APPENDIX R

BALD EAGLE TECHNICAL REPORT

JUNEAU ACCESS IMPROVEMENTS SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT

STATE PROJECT NUMBER: 71100
FEDERAL PROJECT NUMBER: STP-000S (131)

Prepared for

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ACRONYMS AND ABBREVIATIONS

AMHS	Alaska Marine Highway System
DEIS	Draft Juneau Access Improvements Environmental Impact Statement
DOT&PF	(Alaska) Department of Transportation & Public Facilities
EIS	Environmental Impact Statement
FVF	fast vehicle ferry
GIS	Geographic Information System
GPS	Global Positioning System
NEPA	National Environmental Policy Act
SDEIS	Supplemental Draft Environmental Impact Statement
TLMP	Tongass Land Resource and Management Plan
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

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EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (USFWS) is responsible for the conservation of bald eagles (*Haliaeetus leucocephalus*) and has regulatory authority under the Bald and Golden Eagle Protection Act, as amended (16 U.S.C. §§ 668-668d). This law prohibits the taking of bald eagles and bald eagle nests necessitating mitigation of potential impacts from construction activities. A small percentage of bald eagle pairs build new nests in any given year but most pairs use an existing nest. Some nests are used every year while other nests are used periodically. Only 40 to 50 percent of available nests are actively used during any given year. The Bald and Golden Eagle Protection Act applies to all nest sites, regardless of whether they are active or not in a particular year. However, guidelines designed to protect nesting eagles from construction disturbance distinguish between active and inactive nests.

Based on many years of experience in southeast Alaska, the USFWS has developed a set of guidelines for state and federally funded highway construction activities in order to ensure compliance with the Bald and Golden Eagle Protection Act and prevent disruption of bald eagle nests. These guidelines are incorporated into a USFWS and U.S. Department of Agriculture (USDA) Forest Service Memorandum of Understanding for activities on Forest Service land. During the nest selection (initiation) period, March 1 - May 31, all construction activities are restricted within 330 feet of the nest, referred to as the primary zone. A secondary zone, between 330 feet and up to 0.5 mile, is established to screen the nest from particularly loud and obtrusive activities and to protect the habitat within the primary zone. Blasting is restricted within a 0.5-mile radius of any nest during the initiation period. If a nest is not active on June 1, construction activities may proceed as long as they do not endanger the nest tree. If a pair of eagles is actively using a nest by June 1, all activities within 330 feet of the nest, and blasting activities within 0.5 mile, are restricted for the duration of the nesting season, usually until August 31. In certain circumstances, determined on a case-by-case basis, the USFWS may approve limited blasting within a 0.5-mile radius of an active nest depending on factors such as the acclimation of the nesting eagles, terrain shielding, blasting loads, and monitoring of the nest disturbance. The USFWS has approved some highway construction activities to proceed within 330 feet of an active nest under the condition that it is monitored continuously by observers and that construction activities were stopped immediately if the eagles exhibited any signs of disturbance (Dunn, 2000). The City and Borough of Juneau has adopted these same restrictions for nests on lands within its jurisdiction, although construction is allowed within 50 feet of nests on private land.

The Draft Juneau Access Improvements Environmental Impact Statement (DEIS), *Bald Eagle Technical Report* assessed the potential impacts of the proposed project on bald eagle nests as they were identified in 1994. The 1997 DEIS described the methodology that USFWS biologists used to locate bald eagle nests within 0.5 mile of the alternative highway alignments. The positions of all nests were incorporated into the Geographic Information System (GIS) project database. The 1997 DEIS assessed potential impacts of the project by measuring the distances between nests and the proposed highway alignments. Since the primary means of minimizing nest disturbance is to avoid the need for construction activities within 330 feet of nests, highway alignments were adjusted to avoid the primary zone around nests wherever feasible. However, realignments were constrained by a number of engineering and resource limitations such that the alignments could not feasibly avoid all nests. The 1997 DEIS found that, on the East Lynn Canal Highway alignment, 12 out of 78 nests located in 1994 (15 percent) could not be reasonably avoided by more than 330 feet. On the West Lynn Canal Highway route, 6 out of 47 nests (13 percent) could not be reasonably avoided by more than 330 feet. The 1997 DEIS concluded that both the East and West Lynn Canal Highway alternatives had “moderate” impacts on bald eagles, with short-term loss of productivity but no long-term losses. The No

Action and Alaska Marine Highway System (AMHS) improvement alternatives were rated as having “negligible” and “low” impacts on bald eagles, respectively.

Alaska Department of Transportation and Public Facilities (DOT&PF) continued to support bald eagle nest surveys in the Lynn Canal area even after the environmental impact statement (EIS) process was delayed in 1998. When the EIS process was reinitiated in 2003, DOT&PF provided funding for USFWS to locate current nest sites within 0.5 mile of the area. Since many of these nests were different from the ones surveyed in 1994, and because the highway alignments had undergone additional modifications, DOT&PF is reassessing the impacts of the proposed project on bald eagles. This document is intended to update and build on the information presented in the DEIS. The following analysis uses the same primary avoidance criteria to protect eagle nests as considered in the 1997 DEIS but uses nest survey data from 2003 and updated highway alignments.

It is important to note that not all nests are found during helicopter surveys. Some nests may be difficult to see because they have been damaged from winter weather or have not been used for several years. Others may be hidden by vegetation and can only be spotted from the ground or the water. If one of the highway alternatives is selected and proceeds to the construction phase, additional surveys would be needed to ascertain the locations of all nests that may be affected. In addition, some new nests are built each year and some old nests may be destroyed; therefore, surveys will need to be conducted every year as long as construction activity continues. The following analysis is based on the helicopter survey data and approximates the potential effects of the alternatives on eagles.

Both the East and West Lynn Canal Highway alignments were adjusted, where feasible, to avoid known nest sites by more than 330 feet. For each alternative, distances between each nest and the nearest construction limits were calculated. On the East Lynn Canal Highway route, Alternative 2 and 2C would have the greatest impacts on bald eagle nest sites. For both of these alternatives, 57 out of 100 nests located in the 0.5-mile secondary zone (57 percent) could not be reasonably avoided by more than 330 feet. Alternative 2A would encroach on 3 fewer nests by eliminating the section of highway around Berners Bay. For Alternative 2A, 54 out of 82 nests (66 percent) could not be reasonably avoided by more than 330 feet. Alternative 2B would encroach on 12 fewer nest sites by eliminating the segment between Katzehin and Skagway. For Alternative 2B, 45 out of 84 nests (54 percent) could not be reasonably avoided by more than 330 feet.

On the West Lynn Canal Highway route, Alternative 3, 25 out of 45 nests located in 2003 (56 percent) could not be reasonably avoided by more than 330 feet. The AMHS improvement alternatives would have substantially less impact on eagle nest sites than Alternatives 2 or 3. Alternatives 4B and 4D would require the construction of a highway to Sawmill Cove but this section of highway would not encroach on the primary buffer zones of any eagle nests.

Actual impacts of the alternatives on the local bald eagle population would be controlled by site-specific mitigation at each nest location. These factors will be the subject of ongoing consultations with the USFWS.

In 1998 and 1999, an active eagle nest was monitored during construction of a highway near Juneau (Dunn, 2000). The nest site was 120 feet from the clearing limits for the highway and fledged two chicks in each year. This study indicates that, at least for some bald eagle pairs and some construction activities, highway construction within the primary zone does not cause excessive disturbance of nesting eagles. Active monitoring could identify these situations on a nest-by-nest basis and may allow for some construction to continue near active nests during the nesting season.

After construction, vehicle traffic and highway maintenance operations could potentially affect nesting, resting, or foraging eagles. Some nest sites and foraging perches could become less productive due to chronic or periodic disturbance from highway traffic and maintenance or could be abandoned if they are too close to the highway. Some bald eagles become habituated to urban environments while others apparently do not adapt as well to chronic disturbance. The effects of highway operation on eagles would therefore likely change over time as some eagles habituate and others try to reestablish themselves elsewhere.

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1.0 PROJECT DESCRIPTION AND ALTERNATIVES

1.1 Project Purpose and Need

The purpose of and need for the Juneau Access Improvements Project is to provide improved surface transportation to and from Juneau within the Lynn Canal corridor that will:

- Provide the capacity to meet the transportation demand in the corridor
- Provide flexibility and improve opportunity for travel
- Reduce travel time between Lynn Canal communities
- Reduce state costs for transportation in the corridor
- Reduce user costs for transportation in the corridor

1.2 Project Description

Lynn Canal, located approximately 25 miles north of Juneau, is the waterway that connects Juneau with the cities of Haines and Skagway via the Alaska Marine Highway System (AMHS). At present there is no roadway connecting these three cities. The Glacier Highway originates in Juneau and ends at Echo Cove, approximately 40.5 miles to the northwest.

As required by the National Environmental Policy Act (NEPA), the Supplemental Draft Environmental Impact Statement (SDEIS) for the Juneau Access Improvements Project considers the following reasonable alternatives:

Alternative 1 – No Action Alternative – The No Action Alternative includes a continuation of mainline AMHS service in Lynn Canal as well as the operation of the fast vehicle ferry (FVF) *M/V Fairweather* between Auke Bay and Haines and Auke Bay and Skagway. The *M/V Aurora* would provide shuttle service between Haines and Skagway, beginning as early as 2005.

Alternative 2 (Preferred) – East Lynn Canal Highway with Katzehin Ferry Terminal – This alternative would construct a 68.5-mile-long highway from the end of Glacier Highway at the Echo Cove boat launch area around Berners Bay to Skagway. A ferry terminal would be constructed north of the Katzehin River delta, and operation of the *M/V Aurora* would change to shuttle service between Katzehin and the Lutak Ferry Terminal in Haines. Mainline ferry service would end at Auke Bay, and the existing Haines/Skagway shuttle service would be discontinued. The *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 2A – East Lynn Canal Highway with Berners Bay Shuttles – This alternative would construct a 5.2-mile highway from the end of Glacier Highway at Echo Cove to Sawmill Cove in Berners Bay. Ferry terminals would be constructed at both Sawmill Cove and Slate Cove, and shuttle ferries would operate between the two terminals. A 52.9-mile highway would be constructed between Slate Cove and Skagway. A ferry terminal would be constructed north of the Katzehin River delta, and the *M/V Aurora* would operate between the Katzehin and the Lutak Ferry Terminals. Mainline ferry service would end at Auke Bay, and the existing Haines/Skagway shuttle service would be discontinued. The *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 2B – East Lynn Canal Highway to Katzehin with Shuttles to Haines and Skagway – This alternative would construct a 50.5-mile highway from the end of Glacier Highway at Echo Cove around Berners Bay to Katzehin, construct a ferry terminal at the end of the new highway, and run shuttle ferries to both Skagway and Haines from the Katzehin Ferry Terminal. The Haines to Skagway shuttle service would continue to operate, two new shuttle

ferries would be constructed, and the *M/V Aurora* would be part of the three-vessel system. Mainline AMHS service would end at Auke Bay. The *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 2C – East Lynn Canal Highway with Haines/Skagway Shuttle – This alternative would construct a 68.5-mile highway from the end of Glacier Highway at Echo Cove around Berners Bay to Skagway with the same design features as Alternative 2. The *M/V Aurora* would continue to provide service to Haines. No ferry terminal would be constructed at Katzehin. Mainline ferry service would end at Auke Bay, and the *M/V Fairweather* would be redeployed on other AMHS routes.

Alternative 3 – West Lynn Canal Highway – This alternative would extend the Glacier Highway 5.2 miles from Echo Cove to Sawmill Cove in Berners Bay. Ferry terminals would be constructed at Sawmill Cove and William Henry Bay on the west shore of Lynn Canal, and shuttle ferries would operate between the two terminals. A 38.9-mile highway would be constructed between William Henry Bay and Haines with a bridge across the Chilkat River/Inlet connecting to Mud Bay Road. The *M/V Aurora* would continue to operate as a shuttle between Haines and Skagway. Mainline ferry service would end at Auke Bay, and the *M/V Fairweather* would be redeployed on other AMHS routes.

Alternatives 4A through 4D – Marine Options – The four marine alternatives would construct new shuttle ferries to operate in addition to continued mainline service in Lynn Canal. All of the alternatives would include a minimum of two mainline vessel round trips per week, year-round, and continuation of the Haines/Skagway shuttle service provided by the *M/V Aurora*. The *M/V Fairweather* would no longer operate in Lynn Canal. All of these alternatives would require construction of a new double stern berth at Auke Bay.

Alternative 4A – FVF Shuttle Service from Auke Bay – This alternative would construct two FVFs to provide daily summer service from Auke Bay to Haines/Skagway.

Alternative 4B – FVF Shuttle Service from Berners Bay – This alternative would extend the Glacier Highway 5.2 miles from Echo Cove to Sawmill Cove in Berners Bay, where a new ferry terminal would be constructed. Two FVFs would be constructed to provide daily service from Sawmill Cove to Haines/Skagway in the summer and from Auke Bay to Haines/Skagway in the winter.

Alternative 4C – Conventional Monohull Shuttle Service from Auke Bay – This alternative would construct two conventional monohull vessels to provide daily summer service from Auke Bay to Haines/Skagway. In winter, shuttle service to Haines and Skagway would be provided on alternate days.

Alternative 4D – Conventional Monohull Shuttle Service from Berners Bay – This alternative would extend the Glacier Highway 5.2 miles from Echo Cove to Sawmill Cove in Berners Bay, where a ferry terminal would be constructed. Two conventional monohull vessels would be constructed to provide daily service from Sawmill Cove to Haines/Skagway in the summer and alternating day service from Auke Bay to Haines/Skagway in the winter.

2.0 STUDIES AND COORDINATION

Bald eagles are common residents of the Lynn Canal region and are protected under the Bald and Golden Eagle Protection Act, as amended (16 U.S.C. §§ 668-668d). The Bald and Golden Eagle Act prohibits anyone, except under permits authorized by the Secretary of Interior, from "taking" bald eagles, their eggs, nests or any part of these birds. In addition, a Memorandum of Understanding has been signed between the U.S. Department of Agriculture (USDA) Forest Service, the primary landowner in the project area, and the U.S. Fish and Wildlife Service (USFWS) to implement specific restrictions on activities near bald eagle nest sites on Forest Service lands. A small percentage of bald eagle pairs build new nests in any given year but most pairs use an existing nest. Some nests are used every year while other nests are used periodically. Only 40 to 50 percent of available nests are actively used during any given year. The Bald and Golden Eagle Protection Act applies to all nest sites, regardless of whether they are active or not in a particular year. However, rules designed to protect nesting eagles from construction disturbance distinguish between active and inactive nests (see Section 3.2.1).

2.1 1994 Surveys and 1997 Draft EIS

The Alaska Department of Transportation and Public Facilities (DOT&PF) began coordination with the USFWS, Raptor Management Division, during the reconnaissance phase of the Juneau Access Improvements Project in 1994. Because much of the existing bald eagle nest information for the project area was dated, new surveys were needed to provide accurate information on the potential impact of the project alternatives on the bald eagle populations in Lynn Canal.

In order to obtain up-to-date and accurate locations of bald eagle nests, a contractor and USFWS biologists conducted surveys from a helicopter outfitted with automatically recording global positioning system (GPS) instruments. Nests were spotted from the helicopter, which then hovered over the nest for 10 to 30 seconds, while the GPS location was recorded. The initial survey was conducted between July 11 and July 14, 1994, a period when the young eaglets in nests were thermally adjusted to the absence of the adult. This allowed a margin of safety if the adult(s) flushed from the nest during the survey process. Accuracy of the nest location method was determined by duplicating the process over a point with known coordinates at the Juneau Airport. The survey recorded nests within 0.5 mile of the reconnaissance alignments for both the East and West Lynn Canal Highway alignments. This survey coverage area was chosen because each nest site has a designated 0.5-mile radius buffer zone, called the secondary zone, that has specific management implications (see Section 3.2.1). Seventy-three nests were located along East Lynn Canal and 45 nests were located along West Lynn Canal. An additional three nests were located in the Echo Cove area.

The Draft Juneau Access Improvements Environmental Impact Statement (DEIS), *Bald Eagle Technical Report* assessed the potential impacts of the proposed project on bald eagle nests as they were distributed in 1994. The 1997 DEIS described the methodology that USFWS biologists used to locate bald eagle nests within 0.5 mile of the alternative highway corridors. The positions of all nests were incorporated into the Geographic Information System (GIS) project database. The 1997 DEIS assessed potential impacts of the project by measuring the distances between nests and the proposed highway alignments. Since the primary means of minimizing nest disturbance is to avoid the need for construction activities within 330 feet of nests (see Section 3.2.1), highway alignments were adjusted to avoid the primary zone around nests wherever feasible. However, realignments were constrained by a number of engineering and resource limitations, including the need for tunneling or running the highway along the beach, such that the alignments could not feasibly avoid all nests. The 1997 DEIS calculated how much it would cost to avoid these nests and the costs were typically more than one million

dollars per nest. The 1997 DEIS found that, on the East Lynn Canal Highway alignment, 12 out of 78 nests located in 1994 (15 percent) could not be reasonably avoided by more than 330 feet. On the West Lynn Canal Highway alignment, 6 out of 47 nests (13 percent) could not be reasonably avoided by more than 330 feet. The 1997 DEIS concluded that both the East and West Lynn Canal Highway alternatives had "moderate" impacts on bald eagles, with short-term loss of productivity but no long-term losses. The No Action and AMHS improvement alternatives were rated as having "negligible" and "low" impacts on eagles respectively.

2.2 USFWS 1997- 2003 Surveys

Although the NEPA process was suspended after release of the DEIS in 1997, the USFWS continued to conduct an annual nest survey along the East Lynn Canal Highway route with funding and administrative support from DOT&PF. These surveys recorded the locations of all observed nests, including some nests that were more than 0.5 mile from the proposed highway alignments, but also recorded information on reproductive success at each site. The 1997-2003 East Lynn Canal surveys were conducted from helicopters and consisted of two flights per season. The first flights were conducted in late May to determine which nests were active, as indicated by the presence of an incubating adult or sightings of eggs in the nest. The second flights were conducted in late July to determine the number of nests that successfully produced young. In 2003, USFWS biologists conducted a similar survey for nests along the west side of Lynn Canal. The results of these productivity surveys are described in a USFWS report (Attachment A) and summarized in Table 1.

2.3 Supplemental DEIS

When the EIS process was reinitiated in 2003, DOT&PF provided funding for USFWS to locate current nest sites within 0.5 mile of the project area. Since many of these nests were different than the ones surveyed in 1994, and because the highway alignments had undergone additional modifications, DOT&PF is reassessing the impacts of the proposed project on bald eagles. This document is intended to update and build on the information presented in the 1997 DEIS. The following analysis uses the same primary avoidance criteria to protect eagle nests as considered in the 1997 DEIS but uses nest survey data from 2003 and updated highway alignments. The locations of all eagle nests found during the 2003 USFWS surveys are shown in Figures 1 through 8. Figures 2 through 5 include detailed vicinity maps for the East Lynn Canal highway route and Figures 6 through 8 for the West Lynn Canal route. These figures also show the proposed highway alignments and the locations of nests that were included in the productivity surveys but are more than 0.5 mile from the proposed highway.

This technical report focuses on the potential direct effects of the alternatives on bald eagles. Other potential impacts on bald eagles and their habitats are assessed in the *Indirect and Cumulative Effects Analysis Report*.

3.0 AFFECTED ENVIRONMENT

3.1 Life History

Bald eagles (*Haliaeetus leucocephalus*) are more abundant in southeast Alaska than anywhere else in the nation, with a stabilized population estimated at more than 19,500 adults (Jacobson and Hodges 1999). They are common year-round inhabitants of the Lynn Canal area. Nesting pairs disperse to nest sites along the coast in summer but often congregate in the winter in areas where food is more plentiful. Fish comprise the major part of bald eagle diets. Herring, eulachon, flounder, pollock, and salmon are taken in marine waters while salmon are commonly taken in rivers. Eagles also prey on waterfowl, small mammals, sea urchins, clams, crabs, and carrion (ADF&G 2004).

