. The other LUDs that occur in the project area are Wilderness; Wilderness National Monument; LUD II; Old-Growth Habitat; Semi-Remote Recreation; Wild River; Scenic River; Recreational River; Modified Landscape; Scenic Viewshed; Minerals; and TUS.

As noted in Section 1.1 of this Draft SEIS, the 2006 lawsuit against the JAI Project alleged the USFS violated the National Forest Management Act by approving a right-of-way (ROW) crossing designated old-growth habitat without determining that no feasible alternative existed. Detailed information is provided in the paragraphs below to clarify the purpose and importance of old-growth habitat within the Tongass National Forest, and to explain the relationship between the Old-Growth Habitat LUD and the TUS LUD. These paragraphs clarify why no analysis regarding other feasible alternatives is required.

The 2008 TLRMP preserves a large acreage of old-growth forest habitat by designation of Non-Development LUDs. These LUDs function as medium or large old-growth reserves (OGRs). Smaller amounts of old-growth forest habitat that meet specific criteria for size, spacing, and composition[2] are preserved in the form of small reserves designated as Old-Growth Habitat LUDs.

The TUS LUD is part of the Overlay LUD Group and applies to both existing highways and proposed highways (including roads proposed to access new ferry terminals). Where it applies to potential future highways, it is an overlay of other LUDs, including the Old-Growth Habitat LUD. As noted above, the 2008 TLRMP, under the Old-Growth Habitat LUD management prescription, states that "new road construction is generally inconsistent with Old-Growth Habitat LUD objectives, but new roads may be constructed if no feasible alternative is available" (USFS, 2008b, p. 3-61). The prescription indicates that the USFS generally must perform transportation analysis "to determine if other feasible routes avoiding this LUD exist during the project environmental analysis process" (USFS, 2008b, p. 3-61). However, this management prescription is applicable only to proposed roads that are not located in a TUS LUD management overlay.

[2] Specific requirements are discussed in Appendix D to the 2008 TLRMP Final EIS (USFS, 2008a, p. D-6) and in Appendix K of the 2008 TLRMP itself (USFS, 2008b, p. K-3).

The TLRMP states that the TUS LUD goal is "to provide for, and/or facilitate the development of, existing and future major public Transportation and Utility Systems, including those identified by the State of Alaska" (USFS, 2008b, p. 3-128). The prescription states:

> *During the period before actual construction of new (transportation) systems occurs, the management prescriptions of the LUD(s) underlying the corridors will remain applicable. Upon initiation of construction, and during system operation, this (TUS) management prescription will apply*. (USFS, 2008b, p. 3-128)

The plan describes the TUS LUD as a "'window' through the underlying LUD through which roads and/or utilities may be built." The Forest-wide Standards and Guidelines section for "Lands" in the TLRMP provides a description of "windows" (USFS, 2008b, p. 4-32):

> A TUS "window" is an area potentially available for the location of transportation or utility corridors or sites. Windows represent areas of future opportunity where the applied management direction will not conflict with future designation of a TUS. A site-specific analysis is still required during project-level planning, to identify resource protection needs within these areas."

Based on these statements in the TLRMP, the TUS overlay makes *not applicable* the standard Old-Growth Habitat LUD prescriptions for road construction and operations when a road is located within the TUS LUD. Thus, the prescriptions that state "new road construction is generally inconsistent" and that USFS must perform transportation analysis regarding feasible avoidance routes are applicable only to proposed road development outside the TUS LUD.

LUDs on East Side of Lynn Canal –The northwest side of Berners Bay has two areas designated as Old-Growth Habitat, located both east and west of Slate Cove; an additional area of Old-Growth Habitat occurs about midway between Comet and Met Point. These Old-Growth Habitat LUDs were enlarged as part of the 2004 USFS Kensington Gold Project Record of Decision (ROD; USFS, 2004). Figure 3-3 includes the new Old-Growth Habitat LUD boundaries.

The upper 10 miles of the Katzehin River are designated as a Wild River; the lower 2 miles of the river adjacent to Lynn Canal, however, are not designated as Wild in recognition of the potential for a future transportation corridor in this area. Also, there is an unpaved landing strip approximately 0.25 mile north of the river mouth.

Portions of land along East Lynn Canal extending north from Echo Cove to approximately 4 miles north of Met Point are Tongass National Forest lands designated as Scenic Viewshed (Echo Cove area only) and Modified Landscape; the Modified Landscape lands include some areas of mineral development activity. From approximately 4 miles north of Met Point to north of the Municipality of Skagway Borough, USFS lands are designated Semi-Remote Recreation. The Modified Landscape and Old-Growth Habitat designations west of Berners Bay are overlaid with a Mineral designation.

Much of the area around the east side of Berners Bay is designated LUD II and Semi-Remote Recreation. The congressionally designated LUD II permits roads only for access for authorized uses, for transportation needs identified by the State, or for vital linkages. In 1994, the State of Alaska sent a letter to the USFS identifying a highway along the east side of Lynn Canal between Juneau and Skagway as a State transportation need (Hickel, 1994). The USFS included

the highway alignment as a transportation corridor in the 1997 TLMP and its update, the 2008 TLRMP.

LUDs on West Side of Lynn Canal – From William Henry Bay north to nearly the Sullivan River, most of the USFS lands are designated Semi-Remote Recreation. The Endicott River Wilderness Area, which lies inland west and northwest of William Henry Bay, is not affected by the project. The lower 2.5 miles of the Endicott River, where the Alternative 3 highway would be located, is outside of the designated Wilderness Area. The area downstream of the Wilderness Area contains an unpaved airstrip approximately 1 mile north of the river mouth. The land on either side of Alternative 3 in this area is a Scenic Viewshed LUD.

LUDs in the Development category in the West Lynn Canal study area include Scenic Viewshed along the western shore surrounding William Henry Bay and adjoining the lower 3 miles of the Endicott River. USFS lands are designated as Modified Landscape from approximately the Sullivan River to the area of Sullivan Mountain at the boundary with the Haines State Forest. The Modified Landscape designation west of Sullivan Island is partially overlaid with a Mineral designation. An Old-Growth Habitat LUD west of Lynn Canal is near the Tongass National Forest boundary with Haines State Forest.

The USFS identified a transportation corridor on the west side of Lynn Canal during preparation of the 1997 TLMP. That corridor was included in the adopted 1997 TLMP and continues to be recognized in the 2008 TLRMP.

Roadless Areas as a Resource – The Roadless Area Conservation Rule (aka Roadless Rule; 36 Code of Federal Regulations [CFR] 294) applies generally to the National Forest System, but has been under litigation with respect to the Tongass National Forest. At the present time, it is the USFS's position that the Roadless Rule remains in effect on the Tongass National Forest because the U.S. Court of Appeals for the Ninth Circuit's order in Organized Village of Kake v. USDA, No. 11-35517 (March 26, 2014), is not yet final.

In accordance with the Roadless Rule, the USFS typically reviews all proposals for new roads or timber removal in any Inventoried Roadless Area (IRA) to ensure the USFS is "doing all we can to protect roadless area characteristics" (Tidwell, 2012). IRAs on federal lands are a resource potentially available for future designation as wilderness under the Wilderness Act of 1964. Figure 3-4 is a map of the IRAs in the project area. The Roadless Rule defines "Roadless Area Characteristics" as:

> Resources or features that are often present in and characterize inventoried roadless areas, including:
>
> 1. High quality or undisturbed soil, water, and air;
> 2. Sources of public drinking water;
> 3. Diversity of plant and animal communities;
> 4. Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land;
> 5. Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation;
> 6. Reference landscapes;
> 7. Natural appearing landscapes with high scenic quality;

8. Traditional cultural properties and sacred sites; and
9. Other locally identified unique characteristics.

[36 CFR 294 11]

The Tongass National Forest has more than 100 IRAs totaling approximately 9.5 million acres, or 57 percent of the 16.8-million-acre national forest. More than 90 percent of the forest is "roadless" if areas already designated as part of the National Wilderness Preservation System are included (USFS, 2008a, p. 3-445). There are four large IRAs in the project area that together total about 1.6 million acres. As shown in Figure 3-4, IRAs 301 and 305 are located on the east side of Lynn Canal, and IRAs 303 and 304 are located on the west side of Lynn Canal. The IRAs are as follows:

- IRA 301, Skagway-Juneau Icefield: 1.2 million acres
- IRA 303, Sullivan: 66,143 acres
- IRA 304, Chilkat-West Lynn Canal: 198,109 acres
- IRA 305, Juneau Urban: 94,800 acres

Alternatives 2B, 3, 4B, and 4D are in IRA 301 (Juneau-Skagway Icefield) and 305 (Juneau Urban). Alternative 3 is also in IRAs 303 (Sullivan) and 304 (Chilkat). The Roadless Rule prohibits road construction in inventoried roadless areas, unless road construction is conducted under an exempted circumstance, including when a road is "provided for by statute or treaty" [36 CFR 294.12(b)(3)]. In this case, Congress granted transportation and utility easements to the State of Alaska for each side of Lynn Canal ("4407 easements"—see Overlay LUDs above in this section[3]). Because the JAI Project easement is provided by statute, an analysis of other "reasonable and prudent" alternatives need not be conducted prior to the USFS issuance of the 4407 easement. Following are brief descriptions of the IRAs in the project area (USFS, 2003).

IRA 301 - Juneau-Skagway Icefield – This IRA extends from the Juneau vicinity to Skagway on the east side of Lynn Canal, with the south boundary at the shoreline abutting IRA 305 near Cascade Point. Access to IRA 301 is by boat and aircraft, and by hiking trails off the Juneau road system.

IRA 301 encompasses 1,201,474 acres with 159 miles of shoreline bordering tide water. There are approximately 129,669 acres mapped as forestland, of which 60,528 acres (47 percent) are productive old-growth forest.

IRA 301 is generally unmodified and natural. It provides a very high opportunity for solitude and primitive recreation. The primary Recreation Opportunity Spectrum (ROS) class is Primitive, covering 90 percent of IRA 301. The Wilderness Attribute Rating System of IRA 301 is 25 out of 28 possible points for wilderness characteristics (natural integrity, apparent naturalness, outstanding opportunity for solitude, and primitive recreation opportunities).

[3] In Section 4407 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (a 2005 federal transportation law known as SAFETEA-LU; PL 109-59), Congress stipulated: "Notwithstanding any other provision of law, the reciprocal rights-of-way and easements identified on the map numbered 92337 and dated June 15, 2005 are hereby enacted into law." The referenced map shows the potential road segments desired by the State of Alaska across forest lands and log transfer facilities and marine access points desired by USFS on State lands and waters. The map includes easements on the east side and west side of Lynn Canal covering the road segments of the JAI Project alternatives.

IRA 301 is managed under nine LUDs: Modified Landscape, Minerals, Transportation and Utility Systems, Remote Recreation, Semi-Remote Recreation, LUD II, Wild River, Research Natural Area, and Old-Growth Habitat. The Minerals LUD is secondary, overlaying the other land uses. The TUS LUD is also secondary, with land in this LUD managed for the other land uses it overlays until a transportation or utility is constructed in the LUD. The Development LUD, Modified Landscape, covers 2 percent of the IRA, with the remaining 98 percent managed as Non-Development LUDs.

IRA 303 - Sullivan – This IRA encompasses federal land from the Endicott River Wilderness boundary to the north boundary of the Tongass National Forest. There is a usable airstrip adjacent to the area on an alluvial fan along Lynn Canal. The shoreline is flat and accessible at two river mouths from Lynn Canal.

IRA 303 covers 66,143 acres, including 30 miles of shoreline on the west side of Lynn Canal. There are 17,135 acres of forestland in IRA 303, of which 75 percent is productive old-growth forest. The productive old-growth includes 5,693 acres of high volume, coarse canopy old-growth.

IRA 303 is managed under five LUDs: Modified Landscape, Scenic Viewshed, Minerals, TUS, and Semi-Remote Recreation. The Minerals and TUS LUDs are secondary, overlaying the other land uses. The Development LUDs, Modified Landscape, and Scenic Viewshed cover 22 percent of IRA 303. The remaining 78 percent is designated as a Non-Development LUD, Semi-Remote Recreation.

IRA 303's overall natural integrity is high and its appearance is primarily natural. There is a very high opportunity for solitude and an outstanding opportunity for primitive recreation. The primary ROS classes in IRA 303 are Primitive and Semi-Primitive Non-Motorized, which cover 54 and 38 percent, respectively, of the IRA. Along the shoreline of Lynn Canal there is an increased probability of seeing or hearing others, including small planes, ferries, small boats, or cruise ships. The Wilderness Attribute Rating System of IRA 303 is 26 out of 28 possible points for its natural integrity, apparent naturalness, outstanding opportunity for solitude, and primitive recreation opportunities.

IRA 304 - Chilkat-West Lynn Canal – IRA 304 encompasses federal land from the south end of the Chilkat Peninsula north to Endicott River, and is bordered on the east by Lynn Canal. IRAs 303 and 304 are separated by a previously harvested timber unit which is considered a development area. Access to IRA 304 is possible via boat and floatplane. There are no places suitable for landing wheeled airplanes, and access into the interior is by foot or helicopter.

IRA 304 covers 198,109 acres, of which 58 percent is productive old-growth forest.

This old-growth forest includes 23,789 acres of high volume, coarse canopy old-growth forest. The area is managed under five LUDs: Scenic Viewshed, Timber Production, TUS, Semi-Remote Recreation, and Old-Growth Habitat. The TUS LUD is secondary, overlaying the other land uses. The Development LUDs, Timber Production, and Scenic Viewshed cover 23 percent of IRA 304. The remaining 77 percent is designated as Non-Development LUDs (Semi-Remote Recreation and Old-Growth Habitat).

IRA 304 is largely unmodified and maintains its natural integrity and apparent naturalness very well. There is a very high opportunity for solitude and an outstanding opportunity for primitive recreation. The primary ROS classes for IRA 304 are Primitive and Semi-Primitive Non-

Motorized, which cover 48 and 44 percent, respectively, of the IRA. Along the shoreline of Lynn Canal there is an increased potential for seeing or hearing others, including small planes, ferries, small boats, or cruise ships. The Wilderness Attribute Rating System for IRA 304 is 25 out of 28 possible points for its natural integrity, apparent naturalness, outstanding opportunity for solitude, and primitive recreation opportunities.

IRA 305 – Juneau Urban – This IRA, on the east side of Lynn Canal, borders the east side of the community of Juneau from approximately Auke Bay to the north end of Echo Cove–a few miles north of the end of Glacier Highway. Near the shoreline, it abuts IRA 301. Glacier Highway and other local roads provide access to IRA 305 except at the IRA's far north end, which is accessible by boat or on foot.

IRA 305 encompasses 94,800 acres, with only 1 mile of saltwater shoreline. It includes approximately 57,013 acres mapped as forestland, of which 34,883 acres (61 percent) are productive old-growth forest.

IRA 305 has high natural integrity and most of it has a natural appearance, despite many modifications, heavy recreational use, and proximity of air and road activity based in Juneau. Its opportunity for solitude is limited by the sound of frequent air traffic and noise of the Juneau road system, and by the heavy recreational use. There is high opportunity for primitive recreation. The primary ROS classes are Semi-Primitive Non-Motorized and Primitive, covering 41 and 39 percent of IRA 305, respectively. The Wilderness Attribute Rating System for IRA 305 is 21 out of 28 possible points for natural integrity, apparent naturalness, outstanding opportunity for solitude, and primitive recreation opportunities.

IRA 305 is managed under seven LUDs: Semi-Remote Recreation, Minerals, Scenic Viewshed, Remote Recreation, Special Interest Area (the Mendenhall Glacier Recreation Area), Old-Growth Habitat, and Transportation and Utility Systems. The Minerals LUD is secondary, overlying the other land uses. The TUS LUD is also secondary, with land in this LUD managed for the other land uses it overlies until a transportation or utility system is constructed in the LUD; the TUS LUD encompasses proposed State road and power transmission corridors. Non-development LUDs comprise approximately 73 percent of the IRA, with Semi-remote Recreation comprising 52 percent of the IRA. Scenic Viewshed, a development LUD, encompasses approximately 27 percent of this IRA.

3.1.1.2 National Park Service

Within the study area, the NPS manages the Skagway unit of the Klondike Gold Rush National Historical Park. The park is within the Skagway and White Pass District National Historic Landmark (NHL), covering 12,976 acres. Actual ownership is split between the State of Alaska (8,723 acres), the federal government (2,419 acres), the Municipality of Skagway Borough (1,477 acres), and private owners (including Native allotments [220 acres], private land in Dyea [57 acres], and commercial land [80 acres]).

In addition to the historic structures in downtown Skagway, the major attraction of the Klondike Gold Rush Park is the Chilkoot Trail, located 9 highway miles west of Skagway in Dyea. The Chilkoot Trail unit covers 9,900 acres; it begins at the north edge of Dyea and extends 16.5 miles north along the Taiya River valley to the Canadian border. The General Management Plan emphasizes developing and following a comprehensive approach that will protect the natural resources and ensure perpetuation of a pristine landscape compatible with the historic setting.

3.1.1.3 State of Alaska

The State of Alaska owns and manages several State parks, marine parks, and a State forest in the project vicinity. The State also owns and manages most of the tidelands, submerged lands, and navigable waters along Lynn Canal. Specific management guidelines for these lands are set forth in various land management plans. University of Alaska lands and Mental Health Trust lands also lie within the study area.

The State owns the following parcels within the study area (Figures 3-1 and 3-2):

- Point Bridget State Park
- State-owned parcel southeast of Skagway in the area of Devil's Punchbowl
- State-owned parcel north of Skagway in the Twin Dewey Peaks area
- Sullivan Island State Marine Park
- Haines State Forest
- Pyramid Island
- Some parcels of shoreline along Mud Bay Road
- Chilkat State Park

In addition, ADNR owns and manages submerged lands and tidelands throughout the study area, unless conveyed to another entity. Parcels of land owned by other State entities exist within the study area and within alternative corridors. These lands, owned by the Alaska Mental Health Trust and the University of Alaska, are managed to produce revenue for their agencies.

3.1.1.4 Local Government

City and Borough of Juneau – Approximately 3,248 square miles of land are located within CBJ boundaries, including tidelands and submerged lands. The regional transportation policy set forth in the *Comprehensive Plan of the City and Borough of Juneau* is to support the improvement of transportation facilities and systems that reinforce Juneau's role as the capital city and a regional transportation and service center (CBJ, 2008). Juneau depends on air and marine transportation because no roads connect the area with other regions of the State and Canada. Strong local support exists for increasing ferry service in Southeast Alaska; improving and expanding air, marine, and highway transportation systems; and participating in studies of road transportation links between Juneau, Southeast Alaska, and Canada. The CBJ completed an *Area Wide Transportation Plan* in 2001; elements of this transportation plan are included in the 2008 *Comprehensive Plan* in order to support creation of a balanced and integrated multimodal surface transportation system. The 2008 *Comprehensive Plan* supports consideration of all affordable energy efficient transport alternatives to improve transportation links between Juneau and other areas of Southeast Alaska, including improved air (cargo and passenger) service, roadways, ferries, and fixed guideway systems.

The CBJ Assembly Resolution 2463 (March 16, 2009) made recommendations for transportation projects to DOT&PF for the 2010–2013 Statewide Transportation Improvement Program, one of which was extension of the Glacier Highway to MP 91.1 (just north of the Katzehin River delta, consistent with the road portion of Alternative 2B).

Haines Borough – The Haines Borough is located on the east and west shores of the Lynn Canal. The borough extends to the Canadian border. The area encompasses 2,350 square miles of

land and 382 square miles of water. Approximately two-thirds of the land is owned by the federal government, almost one-third is owned by the State of Alaska, and about 2 percent is either privately owned or Borough land (Haines Borough, 2012a).

The Haines Borough Assembly adopted its *2025 Comprehensive Plan* on September 11, 2012, to guide growth over the next 10 to 20 years (Haines Borough, 2012a). This plan describes current conditions, reviews outstanding issues and needs, establishes broad goals that set overall direction, identifies specific objectives that are the desired future that the community wants to achieve over time, and sets out actions to chart a path to achieve the goals and objectives. Topics covered are quality of life, municipal government, the economy and economic development, current and future land use, transportation, recreation, utilities, public safety, community services, and education (Haines Borough, 2012a).

One of the Haines Borough *2025 Comprehensive Plan* transportation objectives (4C) is to support Alaska Marine Highway System (AMHS) ferry service to and from Haines. The plan advocates for daily AMHS day boat service between Upper Lynn Canal communities and Juneau, for the proposed Alaska Class ferry to serve the Upper Lynn Canal, and for an AMHS ferry to homeport or overnight in Haines. If a highway alternative is selected, however, a West Lynn Canal Road (Alternative 3) would be preferable to Haines Borough (Haines Borough, 2012a).

Municipality of Skagway Borough – In 2007, Municipality of Skagway Borough (the Municipality) voters approved dissolving the City of Skagway in favor of forming a borough. The boundaries of the borough are the same as the former city boundaries. Skagway is bounded on the south and west by the Haines Borough, and on the north and east by the U.S./Canada border. Skagway consists of approximately 461 square miles of land. Federal agencies control 71.6 percent, State agencies manage 25 percent, including 1.7 percent that is Taiya Inlet tidelands, the Municipality owns 2.8 percent, and 0.6 percent is in private ownership (Municipality of Skagway, 2009).

Land use within Skagway is governed primarily by its *2020 Comprehensive Plan* (Municipality of Skagway, 2009) and municipal code. The Skagway *2020 Comprehensive Plan* states that it is the goal of the Municipality to provide an integrated, efficient, safe, and reliable transportation network to facilitate the movement and goods in and through Skagway (Municipality of Skagway, 2009). The transportation policy supports maintaining and increasing year-round access to and from Skagway including public and private ferries, and air, road, trail, marine, and rail access. The Municipality depends upon the Klondike Highway and the AMHS to transport goods and people into and through Skagway. The plan acknowledges that the Skagway economy, population growth, and community development are closely tied to the movement of people and goods to and through town. The Municipality supports improved and more frequent ferry service to Skagway (Municipality of Skagway, 2009).

3.1.1.5 Private Lands

The area of Berners Bay was traditionally used by the Auk Tlingit. The land north of Point St. Mary on the east side of Lynn Canal was traditionally used by the Chilkat Tlingit, as was much of the west side of Lynn Canal. Most of this land is now managed by the USFS and the State of Alaska. Sealaska, the regional Native corporation for Southeast Alaska, owns a parcel of land north of Sawmill Cove. Goldbelt, a Native corporation based in Juneau, owns approximately 1,400 acres in the study area surrounding Echo Cove. In 1996, Goldbelt prepared

the Echo Cove Master Plan and the USFS circulated an EIS for a proposed access road from Echo Cove to Cascade Point in Berners Bay. The USFS completed a ROD in 1998. Goldbelt received a USFS special-use permit and a U.S. Army Corps of Engineers (USACE) Section 404 permit for the road. Construction began in 2005 with funding from the State of Alaska Industrial Roads Program. Goldbelt submitted a Master Plan to CBJ for Echo Cove in 1996 and is currently working on a plan to develop a marine facility at Cascade Point just north of Echo Cove (the facility was permitted by CBJ in 2004 and the permit was extended in 2007), which will be used to transport mine workers across Berners Bay. Although the permitting is complete, legal actions and funding constraints have delayed the project (NEI, 2013). Presently, instead of a ferry from Cascade Point, Kensington Mine employees are transported using a shuttle operated by Goldbelt, Inc. from Yankee Cove, 14 miles south of Slate Cove in Lynn Canal (Loiselle, personal communication 2012).

One Native allotment application lies along the proposed alignment of Alternative 2B; seven certified allotments and allotment applications lie near the proposed alignment of Alternative 3. The Central Council Tlingit and Haida Indian Tribes of Alaska administer Native land allotments for the Bureau of Indian Affairs.

Other private lands are clustered at several locations throughout the study area (Figures 3-1 and 3-2) and include mines and patented mining claims and private homesteads.

3.1.1.6 Land and Resource Uses

Current land and resource uses in the study area include commercial/industrial, recreational, residential, and public. Commercial/industrial uses include timber harvest, mineral exploration, commercial fishing, commercial guiding and outfitting, and commercial charter fishing. Recreational uses include sport and personal use fishing, hunting, boating, camping, wildlife viewing, and other recreational activities.

Timber Harvest – The majority of land in Lynn Canal is USFS land and is part of the Tongass National Forest. The USFS currently has no plans for timber harvest and sales in Lynn Canal areas (Sandhofer, personal communication 2012). Lands in the northwest portion of Lynn Canal are part of Haines State Forest and, in the study area, the State manages those lands for scenic and recreational values, fish and wildlife, and potential mineral values: commercial timber harvest is prohibited. Forestry resources in Lynn Canal, even if they were available for logging, would more than likely be used as pulp product rather than as export logs, and the costs of pulp processing in Alaska may limit the growth potential in this industry in northern Southeast Alaska (NEI, 2012a).

Mineral Development – The study area lies within a large mineral region known as the Juneau Mining District. The district has been a highly productive mineral area since 1869, producing large quantities of gold, silver, and lead. The proposed routes under Alternatives 2B and Alternative 3 run through this area of mineral occurrences, prospects, claims, and historic and current mines. The Juneau Mining District consists of five geographical subareas: Haines-Klukwan-Porcupine, Glacier Bay, West Lynn Canal, Juneau Gold Belt, and Coast Range. Portions of each subarea except Glacier Bay are within the JAI Project study area.

The Kensington Gold Project is located just north of Berners Bay within CBJ boundaries and the Tongass National Forest. Coeur Alaska, Inc. (Coeur Alaska), the managing company for the Kensington Gold Project, acquired the Jualin gold prospect in 2001. Coeur Alaska received the

State and federal permits for mine operation, began construction in 2009, and began production in 2012. The Kensington mine is projected to remain operating until 2021, based on its identified resource base and measured economic reserves. As with many large mines, the identified resource base of the mine could expand over time and the mine could operate over a longer period of time than is indicated by its current reserves. Currently, mine workers are transported by bus to Yankee Cove and then by boat to the mine's dock at Slate Creek.

Commercial Fishing – Commercial fishing has historically been an important element of the economy of Southeast Alaska. Although market and other considerations have reduced profits in the salmon industry, commercial fishing continues to be a valuable contributor to the Juneau economic and employment base and an important sector of the Haines economy. According to Commercial Fisheries Entry Commission (CFEC) 2010 data for Juneau, 315 Juneau-based commercial fishermen fished 313 permits and harvested 15.8 million pounds of fish with an estimated gross income of $16.9 million (CFEC, 2011). Earnings per permit fished averaged $53,967. According to CFEC preliminary data for Haines, 81 Haines-based commercial fishermen fished 130 permits in 2010 and harvested 6.4 million pounds of fish with an estimated gross income of $7 million (CFEC, 2011). Commercial fishing has not been substantial in the Skagway economy. CFEC data for Skagway shows that 3 Skagway-based commercial fishermen fished 4 permits in 2011 (CFEC, 2011). Salmon, halibut and other groundfish, and shellfish (crab and shrimp) are the targeted species for Lynn Canal commercial fishing.

