Naknek Crossing Intermodal Economic and Airport Use Study

Prepared for the

Alaska Department of Transportation and Public Facilities

May 2005

Prepared by

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The Office of
Governor Frank H. Murkowski

Dear Alaskan:

It is a great pleasure to welcome you as a reader of this report, which discusses the proposed Naknek Crossing and how such a road and bridge project would affect the airports and economies of King Salmon, Naknek, and South Naknek.

The situation at Naknek epitomizes all too well the problem we grapple with in many communities throughout rural Alaska—villages in close proximity continue to be stand-alone communities. They each require schools, clinics, airports, tank farms, and all the other parts and pieces of a community. Travel between them is by air, boat, or snowmachine. The potential solution—connecting them with a road—is one that would apply elsewhere, as well. It is a solution my administration advocates.

In the attached document, you will read of the many benefits that could ensue from connecting these three communities by road and a bridge across the Naknek River, as described by the residents:

- Reduced cost of travel between communities
- Consolidation of some community services, and a corresponding reduced cost of those services
- Improved safety for travelers
- Improved emergency services and better access to health care
- Better schools and educational opportunities for the children of the communities
- The opportunity to generate economic activity throughout the borough

This proposal is the essence of my administration's mission as the main provider of a transportation system for Alaska's residents. I appreciate the extra effort put forth by all the individuals who prepared this report, and thank the Federal Aviation Administration and Federal Highway Administration for their cooperation in co-funding the report. I believe getting to the right solution for the residents of King Salmon, Naknek, and South Naknek will also be the right solution for the federal funding agencies, and for the Alaska Department of Transportation and Public Facilities.

Sincerely yours,

Frank H. Murkowski
Governor

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR

DEPARTMENT OF TRANSPORTATION
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April 25, 2005

Dear Alaskan:

Every now and then there comes an opportunity to make a transportation decision that results in a tremendous difference in the lives of Alaskans. This study is the result of one such opportunity.

In this case, the department was faced with the choice of spending a significant amount of money to improve airports in the communities of King Salmon, Naknek, and South Naknek, or consider an alternative that had been talked about for a long time – bridging the Naknek River and establishing a physical connection between Bristol Bay Borough communities. Either option involved the investment of millions of dollars – the important question was which of the two would best serve Borough residents and the State of Alaska.

I am happy to report that the *Naknek Crossing Intermodal Economic and Airport Use Study* demonstrates a compelling state interest in moving forward with a bridge project and consolidation of airport facilities. It does so with effective public involvement and sound economic analysis.

The *Naknek Crossing Intermodal Economic and Airport Use Study* was recommended in the Southwest Alaska Transportation Plan (Revised edition, 2004) in order to better identify the range of public services affected and the overall savings such a project would produce for the State and the Borough. It draws its authority from Alaska Statute 44.42.050 and is a component of the Alaska Statewide Transportation Plan as defined in 23 CFR 450.214. In accordance with 17AAC 05.150, I do hereby approve and adopt the *Naknek Crossing Intermodal Economic and Airport Use Study* as a component of the Alaska Statewide Transportation Plan.

I look forward to seeing this project move towards construction in the years ahead. I am confident that it lays the groundwork for a new and improved transportation system that will bring multiple benefits to the people of the Bristol Bay region and to all Alaskans.

Sincerely,

Mike Barton
Commissioner

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Abbreviations

AADT	average annual daily traffic
ADOT&PF	Alaska Department of Transportation and Public Facilities
AHS	Alaska Highway System
AMHS	Alaska Marine Highway System
FHWA	Federal Highway Administration
M&O	Maintenance and operations
NMFS	National Marine Fisheries Service
SHS	Secondary Highway System
SPSS	Statistical Package for the Social Sciences
STIP	State Transportation Improvement Plan
TRAAK	Trails and Recreational Access for Alaska
USFWS	United States Fish and Wildlife Service
VFR	Visual Flight Rules

Executive summary

The Southwest Alaska Transportation Plan of 2002 recommended a study of a potential surface link spanning the Naknek River to define the appropriate level of transportation investment, and to examine the distribution of costs and benefits among various interests.

This project incorporates a combination of airport and roadway planning analysis to determine the impact of a road link and bridge across the Naknek River on air traffic and aviation facility use. Unlike prior studies that focused only on airport or road construction, this study quantifies costs and benefits using a system-wide analysis, comparing the future costs and benefits of a highway crossing with various airport options, to those of airport improvements only.

The Alaska Department of Transportation and Public Facilities (ADOT&PF) is interested in a bridge project as part of its long-term goal of seeking greater efficiencies and providing better transportation services. Connecting the three Bristol Bay Borough communities by road would address this goal by providing better transportation services between the communities and potentially reducing costs by eliminating departmental ownership and operational costs of airports that have only a general aviation component.

During a series of public meetings in the Borough, local residents described several benefits that a bridge and road would provide. These benefits included:

- Improved safety for persons traveling between the communities
- Reduction of the cost of travel between the communities
- Improved educational and social benefits for school-age children
- Improved access to hospitals and clinics for residents of South Naknek
- Improved response time for emergency services and public safety
- Creation of additional economic activity in the Bristol Bay Borough
- Opportunity for consolidation of services and facilities and reduced costs for the Borough, state agencies, and other organizations

The changes under consideration include construction of a bridge as well as closures or improvements to the airports in the Borough. The changes have been categorized into two scenarios (*Aviation Only Improvements* and *Bridge and Aviation Improvements*), with several options for each scenario. The various scenario/option combinations are:

Scenario A. Aviation Only Improvements

Option A1. Keep all three airports open

Option A2. Close Naknek airport

Scenario B. Bridge and Aviation Improvements

Option B1. Keep all three airports open

Option B2. Close Naknek airport

Option B3. Close South Naknek airport

Option B4. Close Naknek and South Naknek airports

Option B5. Bristol Bay Borough operates Naknek and South Naknek airports

Option B6. Close Naknek airport and Borough operates South Naknek airport

If an aviation only scenario is selected, then the planned improvements for the three airports are anticipated to be implemented over a 20-year period that starts when a decision is made on which option to develop. If a bridge scenario is selected, it may take six to eight years to move through the environmental review process and permitting, as well as obtaining the funding for the bridge and the road. For purposes of this report bridge construction is assumed to begin in 2012 with the bridge opening in 2014. Under options calling for closure of the Naknek airport, it would close in approximately 3-5 years under an aviation only scenario, or remain in operation until the bridge is open. For options that include closure of the South Naknek airport, it is anticipated that the airport would remain open until 2017 when grant assurance to the Federal Aviation Administration (FAA) would end.

Table ES-1 compares the annual operating and capital costs associated with A1 to each of the other scenario/options. In all cases, the estimates incorporate the approximately $737,000 in annual operations and maintenance costs, and $41 million to $43 million in planned capital expenditures at the King Salmon airport over the next 20 years.[1] Planned capital improvements at Naknek airport are estimated at about $22 million over that time period, and South Naknek airport improvements are estimated at $4 million to $6 million, depending on the option. The bridge scenario is at a conceptual level of design, and for the purposes of this study the bridge is assumed to span the Naknek River near Fishery Point. Capital costs range from $26 million to $40 million for a 2,300-foot steel girder structure. Maintenance costs for the bridge and the 14,500-foot road are estimated at about $45 thousand annually. Scenario/option A2 has the lowest capital and operating costs for ADOT&PF while B1 has the highest annual operating costs and is tied with B5 for the highest capital costs. However, when the effect of the bridge on annual operating costs of other entities is considered, options B2 and B6 achieve the greatest reduction in total operating costs. Additional comparison information is presented in “How do the Scenarios/options compare?”

[1] The capital improvements change slightly with the scenario/option that may be selected.

Table ES-1. Comparison of scenario/option annual operating and capital costs

	Annual Operating Costs (Thousands of 2003$)					Capital Costs (Millions of 2003$)	
Scenario/Option	Borough	School District	Other Organizations	ADOT&PF	Total	Low	High
A1	0	0	0	0	0	0	0
A2	0	0	0	-30	-30	-19	-19
B1	-100	-300	-76	45	-431	26	40
B2	-100	-300	-76	17	-459	7	21
B3	-100	-300	-76	25	-451	22	35
B4	-100	-300	-76	-5	-481	3	16
B5	-50	-300	-76	-5	-431	26	40
B6	-78	-300	-76	-5	-459	7	21

Note: Capital costs are presented in millions in this table to reflect the level of uncertainty associated with them. Capital costs for the airport improvements were taken from previous studies and updated to 2003 levels based on a national construction inflation index, which may not reflect actual construction cost changes in Alaska, and bridge costs are based on a conceptual level design.

In fiscal year 2003, the ADOT&PF spent approximately $737 thousand for operations and maintenance at the King Salmon airport, about $30 thousand at the Naknek airport, and roughly $20 thousand at South Naknek, for an approximate total of $787 thousand.

Estimates of traffic volumes across the bridge were calculated by identifying pairs of communities that have attributes similar to the Bristol Bay communities: They are not on the continental road system, they each have an airport, and a road link exists between the communities. Four community pairs were identified, and information on traffic, population, and distances between the communities was obtained. A regression equation using population of the communities and distance in road miles to estimate annual average daily traffic had a very high correlation ($r^2 = 0.967$) and all of the variables were statistically significant.

Using this model, potential traffic across a bridge spanning the Naknek River is estimated at about 1,020 vehicle trips per day (supposing it were open in 2003.) Some of these trips would be the replacement of current trips made by airplane and boat, and, when the river is frozen, snow machines and other vehicles. Most of the trips would be new trips generated by the reduction in travel cost and time, and the consolidation of services and facilities. Other trips would be generated by South Naknek residents moving back to the community after having moved to Naknek or King Salmon in recent years for employment opportunities. These people would still be able to retain their jobs in the other communities while living in South Naknek, were a bridge to be built.

In addition to the capital and operating cost comparison, three other approaches were used to compare the scenario/options. These approaches included:

- Comparing the scenario/options with a set of evaluation criteria developed from the public meetings and comments from the public, as well as from the Department of Transportation & Public Facilities' objectives (See Evaluation criteria for a discussion of the scoring system)
- A benefit-cost analysis which summarizes the net present value of a stream of benefits and costs over the life of the facilities (See Benefit-cost analysis)
- A survey of Borough residents to determine the level of support in the community for a bridge and the options associated with it (See Survey)

Table ES - 2 shows the rankings of the scenario/options from each of the evaluation methods.

Table ES - 2. Comparison of scenario/options

Scenario/options	Evaluation Criteria	Benefit-Cost Analysis	Subtotal	Resident Survey	Bridge Total
A1. All airports open	7	8	15		
A2. Close Naknek	8	7	15		
B1 All airports open	6	5	11	1	12
B2 Close Naknek	1	2	3	4	7
B3 Close South Naknek	3	4	7	2	9
B4 Close both airports	1	1	2	6	8
B5 Borough operates both	5	5	10	3	13
B6 Borough operates S. Naknek	4	2	6	5	11

By design the resident survey was developed to assess the level of support for a bridge and did not ask questions about the aviation only alternatives. Therefore, the subtotal column presents the rankings for each scenario/option under the evaluation criteria and benefit-cost analysis, while the bridge total incorporates both of those approaches plus the ranking from the resident survey.

The bridge options have greater net benefits than the A2 option with the base case population projection, hence their higher ranking in Table ES - 2. The bridge options also achieve greater net benefits under the low population forecast case. For option B4, the number of induced trips could be reduced to 10 percent of its projected level with a base case population forecast and the benefits would still be larger than those estimated for A2. Other bridge options could see the number of induced trips reduced to 25 percent of estimated levels and still have larger net benefits than A2.

Under any of the bridge options, the Borough would save about $100,000 annually in reduced expenses through the consolidation of facilities and services, and the provision of

most public services from Naknek, rather than from both communities. The school district would save about $300,000 annually, primarily by closing the South Naknek school and eliminating two full-time and three part-time jobs. Eliminating the air transportation charter for South Naknek students and replacing that service with buses would save about $40,000. Total savings for the Borough, School District, local residents, and other organizations are anticipated to be about $476,000 annually. The Borough has identified three positions that might be filled with the savings from consolidation. The school district board has not yet considered where the savings might be employed but future actions could range from restoring programs that have been cut, to adding new staff, or even providing more materials and supplies.

Annual maintenance costs of about $45,000 for a bridge would be slightly less than the combined annual maintenance expenditures of about $30,000 at the Naknek airport and $20,000 at the South Naknek airport. The annual airport maintenance cost expenditures anticipate that planned capital investments over the next 10 years will increase annual maintenance costs.

A comparison of the results of the various evaluation methods indicates that a bridge scenario consistently ranks above the aviation only scenario. One objective of this study is to provide a recommendation for airport improvements, ownership, and operation if a crossing were built. An evaluation of the bridge options suggests the following:

- Option B2 has the lowest total score and highest ranking, but it would not meet the Department's objectives of cost sharing and reducing operating costs.
- Option B4 would have the next highest ranking but it would not have public support because it would close both general aviation airports.
- Option B3 would have public support because Naknek airport would remain open, and it would achieve reduced operating costs for the Department, but the Department's cost sharing objective is not met.
- Option B6 seems to be the next best option for consideration. This option would provide a general aviation airport as preferred by Borough residents. The Borough could operate South Naknek without the potential problems that might be encountered at Naknek in its current condition.[2] Naknek airport would be closed under this option. This option would also meet the Department's objectives of reducing operating costs and cost sharing, and is the recommended option if a crossing is built.

It is anticipated that any of the bridge alternatives would require an environmental impact statement. The aviation only alternatives may be able to proceed with an environmental assessment. The decision will depend on the issues identified in the scoping process.

[2] The Borough Mayor stated at a public meeting that he is opposed to the Borough operating the Naknek airport in its present condition due to a number of factors. According to the Mayor, the planned improvements at Naknek airport would have to be completed before he could recommend that the Borough become the operator of the airport.

What is the reason for this study?

As outlined in the Request for Proposals, the reason for this study is twofold:

1. Identify and quantify the costs and benefits associated with a highway crossing the Naknek River so that this information can be available to Federal, State of Alaska, Bristol Bay Borough and other community, tribal and business leaders
2. Suggest appropriate recommendations for airport improvements, ownership, and operation (or closure if warranted) for the airports at Naknek, South Naknek and King Salmon in the event a Naknek River crossing is built. The study will determine the probable effects of a bridge crossing on aviation use patterns at the three airports. Its findings will take into account the range of transportation needs and options available locally, state and community long-range goals, and overall efficiencies.

The Alaska Department of Transportation and Public Facilities (Department or ADOT&PF) is interested in improving access to communities in Southwest Alaska and reducing its system-wide operation and maintenance costs. Recent planning efforts for Southwest Alaska and the airports at King Salmon and Naknek indicate that the Department might be able to accomplish these goals by extending the road system to South Naknek.

The communities of King Salmon, Naknek, and South Naknek are located on the Naknek River on the northern side of the Alaska Peninsula (See Figure 1). The communities of King Salmon and Naknek are connected by a 15-mile road, the only existing segment of the Alaska Peninsula Highway, which is a designated route of the Alaska Highway System (See Alaska Administrative Code, 17.05.170 (b)(14)).[3] The community of South Naknek is located directly across the Naknek River from Naknek, a distance of about ½ mile. Residents of these two communities use skiffs and aircraft to travel between the communities when the river is open. When the river is sufficiently frozen local residents cross the river on snow machines and other vehicles at a site upriver beyond the area of tidal influence. At present, all three communities have airports that are owned and operated by the State of Alaska. King Salmon is a jet-capable airfield originally built for military use. The other two airports were built to meet the needs of the local communities and general aviation in the region.

The proposed crossing would entail a bridge spanning the Naknek River and connecting these three communities of Bristol Bay Borough. The distance between South Naknek and King Salmon using the crossing would be about 15.5 miles, and roughly 9.5 to 11.5 miles between South Naknek and Naknek depending on the selected alignment. A bridge would influence aviation use patterns and the priority of aviation operations and improvements at individual airport facilities, some of which are already identified and waiting funding.

Alaska Statute 44.42.050 requires the ADOT&PF to prepare a long-term transportation plan in accordance with the federally-required Statewide Transportation Plan as defined in 23

[3] Governor Murkowski has proposed extending the Alaska Highway System by constructing a road between King Salmon and Chignik, and a bridge across the Naknek River would be an important part of that road project. However, this project is being evaluated solely on the benefits and costs of improving access for residents of the three communities in the Bristol Bay Borough.

CFR 450-214. The Southwest Alaska Transportation Plan is an approved component of the Statewide Transportation Plan. The Southwest Alaska Transportation Plan of 2002 recommended a study to define the appropriate level of transportation investment, and examine the distribution of costs and benefits among various interests.

This project incorporates a combination of airport and roadway planning analysis to determine the impact of a road link on air traffic and aviation facility use. Unlike prior studies that focused only on airport or road construction, this study quantifies costs and benefits using a system-wide analysis, comparing the future costs and benefits of a highway crossing with various airport options, to those of airport improvements only.

This report section, and the following sections, addresses a set of basic questions that were posed by the public at a series of public meetings in the communities to discuss the project. The information has been developed to answer the questions of the general public and address their issues and concerns without adding detail that might be overwhelming to the lay reader. Additional details on this project are contained in the appendices to this main report.

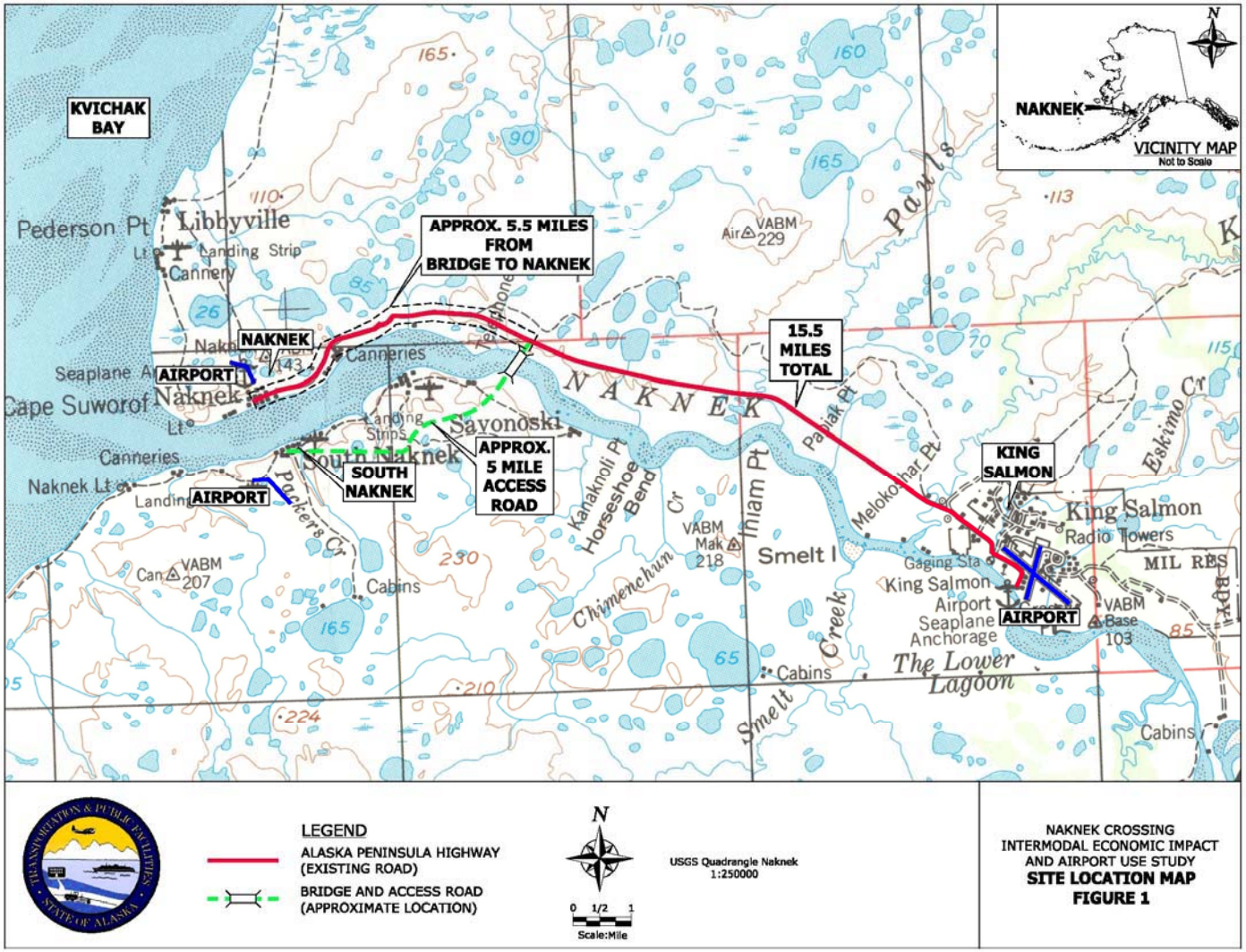


Figure 1. Study area map

Why is a bridge being considered?