3.2 Nest Site

Bald eagles will often choose the largest tree in a stand on which to build a stick platform nest. Nests are usually located 50-200 feet above the ground, and typically below the tree crown. The species of tree that is used for nest building is not as critical as height and size. Bald eagles are known to repair and use the same nest annually, increasing its size over time. The nests are large structures, up to 6 to 8 feet in diameter and up to 12 feet deep, consisting of intertwined sticks and lined with soft materials such as sedges, feathers, and grass. Because eagles often make structural repairs and add a new layer before using an existing nest (Stalmaster 1987), older nests weighing several hundred pounds are susceptible to collapse during heavy winds or inclement weather. The territory (nest site) of a pair of bald eagles may include several alternative nests in addition to the nest most recently used (CDFG 2004). Nest use, but not nesting success, is related to nesting success the previous year (Gende et al. 1997) In most cases, the nests are sited in an area that provides good fishing and allows an eagle sitting in or near the nest to have a clear view of the water. Females lay one to three (usually two) eggs several days apart in late April. Eaglets hatch in late May or early June and are thermally adjusted by mid-July (Table 2). Nestlings compete for food and sometimes the smallest, weakest chick is killed or dies from lack of food. In mid to late August, the juvenile eagles are usually developed enough to fly and can leave the nest. Sub-adult eagles will mature and attain full adult plumage by their fifth season. Bald eagle pairs, which probably mate for life, generally return to their previous nest sites (or begin seeking new nest sites) in early March. By May, most pairs will have chosen a nest site or constructed a new one. In Lynn Canal, these nests are typically in old-growth Sitka spruce trees within 700 feet of saltwater (Hodges and Robards 1982). Some nests are actively used by a pair of eagles every year, while others are active on a more erratic basis. On the east side of Lynn Canal in 1994, approximately 50 percent of nests were active in May and about 40 percent contained young by mid-July. Between 1997 and 2003, active nest sites ranged from 25 to 56 percent of available nests, averaging 39 percent per season (Table 1).

3.3 Productivity

Bald eagle productivity on the east shoreline of Lynn Canal is measured at 0.55 young per active nest (Table 1) based on aerial surveys conducted between 1997-2003. Productivity varied substantially between years, with only 17 percent of active nests producing at least one young in 1997 compared to 63 percent success in 2001. On average, 42 percent of active nests produced at least one eaglet. Data for eagles breeding along the west shoreline of Lynn Canal is sparse. Anthony (2001) studied bald eagle nest productivity on Prince of Wales Island in southeast Alaska during 1991-1993 where productivity, measured at 0.13 young per active nest, was the lowest recorded for the species throughout its geographic range. He found no evidence that human disturbance has a major influence on productivity, because nesting failures occurred along remote as well as human occupied shorelines during all three years. In addition, nest

sites that were successful in producing young were associated with shorelines with human activities as frequently as those that were associated with uninhabited shorelines. Low productivity was prevalent in roadless and un-logged areas as well as human inhabited areas. He determined that food stress is likely the ultimate factor influencing productivity and may result in competition for food from neighboring bald eagles. Elliott et al. (1998) studied factors affecting productivity of bald eagles nesting near industrial sites in British Columbia and also found that food supply was the key factor limiting breeding success. Similar findings were determined by Gende et al. (1997) where nest productivity was associated with availability of prey during the egg-laying and incubation period.

3.4 Disturbance

In southeast Alaska, bald eagles that have chosen nest sites in or near urban areas are often acclimated to high levels of human activity (Johnson 1989). Bald eagles are most susceptible to disturbance during the breeding and nesting season, which in Lynn Canal begins in March and continues through August (Table 2). Steidl and Anthony (1996) measured flush response rate and flush distance of breeding and non-breeding bald eagles to recreational boating along the Gulkana River in interior Alaska from 1989 to 1992. They found that breeding adult eagles were much less likely to flush than non-breeding adults, and flushed at lesser distances. Wood (1999) examined the effects of weekend and weekday boating activity on bald eagle use of three lakes in Florida during 1988 and 1989. Weekend boating activity did not relate to perch use, habitat use or age distribution indicating no alteration of eagle behavior patterns. Flush distance did not vary between weekends and weekdays, but did vary by month, with a greater flush distance during months with highest boating activity.

Stalmaster and Kaiser (1997) studied flush response of wintering bald eagles on the Fort Lewis Army Reservation in Washington. They found that immature eagles flushed more often than adults, and eagles feeding or standing on the ground flushed more often than those perched in trees. Brown et al. (1999) studied the influence of weapons testing noise on visible bald eagle behavior in Maryland. They found that eagles habituate to most weapons testing noise exceeding 120 dBP and do not show a significant behavioral reaction. Their conclusion is supported by nest productivity data for adjacent areas (1.17 fledged young per breeding pair in the study area compared to 1.19 fledged young per breeding pair in adjacent areas).

Holmes et al. (1993) suggested that the bald eagle is more likely to flush when approached by a human on foot than when approached by an automobile. Brown and Stevens (1997) found that 22 times more eagles were detected along the Colorado River, Arizona in reaches with low human use when compared to reaches with high to moderate human use. Eagle distribution did not correspond to prey abundance, biomass patterns or habitat conditions frequently associated with eagle foraging habitat.

3.5 Concentration Areas

The USFWS has conducted surveys to identify important feeding areas for bald eagles in the Juneau Access Improvements project area (M. Jacobson, personal communication, 2003). During spring, seasonal concentrations of bald eagles have been observed in Berners Bay, the Katzehin River, and the Endicott River during spawning aggregations of eulachon (*Thaleichthys pacificus*) and Pacific herring (*Clupea pallasi*) (see *Wildlife Technical Report*, Figure 2). Summer runs of salmon in the tributaries of the Lace and Berners rivers of Berners Bay, the Katzehin River system, the Endicott River, and the Chilkat River also produce concentrations of feeding eagles. Several thousand eagles are attracted to the Alaska Chilkat Bald Eagle Preserve just north of Haines each November to feed on a late run of chum salmon in the Chilkat and Klehini rivers (Stalmaster, 1987).

3.6 Legal Protections And Management Authority

In the early 1900s, fox farmers and salmon fishermen claimed that eagles were endangering their livelihoods and were successful in getting the Alaska Territorial Legislature to establish a bounty on bald eagles. These claims were eventually proven to have little merit and the bounty was abolished. However, during the bounty years, 1917 to 1953, over 100,000 bald eagles were killed in Alaska (ADF&G, 1994). Federal wildlife conservation laws applied to Alaska when it became a state in 1959. The bald eagle has never been listed under the Endangered Species Act in Alaska but it acquired legal protection under the Bald Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d). Since that time, the population of bald eagles in Alaska has rebounded and likely approaches its historic level (Stalmaster, 1987).

The Bald and Golden Eagle Protection Act prohibits the taking or possession of bald (and golden) eagles, their body parts, nests, or eggs, with limited exceptions for religious and scientific purposes. The definition of "take" includes to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or “disturb” eagles. The Bald and Golden Eagle Protection Act imposes criminal and civil penalties on anyone (including associations, partnerships, and corporations) that violate any permit or regulations issued under the act. Regulatory authority resides with the Secretary of the Interior and is delegated to the USFWS. The Migratory Bird Treaty Act and the Fish and Wildlife Coordination Act also provide regulatory authority to the USFWS for the protection of bald eagles.

Provisions in the Forest Service's Tongass Land Management and Resource Plan (TLMP) (Forest Service, 1997) prescribe no-cut buffer zones for beach and riparian areas to mitigate logging impacts. Although infrequent disturbance may lead to short-term adverse effects, recurrent or consistent disturbance during the breeding and nesting seasons of bald eagles is more likely to have long-term adverse effects and is therefore the focus of conservation regulations.

3.7 Protection of Nest Sites

The protection of nest is a high priority for the conservation of bald eagles and is a legal requirement of the Baldand Golden Eagle Protection Act. Therefore, the USFWS has developed a set of guidelines for construction activities near eagle nests. These guidelines are based on many years of experience in southeast Alaska and are incorporated into a Memorandum of Understanding that applies to all construction activities on Forest Service lands (USFWS, 1990).

During the nest selection period, March 1 to May 31, all construction activities are restricted within 330 feet of the nest, an area known as the primary buffer zone. Blasting is restricted within a 0.5-mile radius of the nest, an area known as the secondary buffer zone. If a nest is not active on June 1, construction activities may proceed as long as the nest tree is not jeopardized.

- If a pair of eagles is actively using a nest by June 1, all activities within 330 feet of the nest, and blasting activities within 0.5 mile, are restricted for the duration of the nesting season, usually until August 31.
- In certain circumstances, determined on a case-by-case basis, the USFWS may approve limited blasting within a 0.5-mile radius of an active nest depending on factors such as the acclimation of the nesting eagles, terrain shielding, blasting loads, and monitoring of the nest disturbance.

- In certain circumstances, the USFWS has approved some highway construction activities to proceed within 330 feet of an active nest under the condition that it is monitored continuously by observers and that construction activities were stopped immediately if the eagles exhibited any signs of disturbance (Dunn, 2000).

The City and Borough of Juneau has adopted these same restrictions for nests on public lands although construction is allowed within 50 feet of nests on private land.

4.0 ENVIRONMENTAL IMPACTS

This section contains the direct effects analysis for potential impacts to bald eagles. The following potential direct effects were identified:

- **Proximity of construction activities to eagle nests** – Disruption during the nest selection phase can cause the abandonment of preferred nests or lead to reduction in the occupancy rate of available nests. Disruption during the nesting phase can lead to reduced parental care or desertion, with subsequent reduction of reproductive success or complete loss of eggs and nestlings. As eaglets fledge and become more independent, human disturbance has less impact (Stalmaster, 1987).
- **Proximity of construction activities to feeding and resting areas** – Eagles can be affected by human disturbance and habitat changes throughout the year. Although eagles move substantial distances in response to natural and seasonal changes in their food supplies, uninterrupted access to fishing and resting areas may be important for reproductive success and survival. Disturbance in the forests surrounding favorite fishing spots may cause birds to flush, thereby expending energy, or to abandon important resources if the disturbance is consistent.
- **Removal of trees during construction activities** – The removal of trees during highway construction increases the risk that the trees remaining on the edge of the newly exposed highway corridor will be damaged by the periodic high winds common to the Lynn Canal area. In general, trees that have grown in areas naturally exposed to high winds, such as along the beachfront, have developed strong root systems and are more resistant to high winds. These trees are considered "windfast." Trees that have grown in more protected situations, such as inland from the beach and surrounded by other trees, are not as resistant to high winds. When the surrounding trees are removed and they are exposed to high winds for the first time, they are susceptible to blowing over, a phenomenon known as "windthrow." These windthrow trees may fall into nearby eagle nest trees or expose other trees closer to a nest. Quantitative assessment of the increased risk of windthrow affecting particular nest sites is very difficult, if not impossible. In general, the closer a nest tree is to a newly exposed corridor, the higher the risk of windthrow damage.
- **Disturbance from highway operation and maintenance** – Vehicle traffic and highway maintenance operations could potentially affect nesting, resting, or foraging eagles throughout the year. The intensity of disturbance would likely depend on a number of factors, including distance to the disturbance, traffic frequency, noise level and duration, visual impact, time of year, and behavior of the eagles (e.g., nesting or foraging). Individual eagles probably have different tolerance levels and therefore have different capacities to habituate to vehicle or pedestrian traffic.

  The locations of potential material pits, construction campsites, and associated construction facilities have not yet been determined. Development activities in these areas would follow the USFWS guidelines for protection of eagle nests if a highway alternative is selected and proceeds to construction.

The Juneau Access Improvements Project alternative highway alignments were revised using constraint maps generated in a GIS format that included eagle nest locations among many other factors (i.e., topographical features and other resource restrictions). An engineering exercise was undertaken that consisted of the following steps:

- Offset distances between all nests and the outer boundary of the alignment clearings were calculated and tabulated.
- For nests within 330 feet of the alternative alignment, the alignment was shifted when feasible to avoid the nest by 330 feet.
- For those nests that could not be reasonably avoided by at least 330 feet, the constraint factors that prevented realignment were described in Attachment B, Tables B-1 and B-2.

Overlay maps of known eagle nests and the alternative alignments are presented in Figures 1 through 8. Station numbers of the alignments where the highway passes closest to each nest and the distances between nests and the highway construction limits are presented in Attachment B.

4.1 Alternative 1 – No Action Alternative

Alternative 1 will not result in the construction of any new highways or ferry terminals. No bald eagle nests are near any of the existing ferry terminals and interactions between AMHS ferries and bald eagles on the water are negligible. There were no direct effects on bald eagles identified for this alternative.

4.2 Alternative 2 – East Lynn Canal Highway with Katzehin Terminal

This alternative includes construction of a highway from Echo Cove around Berners Bay, continuing along the east coast of Lynn Canal to Skagway, and construction of a new ferry terminal in the Katzehin River area.

Proximity of construction activities to eagle nests – A total of 100 bald eagle nest sites were recorded within 0.5 mile of the Alternative 2 highway corridor during USFWS surveys in 2003, with 37 of the nests being active. After adjusting the highway alignment to avoid nest sites as much as feasible, 57 nests (57 percent) remain within 330 feet of the construction limits for the highway corridor. Of these 57 nests, 1 is within 30 feet, 22 are within 31 to 90 feet, 23 are within 91 to 180 feet, and 11 are within 181 to 300 feet (Table 3).

Most of the potentially affected nest sites occur north of Sherman Point, an area of steep terrain adjacent to the coast with little opportunity to avoid the nest tree primary zone. In many cases, avoiding the buffer zone would require large rock cuts directly above and within sight of the nest.

Proximity of construction activities to feeding and resting areas – Seasonal concentrations of eagles feed in Berners Bay and the Katzehin River during spring spawning aggregations of eulachon and Pacific herring. Eagle concentrations also occur in the tributaries of the Lace and Berners rivers of Berners Bay and the Katzehin River system during summer runs of salmon. Preferred or specific resting areas have not been identified along the Alternative 2 highway alignment. Construction activities would be timed to minimize impacts to seasonal concentrations of feeding eagles during spring eulachon runs and local salmon runs. It is anticipated that potential disruption during feeding activities or while resting would be short-term during construction activities. This is not expected to result in a significant reduction in the eagle population in the Lynn Canal.

Removal of trees during construction activities – The impact of highway and ferry terminal construction on the susceptibility of a nest tree and nearby buffer trees to windthrow would be mitigated on a case-by-case basis (e.g., stabilizing of nest and buffer trees). Best Management Practices for blasting and construction activities would minimize the potential for accidental damage to nest trees.

Construction activities would be limited near eagle nests according to the Memorandum of Understanding between the Forest Service and USFWS. Active monitoring of nesting eagles could allow some construction activities to be conducted within the established primary and secondary buffer zones as long as disruption of nesting behavior is negligible. The potential for damage or loss of nest trees would be minimized by Best Management Practices and mitigated on a case-by-case basis. These measures should minimize construction impacts. Therefore, while construction may interfere with nesting by some eagles, it is not expected to have a long-term impact on eagle populations in the Lynn Canal.

Disturbance from highway operation and maintenance – Vehicle and pedestrian traffic could make some nest sites less attractive to eagles as they select a nest site. Increasing summer traffic volumes after the nest selection period (March 1 to May 31) could also increase disturbance levels and decrease the value of a nest site. Although some bald eagles are likely to habituate to highway traffic and nest successfully, others may be less tolerant of disturbance and could be forced to relocate elsewhere. Displaced eagles would either have to use alternative nest sites in their own territories, compete with already established birds for nesting territories elsewhere, avoid competition by settling for a nest site in marginal habitat, or forgo breeding efforts for the season. The effects of highway operation on eagles would therefore likely change over time as some eagles habituate and others try to reestablish themselves elsewhere.

Potential for long-term effects – Operation of the highway would involve a persistent source of noise disturbance that may result in the relocation of individual eagle pairs to alternate nest trees within their territory. Individual eagle pairs may even abandon their nest site and associated hunting perches altogether, especially during the summer months when traffic volumes are predicted to peak. Because food availability is identified as a key factor that influences breeding success, eagle pairs less sensitive to noise disturbance would likely habituate to highway operation near prime feeding areas. As a result, Alternative 2 is not likely to adversely affect the overall population of bald eagles in the Lynn Canal area on a long-term basis.

4.3 Alternative 2A – East Lynn Canal Highway with Berners Bay Shuttle

This alternative has the same highway alignment as Alternative 2 except that it eliminates the section of highway around Berners Bay and constructs two ferry terminals, at Sawmill Cove and Slate Creek.

Proximity of construction activities to eagle nests – Alternative 2A would encroach on three fewer nests by eliminating the section of highway around Berners Bay. For Alternative 2A, 54 out of 82 nests (66 percent) could not be reasonably avoided by more than 330 feet. Of these 54 nests, 1 is within 30 feet, 21 are within 31 to 90 feet, 22 are within 91 to 180 feet, and 11 are within 181 to 300 feet (Table 3).

Proximity of construction activities to feeding and resting areas – It is assumed that short-term disturbance due to construction activities would be less under this alternative than Alternative 2 since there is no highway or bridge construction activities near feeding concentrations at the head of Berners Bay.

Removal of trees during construction activities – Impacts would be similar to Alternative 2 because the alignment around upper Berners Bay (Alternative 2) would only encroach on three nest sites. The great majority of nest sites potentially impacted by the Alternative 2A alignment would be the same as for Alternative 2.

Disturbance from highway operation and maintenance – The potential effects of vehicle and pedestrian traffic would be very similar to those described for Alternative 2 because most of the eagle nests are within the common alignment section of highway. Since Berners Bay is a seasonally important foraging area, Alternative 2A would have a decreased potential for chronic disturbance of feeding eagles relative to Alternative 2.

Potential for long-term effects – Alternative 2A would have long-term effects similar to Alternative 2 and is not likely to adversely affect the overall population of bald eagles in the Lynn Canal area on a long-term basis.

4.4 Alternative 2B – East Lynn Canal Highway to Katzehin, Shuttles to Haines and Skagway

This alternative has the same highway alignment as Alternative 2 except that the highway would end at the Katzehin Ferry Terminal, eliminating the highway segment along east Taiya Inlet between the Katzehin Ferry Terminal and Skagway.

Proximity of construction activities to eagle nests – Alternative 2B would encroach on 12 fewer nest sites by eliminating the segment between Katzehin and Skagway. For Alternative 2B, 45 out of 84 nests (54 percent) could not be reasonably avoided by more than 330 feet. Of these 45 nests, 19 are within 31 to 90 feet, 19 are within 91 to 180 feet, and 7 are within 181 to 300 feet (Table 3).

Proximity of construction activities to feeding and resting areas – It is assumed that disturbance would be similar to Alternative 2 because construction activities would be the same around Berners Bay and most of the likely feeding areas on the east side of Lynn Canal. This alternative would avoid disturbing birds feeding or resting along Taiya Inlet, especially during the nesting season when they are more likely to be near their nests.

Removal of trees during construction activities – Potential impacts would be proportionally less than Alternative 2 because the Taiya Inlet highway segment would have passed near 12 known nest sites, including 7 nests within 150 feet of the alignment.

Disturbance from highway operation and maintenance – The potential for chronic disturbance of nesting eagles by vehicle and pedestrian traffic would be proportionally less than for Alternative 2. Potential chronic disturbance at seasonal feeding concentration areas would be similar to Alternative 2.

Potential for long-term effects – Alternative 2B would have long-term effects similar to Alternative 2 and is not likely to adversely affect the overall population of bald eagles in the Lynn Canal area on a long-term basis.

4.5 Alternative 2C – East Lynn Canal Highway with Shuttles to Haines from Skagway

This alternative includes construction of the same highway as Alternative 2 with the exception that the Katzehin Ferry Terminal would not be constructed.

Proximity of construction activities to eagle nests – For Alternative 2C, 57 out of 100 nests (57 percent) could not be reasonably avoided by more than 330 feet. Of these 57 nests, 1 is within 30 feet, 22 are within 31 to 90 feet, 23 are within 91 to 180 feet, and 11 are within 181 to 300 feet (Table 3).

Impacts to bald eagles would be the same as Alternative 2 and are not likely to adversely affect the overall population of bald eagles in the Lynn Canal area on a long-term basis.

4.6 Alternative 3 – West Lynn Canal Highway

This alternative includes construction of a highway from Echo Cove to Sawmill Cove, construction of new ferry terminals at Sawmill Cove and William Henry Bay, and construction of a highway along the west side of Lynn Canal from William Henry Bay to Haines.