Lynn Canal supports commercial salmon drift gillnet and troll fisheries. Berners Bay and the Chilkat River and lakes system are productive fish-rearing areas that contribute to these fisheries. To a lesser degree, the study area also supports halibut and groundfish longline fisheries and crab and shrimp pot fisheries.

Recreation, Sport Fishing, and Hunting – The Lynn Canal area has high recreational value and annually attracts thousands of Alaskans and visitors from all over the world. Because most of the study area lies within the Tongass National Forest, recreation in the region is affected by USFS management decisions. The 1997 Draft EIS included the following description of recreation, which is still pertinent:

> Recreation in Lynn Canal is primarily water-based because of limited access. Boating is both a recreational activity and a means of transportation for other recreational pursuits, such as camping, hunting, hiking and kayaking. Berners Bay is a popular recreation area, which is accessible from a public boat launch at Echo Cove. Tent and recreational vehicle camping occur in urban outskirt areas and in developed campgrounds. A public recreation cabin, managed by the [USFS], is located [8 miles] north of Echo Cove.
>
> Hiking occurs primarily on trails built and maintained by federal, State, and local government agencies and a few private, nonprofit groups. These trail systems are generally in road accessible areas within and around the communities of Juneau, Haines, and Skagway.
>
> Wildlife viewing is an important recreation activity for residents and visitors, especially viewing marine mammals, such as seals, sea lions, porpoises, and whales. Gran Point, located south of the Katzehin River, is the site of a Steller sea lion haulout, a popular viewing location. Seabirds and ducks are abundant in the area. Terrestrial mammals such as brown bears, black bears, and mountain goats can also be seen.

Sport fishing is extremely popular. Surveys have found that boating and sport fishing have higher participation rates in Southeast than in any other region of Alaska.

Hunting is a relatively minor activity in Lynn Canal. The most productive valleys for wildlife are around Haines and Skagway, Berners Bay, William Henry Bay, Katzehin River and the Endicott Wilderness Area. Species harvested include brown bear, black bear, wolf, moose, Sitka black-tailed deer, mountain goat, waterfowl, ptarmigan, and grouse.

Other recreational activities in the study area include flightseeing, eagle viewing at the Alaska Chilkat Bald Eagle Preserve, wildlife viewing, camping, hiking, kayaking, canoeing, and jet and air boating. Marine and freshwater sport fishing is extremely popular in Lynn Canal. Shellfish, including red and blue king, Tanner, and Dungeness crab, and shrimp are also harvested for sport.

3.1.1.7 Parks and Recreation Facilities

Many municipal, State, and federal parks and public recreation areas are located within the study area. The Municipality of Skagway Borough has two public parks: Pullen Creek Shoreline Park and Molly Walsh Park (Figure 3-5). State parks include Point Bridget State Park, Sullivan Island State Marine Park, Chilkat State Park, Chilkoot Lake State Recreation Site, Portage Cove State Recreation Site, and Chilkat Islands State Marine Park (Figures 3-1 and 3-2). The NPS manages the Klondike Gold Rush National Historical Park in the Skagway area (Figure 3-5). The USFS has a public use recreation cabin in Berners Bay (Figure 3-2) and a day use area at Sturgill's Landing south of Skagway (Figure 3-1), which connects with Sturgill's Landing Trail. The USFS concurred that the Berners Bay cabin, Sturgill's Landing Trail, and Sturgill's Landing Day Use Area are the only designated recreational sites on USFS land in the project study area (Griffin, 2004).

The Lower Dewey Lake area is a popular hiking/picnicking destination and trail hub and is owned by the Municipality of Skagway Borough (Figure 3-5). The area has many trails connecting to Sturgill's Landing, Icy Lake, Upper Reid Falls, Upper Dewey Lake, and Devil's Punchbowl. On October 7, 2004, the City of Skagway (now the Municipality of Skagway Borough) adopted an ordinance creating the *Dewey Lakes Recreation Area Management Plan*. This ordinance sets forth allowable and prohibited activities in this management area.

No land purchased with grants under Section 6(f) of the Land and Water Conservation Fund Act would be impacted by any alternative.

3.1.1.8 Residential, Commercial, Industrial, and Public Facilities

City and Borough of Juneau – Auke Bay is categorized as urban in the 2008 CBJ *Comprehensive Plan*. Land use includes Federal Park, Medium Density Residential, Marine Mixed Use, and Institutional and Public Use (CBJ, 2008). From the Auke Bay Ferry Terminal north to the end of the highway at Cascade Point, Glacier Highway is an arterial highway designed to accommodate traffic at steady speeds. The Eagle River to Berners Bay area (Subarea 1) is categorized in the 2008 CBJ *Comprehensive Plan* primarily as Rural. The lands in Berners Bay are designated as Recreation Resource lands in the 2008 CBJ *Comprehensive Plan*. Echo Cove, which is located within Subarea 1, is identified as a Resource Development Area with a New Growth Area overlay (CBJ, 2008). This area includes the Davies Creek and Cowee Creek

watersheds; a scenic corridor/viewshed (approximately 400 feet wide by 10 miles long) from Bridget Cove to Eagle River; and high landslide/avalanche hazard areas at Dean Peak, Mount Adolf Knopf, Dike Mountain, and Mount Ernest Gruening (CBJ, 2008, p. 188).

Haines Borough – Active management within the Haines Borough boundaries takes place only within the former City of Haines boundaries (now called the Townsite Planning Zone) and in former City of Haines Coastal Management Areas Meriting Special Attention. All other areas of the Borough fall under the general use zoning district, until zoned otherwise. The Land Use Zones Map was last updated in August 2008, and includes 11 zones that are defined in Title 18 Land Use/Development of the Haines Borough Code. Traffic from a West Lynn Canal Highway that would be directed onto Mud Bay Road would be within the Mud Bay Planning/Zoning District. This area includes a Rural Residential Zone, which is intended to preserve residents' "lifestyle, community scale, self-sufficiency, self-determination, and the basic rights of health, safety and welfare"; and a Cannery Zone, which is "intended to create a commercial area for the provision of support functions for the Haines fishing fleet" (City of Haines, 2008).

Municipality of Skagway Borough – Land use within the Municipality of Skagway Borough is governed primarily by Skagway's *2020 Comprehensive Plan* (Municipality of Skagway, 2009) and municipal code. The Skagway *2020 Comprehensive Plan* suggests a balance between well-located industrial and commercial land, future growth, port and waterfront utilities, and recreation areas. The Municipality supports port development and there has been long-standing community consensus for split use of the port for tourism and industrial uses. The State ferry terminal facility is jointly used by the Municipality and the State of Alaska; the Municipality owns the transfer bridge and one-third of the floating dock. Current land use is a mixture of water-related commercial and industrial activities, pedestrian paths and amenities, shops and restaurants, small boat harbor uses, a staging area for the city transfer bridge, and the Pullen Creek picnic area.

3.1.1.9 Coastal Zone Management

The Alaska Coastal Management Program (ACMP), in force since the approval of the Alaska Coastal Management Act in 1977, expired on July 1, 2011[4], as provided by Alaska Statute (AS) 44.66.030. The ACMP was administered by the ADNR by districts throughout the state with the intent to preserve, protect, develop, use, and, where necessary, restore or enhance the coastal resources of the state. The ACMP was implemented by local governments, which were required to develop and enforce their own coastal management programs.

Because provisions for resources addressed under the ACMP have been incorporated into local plans and ordinances, coastal management programs still exist at the local level.

The CBJ's Coastal Management Program is reflected in policies and in the borough's codes. Further, when the CBJ's comprehensive plan was amended in March 2012, the *Juneau Coastal Management Plan* was specifically included. The *Haines Coastal Management Program* is reflected in the *2025 Haines Borough Comprehensive Plan*, which was adopted in September 2012 and incorporates the coastal management plan's enforceable policies. The enforceable

[4] "The Alaska Coastal Management Question," or Ballot Measure 2, appeared on the August 28, 2012, ballot in Alaska as an "indirect initiated State statute." The measure, which would have established a new coastal management program, was defeated.

policies of the *Haines Coastal Management Program* apply only to land and water uses and activities within the Haines Coastal Management Area Boundary, which is the same as the former City of Haines corporate boundary. Uses and activities occurring on lands and waters outside the Haines Coastal Management Area Boundary are subject to Haines policies only if a proposed action will have a direct and significant affect on coastal resources within the Haines Coastal Management Area coastal district boundaries. Since the Alaska statutes expired, the Municipality of Skagway Borough has not incorporated coastal management enforceable policies into its comprehensive plan. Some elements, however, are codified in its zoning regulation and, according to Skagway officials, are enforced as much as possible during development review (Van Horn, personal communication 2013).

3.1.2 Visual Resources

Landscapes within Lynn Canal are predominantly natural and undisturbed, and contain a wide range of visual resources. The area is characterized by steep mountainous terrain topped with rugged peaks, sheer rock faces, glaciers, and icefields. The upper elevations along the canal range from approximately 5,000 to 7,000 feet. The moderate to steep slopes along Lynn Canal are largely covered by undisturbed, dense coniferous forest. Rivers or braided streams, wetlands, or glaciers (e.g., Davidson Glacier) occasionally break through the forested landscape, creating spectacular and visually diverse landscapes. In some areas, the rocky coastline of the canal is visible, which provides a distinct contrast to the dramatic mountains and icefields in the background. Within Lynn Canal, several low-elevation islands (e.g., Sullivan Island and Chilkat Islands) have been rounded by the extreme erosional forces found in the canal valley.

Weather conditions of Lynn Canal also play an important role in the visual character of the area. During frequent periods of low clouds and rain, most, if not all, of the spectacular scenery surrounding the canal becomes invisible or severely obscured. Conversely, on bright, clear days, the views are unforgettable and unparalleled within the region. The contrasting colors, shapes, and textures of the surrounding environment visible on these days further highlight the extraordinary visual quality of the area.

The 1997 Draft EIS included the following description of visual resources. Because there has been little change in the area, this information is still relevant.

> Important landscape resources on the east side of the Lynn Canal include: Berners Bay and Lions Head Mountain; the Kakuhan Range north of Comet; a Steller sea lion haulout at Gran Point; the Katzehin River delta and valley area; and the eastern shore of Taiya Inlet. On the west side, the major landscape areas are the Chilkat Mountain Range along William Henry Bay, the Endicott River, Sullivan Island, the narrow drainage valleys west of Sullivan Island, and the Davidson Glacier area. The Forest Service has rated many of these areas as visual variety Class A to denote distinctiveness. This rating is often associated with avalanche chutes, braided streams, steep slopes with rock outcrops, glaciers, and scenic shoreline features.
>
> Most of the viewers are cruise ship and ferry tourists, local travelers, and recreational users. The view perspectives are from the air and waters of Lynn Canal. The entire coastline of Lynn Canal is considered an area of high visual sensitivity.

The 2008 TLRMP includes guidance to manage scenic resources in the Tongass National Forest (USFS, 2008b, p. 4-56). Land management activities are rated based on their Scenic Integrity

Objectives (SIOs).[5] These SIOs are categorized as follows (from most protective to least): High, Moderate, Low, and Very Low (USFS, 2008b, pp. 4-57 and 7-36).

The High SIO provides for land management activities that are not visually evident to the casual observer. Management activities should only repeat the form, line, color, and texture found in the existing landscape.

The Moderate SIO provides for management activities that remain visually subordinate to the characteristics of the existing landscape. These management activities may change visual qualities of the landscape but do not create man-made features that visually dominate the landscape.

Under the Low SIO, land management activities can visually dominate the original characteristics of the landscape. However, facilities should borrow from naturally established form, line, color, and texture to blend with the natural landscape. For transportation projects, rock quarries should be designed and located to minimize the apparent visual size and dominance of the activity.

The Very Low SIO allows management activities of vegetative and landform alteration to dominate the landscape. When viewed in the background, the visual characteristics of these activities should blend with the surrounding landscape.

As mentioned in Section 3.1.1.1, a transportation utility corridor has been designated on both the east and west sides of Lynn Canal. If a highway is constructed on either corridor, the corridor would become a TUS LUD. The SIO for this LUD is Low.

The SIO for much of the study area is Moderate, but large areas also have a High SIO. High SIO areas include the head of Berners Bay, Comet area, Katzehin River valley, William Henry Bay shoreline, several valley mouths on the west side of Lynn Canal, the east shore of Sullivan Island, and the east shore of Taiya Inlet. The Endicott River Wilderness Area has a High SIO.

The USFS Juneau Ranger District staff helped develop the methodology used in the analysis, which incorporated the steps outlined below. This methodology is consistent with the updated visual impact assessment performed for the 1997 Draft EIS and is applied to this Draft SEIS. It allows the visual effects of project alternatives to be compared to the SIOs of the TLRMP, since most of the land traversed by highway alternatives is within the Tongass National Forest.

Classification of Existing Landscapes – Landscapes within the viewshed (or visual sphere of influence) of project alternatives were inventoried by scenic attractiveness and existing scenic integrity. These are qualitative measures of a landscape's inherent scenic value (scenic attractiveness) and the level of noticeable human-made visual change in the natural landscape setting (existing scenic integrity). In addition, the following analyses were conducted to predict the magnitude of impact and to compare the level of impact within the Tongass National Forest with USFS SIOs.

- **Visual Absorption Capability Analysis** – The visual absorption capability analysis characterizes landscapes in terms of their ability to accept human alteration without loss

[5] The 2006 Final EIS used Visual Quality Objectives (VQOs) in accordance with the 1997 TLMP. This Draft SEIS has been updated to comply with the 2008 TLRMP, which replaced the VQOs with Scenic Integrity Objectives (SIOs). The primary difference between the VQOs and SIOs is that the SIOs better recognize the positive scenic values associated with some human-modified (cultural) features and settings. The VQOs and SIOs are similar enough that the definitions were written to allow for easy conversion between the two.

of landscape character or scenic condition. Visual absorption capability levels were integrated with scenic attractiveness and visibility factors to estimate potential visual impacts of highway alternatives on sensitive viewers and visual quality.

- **Consistency Analysis** – Changes to the visual resource resulting from project alternatives were compared to TLRMP SIOs and any local visual resource policies.

For additional information on the visual resource assessment methodology, see the *2014 Update to Appendix G - Visual Resources Technical Report* (see Appendix Z).

Existing travel routes and use areas in Lynn Canal and along the east and west shoreline were inventoried and considered in the visual resources assessment. Landscape units consisting of areas with similar scenic qualities (i.e., scenic attractiveness) were grouped together to facilitate the discussion of the inventory and assessment results. In clear weather, each area is typically seen from Lynn Canal as a whole unit, combining views of the water, shoreline, mountainsides, and rock features at higher elevations in the overall setting. The major landscape units on the east and west sides of Lynn Canal used for this analysis and the characteristics of those units are described in the following subsections.

3.1.2.1 East Lynn Canal

Berners Bay – This bay is almost 3 miles wide and opens to Lynn Canal on its western side. It has distinctive enclosing mountainsides and a varied coastline, ranging from rocky shore to extensive wetlands at the mouths of the Lace and Antler rivers that flow into the bay. Federal lands have a High SIO, and the USFS manages the eastern shoreline of Berners Bay as a scenic viewshed.

Point St. Mary to Eldred Rock – Lynn Canal ranges from 5 to 8 miles wide in this area. Slopes along the shoreline are moderate on both sides of the canal and have uniform forest cover. Federal lands have High and Moderate SIOs.

Eldred Rock to Mount Villard – This area encompasses the Chilkoot Inlet corridor and is about 2 to 3 miles wide. The low hills of the Chilkat Peninsula and islands form the western side, and precipitous mountainsides, interrupted only by the 1-mile-wide mouth of the Katzehin River valley, form the eastern side. Federal lands in this area have several SIOs. Most of the area is classified as Moderate with a small area north of Eldred Rock classified as Low. Views that include the mouth of the Katzehin River and the area east of Anyaka Island are classified as High. The area at about midslope of Sinclair Mountain is classified as Very Low.

Mount Villard to Skagway – This area encompasses a linear narrow marine corridor about 1 mile wide with uniformly steep mountains on both sides. These mountains offer distinctive views of cascading streams, talus slopes, and colorful rock formations. The steep topography flanking the narrow Taiya Inlet tends to funnel views up and down the inlet.

The USFS has established a SIO of Moderate for forested lands under its management in this area. This SIO recommends that facilities remain visually subordinate to the natural landscape. From Kasidaya Creek south to Mount Villard, federal lands have a High SIO. In the USFS High SIO, facilities should not be visually evident.

3.1.2.2 West Lynn Canal

William Henry Bay to Sullivan Island – This area encompasses William Henry Bay north through the straits west of Sullivan Island. The straits are 1 to 2 miles wide with steep mountainsides to the west. This area encompasses the mouth of the Endicott River with the Endicott River Wilderness Area further upstream. The topography north and south of the river delta is relatively rugged and mountainous with closed terrain. Visible glacier fields are rare. Federal lands have High and Moderate SIOs primarily at the mouths of the Endicott and Sullivan rivers.

Sullivan Island to Chilkat – This area encompasses the Chilkat Inlet corridor. It is approximately 3 miles wide and includes views of the forested Chilkat Peninsula and islands to the east and the rugged mountainsides and glaciers of the Chilkat Range to the west. There are no USFS lands in this area; therefore, there are no federal SIOs.

3.1.3 Historical and Archaeological Resources

Section 106 of the National Historic Preservation Act, as amended (16 United States Code [USC] 470f), requires federal agencies with jurisdiction over a project (including federal assistance to State projects) to identify and evaluate historic properties, assess the project's effect upon them, and afford the Advisory Council on Historic Preservation the opportunity to comment on the project if there would be an adverse effect on an historic property. Historic properties are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places" (16 USC 470w[5]).

A literature review completed in 1994 as part of the initial scoping process for the JAI Project identified several previous archaeological studies in Lynn Canal. These studies identified a number of known and reported prehistoric and historic sites along both the eastern and western shores of Lynn Canal that could be affected by project alternatives. Archaeological inventories were undertaken in 1994 and 2003 to confirm the existence of reported sites, locate previously undiscovered sites, and evaluate the significance of these properties. The archaeological research in both years was guided by a research design previously adapted by the Alaska Region of the USFS. An Area of Potential Effect (APE) of approximately 164 feet on both sides of the alternative alignment centerlines including potential terminal locations (a 328-foot-wide corridor) was assessed for cultural resources. Areas with a high potential for past human occupancy (e.g., river and stream mouths, shoreline benches below 100 feet in elevation, and areas of less than 25 percent slope) were surveyed on the ground. Areas with a low potential for past human occupancy received a reconnaissance-level survey using shoreline observations from a boat and a review of aerial photography. The State Historic Preservation Officer (SHPO) was consulted and concurred that the APE and field methodology were applicable for the cultural resource inventories conducted for the proposed project (Bittner, 1995).

Additional archaeological fieldwork was performed during the fall of 2003 and spring of 2004, to more accurately locate previously discovered sites and to evaluate new areas potentially affected by revised alternative highway alignments and potential ferry terminal sites. In September 2003, formal tribal consultation letters were sent to 11 area tribes and Native organizations, with follow-up phone calls and face-to-face meetings when requested. No potential traditional cultural properties were identified within the JAI Project APE. The results of all investigations and FHWA determinations of eligibility and effect were communicated to these

same tribes and organizations in August 2004 (see correspondence section of Chapter 7.0 of the 2005 Supplemental Draft EIS). No additional comments were received from tribes and Native organizations at that time.

In 2012, DOT&PF conducted a follow-up literature review to determine whether any new information on cultural resources in the APE had become available since the 2006 Final EIS was issued. No new cultural resources were identified within the APE.

In 1994 and 1995, formal determinations of National Register of Historic Places (NRHP) eligibility were prepared for sites within the APE, and determinations were made of the potential effect of the project on historic properties eligible for the NRHP. Additional properties in the project area were determined eligible by the USFS in 2004. Formal determinations of NRHP eligibility were also prepared by FHWA for three additional sites within the project study area in 2004. On October 19, 2004, the SHPO concurred with the FHWA determinations of eligibility, proposing minor changes to site boundary delineations (Bittner, 2004).

The APE on the east side of Lynn Canal crosses three historic mining districts eligible for the NRHP: the Berners Bay, Jualin, and Comet/Bear/Kensington historic mining districts (Figure 3–6). The APE passes near a fourth district, the Ivanhoe/Horrible Historic Mining District. The Berners Bay Historic Mining District encompasses the material remains of historic mining activities that took place in the Juneau Mining District from the 1870s to 1944 and contain sufficient integrity to convey that significance. The Berners Bay Historic Mining District includes three smaller districts. Many of the material remains are located in these three smaller historic mining districts.

The contributing elements of the Jualin Historic Mining District are linked with the history of the Jualin Mine operations. The identified elements consist of the Jualin Mine Wharf, Lower Jualin Mine Camp, Upper Jualin Mine Camp, and Jualin Mine Tram. Only one contributing element from this district, the Jualin Mine Tram, is located in the APE under Alternative 2B.

The Comet/Bear/Kensington Historic Mining District includes mining properties that are connected in several ways, including common claim ownership and shared use of mining structures. Identified contributing elements to this district are the Comet/Bear/Kensington Millsite, Comet/Bear/Kensington Railroad, Comet Mine, Comet Mine Tram, Bear Mine, and Kensington Mine. Only one contributing element from this district, the Comet/Bear/Kensington Railroad, is located in the APE under Alternative 2B.

The Ivanhoe/Horrible Historic Mining District reflects the connections between two stamp mills, three tramways, and two mines that were developed through changing claim ownership. Contributing elements to this district are the Mellon Millsite, Portland Millsite, and Lynn Canal Company Horrible Mine Tram. The District has two separate areas. The APE passes between these two areas but no part of either area is within the APE of any alternative.

The Dayebas Creek Sawmill site consists of a shipway, two areas of mill-related debris, and a penstock running parallel to Dayebas Creek. This sawmill embodies patterns of features, such as its location, a pelton wheel, and other associated objects, that were common to late nineteenth and early twentieth century sawmills along Lynn Canal. Although the site possesses little structural integrity, it does have potential as a historical archaeological site to provide information on the character and development of the area's sawmills; therefore, it is eligible for listing in the NRHP (Ballard, 1994; Bittner, 1995). This site is not in the project's APE.

The Skagway Hydroelectric Complex District located at Lower Dewey Lake is another NRHP-eligible historic district on the east side of Lynn Canal. Contributing elements of the district include the Lower Dewey Lake Dam, the reservoir, pipelines, power plant, hoist building, and tramway. None of the elements are in the project's APE.

The Lower Dewey Lake Trail begins at a bridge across Pullen Creek and runs east/southeast toward Lower Dewey Lake. The Lower Dewey Lake Trail (Figure 3-5) is an historic route from the trailhead to the junction where the trail splits into the Upper Dewey Lake Trail, the Sturgill's Landing Trail, and the Lower Dewey Lake Circuit Trail. The eligible portion of the trail ends near the northern end of Lower Dewey Lake at the junction point. The trail is outside the project's APE. The trail is visible in a 1903 photograph of Skagway, and older rockwork supports some of the switchbacks.

The Skagway and White Pass District NHL extends from the Skagway harbor to the Canadian border at White Pass summit. This NHL includes the historic Skagway townsite, which has 152 contributing buildings; a log cabin and wharf built in 1897; the White Pass and Yukon Route (WP&YR) Railroad built between 1898 and 1900; and cliffside painting east of the White Pass Dock, known as the Ships Registry, dating back to 1918. The NHL is not within the project's APE.

The Klondike Gold Rush NHP was established in 1976 to commemorate the gold rush of 1897 to 1898. The park is listed in the NRHP and includes 14 blocks of downtown Skagway, also designated by the Municipality of Skagway Borough as the Skagway Historic District. The Klondike Gold Rush NHP is not within the APE of any of the project alternatives.

On the west side of Lynn Canal, the only NRHP-eligible site within the APE of the proposed project is the Dalton Trail (Figure 3-1). The 305-mile Dalton Trail was built in 1896 and was the longest of three access routes from Lynn Canal to the Klondike goldfields. The trail began at Pyramid Harbor and stretched to B.C. and the Yukon Territory. The part of the trail crossing Green Point north of Pyramid Harbor is within the APE under Alternative 3.

3.1.4 Socioeconomic Resources

Information in this section is derived from the 2014 *Socioeconomic Effects Technical Report* (Appendix EE of this Draft SEIS). Additional economic and social information about the Lynn Canal vicinity is provided in that report.

3.1.4.1 Juneau

Based on the 2010 Census (U.S. Census Bureau, 2010a), approximately 31,275 people reside in the community of Juneau. The population of Juneau has increased by 2 percent since 2000, when 30,711 individuals lived in Juneau, and 16 percent since 1990 when 26,751 persons lived in Juneau. The pace of growth has been slower than in the decades before the 1990s, with an average annual growth rate of 0.8 percent over the last 20 years.

According to the 2010 Census, approximately 69.7 percent of Juneau's population is white, and 11.8 percent is Alaska Native or American Indian. The remaining population consists of 6.1 percent Asian, 0.9 percent African American, and the remainder is other races (U.S. Census Bureau, 2010b).

The 2010 Census counted 12,187 occupied housing units in Juneau, with an average household size of approximately 2.6 persons. The 2010 American Community Survey identifies 12,005 households in Juneau. Among these households, 10.2 percent had incomes less than $25,000 in 2010, and 13.1 percent of all individuals living in Juneau had incomes below the poverty line.[6] More than 68 percent of Juneau households had incomes of over $50,000, with almost 50.4 percent earning $75,000 or more. Median household income was $75,517, and per capita income was $49,458 (U.S. Census Bureau, 2010b).

According to the Alaska Department of Labor and Workforce Development (ADOLWD), annual average employment in Juneau reached 18,057 jobs in 2011. Since 1980, employment in Juneau has grown almost 67 percent, increasing at an average annual rate of 1.6 percent. Juneau's payroll totaled $816 million in 2011. In inflation-adjusted "real" dollars, total annual payroll in Juneau has increased by approximately 66 percent since 1980.

Juneau is the capital of Alaska. Government is Juneau's most important source of employment, accounting for about 41 percent of total employment and about 50 percent of the total annual wage and hour earnings in 2011. State government alone accounts for 24 percent of employment, and local government makes up about another 13 percent. Service-providing industries account for 50 percent of total employment in Juneau but only about 37 percent of the earnings. Goods-producing industries make up the balance of employment (9 percent) and earnings (about 14 percent) (ADOLWD, 2012). Many of the State and federal government jobs in Juneau are there because it is the state capital. There have been several capital move efforts and ballot initiatives over the past three decades. Relocating the capital to a location other than Juneau would decrease the number of government jobs as well as related service industry jobs.