The Department is interested in a bridge project as part of its long-term goal of seeking greater efficiencies and providing better transportation services. Connecting the three Bristol Bay Borough communities by road would address this goal by providing better transportation services between the communities and potentially reducing costs by eliminating departmental ownership and operational costs of airports that have only a general aviation component.

The Southwest Alaska Transportation Plan recognized that a bridge spanning the Naknek River is desirable for a number of reasons, but concluded that further study is necessary to "better identify the range of services affected and the overall savings such a project would mean for the state and the borough." The Plan went on to propose a multimodal study to "define the appropriate level of aviation investment, and to examine the distribution of costs and benefits among various interests." This study is addressing those items. The following paragraphs describe some of the reasons put forward by the public as reasons why a bridge should be built.

At present, persons traveling across the Naknek River use private airplane or air taxi services and, when the river is flowing and free of ice, use skiffs and boats. Automobiles, trucks, all-terrain vehicles, and snow machines are also used to cross the river during winter months when there is sufficient ice thickness on the river. To help meet the need for transportation between the three communities, the Alaska Department of Transportation and Public Facilities owns and operates airports in each community.

The cost of air travel for local residents is an issue. A survey of local residents indicated that South Naknek households spent an average of about $3,800 in 2003 for air taxi service between their community and the other two communities in the borough. This amount represents about 17 percent of the average household income reported in the 2000 Census. In contrast, residents of the other two communities spent about $330 for air taxi travel to and from South Naknek.

The State Department of Education changed the formula for pupil transportation funding, so that each student in Alaska is administratively allocated $1,200 annually for this purpose. This funding covers only about 20 percent of the cost incurred by the school district for school flights. The balance of the school flight cost is covered by local taxes levied by the school district.

The increased cost of air travel and facility operations are only part of the social and economic influences that need to be considered when evaluating a bridge over the Naknek River. Students at the Bristol Bay Consolidated High School that reside in South Naknek are flown each school day to and from the high school, which is located in Naknek. There is high anxiety among parents and students regarding the safety of the flights. Although no serious accidents have occurred, a school flight did once have engine problems, which resulted in the pilot having to land the plane on the river ice. A similar emergency situation during a time when the ice is not present could have dramatic consequences for the community. It takes several trips to fly the approximately 12 students across, and parents are told not to have siblings on the same flight in the event of an accident (See public comments in Appendix B).

The river ice may have saved lives in that incident, but there have been several incidents involving vehicles going through the river ice while traveling between Naknek and South Naknek; one that involved three people in a truck, and another that involved a snow machine with a single rider. Two days after Department staff and consultants made presentations in the communities on March 15 and 16, 2004 a person driving an ATV went through the river ice and was saved by local residents. South Naknek residents sometimes push the limits of safety at the beginning of winter and in spring because travel during these transition periods, (when the ice is not safe enough to drive on and river is not yet free of ice for boat travel), is limited to expensive air taxi or personal airplane travel.

The project team held three sets of meetings in Naknek and South Naknek to discuss the project with local residents and officials. In addition to the items discussed above, a number of other social and economic benefits associated with a bridge were identified by people attending the meetings. These included:

- **Improved educational and social benefits for school-age children.** The school district has been flying South Naknek junior and senior high school students to Naknek regional high school and middle school in Naknek for over 30 years. The school flights operate under Visual Flight Rules (VFR) in daylight only. Thus, in mid-winter, children arrive at school at 9:45 a.m., 45 minutes after school commences. The need to fly in daylight hours also restricts the ability of South Naknek students to participate in after-school activities. If inclement weather is approaching, students sometimes leave school early so that they can get home before air travel is impossible. When students can't return home due to bad weather, the school district incurs costs for housing students in private homes on the north side of the river.

  South Naknek parents also felt that attending a school with a larger number of students would be better for the younger children since it would improve their social skills. It was stated that South Naknek students sometimes have a difficult time adjusting to Naknek junior and high schools because they have been in an elementary school with very few students in each class.

- **Improved access to hospitals and clinics for residents of South Naknek.** South Naknek residents felt that a bridge would improve their access to the regional clinic in Naknek, and that potential weather delays of medevac flights from South Naknek to Naknek or Anchorage would be mitigated with bridge access.

- **Improved response time for emergency services and public safety.** The Peter Pan Seafoods plant in South Naknek was engulfed in a major fire in 2001. Several warehouse buildings that held boats and fishing gear burned down, along with a repair shop. Fire equipment and personnel from Naknek and King Salmon could not assist in fighting the fire that also destroyed 30 fishing boats. Emergency medical technicians, state troopers, and other emergency services and public safety personnel from Naknek and King Salmon also have a difficult time responding quickly to emergency situations and assisting their counterparts in South Naknek. Emergency service volunteers in South Naknek pay their own travel costs when they attend training and certification classes in Naknek or King Salmon. A bridge would enable

quicker response times, reduce training and certification costs for emergency services personnel, and improve retention of volunteers.

- **Removing barriers to economic activity in the Bristol Bay Borough.** The economy of the Bristol Bay Borough has suffered in recent years with the decline of the salmon fisheries. Fish processors have concentrated their remaining infrastructure to the north (Naknek) side of the river because of the high costs imposed on South Naknek plants due to the existing transportation infrastructure. A bridge would reduce costs for South Naknek residents and businesses. A bridge could potentially reduce costs enough to allow one or more of the three closed salmon-processing plants in South Naknek to reopen, although this is uncertain, given the difficult times that the salmon industry is facing in the region. In any event, a bridge would enable setnet fishers whose sites are located on the south side of the river to more easily obtain ice, which would improve the quality of fish harvested in the area. Improved quality is very important to fishers as they attempt to obtain higher prices amidst continuing competition from farmed salmon.

  At present, many South Naknek residents order groceries and other supplies from Anchorage because it is cheaper to pay the mailing costs than to pay the air taxi fee for shopping at local stores. Residents stated that a bridge would reduce travel costs to the point where it would be less expensive to buy groceries at local stores. South Naknek residents also believe the lower costs would provide opportunities for other businesses to open in the community including a gas station, restaurants, boat haulout and repair, and tourism-related businesses.

- **Reduced expenditures for redundant facilities and services.** At present, there is a duplication of some public facilities and services in South Naknek because the community is not readily accessible to the other towns except by air and water. Closing the South Naknek School, the library, the clinic, and other facilities would reduce local government costs. Larger facilities with better services are present in Naknek and would be accessible with a short drive if a bridge were built. Additional information on the potential savings associated with consolidation of facilities and services is presented in Fiscal Effects. The potential savings would enable the Borough to fill the vacant position in the Planning Department, as well as administrative staff in the Port and Public Works Departments (Pike, 2004)

What changes are being considered and what would they cost?

This study considers a number of changes, including construction of a bridge as well as closures or improvements to the airports in the borough. The changes are categorized into two scenarios (Aviation Only Improvements and Bridge and Aviation Improvements), with several options for each scenario. If an airport will remain open under a given option, it is assumed that the capital improvements planned for the next 20 years will be completed. If Naknek airport will be closed, it is anticipated that the closure will occur after the bridge opens. If South Naknek is to be closed it is anticipated to occur after 2016 to meet FAA grant assurances. The various scenario/option combinations are:

Scenario A. Aviation only improvements

Option A1. Keep all three airports open

Option A2. Close Naknek airport

Scenario B. Bridge and aviation improvements

Option B1. Keep all three airports open

Option B2. Close Naknek airport

Option B3. Close South Naknek airport

Option B4. Close Naknek and South Naknek airports

Option B5. Bristol Bay Borough operates Naknek and South Naknek airports

Option B6. Close Naknek airport and borough operates South Naknek airport

Throughout the remainder of this report, the various combinations are referred to according to their scenario (A or B) and option (1 through 2 or 1 through 6) designation presented above. For example, the aviation-only improvements with all three airports open, is referred to as A1. A brief description of each scenario/option combination is provided in the following subsections with a table showing the anticipated annual operating cost and total capital cost.

Costs for the aviation-only alternatives include the capital cost for improvements to the airports. Costs for the bridge alternative include bridge construction plus costs for improvements to airports. Costs of operating and maintaining the aviation facilities over the study period are presented, as well as maintenance of the bridge and access roads. The 20-year study period extends to 2033, assuming that the bridge opens in 2014.

Table 1 summarizes the total annual operating costs for each scenario/option. The bridge capital cost estimates are provided as a range because of uncertainty at this concept level of design (See Appendix E for more detail on bridge capital costs). The capital cost information for airport improvements is taken from Airport Master Plans and other documents (See Appendix F) and is made up of single point estimates for the year in which the report was prepared. Construction cost inflation indices are used to update this information to 2003 dollars. Additional information on each scenario/option is presented in the following subsections. Detailed information for each scenario/option is provided in the appendices.

Table 1. Summary of scenario/option annual operating and capital costs for ADOT&PF

Scenario/ Option	Annual ADOT&PF Operating Costs (Thousands of 2003$)		Capital Costs (Millions of 2003$)			
	Cost ($)	Change ($)	Low	High	Change (Low)	Change (High)
A1	787		68	68		
A2	757	-30	49	49	-19	-19
B1	831	45	94	107	26	40
B2	803	17	75	88	7	21
B3	812	25	89	103	22	35
B4	782	-5	71	84	3	16
B5	782	-5	94	107	26	40
B6	782	-5	75	88	7	21

Notes: Differences reflected in the Change columns may not add due to rounding. The numbers shown in this table have been adjusted to reflect 2003 dollars. Estimates shown in Tables 3 through 10 later in this section reflect the costs in the year in which the original estimates were created.

Table 1 shows the annual operating costs that might be incurred by ADOT&PF for each scenario/option, and presents data on the change in those annual operating costs compared to A1, which is the closest scenario/option to the status quo. Scenario/option A2 would result in the lowest annual operating costs for the department but reductions in annual operating costs could also be achieved with B4, B5, and B6. A2 would also result in the lowest capital costs for the Department. B4 would have the next lowest capital expenditures although that scenario/option would be about $3 million to $16 million more in capital expenditures than A1.

The selection of a scenario/option has implications for other local government entities as well as ADOT&PF. Table 2 shows the estimated change in operations and maintenance costs associated with each scenario/option compared to A1 (See Capital and operating costs for more details).

Table 2. Summary of change in annual operating costs for state and local governments by scenario/option

Scenario/ Option	Annual Operating Costs (Thousands of 2003$)				
	Borough	School District	Other Organizations	ADOT&PF	Total
A1	0	0	0	0	0
A2	0	0	0	-30	-30
B1	-100	-300	-76	45	-431
B2	-100	-300	-76	17	-459
B3	-100	-300	-76	25	-451
B4	-100	-300	-76	-5	-481
B5	-50	-300	-76	-5	-431
B6	-78	-300	-76	-5	-459

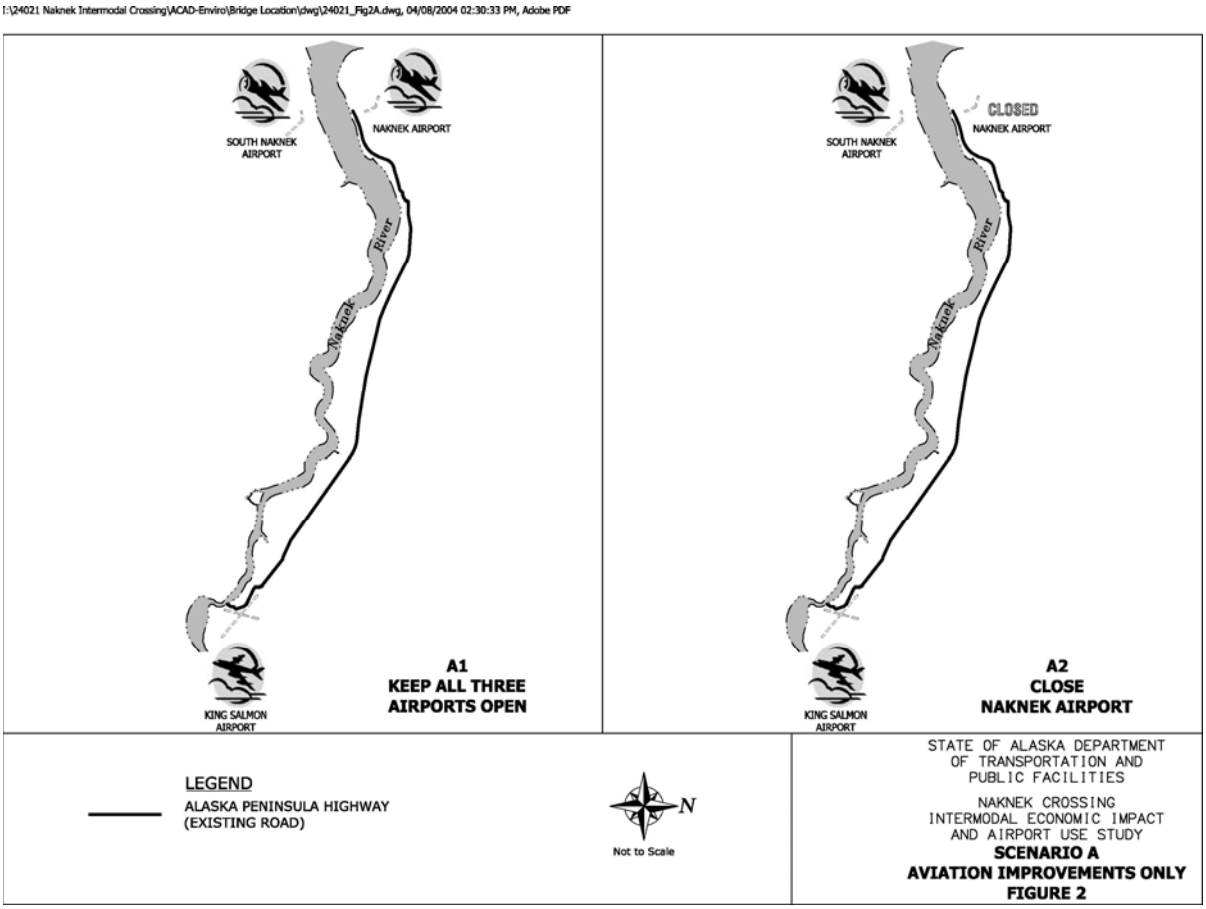
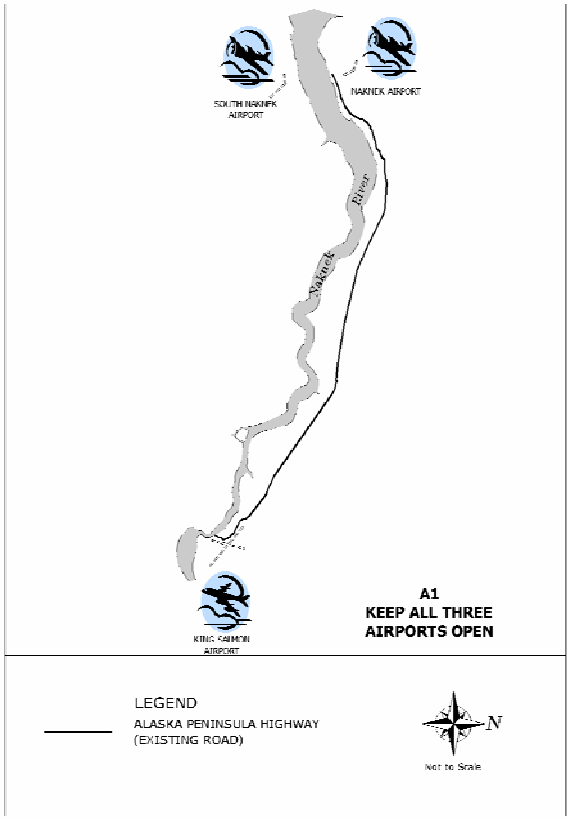


Figure 2. Proposed transportation system with aviation improvements

Scenario A – Aviation Only Improvements

Option A1. Keep All Three Airports Open

This scenario/option would improve access by implementing planned improvements at all three airports in the Bristol Bay Borough. This scenario/option does not include a bridge.



Airport master plans were prepared for the King Salmon and Naknek airports in 2001 and form the basis for the improvements discussed here. Most of the information for South Naknek comes from an airport layout plan (ALP) prepared by ADOT&PF for that facility. The capital improvements for the three airports are anticipated to be implemented over a 20-year period that starts when a decision is made on which scenario and option to develop. Table 3 shows the annual operating costs after year 10, when most of the improvements at Naknek airport are assumed to be complete. It also shows the total capital costs over the 20-year period. The operating and capital costs shown here are taken directly from the various reports and have not been updated to 2003 dollars in these tables. Additional information on the assumptions used in preparing these estimates is presented in the assumption notes below the table.

Table 3. Option A1: Keep all 3 airports open

Airport	Annual operating costs ($)	Capital costs ($)
King Salmon	737,088	39,589,300
Naknek	29,962	20,947,000
South Naknek	19,806	3,910,000
Total	786,856	64,446,300

Assumptions:

1. By year 10, when most improvements are assumed to be made at the Naknek Airport, operating costs increase by $13,000/year to $29,962 due to increased electrical costs ($5,000/year) and maintenance ($4,000) of a new functional lighting system and increased fuel and manpower costs ($4,000) of maintenance and snow removal for runways, taxiways and aprons. Until then operating costs are $16,962.
2. Even though the South Naknek ALP indicates that it could be upgraded to B-II standards in the long term future, for planning purposes it is assumed that it can continue to be developed to B-I standards, similar to the planned standards for the Naknek Airport.
3. South Naknek CIP costs from the ALP include $2.2 million in 1-5 years for resurfacing, a $1 million road extension around runway 4-22 in 6-10 years, and $650,000 for a new grader and lighting upgrades in 11-20 years.
4. The capital costs include wind protection improvements not presented in the master plan. If wind protection is provided for general aviation aircraft it will be provided for all general aviation aircraft at each airport.

Option 2 – Close Naknek Airport

This scenario/option would close the Naknek airport and implement the planned improvements at King Salmon and South Naknek airports over a 20-year period. This option does not include a bridge. It is assumed that the closure of the Naknek airport would occur after completion of wind protection and other improvements at the King Salmon and South Naknek airports to accommodate planes that presently operate from the Naknek airport. These wind protection improvements are only added when an option calls for closure of the Naknek airport. Closure of the Naknek airport might permit improvements at Nornak Lake that would improve facilities for floatplanes, but the potential for such improvements will be the subject of a planned study of floatplane aviation in the borough. This study does not address potential improvements at Nornak Lake. Table 4 presents annual operating costs and capital costs for this scenario/option. The savings from closure of the Naknek airport are almost $21 million in capital costs and $30,000 in annual operating costs.