Proximity of construction activities to eagle nests – Forty-five bald eagle nest sites were recorded within 0.5 mile of the highway alignment for this alternative during USFWS surveys in 2003. This total includes 7 nests on the east side of Lynn Canal between Echo Cove and Sawmill Cove. Of the total nests surveyed in 2003, 42 percent were found to be active. After adjusting the highway alignment and ferry terminal locations to avoid nest sites to the extent feasible, a total of 25 nests (56 percent) remained within 330 feet of the construction limits of the alignment, all of which are on the west side of Lynn Canal. Of these 25 nests, 5 are within 31 to 90 feet, 12 are within 91 to 180 feet, and 7 are within 181 to 300 feet (Table 3).

Proximity of construction activities to feeding and resting areas – Seasonal concentrations of eagles have been observed in the Endicott River during spring spawning aggregations of eulachon and Pacific herring. Summer runs of salmon in the Endicott River and Chilkat River also produce concentrations of feeding eagles. Construction activities would be timed to minimize impacts to seasonal concentrations of feeding eagles. This is not expected to result in a significant reduction in the eagle population in the Lynn Canal.

Removal of trees during construction activities – The impact of highway and ferry terminal construction on the susceptibility of a nest tree and nearby buffer trees to windthrow would be mitigated on a case-by-case basis (e.g., stabilizing of nest and buffer trees). Best Management Practices for blasting and construction activities would minimize the potential for accidental damage to nest trees.

Construction activities would be limited near eagle nests according to the Interagency Agreement between the Forest Service and USFWS. Active monitoring of nesting eagles could allow some construction activities to be conducted within the established primary and secondary buffer zones as long as disruption of nesting behavior is negligible. The potential for damage or loss of nest trees would be minimized by Best Management Practices and mitigated on a case-by-case basis. These measures should minimize construction impacts. Therefore, while construction may interfere with nesting by some eagles, it is not expected to have a long-term impact on eagle populations in the Lynn Canal.

Disturbance from highway operation and maintenance – Vehicle and pedestrian traffic could make some nest sites less attractive to eagles as they select a nest site. Increasing summer traffic volumes after the nest selection period (March 1 to May 31) could also increase disturbance levels and decrease the value of a nest site. Although some bald eagles are likely to habituate to highway traffic and nest successfully, others may be less tolerant of disturbance and could be forced to relocate elsewhere. Displaced eagles would either have to use alternative nest sites on their own territories, compete with already established birds for nesting territories elsewhere, avoid competition by settling for a nest site in marginal habitat, or forgo breeding efforts for the season. The effects of highway operation on eagles would therefore likely change over time as some eagles habituate and others try to reestablish themselves elsewhere.

Potential for long-term effects – The potential long-term effects of Alternative 3 are similar to Alternative 2 because the operation of the highway would involve a persistent source of noise disturbance. Individual eagle pairs may relocate to alternate nest trees in their territory and/or abandon their nest site and associated hunting perches altogether, especially during the summer months when traffic volumes are predicted to peak. Because food availability is

identified as a key factor that influences breeding success, eagle pairs less sensitive to noise disturbance would likely habituate to highway operation near prime feeding areas. In addition, opportunistic bald eagle pairs from other territories may utilize previously abandoned nest sites along the west shoreline of Lynn Canal for breeding. Alternative 3 is not likely to adversely affect the overall population of bald eagles in the Lynn Canal area on a long-term basis.

4.7 Alternatives 4A and 4C – FVF/Conventional Monohull shuttle from Auke Bay

Alternatives 4A and 4C use the existing AMHS ferry terminals and would not result in the construction of any new highways or ferry terminals. No bald eagle nests are near any of the existing ferry terminals. There were no direct effects on bald eagles identified for this alternative.

4.8 AlternativeS 4B and 4D – FVF/Conventional Hull shuttle from Berners Bay

Alternatives 4B and 4D include construction of a highway from Echo Cove to Sawmill Cove and construction of a new ferry terminal in Sawmill Cove.

Proximity of construction activities to eagle nests – Construction of the highway between Echo Cove and Sawmill Cove would pass 7 bald eagle nests, none of which are within 330 feet of the construction limits for the highway (Table 3). The ferry terminal and associated facilities at Sawmill Cove would be at least 1,000 feet away from the nearest nest, (FWS#31), located to the northeast of the facility.

Proximity of construction activities to feeding and resting areas – Seasonal concentrations of eagles feed in Berners Bay during spring spawning aggregations of eulachon and Pacific herring. Preferred or specific resting areas have not been identified along the Alternatives 4B and 4D highway route. Construction activities would be timed to minimize impacts to seasonal concentrations of feeding eagles during spring eulachon runs and local salmon runs. It is anticipated that potential disruption during feeding activities or while resting would be short-term during construction activities and would not have a long-term impact on the eagle population in the Lynn Canal area.

Removal of trees during construction activities – All known eagle nests are outside of the primary buffer zone for eagle nests. Best Management Practices for blasting would minimize potential disturbance of nesting eagles. For these reasons, construction of Alternatives 4B and 4D is not expected to impact bald eagle nest trees.

Disturbance from highway operation and maintenance – Operation and maintenance activities associated with Alternatives 4B and 4D would not impact nesting bald eagles since these activities would take place outside of the primary buffer zone of known eagle nests. The potential for chronic disturbance of foraging eagles would be minimal since traffic would be limited near the water to the Sawmill Cove Ferry Terminal area.

Potential for long-term effects – Because the Alternative 4B and 4D new highway between Echo Cove and Sawmill Cove does not encroach on the primary zones of any eagle nest sites, they would not impact currently known bald eagle nest trees. Because food availability is identified as a key factor that influences breeding success, eagle pairs less sensitive to noise disturbance would likely habituate to highway operation near prime feeding areas. Alternative 4B or 4D operations are not likely to cause long-term adverse effects on bald eagles in the Berners Bay area.

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TABLES

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Table 1
Bald Eagle Productivity
Lynn Canal Juneau Access Improvements Project

East Lynn Canal

	1994	1997	1998	1999	2000	2001	2002	2003	Mean
Nest sites surveyed	(78)	76[a] (71)[b]	76[a] (71)[b]	82	88	83	82	94	83.0
Active nests	(38)	20[a] (18)[b] (25 %)	26[a] (24)[b] (34%)	28 (34%)	38 (43%)	35 (42)%	46 (56%)	37 (39%)	32.9 (39.0%)
Successful nests		4[a] (3)[b] (4%)	8[a] (7)[b] (10%)	14 (17%)	17 (19%)	22 (26%)	18 (22%)	20 (21%)	14.7 (17.0%)
Active nests successful		17%	29%	50%	45%	63%	39%	54%	42.4%
Young		6[a] (4)[b]	9[a] (7)[b]	16	20	32	25	28	19.4
Young/active nest		0.22	0.29	0.57	0.53	0.91	0.54	0.78	0.55
Young/successful nest		1.33	1.00	1.14	1.18	1.45	1.39	1.40	1.27

Notes: [a] Adjusted for 15 kilometers of shoreline which was not surveyed that year
[b] Actual count of area surveyed

West Lynn Canal

	1994	2003
Nest sites surveyed	43	53
Active nests	NA	22 (42%)
Successful nests	18 (42%)	10 (19%)
Active nests successful	NA	45%
Young	25-31	14
Young/active nest	NA	0.64
Young/successful nest	1.39 – 1.72	1.40

Note: NA = Data not available

Table 2
Bald Eagle Breeding Chronology in Southeast Alaska
(adapted from Stalmaster, 1987)

	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Nest Initiation		X	X					
Egg Laying			X	X				
Incubation			X	X	X			
Hatching				X	X			
Nestling Period					X	X	X	
Fledging						X	X	X

Table 3
Number Of Bald Eagle Nests Within 0.5 Miles And Distance To Proposed Alignments
Juneau Access Improvements Project

	No Action	East Lynn Canal				West Lynn Canal	Alaska Marine Highway System Improvements			
Distance from Highway Limits[2]	**Alt. 1**	**Alt. 2**	**Alt. 2A**	**Alt. 2B**	**Alt. 2C**	**Alt. 3**	**Alt. 4A**	**Alt. 4B**	**Alt. 4C**	**Alt. 4D**
330 ft – 0.5 mile	-	43	28	39	43	20	-	7	-	7
301 – 330 ft	-	0	0	0	0	1	-	0	-	0
271 – 300 ft	-	4	4	2	4	1	-	0	-	0
241 – 270 ft	-	2	2	2	2	2	-	0	-	0
211 - 240 ft	-	3	3	2	3	3	-	0	-	0
181 – 210 ft	-	2	2	1	2	1	-	0	-	0
151 – 180 ft	-	2	1	2	2	3	-	0	-	0
121 – 150 ft	-	7	7	6	7	5	-	0	-	0
91 – 120 ft	-	14	13	11	14	4	-	0	-	0
61 – 90 ft	-	15	15	13	15	3	-	0	-	0
31 - 60 ft	-	7	6	6	7	2	-	0	-	0
1-30 ft	-	1	1	0	1	0	-	0	-	0
Total nests < 330 ft	-	57	54	45	57	25	-	0	-	0
Total Nests	-	100	82	84	100	45	-	7	-	7

Notes: [1] Alignments as of 17 December 2003
[2] Clearing and cut/fill limits are considered the extent of construction activity
Dash (-) indicates not applicable
Nest location data from Mike Jacobson, USFWS, Raptor Management, Juneau, AK

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FIGURES

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LEGEND

Alternative 1 No Action (Existing Mainline. Dayboat Shuttle, and FVF Ferry System not shown)

Alternative 2 Highway Segment 2 / Ferry Segment 2

Alternative 2A Highway Segment 2A / Ferry Segment 2A

Alternative 2B Highway Segment 2B / Ferry Segment 2B

Alternative 2C Highway Segment 2C / Ferry Segment 2C

Alternative 3 Highway Segment 3 / Ferry Segment 3

New Multi-span Bridge

Existing Highway

Alternative 4A
Alternative 4C New double stern berth at existing Auke Bay terminal with ferry service from Auke Bay to Haines and Skagway

Alternative 4B
Alternative 4D New ferry terminal at Sawmill Cove with ferry service to Haines and Skagway

Ferry routes not shown for Alternatives 1, 4A, 4B, 4C, and 4D

Bald Eagle Nests

Within 330' of Cut and Fill Limits*

Over 330' from Cut and Fill Limits*

Source: USFWS GPS Locations 2003
*USFWS Primary Buffer

Figure Index

0 1 2 3 4 Miles

1 inch equals 3.5 miles

Figure 2 SCHUBEE GLACIER
Figure 3
Figure 4
Figure 5
Figure 6
Figure 7
Figure 8

Skagway
Klondike Highway
Klondike Gold Rush National Historical Park
Skagway River
Kasidaya Creek
Devils Punch Bowl
Twin Dewey Peaks
Upper Dewey Reservoir
Taiya Inlet
Burro Creek
Face Mountain
Mount Harding
Halutu Ridge
Ferebee River
Dayehas Creek
Mount Villard
Katzehin River
Veldagaga Creek
Gran Point
Chilkat Islands
Eldred Rock
Met Point
Sinclair Mountain
Kakuhan Range
Ivanhoe Mine
Comet Mines
Kensington Mine
Horrible Mine
Ophir Mine
Comet
Sweeny Creek
Sherman Rock
Berners Bay
Point Saint Mary
Johnson Creek
Julalin Mine
Slate Creek
Lace River
Antler River
Berners River
Gilkey River
Antler Lake
Glacier Highway
Squirrill Creek
Echo Cove
Cowee Creek
Lynn Canal
Sullivan Island
Sullivan River
William Henry Bay
William Henry Creek
Endicott River
Beardslee River
Yang-Webster Peak
Chilkat Ra
Mount Young
Lily Lake
Chilkat Peninsula
DESHU ISTHMUS
Glacier Point
Port Chilkoot
Chilkoot
Pyramid Island
Mud Bay Road
Tanani
Haines
Haines Airport
Lutak Inlet
Lutak Road
Mount Ripinski
Ludaseska Creek
Sullivan Mountain
DAVIDSON GLACIER
Chilkoot Lake
Chilkoot River
Cathedral Peak
Mount Kashagnak
Tukgahgo Mountain
Haines Highway
Chilkat River
GARRISON GLACIER
Mount Emmerich
Mount Rice

Juneau Access Improvements

Bald Eagle Nests Alternatives and Figure Index

JOB NO: 26219591.40004	DRAWN BY: TEK	Figure 1
DATE: January 7, 2004	FILE: M:Data/ADOT/Juneau Access /Figures/Tech Report Figures/ISA ISA Figure 2.mxd	

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LEGEND

East Route

- Current Alignment as of 12/15/2003
- Alignment as of 6/12/2003
- Existing Highway

Bald Eagle Nests

- Within 330' of Cut and Fill Limits*
- Over 330' from Cut and Fill Limits*

Source: USFWS GPS Locations 2003
*USFWS Primary Buffer

Contour Interval = 100 feet
Derived from USGS 45m DEM (above MSL)

0 0.25 0.5 0.75 1 Miles

1 inch equals 1 mile

in Dewey Peaks
Upper Dewey Reservoir
Devils Punch Bowl
SCHUBEE GLACIER
Upper Dewey Lake
Icy Lake
Klondike Gold Rush National Historical Park
Klondike Highway
Skagway River
Skagway
Lower Dewey Lake
Kasidaya Creek
Dayehas Creek
003
002
004
600
005
006
090
008
009
010
091
601
012
015
Taiya Inlet
Burro Creek
Parsons Peak
Face Mountain
Mount Harding
Halutu Ridge
Ferebee River

Juneau Access Improvements

Bald Eagle Nests
Skagway Vicinity
East Lynn Canal

JOB NO: 26219581.20005	DRAWN BY: TEK	Figure 2
DATE: January 7, 2003	FILE: M:Data/ADOT/Juneau Access /Figures/Tech Report Figures/Eagles /Figure 2.mxd	

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LEGEND

East Route

- Current Alignment as of 12/15/2003
- Alignment as of 6/12/2003
- New Multi-span Bridge

Bald Eagle Nests

- High Vulnerability
  (Within 330' of Cut and Fill Limits*)
- Low Vulnerability
  (Over 330' from Cut and Fill Limits*)

Source: USFWS GPS Locations 2003
*USFWS Primary Buffer

Contour Interval = 100 feet
Derived from USGS 45m DEM (above MSL)

0 0.25 0.5 0.75 1 Miles

1 inch equals 1 mile

Mount Villard
Katzehin River
Dayehas Creek
Chilkoot Inlet
Chilkat Peninsula
Lily Lake
DESHU ISTHMUS
Chilkat Inlet
Tanani
Haines
Port Chilkoot
Chilkat
Pyramid

008 009 010 091 601 013 012 092 014 015 016 017 018 019 020 021 093 023 024 025 127 126 026 027 028 029

Juneau Access Improvements

Bald Eagle Nests
Katzehin River Vicinity
East Lynn Canal

JOB NO: 26219581.20005	DRAWN BY: TEK	**Figure 3**
DATE: January 7, 2003	FILE: M:Data/ADOT/Juneau Access/Figures/Tech Report Figures/Eagles/Figure 3.mxd	

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LEGEND

East Route

Current Alignment as of 12/15/2003

Alignment as of 6/12/2003

Bald Eagle Nests

Within 330' of Cut and Fill Limits*

Over 330' from Cut and Fill Limits*

Source: USFWS GPS Locations 2003
*USFWS Primary Buffer

Contour Interval = 100 feet
Derived from USGS 45m DEM (above MSL)

0 0.25 0.5 0.75 1 Miles

1 inch equals 1 mile

Kakuhan Range

Sinclair Mountain

Yeldagalga Creek

Comet

Eldred Rock

Chilkat Islands

Lynn Canal

029 030 031 607 608 032 033 034 094 036 096 095 098 125 124 123 099 100 102 101 103 612 104 105 106 107 108 109 110 112 111 113 114 115

Juneau Access Improvements

Bald Eagle Nests
Eldred Rock Vicinity
East Lynn Canal

JOB NO: 26219581.20005	DRAWN BY: TEK	**Figure 4**
DATE: January 7, 2003	FILE: M:Data/ADOT/Juneau Access/Figures/Tech Report Figures/Eagles/Figure 4.mxd	

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LEGEND

East Route

- Current Alignment as of 12/15/2003
- Alignment as of 6/12/2003
- Existing Highway

Bald Eagle Nests

- Within 330' of Cut and Fill Limits*
- Over 330' from Cut and Fill Limits*

Source: USFWS GPS Locations 2003
*USFWS Primary Buffer

Contour Interval = 100 feet
Derived from USGS 45m DEM (above MSL)

0 0.25 0.5 0.75 1 Miles

1 inch equals 1 mile

Berners Bay

Lynn Canal

Sawmill Cove

Sawmill Cre

Echo Cove

Cowee Creek

Glacier Highway

Point Saint Mary

Antler River

Lace River

Johnson Creek

Slate Creek

Sweeny Creek

Jualin Mine

Comet Mines

Kensington Mine

Horrible Mine

Ophir Mine

Comet

Sherman Rock

625 118 117 073 116 072 071 593 070 069 067 068 064 066 065 063 062 061 060 059 058 057 056 055 054 053 052 051 050 049 048 047 115 074 119 076 120 077 078 079 080 081 082 631 083 121 085

Juneau Access Improvements

Bald Eagle Nests
Berners Bay Vicinity
East Lynn Canal

JOB NO: 26219581.20005	DRAWN BY: TEK	Figure 5
DATE: January 7, 2003	FILE: S:GIS/DataQC/Arc/ADOT/ Juneau Access/GIS/Juneau_ Access/mxd/Base Map 11x17	

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Sherman Rock

LEGEND

West Route

Current Alignment as of 11/11/2003

1994 Lochner Alignment

Bald Eagle Nests

Within 330' of Cut and Fill Limits*

Over 330' from Cut and Fill Limits*

Source: USFWS GPS Locations 2003
*USFWS Primary Buffer

Contour Interval = 100 feet
Derived from USGS 45m DEM (above MSL)

0 0.25 0.5 0.75 1 Miles

1 inch equals 1 mile

Lynn Canal

William Henry Bay

Beardslee River

William Henry Creek

Endicott River

Sullivan River

301 305 306 307 308 309 310 313 314 315 317 318 319 320 321 322 323 324 360 361 362 363 364 365 366

Juneau Access Improvements

Bald Eagle Nests
William Henry Bay Vicinity
West Lynn Canal

JOB NO: 26219581.20005	DRAWN BY: TEK	Figure 6
DATE: January 7, 2004	FILE: M:Data/ADOT/Juneau Access/Figures/Tech Report Figures/Eagles/Figure 6.mxd	

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LEGEND

West Route

Current Alignment as of 11/11/2003

1994 Lochner Alignment

Bald Eagle Nests

Within 330' of Cut and Fill Limits*

Over 330' from Cut and Fill Limits*

Source: USFWS GPS Locations 2003
*USFWS Primary Buffer

Contour Interval = 100 feet
Derived from USGS 45m DEM (above MSL)

0 0.25 0.5 0.75 1 Miles

1 inch equals 1 mile

Lynn Canal

Sullivan Island

Sullivan River

Glacier Point

336 337 338 339 340 335 372 711 710 371 334 333 370 331 330 709 369 367 327 326 324

Ludaseska Creek

Sullivan Mountain

DAVIDSON GLACIER

Juneau Access Improvements

Bald Eagle Nests
Sullivan River Vicinity
West Lynn Canal

JOB NO: 26219581.20005	DRAWN BY: TEK	Figure 7
DATE: January 7, 2004	FILE: M:Data/ADOT/Juneau Access/Figures/Tech Report Figures/Eagles/Figure 7.mxd	