The leisure and hospitality industry accounts for 8.1 percent of the service jobs in Juneau. Current employment in Juneau's visitor industry is 1,459 jobs and $26.5 million in annual payroll. Leisure and hospitality positions are mostly seasonal, lower-paying jobs, comprising only 3 percent of total earnings in Juneau.

The tourism industry has been Juneau's fastest-growing industry, primarily from cruise ship visits. Juneau cruise passenger volume reached almost 925,000 visitors in 2012. Between 1998 and 2005, the annual rate of growth from cruise ship visits ranged from 5 to 14 percent, but between 2006 and 2012, the annual rate of growth slowed to 0 to 5 percent.

According to Alaska Visitors Statistics Program data (ADCCED, 2012a), Alaska summer visitor traffic included an estimated 1.6 million out-of-state visitors between May 1 and September 30, 2011. This total number of summer visitors represents an increase of 22 percent over summer 2002 and 2 percent over summer 2010; however, it is 5 percent below summer 2006 and 9 percent below the peak year of 2007 (1.7 million summer visitors). Because of the continuing slow recovery of the U.S. economy, which leads to a reduction in "luxury" spending, slow growth for the Southeast Alaska visitor industry is projected into the future; this trend generally follows national trends (Southeast Conference, 2012).

[6] Poverty status is determined by comparing annual income to poverty guidelines that vary by family size and composition. If a family's total income is less than the threshold, that family and every individual in it is considered in poverty. The 2012 poverty guidelines for Alaska are $13,970 for an individual, $18,920 for a two-person household, $23,870 for a three-person household, and $28,820 for a four-person household (Department of Health and Human Services, 2012).

In summer 2011, Juneau was the most visited destination in the state at 61 percent of Alaska's independent visitor market. The Juneau Convention and Visitors Bureau estimates that between 100,000 and 150,000 visitors arrive annually by non-cruise modes of travel.

Trends in the independent visitor market since 1993 are not well understood, but are reflected in airline and ferry arrival data. Between 1993 and 2011, airline passenger traffic increased by about 7 percent and ferry passenger traffic increased by 8 percent. During the same period, Juneau's population increased by about 12 percent. The increase in air travel to Juneau is likely the result of a combination of increased resident travel (from population growth) and increased visitor arrivals.

Over the long term, the State's commitment to marketing, perceived safety of overseas travel, exchange rates, demographic shifts, and other factors will determine how many independent visitors travel to Alaska.

Juneau's visitor market includes a relatively small number of recreational vehicle (RV) travelers. In 2010, a total of 597 RVs disembarked in Juneau (this included Juneau residents-owned RV travel), according to AMHS data (Gerrish, 2012). That represents about 17 percent of AMHS RV traffic in Southeast Alaska. Juneau's capacity to serve RVs is limited but adequate to meet current demand. It includes 78 RV-specific sites at private RV parks, and 124 sites that are available for camping and RV parking at the Mendenhall Campground.

Although the economy of Juneau is currently dominated by government and summer season tourism, Juneau seeks to diversify its economic base by facilitating new or expanding its current export industries such as mining, food processing, and manufacturing (CBJ, 2008). The Greens Creek Mine, owned by Hecla Mining Company, Juneau's largest private sector employer, has 337 workers. In 2012, Hecla Mining Company received approval to begin exploration for new ore deposits adjacent to the mine. The discovery of new ore deposits, together with expansion of the tailings disposal facility, could extend the life of the Greens Creek Mine an additional 30 to 50 years. Greens Creek employees live in Juneau and commute to the mine on a daily basis.

In 2011, Juneau's mining industry grew by about 207 year-round employees and 38 contract employees because of a new extraction operation at the Kensington Mine. The Kensington Gold Project is located approximately 45 air miles north of Juneau and is owned by Coeur d'Alene Mines Corporation. The mine site is within the CBJ boundaries and the Tongass National Forest. The Kensington Mine has an expected life of about 12 years, though additional ore discovery could extend the operating life of the mine.

The seafood industry in Juneau includes commercial fishing and seafood processing. According to CFEC 2010 data, 315 Juneau-based commercial fishermen fished 313 permits and harvested 15.8 million pounds of fish with an estimated gross income of $16.9 million (CFEC, 2011). Based on 2011 data, approximately 760 Juneau residents fish commercially, as permit holders or crew, landing 22.7 million pounds of fish with a value of $26.4 million (JEDC, 2012a). According to Juneau Economic Development Council data, eight shore-based seafood processing facilities in Juneau processed 15.9 million pounds of product, with a wholesale value of $50.3 million in 2011 (JEDC, 2012a).

Retail trade employment in Juneau for 2011 averaged 1,994 workers who earned a total annual payroll of $52 million. Large retail chain stores, such as Fred Meyer, Walmart, and Safeway, are among the top 10 private employers. Over the long term, the retail industry is expected to keep

pace with changes in local basic industry employment and population and with growth in the visitor industry.

Healthcare providers and social service networks are some of the largest employers in Juneau, making up four of the ten largest firms. Private medical practices are available in the area as well as long-term care facilities; physical therapy services; alcohol treatment programs; and services for victims of domestic violence, AIDS patients, and terminally ill patients. The health services industry in Juneau provides health care to residents of outlying communities as well as the Juneau resident population. The health care and social assistance industry had average annual employment of 1,797 jobs in 2011, representing about 10 percent of the employment in the area and $65 million in annual payroll. With approximately 200 employees in Juneau, the largest healthcare provider in the region is the Southeast Alaska Regional Health Consortium (SEARHC). The Bartlett Regional Hospital in Juneau is the region's next largest healthcare provider. The hospital has a staff of 407 full-time equivalent employees. The hospital is considered part of local government in employment statistics.

Juneau's transportation sector, including air, water, trucking, and warehousing, generated employment of 1,052 and payroll of $40 million in 2011. Air transportation alone accounted for 380 of those jobs. With limited access options, the transportation industry in Juneau is a critical component of the economy. This sector will continue to grow according to the demands of the local population and growth in the visitor industry.

Most of Juneau's basic goods and materials are shipped into the city by barge. According to the U.S. Department of the Army Waterborne Commerce of the United States for the calendar year 2010, the Juneau harbor had in-bound freight traffic of 260,664 tons for the year (USACE, 2010a).

Juneau International Airport is also a critical component for movement of cargo and business people traveling to or from the capital city. Further, the airport serves as a hub for northern Southeast Alaska. In 2009, approximately 9,000 tons of airfreight was shipped to and from Juneau, about half of which is mail. Air freight shippers include Alaska Airlines, Evergreen, and Empire Air.

According to the CBJ Community Development Department, there were 13,057 housing units in the community in 2011, with a vacancy rate of 5 percent (3.2 percent for rentals; Kreiger and Schultz, 2011). Single-family homes comprise 58 percent of Juneau's housing inventory, and multifamily homes and condominiums/townhouses make up another 34.5 percent. The *Juneau Housing Needs Assessment* (JEDC, 2012b) found that Juneau's housing stock is inadequate to meet demand of renters and prospective owners, especially those considered "cost-burdened." The area has a shortage of affordable housing attributable to the continued increase in housing prices and a slow-down in new housing construction. As of 2011 there were 32,290 people (with 2.6 persons per household) living in Juneau. Population projections for the year 2050 predict a population decrease of 210 to 32,080. Although the population is expected to decline, a shortage of suitable housing could continue.

The CBJ had revenues of $134 million in 2010 (CBJ, 2010a). The majority of revenues collected by the CBJ are derived from taxes and State of Alaska sources. Local taxes include real property, sales, bed, liquor, and tobacco taxes.

The Juneau School District had 5,043 students during the 2011 to 2012 academic year. Enrollment has declined by 500 students since the 2002–2003 school year. The school district has typically offered education from kindergarten through twelfth grade, including vocational education programs and a number of alternative learning programs.

Capital City Fire and Rescue has 33 career staff, 70 volunteers, and 9 administrative staff. The Juneau Police Department has 50 sworn officers and 45 civilian staff.

The Alaska State Troopers maintain a headquarters in Juneau. In addition, the A Detachment of Alaska Wildlife Troopers is headquartered in Juneau and covers the entire mainland and numerous islands of Southeast Alaska.

3.1.4.2 Haines

Based on the 2010 Census (U.S. Census Bureau, 2010a), approximately 2,508 people reside in the Haines Borough. According to ADOLWD estimates, the Haines Borough population totaled 2,620 residents in 2011. The population of Haines has grown at an average annual rate of 1.4 percent since 1980. In particular, the local population increased over the previous 5 years, from 2,357 in 2006 to 2,620 in 2011. Average annual population growth in the last 10 years from 2001 through 2011 was 0.9 percent (ADOLWD, 2013a).

Klukwan is a Native village located approximately 20 miles northwest of Haines west of the Haines Highway. The community of Klukwan is a census designated place (CDP). A CDP is a concentration of population identified by the U. S. Census Bureau for statistical purposes. CDPs are populated areas that lack separate municipal government, but which otherwise physically resemble incorporated places. Klukwan CDP is not part of the Haines Borough and is not incorporated as a municipality. It is governed by an Indian Reorganization Act Council. Based on the 2010 Census (U.S. Census Bureau, 2010a), approximately 95 people reside in the Klukwan CDP. This village of 98 residents (ADOLWD 2011 estimate) has experienced a significant net decrease of one-third of its population since 1986, when the population was 151.

According to the 2010 Census, approximately 83 percent of the Haines population is white, 9 percent is Alaska Native or American Indian, and 0.6 percent is Asian. The remaining population is Native Hawaiian and Other Pacific Islander, Black or African American, or some other race (U.S. Census Bureau, 2010a). The only real growth in Haines is in the retirement community. Retirees are moving to Haines based on lifestyle decisions rather than local economic opportunities.

The 2010 Census counted 744 households in Haines, with an average household size of approximately 3.4 persons (U.S. Census Bureau, 2010a). Among those households, more than 18 percent had incomes of less than $25,000 in 2010, and 14.4 percent of all Haines residents had incomes below the poverty line. A total of 47 percent of Haines households had incomes of over $50,000, with almost 31 percent earning $75,000 or more. Median household income was $47,981, and per capita income was $27,979 (U.S. Census Bureau, 2010b).

In 2011, the Haines economy produced an annual average of 1,025 jobs (not including self-employed) and $33.3 million in wages. Employment grew by 79 percent from 1980 to 2011. This is an annual average growth rate of 1.9 percent.

Total Haines earnings in 2011 dollars decreased by almost 4.1 percent, from $34.7 million to $33.3 million, between 1991 and 2011. The average annual rate of decline for total earnings was approximately 0.1 percent during this 20-year period.

In terms of employment, the largest sector of the Haines economy is local government, with 152 jobs and $4.8 million in annual payroll in 2011. Retail trade accounted for 140 jobs with $3.2 million in payroll. The construction sector had average employment of 91 jobs with $6.6 million in payroll. Leisure and hospitality jobs peaked at 370 in August of 2011, while offering 206 average annual jobs with annual payroll of nearly $3.8 million.

The visitor industry directly or indirectly accounted for the annual equivalent of approximately 20.1 percent of total wage and salary employment and 11.4 percent of total wages during 2011. These jobs stem from local spending by visitors to the community, including cruise ship passengers, visitors traveling to and through Haines by ferry or highway, and visitors traveling to Haines to participate in special activities (e.g., attend the fair, take guided hunts, or view eagles).

The number of cruise ship passengers visiting the Borough dropped dramatically between its peak of 195,600 passengers in 2000 to 31,611 in 2012. The long-term outlook for cruise traffic to Haines is uncertain. Haines is likely to remain a secondary port of call. It lacks the tour and excursion opportunities needed to be popular with passengers and cruise lines. Cruise traffic will probably continue to be erratic as lines add or drop the port, depending on availability of other ports of call. Despite receiving few cruise ships in its port, Haines benefits from Skagway cruise ship ports of call. In 2011, approximately 28,500 cruise ship passengers visited Haines via the fast ferry from Skagway. These visitors spent an average of $135 per person in Haines during their stay in 2011, or $3.8 million total. Dependable fast ferry runs between these communities is essential to Haines to capture this business (Haines Borough, 2012).

Haines' non-cruise independent visitor traffic has also been declining. While not all ferry traffic is tourist-related, ferry traffic has also decreased. In 1992, ferry disembarking traffic included 45,300 passengers and 15,100 vehicles. In 2011, disembarking traffic totaled 33,284 passengers and 12,204 vehicles (DOT&PF, 2011b). This reflects an overall decline in the AMHS visitor market in recent years. This decrease in ferry traffic, as well as decreases in cruise ship passenger traffic, has been detrimental to some sectors of the Haines visitor industry, as well as to the local economy as a whole (Haines Borough, 2012). Visitor arrivals by air, however, have increased from 5,641 in 2002 to 9,636 in 2011 (RITA, 2013), but has not returned to levels recorded in the 1990s.

According to Commercial Fisheries Entry Commission preliminary data, 81 Haines-based commercial fishermen fished 130 permits in 2010 and harvested 6.4 million pounds of fish with an estimated gross income of $7 million. The largest single private-sector employer in the Haines Borough is Ocean Beauty Seafoods, a seafood processing plant in Excursion Inlet. There are four other seafood processing facilities in the Borough. Although tourism is the largest industry, seafood processing contributes a significant number of jobs—about 400 in 2009. However, most of the jobs are seasonal and are not filled by Haines residents.

The transportation industry in Haines accounted for an average of 29 jobs in 2010, with peak employment of 49 workers (ADOLWD, 2012). Payroll totaled approximately $0.8 million.

Employment in Haines's retail trade sector in 2011 averaged 140 jobs with $3.2 million in total annual payroll. The retail sector in Haines is particularly dependent on non-resident spending.

This is reflected in the seasonal increase in retail employment. In 2011, retail employment peaked at 158 jobs in August, compared to October employment of 120.

To a significant degree, Haines' retailers compete against Juneau stores. Leakage from the Haines economy, which occurs when local consumers purchase goods and services from outside the community, has been an important issue for Haines merchants.

Medical services are provided by two facilities, the Haines Medical Clinic and the Klukwan Medical Clinic, both operated by SEARHC. Most routine and emergency health care services are provided locally; however, patients are evacuated to Juneau for procedures requiring general anesthesia. The increased population spurred by the visitor industry causes a corresponding increase in demand for local health care services during the summer. While the Haines population has been relatively stable, school district enrollment has been declining since 1997, with 310 enrolled students in 2012. The school district has typically offered education from pre-elementary through twelfth grade. In 2011, educational and healthcare services generated average employment of 137 jobs and annual payroll of $4.2 million. Educational and healthcare services accounted for 13 percent of the jobs in Haines in 2011 and 13 percent of the wage and hourly earnings.

The 2010 Census counted 1,631 housing units in Haines, of which 1,149 were occupied. Vacant housing units numbered 482 (30 percent), but 345 were classified as seasonal, recreational, or occasional-use units (U.S. Census Bureau, 2010a).

Haines Borough had revenues of $14.1 million in 2010. Local taxes included real property, sales, bed, and tour taxes. The Haines Volunteer Fire Department has a full-time training officer, full-time fire/EMS responder, fire chief, and 30 to 35 volunteer firemen. The Haines Police Department employs a police chief, sergeant, 4 patrol officers, a school resource officer, and 5 dispatch/jail personnel. There is one Alaska State Trooper and one Alaska Wildlife Trooper stationed in the Borough.

3.1.4.3 Skagway

Approximately 968 people resided in Skagway in 2010 (U.S. Census Bureau, 2010a). Skagway's population has not changed significantly over the past 20 years, growing only 0.3 percent. However, during the summer the community experiences a significant influx of seasonal workers employed in the visitor industry.

According to the 2010 Census, approximately 91.4 percent of the population is white. The remaining population consists of 5.4 percent Alaska Native or American Indian, 0.5 percent Asian, and the remainder is other races (U.S. Census Bureau, 2010a).

The 2010 Census counted 386 households in Skagway, with an average household size of approximately 2.5 persons (U.S. Census Bureau, 2010a). Among these households, approximately 8.3 percent had incomes of less than $25,000 in 2010, and 20.1 percent of Skagway residents had incomes below the poverty line. Just over three quarters (76.5 percent) of the households had incomes of over $50,000, and of those households, 47.7 percent earned $75,000 or more. Median household income was $73,500, and per capita income was $57,832 (U.S. Census Bureau, 2010a).

The visitor industry is Skagway's most important industry. The number of cruise visitors to Skagway has more than tripled in the last 15 years, from 260,000 in 1996 to almost 820,000 in

2007 before falling back to 708,000 in 2011(Skagway Convention and Visitors Bureau, 2012). However, because of the continuing slow recovery of the U.S. economy, which leads to a reduction in "luxury" spending, slow growth for the Southeast Alaska visitor industry is projected into the future, which generally follows national trends (SEC, 2012).

Historically, Skagway has been an important transshipment center, with freight, fuel, and ore concentrates moving over its dock. Skagway seeks to balance its role as a tourist destination, which produces significant revenue and many seasonal jobs, with its role as a year-round transshipment hub, and has instituted the Gateway Project to enhance its port facilities. The Gateway Project is a cooperative effort among the Municipality of Skagway Borough, the Alaska Industrial Development and Export Authority, and the Government of Yukon, which is intended to better manage industrial and maritime activities in the port area, as well as improve existing pedestrian, vehicle, marine, and train traffic (Municipality of Skagway, 2013).

Non-cruise independent visitor travel to Skagway includes travelers arriving by ferry, air taxi, and highway. In 2011, 73,013 travelers arrived in Skagway via highway in a personal vehicle, according to Skagway Convention and Visitors Bureau data (2012). Additional visitors arrive by bus, but this number is hard to quantify, as many bus passengers are on day trips associated with cruises. Ferry traffic has declined in recent years: the number of disembarking passengers in Skagway exceeded 40,000 in 1995 and years prior to that, but totaled only 21,216 passengers in 2011.

The transportation industry, which is dominated by the visitor industry, employed 239 workers in Skagway in 2007[7], representing about 24 percent of the total employment for the area and nearly 33 percent of the total earnings for the year. The transportation and warehousing sector accounted for 4 percent of personal income in 2010. Transportation workers are primarily employed with the WP&YR Railroad. The railroad was originally built to supply goods to interior gold mining camps. Today, the railroad connects Skagway with Carcross, British Columbia, during the summer months, which is one of the most popular visitor excursions in Alaska.

The Port of Skagway serves several important functions in the Municipality's economy. In addition to serving the cruise ship industry, it is an important freight terminal. Skagway marine freight traffic totaled 166,000 tons in 2010, primarily gasoline and other fuels (almost 75 percent). According to Alaska Marine Lines, 43 percent of Skagway general freight continues on to the Yukon. Three mines are exporting ore out of Skagway: Keno (lead, zinc, and silver), Minto (copper and gold), and Wolverine (zinc and silver) (NEI, 2013). Most important, the port serves the cruise industry and its 708,000 passengers, as well as passengers traveling via the AMHS.

The retail trade industry in Skagway employed an average of 164 workers in 2011. Many of these positions were seasonal.

The 2010 Census counted 636 housing units in Skagway, of which 436 were occupied. Vacant housing units numbered 200 (31 percent), but 48 were classified as seasonal, recreational, or occasional-use units. Skagway is reported to have extreme shortages of housing during the peak summer season.

[7] Due to changed confidentiality standards, 2007 was the last year that employment data were reported for this sector.

The Municipality of Skagway Borough had revenues of $14.8 million in 2010. More than 55 percent of the revenues were generated from sales and real property taxes. Skagway also has a bed tax.

The Skagway School District had 74 students during the 2011 to 2012 academic year. Enrollment has varied but has generally declined over the past 10 years. Education is offered from the pre-elementary through twelfth-grade levels at a single school.

The Dahl Memorial Clinic is owned and operated by the Municipality of Skagway Borough, although it contracts management services through an agreement with Bartlett Regional Hospital. The clinic is overseen by an administrator and staffed by two mid-level providers, a nurse practitioner, a physician's assistant, and support staff. Itinerant doctors, a dentist, pediatrician, public health nurse, and other specialists from Juneau visit the clinic on a rotating basis. Emergency medical patients are generally evacuated to Juneau.

Skagway's fire protection is provided by the Skagway Volunteer Fire Department. The department has two full-time employees, two part-time employees, and 34 volunteers. The Skagway Police Department operates with seven full-time and four seasonal employees. The U.S. Customs and Immigration has an office in Skagway, and the NPS also has law enforcement officers on staff. No Alaska State Troopers are located in Skagway.

3.1.5 Environmental Justice

On February 11, 1994, President Clinton issued Executive Order (EO) 12898. The order applies to "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The EO makes it the responsibility of each federal agency to make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Accompanying this order was a Presidential Memorandum directing each federal agency to analyze the environmental effects, including human health, economic and social effects, of federal actions, including effects on minority communities and low-income communities, when NEPA analysis occurs. Table 3-1 provides demographic information for the study area, based on U.S. Census data, to help identify minority and low-income communities potentially affected by the JAI Project.

Table 3-1:
2010 Demographic and Economic Data[1]

Area	Population Year 2010	Percent Minority or Mixed Race (2010)	Median Household Income[2]	Percentage of Individuals Below Poverty Level[2]
United States	308,745,538	22	$52,762	14.3
Alaska	710,231	33	$69,014	9.5
Juneau City and Borough	31,275	30	$75,517	13.1
Haines Borough	2,508	17	$47,981	14.4
Skagway	968	9	$73,500	20.1
Klukwan	95	92	$43,333	3.5

[1]U.S. Census Bureau (2010b).
[2]U.S. Census Bureau (2010c).

Based on 2010 Census information, the percent minority populations in Klukwan are higher than the state percentage.

The U.S. Census Bureau uses a set of monthly income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the threshold, that family and every individual in it is considered in poverty. The official poverty thresholds do not vary geographically but they are updated for inflation using the Consumer Price Index.

The 2012 poverty guidelines for Alaska for an individual is $13,970. The 2010 Census found that the average household size in Alaska was 2.65. The poverty guideline for a two-person household is $18,920 and for a three-person household is $23,870. The percent of individuals in poverty by area is included in Table 3-1.

3.1.6 Subsistence

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) requires that subsistence hunting and gathering uses be addressed for all projects on federal lands in Alaska. Subsistence is defined in ANILCA as the "customary and traditional use by rural Alaska residents of wild renewable resources for direct personal or family consumption as food, shelter, clothing, tools, or transportation." Subsistence issues are addressed within Section 810 of ANILCA. As a result, subsistence evaluations are commonly called Section 810 evaluations.

Subsistence in Alaska is dually managed by the State and the federal governments. Until late 1989, the State managed statewide subsistence harvests on federal land. Under ANILCA, the federal government began managing subsistence hunting, trapping, and fishing on Alaska's federal public lands in 1990.

Both the State and federal governments have their own legislation and enforceable regulations. The ADF&G Division of Subsistence provides a database and analysis of fishing and hunting patterns to support the implementation of the law by the Board of Fisheries and Board of Game. The Federal Subsistence Management Program's lead agency, the U.S. Fish and Wildlife Service (USFWS), manages hunting of most species of terrestrial mammals, grouse, ptarmigan, fish (except halibut), and shellfish. Residents of rural areas may harvest fish and wildlife under federal subsistence regulations, if a recognized, consistent, and traditional subsistence use of that species exists. Since statehood in 1959, ADF&G has managed all sport, subsistence, and personal use salmon harvesting under regulations set by the Alaska Board of Fisheries. Subsistence regulations have been in place for state residents since 1961. The personal use category was adopted for non-rural communities beginning in 1982. In the mid-1980s, the State designated some historic fisheries and hunts that did not meet the required subsistence criteria or fit the definition of commercial or recreational uses as personal use. Personal use harvests receive no priority and are sometimes open only at times of a non-allocated surplus of a resource. Personal use harvests are open only to Alaska residents, and a resident sportfish license is required to participate (United Fishermen of Alaska, 2004).

Since 1990, salmon harvest under subsistence regulations has been authorized by the Board of Fisheries in discrete areas of Lynn Canal. Salmon are harvested in other areas of the Lynn Canal region under personal use regulations (ADF&G, 1994). In the study area, customary and traditional use areas for salmon, Dolly Varden, smelt, and steelhead identified by the Alaska Board of Fisheries include the Chilkat, Chilkoot, and Lutak inlets, the Chilkat River and its

tributaries, and Chilkat Lake (Figures 3-7 through 3-9). Customary and traditional use areas for shellfish, bottom fish, and herring identified by the Alaska Board of Fisheries include almost all of upper Lynn Canal and its inlets to just south of the southern end of Sullivan Island (ADF&G, 1991) (Figures 3-7 through 3-9).

The 1988 Tongass Resource Use Cooperative Survey (Kruse and Frazier, 1988) remains the most comprehensive subsistence study conducted within the study area. In a more recent study, ADF&G reported harvest data for Klukwan, Haines, and Skagway (ADF&G, 1994). Federally recognized subsistence use of lands within the study area includes the residents of Klukwan, Haines, and Skagway. Most current available information was collected for deer, salmon, non-salmon finfish, marine invertebrates, and marine mammals. No mapped, specific land-use information exists for other species in the study area. For a complete discussion of subsistence in the study area, refer to the 2014 *Land Use Technical Report* (Appendix DD of this Draft SEIS).

3.1.6.1 Haines

Subsistence resource use categories in Haines consist of salmon, non-salmon finfish, marine invertebrates, marine mammals, black bear, brown bear, mountain goats, moose, and Sitka black-tailed deer. Deer are scarce in the upper Lynn Canal region. Hunting takes place on the south end of Sullivan Island, portions of Lincoln and Shelter islands, and the south shore of St. James Bay. Hunting also occurs in the lower Lynn Canal region and on Chichagof and Admiralty islands. Fishing occurs primarily in the Chilkoot River; Chilkoot Lake; the lower Chilkat River; Lutak, Chilkoot, and Chilkat inlets; and St. James Bay. Most invertebrate harvests in upper Lynn Canal areas close to Haines involve crab or shrimp harvest. Clams and cockles are harvested in more distant areas (St. James Bay and the inlets of Icy Strait). Trade with residents of other communities for locally unavailable marine invertebrates is common. Harbor seals have been the only marine mammals hunted by Haines residents for subsistence purposes.

Haines was originally the site of a Chilkoot Tlingit seasonal camp near the mouth of the Chilkat River. The 1988 Tongass Resource Use Cooperative Survey found 93 percent of the households used subsistence resources and 83 percent of households participated in subsistence harvests (Kruse and Frazier, 1988).

Subsistence harvesters focus on river, upland, and marine environments. Salmon were harvested from the Chilkat River and from marine areas of upper Lynn Canal. Trout and eulachon were harvested from rivers and marine finfish were harvested from saltwater areas. Local roads and rivers were used to reach moose, mountain goat, bear, some fish, berry picking, and wood cutting harvest areas.