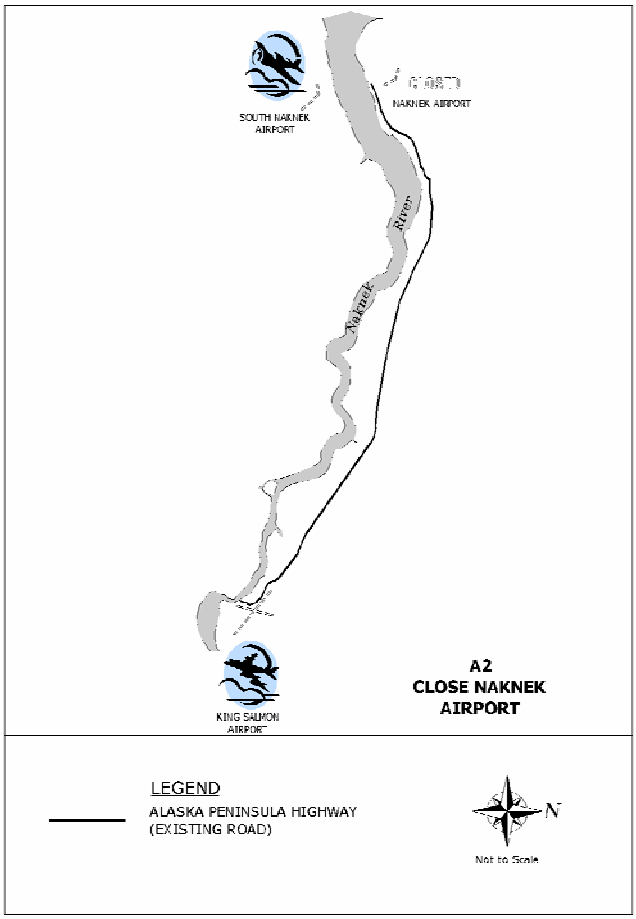


Table 4. Option A2: without bridge – close Naknek Airport

Airport	Annual Operating Costs ($)	Capital Costs ($)
King Salmon	737,088	40,959,300
Naknek	0	0
South Naknek	19,806	5,260,000
Total	756,894	46,219,300

Assumptions:

1. Naknek operating costs ($16,962/year) cease to be paid in 3 to 5 years when ADOT&PF ceases to operate the airport under the aviation only scenario.
2. Additional tie down space is provided at the King Salmon Airport at a cost of $2,800,000. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.

Scenario B – Bridge with aviation improvements

A bridge spanning the Naknek River has been discussed at the conceptual level for the past several decades. For purposes of this analysis, it is assumed that a bridge would be built near Fishery Point (See Figure 1), although sufficient engineering has not been undertaken to know if this location would be a suitable bridge site. The bridge would likely be constructed with long-span steel girders between piers to facilitate maritime traffic and reduce the amount of construction activity and obstructions in the river. Additional detail on the bridge concept is provided in Appendix E.

The following tables show capital and operating costs for the bridge as well as airport options that may be associated with a bridge across the river. The bridge design is only conceptual at this stage of the process, and a range of capital and operating costs have been developed to account for the large amount of uncertainty that presently exists. The proposed bridge and roadway would be part of the Alaska Highway System, and the road is likely to be paved, providing the same level of service as the existing Alaska Peninsula Highway segment. This assumption of a paved (rather than gravel) road results in the operating cost estimate used in the following tables. The bridge/roadway operating costs include $44,550 per year for pavement maintenance on the bridge and road. The steel girders are treated during construction with a permanent anti-corrosion sealant so maintenance painting is not required. Operating cost estimates that assume a gravel road are presented in Appendix E. Capital costs for a steel girder bridge across the Naknek River range from a low estimate of $26,250,000 to a high estimate of $39,500,000. Given the large variation in the range, both estimates are provided in the following tables. Airport capital costs represent planned improvements over the next 20 years as indicated in Airport Master Plans and Airport Improvement Plans, and annual operating costs are based on present contractor and ADOT&PF costs. The airport capital costs also include wind shelters with certain options. Figure 3 shows the six options associated with the bridge scenario.

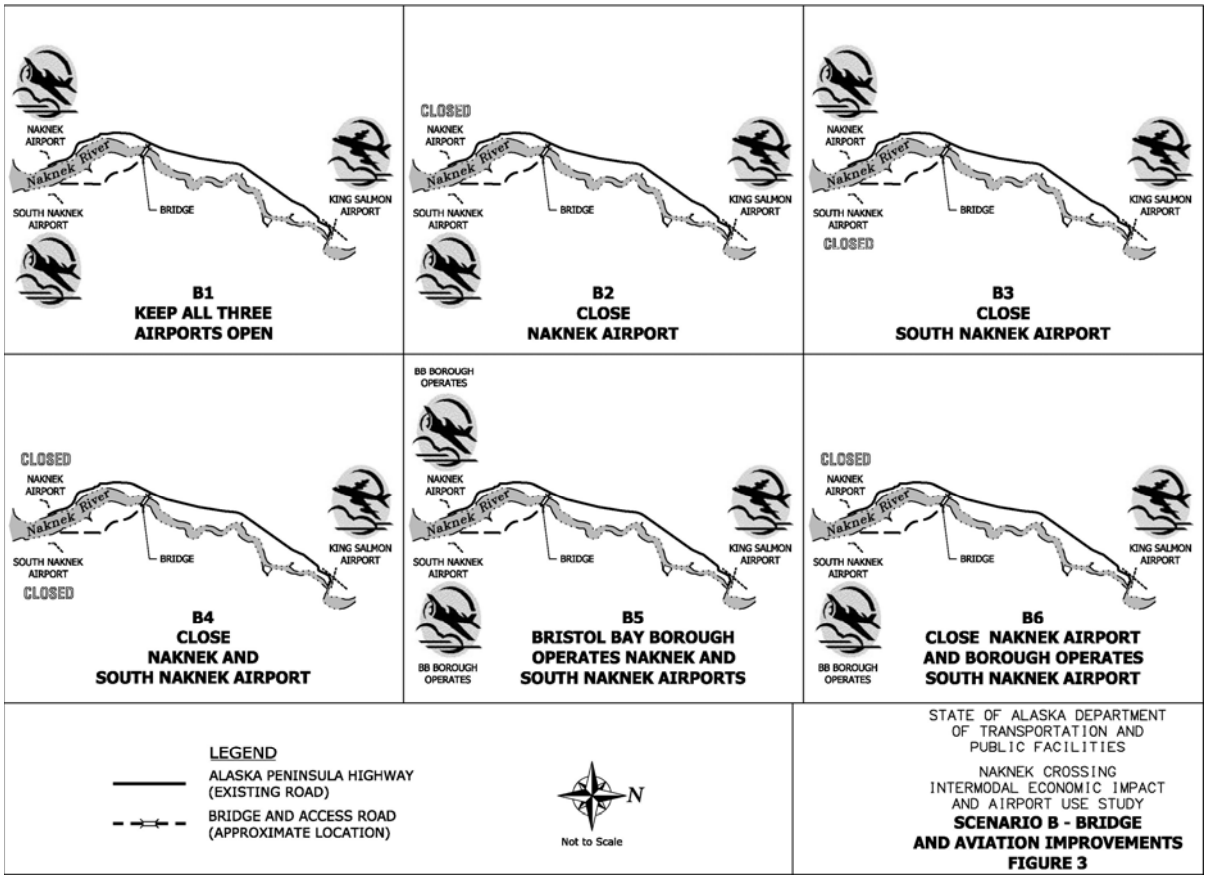


Figure 3. Proposed transportation system with bridge access and aviation options

Option B1 – Keep all three airports open

This scenario/option would develop a road and bridge across the Naknek River and implement planned improvements at all three airports in the Bristol Bay Borough. As shown in Table 5, the airport costs are the same as presented in option A1 (Table 3); the inclusion of the bridge operating and capital costs are the only differences. Under this combination, annual operating costs increase to over $1 million, and capital costs range from more than $90 million to almost $104 million. This scenario/option is the most expensive combination under consideration. This option is described here but is not further evaluated because the Department would not build a bridge *and* undertake improvements at all three airports.

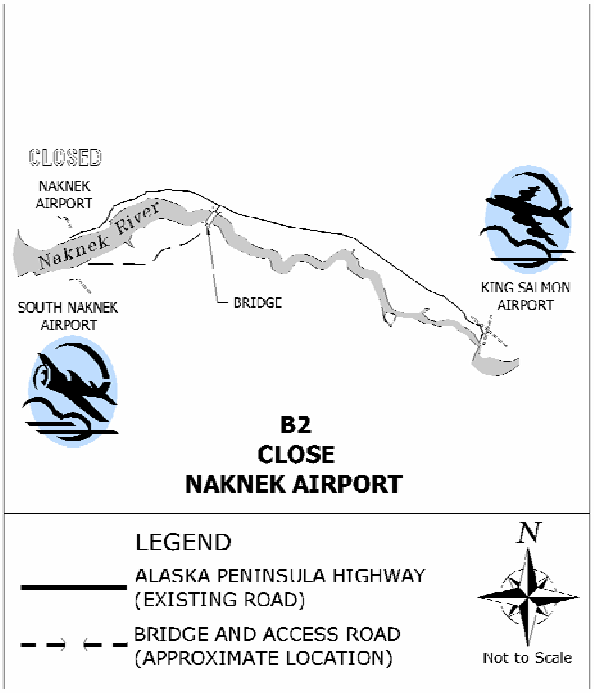
Table 5. Option B1: With bridge – keep all three airports open

Bridge/Airport	Annual Operating Costs ($)	Capital Costs ($)	
		Low	High
King Salmon	737,088	39,589,300	39,589,300
Naknek	29,962	20,947,000	20,947,000
South Naknek	19,806	3,910,000	3,910,000
Subtotal	786,856	64,446,300	64,446,300
Bridge	44,550	26,250,000	39,500,000
Total	831,406	90,696,300	103,946,300

Assumptions:

1. By year 10, when most improvements are assumed to have been made at the Naknek Airport, operating costs increase by $13,000/year to $29,962 due to increased electrical costs ($5,000/year) and maintenance ($4,000) of a new functional lighting system and increased fuel and manpower costs ($4,000) of maintenance and snow removal for runways, taxiways and aprons. Until then operating costs are $16,962.
2. Even though the South Naknek ALP indicates that it could be upgraded to B-II standards in the long term future, for planning purposes it is assumed it can continue to be developed to B-I standards, similar to the planned standards for the Naknek Airport.
3. South Naknek CIP costs include $2.2 million in 1-5 years for resurfacing, a $1 million road extension in 6-10 years, and $650,000 for a new grader and lighting upgrades in 11-20 years.

Option B2 – Close Naknek Airport



Closure of the Naknek airport would follow the opening of a road and bridge spanning the Naknek River in this scenario/option. As stated previously, bridge construction is assumed to begin in 2012 with the bridge opening in 2014. Under options calling for closure of the Naknek airport, the airport would remain in operation until the bridge is open. Compared to B1, this combination results in cost savings of approximately $30,000 in annual operating costs and $18 million in capital costs. Similar to A2, this scenario/option set might enable future improvements at Nornak Lake if the planned floatplane study makes such recommendations.

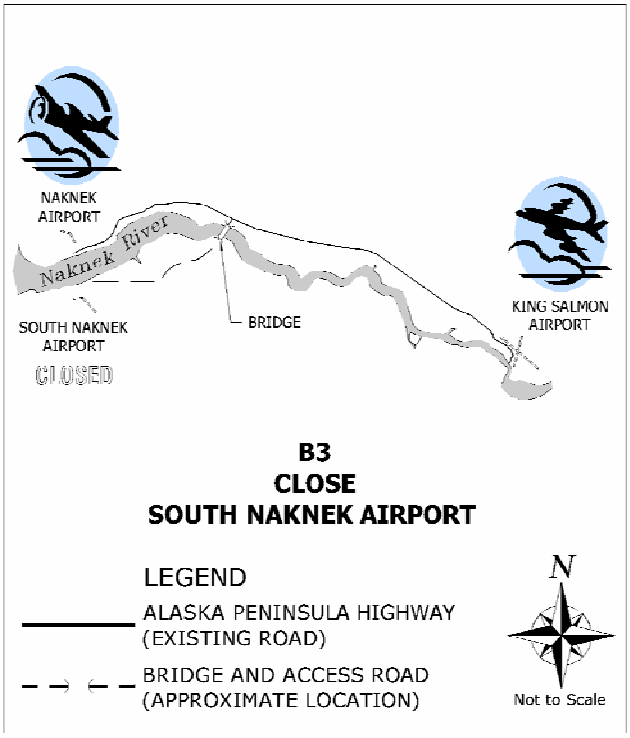
Table 6. Option B2: With bridge – close Naknek Airport

Bridge/Airport	Annual Operating Costs ($)	Capital Costs ($)	
		Low	High
King Salmon	737,088	40,959,300	40,959,300
Naknek	0	0	0
South Naknek	21,806	5,260,000	5,260,000
Subtotal	758,894	46,219,300	46,219,300
Bridge	44,550	26,250,000	39,500,000
Total	803,444	72,469,300	85,719,300

Assumptions:

1. Naknek operating costs ($16,962/year) continue to be paid until the bridge is open.
2. Additional tie down space is provided at the King Salmon and South Naknek airports at a cost of $1,400,000 for each airport. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. Additional maintenance and snow removal of general aviation tie downs and access taxiway adds $2,000/year to the South Naknek operating costs when the bridge is open.
4. Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.

Option B3 – Close South Naknek Airport



This combination would close the South Naknek airport upon completion of a road and bridge crossing the Naknek River. Planned improvements at the Naknek and King Salmon airports would be implemented. For options that include closure of the South Naknek airport it is anticipated that the airport would remain open until 2017, the year in which grant assurance to the Federal Aviation Administration (FAA) would end. Under this scenario/option, capital costs would be reduced by about $4 million in comparison to B1, and annual operating costs would be reduced by about $20,000.

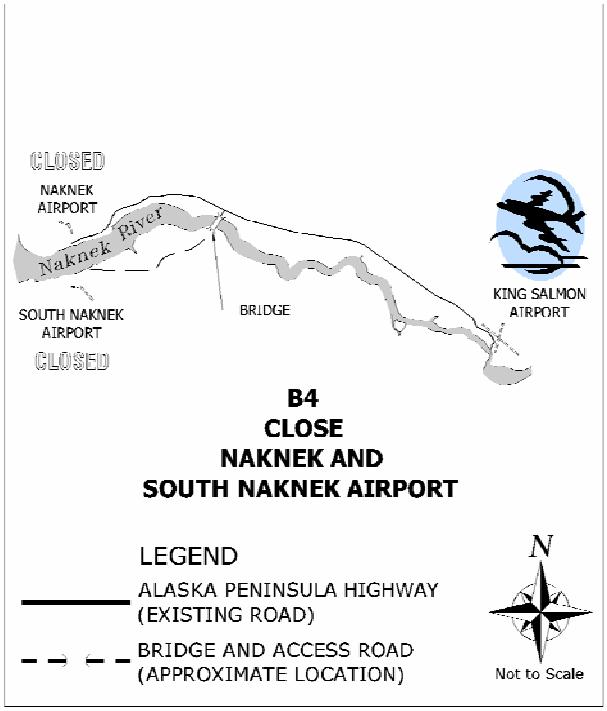
Table 7. Option B3: With bridge – close South Naknek Airport

Bridge/Airport	Annual Operating Costs ($)	Capital Costs ($)	
		Low	High
King Salmon	737,088	39,349,300	39,349,300
Naknek	29,962	21,007,000	21,007,000
South Naknek	0	0	0
Subtotal	767,050	60,356,300	60,356,300
Bridge	44,550	26,250,000	39,500,000
Total	811,600	86,606,300	99,856,300

Assumptions:

1. The planned South Naknek airport resurfacing project can be eliminated and the existing surface can safely meet needs until the bridge is built.
2. South Naknek Airport remains open through 2016 when the FAA grant has been amortized or the FAA and ADOT&PF can work out an arrangement where unamortized grant funding invested in the South Naknek Airport does not need to be paid back or can be applied to the planned investments in the Naknek Airport.
3. South Naknek operating costs ($19,806/year) continue to be incurred until the bridge is open.

Option B4 – Close Naknek and South Naknek Airports



This scenario/option set would close the Naknek and South Naknek airports when the road and bridge are completed. The Naknek airport would close in 2014 when the bridge is assumed to open, and South Naknek would close in 2017. Planned improvements at the King Salmon airport would be undertaken, and all aviation activity associated with wheeled planes would occur at the King Salmon airport. Improvements for floatplanes at Nornak Lake could result with closure of Naknek airport. Compared to B1, this scenario/option saves about $50,000 in annual operating costs and about $22 million in capital costs.

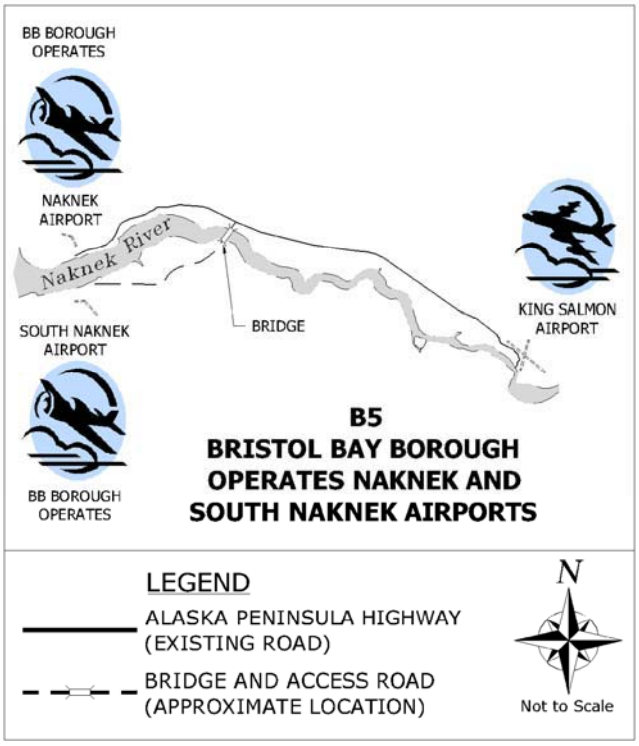
Table 8. Option B4: With bridge – close Naknek and South Naknek Airports

Bridge/Airport	Annual Operating Costs ($)	Capital Costs ($)	
		Low	High
King Salmon	737,088	42,629,300	42,629,300
Naknek	0	0	0
South Naknek	0	0	0
Subtotal	737,088	42,629,300	42,629,300
Bridge	44,550	26,250,000	39,500,000
Total	781,638	68,879,300	82,129,300

Assumptions:

1. The planned South Naknek airport resurfacing project can be eliminated and the existing surface can safely meet needs until the bridge is built.
2. Additional tie down space is provided at the King Salmon Airport at a cost of $2,800,000. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. South Naknek Airport remains open through 2016 when the FAA grant has been amortized or the FAA and ADOT&PF can work out an arrangement where unamortized grant funding invested in the South Naknek Airport does not need to be paid back or can be applied to the planned investments at the King Salmon Airport.
4. South Naknek operating costs ($19,806/year) and Naknek operating costs ($16,962/year) continue to be incurred until the Bridge is open.
5. Addition of general aviation tie downs does not have a measurable effect on operating costs at King Salmon.

Option B5 – Bristol Bay Borough operates Naknek and South Naknek Airports



This combination is similar to B1 in that all three airports would remain open after the bridge is completed, but the Bristol Bay Borough (or BB Borough as used in adjacent figure) would operate the Naknek and South Naknek airports under this scenario/option. Planned improvements at the three airports would also be completed, with the Naknek and South Naknek airport improvements finished prior to the date on which the facilities are transferred to the borough. Total capital costs and operating costs would remain the same as B1, but the state's operating costs would be reduced to about $780,000, with the Bristol Bay Borough responsible for about $50,000 of the operations and maintenance costs (See Table 9).

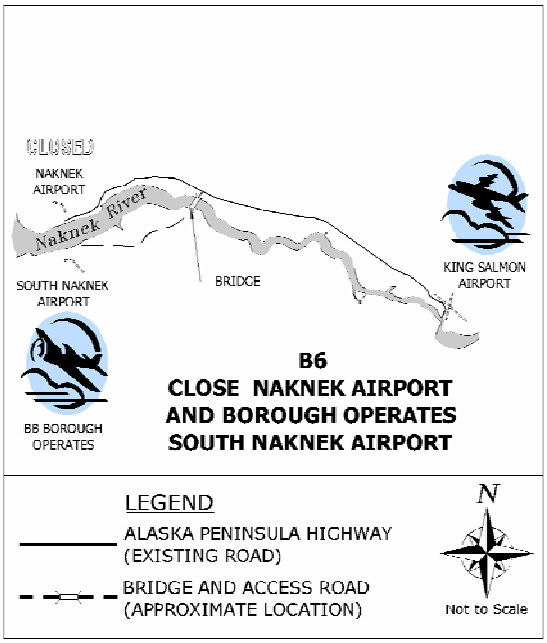
Table 9. Option B5: With bridge – Bristol Bay Borough operates Naknek and South Naknek Airports

Bridge/Airport	Annual Operating Costs ($)		Capital Costs ($)	
	Borough	State	Low	High
King Salmon	0	737,088	39,589,300	39,589,300
Naknek	29,962	0	20,947,000	20,947,000
South Naknek	19,806	0	3,910,000	3,910,000
Subtotal	49,768	737,088	64,446,300	64,446,300
Bridge	0	44,550	26,250,000	39,500,000
Total	49,768	781,638	90,696,300	103,946,300

Assumptions:

1. Bristol Bay Borough operating costs will be comparable to the State of Alaska's current costs. Some costs could be higher while other costs could be lower.