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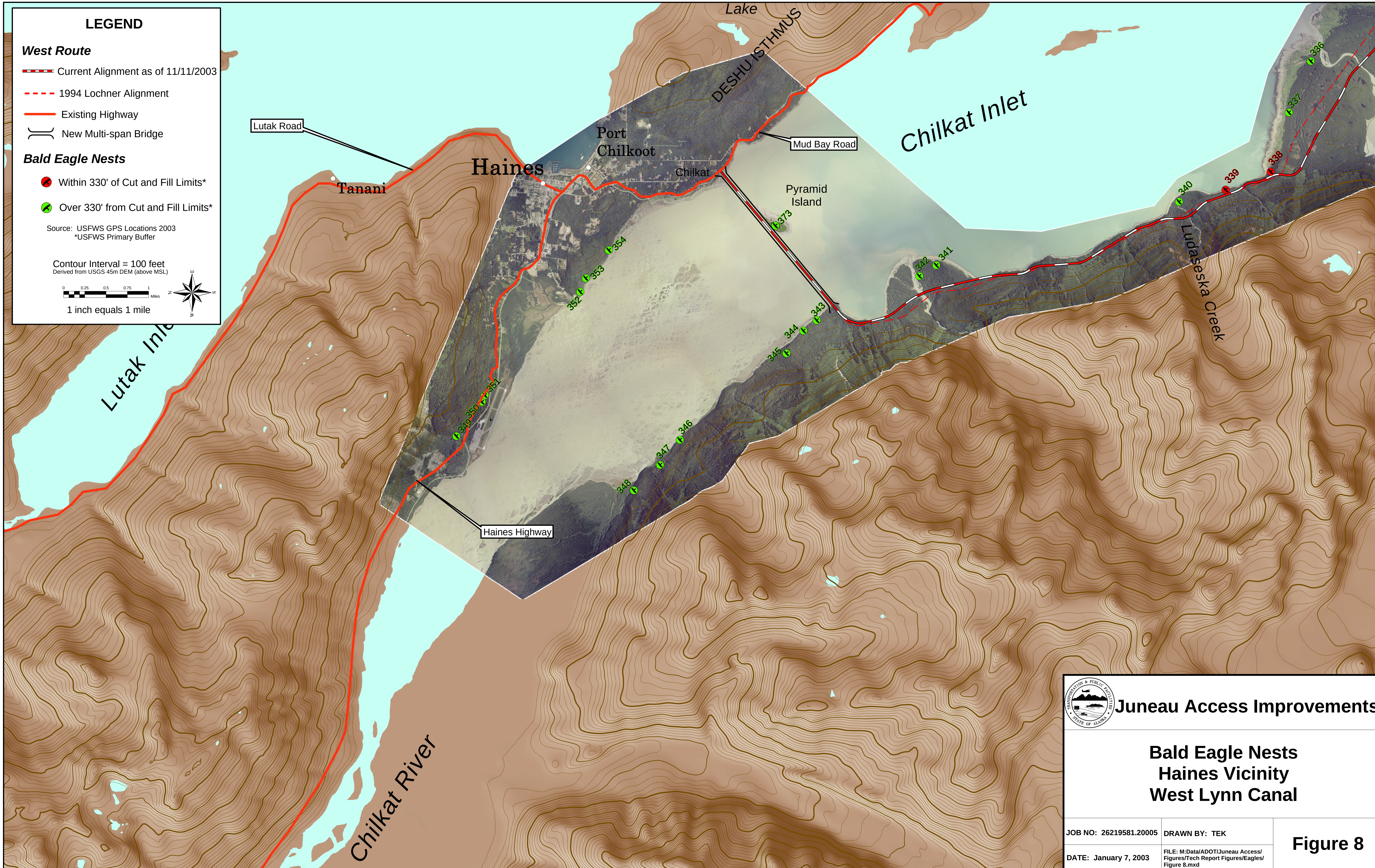

LEGEND
West Route
Current Alignment as of 11/11/2003
1994 Lochner Alignment
Existing Highway
New Multi-span Bridge
Bald Eagle Nests
Within 330' of Cut and Fill Limits*
Over 330' from Cut and Fill Limits*
Source: USFWS GPS Locations 2003
*USFWS Primary Buffer
Contour Interval = 100 feet
Derived from USGS 45m DEM (above MSL)
0 0.25 0.5 0.75 1
Miles
1 inch equals 1 mile
Lake
DESHU ISTHMUS
Chilkat Inlet
Lutak Road
Port Chilkoot
Haines
Tanani
Chilkat
Mud Bay Road
Pyramid Island
Lutak Inlet
Ludaseska Creek
Haines Highway
Chilkat River
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Juneau Access Improvements
Bald Eagle Nests
Haines Vicinity
West Lynn Canal
JOB NO: 26219581.20005
DRAWN BY: TEK
DATE: January 7, 2003
FILE: M:Data/ADOT/Juneau Access/Figures/Tech Report Figures/Eagles/Figure 8.mxd
Figure 8

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ATTACHMENT A

USFWS BALD EAGLE NEST SURVEY REPORT

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BALD EAGLE NESTING AND PRODUCTIVITY AT LYNN CANAL, SOUTHEAST ALASKA, 1997-2003

Prepared for:

State of Alaska
Department of Transportation and Public Facilities
Division of Design and Engineering Services
Preconstruction - Southeast Region

Prepared by:

Michael J. Jacobson
U.S. Fish and Wildlife Service
3000 Vintage Boulevard, Suite 240
Juneau, Alaska 99801-7100

August 30, 2003

BALD EAGLE NESTING AND PRODUCTIVITY AT LYNN CANAL, SOUTHEAST ALASKA, 1997-2003

Michael J. Jacobson, U.S. Fish and Wildlife Service, 3000 Vintage Boulevard, Suite 240, Juneau, Alaska 99801-7100.

August 30, 2003

Aerial surveys of bald eagle nests at Lynn Canal and Taiya Inlet were conducted annually from 1997 through 2003 in response to proposed construction of the "Juneau Access Project," a road planned to link Juneau with the state road system at Skagway and/or Haines. The primary objective of this study was to locate all bald eagle nest sites and determine their productivity. Southeast Alaska holds a high density of bald eagles, perhaps the highest in North America, with a population estimated at more than 19,000 adult birds (Jacobson and Hodges, 1999). Bald eagles typically utilize large trees near the shoreline to support their nests. The majority of nests (98%) are within 200 m of the waterfront (Hodges and Robards, 1982). Road construction near the waterfront may pose conflicts with bald eagle nest sites in southeast Alaska.

METHODS

The shoreline was searched for bald eagle nests from Skagway to Berners Bay (Echo Cove) with a helicopter flying at an altitude of 30-150 m and speeds of 32-65 km/hr (20-40 mi/hr). A repeated pass was sometimes necessary to locate previously mapped nests or verify nest status. Two observers were present during all flights. The front-seat observer (Jacobson) served as navigator and recorded nest site observations directly onto U.S. Geological Survey 1:63360 scale topographic maps. The rear-seat observer (usually Philip Schempf) helped search for eagle nests and determine their status. Two aerial surveys were conducted each nesting season. The first survey, flown in late May, determined which nests were in active use by eagles. A nest was determined to be active if we saw an adult on the nest in incubating posture or if eggs were present. The second survey was flown in late July to recheck the active nests for the presence of young. A nest was determined to be successful if at least one young was present in July. The term "nest site" is used in this report to refer to an unspecified area immediately surrounding a nest tree. A nest site may contain more than one nest, which may be used by a breeding pair of eagles in different years.

The 1997 and 1998 surveys began 3 km north of Dayebas Creek (the northern border of section 31) at Taiya Inlet. In 1999 the study area was extended north15 km to include the eastern side of

Taiya Inlet to Skagway. A Bell 206 helicopter was used for all flights from 1997 through 2002, and an A-Star(BA Model) helicopter was used for the 2003 flights in order to carry an additional person (Tim Reed from ADOT&PF) to record GPS locations at several nests. All flights were based from Juneau, and helicopters were chartered from Coastal Helicopters.

RESULTS AND DISCUSSION

Bald eagle nests were abundant at eastern Lynn Canal, averaging 83 nest sites (0.6 nest sites per km of shoreline) and 32.9 active nests during the 1997-2003 survey period (Table 1). A total of 91(80%) nest sites were active at least once from 1997 to 2003: 30 (26%) were active only once, 25 (22%) were active twice, 16 (14%) were active for 3 yrs, 9 (8%) were active for 4 yrs, 5 (4%) were active 6 yrs, and 1 (1%) site was active all 7 yrs of the survey (Table 2). A total of 103 nest sites were successful. One young was observed at 69% of successful nests and two young were seen at 31% of successful nests. No nest had three young. Most young were 6 to 8 wks old in late July.

Productivity of bald eagles at eastern Lynn Canal was extremely low in 1997 and 1998. Only three successful nests were found during 1997, all at Berners Bay. In 1998 a total of seven successful nests were located (two at Berners Bay), but none contained more than one young. Productivity increased to an average of 18.2 successful nests and 24.2 young during the 1999-2003 period, with highest numbers observed in 2001 (Table 1). Table 2 provides nest site numbers and reproductive status for all bald eagle nest sites located within approximately 0.8 km (0.5 mi) of the proposed route for the Juneau Access Project at eastern Lynn Canal.

Like other areas of southeast Alaska where long-term surveys of bald eagle nests have been conducted, nesting activity at Lynn Canal fluctuated considerably between years. Eastern Lynn Canal nesting success in 1997 and 1998 was the lowest recorded for any area surveyed in southeast Alaska (U.S Fish and Wildl. Serv., unpubl.data), yet rebounded during 1999-2003 to a level generally comparable with other areas.

The eastern side of Lynn Canal, particularly north of Pt. Sherman, is a challenging area to survey for bald eagle nests because of the steep terrain and the extensive high density of large, deformed-top trees that need to be searched. There are many possible nest site locations. An aerial survey by helicopter is the best survey method for assessing bald eagle productivity in southeast Alaska, however there are always some nests that cannot be detected from the air. The single optimal method for finding eagle nests is to scan the shoreline from an open skiff while slowly traveling 50-200 m offshore. A combination of boat and helicopter survey methods will have the greatest success of locating all nests.

ACKNOWLEDGEMENTS

The Alaska Department of Transportation and Public Facilities funded the helicopter surveys, with administrative support from Reuben Yost and William Ballard. Philip Schempf provided expert nest-spotting assistance as rear-seat observer on 12 of the 14 helicopter flights. Richard Enriquez and Bruce Wright each assisted as a rear-seat observer on one flight. Thanks to pilots

Jim Wilson, Mike Rawson, Kent Pierce, Tim Gaffney, Hakon Satvedt, Lewis Hart, Al Holzman, and Jack Garrard. Assistance with report graphics was provided by Deborah Groves.

LITERATURE CITED

Hodges, J.I. and F.C. Robards. 1982. Observations of 3,850 Bald Eagle nests in southeast Alaska. Pages 37- 46 in W.N. Ladd and P. F. Schempf [Eds.], Raptor management and biology in Alaska and western Canada. FWS/AK /PROC-82, U.S. Fish and Wildl. Serv., Anchorage, AK U.S.A.

Jacobson, M.J. and J.I. Hodges. 1999. Population trend of adult Bald Eagles in southeast Alaska, 1967-1997. J. Raptor Res. 33(4):295-298.

Terminology used for Table 1 and Table 2:

A	Active nest. A nest with eggs or an adult on the nest in incubation posture.
E	Empty nest.
Successful nest	A nest containing one or more young in late July.
Status: 0,1,2	Number of young.
Gone	A nest known to be destroyed.
Rem	Remnant nest. A nest which is considered in unusable condition.
?	Active nest whose fate was not determined during the July survey.

TABLE 1. BALD EAGLE PRODUCTIVITY AT EASTERN LYNN CANAL, SOUTHEAST ALASKA, 1997-2003.

	1997	1998	1999	2000	2001	2002	2003	Mean
Nest sites surveyed	76[a] (71)[b]	76[a] (71)[b]	82	88	83	82	94	83.0
Active nests	20 (18) (25%)	26 (24) (34%)	28 (34%)	38 (43%)	35 (42%)	46 (56%)	37 (39%)	32.9 (39.0%)
Successful nests	4 (3) (4%)	8 (7) (10%)	14 (17%)	17 (19%)	22 (26%)	18 (22%)	20 (21%)	14.7 (17.0%)
% active nests successful	17	29	50	45	63	39	54	42.4
Young	6 (4)	9 (7)	16	20	32	25	28	19.4
Young / active nest	0.22	0.29	0.57	0.53	0.91	0.54	0.76	0.55
Young / successful nest	1.33	1.00	1.14	1.18	1.45	1.39	1.40	1.27

a Adjusted for 15km of shoreline which was not surveyed that year.
b Actual count of area surveyed.

Table 2. Location, nest site number, and reproductive status of all known bald eagle nest sites within 0.8 km (0.5 mi) of the proposed Juneau Access Project at eastern Lynn Canal, 1997-2003.

Topographic Map	Nest Site	No. Nests	Status 1997 28 May	17 Jul	1998 28 May	28 Jul	1999 27 May	28 Jul	2000 24 May	29 Jul	2001 1 Jun	27 Jul	2002 29 May	16 Jul	2003 27 May	24 Jul	Years Active
Skagway B-1	002, 003	2					A	2	A	1	A	0	A	2	A	2	5
	004	1					E		E		E		E		E		0
	600, 005	2					A	1	A	0	A	0	E		E		3
	006	1					E		E		A	0	E		E		1
	090	1													A	2	1
	008	1							E				E		E		0
	009	1					E		E		A	?	A	0	A	0	3
	010	1					A	0							E		1
	091	1	E		E		E		E		A	2	E		A	0	2
	601	1					A	?	E		E		E		E		1
	012, 013	2	A	0	A	0	A	1	E		E		E		E		3
Skagway A-1	092	1													A	1	1
	604	1	A	0	A	0	E		gone								2
	014	1					A	0							A	0	2
	015	1													A	1	1
	016	1			E				E		E		E		A	0	1
	017	1													A	0	1
	018, 019	2			E		E		A	0	A	1	A	0	A	0	4
	020	1			A	0	E						A	1	E		2
	021	1							E		E		E		E		0
	093	1	A	0			A	1	A	0	A	0	A	2	A	1	6
	023	1	E		E		E		A	0	A	1	A	1	E		3
	024	1							A	0	A	1	A	2	E		3
	025	1	E		E		E		A	1	E		A	0	E		2
	605	1	E		E		E		E								0
	606	1	E		E		E		E		E		E				0
	026, 027	2	E		E		E		E		E		A	0	E		1
	028	1	E		E		E		A	1	A	2	E		E		2
	029	1	E		E		E		E		E		A	0	E		1
	030	1													E		0
	031	1	E		E		E		E		E		E		E		0
	607	1							E				A	0			1
	608	1	E		E		E		A	0							1
	032	2	E		E		E		A	0	E		A	0			2
	033	1													E		0
	034	2	E		E		A	0	A	1	E		E		E		2
	036, 094	2	E		E		E		E		A	1	A	0	E		2
	609	2	A	0					A	2	E		E		E		2
	095, 096	2							E		E		E		A	0	1

Topographic Map	Nest Site	No. Nests	Status 1997 28 May	1997 17 Jul	1998 28 May	1998 28 Jul	1999 27 May	1999 28 Jul	2000 24 May	2000 29 Jul	2001 1 Jun	2001 27 Jul	2002 29 May	2002 16 Jul	2003 27 May	2003 24 Jul	Years Active
Juneau D-4	098	1	E												E		0
	610	1					A	0	E		E						1
	611	1			A	1	E		A	0	A	2	A	1			4
	099, 100	2	E		A	0	A	0	A	1	A	0	A	0	E		5
	101, 102	2	E		E		E		A	1	E		A	0	E		2
	103	1	E		A	1	E		E		E		E		E		1
	612	1	A	0	E		E										1
	104	1	E		E		E		E		E		E		rem		0
	105	1	E		A	0									E		1
	106	1	E		A	0	A	1	E		E				A	2	3
	107	1	E		E		E		E		rem				E		0
	108, 109	2	E		A	1	A	1	A	2	A	2	A	?	?	E	5
	110	2	E						E		E				?	E	0
	111, 112	2	A	0	E		E		E		E		E		E		1
	113	1	E		E		A	0	A	0	E		A	0	E		3
	044	1	E		E		E		E		A	1	E		E		1
	115	1					E		A	1	A	2	A	1	A	1	4
	047	1							A	0	E		A	0	A	0	3
	048	1	E		A	1	E		E		A	0	A	0	A	0	4
	613	1	E		E		E		gone								0
	049	1	E		E		E		A	0	A	1	A	0	A	0	4
	050	2	A	0	A	0	A	2	E		A	0	E		A	0	5
	051	1	E		E		E		A	0	A	1	A	0	E		3
	052	1	E		E		E		E		A	2	A	0	E		2
	053	1	E		A	1	E		A	0	E		E		E		2
	054	2	E		E		E		A	1	A	0	A	0	A	1	4
	055	1							A	1	A	1	E		E		2
	614	1			A	0	rem		gone								1
	056	1											A	2	A	1	2
	057	2	E		E		A	1	A	1	A	0	E		E		3
	058	1	E		A	0	E		E		E		E		A	1	2
	059	2	A	0	E		A	1	A	1	A	2	A	0	A	2	6
	060	1							A	0	A	0	A	1	E		3
	615	1	A	0	E		A	0	E		E		E		rem		2
	616	3	E		A	0	A	0	A	2	A	2	A	1	A	0	6
	617	1	E		E		E		E		E		A	0	rem		1
	618	1											E		E		0
	619	1	E				A	1	E		E		E				1
	063	2	A	0	A	1	A	0	A	0	E		A	0	A	2	6
	064	1	E		E		E		E		E		E		E		0
	065	1	E		E		E		E		E		E		E		0
	066	1			E		A	0	A	1	E		E		A	2	3
	067, 068	2											A	0	A	0	2

Topographic Map	Nest Site	No. Nests	Status 1997 28 May	1997 17 Jul	1998 28 May	1998 28 Jul	1999 27 May	1999 28 Jul	2000 24 May	2000 29 Jul	2001 1 Jun	2001 27 Jul	2002 29 May	2002 16 Jul	2003 27 May	2003 24 Jul	Years Active
Juneau D-4	069	1	A	2	E		E		E		E		E		E		1
	070	2	A	0	A	1	A	1	A	0	A	1	A	2	A	0	7
	071	1					E		E		E				E		0
	072	1	E		E		E		E		E		A	0	A	0	2
	073	1							A	0	E		A	1	E		2
Juneau D-3	620	1	E		E		A	0	A	0	E		A	2	A	1	4
	621	1											A	gone			1
	116	1	A	0	A	0	E		E		E		A	1	E		3
	117	1	E		E										E		0
	622	1													A	0	1
	623	2	A	0	A	0	A	0	A	0	A	1	A	1	E		6
	624	1	A	0	E		E		E		A	1	A	0	A	1	4
	625	1	A	1	A	0	A	1	E		A	gone					4
	626	1					E		E		A	0	A	0	E		2
	627	1	A	1	A	0	A	1	E		E		A	0	A	0	5
	118	1													?	E	0
	628	1	A	gone													1
	629	1	A	0	E		E		A	1							2
	074	1	E		E		E		E		E		E		E		0
	119	1											A	0	A	1	2
	076	1	E		E		E		E		A	2	E		E		1
	120	1	E		A	0	A	0	E		E				A	2	3
Juneau C-3	077	1	E		E		E		A	0	E		E		E		1
	078	1									E		A	1	A	1	2
	079	1	E		E		E		A	1	A	1	A	1	E		3
	080	1	E		E		E		E		E		E		E		0
	081	1			A	0	E		E		A	2	A	2	E		3
	082	1	E												A	2	1
	630	1	E		E		E		E		gone						0
	631	1	E														0
	083	1							E		E				E		0
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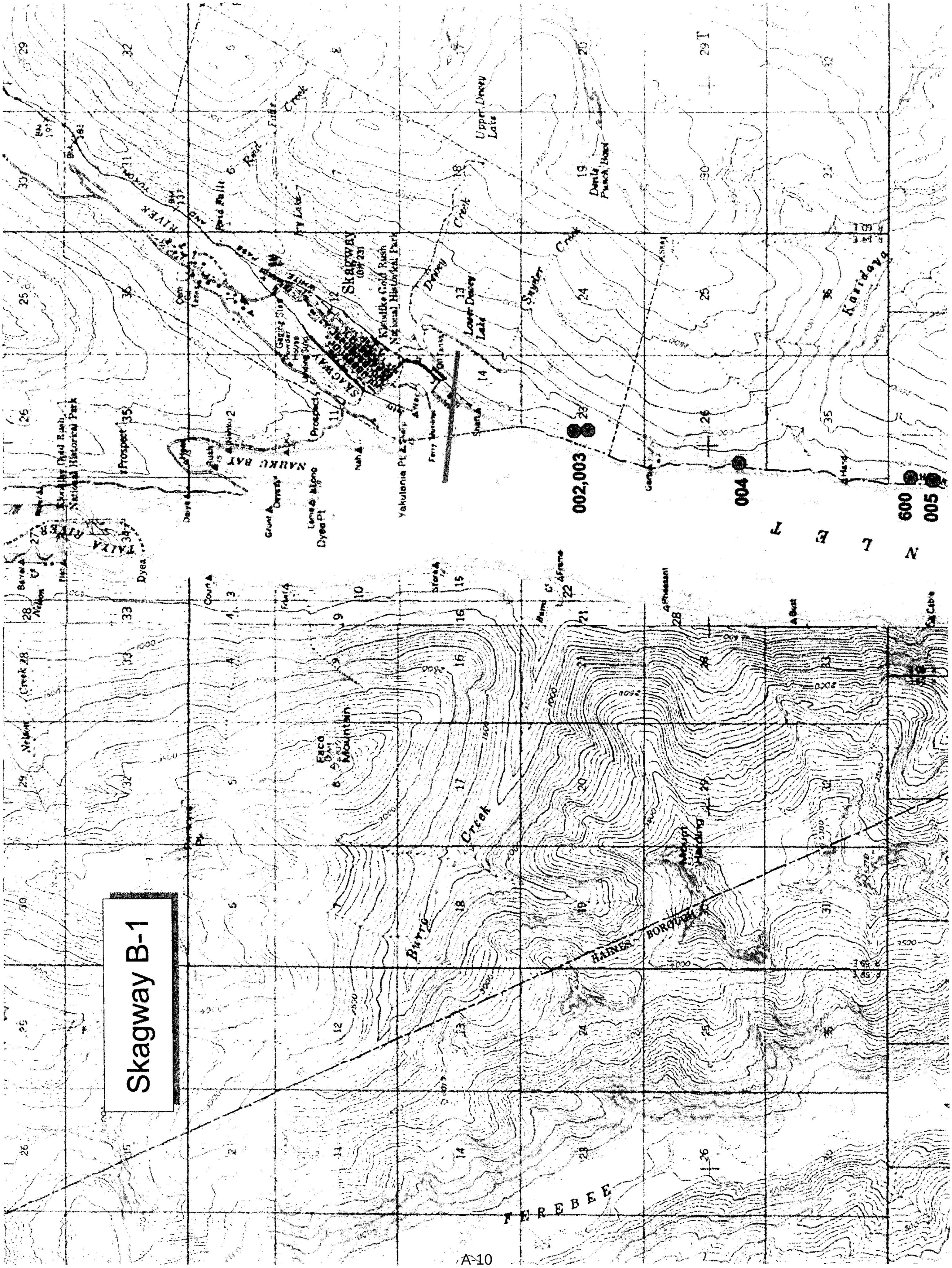