3.1.6.2 Juneau

Juneau has a relatively large native community and personal use of fish and wildlife is common, but the CBJ is not designated under ANILCA as a subsistence area.

3.1.6.3 Klukwan

Klukwan is a Tlingit community located near the confluence of the Chilkat, Klehini, and Tsirku rivers approximately 30 miles northwest of Haines. Subsistence is important economically and culturally to Klukwan residents, who continue to use the study area for these purposes. The people of Klukwan harvest salmon, non-salmon finfish (e.g., eulachon, trout, char, and halibut),

black bear, brown bear, moose, mountain goat, marine mammals (harbor seals), and Sitka black-tailed deer. Deer are scarce in the Chilkat Valley and other mainland areas in the northern Lynn Canal area. Sitka black-tailed deer hunting occurs on portions of Lincoln, Shelter, Benjamin, and Sullivan islands. There is some moose harvest as well.

Residents of Klukwan generally fish for sockeye, pink, and chum salmon in designated subsistence harvest areas near their community. Non-salmon harvest for Klukwan residents takes place in all waters of Chilkat River for eulachon, Chilkoot and Lutak inlets for halibut, and Lynn Canal from Point St. Mary (entrance to Berners Bay) to Seduction Point, including waters around Sullivan Island and in William Henry Bay, for halibut (ADF&G, 1994).

The 1988 Tongass Resource Use Cooperative Survey found that 100 percent of Klukwan households used subsistence resources and 95 percent of households participated in the harvest of those resources (Kruse and Frazier, 1988).

Resource harvest for Klukwan is strongly focused on riverine and inland environments for most of the resources harvested. Chinook salmon, sockeye salmon, chum salmon, and eulachon were the primary species harvested in the Chilkat River system. In addition, Chinook and the other salmon, and bottomfish, were harvested in the marine environment by rod and reel.

Harbor seals were the primary marine mammals harvested. Moose, mountain goat, and bear were harvested along the local roads and rivers. Deer hunting was conducted along Lynn Canal by boat.

3.1.6.4 Skagway

As with Klukwan and Haines, relatively little deer hunting occurs in the vicinity of Skagway because of the scarcity of deer in the upper Lynn Canal area. Skagway residents hunt black bear, brown bear, moose, and mountain goat. Most Skagway residents fish Taiya Inlet and Burro Creek for Chinook, coho, and pink salmon. The primary non-salmon finfish species harvested is halibut. Skagway residents fish for trout in creeks and lakes near the community. Invertebrate harvesting by Skagway residents is common along the beaches and in the bays and coves near town. In areas close to the community, including Dyea, Nahku Bay, and Taiya Inlet, residents harvest shrimp and crab. Skagway lacks good clam beaches; therefore, crab is more heavily harvested by Skagway residents (ADF&G, 1994). Harbor seals have been the only marine mammals hunted by Skagway residents for subsistence purposes.

The 1988 Tongass Resource Use Cooperative Survey found that 96 percent of households used subsistence resources and 68 percent of household participated in harvest activities (Kruse and Frazier, 1988).

3.1.7 Transportation

The existing transportation network in Lynn Canal is described in Sections 1.2 and 1.3. As stated in those sections, access to Juneau is only possible by air and water. Juneau is the largest community on the North American continent not connected to the continental highway system.

Commercial jet aircraft provide access to Juneau. Commuter aircraft serve Haines, Skagway, and other communities that do not have the demand or facilities for jet aircraft service. Commuter air service between Juneau and Haines and Juneau and Skagway in 2013 accommodated approximately 3,600 passengers on both Wings of Alaska and Alaska Seaplanes (Wings of

Alaska, 2013; Alaska Seaplanes, 2013). Most of the commuter aircraft in use in Lynn Canal can accommodate 5 to 9 passengers. Departing from Juneau to Haines, there are typically 7 daily scheduled flights in the winter and 14 in the summer. Departing from Juneau to Skagway, there are typically 6 flights operated daily in the winter and 14 daily flights in the summer. On average, there are four passengers per flight. The cost of one-way travel between Juneau and Haines is approximately $120 and between Juneau and Skagway is approximately $130.

The AMHS is the only form of public transportation that carries passengers and vehicles in Lynn Canal. During the summer, the Lynn Canal corridor is typically served by one mainline ferry originating from Bellingham (*M/V Columbia*) and one mainline ferry originating from Prince Rupert (*M/V Matanuska*); these ferries are scheduled to run weekly between May and September (AMHS, 2013). The *M/V Fairweather*, a fast vehicle ferry, is scheduled to run once or twice per month, May through September, to support special events. Day boat service is provided in Lynn Canal 6 days a week (every day but Monday) by the *M/V Malaspina* typically from May through September.

Private ferry companies provide passenger-only service between Lynn Canal communities. This service is seasonal from mid-May to mid-September. Multiple daily trips are scheduled between Haines and Skagway, as well as daily service between these communities and Juneau (Alaska Fjordlines, 2013; Haines-Skagway Fast Ferry, 2013).

Pedestrians and bicyclists are also served by the AMHS. The 2011 passenger-to-vehicle ratio in Lynn Canal was 3.2 to 1. Assuming the actual number of passengers traveling with cars was closer to the highway average of 2.3, as many as approximately 22,300 people may have been walk-on passengers on AMHS ferries in Lynn Canal in 2011 (see Appendix AA, the 2014 *Traffic Forecast Report*).

At least 10 rivers in the project area may be navigable by small craft. These include the Antler, Gilkey, Lace, Berners, and Katzehin rivers on the east side and the Endicott, Sullivan, 'Unnamed' (north of Sullivan Island), North Glacier, and Chilkat rivers on the west side. There is little known information regarding boat use on these rivers. The U.S. Coast Guard has jurisdiction for bridges over navigable rivers. Coordination with U.S. Coast Guard during development of the 2006 Final EIS established that the largest vessels using these rivers are air boats with a maximum height above water of 12 feet. It is unlikely that boats supporting interstate or foreign commerce frequent these waterways. Currently, there are no known plans to improve navigation of these waterways. No marinas, marine repair facilities, public boat ramps, or private docks are located on or within several miles of these rivers, which may limit access and use of the rivers by potential users (primarily recreational users).

3.2 Physical Environment

3.2.1 Geology

A geotechnical and geologic study was prepared in February 1994 by Shannon & Wilson, Inc. for inclusion in the 1997 Draft EIS *Juneau Access Improvement Reconnaissance Engineering Report.* Because geologic changes are not rapid occurrences, a new study was not prepared for the 2006 Final EIS. However, limestone features (termed karst) are located along the proposed alignment of the West Lynn Canal Highway alternative (Alternative 3), and a new study was completed in 2003 to further delineate and assess these features. Following selection of Alternative 2B in the 2006 ROD, DOT&PF conducted a geotechnical investigation of a 22-mile

segment of the alternative designated as Zone 4. This work was summarized in the *Final Report, Lynn Canal Highway, Phase I, Zone 4 Geotechnical Investigation, State Project Number 71100* (Golder Associates, 2006). The geotechnical investigation included the identification and preliminary evaluation of geologic hazards affecting the alignment of Alternative 2B. With changes to the alignment since 2006 (i.e., to avoid and minimize impacts to wetlands and reduce the extent of rock side cast areas, changes based on advanced geotechnical survey information, and recent changes in 2012 in response to updated bald eagle nest survey data), DOT&PF updated to the geologic hazards evaluation in 2012 in the *Revision of Geologic Hazard Summary – Juneau Access Improvements Supplemental Environmental Impact Statement Technical Memorandum* (Golder Associates, 2012). Information from the 2006 and 2012 geotechnical studies has been incorporated into this Draft SEIS.

The 1997 Draft EIS included the following description of geology in the study area:

> Lynn Canal, Chilkat Inlet, Chilkoot Inlet, Taiya Inlet, and Berners Bay are all typical fjords occupying glacially sculpted valleys in the Southeast's coast mountains. These mountains rise steeply from the water to elevations greater than 2,000 meters (6,561 feet) and the valley sides dive steeply into the water reaching depths in excess of 300 meters (984 feet). Rock outcrops are pervasive in the steep areas.
>
> Glacially fed streams and rivers flow into the fjords from both sides, as well as from the heads of the valleys. Large amounts of sediment have been deposited as deltas where these streams and rivers enter salt water. A generally high water table and generally low soil density in the delta areas, combined with the large tide range and possibility of earthquakes, increases the potential for liquefaction and sloughing along the face of the deltas.

3.2.1.1 Geologic Features

Physiographic and Tectonic Setting – The northern part of Southeast Alaska is underlain by a complex heterogeneous assemblage of rocks, including sedimentary, volcanic, metamorphic, and intrusive rocks of Paleozoic, Mesozoic, and Tertiary age. These rocks were emplaced in the southeastern Alaska archipelago during a series of subductions and accretions by tectonic plates obliquely colliding with the ancient continental margin of western North America during Jurassic to early Tertiary time (Gehrels and Berg, 1992 and 1994). Plate tectonic activity since the late Paleozoic has resulted in northwesterly trending curved bands of folded sedimentary, volcanic, and metamorphic rocks. Granitic batholiths, emplaced during the Cretaceous times, are widespread and form the backbone of the Coast Range. Tectonic activity during the Tertiary age resulted in major northwest-trending fault zones.

Major contours in the region, such as fjords and river valleys, are likely controlled by major faults or fault zones (Lemke, 1974). The Chatham Strait/Lynn Canal/Chilkoot River fault system, which bisects the study area along Lynn Canal, trends northwest and apparently continues for over 300 miles, connecting with the Denali fault of interior Alaska (Miller, 1972).

While the faults are thought to control the orientation of features in the area, the fjords and U-shaped river valleys that characterize the region are the result of glaciation. These features were carved by glaciers that have been active since the Pleistocene. The weight of the ice, which at times has reached a thickness of about 5,000 feet, has caused the surrounding land mass to sink

below its original level. Upon deglaciation, gradual rebound of the depressed ground has resulted in the emergence of marine deposits and has also caused uplifted rock faces to be exposed to the effects of shoreline erosion. This erosion forms benches or terraces at the lower elevations of the U-shaped valley walls.

Bedrock – Rock types encountered in the study area include deep to shallow marine sedimentary rocks, volcanics and their metamorphosed equivalents, and granite intrusive rocks. The proposed road corridors along both the east and west sides of Lynn Canal are roughly parallel or oblique to the rock units. Bedrock is visible along wave-cut shorelines, forms knolls and cliffs in the lower slopes, and occurs as bare or muskeg-covered slopes above the timberline on higher mountain slopes. In offshore areas and river drainages, the bedrock surface is often deeply buried beneath unconsolidated soils that are glacial or alluvial in origin.

Based on available information related to geologic features on the east side of Lynn Canal, it is unlikely that acid-generating rock or rock with high total metals content occurs within the project area. No rock containing micro sulfides has been encountered in the area. On the west side of Lynn Canal, carbonate rock associated with karst (see below) has a very high pH value (between 7.0 and 8.2) and is unlikely to be found in proximity to acid-generating rock or rock containing micro sulfides.

Karst – The term "karst" is used to describe an area of limestone or carbonate rock in which the landforms are mostly soluble in origin and drainage is underground through enlarged fissures and conduits (Drew, 1999). Karst develops when acidic waters, enriched in humic and carbonic acids from natural soil decomposition, drain onto carbonate rocks, causing limestone to dissolve. The most favorable climatic environment for karst development occurs in alpine and cold temperate regions with high precipitation and runoff rates (Ford and Williams, 1994). These conditions are generally optimal in Southeast Alaska, creating one of the most actively developing karst regions in the world. The presence of muskegs and forested wetlands ensures that acidic water is generated, which results in aggressive solution activity where water drains onto carbonate rock. Through this chemical weathering process, surface and subsurface features such as interconnected channels are developed. These areas can collapse when limestone dissolved by water percolating downward, combined with removal of cavity roofs from below, weakens the span of surface bedrock or soil.

As described above, karst is a three-dimensional terrain developed on and within soluble, carbonate bedrock in which caves develop. The Federal Cave Resources Protection Act (FCRPA) of 1988 (16 USC 4301-4310) requires protection of significant caves on federal lands. The purposes of the FCRPA are "(1) to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and (2) to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, education, or recreational purposes." Although FCRPA does not specify protection of karst resources, the USFS recognizes that caves with associated features and resources are an integral part of the karst landscape, and that karst must therefore be managed as an ecological unit to ensure protection of cave resources.

Previous mapping studies (DOT&PF, 1994b; Dames & Moore, 1994; NLUR, 1994) indicated that carbonate rock and karst landscape exists on the western side of Lynn Canal in the area between Sullivan Island and William Henry Bay. Carbonate rock is not known to underlie East Lynn Canal. A karst assessment was conducted in summer 2003 to determine the extent of karst

development along the Alternative 3 route (West Lynn Canal) and to evaluate whether the location and design of the highway would be protective of karst resources based on vulnerability criteria and land use objectives established by the USFS for the Tongass National Forest.

A preliminary karst survey of the project area on the west side of Lynn Canal was performed in 1994. This survey was based primarily on literature and aerial photograph review and did not include a field survey (Dames & Moore, 1994). An archaeological team investigating the route of Alternative 3 in 1994 documented a number of shoreline karst features during a ship-based survey (NLUR, 1994); however, a systematic karst survey of the project area was not conducted during these investigations.

A karst field survey was conducted for the project in 2003. The protocol for the survey was developed in coordination with and approved by the USFS. The survey corridor was 300 feet wide (150 feet on either side of a preliminary road centerline) and was expanded to 500 feet wide in areas where high-vulnerability karst was encountered.

Pertinent karst vulnerability rating criteria from the 1997 TLMP and a Tongass Plan Implementation Team Clarification Paper were used to rate karst features encountered in the field. The criteria are as follows:[8]

- **High Vulnerability** – Areas containing a high density of karst features and areas exhibiting openness to the subsurface. These areas are underlain by carbonate bedrock that is well drained internally.
- **Moderate Vulnerability** – Areas underlain by carbonate bedrock that are well drained internally. Areas often occur on knobs and ridges and on the dip-slope of carbonate bedding planes. The surface tends to be irregular and undulating and often open. The primary characteristic used to differentiate between moderate- and high-vulnerability karst is the degree of openness of the system.
- **Low Vulnerability** – Areas underlain by carbonate bedrock that are most commonly internally drained, but surface streams may be present. Generally, these areas have been greatly modified by glaciation and have a covering of glacial till or mineral soil.

The following paragraphs summarize the types of karstland encountered along the West Lynn Canal project area based on the vulnerability criteria category. Figure 3-10 identifies their locations.

High-Vulnerability Areas – Linear strips of high-vulnerability karst were mapped along coastal cliffs in several areas where the Alternative 3 highway alignment comes close to shoreline and where caves or other potential karst features were observed in the cliffs. Similar features were also occasionally observed along inland cliffs along what may be raised wave-cut terraces. A number of the coastal caves observed have previously been mapped and named in the vicinity of Glacier Grotto (Allred and Allred, 1995; Dames & Moore, 1994; Love, 1999). Most of these caves lie outside of the eastern edge of the study corridor.

Many of the shoreline cliff features do not appear to be solutional in origin; rather, most appear to have been formed by cavitation and littoral erosion accompanied by block failure. Cavitation occurs as air is forced into joints or small solution cavities within the rock, and the hydraulic

[8] The 2008 TLRMP made no changes to the karst classification criteria that would alter the general descriptions herein. The descriptions of karstland in the project area are consistent with the 2008 TLRMP.

force of the water and pneumatic pressure of the trapped air interact to cause corrosion. The abrasive effects of cobbles and sand cause littoral erosion and undercutting of cliff exposures. Block failure along fracture planes enlarges the developing cavities. Although solutional connectivity appeared to be lacking in most of these features, the littoral caves were considered high-vulnerability areas nonetheless, because they met the FCRPA definition of a significant cave (36 CFR 290).

Low- to Moderate-Vulnerability Areas – Much of the karst encountered in the project area was of low to moderate vulnerability typical of other low-elevation karstland around Southeast Alaska. Areas underlain by carbonate-bearing bedrock, which is otherwise dominated by non-carbonates (e.g., schist with minor marble interbeds or limestone-bearing conglomerates), were given a low-vulnerability rating. Within the alignment, these areas were characterized by shallow undulating terrain, thick glacial deposits, and rare bedrock exposures along benches and gentle slopes. Exposed limestone cliffs, ridges, and rock overhangs were characterized as moderately vulnerable if open fractures were observed that appeared to be soil-filled at shallow depths. Limestone cliffs and ridges with closed fractures were characterized as low vulnerability, as were lower slopes at the base of cliffs where covered by a thick section of colluvium or talus deposits.

No- to Low-Vulnerability Areas – Areas with underlying non-carbonate bedrock, such as volcanics and schist, were considered to have no karst vulnerability. Non-carbonate bedrock underlies more than 70 percent of the West Lynn corridor. The landscape over these rocks typically exhibits little to no karst characteristics.

Karst Resources on Alternative Alignments – No identified significant caves or other important karst features are within the current alignment of any alternative. Where significant caves or other important karst features were identified, DOT&PF moved the alignment to avoid them.

3.2.1.2 Geologic Hazards

It is important to recognize the potential for geologic hazards within areas considered for the project alternatives. Geologic hazards in the study area include avalanches, earthquakes, tsunamis, outburst floods, and landslides.

Avalanches – The most common geologic hazard within the study area is avalanches. The avalanche information presented in the 1997 Draft EIS has been updated. Steep slopes, heavy snowfall and precipitation, high winds, and a climate influenced by both maritime and continental systems contribute to this hazard. The proposed road alignments along both the east and west sides of Lynn Canal traverse areas that exhibit considerable evidence of ongoing avalanche activity. These areas are marked by a lack of timber in the avalanche chutes and, in some areas, by large accumulations of snow at the base of the chutes in the spring and well into the summer. The paths are described as small, medium, large, and very large based on starting height, amount of snow, and avalanche frequency. Occasionally, subpaths run off from the main path. Figure 3-11 shows the location of the avalanche paths. The *Snow Avalanche Report* (Appendix J) and the *2013 Update to Appendix J – Snow Avalanche Report* in Appendix Z provides more detailed information on the snow avalanche paths mapped and rated along each side of Lynn Canal.

> **East Lynn Canal Highway Alignment** - The average annual snowfall for the East Lynn Canal, as a whole, is estimated to be 147 inches. This high level of snowfall contributes

to 43 avalanche paths that might affect the alignment, including subpaths, on the east side of Lynn Canal. Of the paths identified, 10 are considered large or very large based on their high elevation starting zones and their tendency to produce frequent large avalanches. Runout from avalanche events in some of these paths would reach the highway only once in several decades, whereas, in the absence of mitigation efforts, runout from events at other path locations could cross the highway more than once in an average winter.

Field observations have identified four avalanche paths from Echo Cove to a location three miles north of Independence Lake. One is near Sawmill Cove in Berners Bay and three are north of Independence Lake. The first path north of Independence Lake is the widest on this portion of the alignment and is a frequent producer of large avalanches.

The area north of these paths to the northern edge of the Katzehin River delta, a distance of 21 miles, contains 39 avalanche paths. They are found in three clusters of multiple paths that include large and very large paths. The first cluster is located opposite Eldred Rock, the second group is south of Yeldagalga Creek, and the third group is north of Yeldagalga Creek.

West Lynn Canal Highway Alignment – Average annual snowfall for the West Lynn Canal area is estimated to be 120 inches. The highway alignment of Alternative 3 on the west side of Lynn Canal is near 19 avalanche paths, including subpaths. Of the paths identified, 11 are considered large or very large.

Some of these avalanche paths occur in clusters. The first cluster consists of four paths, located between William Henry Bay and the Endicott River, which are considered medium in size. The second cluster of five paths is located approximately three miles north of Sullivan River to the northern tip of Sullivan Island, which are mostly rated as large to very large. The third cluster consists of eight paths located in the area just north of Glacier Point to Pyramid Harbor. These paths are also mostly rated as large to very large.

Earthquakes – Large earthquakes have occurred on the strike-slip faults associated with the Queen Charlotte/Fairweather fault system (Hanson and Combellick, 1998). This system, located along the outer coast of Southeast Alaska approximately 75 miles west of the study area, produces lateral motion parallel to the fault line. Within the last century, four earthquakes with magnitudes greater than 7.0 have occurred along the Queen Charlotte/Fairweather fault system (Hanson and Combellick, 1998). Recent earthquake activity along the Queen Charlotte/ Fairweather fault includes a 7.5-magnitude event on January 5, 2013 (AEIC, 2013). In addition to these well-recorded historic shocks on the main plate boundary, significant seismicity follows the southern end of the Denali fault system and has produced historic earthquakes of up to at least 6.4 in magnitude. The interior Alaska portion of the Denali fault was responsible for the 7.9 magnitude earthquake in November 2002. The Denali fault trends southeast beneath Lynn Canal and appears to join the Chatham Strait fault system, which continues south past the Juneau area. Little historic seismicity is associated directly with the Chatham Strait segments of this fault system. The Alaska Earthquake Information Center lists only 13 events of magnitude 4 or greater along this fault system within a radius of 35 miles of Haines (Ruppert, personal communication 2013). The strongest event had a magnitude of 6.9 with its epicenter 24 miles southwest of Haines.

Landslides – Landslides occur less frequently than snow avalanches. Most landslides are caused by the combined effects of geologic characteristics, soil types, and slope saturation by heavy precipitation or snowmelt. Earthquakes are also a triggering mechanism for landslides in Southeast Alaska. Avalanche paths are also prone to slides during the summer months due to the lack of vegetative cover and the channel-like nature of avalanche chutes.

The 1997 Draft EIS identified three landslides along the East Lynn Canal alignment and two landslides along the West Lynn Canal alignment. There was an additional land slide that occurred in 2001 on the east side of Lynn Canal north of Independence Lake. Figure 3-11 identifies the locations of the slides. The identified slides are all rock slides created when large rock fractures at the top of a steep slope released rock and the falling rock caused the poorly attached, vegetated slope below to slide. Little soil movement was involved because in these areas there is almost no soil between the vegetation layer and the underlying rock.

The 2006 investigation of geologic hazards along the Alternative 2B alignment (Golder Associates, 2006) revealed the following types of geological hazards as being present along the alignment: debris flow, hazard rocks, landslides, rock slides, rockfalls, soil raveling, and transitional slides.[9] The investigation identified 112 locations of potential geologic hazards: 38 were determined to have a high probability of occurrence or likely to result in a more-severe event, 53 were determined to have a moderate probability of occurrence or likely to result in a moderately-severe event, and 21 were found to have a low probability of occurrence or likely to result in a less-severe event.

Following the 2006 geotechnical investigation, DOT&PF shifted the Alternative 2B alignment in several areas to avoid geologic hazards. The geologic hazards identified in 2006 were re-evaluated in 2012 to update the information for each hazard with respect to the shifted alignment. Based on the 2012 geotechnical investigation (Golder Associates, 2012), the East Lynn Canal corridor would encounter 99 locations of geologic hazards: 38 were determined to have a high probability of occurrence or likely to result in a more-severe event, 44 were determined to have a moderate probability of occurrence or likely to result in a moderately severe event, and 17 were found to have a low probability of occurrence or likely to result in a less-severe event. The shifted alignment avoids 13 previously identified potential geologic hazards; however, due to the shifting of the alignment, there is an additional debris flow hazard.

Outburst Floods – Glacial lake outbursts can result in flooding, the scale of which can be many times greater than the anticipated maximum flood event for a given basin. The proposed highway alignments on both the west and east sides of Lynn Canal cross rivers that drain glaciers and thus have the potential for outburst flooding.

The 1997 Draft EIS presented the following information about glacial outburst floods:

> Meade Glacier, located at the head of the Katzehin River, creates a glacially dammed lake which discharges annually, usually in late August. Glacial outburst floods also occur occasionally on the Gilkey/Antler River system in Berners Bay.

The Chilkat and Endicott rivers on the west side of the canal also have the potential for glacial outburst flooding from large glaciers at their headwaters. More recent information on outburst floods in the study area is not available.

[9] Avalanche hazards were not included in the Golder Associates (2006) report; however, they are described previously in this section.

Glacial Advance – The 1997 Draft EIS contained the following information about glacial advance:

> Numerous glaciers are located in the mountains around Lynn Canal. None of the glaciers in the project area pose a hazard.

3.2.2 Hydrology and Water Quality

Lynn Canal, Chilkat Inlet, Chilkoot Inlet, Taiya Inlet, and Berners Bay are all typical fjords occupying glacially sculpted valleys in the coastal mountains. The landscape is intensely glaciated and the mountains are heavily forested. The study area contains rugged topography with moderate to steep forested slopes, broken by raised benches and bare rock cliff bands. Drainage patterns are characterized by steep, deeply incised, first-order streams, which feed into wide, braided rivers in the base of glacially carved valleys. The wide valley bottoms are relatively flat due to infilling with unconsolidated sediments.

3.2.2.1 Climate

Lynn Canal has a maritime climate with temperatures in the range of 50 to 70 degrees Fahrenheit (°F) in the summer and 10°F to 35°F in the winter (ADCCED, 2012b). The north end of Lynn Canal around Haines and Skagway lies within a climatic transition zone that receives less precipitation than Juneau. Annual precipitation in the area ranges from 54 inches in Haines to 92 inches in the Endicott River Wilderness Area. Storms and rain showers occur throughout most of the year; however, precipitation is heavier and more frequent from November to January. The *2013 Update to Appendix J - Snow Avalanche Report* (see Appendix Z) estimates average snowfall for East Lynn Canal at 147 inches per year or approximately 12 feet per year, and for West Lynn Canal at 120 inches per year or approximately 10 feet per year. Melting snows and spring rains contribute large amounts of water to rivers and creeks within the study area.

3.2.2.2 Freshwater Environment

Glacially fed streams and rivers flow into the fjords from both sides, as well as from the heads of the valleys. Large amounts of sediment have been deposited as deltas where these streams and rivers enter saltwater. A generally high water table and generally low soil density in the delta areas, combined with the large tidal range and the possibility of earthquakes, increases the potential for liquefaction and sloughing along the face of deltas.

The 1997 Draft EIS included the following description of water quality:

> Most streams in the project area originate in undeveloped alpine areas and are clear and low in dissolved solids. The larger rivers generally originate from glaciers and characteristically carry large silty glacial plumes into Lynn Canal off Berners Bay and the Katzehin delta. Overall, water quality in the project area is high except during periods of heavy runoff when plumes of silt can be seen at the mouth of most streams.

During winter and periods of low flow, streams generally carry less silt. During spring melt, streams carry higher silt loads.