Option B6 – Close Naknek Airport and Bristol Bay Borough operates South Naknek Airport



Under this scenario/option the Naknek airport is closed when the bridge opens in 2014, and the State of Alaska transfers responsibility for operating the South Naknek airport to the Bristol Bay Borough (BB Borough) after the bridge is built. Planned improvements at the South Naknek and King Salmon airports are implemented, and the South Naknek improvements are completed before the facility is transferred to the borough. This scenario/option reduces the state's annual operating costs by almost $50,000 in comparison to B1, but the borough's costs increase about $21,800. The capital costs for this scenario/option are about $21 million less than for B5.

Table 10. Option B6: With bridge – close Naknek Airport and Borough operates South Naknek Airport

Bridge/Airport	Annual Operating Costs ($)		Capital Costs ($)	
	Borough	State	Low	High
King Salmon	0	737,088	39,589,300	39,589,300
Naknek	0	0	0	0
South Naknek	21,806	0	3,910,000	3,910,000
Subtotal	21,806	737,088	43,499,300	43,499,300
Bridge	0	44,550	26,250,000	39,500,000
Total	21,806	781,638	69,749,300	82,999,300

Assumptions:

1. Naknek operating costs ($16,962 per year) continue to be paid until the bridge is open.
2. Additional tie down space is provided at the King Salmon and South Naknek Airports at a cost of $1,400,000 for each airport. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
3. Additional maintenance and snow removal of general aviation tie downs and access taxiway adds $2,000 per year to the South Naknek operating costs once the bridge is open.
4. Addition of general aviation tie downs does not have a measurable effect on operating costs at King Salmon.
5. Bristol Bay Borough operating costs will be comparable to the State of Alaska's current costs. Some costs could be higher while other costs could be lower.

What are the potential effects of the proposed changes?

This section summarizes the various beneficial and adverse effects associated with the construction, operation, and potential closure(s) under the scenarios/options. These effects include social, economic, and biological effects, as well as those related to changes in the existing transportation patterns. Additional detail on these effects, as well as background information on the environment, communities, and transportation systems is provided in the appendices for those readers who may be unfamiliar with the existing conditions.

Human environment

This section addresses the role of the transportation system in the area, the factors affecting future transportation demand, with and without a bridge, and the potential financial and economic effects of the scenarios and options on the government and private sectors.

Transportation

In addition to the construction of new facilities and/or closure of such as described in What changes are being considered and what would they cost?, the scenarios and options will have different effects on the transportation system in the borough. The following subsections describe the changes in aviation activity — with and without a bridge — and the number of trips across the Naknek River in the event a bridge is built.

Bridge forecasts

A bridge across the Naknek River will provide road access to South Naknek and thereby increase the number of trips that residents of South Naknek make between Naknek and King Salmon, and the number of trips that residents of the latter two communities make to South Naknek.

Even after construction of this bridge crossing, the three communities will be isolated from other road systems in Alaska. The airport at King Salmon will provide the primary mode of passenger travel to and from other communities in the state and the Lower 48 states, and tugs and barges will be the primary mode of transport for fuel and freight to and from the three communities. A bridge alternative will, however, increase the interaction between the communities by reducing the current cost of travel, whether expressed in terms of dollars (e.g., airfare between King Salmon and South Naknek), or time (e.g., boat crossing between Naknek and South Naknek).

The current number of trips between South Naknek and the other two communities in the Bristol Bay Borough is not well documented. Some limited information is available on air transport passenger and freight volumes, but the only data on travel by skiff, landing craft, tug and barge, automobile, or snow machine across the river come from a survey of borough residents conducted for this study (See Appendix J for additional detail on the survey). Table 11 shows the estimated number of round trips across the Naknek River by community of residence and by mode of travel in 2003. No information was obtained on the number of trips

made by nonresident fishers, other seasonal nonresident workers, and visitors to the community, so the information presented in Table 11 underestimates the total number of trips. The estimate of more than 25,600 trips equates to about 71 trips per day.

Table 11. Estimated number of trips across Naknek River by mode of travel, 2003

	Round Trips			
Mode of travel	**King Salmon**	**Naknek**	**South Naknek**	**Total**
Air taxi	1,044	2,489	4,144	7,677
Private plane	3,169	2,774	249	6,192
Skiff or boat	1,683	5,354	2,063	9,100
Snow machine	210	215	174	599
Other vehicle	921	106	1,046	2,073
Total	7,027	10,948	7,676	25,651

Note: At a public meeting where these data were presented it was stated that the number of trips by snow machine or other vehicle would be higher in most years preceding and following 2003, that year having been a very warm year, with the river only frozen for a short period.

The cost of travel in terms of dollars and the time required to travel back and forth across the river deters travel between the communities. If a bridge is built, these costs will be reduced and the number of trips will increase. A bridge would substantially change the transportation system in the borough, although it is difficult for individuals to estimate the number of future trips they *might* make when the bridge does not exist. When a person's stated preference in a survey is not likely to be a reliable predictor of future trips, economists typically turn to other sources of data and models that can reveal estimates of such trips.

There are other communities around the state that have analogous situations, and it was hypothesized that existing travel data between these communities could be used to project future travel between South Naknek and the other two Bristol Bay Borough communities once a bridge alternative is in place. Four relevant community pairs were identified from around the state with annual average daily traffic count information. These community pairs included:

Naknek – King Salmon
Klawock – Thorne Bay
Seldovia – Jakolof Bay
Nome – Teller

Table 12 shows the sum of 2003 population estimates for each community-pair, the average annual daily traffic (AADT) counts between each community-pair for 2003, and the mileage between each community-pair. Population data are from the Alaska Department of Labor and Workforce Development (ADOLWD) website, except data for Jakolof Bay which is from the Alaska Department of Commerce, Community, and Economic Development website. Jakolof

Bay population is not reported by ADOLWD. AADT estimates for 2003 are taken from the Annual Traffic Volume reports presented on the Alaska Department of Transportation and Public Facilities (ADOT&PF) website. The AADT counts were selected for a road segment near a mid-point between the community pairs with a goal of minimizing influence of local community travel on the traffic counts. Mileage estimates for the Northern and Central Regions are taken from the Annual Traffic Volume reports, while estimates for the Southeast community-pairs are based on the Alaska Milepost.

Table 12. Community pair data

Community Pairs	Sum of Population	Travel Distance (miles)	Annual Average Daily Traffic
King Salmon – Naknek	999	15.5	1,010
Seldovia – Jakolof Bay	339	11.8	45
Nome – Teller	3,690	72.2	25
Craig – Klawock	2,025	6.5	2,060

A multiple regression analysis using SPSS (Statistical Package for the Social Sciences) was employed to estimate AADT based on the population of the community-pair, and the distance between them. The population and travel distance data for each community pair can be substituted into the equation and used to develop an estimate of the AADT that exists between the community pair. Since South Naknek will be interacting with both Naknek and King Salmon, the total population of the latter two communities was used along with a weighted average distance factor of 11.8 miles.

Table 13 compares the actual AADT for the four community pairs with the estimated AADT from the equation, as well as the estimated AADT for trips between South Naknek and the other two Bristol Bay communities using the equation. If separate AADT estimates are developed for South Naknek-Naknek and South Naknek-King Salmon, the combined estimated AADT are approximately 100 trips greater than what is shown in Table 13. The number of trips between South Naknek and Naknek alone is estimated at 806 trips, which is greater than the current number of trips between Naknek and King Salmon. This is to be expected since the model indicates that distance has a greater influence than population; the coefficient for distance is -52.051 (which means that the number of trips declines by 52 trips for each additional mile of distance between the communities), and the coefficient for population is 0.858 (each additional person in the two communities will add 0.858 trips). See Appendix I for additional information on the traffic forecasting methodology.

Table 13. Actual and estimated average annual daily traffic, 2003

Community Pairs	AADT	Estimated AADT
King Salmon – Naknek	1,010	740
Seldovia – Jakolof Bay	45	350
Nome – Teller	25	105
Craig – Klawock	2,060	2,100
South Naknek – Naknek/King Salmon (population of 1,101)		1.020

A comparison of the actual AADT data with the estimated AADTs suggests that the equation may be an acceptable means for estimating future trips with a bridge alternative. The equation indicates that about 1,020 daily passenger vehicle trips might occur if a bridge were available between South Naknek and the other two communities in 2003 (with the three communities having a total combined population of 1,101) Recall that in 2003, Bristol Bay Borough residents indicated that they make about 71 round trips (142 one-way trips) per day with the existing situation. The difference between the 1,020 estimated trips in 2003 with a bridge, and the estimate of 142 current resident trips from the survey, or 878 trips, represents new trips that would be induced by the presence of the bridge, and the resulting lower cost of transportation.

The estimated AADT in Table 13 does not include any possible changes in future economic conditions or population changes in South Naknek that might occur with a bridge. Such changes are addressed in the following paragraphs.

The level of traffic will change over time as the population in the Borough and particularly South Naknek changes. Population changes in the Borough will be driven to a large extent by economic opportunities surrounding the Bristol Bay fishing industry. As noted in Appendix C, 'Community Profile,' the salmon industry is in a state of flux, and it is difficult to foresee what the future will hold for the local seafood industry and residents. Given the difficulty in reliably forecasting future economic conditions for the industry, this study uses a scenario-based approach to describe what the future might hold for the region. This scenario-based approach attempts to provide a range within which the future may occur, and enables the analyst to assess the viability of a project or its impacts within this range of futures.

As described in Appendix I, the forecasts are predicated on changes in local economic conditions. The base case forecast anticipates a continuation of the trends described in Appendix C that have taken shape over the past 13 years. The low case would see economic conditions deteriorate, and the most negative trends experienced over the past 13 years would be expected. Conversely, the high case would see economic conditions improve, and the population would increase in response to those conditions. The turnabout in economic conditions is not expected to occur immediately, so the current trends of decreasing population in King Salmon and Naknek would, under these assumptions, continue until about 2010, the point at which economic conditions might have improved enough to encourage population growth.

Table 14 shows the projected AADT for passenger vehicles across the proposed Naknek River Bridge between South Naknek and the other two communities in the Bristol Bay Borough during the first 20 years of operation for each of the scenarios described above.

Table 14. Projected average annual daily passenger vehicle traffic across a Naknek River bridge, 2014 - 2033

	Year				
Scenario	**2014**	**2019**	**2024**	**2029**	**2033**
Base Case	938	966	994	1,023	1,045
Low Case	498	441	383	326	280
High Case	945	1,105	1,265	1,427	1,557

The number of people traveling across the bridge can be estimated by multiplying the number of vehicle trips (AADT) by the average number of people in a vehicle (vehicle occupancy rate). An occupancy rate specific to the Naknek-King Salmon road is not available, so a national average of 1.7 for all trips not in a metropolitan statistical area (Nationwide Personal Transportation Survey, 1990) was used to project the person-trip estimates shown in Table 15.

Table 15. Projected average annual daily person-trips across a Naknek River bridge, 2014 - 2033

	Year				
Scenario	**2014**	**2019**	**2024**	**2029**	**2033**
Base Case	1,594	1,642	1,690	1,738	1,777
Low Case	846	749	652	554	476
High Case	1,607	1,878	2,151	2,426	2,647

Aviation forecasts

There is great variation in estimates of air traffic and characteristics at King Salmon, Naknek, and South Naknek Airports, as well as for float plane operations on Nornak Lake and the Naknek River. This is due to the following factors:

- Forecasts from the Airport Master Plans are higher than actual activity levels because the region's economy and population have declined more rapidly and dramatically than anticipated.
- No recorded data exists beyond the King Salmon Air Traffic Control Tower and certificated air carrier reporting.

In this section, the baseline and forecasted air traffic from the 2001 Master Plans, FAA Terminal Area Forecasts, FAA 5010 forms, factors from models generated in the Yukon-

Kuskokwim Area Transportation Plan, the Southwest Alaska Transportation Plan, and estimates by area residents and operators are all considered. Conversations with local airport operators have provided the basis for describing types of air travel.

King Salmon Airport Traffic

The following table shows the 2001 Airport Master Plan base year and forecasts through 2019. A median between base year 1996 and 2004 is also shown, as a basis for comparison with Tower Counts for 2001.

Table 16: 2001 King Salmon Airport Master Plan forecasts

	1996	2001	2004	2009	2019
Aircraft Operations	33,284	34,942	36,600	39,316	44,745
Enplaned Passengers	51,707	55,556	59,404	68,694	87,278
Total Based Aircraft	40	40	40	40	42
Air Cargo/Mail (tons)					
Enplaned Freight (tons)	3,500	3,500	3,500	3,500	3,500
Enplaned Mail (tons)	400	500	600	600	1,100

Note: 2001 estimate is the 1996-2004 median.

The FAA's Terminal Area Forecasts are currently updated with historical data provided by the Control Tower through 2001. This operation figure shows 25,926 operations, 9,016 less than the Master Plan estimated for 2001. However, the Master Plan estimates were partly tied to an annual population growth rate of about 2 percent, which is significantly higher than the actual rate of population growth in the borough.

Naknek Airport Traffic

The forecasts prepared for the 2001 Naknek Airport Master Plan are shown in the following table. There was a wide range of differing estimates for 1996 traffic, from 53,500 operations per year listed in the 1990 FAA Airport Master Record, to the FAA Terminal Area Forecast estimate of 29,000. Local operators estimated 27,000. Responses from a local and non-local pilot survey were also reviewed, and appeared to support the Master Record estimate. Enplaned freight and passengers were not forecasted. Air carrier records showed 2,310 commuter passenger enplanements in 1996, which probably did not include about 3,500 student-charter enplanements per year. These results from the 2001 Airport Master Plan are shown below, with an average peak day added to help visualize the activity at Naknek Airport:

Table 17: 2001 Naknek Airport Master Plan Forecasts

	1997	2002	2007	2017
Forecasted Operations	53,500	57,464	61,723	71,210
Average Day Peak Month (based on King Salmon proportions)	610	655	704	811
Passenger Enplanements (1996)	5,810			

The Naknek Airport Forecasts are revised in this study because a variety of factors have changed dramatically since *historical* data were used to produce the 1990 Airport Master Record.

These changes include:

- Penair stopped scheduled service to Naknek in 1999, which represented about 10,000 flights annually. Most of these operations were conducted at adjacent Tibbetts Airfield. However, because Penair uses the descriptive identifier "NNK" (for North Naknek) in their carrier reports, older historical reports of their activity may have been included in "5NK", Naknek Airport.
- Fish-spotting from the air became illegal in 1997, which may account for the historically large number of operations, and relatively low passenger enplanements. These could easily have represented 40 operations a day through the summer months.
- Many of the canneries/fisheries have closed in recent years. Operations on behalf of the canneries once represented about 50 operations a day in the summer. This activity involved both the acquisition of goods and services available in Naknek, and the transportation of workers.

Naknek Airport provides secondary air service to the community of Naknek, since Naknek is connected by road to the larger King Salmon Airport. However, it does provide essential service to South Naknek, both in the transport of schoolchildren, and to South Naknek families traveling to Naknek for goods and services. There are also flights from other towns in the region, such as Egegik, which are primarily trips for supplies available in Naknek, especially for private fish camps.

In addition, the airport provides convenient fueling and maintenance facilities for itinerant aircraft. It also provides wind protection for small aircraft based there and for exposed aircraft at other airports when a storm is approaching. It is also convenient to load goods directly onto an aircraft from a car or other vehicle.

An estimate of current air traffic activity from various sources is shown in the following table.

Table 18: Comparison of estimates of current Naknek air traffic

	King Air	Penair	FAA 5010	FAA TAF	Y-K Plan
Total Airport Operations	13,000	10,000	7,700	29,000	
Air Taxi	100	1,000	600	12,000	
GA Local	10,000	8,000	7,000	7,000	
GA Itinerant	2,900	1,000	100	10,000	
Character of Operations[1]					
A. School Transportation	3,500				
B. Bristol Bay Borough Business	3,500				
C. Fishing	1,500				
D. Itinerant Fueling/Maintenance/ Wind Protection	3,000				
E. South Naknek Resident Personal Business	1,000				
F. Other	500				
Enplanements					
Passenger[2]	9,380				10[4]
Mail (tons)	0	0			
Freight (tons)[3]	10				200[5]

Notes:

1. Derived from 1996 Pilot survey, 2003 community meetings, John King
2. 2,880 pupils + 6,500 (2 enplanements x ½ operations, except A, D.)
3. Derived from South Naknek's population less calculation of freight enplanement to King Salmon
4. Per person per year
5. Pounds per person per year

The Character of Operations shown in the above table can be broken into categories that relate to the type and main purpose of air travel. The categories can be described as follows:

A. School Transportation: Includes daily air busing of students, and air transportation for teachers, school board members, and administrators. Also includes air transportation for students for Bristol Bay Borough-sponsored extracurricular activities such as sports and field trips.

B. Bristol Bay Borough Business: All air transportation related to the construction, maintenance, and supply of public and private utilities and services.

C. Fishing: All transportation related to the supply of commercial fishing, whether a private or business enterprise. This includes equipment, supplies, and transportation of workers.

D. Itinerant Fueling/Maintenance/Wind Protection: Aircraft owners taking advantage of the ease of access at the airport, and temporarily parking aircraft based elsewhere during storms.

E. South Naknek Resident Personal Business: All air activity generated by South Naknek residents traveling for recreation, supplies, and/or visiting.

F. Other: Includes all else: for example, scheduled or chartered air taxi service from towns outside the Bristol Bay Borough, such as Iliamna or Dillingham.

The following table compares the Master Plan and DOWL estimate for Naknek Airport, as well as the factors used for allocating types and character of operations:

Table 19: Comparison of Master Plan and DOWL estimate

	Master Plan estimate (2002)	DOWL estimate
Total Airport Operations	57,464	13,000
Air Taxi	575	100
GA Local	44,247	10,000
GA Itinerant	12,642	2,900
Based Aircraft	70	70
Character of Operations		
A. School Transportation	3,500	3,500
B. Bristol Bay Borough Business	19,967	3,500
C Fishing	8,634	1,500
D. Itinerant Fueling/ Maintenance/Wind Protection	17,268	3,000
E. South Naknek Resident Personal Business	5,936	1,000
F. Other	2,698	500
Passenger Enplanements	6,241	9,380
Enplaned Mail	0	0
Enplaned Freight (tons)	10	10

Figure 4 shows the current characteristics of traffic at the Naknek airport.

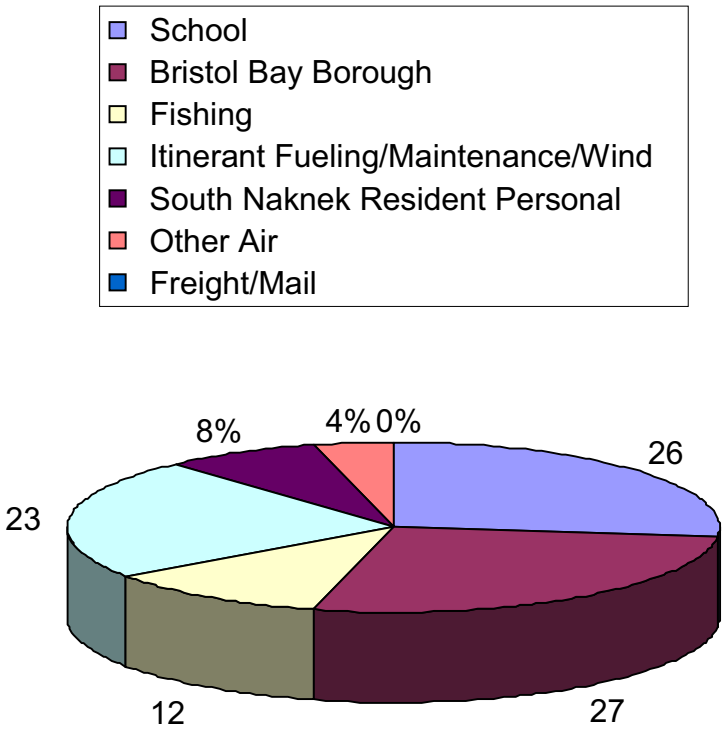


Figure 4: Current air traffic characteristics at Naknek Airport

South Naknek Airport

Though the FAA Terminal Forecasts have not been updated for ten years, estimates of South Naknek operations are supported by air carrier reports filed by Penair. Penair estimates that they represent about 80 percent of all enplanements at the airport.