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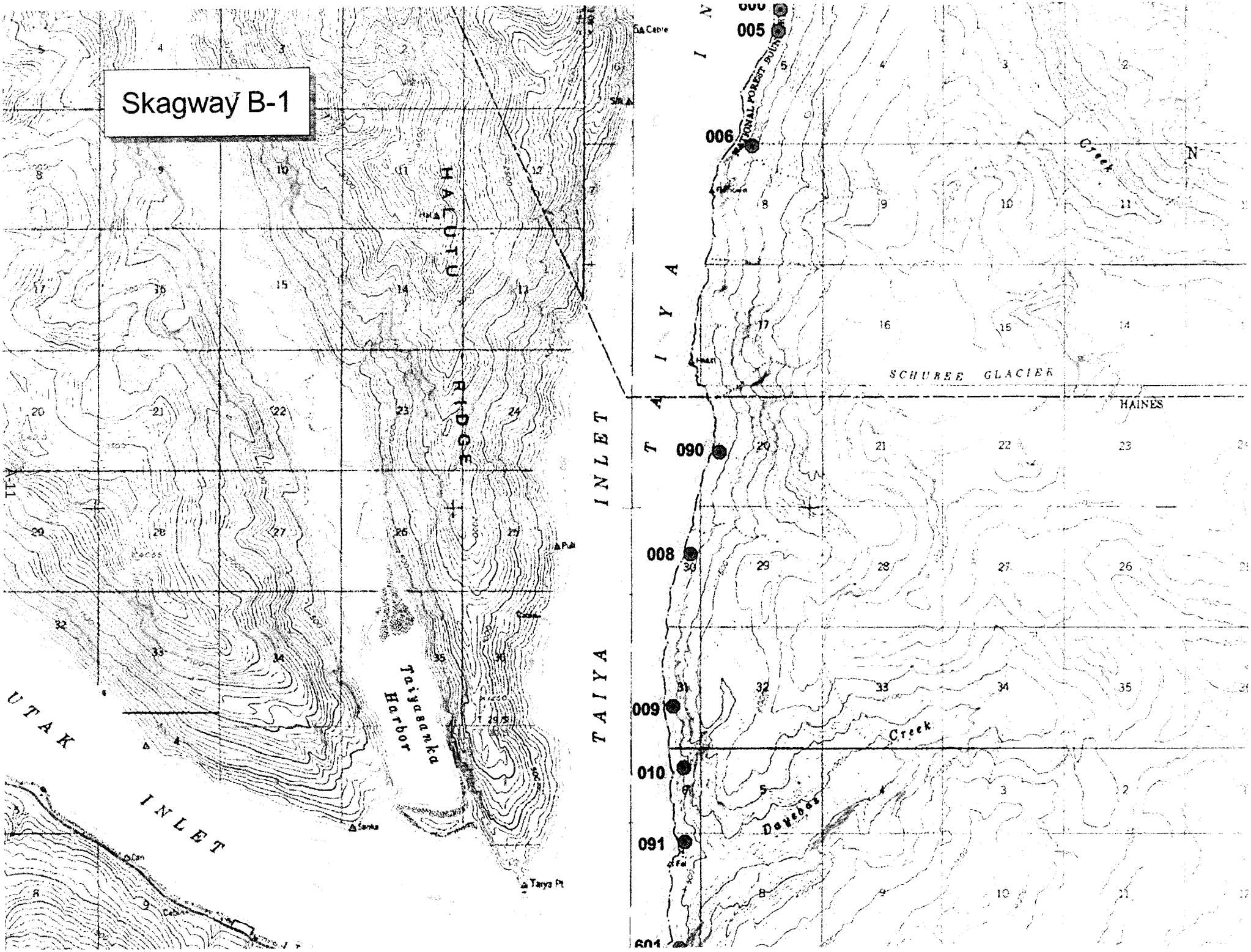
004
009
005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TAIYA INLET
UTAK INLET
HAINES HIGHWAY
Taiyaganka Harbor
Dayebas Creek
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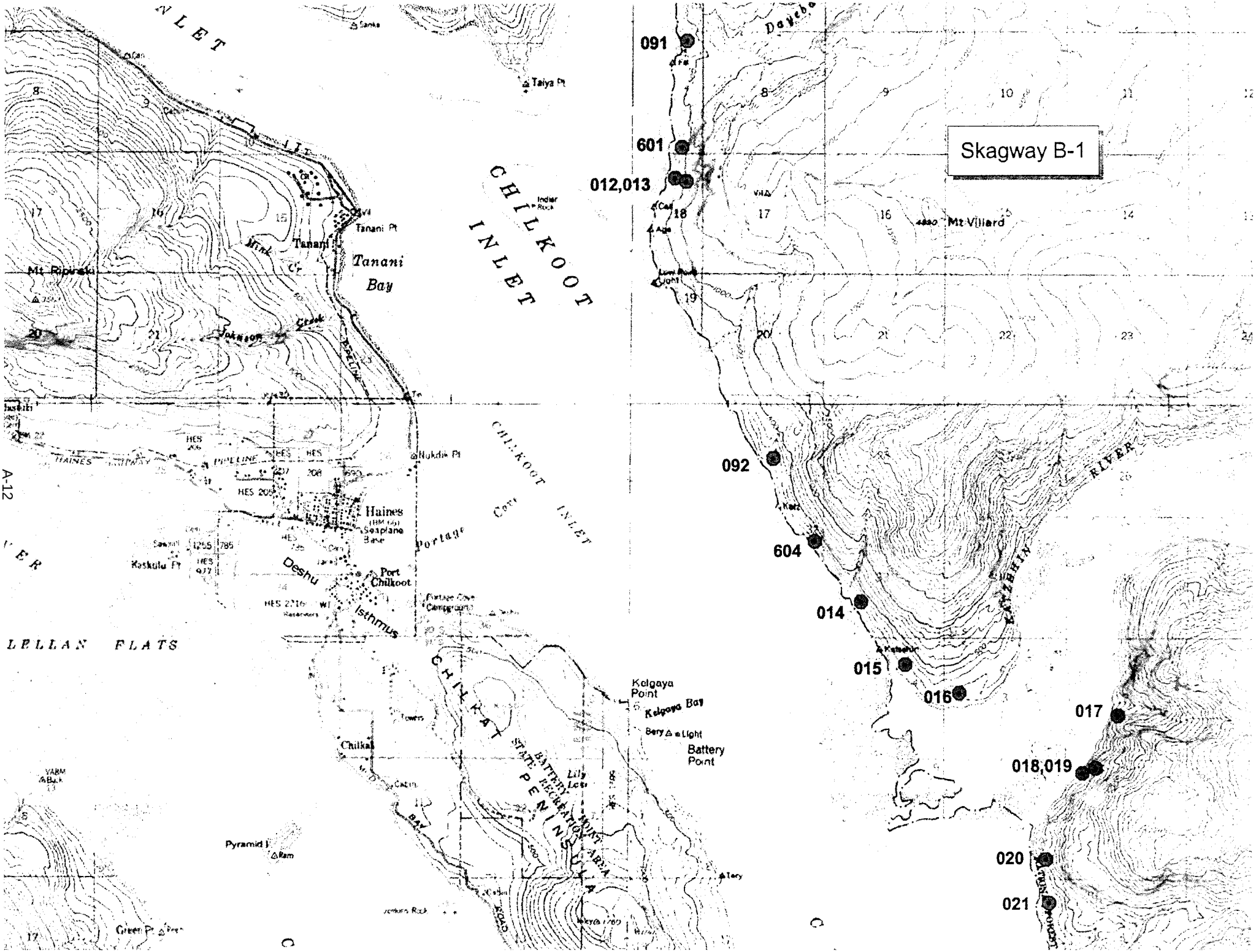
006
090
008
009
010
091
601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014
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017
018,019
020
021
CHILKOOT INLET
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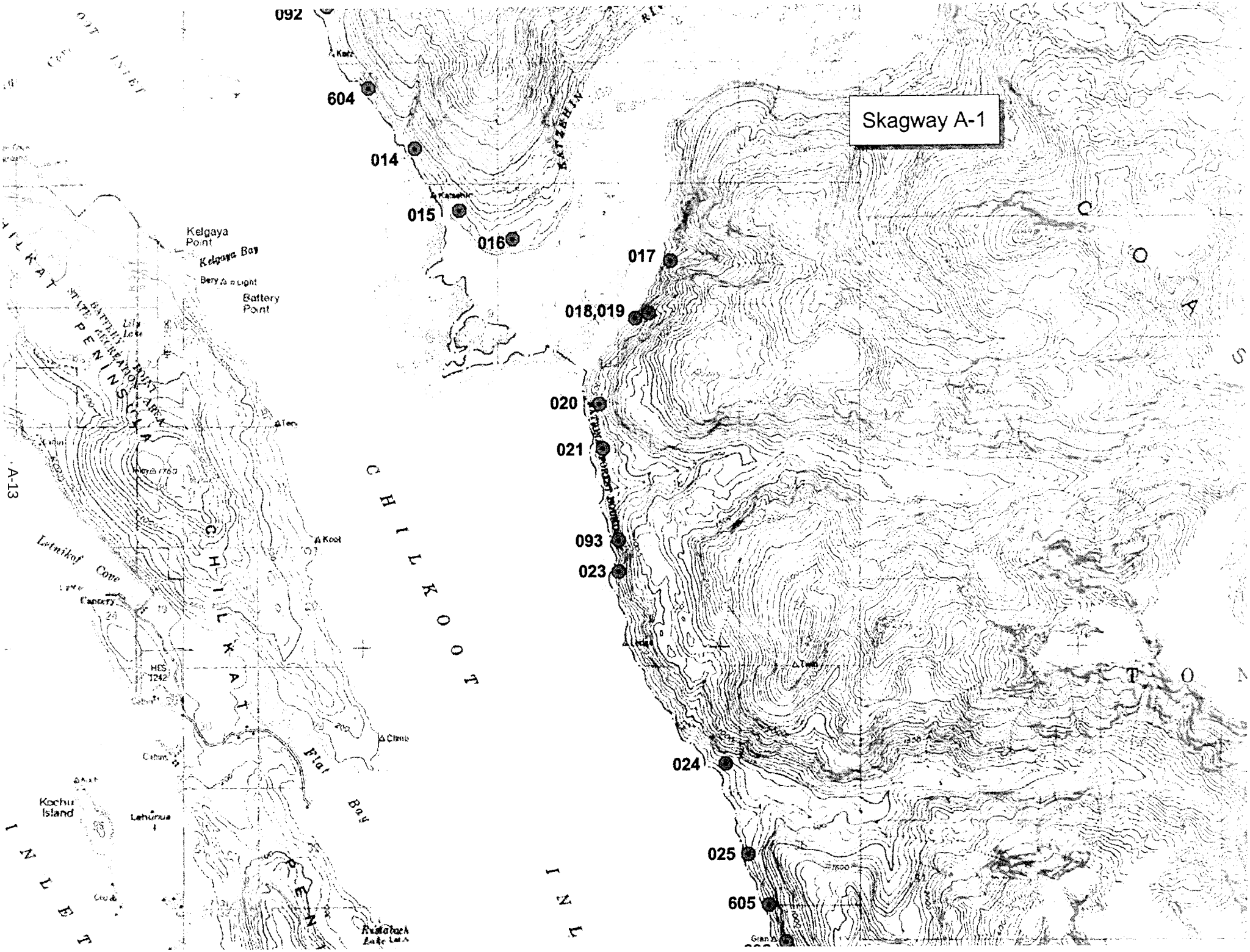
Tanani Pt
Mink Cr
Mt Ripinski
Jakuon Creek
Haines
Nukdik Pt
Deshu
Port Chilkoot
Isthmus
Portage Cove
Portage Cove Campground
Kaskulu Pt
LELIAN FLATS
CHILKAT STATE PARK
CHILKAT PENINSULA
Battery Point
Kolgaya Point
Kolgaya Bay
Lily Lake
Pyramid I
Green Pt
Mt Villard
KAYLEHIN RIVER
A-12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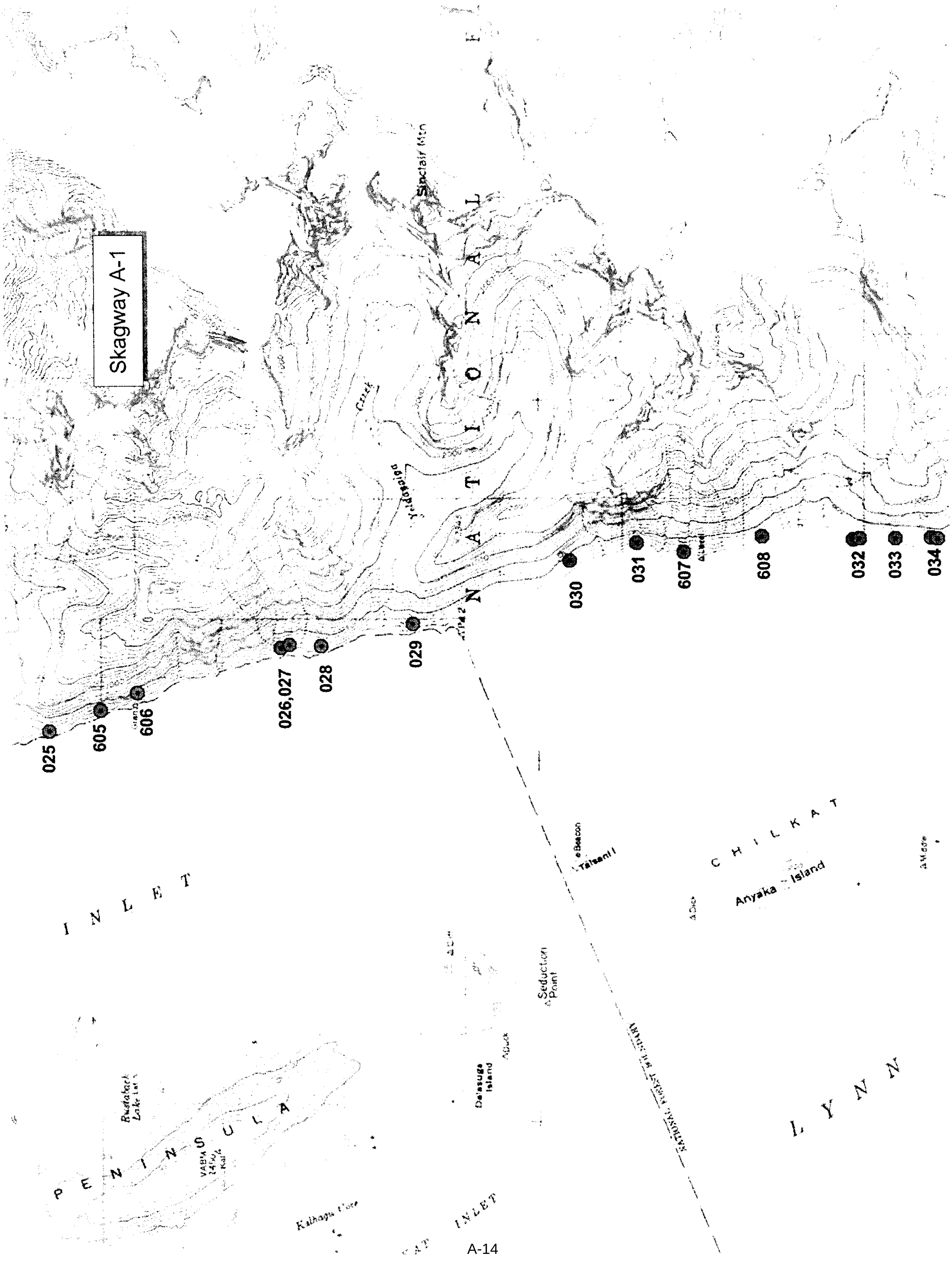
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608
032
033
034
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N A T I O N A L
I N L E T
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P E N I N S U L A
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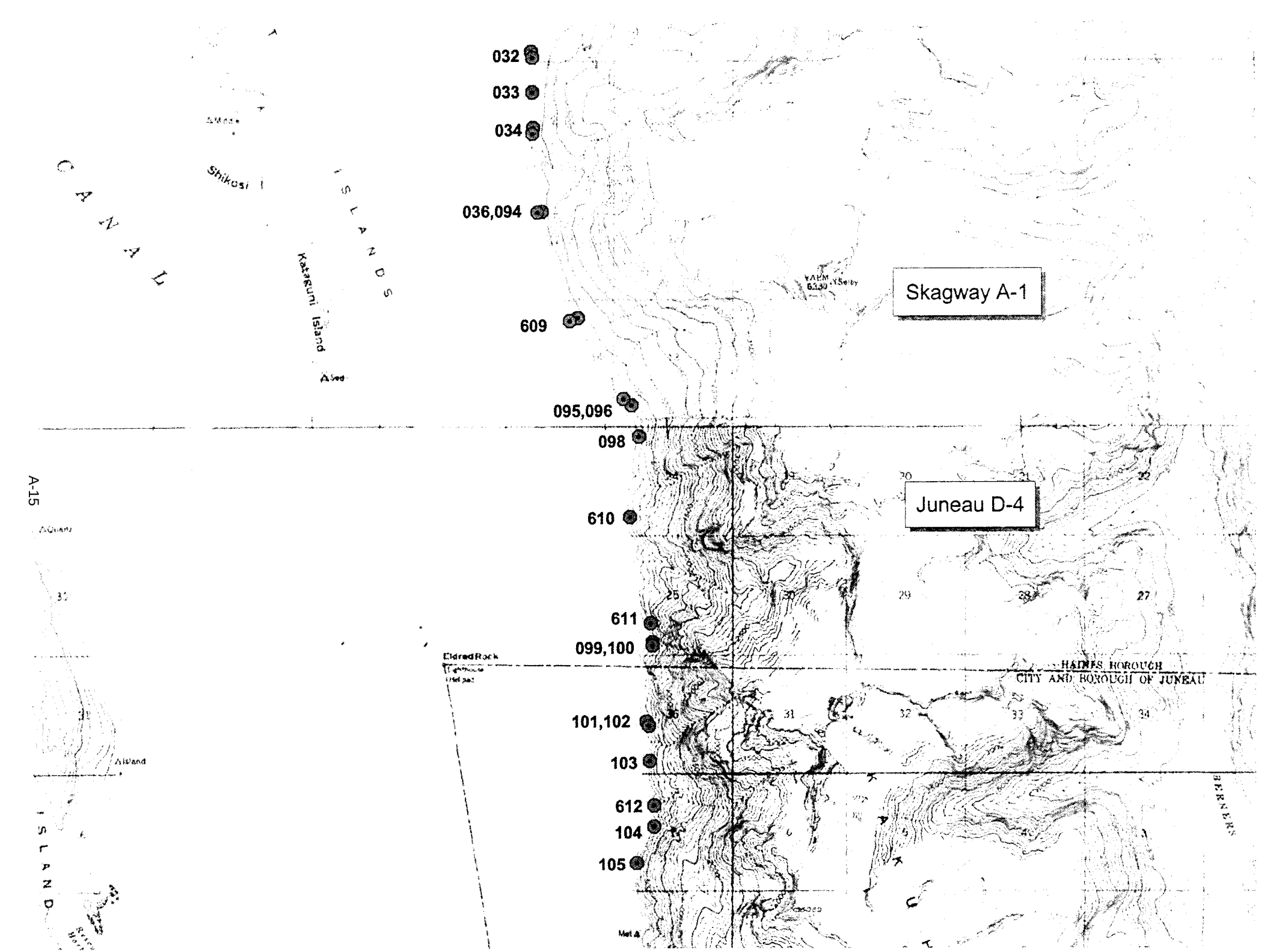
Seduction Point
Tatsani I
Kalhagu Cove
I N L E T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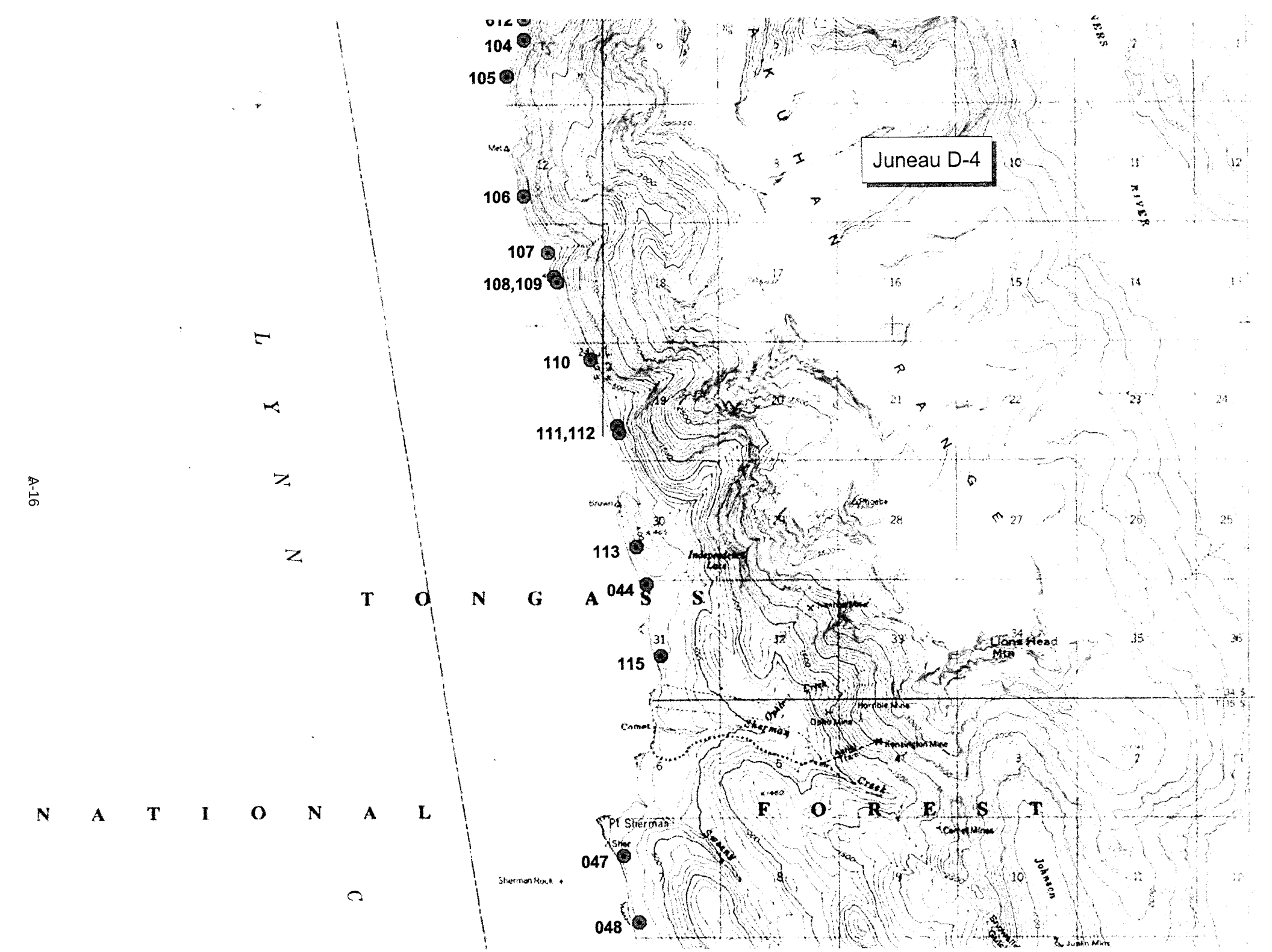
Juneau D-4
HAINES BOROUGH
CITY AND BOROUGH OF JUNEAU
Shikosi I
Kasaguni Island
Eldred Rock
A-15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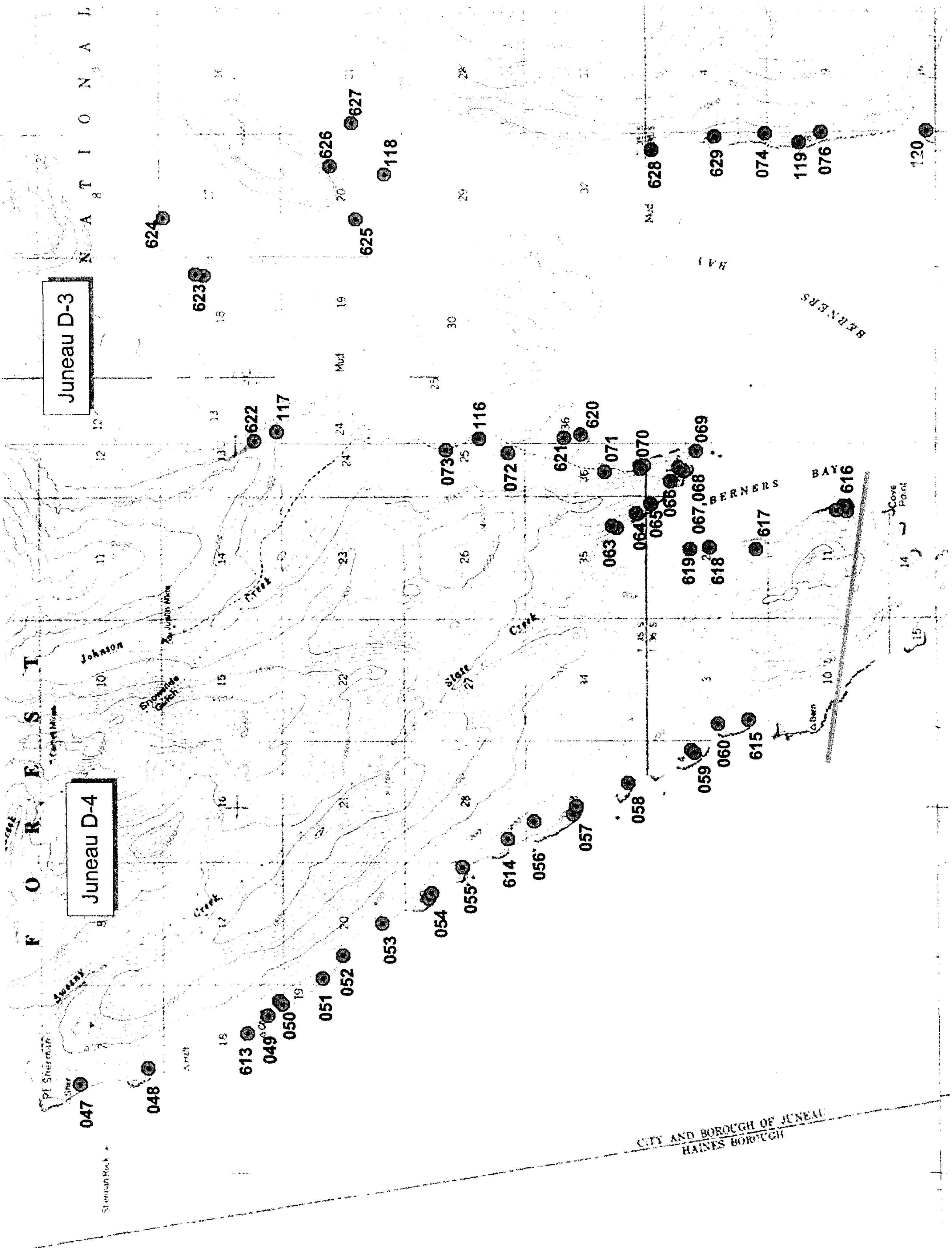
RIVER
RANGE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BAY
Cove Point
Pt Sherman
CITY AND BOROUGH OF JUNEAU
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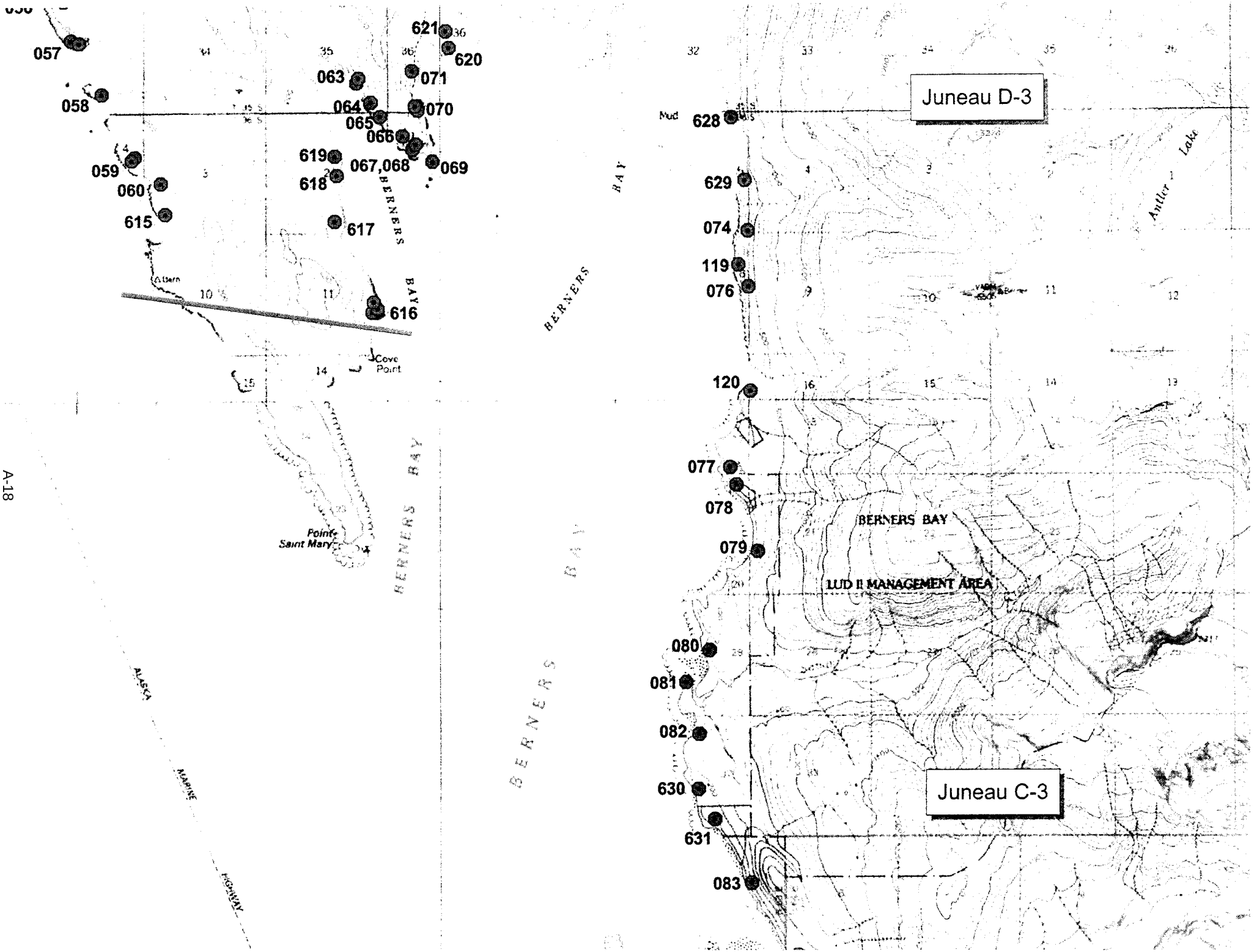
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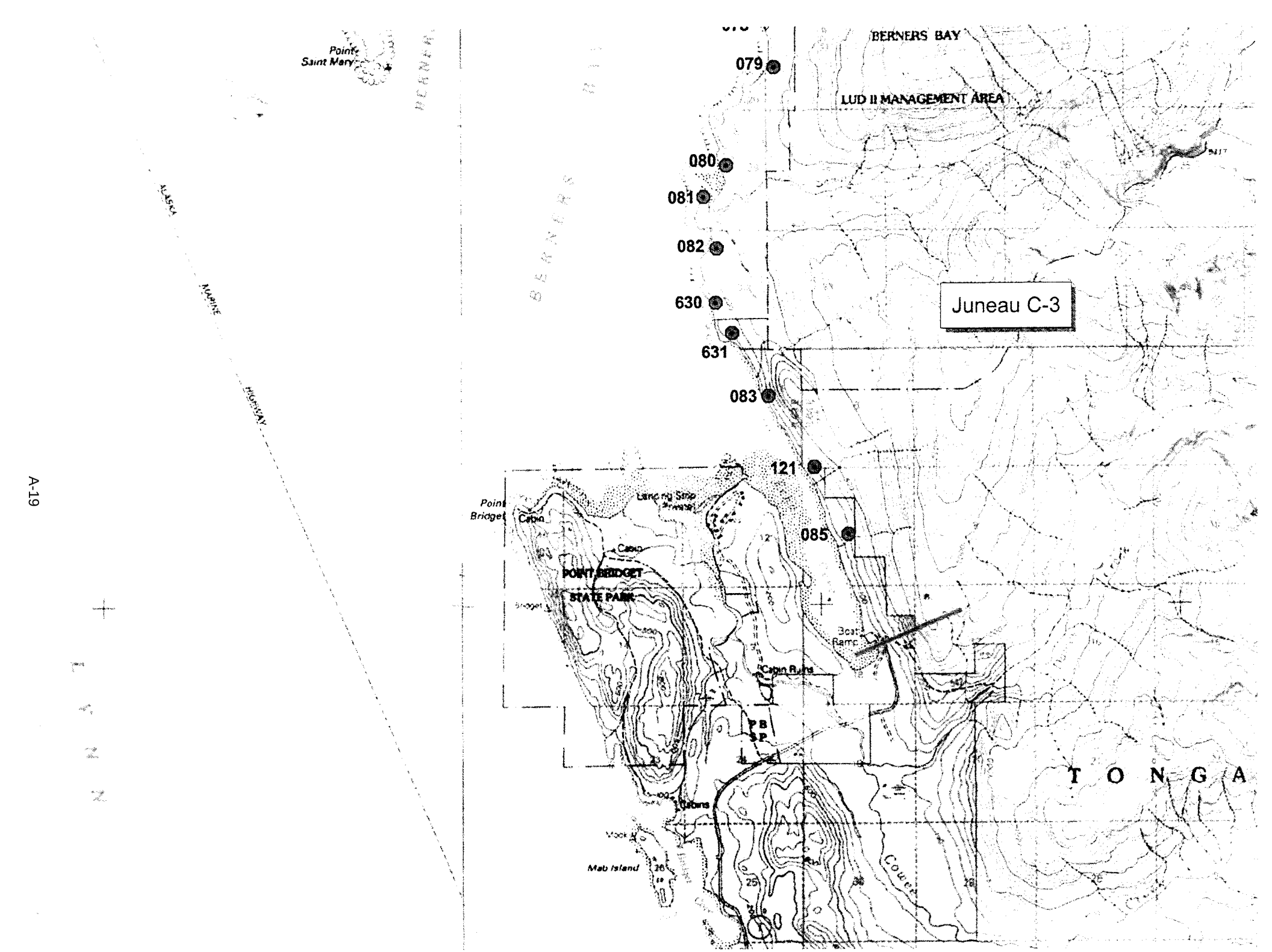
LUD II MANAGEMENT AREA
Point Saint Mary
Cove Point
Antler Lake
ALASKA
MARINE
HIGHWAY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Juneau C-3
Point Saint Mary
Point Bridget
POINT BRIDGET STATE PARK
Cabins
Mab Island
T O N G A
BERNERS BAY
ALASKA
MARINE
HIGHWAY