There are 64 streams/rivers along the east side of Lynn Canal. The Antler/Gilkey river basin, Lace/Berners river basin, and the Katzehin River basin drain watershed areas that are each larger than 100 square miles. All of these watersheds include large glacial areas. These larger basins

include areas behind the coastal ridge at high elevation. Several intermediate-sized drainages (between 5 and 20 square miles in area) also have relatively large areas covered by glaciers. The majority of streams are relatively small, draining steep watersheds of less than 5 square miles, and are confined to the seaward coastal ridge along Lynn Canal.

Freshwater resources on the west side of Lynn Canal in the project area include 28 streams/rivers, four of which drain major watersheds with basin areas greater than 20 square miles. Only one of these watersheds, Endicott River, drains an area greater than 100 square miles. All of these basins have relatively large glacial areas, except the Endicott River. These watersheds all drain into Lynn Canal and are generally less steep than on the east side of the Canal. The terminus of Davidson Glacier is near the base of a watershed and occupies nearly the entire valley of the Glacier River. The larger drainages along this route all have deltas (alluvial fans) that have formed where the streams enter Lynn Canal.

3.2.2.3 Groundwater

Detailed hydrogeological information has not been obtained for the study area; however, general geologic considerations and base flow data/observations provide sufficient information to understand the groundwater regime. Groundwater along the roadway alignments occurs within the bedrock, shallow soils, glacial till sediments overlying bedrock, and alluvial deposits within floodplains. No groundwater wells are known to exist within the proposed alternative project alignments.

Due to the low bulk permeabilities and associated low yield, groundwater storage within bedrock formations generally does not constitute significant aquifers. One exception to this condition occurs in fractured and faulted zones, where permeability and storage are higher due to large fracture porosity. Groundwater seepage tends to be seasonal with large fluctuations. Shallow soils and glacial till found in the area would also be expected to yield low quantities of groundwater because of low permeability and storage potential. Levels of groundwater in these materials are very seasonal and do not provide significant base flow to streams and rivers.

Alluvial and glacial outwash associated with floodplains of larger streams and rivers in the area can be expected to have notable groundwater year-round. At the valley walls, groundwater levels are controlled by the water level in nearby surface waters, which are recharged by precipitation and snow melt. Relatively shallow groundwater levels are expected within the glacio-fluvial deposits in the alluvial valleys. Within these larger streams, including tributaries downgradient of the valley wall slope break, base flows are sustained by groundwater seepage.

3.2.2.4 Marine Environment

Lynn Canal and Chatham Strait, with a combined length of about 235 miles, comprise the longest and straightest fjord-like inlet in North America. Lynn Canal is the narrow, northern segment of this inlet, extending northward some 90 miles from its junction with Icy Strait, west of Juneau, between steep mountains where it splits into Chilkat and Chilkoot inlets at its north end. Marine access to the communities at the head of Lynn Canal is provided through Chilkoot Inlet and its northeasterly extension as Taiya Inlet.

The physical setting and oceanographic environment of Lynn Canal suggest that it is a fjord-type estuary. Pritchard (1967) defined an estuary as "…a semi-enclosed body of water which has a free connection with the open sea and within which fresh water is measurably diluted with sea

water." Estuary settings range from coastal plain to steep-sided fjords such as Lynn Canal, but all have the common feature of serving as a mixing region for freshwater and saltwater. Density differences between freshwater and saltwater can drive circulation and hence influence mixing and flushing in estuaries. The net circulation depends on the amount and timing of freshwater and saltwater input as well as other influences such as winds, tides, topography, and continental shelf oceanic properties and processes. These influences can combine in various ways such that distinctly different circulations develop in otherwise similar estuaries.

Fjords are deep, narrow, and steep-sided estuaries that are peculiar to glacially carved coastlines and have hydrodynamic characteristics that distinguish them from shallower embayments. Most fjords have at least one moraine or bedrock sill that affects, if not controls, hydraulic communication with the adjacent ocean. Several major rivers and numerous streams discharge into the northernmost reaches of Lynn Canal, further supporting its classification as a fjord-type estuary and a presumption of estuarine circulation within it.

Studies of fjords show that deep or bottom water ranges from well oxygenated to poorly oxygenated. Because the bottom water in fjords that have sills at their entrances are not always oxygen deficient, there must be times when the deep waters undergo renewal and become oxygenated. The movement of water along the bottom and tidally driven mixing are probably the most effective mechanisms for increasing the oxygen content of the water. Details regarding typical oceanographic conditions in Lynn Canal are provided in the *Hydrology and Water Quality Technical Report* (Appendix K).

Tides in Lynn Canal vary during the year, with the maximum recorded level in the Juneau area being 23.8 feet. Available data show that the highest tide in the study area is 22.5 feet above mean lower low water at Chilkat Inlet near Pyramid Island. The more normal tidal range is 14 to 16 feet (DOT&PF, 1994b).

3.2.3 Floodplains

EO 11988 (May 24, 1977), Floodplain Management, addresses the use of floodplains by federal agencies. The objective is to avoid to the extent possible the long- and short-term adverse impacts associated with occupancy and modification of floodplains.

The following information about floodplains that was included in the 1997 Draft EIS is still relevant to the proposed project:

> The Federal Emergency Management Agency has not mapped floodplains in the project area. There is little information available about past floods. A floodplain analysis was conducted for this project. There are nine large rivers that potentially have extensive 100-year floodplains. From south to north, on the east side of Lynn Canal, these include the Gilkey, Antler, Lace, Berners and Katzehin rivers, and some of their tributaries. The west side includes the Endicott, Sullivan, 'Unnamed' (north of Sullivan Island), and North Glacier rivers, in addition to Chilkat Inlet at the mouth of the Chilkat River.
>
> The smaller, coastal streams have steep banks or channels that allow considerable overflows during floods. Although these channels carry floodwaters, they are not considered floodplains. Floodplains, which occur downstream in less steep areas, typically have braided channels, and can cover wide areas of up to several square miles. Seasonal flooding often causes changes in the channels.

> Available data show that the highest tide in the project area is [22.5 feet] above mean lower low water at Chilkat Inlet near Pyramid Island. The coastal floodplain is in the area affected by tides. Tidal fluctuation and stormwaves dominate coastal floodplains. In addition, tides will affect velocity and flow dynamics within the tidal zone.

3.2.4 Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968, as amended, was established to recognize and preserve certain rivers in a free-flowing state to better manage the development of river resources.

There are no designated Wild and Scenic Rivers in the project study area. Two rivers within the Lynn Canal corridor have been recommended by the USFS for designation: the Gilkey and the Katzehin rivers (Figures 1-1 and 3-3), both located on the east side of Lynn Canal. The Gilkey River joins with the Antler River, and the Antler River subsequently empties into Berners Bay. The lower 2 miles of the Katzehin River have been excluded from recommendation because this 2-mile segment is a designated transportation corridor.

Four additional rivers within the canal corridor are on the USFS list of potential Wild and Scenic Rivers but have not been recommended for designation: the Antler, Berners, Endicott, and Lace rivers. The Antler, Berners, and Lace rivers were not recommended because they are in a congressionally designated LUD II area that provides protection the USFS considers adequate (Figure 3-3). The Endicott River was not recommended because a majority of the river lies within the Endicott River Wilderness Area, and such a designation already serves to protect the river's values.

The Sullivan River has not been evaluated by the USFS with regard to eligibility as a Wild and Scenic and/or Recreation River. The USFS has indicated that the lower reach of the Sullivan River is not eligible due to past development activities.

3.2.5 Air Quality

According to the air quality report prepared for the 1997 Draft EIS (DOT&PF, 1994a), ambient air quality is good and carbon monoxide (CO) levels are well below maximum allowable levels. This section describes applicable air quality standards, attainment status, and ambient air quality relevant to the project area.

3.2.5.1 Air Quality Standards and Relevant Pollutants

Air pollution is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual pollutants degrade the atmosphere by reducing visibility, damaging property, reducing vegetation productivity, or adversely affecting human and animal health.

Air quality is regulated at the federal level under the Clean Air Act Amendments of 1990 and the Final Conformity Rule (40 CFR, Parts 51 and 93). The Clean Air Act authorizes the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that pose a risk to public health. These primary standards represent the air quality levels, with an adequate safety margin, that are required to protect public health. EPA has established standards for seven criteria pollutants: CO, ozone (O_3), particulate matter with an aerodynamic diameter of less than or equal to 10 microns (PM_{10}), particulate matter with

an aerodynamic diameter of less than or equal to 2.5 microns ($PM_{2.5}$), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and airborne lead. The Alaska Ambient Air Quality Standards (AAAQS) mirror the federal standards for most of the pollutants. Air quality is regulated at the State level under the AAAQS promulgated in Title 18, Chapter 50, of the Alaska Administrative Code (AAC). Table 3-2 shows the federal and State air quality standards for selected pollutants.

The federal standards require each State to submit a State Implementation Plan (SIP) detailing strategies for attaining the standards.

In addition to the NAAQS, EPA has developed Prevention of Significant Deterioration standards that limit the incremental increase in air pollutant concentrations above the specified Prevention of Significant Deterioration standards. The study area is within the Southeast Alaska Intrastate Air Quality Control Region, where baseline dates have been set for SO_2 and NO_2, and incremental increases of these two pollutants must be below the levels set by EPA.

3.2.5.2 Attainment Status of Study Area

The geographic region where the project is located has been designated an air quality attainment area or unclassifiable. This means that the project is in an area where the region meets the ambient air quality standard for each pollutant or there are insufficient data to make a determination. Therefore, the SIP does not contain any control measures, and conformity procedures do not apply to this project. A conformity determination is not required per 40 CFR 51.

Regions where monitored values of any pollutant exceed the NAAQS are formally designated by EPA as non-attainment areas. Both federal and State regulations require the preparation of strategies by which non-attainment areas can meet attainment for each pollutant where the NAAQS are exceeded. Documentation of this strategy and planning is then included in the SIP.

The Mendenhall Valley area, located approximately 40 miles south of the southern extent of potential highway construction, was designated as a moderate non-attainment area for airborne particulate matter (PM_{10}) by the EPA in 1990. On March 24, 1994, EPA approved the Mendenhall Valley PM_{10} attainment plan. The plan strategy for improving air quality in the Mendenhall Valley focuses on control of wood smoke emissions and fugitive dust sources (e.g., glacial silt and dust from unpaved roads) during the winter months. There have been no measured violations of NAAQS since the plan has been in effect (EPA, N.d.).

3.2.5.3 Ambient Air Quality in the Study Area

Weather and topography influence air pollution concentrations. Hydrocarbon and NO_2 emissions from automotive sources, when exposed to sunlight, are a major component of photochemical smog. Still air and temperature inversions that result in heavy fog can result in high CO concentrations, if there are sufficient pollutant sources in the area. The potential for dispersion of airborne pollutants at the study area is determined by the stability class, or measure of atmospheric turbulence.

Table 3-2:
National and Alaska Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS	AAAQS
Carbon Monoxide (CO)	1 hour	35 ppm (40,000 µg/m^3)	40,000 µg/m^3
	8 hours	9 ppm (10,000 µg/m^3)	10,000 µg/m^3
Lead (Pb)	Rolling 3 months	0.15 µg/m^3	0.15 µg/m^3
Nitrogen Dioxide (NO_2)	1 hour	100 ppb	Not Applicable
	Annual	Not Applicable	100 µg/m^3
Ozone (O_3)	8 hours	0.075 ppm	0.075 ppm
Respirable Particulate Matter (PM_{10})	24 hours	150 µg/m^3	150 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	24 hours	35 µg/m^3	35 µg/m^3
	Annual	12 µg/m^3	15 µg/m^3
Sulfur Dioxide (SO_2)	1 hour	75 ppb	196 µg/m^3
	3 hours	Not Applicable	1,300 µg/m^3
	24 hours	Not Applicable	365 µg/m^3
	Annual	Not Applicable	80 µg/m^3

µg/m^3 = micrograms per cubic meter
ppm = parts per million
ppb = parts per billion
Note: Standards from 40 CFR 50.8 and 18 AAC 50.010. Alaska standard for ammonia is not included in this table.

Stability classes are divided into six categories, designated "A" through "F," with the greatest pollutant dispersion occurring for "A." The study area distribution of stability classes is expected to be similar to that found in all of Southeast Alaska. Stability class "A" occurs infrequently due to the lack of strong solar insulation. Stability class "D" occurs most frequently (55 percent of the time). The moderately high frequency of stable atmosphere classes ("E" and "F") occur 40 percent of the time. This indicates that the potential exists for elevated air pollution within the study area due to temperature inversions (USFS, 1992). Air modeling for the project assumed a conservative air dispersion stability class of "F" (little to no wind).

Air quality analyses must account for ambient concentrations of pollutants. With the exception of Anchorage, Fairbanks, and Juneau, Alaska does not have a statewide air toxics emission inventory (ADEC, 2001). The ambient air quality CO impact is rated insignificant for the study area, and no air quality sampling was completed to determine baseline conditions. Minimal to no development has occurred within the study area, except at the ends of the study area near Haines and Skagway. Air quality within the study area is estimated to be very good due to the absence of air pollution sources. Therefore, background levels of CO, O_3, sulfur oxides, and nitrogen oxides are estimated to be low. This determination is further supported by data accumulated for the EIS for the Kensington Gold Project, which is within the project area, showing that background concentrations of air pollutants were significantly below NAAQS (USFS, 1997a).

On rare occasions, elevated PM_{10} concentrations may exist in the study area when wood smoke or smoke from fires is carried south from the Yukon via northerly winds (USFS, 1992).

The Alaska Department of Environmental Conservation (ADEC) collected $PM_{2.5}$ measurements in 2004 and 2005 in Skagway. These data are not published but they have been included in the EPA air quality database for Alaska. Most of the measurements were less than 10 micrograms per cubic meter ($\mu g/m^3$) for the 24-hour average concentration. This is below the NAAQS 24-hour standard of 35 $\mu g/m^3$. On two occasions, $PM_{2.5}$ concentrations were elevated over typical conditions due to smoke from fires. On August 16, 2005, the 24-hour $PM_{2.5}$ concentration was recorded at 44 $\mu g/m^3$. This was attributed to smoke from an interior wildfire. On June 20, 2004, the 24-hour $PM_{2.5}$ concentration was recorded at 32.5 $\mu g/m^3$. This was attributed to a barge fire offshore of Haines.

3.2.5.4 Greenhouse Gases and Climate Change

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). As the amount of GHGs in the atmosphere increases, more heat becomes trapped, contributing to climate change. The principal GHGs that enter the atmosphere because of human activities are carbon dioxide (CO_2), methane, nitrous oxide, and fluorinated gases. CO_2 makes up the largest component of these GHG emissions. An inventory of Alaska's GHG emissions found that 35 percent of all GHG emissions were from the transportation sector (Alaska Climate Change Subcabinet, 2009). Other contributors include industrial activities and the fossil fuel industry (50 percent), residential and commercial fuel use (8 percent), electricity (6 percent), and waste and agriculture (1 percent). In the CBJ, the transportation sector is a primary source of GHG emissions, comprising more than 50 percent of total emissions (CBJ, 2007).

Climate change is an issue of national and global concern. While the Earth has gone through many natural climatic changes in its history, there is general agreement that the Earth's climate is currently changing at an accelerated rate and will continue to do so for the foreseeable future.

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. Because atmospheric concentration of GHGs continues to climb, our planet will continue to experience climate change-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels.

3.2.6 Noise

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Response to noise can vary according to type and characteristic of the noise source, the distance between the noise source and receptor, the sensitivity of the receptor, and the time of day.

The perception of noise is dependent on land use and receptors. Most of the land adjacent to the proposed alternatives is undeveloped. Most of this land is multi-use including dispersed recreation, subsistence, and personal use hunting. Within and near the communities of Juneau, Haines, and Skagway, the presence and density of noise-sensitive receptors increase. Residential

development, motels and hotels, recreation areas, parks, schools, churches, and hospitals are present in these urban areas.

Levels of noise are measured in units called decibels (dB). Since the human ear cannot perceive all pitches or frequencies equally well, measured sound levels are adjusted or weighted to correspond to human hearing. This adjusted unit is known as the "A-weighted" decibel. All references to noise in this report refer to A-weighted decibel levels or dBA.

Very few noises are constant; most fluctuate in decibel level over short periods of time. One way of describing fluctuating noise is to present the sound level over a specific time period as if it had been steady and unchanging. In this approach, a descriptor called the equivalent sound level, L_{eq}, is computed. L_{eq} is the constant sound level that, for a given situation and time period, conveys the same sound energy as the actual time-varying sound. The L_{eq} during the peak-hour traffic period is often used to determine necessary noise mitigation measures from roadway noise, and is used in describing noise in this report.

The FHWA specifies noise abatement criteria (NAC) (codified in 23 CFR 772) for noise-sensitive human land uses. Noise abatement must be considered when the predicted future peak-noise-hour from highway traffic on new construction approaches or exceeds the NAC for specific land use types, or when a substantial increase occurs. DOT&PF updated its Noise Policy in April 2011 in response to changes in the FHWA noise regulations. The DOT&PF is responsible for implementing the FHWA regulations in Alaska, and considers a traffic noise impact to occur if predicted noise levels approach within 1 dBA of the FHWA NAC. The NAC are applied to the peak noise impact hour. If an adverse noise impact is predicted, FHWA's regulations and DOT&PF policy require that noise abatement measures be considered.

The following NAC apply to noise-sensitive land uses.

- **Activity Category A** – Exterior L_{eq} (hourly [h]), dBA 56: 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. (There are no Activity Category A land uses in the project study area.)
- **Activity Category B** – Exterior $L_{eq(h)}$, dBA 66: Residential land use (e.g., homes adjacent to new highway construction).
- **Activity Category C** – Exterior $L_{eq(h)}$, dBA 66: Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings (e.g., the USFS cabin in Berners Bay).
- **Activity Category D** – Interior $L_{eq(h)}$, dBA 51: Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios (e.g., facilities in the community of Juneau, Haines, or Skagway).
- **Activity Category E** – Exterior $L_{eq(h)}$, dBA 71: Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F. (e.g., the exterior of hotels and motels in Juneau, Haines, or Skagway).

- **Activity Category F** – Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), and warehousing. (e.g., Juneau International Airport).
- **Activity Category G** – Undeveloped lands that are not permitted for development.

In accordance with 23 CFR 772.11a, primary consideration is given to exterior areas in determining and abating traffic noise impacts. Noise abatement is usually considered only where frequent human use occurs and a lowered noise level would be of benefit to people. Exterior noise levels take precedence in the evaluation and mitigation of traffic noise because protection of exterior areas from noise typically achieves protection of interior spaces as well.

There are cases where, for example, residential areas (Activity Category B), would be affected by traffic noise but do not receive "frequent human use" or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents a noise impact on exterior activities. For example, in a home situated close to a roadway (e.g., 20 to 40 feet), the residents may not use the outdoor area adjacent to the road for more than coming into and out of the house, and concentrate their outdoor activities to a back yard shielded from the road by the house. In these cases, 23 CFR 772.11b indicates that the interior NAC (Activity Category D criterion) should be used as the basis of determining noise impacts. The NAC categories and sound levels are also useful in evaluating noise impacts that occur as an indirect effect of a proposed project. FHWA regulations do not require consideration of noise abatement for these types of impacts.

A new traffic noise analysis was conducted for the 2005 Supplemental Draft EIS (Appendix L). Since most of the highway portions of the alternatives cross undeveloped lands where there are no noise sensitive receptors, much of the analysis was undertaken in an effort to disclose any indirect noise impacts associated with the predicted increases in traffic on the existing road systems of Juneau, Haines, and Skagway. Short- and long-term sound level measurement data were collected for this study. Short-term noise measurements have durations of less than one hour. Long-term measurements have durations of at least 24 hours.

For purposes of evaluating direct highway traffic noise effects, no noise sensitive receptors were evaluated in the vicinity of Juneau for any of the Build Alternatives other than the campground at Echo Cove where a short-term noise measurement was taken (ST-17). This is due to the fact that all of the proposed new highway sections of the Build Alternatives would begin north of Echo Cove. The short-term noise measurement at Echo Cove campground, the only identified sensitive receptor in the area, was 43 dBA.

Short-term measurements were collected at and near the USFS cabin at the head of Berners Bay. Alternative 2B would pass more than 600 feet east of this cabin. Meteorological conditions were mostly favorable when data were collected from September 10–16, 2003. Measurements were 49 dBA at the beach to the west of the cabin and 52 dBA at the cabin. The higher levels at the cabin were attributable to a nearby stream and rain falling through the trees. Noise in Berners Bay includes intermittent sounds from helicopters, small airplanes, and small boats including airboats, with the greatest frequency occurring in the summer.

No sensitive receptors were evaluated in Haines for direct noise impacts because the new highway segment associated with Alternative 3 would not be located in the vicinity of any

receptors. Public comments on the 1997 Draft EIS expressed concerns that noise from a highway on the east side of Lynn Canal would result in noise impacts on the Chilkat Peninsula in the vicinity of Chilkat State Park. On September 10, 2003, a long-term sound measurement was collected near a residence at the end of Mud Bay Road (LT-2) overlooking Chilkoot Inlet and opposite the southern end of the Katzehin River delta. Two short-term sound measurements were also taken near this location. The sound sources included vehicular traffic, boats, birds, distant aircraft, and rain. Measured sound levels ranged from a low of about 34 dBA to a high of 55 dBA.

Long-term sound measurements were recorded in Skagway on September 12 and 13, 2003. One sound level meter was positioned in the backyard of a residence on 22nd Avenue and State Street facing 23rd Avenue and State Street (LT-3). Noted sound sources were vehicular traffic, railroad activity, aircraft, rustling leaves, and distant lawn maintenance activities and ship horns. A second monitoring station was located at a residence on Broadway and 12th Avenue (LT-4). Noted sound sources were traffic, rustling leaves, railroad activities, and aircraft. At LT-3, ambient noise ranged from about 60 to 65 dBA between 11 a.m. and 5 p.m., dropping steadily after that time to a low of about 46 dBA between midnight and 5 a.m. Noise rapidly increased to 55 to 60 dBA shortly after 5 a.m. and remained at that level until 11 a.m. Ambient noise followed the same trend at LT-4 except it was typically about 5 dBA lower than at LT-3. Peaks that occurred simultaneously at both sites were likely attributable to passing trains or aircraft. Two short-term measurements were collected at midblock on 22nd Avenue between Main Street and State Street. These measurements recorded noise levels of 56 and 57 dBA.

Long-term and short-term sound measurements were collected in Juneau, Haines, and Skagway where increased traffic on local roads resulting from project alternatives could result in indirect noise effects to sensitive receptors. In Juneau, the Glacier Highway from downtown to Auke Bay is densely developed. Some residential noise receptors either abut the highway or have a direct line of sight to the highway without benefit of intervening structures. From Auke Bay to Echo Cove, development density decreases and sensitive land use is mostly residential. The Eagle Beach State Campground and a camping area at Echo Cove are located adjacent to the highway.

On September 14 and 15, 2003, long-term sound level measurements were collected in Juneau. One sound level meter was positioned at a residence adjacent to Glacier Highway between Auke Bay and Lena Cove. Noted sound sources were vehicular and helicopter traffic, birds, and rain. A second meter was placed at a residence adjacent to the Glacier Highway south of Auke Bay. The noted sound source was vehicular traffic. The measured noise levels at this location were above the NAC thresholds of 67 dBA. The higher noise levels were associated with greater traffic volumes that included heavy trucks and buses that do not regularly travel north of the ferry terminal at Auke Bay. Both locations had sound level measurements that were dominated by traffic noise, with peak traffic noise occurring between 5 p.m. and 6 p.m.

Seven short-term measurements were collected on the Juneau road system including side yards at homes along Glacier Highway and at Bear Lair Cabin, Adlersheim Wilderness Lodge near Yankee Cove. Measurements varied from 45 dBA at the Bear Lair Cabin to 70 dBA at 4150 Glacier Highway overlooking Egan Drive near downtown.

Downtown Haines is mostly commercial with some residences, motels, schools, and a public library. Residences are scattered from the end of Mud Bay Road north to Haines and to the Lutak

Ferry Terminal. Residences abut the existing roadway where the proposed West Lynn Canal Highway would intersect Mud Bay Road.

On September 10, 2003, a long-term sound measurement was collected in Haines adjacent to Lutak Road. The sound sources included vehicular traffic, boats, birds, distant aircraft, and rain. Measured sound levels ranged from about 40 to 50 dBA.

Six short-term measurements were collected at five locations in Haines. Those locations included a residence near the Alternative 3 crossing of the Chilkat River/Inlet, the camping area at Portage Cove State Recreation Site, downtown Haines between Soap Suds Alley and Portage Street, and the Haines School on 3rd Avenue adjacent to the playground. Noise levels varied from 43 dBA at the Portage Cove State Recreation Site to 57 dBA at Haines School located downtown.

Five short-term measurements were collected at four locations in downtown Skagway, including the front yards of residences at Spring Street and 10th Avenue and Main Street between 15th and 17th avenues, mid-block on 22nd Avenue between Main and State streets, Historic Moore Homestead, and Pullen Creek Shoreline Park. Recorded levels varied from 44 to 57 dBA, except for one peak measurement of 70 dBA caused by a barking dog in close proximity to the meter.

Additional information on noise can be obtained in the *Noise Analysis Technical Report* (Appendix L) and the *2014 Update to Appendix L - Noise Analysis Technical Report* (in Appendix Z).

3.2.7 Hazardous Materials

An Initial Site Assessment (ISA) was prepared in 2004 for the project area (Supplemental Draft EIS Appendix M) and updated in 2012 (see *2014 Update to Appendix M - Initial Site Assessment* in Appendix Z) to determine the potential for encountering hazardous materials during construction of any alternative. The objective of the ISA process is to evaluate, based on readily available information, whether hazardous materials or petroleum products are likely to be present along the project corridor or are likely to exist in the future due to on-site or nearby activities or problems. Hazardous materials include soil and groundwater contamination due to leaking underground storage tanks, aboveground storage tanks, pesticides, and other chemical discharges.

The ISA was prepared in general accordance with the corridor screening requirements as defined by American Association of State Highway and Transportation Officials Hazardous Waste Guide for Project Development (AASHTO, 1990) and FHWA guidance documents on hazardous materials (FHWA, 1988 and 1997).

Known and potential hazardous material sites in the project area were identified through review of federal and State databases, agency interviews, aerial photography, and site reconnaissance. Federal and State database research was updated in 2012 (see *2014 Update to Appendix M - Initial Site Assessment* in Appendix Z). Minimum search distances and the types of databases required for review were based on American Society for Testing and Materials standard E2247-08.

Based on federal and State database review, there are 19 recorded sites in the vicinity of the Draft SEIS alternatives (Figure 3-12). Sixteen are incident reports for releases to the environment and three are registered underground storage tanks at the Auke Bay AMHS ferry terminal.