Penair operates three scheduled flights a day, for a total of about 2,200 annually, and King Air school-related transportation flights add another 3,500. There are 10 locally-based aircraft that represent about 1,000 flights a year. Various air taxis and private aircraft create about 5,000 operations per year for borough business, and for South Naknek residents' private business across the river in Naknek. South Naknek Airport is therefore estimated to have 11,700 operations per year, as shown in the following table. Figure 5 shows the Character of Operations in a chart.

Table 20: 2001 South Naknek Airport air traffic characteristics estimates

		Current Estimates[1]
Total Airport Operations		11,700
Air Taxi		2,200
GA Local		1,000
GA Itinerant		8,500
Based Aircraft		10
Character of Operations		
A.	School Transport	3,500
B.	Bristol Bay Borough Business	2,500
C.	Fishing	1,000
D.	Itinerant Fueling/Maintenance/Wind Protection	0
E.	South Naknek Resident Personal Business	2,500
F.	Air Taxi/Freight Mail	2,000
G.	Other	200
Enplanements		
Passenger[2]		8,200
Mail		1
Freight (tons)		2.23

Notes:

1. Derived from 2003 community meetings, King Air, Penair
2. 2880 pupils + 6500 (2 enplanements x ½ operations, except A, D)

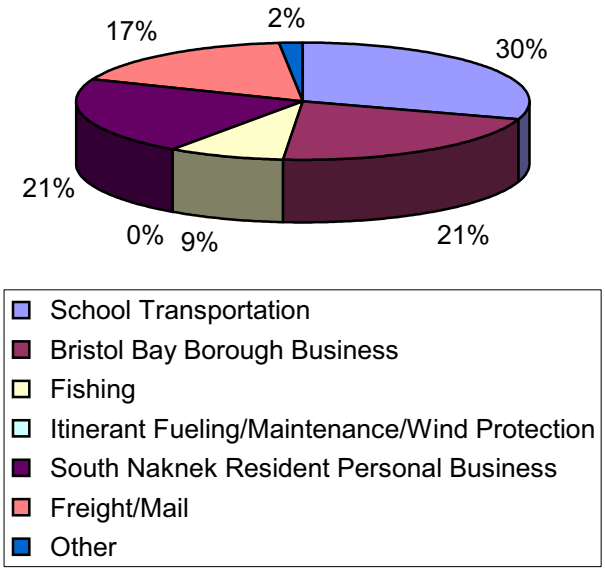


Figure 5. Current air traffic characteristics at South Naknek Airport

Floatplane Bases

The Floatplane operating areas on the Naknek River adjacent to the King Salmon Airport and on Nornak Lake adjacent to the Naknek Airport also play a part in the Bristol Bay Borough's aviation system. Operations at Nornak Lake are estimated at 500 per year. Though there is one floatplane based there, the lake is primarily temporarily used for aircraft maintenance for Naknek River operators. Occasionally operators also shelter their aircraft there if extremely windy conditions are anticipated. The lake is depressed and surrounded by thick bushes.

Naknek River float operations have never been counted, though this is now underway as part of the Air Traffic Control Tower contract process. Preliminary estimates are about 10,000 operations per year. These operations are primarily visitor-related, providing access to fishing and hunting areas and lodges. Though not of interest as essential air service, tourism is forecast in several studies to increase in the area, which may be a benefit to the borough's economy in the future. Floatplane traffic is not expected to be affected by any scenario in this study.

Forecast Development

In developing aviation system forecasts for the region, some factors are important to consider:

- A dwindling state budget, in which the availability of maintenance funds is expected to decline
- State policy is being developed which would seek to eliminate duplication of services and facilities, especially in road-connected communities
- State policy for infrastructure development could be modified with changes in state administration (over 20 years)

- Difficulty in applying costs, benefits, and responsibility to other state agencies, which influence and are influenced by transportation projects (i.e., Department of Education)
- Budget shortfalls throughout the state realistically limit alternative sponsors for airports or any other facilities. However, the Bristol Bay Borough has requested information about assuming sponsorship of the Naknek airport from ADOT&PF
- FAA's commitment for funding safety improvements requires also that the sponsor maintain the facility for at least 20 years following the most recent grant, under their "Grants Assurances" policy. The State is obligated to maintain South Naknek Airport through 2016, and King Salmon Airport indefinitely. There is no obligation for Naknek Airport since no federal funds have been spent there yet.
- If an airport is closed, the unamortized portion of the FAA grant may have to be paid back to the FAA. In some cases, the FAA has considered using these funds to improve other airports in the airport system. Environmental reclamation, if necessary, may also have to be undertaken if the airport is closed or if there is a change in sponsorship.
- All airports must be safe for public operations
- Transportation changes unrelated to the proposed bridge may also influence future traffic patterns and capacity. Of note is the King Salmon control tower closure, and state pupil transportation policy
- Possibility of incentives for revenue-generating improvements such as tie-down rentals and other user fees, statewide
- Possibility that the U.S. Air Force could change maintenance and operations (M&O) funding in support of King Salmon airport
- Possibility of improved float plane base facilities

This section describes potential changes to the Borough's aviation system if a bridge is built across the Naknek River. The descriptions illustrate closures of some airports, and the resulting airport capital and operating cost savings.

Closure of an airport could also mean that another entity assumes sponsorship, control, and the cost of the airport improvements and maintenance, with the airport remaining open for public service. In all scenarios, King Salmon airport is kept open, maintained, and expanded according to plans already in place. Aviation considerations assumed in each scenario/option are shown in the following table.

Table 21: Aviation considerations in forecast development

	King Salmon Airport	Naknek Airport	South Naknek Airport
Safety/Risk		Requires extensive development to meet minimum FAA and state safety standards.	
Improvement Costs	Requires capital improvements; increased maintenance.	Requires capital improvements; increased maintenance.	Requires capital improvements.
Convenience	15.5 mile road distance to Naknek, approximately 18-mile distance to South Naknek if bridge is built.	Located in the Borough's Population Center; unconstrained access to aircraft.	South Naknek relies on the airport for essential service; if it were closed, and a bridge were built, it could be an 18-mile trip to King Salmon Airport.
School Access	Airport is too far away from South Naknek to accommodate a fly/bus combination to school in Naknek.	Transportation of school children by air to Naknek is expensive and restricts school activities; with a bridge they could be bused.	Relies on airport for transportation of school children; with a bridge they could be bused.
Shift in Air Transportation Demand		Induced relocation of residents and businesses to King Salmon and South Naknek if the airport is closed and/or the bridge is built.	With a bridge, the community thinks that more residents would relocate to South Naknek, and business would be developed there.
Grant Obligations		Improvements to the Airport will trigger a 20-year grant assurance to FAA.	The Airport already has grant assurances to the FAA through 2016; if the airport were closed, this may have to be paid back.

	King Salmon Airport	Naknek Airport	South Naknek Airport
King Salmon Control Tower	A shift of more operations to that Airport would bolster sagging operations there, and may trigger FAA/state funding of the Tower.		
Timing		Naknek Airport will need to remain open and may need to be improved *before* a bridge is built if the school children continue to be flown over from South Naknek.	

Aviation Forecasts

The following figure shows forecasts of aviation activity (annual operations) in 2029 for each of the scenarios/options based on the considerations described above. Additional details on the operations and enplanements for years 2010, 2019, and 2020 are in Appendix F.

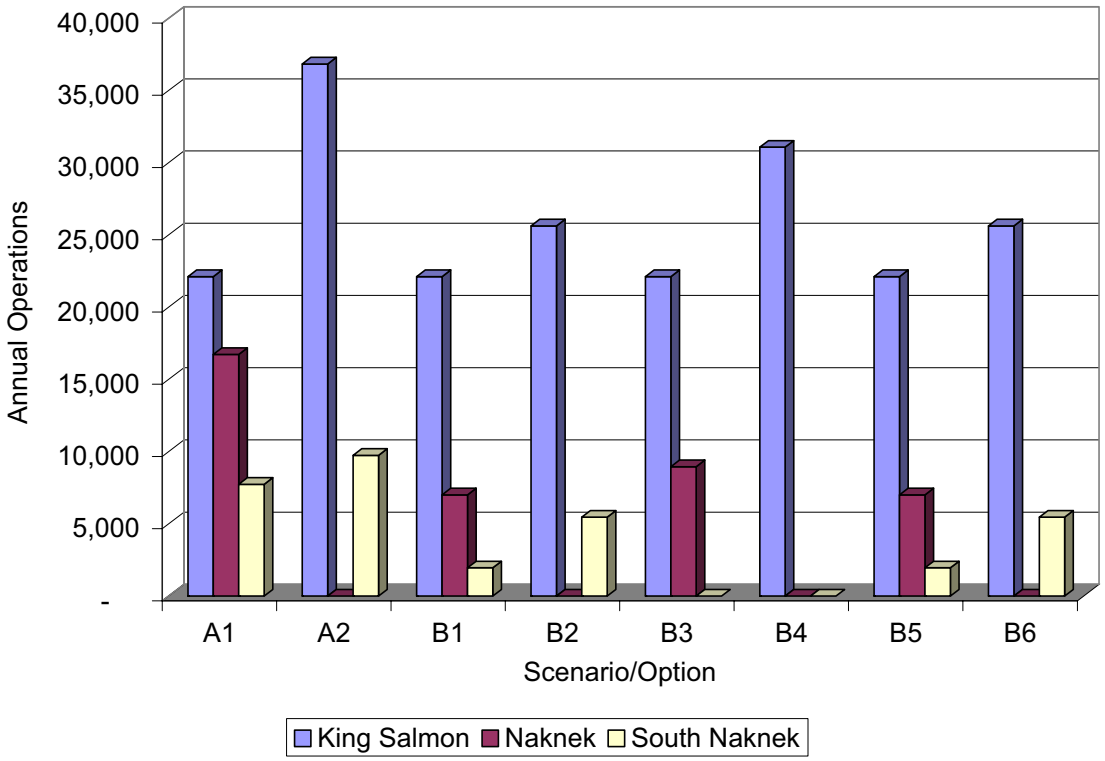


Figure 6. Forecast of annual operations at area airports in 2029 by scenario/option

Socioeconomics

Construction and operation of any of the scenarios/options will change the transportation system in the Borough and influence the social and economic patterns in the community. The following paragraphs describe the potential changes in the economy and population under the aviation only (A) and with bridge (B) scenarios. Additional background information and detail on the information presented in this section can be found in Appendix C (community profile) and Appendix I (population and traffic projections).

Population

The population forecasts shown in Table 22 are predicated on changes in local economic conditions under the aviation only scenario (A). As discussed in Appendix C, the salmon industry is in a state of flux, and it is difficult to foresee precisely what the future will hold for the local seafood industry and residents (See for example, Knapp 2004 and CFEC 2004). As a result, low, base, and high scenarios were developed to assess the viability of a scenario/option and its potential impacts. In developing these scenarios the consultant team reviewed the reports cited above, statewide forecasts prepared by the Institute of Social and Economic Research at the University of Alaska Anchorage, the Alaska Department of Labor and Workforce Development, and studies prepared by Northern Economics on restructuring of the Bristol Bay salmon fishery, as well as other studies conducted by the firm in the region.

The base case population forecast anticipates continuation of long-term trends, and extrapolation of those trends is used to project the future population change. Similar extrapolations are used for the low and high cases. As noted in Appendix C, a substantial portion of the population loss in the Borough has been due to population declines in King Salmon, which has experienced significant population loss since the closure of the U.S. Air Force Base in 1994. At some point this population loss associated with the closure of the base will reach equilibrium, and the Borough economy will begin to respond more closely to changes in the salmon fishery. The current depressed status of the fishery, combined with anticipated restructuring of the salmon fishery, improving quality, and other factors suggest that the local economy could rise from its current levels, or at least maintain its current position, thus suggesting some stability or relatively minor changes in population levels over time for the base case.

The low case would see economic conditions deteriorate and the most negative population trends experienced over the past 13 years would be expected to continue. Conversely, the high case would see economic conditions improve and the population increase in response to those conditions. The turnabout in economic conditions is not expected to occur immediately, so the current trends of decreasing population in King Salmon and Naknek would, under these assumptions, continue until about 2010, the point at which economic conditions might have improved enough to encourage population growth. See Appendix I for additional detail on these scenarios.

Table 22. Projected population by community under aviation only scenario

Community	Year								
	2000	2001	2002	2010	2014	2019	2024	2029	2033
Base Case									
King Salmon	442	386	392	409	374	331	287	243	208
Naknek	678	663	642	722	749	784	819	853	881
South Naknek	137	124	121	117	109	100	91	82	74
Bristol Bay Borough	1,257	1,173	1,155	1,248	1,233	1,215	1,197	1,178	1,164
Low Case									
King Salmon	442	386	392	357	327	290	253	215	186
Naknek	678	663	642	653	652	652	651	651	651
South Naknek	137	124	121	106	96	83	70	57	46
Bristol Bay Borough	1,257	1,173	1,155	1,116	1,075	1,025	974	923	882
High Case									
King Salmon	442	386	392	370	393	423	456	491	521
Naknek	678	663	642	855	923	1,007	1,092	1,177	1,244
South Naknek	137	124	121	110	117	126	136	146	155
Bristol Bay Borough	1,257	1,173	1,155	1,336	1,433	1,557	1,684	1,814	1,921

Source: Population projections by Northern Economic, Inc.
Note: For comparison purposes, the ADOLWD projections cited in Appendix I estimated that the Bristol Bay Borough population in 2018, the last year of their projection, would be 1,734 under the middle case, 1,413 under the low case, and 2,668 under the high case. These estimates are much higher than those used in this report. ISER prepares statewide projections as well as projections for boroughs and census areas in the Railbelt, but projections for the Bristol Bay Borough were not identified.

The availability of a bridge would be expected to result in different economic conditions in the three communities, but particularly in South Naknek. The effect of the bridge on the communities is uncertain, so a range of outcomes is provided in this analysis using low, base, and high scenarios (See Appendix I for detail on the assumptions used in these scenarios).

Under the low case, it is assumed that the positive influence of the bridge is more than offset by the magnitude of adverse change in the regional economy. The decreasing population trends in South Naknek and King Salmon continue, and population levels are the same as projected in Table 22.

Under the base case, former residents of South Naknek who currently reside in Naknek because of proximity to their current jobs return to the community, and the lower transportation costs result in economic growth and additional jobs in South Naknek. The overall population levels in the Bristol Bay Borough under the base case remain the same as shown in Table 22, but there is a shift in future population growth with a greater portion of future growth occurring in South Naknek (See Table 23. This shift begins with construction of the bridge and continues after the bridge opens.

Under the high case, positive changes in regional economic growth result in population growth in all three communities, and additional employment in the region. The positive economic changes could be associated with restructuring of the salmon fishery, oil and gas development on the Alaska Peninsula, completion of the road to Chignik, or a combination of these and other changes. Former residents of South Naknek return to the community and a significant portion of persons migrating into the region for economic opportunity also settle in South Naknek.

Table 23. Projected population by community under bridge and aviation scenario

Community	Year								
	2000	2001	2002	2010	2014	2019	2024	2029	2033
Base Case									
King Salmon	442	386	392	409	374	331	287	243	208
Naknek	678	663	642	715	735	759	783	808	827
South Naknek	137	124	121	128	135	143	152	161	168
Bristol Bay Borough	1,257	1,173	1,155	1,253	1,244	1,233	1,222	1,212	1,203
Low Case									
King Salmon	442	386	392	357	327	290	253	215	186
Naknek	678	663	642	653	652	652	651	651	651
South Naknek	137	124	121	106	96	83	70	57	46
Bristol Bay Borough	1,257	1,173	1,155	1,116	1,075	1,025	974	923	882
High Case									
King Salmon	442	386	392	397	416	442	470	500	526
Naknek	678	663	642	855	923	1,007	1,092	1,177	1,244
South Naknek	137	124	121	138	165	199	232	264	290
Bristol Bay Borough	1,257	1,173	1,155	1,390	1,504	1,648	1,794	1,941	2,060

Source: Projections by Northern Economics, Inc.

Economy

A description of existing economic conditions in the region is provided in Appendix C. As noted previously, the uncertainty surrounding the Bristol Bay salmon fishery makes it difficult to forecast future economic conditions with precision, and a detailed analysis of the industry is beyond the scope of this study, so a scenario-based approach is used to depict the range of futures that might occur. Appendix I provides additional detail on the scenarios. The following paragraphs describe the potential changes in the economy under the aviation only (A) and under the bridge (B) scenarios.

The local economy would be affected by construction activities for any of the scenarios/options, and the resulting effects these expenditures and activities would have on local businesses. After construction is completed, the aviation only scenarios/options are not anticipated to influence the local economy in a manner that is substantially different from the present situation (See Appendix C). However, under the base case, population declines would continue at South Naknek and King Salmon. Closure of the Naknek airport would

shift aviation activity for wheeled planes to King Salmon, but no businesses are expected to close as a result (See Appendix I).

A road and bridge to South Naknek would eliminate the need for the air taxi service between South Naknek and the other two communities. King Air would lose a substantial portion of its current business, but the company does provide service to outlying villages, and this demand for air taxi service would continue even with a bridge in place.

During public meetings in South Naknek, residents stated that they order a substantial portion of their groceries and supplies via catalogs and mail order. According to the residents, the cost of ordering from Anchorage and shipping an item to South Naknek results in the item costing about the same as if they purchased it in Naknek or King Salmon. However, with the additional costs of flying back and forth to Naknek or King Salmon, the ultimate cost of buying locally is more expensive than ordering supplies from outside of the region. It is their opinion that a bridge would lower the costs of buying locally and were the bridge in place, they would purchase more groceries and supplies from local stores, thereby improving the regional economy. They also believe that a gas station, restaurant, and similar services would open or remain open year-round with bridge access.

In addition to the population-serving businesses cited above, local residents believe that a bridge would lower operating costs enough that one or more of the South Naknek processing plants would reopen. Given the state of flux that the seafood industry is in (See Appendix C) it is uncertain if this situation would occur. However, operating costs for a South Naknek plant would not be significantly different from a Naknek plant if a bridge were in place, so the possibility certainly does exist. It should be noted that economic trends are not continuous, but rather typically cyclical, and that future conditions could emerge that might see the South Naknek plants reopen. While a downward trend in the fishing industry has been in effect in recent years this trend could change with:

- A return to larger sockeye salmon harvests that existed in the recent past
- A change in public demand for wild salmon in response to health, safety, and sustainability issues surrounding the farmed fish industry
- A growing world population and continuing demand for foodstocks
- Changing foreign exchange rates that make imported farmed fish more expensive

Other events such as oil and gas development on the Alaska Peninsula could also result in improved economic conditions in the region. Most of the benefits to the Bristol Bay Borough and its communities would likely be associated with employment since previous studies conducted for the Minerals Management Service indicate that oil and gas activities would be centered around Port Moller, with the production being moved by pipeline across the Peninsula to deep water port sites on the Gulf of Alaska. The oil and gas industry is also expected to use the Cold Bay airport for exploration and production needs (U.S. Department of Interior, Minerals Management Service, 1985). The anticipated influence of conventional oil and gas development on the local economy is expected to be relatively small although potential development of local resources for coal bed methane could substantially reduce local energy costs.

Fiscal Effects

This section identifies local revenue sources and outside funding sources including grants to the Bristol Bay Borough. This information is drawn from three sources: the Consolidated Federal Funds Report for fiscal year 2002 put out by the U.S. Census Bureau, information on operating revenues and expenditures from the DCED web page, and from the Alaska Department of Tax Revenue. This section also provides an estimate of the potential savings that could accrue to the Borough and other local organizations with a bridge scenario.

Figure 7 shows the Borough's local tax revenues over the past twelve years. The variability of salmon runs — and hence the variable amount of fish tax revenue — means that the local tax revenue amount available to the Borough is also highly variable. Declining fish tax revenues have forced the Borough to raise property tax rates significantly in an effort to stabilize the Borough's budget. In 1990, property taxes represented 21 percent of total revenues. In 2002, they represented 85 percent of revenue. Additional detail on the Borough's revenues is presented in Appendix C.