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
Juneau Field Office - Raptors
3000 Vintage Blvd., Suite 240
Juneau, Alaska 99801-7100
(907) 586-7243

IN REPLY REFER TO:

October 10, 2003

Reuben Yost
Special Projects Manager
Alaska Department of Transportation and Public facilities
6860 Glacier Highway
Juneau, Alaska 99801-7999

Dear Reuben:

The enclosed tables and maps are to be included as supplemental information to the August 30, 2003 report "Bald Eagle Nesting and Productivity at Lynn Canal, Southeast Alaska, 1997-2003."

Two aerial surveys were conducted by helicopter at the west side of Lynn Canal during the 2003 bald eagle nesting season. The first survey, flown 29 May, determined which nests were in active use by eagles. The second survey was flown 25 July to recheck active nests for the presence of young.

I have also included data from 1994 (July 11 and 12) when I conducted a single aerial survey of bald eagle nests at western Lynn Canal from William Henry Bay northward to an end-point 1 km beyond Pyramid Harbor (see enclosed map Skagway A-2). The 2003 survey area was expanded to include approximately 18 km of shoreline on both sides of the Chilkat River delta.

The terminology used in the tables is as follows:

Nest site = an unspecified area immediately surrounding a nest tree. A nest site may contain more than one nest, which may be used by a breeding pair of eagles in different years.

Active nest = a nest with eggs or an adult on the nest in incubation posture.

Successful nest = a nest containing one or more young in July.

A = active nest.

E = empty nest.

Remnant = a nest which is considered in unusable condition.

Status 0, 1, 2 = number of young.

Status 1-2 = at least one young was seen at the nest but the exact number was not determined (assumed to be no more than two, since a nest containing 3 young is uncommon in Southeast Alaska).

A "blank" in the 1994 column of Table 2 means the nest was not known to exist at that time. Nest sites with number 300 series are nests with GPS locations obtained in 2003.

Please let me know if you have any questions.

Sincerely,

Mike Jacobson

Mike Jacobson
Wildlife Biologist

TABLE 1. BALD EAGLE PRODUCTIVITY AT WESTERN LYNN CANAL, SOUTHEAST ALASKA.