Eleven of the 16 database records of releases are at the Auke Bay AMHS ferry terminal: 10 spill reports from 2005 to 2011 involving the release of petroleum hydrocarbons (e.g., fuel oil, gasoline, or diesel fuel), and one report of contamination from a leaking underground storage tank (LUST). Most of the reports of releases indicate that cleanup was initiated and the release secured, or the amount of release was low and the released material has since dissipated. The report of LUST at the ferry terminal states that a conditional closure was approved in 2004.

Three of the 16 database records of releases are associated with Coeur Alaska operations and are mostly hydraulic oil leaks. One was near Comet Beach and two were near Slate Creek. These releases have been cleaned up or, in the case of the report of sheen from unknown sources of in lower Slate Creek in 2010, have likely dissipated.

The remaining two records (i.e., of the 16 total) represent an aboveground tank at a residence on the Glacier Highway and the release of diesel range organics from the AT&T Alascom Sullivan River Microwave Repeater Station on the west side of Lynn Canal. The incident at the Glacier Highway residence occurred in 2003 and the status remains "open" in the ADEC database as of 2012. The Sullivan River Microwave Repeater Station is located 1 mile north of the Sullivan River and within 600 feet of the centerline for the Alternative 3 alignment. State records identify the contamination was cleaned up to the satisfaction of ADEC by 2010.

Although it did not appear in any federal or State database listings, the Kensington beach facility, which is located within the alignment under Alternative 2B at Comet, contains three 20,000-gallon above-ground diesel fuel storage tanks and an incinerator. DOT&PF would acquire this facility if Alternative 2B were selected. A Phase I environmental site assessment would be performed to assess any risk associated with the use, history, or removal of any of the facility infrastructure.

For specific information on the 2014 ISA update, refer to Appendix Z.

3.3 Biological Environment

3.3.1 Wetlands

Waters of the U.S., including wetlands, are regulated by the USACE under the authority of the Clean Water Act. Wetlands are defined in the following excerpt from the federal regulations implementing Section 404 of the Clean Water Act (33 CFR 328.3):

> [Wetlands are] … those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

The Lynn Canal study area contains 13,710 acres of wetlands and aquatic beds (e.g., lily ponds). The USFWS National Wetlands Inventory (NWI) has mapped wetlands in the region. The inventory has grouped wetlands into general wetland classes or complexes. The predominant wetlands in the project area consist of palustrine forested and scrub-shrub wetlands (and combinations) with an area of 10,562 acres, and palustrine emergent and emergent/scrub-shrub wetlands with an area of 2,152 acres. The combination of these classes of wetlands comprises about 93 percent of all wetlands in the project study area.

The least common wetlands in the study area consist of 966 acres of estuarine emergent wetlands and 30 acres of palustrine aquatic bed/open water. These wetlands comprise 7.1 and 0.2 percent, respectively, of all wetlands in the project area.

In the study area, the largest wetland areas occur on the east side of Lynn Canal at the northern end of Berners Bay and on lowlands between Slate Cove and Sherman Point (Figures 3-13 through 3-17). At the north end of Berners Bay, the Antler and Berners rivers and their tributaries support an extensive area of palustrine scrub-shrub, palustrine emergent, estuarine flooded and emergent, riverine flooded, and palustrine forested wetlands. Forested wetlands cover large areas between Slate Cove and Sherman Point with patches of emergent and scrub-shrub wetlands in depressions and areas of groundwater discharge. On the west side of Lynn Canal, the most extensive wetlands in the study area are present in the Endicott River and Sullivan River areas (Figures 3-15 through 3-17). The Davidson Glacier outwash plain supports a large number of relatively small wetlands and water bodies that have formed in the alluvial material including emergent wetlands, ponds with emergent or floating vegetation, and open water habitats.

The 1997 Draft EIS identified wetlands using existing USFWS NWI maps with some additional wetland field determinations performed in specific areas in accordance with methods presented in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). The NWI groups wetlands into classes or complexes.

Agency comments on the 1997 Draft EIS, as well as scoping comments for the 2005 Supplemental Draft EIS, indicated that further analysis was needed for the proposed project relative to wetlands, and a new wetlands analysis was conducted in 2003. The 2003 analysis focused on wetlands in the immediate vicinity of the alignment for project alternatives.

Field methods for verifying wetland classification and boundaries were based on the presence of three parameters: hydrophytic vegetation, hydric soils, and wetlands hydrology, as outlined in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). Information on general site hydrology was interpreted from aerial photographs. On-site observations of wetland hydrology included the following criteria: inundated or saturated soils, landscape position, oxidized or reduced root channels, or sediment and debris deposits from previous flooding. Qualitative field notes of functions and values were recorded on a modified version of the Juneau Airport EIS Wetland Functional Assessment Data Form.

The combination of field notes, aerial photography interpretation, and global positioning system (GPS) coordinates were used to develop wetland maps of the project area. Delineations of wetlands not recorded on the ground are primarily based on NWI delineations and aerial photography interpretation. Of the 116 wetland areas potentially impacted by project alternatives, 51 were field checked. This represents approximately 67 percent of the wetland acreage potentially impacted.

In 2006, after the Final EIS was published, DOT&PF submitted a Clean Water Act Section 404 permit application to the USACE for the Final EIS preferred alternative, Alternative 2B. During the permit process, the wetlands in the area of the Antler and Berners/Lace rivers were delineated using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), as described above. The delineation resulted in better information on the extent of wetlands in this area and a minor reduction in the total number of wetland acres. The reduction is reflected in Section 3.3.1.2 (Distribution within the Project Area).

In 2010, the DOT&PF applied for a Clean Water Act Section 404 permit for the Glacier Highway Extension, a separate project from the JAI Project. Additional wetland delineation field work to refine wetland boundaries was completed for the three-mile extension. This delineation field work also produced better information on the extent of wetlands in this area, leading to a minor reduction in the total number of wetlands reported in the project area. The reduction is reflected in Section 3.3.1.2 (Distribution within the Project Area).

3.3.1.1 Wetland Classifications

The classification of wetlands in the project area follows the NWI Classification System and includes both freshwater and saltwater-influenced wetlands. Palustrine wetlands are nontidal wetlands with vegetation either dominated by persistent emergent vegetation ("emergent"), shrubs ("scrub-shrub"), or trees ("forested"), or by water bodies that lack such vegetation and have relatively shallow water ("aquatic bed/open water"). Estuarine emergent wetlands, or salt marsh communities, consist of salt-tolerant vegetation in areas that are subject to tidal inundation and extend to the seaward limit of emergent vegetation and/or upstream where the ocean-derived salts measure less than 0.5 percent during low-flow periods. Figures 3-14 through 3-17 identify the locations of these wetlands within the project area.

Palustrine Emergent Wetlands – Palustrine emergent wetlands within the project area primarily occur in association with groundwater seeps (marshes or fens), muskeg or bog environments, and areas that are flooded to the extent that tree and shrub growth is inhibited. Sedges (*Carex* spp.) are typically the dominant species, with cottongrass (*Eriophorum* spp.) and water horsetail (*Equisetum fluviatile*) also found. These areas have a low shrub component of Labrador tea (*Ledum groenlandicum*), bog blueberry (*Vaccinium uliginosum*), or cloudberry (*Rubus chamaemorus*). Emergent wetlands are often components of larger wetlands complexes of scrub-shrub and forested wetlands and aquatic bed/open water features.

Palustrine Scrub-Shrub Wetlands – Scrub-shrub wetlands are dominated by shrubs and/or trees that are less than 20 feet tall. These wetlands are typically associated with muskegs and floodplains along rivers and streams. In the project area, scrub-shrub wetlands are dominated by either deciduous species such as Sitka alder (*Alnus sitchensis*), thinleaf alder (*Alnus tenuifolia*), and willow (*Salix* spp.) along rivers and streams. In muskeg environments, the common species include shore pine (*Pinus contorta*), mountain hemlock, and western hemlock (*Tsuga mertensiana*). Smaller shrubs in these communities include Labrador tea, deer cabbage (*Fauria crista-galli*), Alaska blueberry (*Vaccinium alaskaensis*), bog blueberry, and cloudberry.

Palustrine Forested Wetlands – Forested wetlands are dominated by trees taller than 20 feet and typically consist of layers of trees, shrubs, and herbaceous vegetation. Tree species found in the forested wetlands within the project area include mountain hemlock, western hemlock, and Sitka spruce (*Picea sitchensis*). The shrub understory consists of rusty menziesia (*Menziesia ferruginea*), tall blueberry (*Vaccinium ovalifolia*), and Alaska blueberry. The ground cover species layer is dominated by Canada bunchberry (*Cornus canadensis*), skunk cabbage (*Lysichiton americanum*), spleenwort-leaf gold thread, Alaska goldthread (*Coptis asplenifolia, C. trifolia*), and false lily-of-the-valley (*Maianthimum dilatatum*). Broad-leaved forested wetlands are found along river floodplains and are dominated by black cottonwood (*Populus balsamifera*) with typical understory species of willow and alder. Forested wetlands, mostly of the needle-leaved evergreen subclass, occupy the greatest area of wetland land cover within the project area.

Palustrine Aquatic Bed/Open Water – Palustrine aquatic bed wetlands are permanently flooded areas that contain vegetation that grows on or below the surface of the water for most of the growing season (Cowardin et al., 1979). These communities are considered "vegetated shallow" under the Clean Water Act. Dominant vegetation in aquatic bed wetlands of the project area consists of floating-leaf pondweed (*Potomageton natans*), northern burreed (*Sparganium hyperboreum*), and yellow pond lily (*Nuphar polysepalum*). Palustrine aquatic bed habitats are relatively scarce in the project area.

Estuarine Emergent Wetlands – Estuarine emergent wetlands, also called salt marshes, are found within the intertidal zone and are present in the project area. These areas vary in species composition depending on exposure to saltwater. Vegetation of upper beach areas consists of beach rye (*Leymus arenarius*), silverweed (*Argentina anserina*), beach pea (*Lathyrus japonicus*), and Lyngbye's sedge (*Carex lyngbyei*); the substrate is mostly gravel and sand. Salt-tolerant forbs, such as seaside arrowgrass (*Triglochin maritimum*) and seaside plantain (*Plantago maritima*), occupy the areas irregularly exposed to salt water. Areas more frequently inundated support salt-tolerant alkali grass (*Puccinella* spp.), sea milkwort (*Glaux maritima*), and salt brush (*Atriplex alaskana*).

Marine Areas – Unvegetated intertidal flats, beach bars, and rocky shores are also included in the NWI and are classified as estuarine wetlands. They do not meet the USACE definition of wetlands and are therefore classified as other waters of the U.S. Rocky shores are the most extensive intertidal habitats in the project area and occur along extensive areas on both sides of Lynn Canal. Beach bars are found on active beaches with unconsolidated substrate. Descriptions of potentially impacted marine sites, including subtidal areas, are presented in the *Essential Fish Habitat (EFH) Assessment* (Appendix N).

3.3.1.2 Distribution within the Project Area

The East Lynn Canal wetlands are bounded by the Juneau icefields to the east, the Lynn Canal marine waters to the west, Skagway to the north, and the northern extent of the Glacier Highway to the south. Approximately 11,207 acres of wetlands lie within the eastern side of the study area. Palustrine forested wetlands make up over half of the wetlands in this area (Table 3-3).

The greatest amount of wetland coverage extends from Slate Cove on the north side of Berners Bay to Sherman Point, where forested wetlands dominate with smaller amounts of muskegs or emergent wetlands. The most extensive areas of estuarine emergent wetlands in this region occur at the head of Berners Bay, at the mouths of the Antler and Berners/Lace rivers, and on the Katzehin outwash plain. Unvegetated intertidal flats are also associated with these rivers and glacial outwash plains. Unvegetated rocky shorelines are extensive along the coast especially in the northern portions of East Lynn Canal between Sherman Point and Skagway.

Table 3-3:
Project Area Wetlands by Type

Wetland Type	Acres (Percent of Total)		
	East Lynn Canal	West Lynn Canal	Total Project Area
Estuarine Emergent	573 (5.1%)	392 (16.0%)	966 (7.1%)
Palustrine Emergent	1,812 (16.2%)	340 (13.9%)	2,152 (15.7%)
Palustrine Forested	6,682 (59.6%)	1,039 (42.4%)	7,759 (56.6%)
Palustrine Scrub-shrub	2,120 (18.9%)	670 (27.3%)	2,803 (20.4%)
Palustrine Aquatic Bed	20 (0.2%)	10 (0.4%)	30 (0.2%)
Total Wetlands	11,207	2,451	13,710

The West Lynn Canal wetlands are bounded by the Lynn Canal marine waters to the east, the Chilkat Range in the northwest, and the eastern boundary of the Endicott River Wilderness Area to the southwest. The northern extent of the highway at Mud Bay Road in Haines acts as the northern boundary, and William Henry Bay is the southern boundary. Approximately 2,451 acres of wetlands lie within the western side of the study area.

Forested wetlands are the dominant wetland type, similar to the East Lynn Canal wetlands (Table 3-3). These wetlands are most extensive on Sullivan Island and in the Endicott and Sullivan River areas. The Davidson Glacier outwash plain is different from other sections of this coastline in that it has numerous small, wet depressions that support a diverse range of emergent wetlands, aquatic beds, and open water habitats. Estuarine emergent wetlands are primarily found at the mouths of small rivers and the outer fringes of the glacial outwash plains and river deltas. Intertidal rocky shores occur along most of the coastline between the major rivers and outwash plains. Unvegetated intertidal flats occupy the outer fringes of most outwash plains and deltas.

3.3.1.3 Wetlands Functions

Wetlands functions are "the physical, chemical, and biological processes or attributes that contribute to the self-maintenance of wetland ecosystems" (ASTM International, 1999). Wetlands also provide many benefits to society, depending upon the wetland types and their location, including both consumptive and non-consumptive uses. Values assigned to specific wetlands are generally estimates, sometimes subjective, of the importance of wetland functions to people, fish, wildlife, water quality, etc. Values often include social values. The discussion of values of wetlands will specify the degree of importance as well as the entity for which the function is important.

A modified version of the Adamus Resource Assessment, Inc., Wetland Evaluation Technique (Adamus, 1987; SWCA Environmental Consultants, 2002) was used to evaluate the wetlands in the project area. The Interagency Working Group of the Juneau Airport EIS revised this primarily freshwater assessment methodology to consider coastal wetlands (SWCA Environmental Consultants, 2002). During 2003 scoping, resource agencies determined that this would be an appropriate method for the JAI Project. All wetlands affected by the project were rated from high to low for each of the following functions:

- Groundwater recharge
- Groundwater discharge/lateral flow

- Surface hydrologic control
- Sediment/toxicants retention
- Nutrient transformation and export
- Riparian support
- Disturbance of sensitive wildlife habitat
- Regional ecological diversity
- Erosion sensitivity
- Ecological replacement cost
- Downstream/coastal beneficiary sites

There are intermittent palustrine forested wetlands along the east shore of Berners Bay from Echo Cove to the Antler River that are apparently fed by groundwater seeps from the hillside. These wetlands have a moderate to low wildlife habitat function; they provide forage and cover for several species such as deer, brown bear, black bear, marten, goat (in winter), and many species of birds, as does the surrounding upland forest. Their principal function is groundwater discharge and lateral flow and nutrient transformation/export.

The estuarine emergent wetland at the head of Berners Bay has high wetland function ratings for wildlife habitat, riparian support, regional ecological diversity, and ecological replacement cost. This rating is based on the documented use of the area by wildlife and because the wetland type is limited in distribution in Berners Bay and likely receives substantial use by wildlife. Riparian support is also important to fish.

There is a broad band of palustrine forested wetlands at lower elevations between Slate Cove and Sherman Point. Large patches of emergent and scrub-shrub muskeg wetlands occupy the lowest elevations in this area with expanses of seasonally flooded emergent wetlands in low lands west of Slate Cove. While the forested wetlands have a moderate to low wildlife habitat function, the scrub-shrub muskeg provides blueberry foraging areas for bears as well as nesting and rearing habitat for songbirds in the summer. The principal function of these wetlands is sediment retention, groundwater recharge and discharge, and lateral flow.

The Katzehin River delta supports estuarine emergent wetland. These wetlands receive floodwaters and are rated high as wildlife habitat. The estuarine emergent wetland area is extensive in the Katzehin River outwash plain and a valuable habitat for wildlife. At the location of the proposed Katzehin Ferry Terminal, the intertidal rocky shore is rated high for fish and wildlife habitat. The rocky shore habitat north of the Katzehin River is extensive along the shoreline and a valuable habitat for fish and wildlife.

On the west side of Lynn Canal, between the Endicott River and the Davidson Glacier outwash plain, forested wetlands are the predominant wetlands. This area supports relatively large trees and is rated high for groundwater discharge, nutrient transformation, and wildlife habitat.

The Glacier River bisects the Davidson Glacier outwash plain, and the area supports a number of unique wetlands. Wetland types include emergent wetlands, ponds with floating vegetation, and open water habitats. They are generally rated high for groundwater functions, surface hydrologic control, and nutrient transformation and export. The groundwater and nutrient transformation and export functions are important to fish. The surface hydrological control is important for fish and wildlife, as it controls flooding and erosion.

Detailed wetland maps and additional information on wetland function ratings are provided in the *Wetlands Technical Report* (Appendix O), and the *2014 Update to Appendix O – Wetlands Technical Report* (see Appendix Z).

3.3.2 Marine and Freshwater Habitat (Including Essential Fish Habitat)

Lynn Canal is a long and deep fjord-like estuarine inlet surrounded by rugged glaciated mountains with deep V-shaped and U-shaped valleys. Many of the bays in the project area have narrow margins of hilly moraines, with small flat-bottomed valleys at their heads. Most slopes throughout the project area are steep. Elevation ranges from sea level to over 4,000 feet. The marine and freshwater habitats in Lynn Canal support a variety of animal and fish species.

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to assess the effects of their projects on EFH for commercial fish stocks in all life stages and associated habitats. This Act also calls for direct action to stop or reverse the continued loss of fish habitats. The Act requires consultation between the National Marine Fisheries Service (NMFS), the Fishery Management Councils, and federal agencies to protect, conserve, and enhance EFH. Federal agencies are required to determine if their actions have a potential adverse effect on EFH and if so, they must prepare an EFH assessment. The Act defines EFH as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Act considers *fish* to include finfish, mollusks, crustaceans, and other forms of marine life except marine mammals and birds. The Act defines *waters* as "aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish, where appropriate"; *substrate* as "sediment, hard bottom, structures underlying the waters, and associated biological communities"; and *necessary* as "the habitat required to support a sustainable fishery and a healthy ecosystem." In considering an *adverse effect* to EFH, Subpart J, Section 600.810 of the Act defines an adverse effect to EFH as "any impact, which reduces the quality and/or quantity of EFH."

This section provides a description of EFH in the project study area. The section also describes habitat for shellfish, prey species, and resident fish that are not commercial fish stocks covered by the Magnuson-Stevens Fishery Conservation and Management Act.

3.3.2.1 Marine Habitat in Lynn Canal

Marine habitats considered for evaluation in this Draft SEIS include intertidal and subtidal zones in Lynn Canal that would potentially be affected by fill placement and/or sidecasting from construction of a road or new ferry terminal, and offshore waters that would potentially be affected by ferry traffic. The marine habitats in Lynn Canal support many species of both resident and transient marine mammals, terrestrial mammals (river otter), seabirds, fish, marine invertebrates, and vegetation, all of which are discussed in detail in subsequent sections of this Draft SEIS.

Lynn Canal provides an essential migratory corridor for all five species of Pacific salmon (*Oncorhynchus* spp.), which includes all estuarine and marine areas used by the fish. Marine habitat in Lynn Canal exists for such marine fish as sablefish (*Anoploma fimbria*) (estuarine waters), sculpin (Cottidea) (intertidal and subtidal sites), Pacific herring (*Clupea pallasii*) (kelp and eelgrass for spawning), skate (Rajiidae) (Berners Bay subtidal areas), and forage fish (prey species; estuarine and marine waters) such as eulachon (*Thaleichthys pacificus*) (Berners Bay

and surrounding rivers for spawning), sand lance (*Ammodytes hexapterus*), and capelin (*Mallotus villosus*) (Berners Bay for spawning).

Field surveys were conducted in 2003 to obtain information on intertidal and subtidal habitat composition in Lynn Canal. Fieldwork and assessment methodologies were developed in consultation with the USACE, USFS, NMFS, USFWS, EPA, ADNR, ADF&G (formerly the ADNR Office of Habitat Management and Permitting), and FHWA in 2003. Based on preliminary consultation with NMFS, DOT&PF determined that the proposed project alternatives may adversely affect the following EFH fish species including specific life stages, and prey species:

- Pink salmon (*Oncorhynchus gorbuscha*), chum salmon (*O. keta*), sockeye salmon (*O. nerka*), coho salmon (*O. kisutch*), and Chinook salmon (*O. tshawytscha*) – eggs, fry smolt, and spawning adults
- Sablefish and other rockfish (*Sebastes* spp.) – adults; other life stages unknown
- Sculpin – eggs, juveniles, and adults
- Skate – adults; other life stages unknown
- Pacific herring – eggs, juveniles, and adults
- Forage fish (eulachon, capelin, and sand lance) – eggs, juveniles, and adults

Thirty-one subtidal areas were surveyed using the Seabed Imaging and Mapping System, which consists of a video camera that is towed just above the seabed and a video recording system that links GPS fixed locations to the imagery. Figure 3-18 shows the 14 general locations where these 31 subtidal surveys were conducted. Video data were classified for geological and biological features, providing a classification record for every two seconds of imagery.

Surveys of 49 intertidal sites were conducted during low tide from August 26 to 29, 2003. These sites were identified by DOT&PF as areas potentially affected by highway construction and ferry terminal development.

Intertidal Habitat – The nearshore coast or intertidal zones surveyed in Lynn Canal consist mainly of sediment beaches (boulder, cobble, gravel, sand, and/or mud), bedrock cliffs, and vertical rock faces. There are also a few tidally influenced sloughs and estuarine wetland habitats. Some sites consist of one shoreline classification, while others are a combination of two or more classifications. Characteristics of the zonation and types of organisms observed can differ greatly among locations and depend upon many variables including wave exposure and slope of the beach.

The sediment beaches that exhibit a low slope angle tend to have vegetation and low to medium wave exposure. Sediment beaches tend to support a higher diversity of species than shorelines with a higher angle or harsher wave action. Species observed at these high-angle sites form conspicuous bands or belts of varying widths (zonation).

Bedrock cliffs or vertical face shorelines can likely support prey species for many marine and anadromous species known to inhabit the study area. Due to their morphology, these sites are not important for the spawning, breeding, or growth to maturity for these fish species.

The nearshore waters of the intertidal zone are used by forage fish species (e.g., eulachon and capelin) for consumption of intertidal prey; some anadromous fish for consumption of prey as well as spawning and/or rearing; marine birds for feeding and/or nesting; and river otters, harbor

seals, and Steller sea lions for feeding and haulouts. The project vicinity contains the following intertidal habitat areas:

- **Sawmill Cove** – Vegetation coverage was linked to gravel presence. The rocky points at the north and south headlands of the cove are covered with dense *Fucus* (rockweed) to about the zero foot tidal elevation. In the lower intertidal zone, rockweed is interspersed with two kinds of large-bladed kelp (*Lamanaria saccharina* and *Agarum clathratum*). Foliose red and green algae and filamentous green algae are also present in the intertidal zone. Intertidal fauna was composed of barnacles, mussels, and anemones. Siphons of many mollusks were observed during a field survey.
- **Slate Cove** – No intertidal vegetation or fauna were observed.
- **Katzehin Ferry Terminal Area** – The intertidal area is a boulder-cobble-pebble dominant zone. Vegetation observed included stalked kelps in one location, foliose green algae, filamentous red algae, and rockweed.
- **Taiya Inlet** – Typical zonation was observed on the rocky cliffs and bedrock outcrops in Taiya Inlet and on the boulder beaches north of the Katzehin River.
- **William Henry Bay** – The intertidal area has gravel with boulders and cobbles along the western shore and mostly pebbles to the south. Intertidal vegetation observed included bladed kelps, coralline red algae, rockweed, filamentous red algae, and foliose red algae. Intertidal fauna observed included barnacles, blue mussels, sea cucumbers, and green urchins.

Subtidal Habitat – Subtidal areas are the areas extending below the intertidal zone along the seabed toward the offshore region. The substrate in the subtidal areas surveyed in Lynn Canal consists of boulders, cobbles, gravel sediments, and mud. Fish, invertebrates, and vegetation are present in the subtidal area; the concentrations of these species depend on the type of substrate. Offshore regions consist predominantly of mud and sand with a minimum of vegetation, but observable populations of burrowing mollusks and fish occur. The subtidal areas nearer to the shore consist of a mixture of sandy and rocky substrates, with boulders and cobbles more concentrated toward the shore. The rocky substrates support a higher diversity of sessile fauna (e.g., cup corals and sea anemones) as well as mobile species (e.g., crabs and urchins) and algae (e.g., kelps and coralline reds). Areas where subtidal habitat surveys were conducted are noted on Figure 3-19. Site-specific observations are presented below.

- **Sawmill Cove** – A 500-by-1,600-foot area was surveyed from the intertidal zone (at approximately +10 foot tidal elevation) to a depth of 100 feet. The seabed is composed almost exclusively of clastic sediment (muds, sand, and gravels) with occasional large cobble. Gravel content is highest in the intertidal zone and drops off rapidly in the offshore where sands and muds predominate. Rockweed was interspersed with large-bladed kelp. One species of this kelp (*Laminaria saccharina*) was sparse but persistent and evenly distributed throughout the site. No eelgrass, floating kelp, or giant kelp were noted at the site. Subtidal fauna included sea whips (*Halipterus* sp.), one location of orange sea pens, and one location with a bivalve and brozoan complex concentration. Mobile species were also recorded including yellowfin sole, rock sole, gunnels, snake pickleback, sculpin, sand lance, and a large school of young Pacific herring.
- **Slate Cove** – A 980-by-2,600-foot area was surveyed from the intertidal zone (at approximately +6 foot tidal elevation) to a depth of 125 feet. The site has a highly uniform seabed consisting of mud. A few boulders and cobbles were observed. No sea

grasses or kelps were noted. Subtidal fauna was sparse with a few unidentified fish, a few flatfish, and one anemone observed.