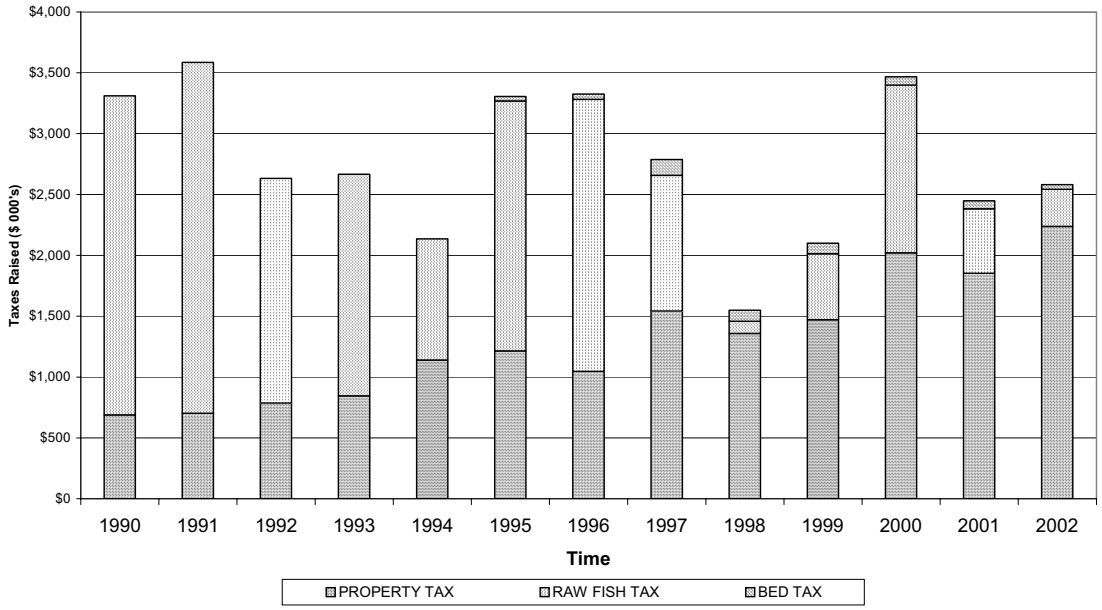


Figure 7. Bristol Bay Borough local tax revenues, 1990-2002

Bristol Bay Borough has a 13.0 mills property tax (4.14 mills for schools and 8.86 for general services[4]), a three percent raw fish tax, and 10 percent accommodations tax during the months of May through October. Table 24 shows operating revenues from local and outside sources for the Borough. Approximately 49 percent of Bristol Bay Borough's operations revenue comes from outside sources. According to DCED, this amounts to $7,868 per capita in revenue. Table 25 shows Borough expenditures. Expenditures per capita are $6,859.

[4] Bristol Bay Borough, Assembly Meeting Minutes, May 5, 2003.http://www.theborough.com.

Table 24. Bristol Bay municipal revenues

Revenue Source	Amount ($)
Local Revenue	4,670,306
Local Tax Revenue	2,578,165
Service Charges	185,553
Enterprise Revenue	1,217,709
Other Local Revenue	688,879
Outside Revenue	4,448,783
Federal Operating Revenue	112,325
State Revenue Sharing	27,960
State Municipal Assistance	29,252
State Fish Tax Sharing	930,413
Other State Revenue	130,337
State and Federal Education Funding	3,218,496
Total Operating Revenue	9,119,089

Source: Rural Alaska Project Identification and Delivery System.
http://www.dced.state.ak.us/dca/commdb/CF_RAPIDS.cfm accessed on April 9, 2004.

Table 25. Bristol Bay Borough municipal expenditures

Expenditure Category	Amount ($)
General Government	826,206
Public Safety	695,565
Public Services No Education	2,526,330
Education Expenditures	3,653,345
Debt Retirement	247,919
Total Operating Expenditures	7,949,365

Source: Rural Alaska Project Identification and Delivery System.
http://www.dced.state.ak.us/dca/commdb/CF_RAPIDS.cfm accessed on April 9, 2004.

In addition to these revenues and expenditures, the federal government provides other funds to the Bristol Bay Borough and organizations located or operating within the Borough. The Census Bureau categorizes federal spending using the following major "object" categories: retirement and disability, other direct payments, grants, procurement, and salaries and wages. Grants consist of grant payments (usually obligations incurred at the time the grant is awarded) to state and local governments and non-governmental recipients from all major

departments and agencies of the federal government. The grants are for a wide variety of programs and purposes, including Medicaid, highways and transit, education, food and nutrition services, community development, employment and training, energy assistance, environmental protection, low-income housing operations and rehabilitation, parks, airports, and other issues.

In most areas of the U.S., direct expenditures for retirement and disability payments for individuals, which includes fiscal year obligations for Social Security payments of all types, federal employee retirement and disability payments, veterans benefits, and other related federal expenditures, is usually by far the largest of the five federal spending categories. However, in the Bristol Bay Borough, federal expenditure for grants was fives times larger than the expenditure for retirement and disability payments in fiscal year (FY) 2002 (Table 26). Approximately three-fourths of that grant money was for the Medical Assistance Program—$15,138,756 of $20,143,503 (See Appendix C).

Table 26. Consolidated federal funds report, Bristol Bay Borough, FY2002

Summary Totals	FY 2002 Amount ($)
Direct Expenditures or Obligations	
Retirement/Disability Payments for Individuals	4,140,405
Other Direct Payments for Individuals	969,028
Direct Payments other than for Individuals	118,531
Grants (Block, Formula, Project, and Cooperative Agreements	20,143,503
Procurement Contracts	4,019,847
Salaries and Wages	2,976,245
Total Direct Expenditures or Obligations	32,367,559
Exhibit	
Total Direct Expenditures or Obligations—Defense	3,359,000
Total Direct Expenditures or Obligations—Non Defense	29,008,559
Other Federal Assistance	
Guaranteed/Insured Loans	3,684,000

Source: U.S. Census Bureau, consolidated Federal Funds Report: Fiscal Year 2002, Detailed Federal Expenditure Data, accessed at http://harvester.census.gov/cffr/asp/GeographyB.asp on April 8, 2004.

As noted above, the largest federal grant in fiscal year 2002 was for about $15 million, followed by $1.5 million for highway planning and construction, and $1.3 million for a state children's insurance program. All other federal expenditures were for less than $1 million. Additional detail on specific grants awarded to the Bristol Bay Borough or other organizations in fiscal year 2002 is presented in Appendix C. Information on federal expenditures from 1992 through 2003 and planned expenditures for 2004 and 2005, is also presented in Appendix C.

The bridge scenario would allow for consolidation of facilities and services in the Borough, save travel costs for some agencies, and enable some social service programs to expand into South Naknek. Table 27 summarizes the potential savings if a bridge were built across the Naknek River. The total estimated consolidation savings associated with bridge construction are about $476,000, based on estimates gathered for several organizations and government agencies. The largest savings would occur for the Bristol Bay School District and Bristol Bay Borough, which could save a combined total of approximately $400,000, or about 5 percent of total local government expenditures.

Table 27. Estimated Savings with a Bridge Scenario

Agency/Organization	Estimated Consolidation Savings
Library	15,500
Borough, including Police and Fire Protection	100,000
Private Heating Fuel Savings	10,000
Post Office	10,000
Bristol Bay Borough School District	300,000
Family and Youth Services	320
BBNA Workforce Development	40,320
Total	476,140

Savings for the school district are mainly in the elimination of salaries associated with two teachers and three to four part-time jobs at the South Naknek school along with other operating cost savings. The school district would eliminate the $128,000 annual cost of air transportation but increased busing costs of approximately $75,000 to $80,000 would offset some of these savings[5]. The school district will also be able to save capital expenditures by closing the current South Naknek school, and thereby avoiding the $1.5 to $2 million cost of a new school that would be needed in the near term if the present school were to continue in operation.[6] The school board has not yet considered where such savings might be employed elsewhere in the district, but these savings might be used to restore programs that have been cut, add new staff, or even provide materials and supplies.[7]

The Bristol Bay Borough provided a letter that documented potential cost reductions of about $100,000 a year, depending on savings that are realized.[8] Some savings might be realized in salaries and expenses for the fire departments, and elimination of a part-time police officer in South Naknek during the summer months. However, a full-time police officer stationed in South Naknek might be required if the community's population increased to a level that required this additional position. This increased staffing would increase the overall cost for

[5] Hebhardt, Richard. March 2004.

[6] Kumin, John. March 2004.

[7] Madsen, Cindy. November 2004.

[8] Alder, John, April 2004.

the police department. Closure of the South Naknek landfill could also result in additional savings, but this action has not been formally considered by the Borough Assembly.[9] Other benefits include reductions in fuel costs, vehicle purchases and maintenance, fuel transportation costs, electricity expenses, and travel expenses.[10, 11, 12, 13]

Other agencies and organizations are expected to realize cost savings as well. Bristol Bay Native Association's Workforce Development program expects to see annual savings of over $40,000, almost all of which is based on the costs incurred by residents attending training courses.[14, 15, 16]

The library would realize savings of about $15,500, which includes a librarian's salary and telephone expenses.[17, 18] The Post Office probably would not close, but it may realize some savings in transferring mail by truck rather than plane, an annual benefit estimated at about $10,000.[19,20]

Residents of South Naknek would probably realize about $10,000 in annual savings on their fuel expenses, due to the current high cost of transporting fuel across the river by landing craft or barge.[21]

Several social service programs such as "Meals on Wheels," and transportation services for the elderly that are provided by Bristol Bay Native Association are not available in South Naknek because of the high cost of travel.[22] The Alaska Division of Family and Youth Services is unable to have foster homes in South Naknek because the high cost of travel precludes the ability of the agency to monitor potential foster homes in the community. As a result, children are placed in foster homes in other communities, which makes it more difficult for the children. The absence of these programs in South Naknek imposes a cost on the potential recipients, but the cost is not readily monetized.[23]

[9] Ibid
[10] Ibid
[11] Castleberry, Jerry. April 2004
[12] Bonnin, Betty. April 2004
[13] LaBrecque, Laurie. April 2004
[14] Freeland, Pat. April 2004
[15] Johnson, Ari. April 2004
[16] Reamy, Kathy. April 2004
[17] Elby, Anisha. March 2004
[18] Savo, Becky. March 2004
[19] Johnson, Tammy. March 2004
[20] Lochman, Bob. March 2004
[21] Ferrazzi, Tom. April 2004
[22] BBNA Elders' Services, April 2004
[23] Parrish, Julia. April 2004

Land Use and Ownership

Land uses near the King Salmon or South Naknek airports are not expected to change with the aviation-only scenario. Land uses near the Naknek airport would change with either option under the aviation-only scenario. Improvements at the Naknek airport would result in land acquisition in the vicinity to move and expand the airport, and mostly vacant land would be converted for airport-related uses. The airport expansion would be onto lands primarily owned by Paug-vik, Ltd., with subsurface rights owned by the Bristol Bay Native Corporation. Closure of the Naknek airport would result in land use changes, as the state would have little interest in continuing its lease with Paug-vik, Ltd. for the current airport. Paug-vik, Ltd. would have substantial incentives to have this land converted to other uses that maintain the revenue stream for the corporation. Closure of the airport may result in improvements at Nornak Lake, which could result in more floatplane operations. It is uncertain if this would be sufficient for these businesses to remain in operation or if they would move to King Salmon.

Land uses on the north side of the Naknek River near the proposed road and bridge corridor are primarily privately owned, low density residential, with some boat storage and related facilities on some of these properties. On the south side of the river, the proposed alignment crosses mostly Alaska Peninsula Corporation lands, although there are privately owned Native allotments near the proposed bridge. Most of this land is vacant and used for subsistence and recreation. Closer to the community of South Naknek, privately owned residential lots are the primary use. Some additional lands in South Naknek may see residential construction if the population of the community increases. Other than that change, construction of a bridge and road will have limited effect on changing land uses on either side of the river in the 20-year study period.

Natural Environment

The natural environment includes the components of the physical environment such as geology, soils, and hydrology, and the biological environment, which includes vegetation, wetlands, wildlife, and fish. Environmental considerations described in this section are common for major infrastructure projects and the procedures are normal for projects in the State of Alaska and the region.

The following paragraphs provide a brief synopsis of items that will need to be addressed in any future environmental studies. Usually, an Environmental Assessment is conducted, and if potential impacts are determined not to be significant, a Finding of No Significant Impact would be issued. If environmental impacts are identified with the potential to be significant, an Environmental Impact Statement would be prepared.

Issues that may arise during the environmental permitting phase would likely include impacts on land use, the economy, air and water quality, wetlands, wildlife and migratory waterfowl, floodplains, coastal zone, Threatened or Endangered Species, fish and fish habitat, historic and archeological resources, and construction impacts.

Geology and soils would need to be studied for bridge and road construction, both from engineering and environmental aspects. Sediment deposition from road or bridge construction would be a major concern. Bridge design and construction methods would need

to be coordinated with resource agencies to ensure fish habitat is protected. Additional material sites would need to be found for transportation improvements at South Naknek.

Road construction may disrupt surface water hydrology, so design and construction would need to maintain natural drainage patterns in wetlands, and ensure storm water drainage prevents sedimentation and contamination of surface water. Further study will be required to determine whether dewatering or inundation of habitat are potential impacts of the project. Another area of concern is whether changes in surface water hydrology will compromise soil stability of the road, and/or its underlying substrate, or cause degradation of permafrost elsewhere in the project area.

The effects that a bridge would have on the Naknek River would need to be analyzed. The hydrology of the Naknek River would need to be evaluated to ensure that a bridge and roads are located and designed to avoid the potential for future actions that may adversely affect water quality. For example, the bridge location or design may eventually cause riverbank erosion, requiring riprap reinforcement; the bridge may need alterations to protect the abutments or piles from scour or ice movement; and dredging may be needed if sediment is being deposited. Ice, tidal influences, navigation channels, and/or fish and wildlife migration may affect or be affected by a bridge.

Water quality of surface water bodies, including the Naknek River, will need to be evaluated. Runoff from the bridge deck will need to be evaluated to prevent storm water runoff from the bridge deck reaching the water. Potential sources of pollution, such as oil from vehicles, construction-related fuel storage and equipment fueling, de-icing compounds, and dust palliatives and their probable impacts need to be identified.

The Naknek River area is located in a discontinuous permafrost zone. All structures and roads must be designed and built in a way that prevents or avoids subsidence from melting permafrost.

The construction phase of the project would introduce additional air pollutants into the area. These may be attributed to operation of heavy equipment exhaust and particulates. Dust from material mining, hauling, and placement would need to be examined. Further investigation will be needed regarding the levels of airborne particulates and whether an additional gravel road will add to air quality problems.

Wetlands dominate the region, and wetlands will need to be filled to construct a road, or for any airport or road improvements. Complete wetland avoidance is not possible. Wetlands in the project area will need to be mapped to quantify the types and amounts that could potentially be impacted under different development scenarios/options. The analysis should also determine whether development in wetlands potentially creates any significant impacts to surface water hydrology or fish and wildlife habitat in the project area. Sedimentation from disturbed soils will need to be investigated.

Marine mammal species that are known to occur in Bristol Bay are whales (beluga, gray, and Orca), harbor porpoise, walrus, northern fur seal, harbor seal, Steller sea lion, and sea otter. Beluga whales are known to follow smelt when they migrate up the Naknek River.

Endangered and threatened species of Alaska include: Aleutian shield fern, short-tailed albatross, spectacled eider, Steller's eider, Eskimo curlew, Steller sea lion, humpback whale, right whale, blue whale, and bowhead whale. Of these, the spectacled and Steller's eider are

known to occur in the area. Essential Fish Habitat (EFH) occurs along the Naknek River and its tributaries.

Consultation with the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) for the Naknek and King Salmon Airport Master Plans (ADOT&PF, 2001a and 2001b) indicated that the airport projects would not likely affect any threatened or endangered species or their habitat. Consultation with the USFWS and NMFS will be required throughout the design and construction phases. Potential adverse impacts on EFH and threatened species would need to be examined and mitigated. Timing restrictions for construction will likely be identified, as well as methods to reduce or avoid potential adverse impacts.

The undeveloped lands on the south side of the Naknek River are used for subsistence hunting and gathering. A bridge and road would provide increased access to subsistence areas. The majority of the land surrounding South Naknek is owned by the local Native Corporation, the Alaska Peninsula Corporation. The general public currently needs permission to enter corporate lands. During the detailed study phase of the project, an assessment of subsistence resource impacts due to increased access would need to be conducted. Additional restrictions or enforcement activities may be necessary to maintain adequate subsistence resources.

The Naknek area was first settled more than 6,000 years ago by Yup'ik Eskimo and Athabascan Indians. The area has historically been used for fish camps, hunting, and trapping. Cultural Resources Surveys have been conducted for the airports. During the detailed study phase, a Cultural Resources Survey would need to be conducted for road and bridge routes.

The U.S. Department of Transportation Section 4(f) lands are publicly owned lands in public parks, recreation areas, wildlife and waterfowl refuges, and historic sites. Taking Section 4(f) lands is not permitted by U.S. Department of Transportation projects unless there is no prudent and feasible alternative to the use of land from the property, and the proposed action includes all possible planning to minimize harm to the property resulting from such use. Most of the land surrounding Naknek, King Salmon, and South Naknek is local Native corporation land (Paug-Vik, Inc. and Alaska Peninsula Corporation), Bristol Bay Borough, municipal lands, private land, and Native allotments. Publicly owned parklands and recreational areas are not sited in the Naknek area. To ensure avoidance of 4(f) lands, land status and land use designations would need to be confirmed before siting a bridge or road routes.

Aircraft noise is reduced when an airport closes, while an increase in vehicular noise would be expected in an area where a new road is built. Reductions and increases in noise due to any proposed action would need to be considered during a more detailed study. The effects of noise during construction of a bridge at any location over the Naknek River would need to be examined. Noise effects due to road or airport construction would need to be evaluated.

How do the Scenarios/options compare?

Capital and operating costs

This section provides several comparisons of the scenarios and options. The first comparison is based on estimated capital and annual operating costs for the scenario/options, using each of the aviation only alternatives as the basis for comparison (See Table 28 and Table 29). The tables show the change from the amounts of capital and operating costs that are associated with the comparison option.

Table 28. Estimated Capital and annual operating costs: A1 Comparison

	Annual Operating Costs (Thousands of 2003$)					Capital Costs (Millions of 2003$)	
Scenario/Option	Borough	School District	Other Organizations	ADOT&PF	Total	Low	High
A1	0	0	0	0	0	0	0
A2	0	0	0	-30	-30	-19	-19
B1	-100	-300	-76	45	-431	26	40
B2	-100	-300	-76	17	-459	7	21
B3	-100	-300	-76	25	-451	22	35
B4	-100	-300	-76	-5	-481	3	16
B5	-50	-300	-76	-5	-431	26	40
B6	-78	-300	-76	-5	-459	7	21

Note: See discussion entitled “What Changes are Being Considered and What Would They Cost?” and notes to Table 1 for additional clarification of information presented in this table.

Table 29. Estimated capital and annual operating costs: A2 comparison

	Annual Operating Costs (Thousands of 2003$)					Capital Costs (Millions of 2003$)	
Scenario/Option	Borough	School District	Other Organizations	ADOT&PF	Total	Low	High
A1	0	0	0	30	30	19	19
A2	0	0	0	0	0	0	0
B1	-100	-300	-76	75	-401	45	58
B2	-100	-300	-76	47	-429	26	40
B3	-100	-300	-76	55	-421	41	54
B4	-100	-300	-76	25	-451	22	35
B5	-50	-300	-76	25	-401	45	58
B6	-78	-300	-76	25	-429	26	40

In addition to the operating and capital cost information presented for each scenario/option above, this study used three other approaches to compare the various scenarios and options. These approaches included:

- Evaluation criteria
- Benefit-cost analysis
- Survey of Borough residents

The results of each of these approaches are summarized in the following subsections. Details on each approach are presented in the appendices in this report.

Summary of rankings for other approaches

Table 30 summarizes the information on rankings for each scenario/option from the three different approaches. The information is ranked from best (1) to worst (8). Additional detail on the ranking for each approach is presented in the following subsections.