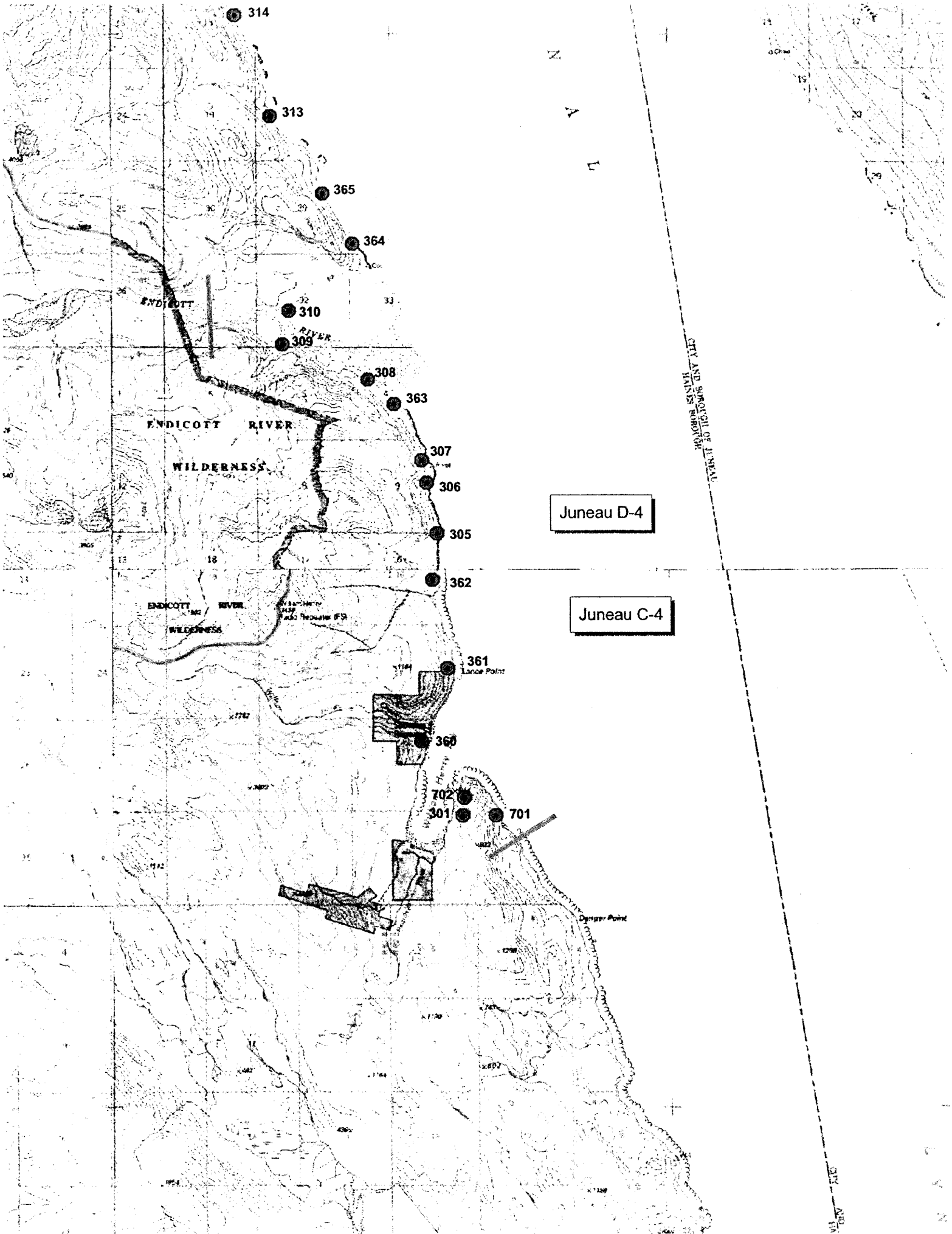
	1994	2003
Nest sites surveyed	43	53
Active nests		22 (42%)
Successful nests	18 (42%)	10 (19%)
% active nests successful		45
Young	25-31	14
Young / active nest		0.64
Young / successful nest	1.39-1.72	1.40

Table 2. Location, nest site number, and reproductive status of bald eagle nest sites at western Lynn Canal, 1994 and 2003.

Topographic Map	Nest Site	No. Nests	Status 1994 11-12 July	Status 2003 29 May	Status 2003 25 July
Juneau C-4	701	1	1-2	A	0
	702	1	2	not found	
	301	1	not found	E	
	360	1	1-2	A	0
	361	1	2	A	1
	362	1	2	A	0
Juneau D-4	305	1	E	E	
	306	1	E	E	
	307	1	E	E	
	363	2	1-2	E	
	308	1		E	
	309	1		E	
	310	1		A	0
	364	1		A	0
	365	1	1	A	2
	313	1	E	E	
	314	1		E	
	703	1	E	remnant	
	317,366,315	3	2	E	
	318	1	1-2	E	
	319	1	2	A	1
	320	1	1-2	E	
	321	1	E	E	
	322	1	E	E	
	323	1		A	2
Juneau D-5	704	1	E	not found	
	705	1	E	not found	
	324	1		E	
	706	1	1	not found	
	326	1		E	
	707	1	E	not found	
	327	1	E	E	
	708	2	E	E	
	369	1	1	A	2
	709	1	1-2	not found	
	330	1	not found	remnant	
	331	1		E	
	370	1	E	A	2
	333	1	E	A	1
	334	1	1	E	

Table 2. Continued.

Topographic Map	Nest Site	No. Nests	Status 1994 11-12 July	Status 2003 29 May	Status 2003 25 July
Skagway A-2	371	1	E	E	
	710	1	E	remnant	
	711	1	2	not found	
	712	1	E	not found	
	713	1	E	remnant	
	372	1	E	E	
	335	1	E	E	
	336	1	not found	E	
	714	1	2	not found	
	337	1		E	
	338	1	E	E	
	339	1	1-2	E	
	340	1		E	
	341	1		E	
	342	1	E	A	0
	715	1	E	not found	
	343	1	E	A	1
	344	1	E	A	0
	345	1	1	E	
	373	2		A	0
	346	1	not surveyed	A	0
	347	1	not surveyed	remnant	
	348	1	not surveyed	A	1
	349	1	not surveyed	A	1
	350, 351	2	not surveyed	A	0
	716	1	not surveyed	A	not surveyed
	352, 353	2	not surveyed	A	0
	354	1	not surveyed	E	
	717	1	not surveyed	not surveyed	
	718	1		not surveyed	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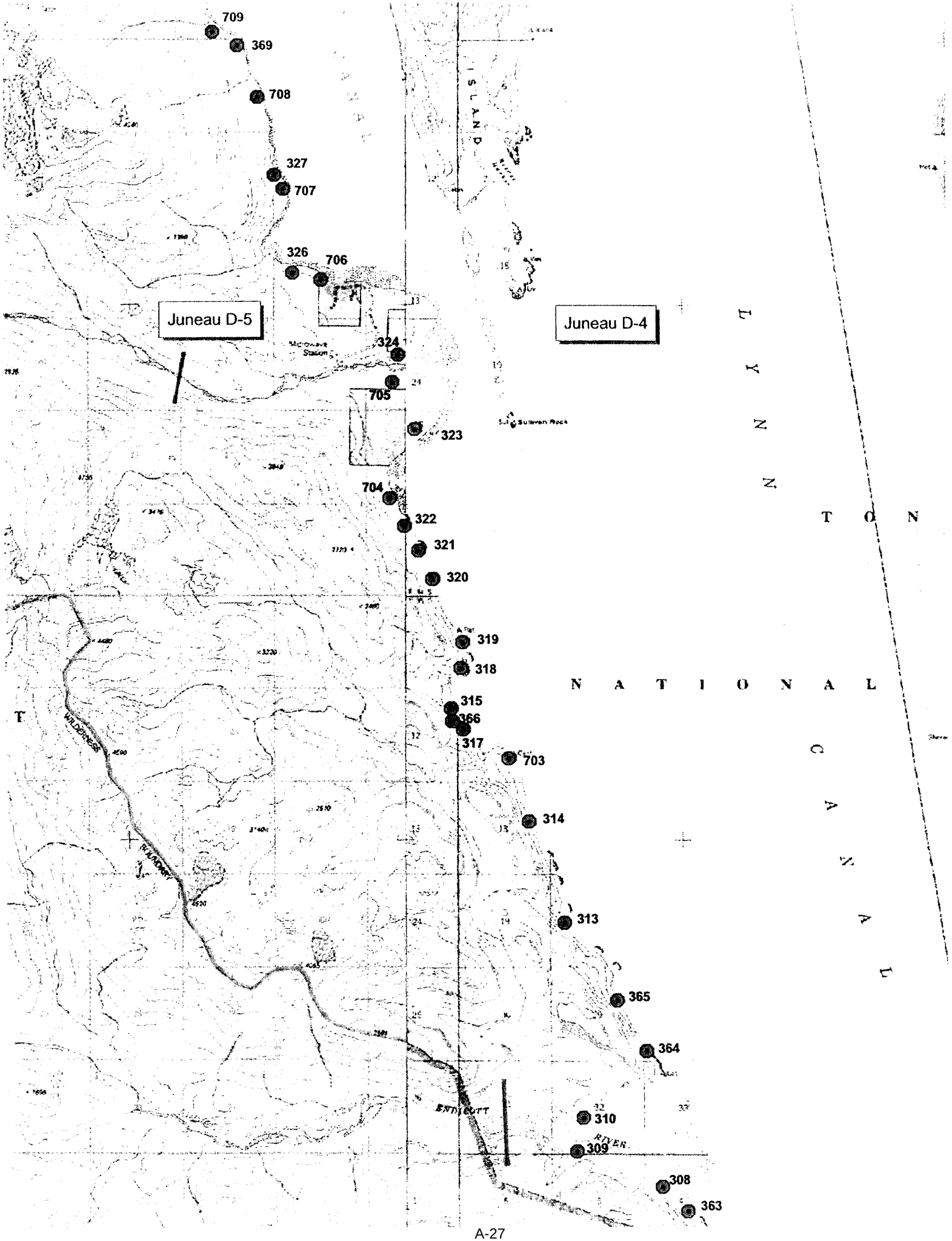
WILDERNESS
Juneau D-4
Juneau C-4
Lance Point
Danger Point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Juneau D-4
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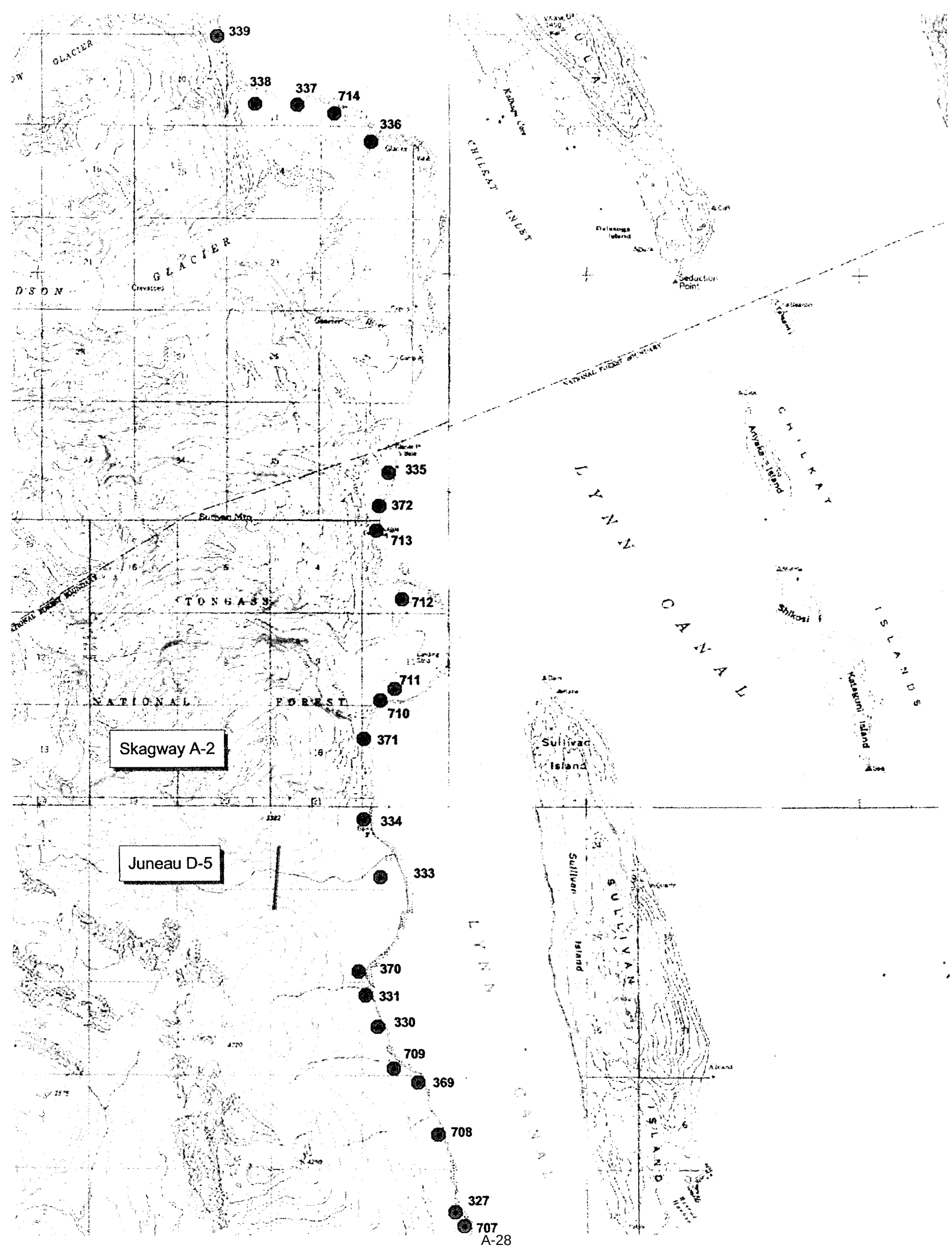
TYNNTON
NATIONAL
CANAL
WILDERNESS
ROADWAY
ENTRANCE
RIVER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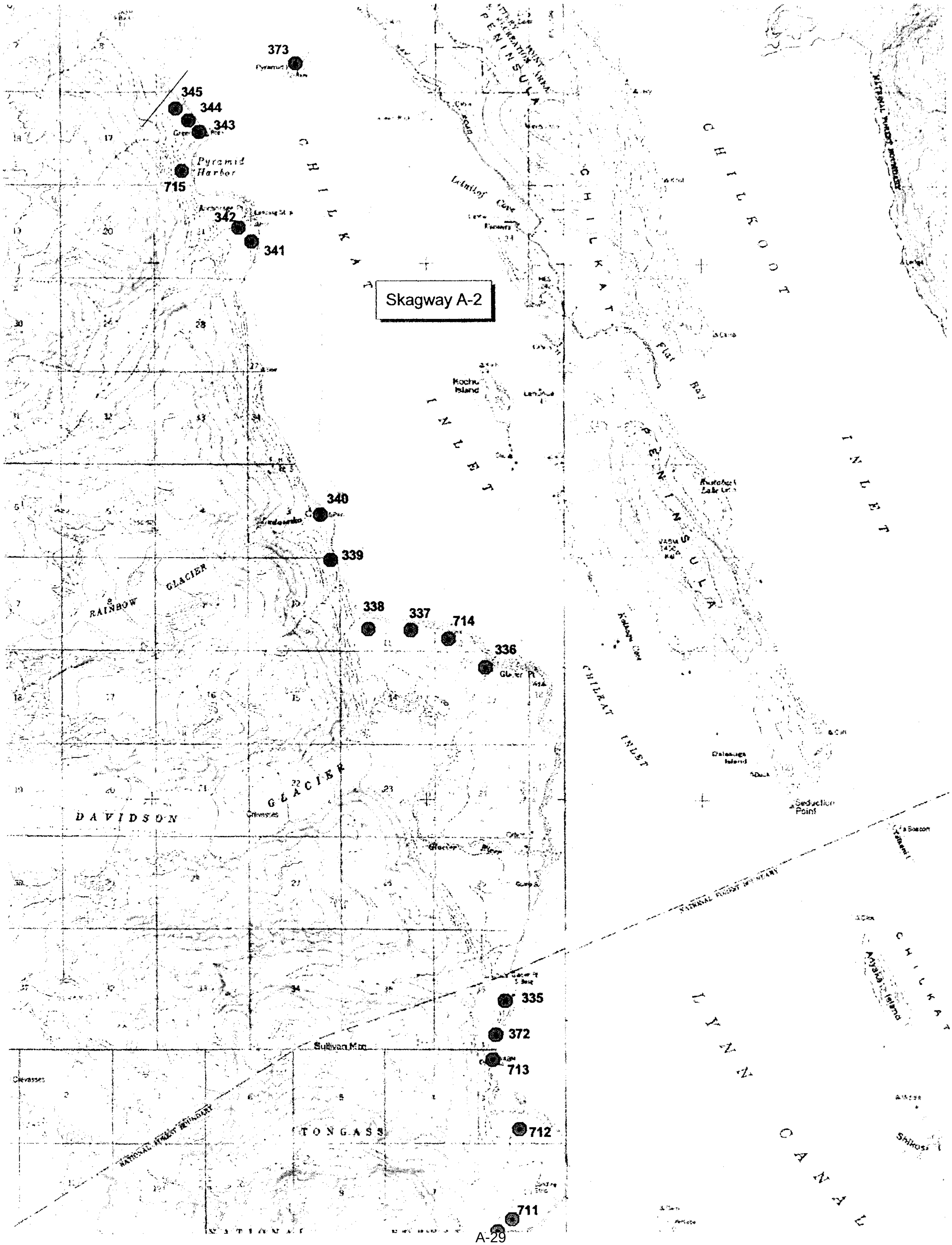
707
Skagway A-2
Juneau D-5
NATIONAL FOREST
TONGASS
GLACIER
CHILKAT INLET
Seduction Point
Sullivan Island
Shikosi Island
Katakumi Island
Aiyansh Island
CHILKAT ISLANDS
SULLIVAN ISLAND


Skagway A-2
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Pyramid Harbor
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337
714
336
Glacier Pt
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712
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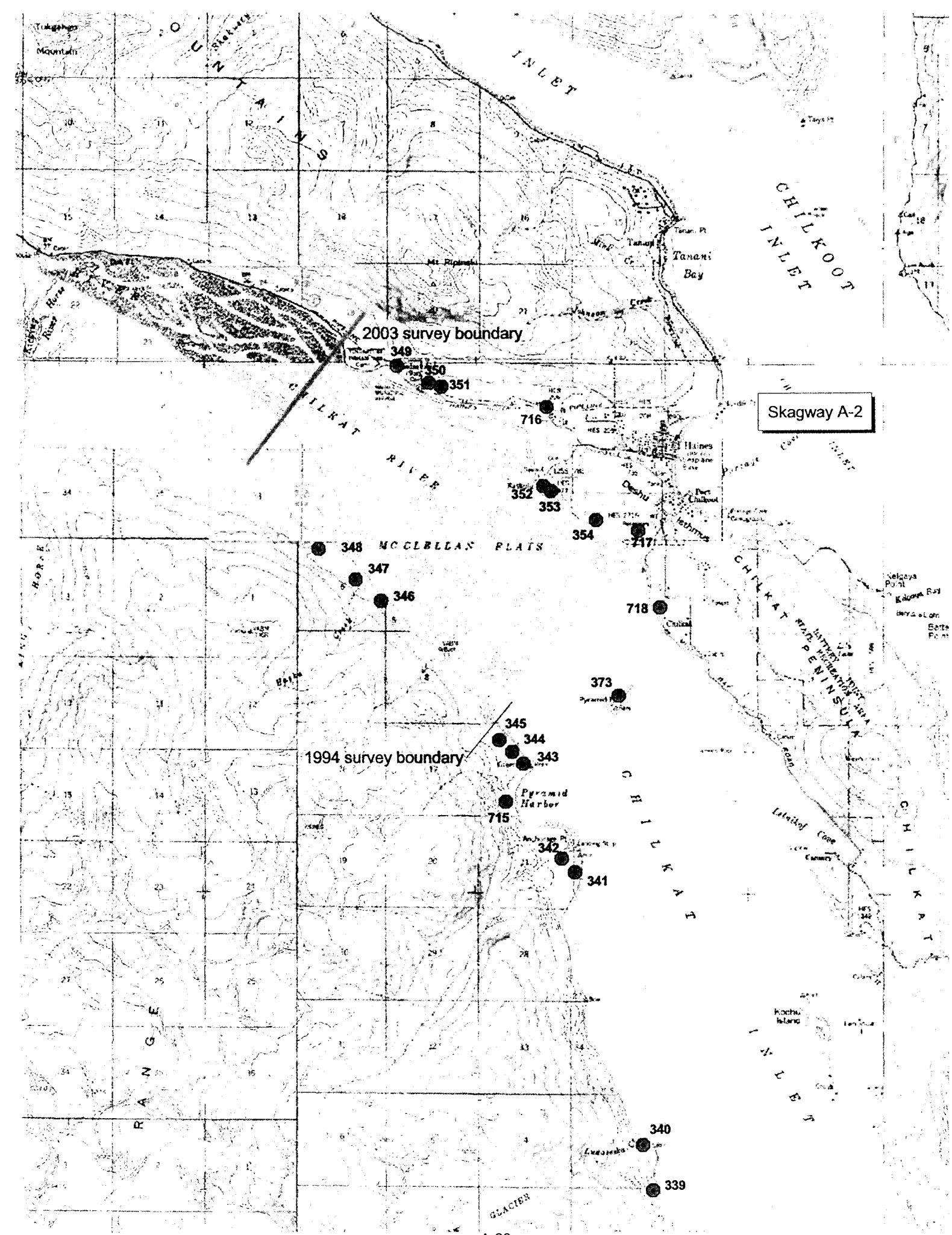
CHILKAT INLET
CHILKOOT INLET
CHILKAT PENINSULA
LYNN CANAL
RAINBOW GLACIER
DAVIDSON GLACIER
TONGASS
Sullivan Mtn
Seduction Point
NATIONAL FOREST BOUNDARY
Flat Bay
Kochu Island
Crevasses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1994 survey boundary
Skagway A-2
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McCLELLAN PLAIN
CHILKAT RIVER
CHILKOOT INLET
Tanani Bay
Haines
Port Chilkoot
Pyramid Harbor
CHILKAT PENINSULA
CHILKAT RANGE
GLACIER