- **Representative East Lynn Canal Shoreline between Comet and Katzehin River** – Surveys were conducted at three locations along the east coast of Lynn Canal between Comet and the Katzehin River. The surveys were conducted from the intertidal zone (from approximately +10 to -4 feet tidal elevation) to depths from 100 to 128 feet. This section of shoreline is very steep and has substrate with varying amounts of bedrock, sediment veneer over bedrock, and boulder-cobble-gravel sediments. Shell fragments were noted throughout the survey areas. Coralline red algae were common at all three survey areas, whereas bladed kelps, fucus, filamentous red algae, and foliose red algae were uncommon. Bryozoan complexes dominated the deeper areas of all three areas. Unidentified fish were common at two of the areas, and anemones, sea whips, and mottled stars were uncommon at all three areas. Green urchins were common in the intertidal zone at two survey areas and uncommon at the other. Barnacles and mussels were noted but uncommon.
- **Katzehin Ferry Terminal Area** – A 660-by-2,600-foot area was surveyed from the intertidal zone (at approximately +10 foot tidal elevation) to a depth of 85 feet. The subtidal seabed is composed of a muddy zone. No vegetation was observed. Subtidal fauna was sparse with a few unidentified fish, a few flatfish, and a single anemone.
- **Taiya Inlet** – Two types of subtidal habitat were surveyed in the Taiya Inlet as representative of habitat potentially impacted by rock sidecasting. The first type represents a scenario where rock would land on an underwater outcrop (or ledge) of rock. The second represents a scenario where rock would fall into marine water with steep-sided shores. A survey area north of the Katzehin River where underwater bedrock outcrops were observed in deeper water represents the underwater outcrop scenario. The survey was conducted from the intertidal zone (from +6.5 foot tidal elevation) to a depth of 125 feet. Intertidal substrate was mostly boulder-cobble with offshore substrate mostly gravelly mud/sand. Shell fragments were sparsely distributed with higher concentrations associated with bedrock areas. Vegetation cover was restricted to the intertidal area and dominated by bladed kelps and coralline red algae. At depths greater than 50 feet, mussels, shrimp, and unidentified urchins were common. Green sea urchins, crab, snails, unidentified fish, and flatfish were noted but uncommon. Five steep-sided sites were surveyed in the Taiya Inlet. The surveys were conducted from the intertidal zone (0 foot tidal elevation to +11.5 foot tidal elevation) to depths from 100 to 148 feet. The shoreline was steep with variable substrate. Bedrock dominated the intertidal and shallow subtidal areas. Subtidal areas had rock with sediment veneers over bedrock. Shell fragments were common (30 to 50 percent coverage). Vegetation was observed in the shallow subtidal areas and primarily consisted of coralline algae, foliose green algae, fucus, filamentous red algae, and bladed kelp. Vegetation covers were typically low (e.g., one site had 25 percent coverage). Barnacles and mussels were common in the intertidal area, and shrimp were common in the subtidal areas. Sea urchins, anemones, bryozoan complexes, and fish were observed but were not common.
- **William Henry Bay** – A 1,300-by-3,000-foot area was surveyed from the intertidal zone (at approximately +10 foot tidal elevation) to a depth of 70 feet. Fines rapidly increased in the offshore direction, with sands and muds extending to the 30 to 50 foot depth and muds predominate in deeper water. Vegetation was restricted to depths of less than 50

feet. Subtidal vegetation observed included minimal amounts of bladed kelp and filamentous red algae. Subtidal fauna observed included sea cucumbers; orange sea pens, which were common on the northern end of the survey area (33- to 65-foot depth); sea whips; anemones, which were common at depths greater than 33 feet; mottled sea stars, which were common between three and 20 feet; 18 crabs; and flatfish, which were common and had 44 individuals observed at depths greater than 23 feet throughout the survey area.

For further information on the marine environment in the study area, see the *EFH Assessment* (Appendix N) and the *2014 Update to Appendix N – Essential Fish Habitat Assessment* (see Appendix Z).

3.3.2.2 Freshwater Habitat in Lynn Canal

Freshwater habitat in the study area consists of mountain lakes and side streams that were formed mainly by glacier melt. Most of the streams drain directly into Lynn Canal. The mixture of steep and gentle terrain along Lynn Canal produces a variety of stream types and habitat for freshwater and anadromous fish species. Mountain lakes provide habitat for some mammals and amphibians.

Approximately 90 streams are within the proposed project area, and about 29 percent of these streams (15 on the east and 11 on the west side of the canal) are known to support anadromous fish species (ADF&G, 2013). Freshwater lake habitat in the area consists of high mountain lakes, which are usually surrounded by a variety of riparian vegetation.

Freshwater stream habitat in Lynn Canal consists of drainages within the deep V-shaped and U-shaped valleys that dominate the area. The river-carved V-shaped valleys lack the outwash region or floodplain characteristics of the more gently sloped U-shaped valleys, where many side channels and sloughs are usually located. Spawning habitat in the V-shaped valley streams is limited to the intertidal zone, and rearing habitat in these streams is usually limited to the main channel. Both of these features may restrict the variety of species able to use the area. The large, glacial, braided river systems contained within U-shaped valleys provide a greater potential for anadromous habitat located outside of the main channel. Side channels branch out into adjacent muskegs and floodplain areas associated with the river, providing varied and extensive rearing and spawning habitat within the river system, which promotes anadromous species diversity. Necessary characteristics of habitat required to support anadromous fish species include ample spawning and rearing habitat. Depending on the species, one or both of these habitat types can be the limiting factor in the successful reproduction of the species.

Anadromous fish habitat has been identified along the east side of Lynn Canal within Berners Bay (the Berners, Lace, and Antler rivers, Johnston and Slate creeks, a side channel to the Lace River, and a slough south of the Antler River, and an unnamed creek northwest of Slate Cove); at Sherman, Sawmill, Independence, Sweeney, and Pullen creeks; and in the Katzehin River and a side channel to the Katzehin River (Figure 3-18). The Katzehin, Lace, and Antler rivers are large glacial river systems in U-shaped valleys. Many of these anadromous streams also support resident fish populations. There are several smaller streams with the potential to support resident fish; the remaining streams along the east side of the canal provide poor fish habitat and/or have steep waterfalls.

Anadromous fish habitat exists within rivers contained in floodplains and U-shaped valleys along the west side of Lynn Canal. Anadromous streams found in William Henry Bay are the Beardslee River and William Henry Creek. Other anadromous streams are the Endicott, Sullivan, and Chilkat rivers; Sullivan Creek; Glacier River; and four unnamed streams. As on the east side of Lynn Canal, many of the anadromous fish streams also support resident fish populations. Several smaller streams have the potential to support resident fish; the remaining streams along the west side of the canal provide poor fish habitat.

See the *Anadromous and Resident Fish Streams Technical Report* (Appendix P) and the *2014 Update to Appendix P – Anadromous and Resident Fish Streams Technical Report* (see Appendix Z) for additional information on stream habitat in the project area.

3.3.3 Terrestrial Habitat

The landscape in Lynn Canal is glaciated at high elevations, and the mountain slopes are primarily densely forested with a typically undisturbed coniferous closed canopy system, interrupted in a few areas by river valleys and glacial outwash plains. The study area contains rugged topography with moderate to steep forested slopes, interrupted by raised benches, bare rock cliffs, and steep avalanche chutes.

Terrestrial habitat in the Lynn Canal study area consists mostly of coastal coniferous rainforest, which occurs throughout the study area and is characterized by an overstory dominated by western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), and some scattered mountain hemlock (*T. mertensiana*), Alaska or yellow cedar (*Chamaecyparis nootkatensis*), and red alder (*Alnus oregona*). The TLRMP refers to this climax stage of the spruce/hemlock or hemlock forest habitat as old-growth forest. Large trees, decaying logs, lush undergrowth, and multiple canopy layers characterize old-growth forest habitat. There is a total of approximately 155,464 acres of old-growth forest in the Lynn Canal watershed, with 103,501 acres along East Lynn Canal and 51,963 acres along West Lynn Canal (see the 2014 *Land Use Technical Report,* Appendix DD of this Draft SEIS). Old-growth forest typically extends from sea level to an elevation of approximately 2,500 feet, with subalpine and alpine habitats at higher elevations. In the typical Sitka spruce/western hemlock forest, the understory consists of shrubs such as Sitka alders (*A. crispa*), rusty menziesia (*Menziesia ferruginea*), blueberry (*Vaccinium ovalifolium and V. alaskensis*), red huckleberry (*V. parvifoloium*), salmonberry (*Rubus spectabilis*), shield ferns (*Dryopteris dilitata*), devils club (*Echinopanax horridum)*, and yellow skunk cabbage (*Lysichiton americanum*).

Deciduous forest or mixed deciduous/needleleaf forest communities are found in limited areas, primarily in association with floodplains of larger rivers. The dominant tree species in these areas are the black cottonwood (*Populus balsamifera*) with a shrub layer of Sitka alder (*A. crispa*), thinleaf alder (*A. tenuifolia*), and willow (*Salix* spp.).

Interspersed within the forest are open, poorly drained areas, including muskeg and bog communities. These wetland communities are discussed in Section 3.3.1.

Shrub communities in the study area consist of open dwarf tree complexes, tall shrub communities, and low shrub communities. Dwarf tree communities are primarily dominated by mountain hemlock (*T. mertensiana*), smaller amounts of shore pine (*Pinus contorta*), and an understory of blueberry (*Vaccinium* spp.) shrubs. Tall shrub communities are found on steep slopes, along stream banks, and in floodplains. Dominant species on steep terrain typically

include Sitka alder (*A. crispa*). A mixture of willow (*Salix* spp.), alder (*Alnus* spp.), and cottonwood (*Populus* spp.) is typically found near stream banks and floodplains of rivers such as the Antler River on the east side of Lynn Canal and the Endicott River on the west side of Lynn Canal. Low shrub communities are typically found in poorly drained bog habitat and are dominated by ericaceous shrubs such as Labrador tea (*Ledum groenlandicum*), crowberry (*Empetrum nigrum*), leatherleaf (*Chamaedaphne decumbens*), and deer cabbage (*Fauria crista-galli*).

The subalpine and alpine areas, with steep slopes and limited soil, support low shrub and dwarf shrub communities of blueberry (*Vaccinium* spp.), Aleutian heather (*Phyllodoce aleutica*), Arctic willow (*Salix arctica*), salmonberry (*R. spectabilis*), and a variety of grasses, wildflowers, ferns, and mosses. At elevations above the alpine vegetation, glaciers and snowfields dominate.

Herbaceous communities are typically found at lower elevations and consist of sedge/grass/forb meadow communities on outwash plains, wet meadow communities in poorly drained wetlands areas with emergent grasses, sedges (*Carex* spp.), and cottongrasses (*Eriophorum* spp.). Herbaceous salt marsh communities occur in tidally influenced areas, typically at the mouth of rivers, streams, or along outwash plains, and are dominated by salt-tolerant species such as sea beach lyme-grass (*Elymus mollis*), beach lovage (*Ligusticum scoticum*), seaside plantain (*Plantago maritima*), and seaside arrowgrass (*Triglochin maritimum*).

Surveys for plants listed as threatened, endangered, or proposed under the Endangered Species Act (ESA), and plants on the USFS Alaska Region Sensitive Species List were conducted in the summer of 2004 along portions of the alternative alignments where they would be likely to occur. None of these species were found in the surveys.

Three species of plants listed as rare by the Alaska Natural Heritage Program were identified during field surveys conducted in 2004 (URS, 2005). Paper birch (*Betula payprifera*) was found at seven locations on the east side of Lynn Canal and near William Henry Bay on the west side. Wild blue lettuce (*Lactuca biennis*) was found at two locations on the east side and near Cant Point on the west side. A small population of *Scheuchzeria palustris* was identified north of Sawmill Cove.

Three non-native plant species were found north of the Katzehin River. Two of these species, creeping buttercup (*Ranunculus repens*) and butter and eggs (*Linaria vulgaris*) are considered invasive.

Lands on both sides of Lynn Canal, in the vicinity of the JAI Project, contain substantial but sometimes discontinuous old-growth forest habitat (USFS, 2008a). As stated in Section 3.1.1.1, the 2008 TLRMP preserves a large acreage of old-growth forest habitat as medium or large OGRs or as small reserves in Old-Growth Habitat LUDs.

The OGRs and Old-Growth Habitat LUDs are the key components of the forest's old-growth habitat conservation strategy, which is meant to protect wildlife species as well as the forest itself, with emphasis on the viability of key indicator wildlife species. In short, the reserve system is "designed to maintain a functional and interconnected old-growth ecosystem" across the Tongass National Forest (USFS, 2008a, p. D-6).

As described in the 2008 TLRMP Final EIS (USFS, 2008a, p. D-6), the old-growth reserve system must meet minimum size, spacing, and composition requirements, as follows:

- **Large old-growth reserves** – A large reserve must be 40,000 acres; 20,000 of those acres must be productive old-growth forest (more than 8,000 board feet [BF] per acre). At least 10,000 acres of the productive old-growth forest should be in the high volume class (more than 20,000 BF per acre).
- **Medium old-growth reserves** – A medium reserve is 10,000 acres; 5,000 of those acres must be productive old-growth forest. At least 2,500 acres should be in the high-volume class.
- **Small old-growth reserves** – Small reserves are identified within value comparison units (VCUs) of the Tongass National Forest. Small reserves must be at least 16 percent of the area of the VCU, and at least 50 percent of that area must be productive old-growth forest. Each reserve should contain at least 800 acres of productive old-growth forest, but must contain a minimum of 400 acres of productive old-growth forest.

Evaluation of any modification of reserves must include consideration of Non-Development LUDs that function as medium or large old-growth reserves to maintain the integrity of the old-growth forest ecosystem and contribute to a forest-wide system of reserves. Where the Non-Development LUDs do not fulfill size, spacing, and composition criteria of Old-Growth Habitat reserves, it would be necessary to add or modify old-growth reserves to meet the criteria.

In the project area, Old-Growth Habitat LUDs occur in the following VCUs:

- VCU 230 and VCU 240, adjacent Old-Growth Habitat LUDs on the east side of Lynn Canal north of Juneau near Echo Cove.
- VCU 160 and VCU 200, adjacent Old-Growth Habitat LUDs east of Lynn Canal in the area of Slate Cove and Point Saint Mary Peninsula on the northern edge of Berners Bay. The Old-Growth Habitat LUD in VCU 200 overlaps into VCU 160, and there is a separate Old-Growth Habitat LUD in VCU 160 as well.
- VCU 190, an Old-Growth Habitat LUD east of Lynn Canal in an area between Comet and Met Point.
- VCU 950, an Old-Growth Habitat LUD west of Lynn Canal near the National Forest boundary with Haines State Forest.

According to USFS policy, Old-Growth Habitat LUDs require a contiguous landscape of at least 16 percent of the VCU area, and 50 percent of this area must be productive old-growth timber (USFS, 1997b). Where feasible, the boundaries of an Old-Growth Habitat LUD should follow geographic features so that the boundaries can be recognized in the field. Along with the general criteria of size and productivity, connectivity between areas of old-growth habitat is also a criterion. The design of each habitat is to be based on wildlife concerns specific to the particular area.

Criteria commonly used in designating Old-Growth Habitat LUDs include important deer winter range, probable goshawk nesting habitat, probable marbled murrelet nesting habitat, large forest blocks, rare plant associations, and landscape linkages. The 2014 *Land Use Technical Report* (Appendix DD of this Draft SEIS) provides detailed information on Old-Growth Habitat LUDs in the study area.

3.3.4 Marine and Anadromous Fish and Shellfish

The waters in the Lynn Canal area support anadromous, resident, and marine finfish, and shellfish. The varied and dramatic topography of the area provides habitat for a diversity of fish species along the canal. See Section 3.3.2 for habitat descriptions.

3.3.4.1 Marine Finfish

The following marine fish in the Lynn Canal were assessed: sablefish, yelloweye rockfish (*Sebastes ruberrimus*), other rockfish (*Sebastes* spp.), sculpin, skate, Pacific herring, and forage (prey) fish (eulachon, capelin, and sand lance).

Sablefish spawn at depths of 984 to 1,640 feet near the edges of the continental slope. Larval sablefish move into shallow nearshore waters for the first 1 to 2 years of their lives and begin moving offshore again to the continental slope and deep-water coastal fjords. Young sablefish have been known to occur in Lynn Canal estuaries (e.g., Berners Bay). Sablefish are highly mobile during part of their life. Substantial movement between the Bering Sea/Aleutian Islands and the Gulf of Alaska has been documented. Larval sablefish feed on small zooplankton. Juveniles and adults are considered opportunistic feeders and feed on euphausiids, shrimp, cephalopods, squid, jellyfish, and other fish species.

Rockfish use three types of habitat: demersal shelf, pelagic shelf, and slope. Demersal shelf rockfish are nearshore bottom dwellers, inhabiting the continental shelf in rocky-bottomed areas. Pelagic shelf rockfish are nearshore schooling fish, inhabiting the continental shelf water column rather than along the ocean floor. Slope rockfish, which are deepwater species inhabiting the edge of the continental shelf, are unlikely to occur in Lynn Canal. Rockfish diet varies by species. In general, juvenile rockfish eat plankton and fish eggs, and adults feed on crustaceans and fish species.

Sculpins are bottom dwelling fish that lay adhesive eggs in nests against rocks. Larval sculpin are generally found in food-rich habitats, including fast-moving cold-water streams; rocky intertidal zones; and pier, wrecks, and reefs. Sculpin species have been caught near Skagway during marine and freshwater fish inventories and were observed in tidal pools during intertidal surveys conducted in 2003 for the JAI Project. Sculpin feed on small invertebrates (e.g., shrimp, crab, barnacles), small flatfish, eelpouts, other sculpin, and smelt.

Skate inhabit inner and outer shelf areas, most commonly soft-bottom areas. Skates lay fertilized eggs on the ocean floor where they hatch and grow to maturity. Skates have been collected in Lynn Canal trawl surveys. Skate prey on pollock, shrimp, crab, small flatfish, sculpin, eelpouts, smelt, and other bottom-dwelling species.

Pacific herring spawn primarily in shallow, vegetated intertidal and subtidal areas. After spawning, adults move offshore to feed. The young rear in sheltered bays and inlets and appear to remain segregated from adult populations until they mature. Pacific herring currently spawn in Berners Bay. Young herring feed on small copepods and nauplii, diatoms, and ostracods, and change to feed on crustaceans and medium-size zooplankton as they mature. Adult herring feed on zooplankton, pollock larvae, sand lance, capelin, and smelt.

The Pacific herring population in Lynn Canal has been substantially reduced over the decades to the point that it is no longer a viable commercial fishery. Various hypotheses have been made about why the stocks have declined, although none have been substantiated by scientific

analysis. These hypotheses include one or some combination of the following factors: overfishing, increased predator populations, disease, habitat alteration/degradation, water pollution, and unfavorable oceanographic conditions.

In a quantitative assessment of the frequency with which explanations have been attributed to herring stock collapses worldwide, Pearson et al. (1999) found that overfishing (74 percent of the cases) was the most frequently cited cause, followed by environmental change (50 percent of cases), changes in food supply (15 percent), predation (2 percent), disease (2 percent), and habitat modification (2 percent). In most cases, these factors were seen to have acted in combination with others; single-factor causes other than overfishing (37 percent) or environmental change (13 percent) alone were rare.

Overfishing may have played a role in the initial decline of Lynn Canal herring stocks. As previously noted, stocks were harvested at a relatively low rate (<1,000 tons) until stock declines led to a fishery closure in 1982. Harvest did occur in some seasons when minimum spawning biomass thresholds were not met, and the Lynn Canal stock may have been especially susceptible to brief periods of overfishing due to poorly understood factors, such as its limited migratory range.

A 2007 petition to list the Southeast Alaska Distinct Population Segment (DPS) of Pacific herring under the ESA focused on the Lynn Canal stock. On April 11, 2008, that petition was denied because the Lynn Canal population was not found to qualify as a DPS.[10] However, NMFS announced it would be initiating a status review for a wider Southeast Alaska DPS of Pacific herring that includes the Lynn Canal population.

Eulachon aggregate near the bottom of estuarine and riverine channels prior to their spawning migration to the lower reaches of rivers with moderate velocities. Eulachon mass spawn at night. Most adults die following their first spawning. Newly hatched larvae are quickly flushed to the marine environment by the river currents where they will remain for several weeks. Juveniles and adults feed on planktonic prey. Eulachon spawn in Berners Bay rivers and the Katzehin, Chilkat, Skagway, and Taiya rivers.

Capelin spawn in intertidal zones with coarse sand and fine gravel substrate. Very few adult capelin survive after spawning. Capelin feed on planktonic prey for the most part although marine worms and small fish are also consumed.

Sand lance spawn in coastal inshore waters. Newly hatched larvae and adults migrate offshore in early summer and return to inshore waters to overwinter. Sand lance feed in the water column on crustaceans and zooplankton when young and adults feed on fish larvae, amphipods, annelids, and common copepods.

3.3.4.2 Marine Shellfish

Shellfish species found in Lynn Canal include red king crab (*Paralithodes camtschaticus*), blue king crab (*P. platypus*), golden king crab (*Lithoides aequispinus*), bairdi Tanner crab (*Chionoecetes bairdi*), Dungeness crab (*Cancer magister*), Pacific blue mussels (*Mytilus trossulus*), clams (*Macoma* spp.), and shrimp (*Decapoda* spp.). All of the shellfish except golden king crab inhabit the intertidal and subtidal zones at some time during their life history. Red and blue king, bairdi Tanner, and Dungeness crabs are all found at depths between the intertidal zone

[10] Federal Register Notice: 73 FR 19824.

and approximately 600 feet (depending on their life stage), whereas golden king crabs are usually found much deeper, usually between 600 to 1,600 feet (ADF&G, 2004). Mussels and clams, which are less motile than crabs, are restricted to the intertidal and subtidal zones. Shrimp species inhabit varying depths and habitat types, but are generally found between the intertidal zone and depths of 1,800 feet.

3.3.4.3 Anadromous Fish

Anadromous fish occurring in the Lynn Canal study area were identified by a 1994 field survey of streams in Lynn Canal and a recent review of ADF&G's *Catalog of Waters Important to the Spawning, Rearing or Migration of Anadromous Fishes*. The anadromous fish species found in Lynn Canal are all five Pacific salmon species (chinook, coho, sockeye, chum, and pink), steelhead/rainbow (*O. mykiss*) and cutthroat trout (*O. clarki*), Dolly Varden char (*Salvelinus malma*), round whitefish (*Prosopium cylindraceum*), and eulachon.

Depending upon the species, anadromous fish spend from one to several years rearing in freshwater (chinook, coho, and sockeye salmon; rainbow/steelhead and cutthroat trout; and Dolly Varden) or leave immediately upon emerging from the spawning gravels (chum and pink salmon). Still others move into fresh water with the tides, spawn, and return to saltwater (eulachon). Steelhead trout, rainbow trout that have spent a portion of their lives at sea, commonly spawn more than once, unlike salmon.

Chinook salmon tend to favor large river systems such as the Chilkat River for spawning and rearing, while sockeye salmon seek out river systems that include lakes, such as the Berners, Chilkoot, and Chilkat rivers. Coho salmon will rear in lakes but are usually found in small streams that empty directly into saltwater. In the Lynn Canal area, round whitefish are found only in the Chilkat River system. Round whitefish are less tolerant of the marine environment than other anadromous species, so during spring and summer, they move from freshwater out to nearshore brackish waters to feed, and then in fall move upstream to spawn and/or overwinter.

3.3.5 Wildlife

Hundreds of wildlife species (mammals, birds, and amphibians) live within or pass through the study area for the JAI Project. The 1997 Draft EIS primarily analyzed five species based on 1994 agency scoping comments. The 2006 Final EIS evaluated 27 species, including species identified in 2003 agency scoping comments. Some of these species were added because they are listed on federal or State agency conservation plans. Other species were added because they are susceptible to the effects of highway construction or represent management concerns for similar species. This Draft SEIS presents information on four additional species that occur in the project area but were not analyzed in the previous studies: yellow-billed loon (*Gavia adamsii)*, black oystercatcher (*Haematopus bachmani)*, Aleutian tern (*Onychoprion aleuticus*), and dusky Canada goose (*Branta canadensis occidentalis*).

The principal discussion on bald eagles is provided in Section 3.3.6. Threatened and endangered species (Steller sea lions [*Eumetopias jubatus*] and humpback whales [*Megaptera novaeangliae*]) are discussed in Section 3.3.7. Figures 3-19 through 3-23 depict wildlife and habitat locations.

Many species have been placed into various categories by the USFS, State of Alaska, or other agencies, according to multiple population characteristics, predictable responses to certain

human activities, low abundance, or susceptibility to habitat disturbance or loss. Subsequent to the 2006 Final EIS, the USFWS added an ESA candidate species, the USFS updated its Sensitive Species designations for Tongass National Forest and no longer uses a Species of Concern list (USFS, 2008b), and the State of Alaska no longer maintains a Species of Special Concern list (ADF&G, 2012a). The following subsections identify both the categories applicable to the species found in the study area and the species selected for analysis.

3.3.5.1 Species Selected for Analysis

The species selected for analysis were drawn from USFS management indicator species (MIS), USFS's previously identified species of concern, USFS sensitive species, the previously listed State species of special concern, and other species identified by agencies of particular concern or representative of a group of species.

USFS Management Indicator Species – MIS are species whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements. The USFS recognizes limitations in the MIS concept but uses it to represent the complex of habitats, species, and associated management concerns for planning, assessment, and monitoring purposes (USFS, 1997b). For this reason, seven mammal species and one bird species identified as MIS for the Tongass National Forest (USFS, 2008b) were identified for analysis in this Draft SEIS based on coordination and consensus with the resource agencies during scoping for the 2005 Supplemental Draft EIS. Those species are: mountain goat (*Oreamnos americanus*), Sitka black-tailed deer (*Odocoileus hemionus sitkensis*), river otter (*Lutra canadensis*), marten (*Martes americana*), brown bear (*Ursus arctos*), black bear (*U. americanus*), Alexander Archipelago wolf (*Canis lupus ligoni*), and bald eagle (*Haliaeetus leucocephalus*).

USFS Species of Concern –Because the 2008 TLRMP no longer uses a Species of Concern list (USFS, 2008b), the species analyzed in the 2006 Final EIS under this heading have no special designation in the project area as of 2008.

USFS Sensitive Species – These species are considered susceptible or vulnerable to habitat alterations and management activities to the extent that there is concern for the long-term persistence of the species. Five bird species identified for analysis fall under this category: the yellow-billed loon, Queen Charlotte goshawk, black oystercatcher, Aleutian tern, and dusky Canada goose.

State Species of Special Concern –As of August 2011, the State of Alaska no longer maintains a list of Species of Special Concern (ADF&G, 2012a). Species that were formally listed and previously analyzed without any other past or current State or federal designation include the terrestrial bird species olive-sided flycatcher, gray-cheeked thrush, Townsend's warbler, and blackpoll warbler.

Other Species – Species not included in the above categories but included in analysis for this Draft SEIS include three birds, one amphibian, one terrestrial mammal, and five marine mammals. Kittlitz's murrelet (*Brachyramchus brevirostris*) was petitioned for ESA listing in 2001 (Center for Biological Diversity et al., 2001).