Table 30. Comparison of rankings by scenario/options

Scenario/options	Evaluation Criteria	Benefit-Cost Analysis	Subtotal	Resident Survey	Bridge Total
A1. All airports open	7	8	15		
A2. Close Naknek	8	7	15		
B1 All airports open	6	5	11	1	12
B2 Close Naknek	1	2	3	4	7
B3 Close South Naknek	3	4	7	2	9
B4 Close both airports	1	1	2	6	8
B5 Borough operates both	5	5	10	3	13
B6 Borough operates S. Naknek	4	2	6	5	11

By design the resident survey was developed to assess the level of support for a bridge and did not ask questions about the aviation only alternatives. Therefore, the subtotal column presents the rankings for each scenario/option under the evaluation criteria and benefit-cost analysis, while the Bridge total incorporates both of those approaches plus the ranking from the resident survey.

A comparison of the results of the various evaluation methods indicates that a bridge scenario is preferred and consistently ranks above the aviation only scenario. Option B2 has the lowest score and highest ranking but it would not meet the Department's objectives of cost sharing and reducing operating costs. Option B4 would have the next highest ranking but it would not have public support because it would close both general aviation airports. Option B3 would have public support because Naknek airport would remain open, and it would achieve reduced operating costs for the Department, but the Department's cost sharing objective is not met. Option B6 seems to be the next best option for consideration. This option would provide a general aviation airport as preferred by Borough residents and one that the Borough could operate without the potential problems that might be encountered at Naknek in its current condition. This option would also meet the Department's objectives of reducing operating costs and cost sharing.

The following subsections provide additional detail on the evaluation methods.

Evaluation criteria

The evaluation criteria presented here came from comments at the public meetings conducted by the project team, correspondence from local residents, and the goals and objectives of the Department in undertaking this study as identified in the Request for Proposals, and in public presentations. The criteria and associated measures for evaluating each scenario/option are presented below.

Which scenario/option:

- Results in the lowest total annual maintenance costs for ADOT&PF?
    - Measure: Net present value of maintenance costs for airport and bridge alternatives over the 20-year study period
- Has the lowest capital cost?
    - Measure: Net present value of capital costs, including replacement and major refurbishment costs, over the 20-year project study period
- Results in the greatest improvements in safety for school children and other travelers?
    - Measure: Qualitative assessment of South Naknek parents' and air taxi pilots' perceptions of safety
- Results in improved educational and social benefits for school-age children?
    - Measure: Number of times students arrive late for school or cannot return home under each alternative
    - Measure: Perception of socialization benefits of attending a larger school by South Naknek teachers and parents
- Has the largest effect on reducing costs and generating savings (if any) for other government agencies, local businesses, and residents of the Borough?
    - Measure: Changes in capital (including replacement and refurbishment costs) and operating and maintenance costs over the 20-year project study period for each alternative for each major entity and an aggregate estimate for all South Naknek households.
- Improves access to hospitals and clinics for residents of South Naknek?
    - Measure: Discussion of reductions in emergency response time and travel time from South Naknek to Naknek, and medical evacuations to Anchorage.
- Will generate the most economic activity in the Bristol Bay Borough?
    - Measure: Net number of businesses (gains and losses) or business expansions anticipated with each alternative (including effect on air taxi services)
    - Measure: Number of seasonal and permanent jobs created or lost, by community
    - Measure: Net tax revenue generated in Bristol Bay Borough
- Has the largest net benefits?
    - Measure: Net benefits identified in the benefit-cost analysis
- Has the largest benefit to outlying villages?
    - Measure: Provides easiest access to subregional center businesses and facilities in the Bristol Bay Borough
- Provides the greatest net benefit to general aviation, including floatplanes, operating in the study area?
    - Measure: Number of aircraft parking spaces available
    - Measure: Reduction in occurrences of wind damage anticipated with each alternative
    - Measure: Qualitative assessment of improved operational safety at remaining airports under each alternative as perceived by pilots and control tower personnel
- Improves access for emergency services vehicles and staff throughout the Borough?
    - Measure: Qualitative assessment of improved access for vehicles and staff

Table 31 summarizes the results of applying the evaluation criteria to the scenario/options. The scenario/options are ranked using a scale of one to five. Since there are seven unique scenario/options, some receive the same ranking. Under the scoring system used in this table, a lower score indicates a better scenario/option. A score of 1 indicates that a scenario/option is a better choice than the other options, although ties are possible. A score of 5 indicates that a particular scenario/option does not provide as many benefits as other options, or that it has an adverse effect. A score of 3 suggests that the scenario/option provides fewer benefits than some options but more than others, or if there is an adverse effect, that the effect is less than some and more than other options.

Table 31. Evaluation criteria summary`

	Aviation Only			With Bridge			
						Borough Operates	
Criteria	All Open	Naknek Closed	Naknek Closed	S. Naknek Closed	Both Closed	Both	S. Naknek
Perceived Safety	4	5	1	1	1	1	1
Education/social benefits	4	5	1	1	1	1	1
Health care access	4	5	2	1	3	1	2
Emergency service access	4	5	1	1	1	1	1
Economic development	4	5	1	1	1	3	2
Net benefits	5	4	2	3	1	3	2
Benefits to outlying villages	2	5	3	2	4	1	3
Lowest maintenance cost	2	1	3	4	2	5	3
Lowest capital cost	2	1	3	4	3	5	3
Reduces cost for others	4	5	1	1	1	3	2
Total Ranking	35	41	18	19	18	24	20

Note: Lowest numeric value represents scenario/option with most positive aspects

Benefit-cost analysis

A benefit-cost analysis was prepared to evaluate the various scenario/options (See Table 32). In benefit-cost analysis, the scenario/options are compared to a selected case. In this analysis, scenario/option A1 is the comparison standard, so that scenario/option has zero benefits or costs. Benefit-cost analysis also evaluates a project from the perspective of a broader society or in this case, at the national level. Therefore, even though the state will save money if the Borough operates and maintains one or more airports, the Borough will incur similar costs so there is no difference between scenario/options B1 and B5, or between B2 and B6. In a

similar manner, a person who loses their job because of consolidation will surely feel a loss of income and consider this a cost. However, for society, the cost savings resulting from the elimination of a job presents an opportunity to use or reinvest those dollars in another activity that can provide greater benefits since the job is now redundant.

The estimates shown in Table 32 employ the base case population forecast (See Appendix I) and the high bridge cost estimate (See Appendix E for other cost estimates). A lower bridge cost or higher population growth increase the net benefits for the options associated with the bridge scenario. Additional detail on the benefit-cost analysis is presented in Appendix G.

Table 32. Benefit-cost summary with base case population and high bridge cost

Option	Travel Cost Benefits or Costs		Consolidation Savings	Net Operating Cost Savings	Total Incremental Capital Costs	Net Benefits
	Existing Trips	Induced Trips				
(Net Present Value, Millions of 2003 $)						
A1. All Airports Open	0	0	0	0	0	0
A2. Close Naknek	(7.10)	-	-	0.40	(14.60)	7.90
B1. All Airports Open	7.14	168.11	4.39	(0.03)	24.47	150.76
B2. Close Naknek	2.55	168.11	4.39	0.37	9.89	161.14
B3. Close South Naknek	6.03	168.11	4.39	0.16	20.92	153.39
B4. Close Naknek and South Naknek	1.44	168.11	4.39	0.59	6.51	163.63
B5. Borough Operates Both	7.14	168.11	4.39	(0.03)	24.47	150.76
B6. Borough Operates South Naknek	2.55	168.11	4.39	0.37	9.89	161.14

Note: Travel cost benefits or costs include costs for passengers and pilots whose planes are diverted from their preferred airport to another airport when their preferred airport is closed. These costs are included under the existing trips column.

Option B4 has the highest net benefits for the bridge scenario; however, all of the bridge options offer significant net economic gains. The benefits for B4 are so large that the benefits associated with induced trips for any of the bridge options could be reduced to less than 10 percent of the estimated levels shown in Table 32 and the net benefits would still be larger than A2. Induced benefits for the other bridge options could be reduced substantially and they would still provide larger net benefits than A2. Under the high bridge cost and low

population forecast the bridge options still have greater net benefits than A2 (See Appendix G).

There are two types of benefits shown in the table. These include travel cost or user benefits, and consolidation savings to the Borough, local residents, and other organizations. The consolidation savings should not be added to the travel cost benefits because, as described below, the savings are already captured in the value of the induced trips. (See Appendix G for more details.) Costs include the net operating costs and capital costs in relationship to scenario/option A1. The difference between the sum of the benefits and the costs equals the net benefits.

Direct standard of living and productivity gains to persons making river crossings are called "user benefits" to distinguish them from other more indirect benefits, such as economic development, that may accrue to persons who may not cross the river at all, or to the community or region as a whole. The primary user benefits of the construction of a bridge spanning the Naknek River at Fishery Point will arise in two principal categories. The first category includes those existing travelers who currently make river crossings via the various modes currently available: air taxi, private plane, skiff or other boat, snow machine and "other vehicles," which includes cars and trucks making the crossing when the river freezes sufficiently to support the vehicle's weight. Time savings and reduction in out-of-pocket travel costs benefit existing travelers as a result of the quicker and less expensive means of travel provided by the bridge.

Benefits in the second principal category arise in the form of additional trip-making to and from South Naknek and neighboring areas by auto and truck users for whom the costs of access prior to the improvement outweighed the value of opportunities on the other side. Such opportunities can include existing draws such as shops, work places, and social and recreational activities. As well, new opportunities can emerge in response to the new cost-to-value travel equation, leading to yet further "induced demand." Together, the reduction in time savings, and operating costs, plus the value of new trips account for the vast majority of benefits associated with transportation projects.

Although the economic benefits of improved access to South Naknek are measured here in terms of the monetary equivalent value of the time and operating costs to be saved by users of a prospective bridge, and the value derived from new trips, the final economic manifestation of such benefits could arise partly in other forms. These other benefits could include stimulation of commercial and housing development on both sides of the river, increases in the value of land, addition of jobs from businesses whose transportation costs are significantly lower, costs savings to the Bristol Bay Borough from consolidation of services currently duplicated in both Naknek and South Naknek and so on. Estimates of the latter benefits have been made and are shown in Table 32 alongside the total travel cost benefits, because these benefits are, in effect, already included in the value of the induced trips. In fact, the increase in the number of trips resulting from the bridge is in part due to residents traveling across the river to procure services such as education, library, and clinic, which would no longer need to be provided on both sides of the river.

It is simply analytic convenience that leads transportation economists to measure the development value of better access through the lens of trip volumes, including new demand, and corresponding time savings. We know something of the trip-generating effects of a new

bridge in a particular geographic circumstance. The alternative, namely to forecast the monetization of each acre of land development because of improved access, requires a great deal more information and, more significantly, is a great deal less accurate.

Survey

As a result of public meetings held in the Borough in October 2003, the Department decided to conduct a survey of Borough residents to determine their support for the bridge and the various options, and to assess current travel patterns. Between January 2 and January 5, 2004, 172 households in King Salmon and Naknek were surveyed by telephone. Respondents were selected through a combination of random-digit-dial methodology and an Internet phone directory number search. Thirty-five households out of 36 households in the community responded to a survey distributed by the South Naknek Tribal Council in February, 2004. The travel pattern information was presented in Why is a bridge being considered?. This section summarizes the information on residents' support for the various scenario/options.

Respondents were asked if they support or oppose the construction of a bridge over the Naknek River under the following conditions:

1) Unconditionally
2) If South Naknek Airport was closed
3) If Naknek Airport was closed
4) If both South Naknek and Naknek Airports were closed
5) If both airports remained open but Bristol Bay Borough provided maintenance and operation costs (respondents were provided an estimate of this amount)

Figure 8 presents the analysis from both surveys. Local residents generally support the bridge, with lesser support if individual airports are closed or the Bristol Bay Borough operates the airports. Only when both airports are closed does public support fall below 50 percent.

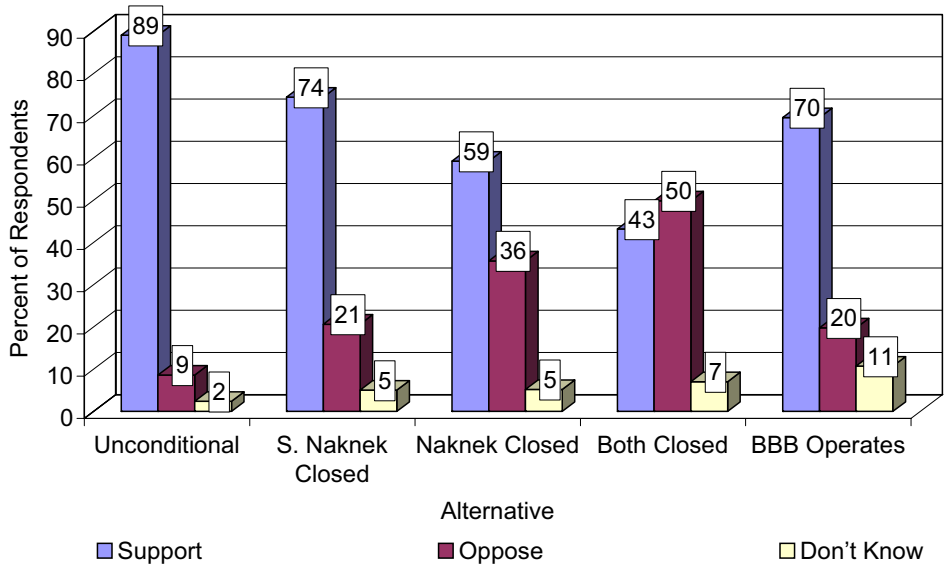


Figure 8. Borough resident opinions on bridge and selected options

Additional information on the survey is presented in Appendix J.

How might the future transportation system be managed and financed?

This section describes potential financing and funding alternatives for construction and maintenance of the Naknek bridge and connector roads. It also discusses the funding options — or lack of funding options — for community operation and maintenance of the airports in South Naknek and/or Naknek. Additional background information and detail on transportation funding programs is provided in Appendix H.

ADOT&PF prepares a list of needed transportation projects across the state in three-year increments. The current State Transportation Improvement Plan (STIP) is for 2004 through 2006. ADOT&PF also maintains an up-to-date online project database of the Needs List.

The Needs List contains all the projects that state residents, elected officials, and transportation officials have formally proposed; however, the content of the list is constrained by the estimate of available funding and is limited to those projects for which there is reasonable expectation of funding (ADOT&PF, 1999). ADOT&PF retains the selection authority for NHS and AHS projects because of the statewide importance of these projects. In addition, projects may be advanced or delayed to take advantage of specific funding categories (ADOT&PF, 2003).

The proposed Naknek River crossing is not included in the STIP but it was identified in the Southwest Area Plan as a potential project. If built, the Naknek River crossing project would be selected and funded at the discretion of the ADOT&PF Commissioner since the project would be part of the Alaska Peninsula Highway and, therefore, part of the AHS. It is anticipated that if a decision to proceed with construction of the crossing project is made, that the bridge might open to traffic six to eight years after the decision.

Improvements for the aviation-only scenario, with the exception of wind protection, have been identified in airport improvement plans. The initial improvements at King Salmon are anticipated to start in federal fiscal year 2006 under either scenario. (Additional detail on the proposed improvements and the schedule for implementation is presented in Appendix F.) Improvements identified in the airport improvement plans for Naknek and South Naknek airports are presently deferred until this report is complete. If a decision is made to proceed with the improvements at one or both of the airports, the airport projects would need to be placed into the programming process where they would be re-evaluated and ranked with other airport improvements projects around the state. Depending on the ranking of the projects and policy goals, the capital projects at Naknek and South Naknek could possibly be funded in 2006, 2007, or later years.

Operations and maintenance funds for the three airports and the existing highway are provided by the state with airport leases providing some of the funds necessary for maintenance and operations at the airports.

Funding for construction of the bridge and road would come from the Federal Highway Trust Fund through the Federal Highway Administration (FHWA). The State of Alaska would need to provide matching funds for the project. As noted in What changes are being considered and what would they cost?, the cost for the bridge and road is estimated at $26 million to $40 million in 2003 dollars but under the bridge scenario, the State would not

make the $22 million (in 2003 dollars) investment in the Naknek airport over the next 20 years. The bridge and road would be part of the Alaska Highway System, and it is anticipated that the state would maintain those facilities.

Scenario/options B5 and B6 would reduce the Department's annual maintenance costs of roughly $50,000 at the Naknek ($30,000) and South Naknek ($20,000) airports (See Capital and operating costs). The reduction in annual maintenance costs under these scenario/options could offset at least part of the estimated maintenance costs of $45,000 for the proposed bridge and road extension. Under these scenario/options, the Bristol Bay Borough would accept the annual obligation for maintenance of the South Naknek and possibly the Naknek airport. Part of this maintenance cost could be offset by leasing revenues and/or tie-down fees at the South Naknek airport, but this revenue stream has not been estimated since it is uncertain if the Borough would implement such lease requirements or fees.

Total expenditures by the Borough could increase or decrease, depending on policy decisions yet to be made regarding consolidation of facilities and services, as described above and in Fiscal Effects. However, if the savings to the Bristol Bay Borough School District of approximately $300,000 were included, taxpayers in the Borough could benefit from potential reductions in total expenditures of about $400,000. This would more than offset the additional expenditures that the Borough might incur for maintaining the South Naknek airport.

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Appendix A: Agency mailing list

The following table lists the agencies and individuals in each agency that were included in the mailing list for receiving newsletters prepared for the project. The intent of mailing the newsletter to the agencies for this project was to notify them of the project and keep them informed of the progress and findings throughout the process.

Name	JobTitle	Agency	Address	City, state, zip
Christy Miller	Division of Community & Business Development	Alaska Department of Community & Economic Development	550 W 7th Avenue, Suite 1770	Anchorage AK 99501-3510
Alan Wien	Environmental Specialist	Alaska Department of Environmental Conservation	PO Box 871064	Wasilla, AK 99687
Ted Rockwell		Environmental Protection Agency	222 W 7th Avenue, #19	Anchorage AK 99513
Stewart Seaberg	Office of Habitat Management and Permitting	Alaska Department of Natural Resources	333 Raspberry Road	Anchorage, AK 99518-1599
		Alaska Department of Natural Resources	550 W. 7th Avenue	Anchorage, AK 99501
Cynthia Zuelow-Osborn	Office of Project Management and Permitting	Alaska Division of Governmental Coordination	550 W. 7th Avenue, Suite 1660	Anchorage, AK 99501
Ann Rappoport		U.S. Fish and Wildlife Service	605 W. 4th Ave, Room 62	Anchorage, AK 99501
Jeanne Hanson	Habitat Conservation Division	National Marine Fisheries Service/NOAA	222 W. 7th Ave. #43	Anchorage, AK 99513-7577
Judith Bittner	State Historic Preservation Officer	Alaska Department of Natural Resources	550 W. 7th Avenue, Suite 1380	Anchorage, AK 99501

Name	JobTitle	Agency	Address	City, state, zip
Harlan Legare	Hydraulics Hydrology Section	U.S. Army Engineer District, Alaska	P.O. Box 898	Anchorage, AK 99506
Larry Reeder	Regulatory Branch	U.S. Army Engineer District, Alaska	PO Box 898	Anchorage, AK 99506
Judity Leckrone-Lee		EPA Region 10	1200 Sixth Avenue (MS ECO-088)	Seattle, WA 98101
Bill Wood	State Biologist	Natural Resources Conservation Service	800 W. Evergreen, Suite 100	Palmer AK 99645
Jim Helfinstine	Commander (OAN)	17th Coast Guard District	PO Box 25517	Juneau, AK 99802
Joan Darnell		National Park Service-Alaska Regional Office	2525 Gambell Street	Anchorage, AK 99503

Appendix B. Public involvement

This appendix provides a description of the strategy employed to obtain public involvement and the actions taken in regards to that strategy. It also summarizes the public input from several meetings that were held in the Borough regarding the project, and a copy of the newsletters that were mailed to agencies and other organizations, and individuals in the community. Comments received from agencies and the public are also included in this appendix.

Project context

DOT&PF was faced with the challenge of looking at connectivity between the communities of King Salmon and Naknek across the river to South Naknek. Currently, residents use skiffs and aircrafts to transit the short distance between these communities. Due to safety, access, and cost concerns a surface link, otherwise known as the Naknek Crossing, spanning the Naknek River and connecting the three communities of Bristol Bay Borough is desirable. The study process engaged these communities several times since June of 2003 to identify the public's issues and wishes, and to determine the potential feasibility of the crossing.