ATTACHMENT B

BALD EAGLE NEST LOCATIONS, OFFSET DISTANCES, AND REALIGNMENT CONSTRAINTS – EAST AND WEST LYNN CANAL

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Table B-1
Eagle Nest Locations Within 0.5 Mile of Construction Zone
East Lynn Canal (Alignment as of 17 December 2003)

Station No.	Project Nest No.	USFWS Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
126+05	085	FWS #4	382	Not Applicable
174+22	121	FWS #90	357	Not Applicable
198+10	083	FWS #65A	335	Not Applicable
233+01	052	FWS #65	>335	Not Applicable
270+75	082	FWS #30B	1,361	Not Applicable
291+36	081	FWS #30A	2,194	Not Applicable
306+17	080	FWS #30	1,384	Not Applicable
361+15	079	FWS #31	333	Not Applicable
383+82	078	FWS #32	1,609	Not Applicable
396+63	077	FWS #32A	1,637	Not Applicable
422+10	120	FWS #8	686	Not Applicable
464+74	076	FWS #2	44	Nest is located on top of cliff overlooking deep water to the west and at the base of steep rock knob. The alignment was moved uphill as far as possible onto a narrow bench at the base of the rock knob.
476+89	119	FWS #4A	157	Nest is located on top of cliff overlooking deep water to the west and at the base of cliffs. The alignment was moved uphill as far as possible onto a bench at the base of the cliffs.
487+97	074	FWS# 4	104	Held uphill alignment forced by nests FWS#4 and FWS#4A. Downhill alignment would have been in buffer area with cut slopes daylighting close to the tree.
678+81	625	601	2,257	Not Applicable
776+85	073	FWS#?	>330	Not Applicable
795+99	116	FWS #7	775	Not Applicable
817+18	072	FWS #69	1,211	Not Applicable
852+56	711	FWS # 102A	685	Not Applicable
857+31	593	5931	1,206	Not Applicable
857+79	070	FWS #102	1,834	Not Applicable
862+69	066	FWS #46C	1,706	Not Applicable
864+98	064	FWS #46	831	Not Applicable
865+01	065	FWS #46B	1,315	Not Applicable
876+56	063	FWS #46A	517	Not Applicable
1029+37	057	FWS #99	2,122	Not Applicable
1041+71	056	FWS #97A	962	Not Applicable
1074+71	055	FWS #97	729	Not Applicable
1102+10	054	FWS #89	910	Not Applicable
1120+26	053	FWS #64	439	Not Applicable

Table B-1 (continued)
Eagle Nest Locations Within 0.5 Mile Of Construction Zone
East Lynn Canal (Alignment As Of 17 December 2003)

Station No.	Project Nest No.	USFWS Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
1139+83	052	FWS #65	417	Not Applicable
1153+64	051	FWS #96	749	Not Applicable
1175+57	050	FWS #95	707	Not Applicable
1187+70	049	FWS #94	593	Not Applicable
1244+72	048	FWS #27	709	Not Applicable
1273+08	047	FWS #83	498	Not Applicable
1362+83	115	FWS #57	82	The nest buffer encompasses the beach and an uphill bench at the base of steep terrain. The beach alignment would have had cuts into the cliff face below the nest tree, so the alignment was set on the east edge of the bench uphill from the nest.
1399+02	114	FWS #82	113	This nest is on the base of a rock knob overlooking a beach area. Alignments on either side of the tree would enter the buffer. The beach alignment was chosen for it's smaller footprint (fill vs. rock cuts) and to avoid encroachment into nest FWS#81 buffer.
1418+25	113	FWS #81	355	Not Applicable
1464+34	111	FWS #81A	296	Nest sets at the bottom of very steep terrain, with relatively gradual slope down to the beach. Alignment on the outer edge of buffer on the beach.
1465+48	112	FWS #81B	366	Not Applicable
1512+76	110	FWS #80	76	Nest is in the middle of a wide bench between deep water beach and very steep terrain. Alignment set a back edge of bench at the base of the steep terrain.
1531+51	109	FWS #79A	110	Nest on narrow bench a short distance from waterside cliffs and deep water to the west and steep terrain to the east. The alignment loops uphill to the base of a cliff in the steepest part of the slope to minimize encroachment.
1534+44	108	FWS #79	133	Close to nest FWS#79, it is on a narrow bench a short distance from waterside cliffs and deep water to the west and steep terrain to the east. The alignment loops uphill to the base of a cliff in the steepest part of the slope to minimize encroachment.
1560+62	107	FWS #78	109	Nest located on very steep hillside 160' from beach. Alignment spotted on bench near beach.
1592+78	106	FWS #32	291	Nest located at top of beach cliff into deep water. Alignment set as far as possible to the east at the base of very steep slope.
1635+07	105	FWS #77	71	Nest positioned midway between beach and base of very steep slope. Alignment set at the base of the steep slope.
1655+13	104	FWS #77A	86	Nest positioned midway between beach and base of very steep slope. Alignment set below nest and just above the beach.

Table B-1 (continued)
Eagle Nest Locations Within 0.5 Mile Of Construction Zone
East Lynn Canal (Alignment As Of 17 December 2003)

Station No.	Project Nest No.	USFWS Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
1661+72	125	FWS# 84A	67	Located above the roadway on a steep ridge at the edge of an avalanche chute.
1677+21	103	FWS #84	88	Nest located on a wide bench about 2/3^{rds} the way from the beach to very steep terrain. The alignment is set at the beach for minimum buffer encroachment.
1694+53	101	FWS #93A	217	Nest is under cliffs in very rugged terrain. Alignment on the beach to minimize buffer encroachment.
1698+54	102	FWS #93	76	Nest on a 100' wide bench between the beach and very difficult terrain. Alignment on the beach to minimize buffer encroachment.
1742+64	100	FWS #76	152	Nest located high on very steep terrain. Alignment on the beach to minimize encroachment.
1751+69	099	FWS #75	93	Nest is at the top of beach cliff above deep water. East buffer is in very steep terrain. Alignment is at the base of the steep terrain.
1773+97	123	FWS #?	252	Nest is on rock point overlooking deep water. Alignment set as far a possible on the uphill slope and still make it onto the bench below the cliffs ahead online, an so, under next nest ahead on line.
1787+04	124	FWS #?	91	Nest is on steep terrain under cliffs. Alignment is on downhill bench just above beach cliffs. Unable to move down to beach because of nest at sta. 1796+44.
1796+44	125	FWS #?	135	Nest at top of cliff overlooking beach. Alignment crosses above nest after climbing from the low alignment required to get around the nest at sta. 1787+04.
1822+89	098	FWS #74	76	Nest is just above the beach cliff and below very steep terrain. Beach fill alignment is the minimum impact alignment that is also necessary to get around nest FWS#38B and FWS#38C.
1839+94	095	FWS #38C	53	Located high on steep terrain. Beach fill alignment provides minimum impact to buffer.
1849+58	096	FWS #38B	94	Located on ridge coming off of steep terrain. Maintained low buffer encroachment alignment dictated by preceding two nests.
1941+64	036	FWS# 37	129	Above nest FWS#41. On bench just above cliff. Extremely steep terrain just before nest prevented an uphill alignment, though an uphill alignment would still have encroached on buffer. Alignment on the beach below cliff.
1941+94	094	FWS#41	33	On bench just above cliff. Extremely steep terrain just before nest prevented an uphill alignment, though an uphill alignment would still have encroached on buffer. Alignment on the beach below cliff.
1985+23	034	FWS #36	190	Nest off beach on steep terrain. Alignment towards uphill limits of buffer at base of cliffs.

Table B-1 (continued)
Eagle Nest Locations Within 0.5 Mile Of Construction Zone
East Lynn Canal (Alignment As Of 17 December 2003)

Station No.	Project Nest No.	USFWS Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
1999+31	033	FWS #35A	99	Alignment set at base of steep terrain on uphill side of nest. Downhill alignment precluded by beach cliffs and beach location of nest FWS#35.
2010+33	032	FWS #35	229	Nest on bench above beach cliffs. Alignment moved uphill to base of steep terrain near outer limits of buffer.
2057+14	608	FWS# 33	140	Nest located above the roadway in steep terrain just to the south of steep knob that extends almost to the beach. The knob and the uphill terrain forced the alignment below the nest.
2089+76	607	FWS# 39B	65	Located at the base of very steep terrain at the back of a bench that extends to tall beach cliffs. Alignment set at the bottom of the beach cliffs.
2108+77	031	FWS#39	56	Nest located on steep hillside. Very steep terrain back on line prevented moving alignment for an uphill encroachment. Beach alignment is the minimum impact alignment.
2133+41	030	FWS #39A	380	Not Applicable
2218+15	029	FWS#32	54	Located at base of extremely steep terrain. Alignment moved as close to the beach as possible.
2254+03	028	FWS #31	76	Nest on bench above initial beach cliff. Alignment set on top of next cliff and at the base of steep terrain.
2273+63	027	FWS #30	97	Located on steep side slope. Extremely steep terrain and nest FWS#29 necessitated dropping the alignment below the nest to the bench just above the beach.
2275+76	026	FWS #29	86	Located on steep side slope. Extremely steep terrain just past this nest necessitated dropping the alignment below the nest to the bench just above the beach.
2326+55	126	FWS #?	123	Located in steep terrain 100' off of deep-water beach. Uphill shift due to Gran Pt. sea lion haulout limited by cliffs.
2343+84	127	FWS #?	93	Alignment determined by downhill sea lion haulout and uphill cliffs.
2385+83	025	FWS #27B	74	Nest located on top of beach cliff over deep water. Uphill alignment shift constrained by cliffs preceding the nest and directly above it.
2427+91	024	FWS #27A	75	Nest on steep hillside below cliffs. Alignment constrained to location by steep terrain before and after the nest and deep-water beach fills.
2526+03	023	FWS #25	94	Nest on bench below very high cliffs. Alignment pinned to location by cliffs before, at and after the nest. Beach goes directly into deep fills precluding dropping below the nest.

Table B-1 (continued)
Eagle Nest Locations Within 0.5 Mile Of Construction Zone
East Lynn Canal (Alignment As Of 17 December 2003)

Station No.	Project Nest No.	USFWS Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
2542+69	093	FWS #24	44	Nest on a very steep slope below cliffs. Alignment confined to a narrow bench below a large cliff. Beach goes directly into deep fills precluding dropping below the nest.
2578+67	021	FWS #44A	139	Nest located on a wide bench above the beach cliff. The alignment is pinned below a cliff preceding the nest and has to drop quickly past the nest to get below a massive vertical face. A downhill alignment would encroach on the buffer and have backslopes daylighting near the base of the tree.
2599+46	020	FWS #44	270	This nest is 350'+ off of the beach on a steep hillside. The alignment stays on the beach to get around the steep bluff that begins at the beach.
2621+38	018	FWS #43	2,602	Not Applicable
2683+08	016	FWS #42	771	Not Applicable
2703+58	015	FWS #23B	340	Not Applicable
2742+08	014	FWS #23A	197	The nest is on the east edge of a wide bench that abuts very tough terrain. Alignment is on the flats of the Katzehin delta in outer limits of the buffer.
2815+63	092	FWS #22	391	Not Applicable
2954+98	013	FWS #15B	118	Nest high on steep slope. Nest FWS#15A is between FWS#15B and beach. Alignment runs above nest and is constrained by the need to stay below the cliffs back and ahead on line.
2956+66	012	FWS #15A	345	Not Applicable
2966+64	601	FWS# 15	136	Nest located above roadway near elevation 400' in steep terrain and in the vicinity of many cliffs. Roadway is on a bench between massive cliffs back on line and drops below nest to get under extreme cliffs ahead on line.
3021+64	091	FWS #6	79	Nest on very steep terrain 150 feet from beach. Alignment runs above nest and is constrained by extremely steep terrain ahead on line.
3050+73	010	FWS #14	59	Nest is high on very steep terrain. Alignment runs below nest and is constrained by the steep terrain back and ahead on line.
3099+89	009	FWS #16A	219	Nest very high up steep slope at the base of vertical faces. Alignment set due to the need to get below the cliffs back on line and above the vertical face at the beach ahead on line.
3136+74	008	FWS #16	30	Nest is on steep terrain under cliffs 160 ft from beach. Alignment runs below nest due to terrain constrains back and ahead on line.
3186+40	090	FWS #13A	104	Nest in steep terrain just off of beach. Uphill alignment runs at the base of cliffs and very steep terrain.

Table B-1 (continued)
Eagle Nest Locations Within 0.5 Mile Of Construction Zone
East Lynn Canal (Alignment As Of 17 December 2003)

Station No.	Project Nest No.	USFWS Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
3340+76	006	FWS #13	119	Nest is very high on steep slope below cliffs. Only alignment option was to go low just above the beach.
3377+57	005	FWS #12A	65	Nest is on first bench just off of beach. Alignment constrained by cliffs on both sides of the nest.
3395+69	600	5414	283	Nest very high up steep slope. Alignment on outer limits of buffer on first bench above deep-water beach.
3468+87	004	FWS #11	272	Nest is just off of beach on steep knob. Alignment is in outer limits of uphill buffer on bench defined by downhill and uphill cliffs.
3544+66	002	FWS #9	457	Not Applicable
3552+36	003	FWS #10	651	Not Applicable

Notes: FWS #? – number not assigned

Table B-2
Eagle Nest Locations Within 0.5 Mile of Construction Zone
West Lynn Canal (Alignment as of 17 December 2003)

Station No.	Project Nest No.	USDA Forest Service Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
4064+37	360	FWS #8	164	Alignment on bench uphill from nest to get around rock knob ahead on line. Beach alignment would have encroached on buffer and increased the impacts to FWS#9.
4104+94	361	FWS #9	155	Nest on east edge of bench overlooking beach. Beach alignment would have had cut daylighting near base of tree. Alignment at base of mountain uphill from tree.
4155+80	362	FWS #57	139	Buffer encroachments on beach and uphill alignments. Chose lesser impact on uphill bench at base of hill.
4183+90	305	FWS #6	93	Nest overlooking beach at the end of a ridge. Beach alignment would most likely be a "take". Chose an uphill thru-cut.
4215+11	306	FWS #7	101	Nest overlooking beach on the south-facing slope of ridge that extends to the beach. Beach alignment would have had cut daylighting near base of tree. Moved alignment uphill as far a possible into a thru-cut.
4226+52	307	FWS #68	85	Nest overlooking beach on the north facing slope of ridge that extends to the beach. Beach alignment would have had cut daylighting near base of tree. Alignment exits thru-cut from FWS#7 and runs along the back edge a bench uphill from the nest.
4263+10	363	FWS #43	381	Not Applicable
4291+48	308	FWS #43A	81	Nest on top of cliff overlooking Endicott R. Uphill alignment at base of mountain gives greatest offset from nest and best approach for Endicott R. bridge.
4364+18	364	FWS #9	177	Nest at base of cliff and on beach. This is a karst area. Alignment set at base of mountain as far as possible uphill from nest and karst.
4395+55	365	FWS #10	348	Not Applicable
4449+90	313	FWS #70	116	Nest on rock bluff. Only alignment alternative was on the beach.
4508+62	314	FWS #14A	54	Nest on wide bench in karst area. About equal encroachment on alignment uphill and downhill from nest. Chose uphill alignment at base of mountain to stay out of high vulnerability karst.
4584+91	317	FWS #91B	97	This nest is on a bench between the beach and a steep bluff in a high vulnerability karst area. The alignment moved onto the beach below the nest as the low impact and karst avoidance option.
4586+23	366	FWS #91	150	This nest is on a bench between the beach and a steep bluff in a high vulnerability karst area. The alignment moved onto the beach below the nest as the low impact and karst avoidance option.

Table B-2 (continued)
Eagle Nest Locations Within 0.5 Mile of Construction Zone
West Lynn Canal (Alignment as of 17 December 2003)

Station No.	Project Nest No.	USDA Forest Service Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
4595+63	315	FWS #91A	140	Beach alignment, below nest, driven by nests FWS#91 and FWS#91B.
4613+57	318	FWS #71	68	Nest on top of cliff overlooking the beach and the base of a very steep bluff. Encroachment either way. Beach alignment cut slope would have daylighted close to nest tree. Chose to set alignment at base of bluff uphill of the nest. This set the alignment to avoid encroachment into nest FWS#72 buffer and high vulnerability karst ahead on line.
4633+53	319	FWS #72	606	Not Applicable
4668+61	320	FWS #17	339	Not Applicable
4686+74	321	FWS #73	377	Not Applicable
4714+12	322	FWS #18	589	Not Applicable
4863+48	326	FWS #1A	438	Not Applicable
4941+36	327	FWS #17	338	Not Applicable
4981+24	367	FWS #18A	597	Not Applicable
5011+77	369	FWS #19	313	Nest located on wide bench between beach and base of mountain. Chose minimum impact alignment at base of mountain uphill from nest.
5030+58	709	FWS #10	207	Nest located just north of extremely steep terrain which forced the alignment downhill from the nest.
5054+28	330	FWS #10A	123	Nest buffer encompasses the beach and steep uphill terrain. Buffer encroachment about the same uphill and downhill. Chose downhill alignment for the easier terrain and smaller footprint.
5075+07	331	FWS #20A	284	Nest located on top of cliff above beach. Minimum impact alignment set on uphill bench at base of mountain.
5086+53	370	FWS #20	145	Nest located on top of cliff above beach. Minimum impact alignment set on uphill bench at base of mountain.
5145+57	333	FWS #21	1,242	Not Applicable
5172+70	334	FWS #7	240	Nest located on top of cliff above beach. Minimum impact alignment set on uphill bench at base of mountain.
5212+53	371	FWS #20	226	Nest located at the base of cliff and on the beach. Set the alignment at back edge of uphill bench at the base of the mountain.
5246+92	710	FWS #19	48	Nest located just off of the beach. Alignment uphill and against cliffs.
5256+42	711	FWS #21	252	Nest located in flats above beach and below the alignment, which is running at the base of extensive cliffs.

Table B-2 (continued)
Eagle Nest Locations Within 0.5 Mile of Construction Zone
West Lynn Canal (Alignment as of 17 December 2003)

Station No.	Project Nest No.	USDA Forest Service Nest No.	Offset from Construction Zone (feet)	Comments for Primary Zone Encroachments
5361+70	372	FWS #4	358	Not Applicable
5384+93	335	FWS #23	680	Not Applicable
5587+33	336	FWS #24	2,583	Not Applicable
Not assigned	Not assigned	FWS #25	Approx. 2,500	Not Applicable
5624+38	337	FWS #25A	2,196	Not Applicable
5669+65	338	FWS #6	219	Nest located at the base of cliff and on the beach. Set the alignment at back edge of uphill bench at the base of a steep cliff.
5700+43	339	FWS #17	260	Nest located at the base of cliff and on the beach. Set the alignment at back edge of uphill bench at the base of the mountain.
5733+45	340	FWS #17A	1,008	Not Applicable
5891+30	341	FWS #8A	1,404	Not Applicable
5901+50	342	FWS #8	1,041	Not Applicable
5967+73	344	FWS #15	1,345	Not Applicable
5968+02	343	FWS #26	2,399	Not Applicable
6029+30	373	FWS #29	368	Not Applicable