The USFWS designated this species as a candidate species in 2004.[11] The yellow-billed loon was designated as a candidate for ESA listing on March 25, 2009 (USFWS, 2011). Harlequin duck (*Histrionicus histrionicus*) is included as a representative species of the waterfowl that inhabit Lynn Canal. Wood frog (*Rana sylvatica*) is representative of other amphibians such as the spotted frog and boreal toad that inhabit Lynn Canal. Moose (*Alces alces*) is included due to its importance as a game management species in Alaska. Sea otter (*Enhydra lutris*), minke whale (*Balaenoptera acutorostrata*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), and killer whale (*Orcinus orca*) are included because they are found in Lynn Canal and they are species protected by the Marine Mammal Protection Act (MMPA; 16 USC 1361 *et seq.*).

3.3.5.2 Terrestrial Habitat Use

The dominant terrestrial cover type, Sitka spruce/western hemlock forest, provides habitat for a variety of both mammal and bird species. The presence of large trees, decaying logs, lush undergrowth, and multiple canopy layers that characterize the spruce/hemlock forest of the study area provide unique habitat for many species for foraging, resting, nesting or denning, and as escape cover from predators. Forested wetlands, muskegs and bogs, and emergent wetlands occur in small, isolated pockets or large expanses, provide openings or breaks in forest cover, and are important to the overall habitat diversity in the region by providing both food and cover for some species of wildlife.

Migratory birds are protected under the Migratory Bird Treaty Act of 1918, which regulates the taking of migratory birds and their eggs or nests, and the Migratory Bird EO (EO 13186), which encourages federal agencies to avoid or minimize to the extent practicable adverse impacts on migratory bird resources. Forest habitat is used as foraging and nesting habitat by a number of migratory birds, several of which are species of special concern such as the olive-sided flycatcher, gray-checked thrush, Townsend's warbler, and blackpoll warbler. Marbled murrelets also use the forest habitat for nesting. Resident forest-dwelling bird species such as woodpeckers, finches, sparrows, and thrushes also use these areas for foraging, nesting, and rearing young.

In accordance with a commitment in the 2006 ROD for the JAI Project, DOT&PF funded ADF&G population studies for 3 years to address potential game management concerns raised by ADF&G. These studies focused on brown bears, moose, mountain goats, and wolverines and provide additional detail on their terrestrial habitat use. This section includes updated information from those studies.

Forest habitat is important for cover and foraging for black bears during the spring, summer, and fall and for denning during the winter. Black bears are attracted to palustrine emergent and scrub-shrub wetlands for berry-producing shrubs, wetland grasses, sedges, and forbs such as skunk cabbage. Black bears migrate to estuarine areas in the spring and again in the fall along well-established corridors (Christensen and Van Dyke, 2004). See Figure 3-20.

[11] Candidate species are plants and animals for which USFWS has sufficient information to propose them as endangered or threatened under the ESA but for which development of a listing regulation is precluded by other higher priority listing activities. Candidate species are not subject to regulatory protection, and human activities that may affect them are not restricted.

The recent ADF&G study of brown bears, which involved tracking of collared bears from June 2006 to December 2010 (Flynn et al., 2012), focused on the area surrounding the drainages of Berners Bay, although bears were also recorded outside those areas. The estimated population centered on Berners Bay was 44 bears in 2006, 67 bears in 2007, and 60 bears in 2008, with a density of brown bears similar to that of other areas on the mainland coast between Ketchikan and Skagway. The highest numbers of bears moving through Berners Bay and surrounding drainages occurred during early summer and late summer. The recorded locations also identified brown bear crossings of rivers and creeks. The most brown bear crossings in the Berners Bay study area were at Sawmill Creek, Berners Bay estuary, Slate Creek, Sweeny Creek, and Independence Lake Creek just north of Comet (Flynn et al., 2012).

By June 1, most bears were out of their dens, and they moved to riparian areas and the estuary in Berners Bay to feed on lush vegetation. In the early summer, brown bears selected estuarine emergent habitats, as well as herbaceous, closed forest, open forest, shrub, and beach habitats. About mid-July, salmon entered the local streams, and most bears sought spawning salmon. Late summer habitat selection included estuarine emergent, open forest, and shrub. Brown bear paths followed river bottoms in all seasons except denning. Brown bears were not recorded in alpine areas. Some bears started seeking out dens in mid-October. Denning bears emerged from dens from early April until late May (Flynn et al., 2012). Additional details regarding this study are in the *2014 Update to Appendix Q - Wildlife Technical Report* (see Appendix Z). Figure 3-21 shows brown bear habitat within the project area.

Forested wetlands provide a variety of plant forage species not found in upland forests. Other key forest-dwelling wildlife species in the study area include the marten (Figure 3-21) and Alexander Archipelago wolf (Figure 3-20), both of which require forest habitat for foraging and reproduction. Forested areas are important for the Sitka black-tailed deer (Figure 3-22), especially to avoid deep snow during the winter, after spending summer months in alpine and subalpine areas feeding on herbs and shrubs.

Emergent and scrub-shrub wetlands provide habitat for wildlife such as the Alaska wood frog and the boreal toad. Alaska wood frogs are common in various types of wetland habitat (Broderson, 1994).

Small populations of moose occur in the Berners Bay area (see Figure 3-22). The recent ADF&G study of moose in the Berners Bay area recorded moose along coastal areas around Berners Bay from Davies Creek (Echo Cove area) north to approximately 3 miles north of Slate Cove (White et al., 2012a). During the study, the population estimates declined from approximately 120 animals to 85 (and as low as 78 during 2009 to 2010), most likely due to deep and long-lasting snow levels during most of the winters (White et al., 2012a). Most moose activity occurred at elevations below 500 feet during all seasons. Predominant vegetative types important for moose in the Berners Bay area are deciduous shrublands, emergent herbaceous meadows, conifer forest, and unvegetated riparian and upland habitats (White et al., 2007). During summer (June to August), moose primarily used deciduous and riparian habitats. During winter (November to March), moose utilized deciduous habitats the most, but the use of conifer habitat during winter was observed where lower snow depths occurred. Additional details regarding this study are in the *2014 Update to Appendix Q - Wildlife Technical Report* (see Appendix Z).

The higher alpine and subalpine habitats support mountain goats during the spring and summer. During winter, goats use forest habitats for cover when snow forces them out of higher areas.

Subalpine and alpine habitats are used by black bears to forage, brown bears to den (winter), and Sitka black-tailed deer to forage in the summer months. Kittlitz's murrelets nest at scattered sites located high on recently deglaciated rocky slopes. This species forages in glacially fed waters during the breeding season.

The recent ADF&G study of mountain goats in the Berners Bay area determined that mountain goats along eastern Lynn Canal migrated from alpine summer ranges (averaging > 3,000 feet) to remain in low elevation (<1,500 feet) forested winter ranges between late October and late April (White et al., 2012b). Some goats spent time below 500 feet in elevation during winter, including near tide line where steep terrain extended to sea level. East of Berners Bay, steep terrain does not consistently extend to sea level, and mountain goats winter at slightly higher elevations on average than other areas of Lynn Canal. Areas of high use during winter occur very close to the coast north of Comet. Most of the Berners Bay, Katzehin beach, and Slate Cove to Comet coastal areas are not considered mountain goat habitat due to their distance from steep escape terrain and lack of suitable forage. Additional details regarding this study are in the *2014 Update to Appendix Q - Wildlife Technical Report* (see Appendix Z).

The recent ADF&G study of wolverines in the eastern Lynn Canal area (Lewis et al., 2012) found the average home range for female wolverines to be 25 square miles during late winter to mid-summer and for males the range was 188 square miles. The home range areas encompass marine lowlands and mountainous terrain. Wolverines in the study made extensive use of valley sides throughout the Berners Bay area, from river bottoms to treeline and above. These correspond to low- to mid-elevation areas (<3,280 feet) with moderate slopes (30 percent). Wolverines were more likely to use shrub habitats (e.g., avalanche chutes and other shrubby areas) for foraging on small mammals and birds, and unvegetated habitats (e.g., alpine areas) for denning. Litters are born between February and April. Wolverines are active at any time of day, year round. They are carnivores, and are known to prey on voles, squirrels, snowshoe hares, and birds, and scavenge on larger animals (e.g., moose, deer, mountain goats; ADF&G, 2008). Sources of animal mortality, such as avalanche chutes, can be important for scavenging wolverines. A population estimate for wolverines in the study area was not accomplished, although a low density is very likely (Lewis et al., 2012). Additional details regarding this study are in the *2014 Update to Appendix Q - Wildlife Technical Report* (see Appendix Z).

Salt marsh habitats are one of the more important habitats in the region and support a large number of resident and migratory waterfowl and shorebird species at certain times of the year, as well as resident water bird species such as great blue heron. These areas are also important for terrestrial mammal species such as brown bear and black bear for scavenging and foraging on vegetation during the spring. The mudflats adjacent to estuarine wetlands provide a resting place for harbor seals and their pups during low tide.

Proximity to the shoreline along either exposed coastline (beach fringe) or along protected bays and coves (estuary fringe) is an important wildlife habitat feature. Beach fringe habitat, a mixture of both uplands and wetlands, has high seasonal value for black and brown bears, river otters, bald eagles, and Sitka black-tailed deer. Estuary fringe habitat consists of upland forest, palustrine wetlands, and often extensive estuarine wetlands (salt marsh). The estuarine fringe habitat along Berners Bay has been identified as potentially high value for many wetland functions, including habitat for disturbance-sensitive wildlife, and provides important habitat for moose, brown and black bear, and several species of migrant and resident waterfowl species. See

the *Wildlife Technical Report* (Appendix Q) and the *2014 Update to Appendix Q – Wildlife Technical Report* (see Appendix Z) for additional information on wildlife in the study area.

3.3.5.3 Marine Habitat Use

Marine habitats in Lynn Canal are used by marine birds, Steller sea lions, humpback whales, harbor seals, minke whales, killer whales, harbor porpoises, Dall's porpoises, and sea otters. Steller sea lions and humpback whale are discussed in Section 3.3.7. The marine birds and other marine mammals are discussed below.

A variety of marine birds and waterfowl use Lynn Canal throughout the year. Harlequin ducks, common and king eiders, oldsquaws, and several species of scoter winter along the coast of Southeast Alaska, including Lynn Canal. Mew gulls, kittiwakes, murres, black oystercatchers, yellow billed loons, and other marine birds feed on invertebrates and fish in the Canal.

Harbor seals occur in marine waters and estuaries throughout Alaska. While they are most often found in water, they haulout on rocks, beaches and glacial ice to rest, give birth, and care for their young. In the project study area, haulout sites include a number of sand bars and rocky beaches including Berners Bay and at the mouth of the Katzehin River. See Figure 3-19. Harbor seals are non-migratory with local movements attributed to factors such as prey availability, weather, and reproduction. Harbor seals feed on a variety of fish, including pollock, Pacific cod, Pacific sand lance, sculpins, salmon and flatfishes, and oily fish such as capelin, eulachon, smelt, and Pacific herring. There are 12 stocks of harbor seals in Alaska. Seals within the project area are a part of the Lynn Canal/Stephens stock which has an abundance estimate of 8,870 animals (Allen and Angliss, 2012). The population trend for this stock is currently unknown.

Minke whales are found in all oceans of the world (Leatherwood et al., 1982). Two minke whale stocks are recognized in U.S. waters: Alaskan stock and the California/Oregon/Washington stock (Allen and Angliss, 2012). No population estimates exist for the Pacific population as a whole or for the Alaskan stock, therefore the population trend is unknown. From 1991 to 2007, 31 minke whales were observed in Southeast Alaska, but there were no sightings within Lynn Canal (Dalheim et al., 2009). Therefore, relatively few minke whales are expected to occur in the project area.

There are three eco-types of killer whales: resident (small-fish-eating; e.g., salmon), transient (mammal-eating; e.g., seals), and offshore (large-fish-eating; e.g., sharks). Of these three, the resident and transient ecotypes are the eco-types most likely to occur in the project area. Resident killer whales in Lynn Canal are most likely a part of the Alaska Resident stock, but some interchange between resident stocks has been documented (Allen and Angliss, 2012). As of 2009, 109 resident whales have been identified in Southeast Alaska, with concentrations of whales often found in Icy Strait, Lynn Canal, Stephens Passage, Frederick Sound, and upper Chatham Strait (Allen and Angliss, 2012; Dalheim et al., 2009). Transient killer whales have also been documented in Southeast Alaska although there have been few sightings in Lynn Canal (Dalheim et al., 2009). Transient killer whales in the project area are a part of the Eastern North Pacific transient stock which ranges from Alaska through California. A total of 219 transient killer whales have been identified between Southeast Alaska and British Columbia (Allen and Angliss, 2012). From 1991 to 2007, an increasing population trend of 5.2 percent annually has been documented for transient killer whales in Southeast Alaska (Dalheim et al., 2009).

There are three stocks of harbor porpoises in Alaska; the harbor porpoises in Lynn Canal belong to the Southeast Alaska stock (Allen and Angliss, 2012). Harbor porpoises inhabit coastal, shallow waters and research suggests that they prefer to stay within small geographic ranges, but more data are needed to confirm this theory. The current abundance estimate for the harbor porpoise in the Southeast Alaska stock is 11,146 animals (Allen and Angliss, 2012). The population appears to be stable, given only a 0.2 percent annual increase from 1991 through 2007 (Dalheim et al., 2009).

Dall's porpoises are endemic to the northern North Pacific Ocean and adjoining seas, inhabiting both nearshore habitats and pelagic deep waters over the continental shelf and the oceanic basins (Rice, 1998; Allen and Angliss, 2012). There is only one Dall's porpoise stock in Alaska, but the stock structure is not adequately understood (Allen and Angliss, 2012). The population for the entire Alaska stock is 83,400 animals, but the number of animals residing in Southeast Alaska is unknown (Allen and Angliss, 2012). Dall's porpoises have been documented in Southeast Alaska with animals consistently found in Icy Strait, Lynn Canal, Stephens Passage and upper Chatham Strait (Dalheim et al., 2009). From 1991 to 2007, an increasing population trend of 2.5 percent annually has been documented for Dall's porpoise (Dalheim et al., 2009).

Historically, sea otters occurred across the entire North Pacific Rim, but large-scale commercial exploitation in the 1800s nearly extirpated this species. After this large-scale harvest, there were no remnant sea otter populations in Southeast Alaska. Therefore, all of the current sea otters in the Southeast Alaska stock have been translocated from other Alaskan stocks. The range of the Southeast Alaska stock extends from Cape Yakataga to the southern boundary of Alaska (Gorbics and Bodkin, 2001). There are an estimated 10,563 sea otters in this stock (NMFS, 2008).Until recently, the species was not present in inside waters of Southeast Alaska, but they have been documented in Glacier Bay and Sumner Strait, which suggests that this population is expanding its geographic range (Esslinger and Bodkin, 2009). However, sea otter densities are still very low, which means that encountering this species in the project area is not likely.

3.3.6 Bald Eagles

The Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act provide regulatory authority for the protection of bald eagles.[12] The BGEPA prohibits anyone from "taking" bald eagles, their eggs, nest, or any part of the birds without a permit.[13] It defines "taking" as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." "Disturb'' means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

Bald eagles are listed as an MIS by the USFS in its TLRMP because of their dependence on coastal areas for foraging and nesting (Goldstein et al., 2009).

[12] Golden eagles do not nest in the study area and, therefore, are not included in the affected environment or impact evaluation for the JAI Project.

[13] The regulations governing eagle permits can be found in 50 CFR part 13 (General Permit Procedures) and 50 CFR part 22 (Eagle Permits).

Bald eagles are abundant in Southeast Alaska, with a population estimated at approximately 13,000 adults (Hodges, 2011). They are common, year-round inhabitants of the Lynn Canal area. During the summer months, nesting pairs disperse to nest sites along the coast. In winter, they tend to congregate in areas where food resources are plentiful and where they can seek shelter from strong winds and storms. Thousands of bald eagles winter in the Chilkat Bald Eagle Preserve because of the abundance of a late chum salmon run (Boeker, 2008). Fish are the most important prey for bald eagles in Southeast Alaska and often comprise 80–90 percent of their diet (Lincer et al., 1978). Eagles also prey on waterfowl, small mammals, sea urchins, clams, crabs, and carrion. In the winter months, ducks and geese may represent up to 20 percent of a bald eagle's diet (Isleib, 2008).

Nesting habitat is primarily old-growth trees near salt water (Hodges and Robards, 1982). Most nest trees are located within 600 feet of the shoreline (Suring, 2008). Some nests are occupied more frequently than others, and the productivity of each nest varies greatly. Only 25 to 55 percent of available nests are occupied during any given year. Bald eagles are most susceptible to disturbance during the nesting season (March through August in Southeast Alaska; USFWS, 2009).

The USFWS has conducted surveys to identify several key seasonal concentration areas for bald eagles within the study area (Jacobson, 2003). During spring and during spawning aggregations of certain fish species, eagle concentrations have been observed in Berners Bay, the Katzehin River, and the Endicott River. Similarly, in the summer months, the tributaries of the Lace and Berners rivers, the Katzehin River, the Endicott River, and the Chilkat River also have high bald eagle concentrations.

The first bald eagle aerial survey for the project was conducted in 1994 by USFWS biologists. The USFWS conducted annual nest surveys along the East Lynn Canal route from 1997 through 2008 and again in 2012 with funding and administrative support from DOT&PF. Results of the 1997–2003 USFWS surveys are described in the *Bald Eagle Nesting and Productivity at Lynn Canal, Southeast Alaska, 1997–2003* (USFWS, 2003a) and were used in the assessment of bald eagle impacts in the 2006 Final EIS for the JAI Project. Subsequent USFWS surveys are documented in the *2014 Update to Appendix R - Bald Eagle Technical Report* (in Appendix Z) and summarized in Table 3-4 (note: data from 2003 are included in the table for purposes of comparison). The surveys included nests along a broad corridor of the East and West Lynn Canal routes; however, only nests within 0.5 mile of the work limits associated with the build alternatives are included in Table 3-4. The 0.5-mile distance threshold is the greatest recommended distance from active bald eagle nests for permitted activities, according to the 2007 National Bald Eagle Management Guidelines (USFWS, 2007; see also *2014 Update to Appendix R - Bald Eagle Technical Report* in Appendix Z).

The locations of all eagle nests found during the 2003 through 2012 USFWS surveys are shown in Figure 3-23.

Table 3-4:
Active Bald Eagle Nests and Nest Productivity, 2003–2012

East Lynn Canal								
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2012**	**Mean**
Nest sites surveyed	94	92	98	95	102	111	124	102.3
Number of new nests	NA	NA	NA	11	6	4	60	20.3
Active nests (No. of nests and percent)	37 39%	35 38%	45 46%	46 48%	46 45%	42 38%	48 39%	42.7 42%
Successful nests (No. of nests and percent)	20 21%	17 19%	22 22%	23 24%	15 15%	16 14%	22 18%	19.3 19%
Active nests successful	54%	49%	49%	50%	33%	38%	46%	45%
Young/active nest	0.78	0.60	0.64	0.65	0.48	0.48	0.63	0.60
Young/successful nests	1.40	1.24	1.32	1.30	1.47	1.25	1.36	1.33
West Lynn Canal								
	2003	**2004**	**2005[1]**	**2006[1]**	**2007[1]**	**2008[1]**	**2012**	**Mean**
Nest sites surveyed	53	50	---	---	---	---	40	47.7
Number of new nests	NA	NA	---	---	---	---	21	21.0
Active nests (No. of nests and percent)	22 42%	26 52%	---	---	---	---	18 45%	22.0 46%
Successful nests (No. of nests and percent)	10 19%	16 32%	---	---	---	---	3 8%	9.7 19%
Active nests successful	45%	62%	---	---	---	---	17%	41%
Young/active nest	0.64	0.69	---	---	---	---	0.22	0.52
Young/successful nests	1.40	1.13	---	---	---	---	1.33	1.29

NA = not applicable

[1]No surveys completed during the year indicated.

Sources: USFWS, 2003a; USFWS, 2009; JAI Project 2006 Final EIS, Appendix W; *2014 Update to Appendix R – Bald Eagle Technical Report* (see Appendix Z); Lewis, personal communication 2012.

Note: Nests located more than 0.5 mile from the work limits are not included.

See the *2014 Update to Appendix R - Bald Eagle Technical Report* (see Appendix Z) for additional information on bald eagles in the study area, including a detailed list of the nests potentially affected by the JAI Project alternatives (in Attachment A of that report).

3.3.7 Threatened and Endangered Species

Threatened and endangered species are plant and animal species that have been determined to be in danger of extinction based on criteria established by the ESA of 1973. The Act defines an endangered species as one that is likely to become extinct in the foreseeable future. A threatened species is defined as one likely to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future. The ESA requires federal agencies to ensure

that their projects do not have an adverse effect on populations of species protected under the Act. Section 7 of the ESA requires consultation with the appropriate federal agency (USFWS and/or NMFS) to ensure that the project is not likely to jeopardize a threatened or endangered species or its habitat.

Of the wildlife species known to occur in the study area for the JAI Project, two are considered in the threatened and endangered species analysis: humpback whales (endangered) and western DPS Steller sea lions (endangered). Figure 3-20 identifies locations within the study area that are frequented by humpback whales and Steller sea lions. The Kittlitz's murrelet listed as a candidate species by the USFWS in 2004 is also included in the wildlife analysis (see Section 3.3.5.2). The *Revised Biological Assessment* describing Steller sea lions and humpback whales in further detail will be appended to the Final SEIS.

3.3.7.1 Humpback Whale

Humpback whales were extensively harvested by commercial whalers until the International Whaling Commission imposed a moratorium in 1965. Humpback whales were listed as endangered under the ESA in 1973 and were consequently listed as depleted under the MMPA. Currently, humpback populations are divided into management stocks based on their fidelity to particular summer and wintering grounds. The whales that spend the summer and fall in Southeast Alaska tend to winter in Hawaiian waters and are considered part of the Central North Pacific stock (Allen and Angliss, 2012).

A recent study identified 1,115 individual humpback whales in Southeast Alaska, which results in an estimate of 2,883 to 6,414 whales occurring in the waters off Southeast Alaska and Northern British Columbia (Allen and Angliss, 2012). This stock of whales has shown a population increase throughout the range of 5.5 percent to 6.0 percent per year since the early 1990s (Allen and Angliss, 2012). Surveys conducted in Southeast Alaska between 1991 and 2007 found humpback whales throughout the area with high concentrations in several locations, including Lynn Canal. This study also indicated seasonal variability, with the fewest whales present in the spring and more animals present in the summer and fall (Dalheim et al., 2009). Over the 17-year study, the analysis showed a 10.6 percent annual increase in the humpback population in Southeast Alaska (Dalheim et al., 2009).

The population structure for humpback whales is currently under review by NMFS given the extensive data that was collected between 2004 and 2006 during the Structure of Populations, Level of Abundance, and Status of Humpbacks project. The State of Alaska petitioned NMFS to identify the North Pacific humpback whales as a DPS and delist the DPS under the ESA. On August 29, 2013, NMFS issued a 90-day finding on the petition (78 FR 53391). To date, NMFS has not officially proposed delisting the humpback whales or identified the North Pacific population as a DPS.

3.3.7.2 Steller Sea Lion

Steller sea lions are distributed along the coast of the North Pacific Ocean from California through Japan, with the highest concentrations in the Gulf of Alaska and the Aleutian Islands. In 1990, Steller sea lions were listed as threatened under the ESA due to declines in the population throughout their range and critical habitat was designated in 1993 (55 FR 12645, 58 FR 45269). Based on distribution, genetics, and population trends, NMFS separated Steller sea lions into two DPS in 1997 with the dividing line near Cape Suckling (144°W), approximately 50 miles

southeast of Cordova, Alaska (62 FR 30772). When NMFS separated the population into the two DPS units, the western DPS was reclassified as endangered under the ESA. In 2010, NMFS initiated a review to assess the listing classification of the eastern DPS (75 FR 37385) and in 2012 proposed its delisting (77 FR 23209). On November 4, 2013, NMFS noticed the final rule to delist the eastern DPS Steller sea lion, effective December 4, 2013 (78 FR 66139). The western DPS Steller sea lion remains listed as endangered. Although the eastern DPS is no longer protected under the ESA, it remains protected under the MMPA and the designated critical habitat remains unchanged because it was established for the entire population before the two DPS units were recognized. It is also protected as a USFS Alaska Region sensitive species.

Steller sea lions that inhabit Lynn Canal are a part of the eastern DPS, but there is some limited interchange between the eastern and western DPSs, and branded individuals from the western DPS have been observed in the JAI Project area. The ADF&G has documented 88 western DPS Steller sea lions in the eastern region, of which 40 percent were female, and 9 of these animals gave birth at rookeries in the eastern region. Data suggest that 5 out of these 9 females have permanently immigrated to the eastern region. The first western DPS Steller sea lion documented near the project area occurred in 2003 at Benjamin Island in Southern Lynn Canal. This animal was subsequently re-sighted in 2003 and 2004. Two additional animals have been observed at Benjamin Island in 2005 and 2006. Three individual western DPS Steller sea lions have been observed repeatedly at Gran Point from 2003 through 2012. There have been no western DPS Steller sea lions documented at Met Point (Jemison, personal communication 2013).

Within the JAI Project, only one site has been designated as a Steller sea lion Critical Habitat Area: the Gran Point haulout (50 CFR 226.202; see Figure 3-19). Under Section 7 of the ESA, as part of the consultations on the effects of the proposed project, DOT&PF agreed to monitor the use of the Gran Point haulout throughout the year. DOT&PF installed a remote video camera system in late 2002 to determine periods of Steller sea lion use.

Early data from the video camera monitoring at Gran Point indicated that the haulout was used most heavily in the spring, with more than a hundred sea lions present on most days. Then usage decreased in the early summer and there were periods of time (1- to 5-week blocks) when sea lions were absent. Use of the haulouts increased again by early fall, with more than a hundred animals present at each site by mid-September. There were generally fewer animals at Gran Point during December through March; however, data collected from 2006 through 2011 indicate a nearly year-round residency pattern for Steller sea lions at Gran Point. In addition, more animals were present from late summer through early fall compared to the earlier data (2002 through 2005). Video monitoring during winter months was discontinued in 2008, primarily due to the well established consistent use of the haulout during winter, and the assumption that winter construction in the areas around Met Point and Gran Point would be limited or not occur at all, and the difficulty in maintaining the system in winter.

In addition to the Gran Point and Met Point haulouts, Steller sea lions also have been observed to haulout in the spring on a small, offshore rock on the eastern shore of the mouth of Slate Creek Cove and near Cove Point in Berners Bay. There is little information on the use of these haulout sites, although juveniles and adults have been observed there during the peak of eulachon and herring spawning in April and May. There are no documented Steller sea lion haulouts on the Katzehin Flats, although Steller sea lions forage in this area.

The *Steller Sea Lion Technical Report* (Appendix S) and the *2014 Update to Appendix S - Steller Sea Lion Technical Report* (in Appendix Z) include additional information on Steller sea lions.

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