Strategy for public outreach

Due to repeated historical contacts, meetings, and planning studies related to this project, the public was skeptical that action would be forthcoming. Therefore, the demand for substantive and relevant communication for this project was critical to making an accurate assessment of the need to build or not to build the Naknek Crossing and related infrastructure improvements. The intent of the agency was to make a decision with the community on the best solution, and then to work together to get it implemented.

The public process approach selected was to identify the information necessary to select the best alternative for the communities at large, looking at environmental justice, the environment, future economic stability of the community, access to goods and services, and almost all aspects of daily life. Input from residents was part of the study process, as demonstrated through newsletters, public meetings, and a project website.

Key activities

Building personal relationships requires attention to the individual residents. It also requires a clear process, a consistent message and a feedback loop which gets input from any part of the system to the rest of the system. The Naknek project approach was designed for maximum impact and consistency. Most of the work was accomplished between June and October of 2003. Key activities in this intensive engagement process are outlined below.

- Three public outreach on-site meetings.
- Over 20 individual stakeholder interviews.
- Specific stakeholder/agency meetings.

- Phone survey of local residents.
- Intermittent strategy sessions with technical team and public input.
- Distribution of Comment Cards at every public meeting.
- Database of all contact information accessible to the full team.
- Website updated regularly with project information.
- Matrices demonstrated the pro/cons of the study alternatives.
- Clear records of input from all residents.
- Clarity of expectations and schedule.
- Follow-up to special requests for information, copies of maps and photos.
- Consistent message with follow-up newsletter and phone calls.

Public meeting summaries

The following summaries describe discussions that occurred at public meetings held in South Naknek and Naknek in June and October of 2003, and March of 2004. The purpose of these meetings was to better understand public opinions about the current transportation situation, and the ideas and attitudes about future transportation options.

June 17 & 18, 2003 meetings

On June 17 and 18, 2003, representatives of the Alaska Department of Transportation and Public Facilities, the Federal Aviation Administration, and a team of consultants led by Northern Economics held public meetings in Naknek and South Naknek to discuss the current transportation system and a proposed bridge crossing of the Naknek River.

The major components of the current transportation system in the Bristol Bay Borough consist of:

- A jet-capable airport at King Salmon
- A recently improved gravel airfield at South Naknek
- A gravel airfield at Naknek
- A float plane base at Nornak Lake, adjacent to the Naknek airfield
- A paved highway between King Salmon and Naknek

Other aviation activity occurs at Tibbets Field, located near the Naknek airport, and there is floatplane activity on the Naknek River near the King Salmon Airport. Local road networks exist in each community.

The following paragraphs summarize the key points raised in those meetings.

The current transportation system increases the cost of living and operating businesses in South Naknek. In the summer, people and cargo use air taxi services, skiffs, and barges for traveling between South Naknek and Naknek or King Salmon. In the winter, after sufficient

ice thickness is achieved, people can drive snowmachines and vehicles across the river, or use air taxi services. The roundtrip airfare for an individual traveling between Naknek and South Naknek is $60.00, if traveling alone, and the one-way cost to move a car by barge in the summer is $500. The transportation costs affect a number of organizations. For example, parents of South Naknek students that attend Naknek schools are flown to parent-teacher conferences at school district expense. South Naknek emergency services personnel pay for their own travel costs to attend training in Naknek or King Salmon.

In addition to the high transportation costs imposed on South Naknek residents and businesses by this transportation system, safety is a primary issue. The school district has been flying South Naknek junior high and high school students to Naknek schools for 30 years. One winter a plane had mechanical problems and landed on the river ice. A similar situation during times when ice is not present could have dramatic consequences for the community. The concern about safety is always present in the minds of South Naknek parents whose children fly on a daily basis.

The school charters impose other costs as well. For example, the school flights operate under visual flight rules in daylight only. In mid-winter this results in children arriving at school at 9:45 a.m., 45 minutes after school commences. The requirement to fly during daylight hours also constrains the ability of South Naknek students to participate in after-school activities. At times bad weather will result in students not being able to return home. On those days the school district incurs costs for housing students in private homes on the north side of the river.

Emergency services are also affected by bad weather. There is concern in the community about the availability of medical evacuation flights during bad weather to transport people that may need immediate medical care. The majority of emergency services personnel in the Bristol Bay Borough are located on the north side of the river and the present transportation system hinders their ability to support or assist their counterparts in South Naknek.

The present transportation system requires the Bristol Bay Borough and a number of other agencies to maintain separate facilities on both sides of the Naknek River. With a bridge available it is anticipated that a number of facilities would be consolidated with subsequent savings to local, state, and federal government budgets, and the possibility of lower local tax rates or improved services if redundant facilities do not need to be maintained. Residents mentioned a number of facilities that are potential candidates for consolidation. These included the post office, health clinic, landfill, emergency services, and the library.

South Naknek residents also believe that a bridge would stimulate economic development in the community and offer new business opportunities, resulting in new jobs that would offset any losses from consolidation. Among the businesses mentioned were a gas station, restaurants, boat haulout and repair, and tourism-related businesses. None of the fish processing plants located in South Naknek are processing at this time and it is believed that a bridge will lower operating costs for these facilities and result in some of them reopening. A reopened plant or plants would also make ice available for setnet fishers whose sites are located south of the Naknek River and improve the quality of fish harvested in the area. Improved quality is very important as the Alaska wild salmon industry faces continuing competition from farmed salmon.

October 7 & 8, 2003 meetings

On October 7th & 8th the Department of Transportation in conjunction with the Northern Economics consultant team held two public hearing meetings in both Naknek and South Naknek. The purpose was to provide the public with preliminary findings to date and collect additional public input regarding a crossing between the two communities.

Patrick Burden of NEI provided a preliminary briefing on project analysis progress. This included the proposed evaluation criteria for analyzing the alternatives, and low, mid, and high cost estimates for the various alternatives. The remainder of the two meetings included periods of discussion and clarification of alternatives.

Mike Scott with DOT made a brief announcement regarding his position with DOT. Governor Murkowski has a positive outlook towards national resource development. The fishing industry has waned and therefore, the community either needs to see an improvement in the fishing industry or need to look towards economic diversification/ i.e., resource development.

The following paragraphs detail the discussion and comments gathered during the public meetings.

In general, residents prefer to spend money locally, however the high cost of transportation between South Naknek and Naknek limits their ability to do so. One round trip ticket to Naknek from South Naknek costs $80. Because of the high costs of transportation, one South Naknek household estimated that they spend about $7,000 per year ordering groceries from Costco in Anchorage and having them shipped to their home. If it cost less to travel between Naknek and South Naknek they would buy more groceries at the local store, putting more money into the local economy.

In order to determine the average expenditure on transportation costs for Naknek and South Naknek households, people were asked to estimate the amount their household spend annually on air travel between South Naknek and Naknek or King Salmon.

Nine members of the audience, each representing a different household, responded to the request by raising their hand as different amounts were mentioned. The responses are shown in Table 1

Table 1. Estimated annual cost of airfare per household

Cost	Households
Less than $1,000	3
Less than $2,000	1
Less than $3,000	3
Less than $4,000	0
Less than $5,000	0
Greater than $5,000	2

Considering these expenditures on transportation, meeting attendees commented that have a bridge would strengthen the local economy. The bridge would enhance capabilities of getting materials across the river. Others commented that jobs and wages could be significantly impacted if the bridge were constructed.

In addition, the Southwest Alaska Vocational Center in King Salmon has recently opened. Many evening classes are offered however, residents of South Naknek cannot attend due to limited flight times during the winter months (planes do not fly in the dark).

It was also mentioned that weather conditions make driving easier than flying.

Meeting attendees strongly stressed that closing the Naknek airport before a bridge is in place is **not** an option. Also, rather than closing the Naknek Airport after a bridge is constructed an ADOT representative recommended that a local sponsor take over the operation and maintenance of the airport. A petition to keep Tibbets Field open has been submitted to ADOT.

The air and gas group attending the meeting suggested the bridge be constructed in five years, rather than the 10 years referenced in the presentation.

Concerns have also been voiced over the impact on subsistence. Comments during the meeting suggested there might not be a large impact on subsistence activities. The Alaska Peninsula Corporation owns a majority of the land, and therefore access to land would be limited due to the private land ownership. Hunting on private land is legal only with a permit, therefore it is expected that building the bridge would cause minimal impact on subsistence activities near South Naknek.

March 15 & 16 2004 meetings

- Public: What is the estimated bridge cost? Planning team: $20 to $40 Million.
- Public: The numbers of trips driving over the river (snowmachine or vehicle) may be a low compared to the current winter season because over the previous two winters the weather was warm and there were limited periods when residents could drive over the river.
- Public: This year the number of trips by snow machine and other vehicles will be higher than stated in the PowerPoint because of the longer period when the river was sufficiently frozen.
- Public: Do the airport cost estimates in the presentation include the improvement costs at King Salmon? Planning team: Yes.
- Mayor: Is there a breakout by town (King Salmon and Naknek) for public opinions regarding the alternatives? Planning team: Northern Economics will do this breakdown to see if there is a difference between these two communities.
- Public officials: The cost benefit consolidation of $300,000 seems to be a little low. John Alder with the Borough will look into the validity of the Borough consolidation costs.

- Mayor: Happy to see the public support for the bridge. However, the Borough does not have Airport Powers and the public would need to vote and approve the Borough having these powers; however, the Mayor would not support this action at this time due to the condition of the Naknek Airport. Numerous improvements need to happen prior to supporting this. In regards to the South Naknek Airport, there does not seem to be as many concerns.
- Public: The annual savings is the driving factor of this report for the Borough.
- Public: The mail cost savings discussed would be considered freight. The postal service probably would not have good numbers.
- Public: Major concerns regarding safety at the Naknek Airport. This should have been improved 10 years ago. Even if the bridge is only 7 years out the School District will still be flying kids into the Naknek Airport for those years.
- Public: Why is there $14 million for a bike path that does not have a location set, but we can't get money for a bridge??
- Public: Bridge would allow for substantial economic development with the bridge.

Newsletters

The following pages present the newsletters that were prepared after the public meetings and distributed to the public and agencies to keep them informed on the progress of the study.

Bristol Bay Road Considered

Alaska Governor Frank Murkowski recently announced the state's intention, in partnership with Bristol Bay Native Corporation, to open up state and Native corporation lands in the Alaska Peninsula to leasing for oil and gas exploration and development. The state is considering a new road development on the Alaska Peninsula that would over time connect communities between King Salmon and Chignik, while providing access to areas licensed or leased for energy exploration and development.

The administration estimates that potential revenue from the sale of oil and gas leases will more than pay for the $285 million gravel road. A road crossing the Naknek River would complete an important segment of the overall highway project.

Alaska DOT&PF
Division of Statewide Planning
3132 Channel Drive, Room 200
Juneau, Alaska 99801

Notes

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Project Update

Schedule

09/15/03 ..... Public Meetings, Naknek/S. Naknek

12/22/03 ..... Release report for public comment

03/12/04 ..... Present final report

Contact Information

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907.465.8958
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Project Website

www.dot.state.ak.us/stwdplng/projectinfo/proj_master.html

Naknek Crossing Intermodal Economic Impact

and Airport Use Study

August 2003

The Alaska Department of Transportation and Public Facilities is examining a potential crossing of the Naknek River. This project is entitled the "Naknek Crossing Intermodal Economic Impact and Airport Use Study." A planning team headed by Northern Economics, Inc. of Anchorage has been hired by the Department to evaluate and recommend regional transportation alternatives.

This study was recommended in the Southwest Alaska Transportation Plan, released in November 2002, which indicated the Naknek crossing may be desirable for safety, access, economic development and cost concerns.

The proposed crossing would entail a bridge spanning the Naknek River and connecting the three communities of the Bristol Bay Borough. A bridge would influence aviation use-patterns, as well as the priority of aviation operations and improvements at individual airport facilities, some of which are already identified and awaiting funding. The bridge alternative being examined would include trade-offs in transportation, such as the Department relinquishing ownership of one or both of the smaller airports at Naknek and South Naknek, while improving King Salmon airport's capacity for general aviation operations. The multi-modal needs study will define the appropriate level of transportation investment, and examine the distribution of costs and benefits among various interests. The study's aim is to compare the future costs and benefits of a highway crossing to those of improved airports.

The Alaska Department of Transportation has studied this issue over the last several years. The Department is committed to a good regional solution, and is now restricting expenditure of airport improvement funds for Naknek, South Naknek, and King Salmon pending the outcomes of this study. The results of this study will provide the information to guide sound future investments in transportation and economic development for the region. Input from the Bristol Bay communities is a critical element in those decisions.

Summary of Public Meetings Comments

On 17 and 18 June 2003, representatives of the Alaska Department of Transportation and Public Facilities (ADOT&PF), the Federal Aviation Administration, and a team of consultants led by Northern Economics held public meetings in Naknek and South Naknek to discuss the current transportation system and a proposed bridge crossing of the Naknek River.

For this study, ADOT&PF is studying transportation in the Bristol Bay Borough as a system, rather than as individual facilities. The major components of the current transportation system in the Bristol Bay Borough consist of:

- A jet-capable airport at King Salmon
- A recently improved gravel airfield at South Naknek
- A gravel airfield at Naknek
- A float plane base at Nornak Lake, adjacent to the Naknek airfield
- A paved highway between King Salmon and Naknek

Other aviation activity occurs at Tibbets Field, located near the Naknek airport, and floatplane activity occurs on the Naknek River near the King Salmon Airport. Local road networks exist in each community.

Airport operators and users in the Borough expressed the following concerns about air transportation in the area:

- Closure of the King Salmon air traffic control tower could affect the capacity and safety of that airport.
- Operations at Naknek Airport are important to the region because it is located near shopping, services, recreation, and the school system. 70 or more aircraft are parked there, partly due to better wind protection than other airports in the area.
- South Naknek students need safe transportation to school in Naknek.
- Naknek Airport needs safety upgrades, and South Naknek Airport needs surface repair.
- The timing of airport improvements and/or potential airport closures is critical; there needs to be an interim plan before any new transportation facilities are constructed 10 or more years from now.

The following paragraphs summarize other key points raised in those meetings.

The current transportation system increases the cost of living and operating businesses in South Naknek. In the summer, people and cargo use air taxi services, skiffs, and barges for traveling between South Naknek, and Naknek or King Salmon. In the winter, after sufficient ice thickness is achieved, people can drive snowmachines and vehicles across the river, or use air taxi services. The roundtrip airfare for an individual traveling between Naknek and South Naknek is $60 if traveling alone, and the one-way cost to move a car by barge in the summer is $500. The transportation costs affect a number of organizations. For example, parents of South Naknek students that attend Naknek schools are flown to parent-teacher conferences at school district expense. South Naknek emergency services personnel pay for their own travel costs to attend training in Naknek or King Salmon.

In addition to the high transportation costs imposed on South Naknek residents and businesses by this transportation system, safety is a primary issue. The school district has been flying South Naknek junior high and high school students to Naknek schools for 30 years. One winter a plane had mechanical problems and landed on the river ice. A similar situation during times when ice is not present could have dramatic consequences for the community. The concern about safety is always present in the minds of South Naknek parents whose children fly on a daily basis.

The school charters impose other costs as well. For example, the school flights operate under visual flight rules in daylight only. In mid-winter this results in children arriving at school at 9:45 a.m., 45 minutes after school commences. The requirement to fly during daylight hours also constrains the ability of South Naknek students to participate in after-school activities. At times bad weather will result in students not being able to return home. On those days the school district incurs costs for housing students in private homes on the north side of the river.

Emergency services are also affected by bad weather. There is concern in the community about the ability of medical evacuation flights during bad weather to transport people that may need immediate medical care. The majority of emergency services personnel in the Bristol Bay Borough are located on the north side of the river and the present transportation system hinders their ability to support or assist their counterparts in South Naknek.

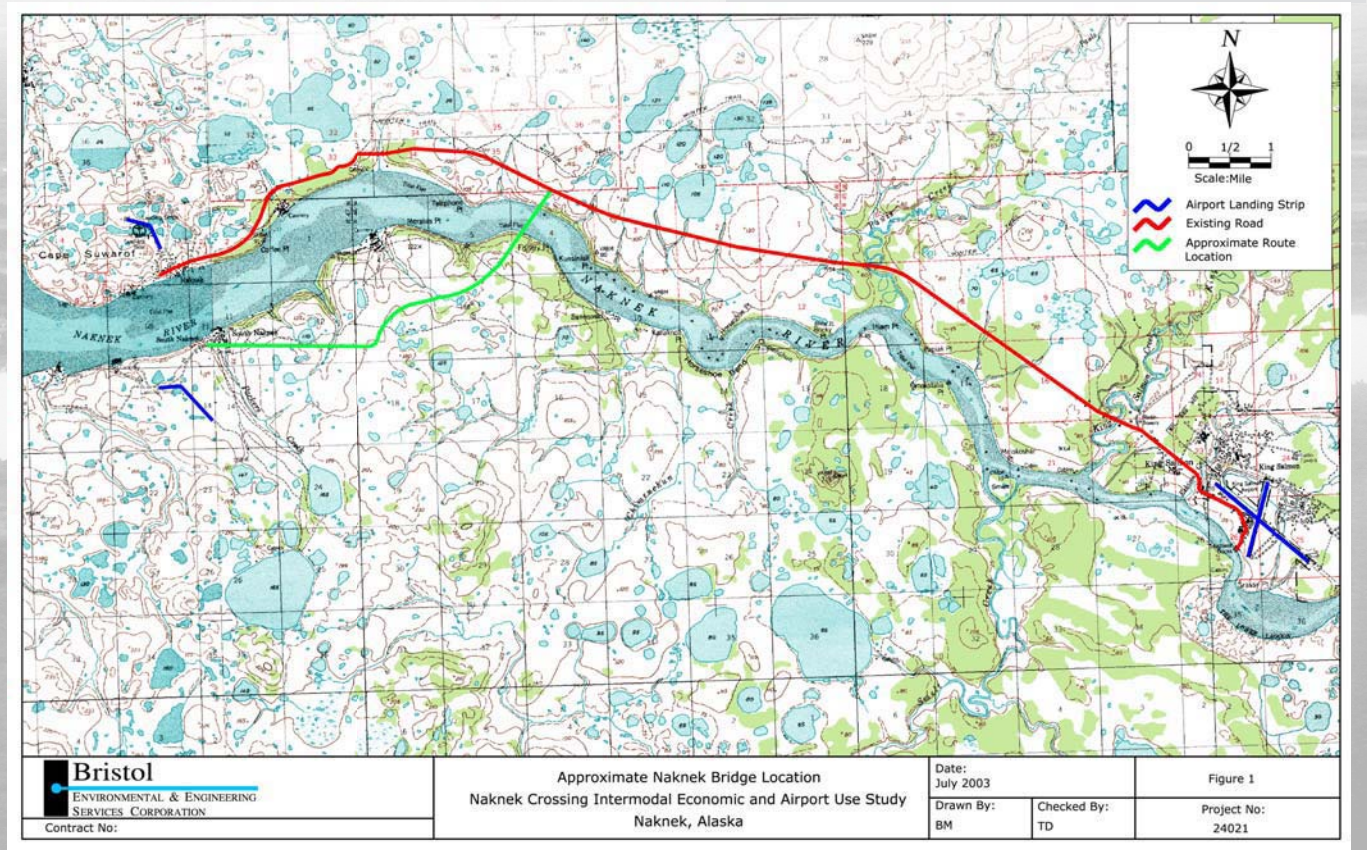
The present transportation system requires the Bristol Bay Borough and a number of other agencies to maintain separate facilities on both sides of the Naknek River. With a bridge available it is anticipated that a number of facilities would be consolidated with subsequent savings to local, state, and federal government budgets, and the possibility of lower local tax rates or improved services if redundant facilities do not need to be maintained. Residents mentioned a number of facilities that are potential candidates for consolidation. These included the post office, health clinic, landfill, emergency services, and the library.

South Naknek residents also believe that a bridge would stimulate economic development in the community and offer new business opportunities, resulting in new jobs that would offset any losses from consolidation. Among the businesses mentioned were a gas station, restaurants, boat haulout and repair, and tourism-related businesses. None of the fish processing plants located in South Naknek are processing at this time and it is believed that a bridge will lower operating costs for these facilities and result in some of them reopening. A reopened plant or plants would also make ice available for setnet fishers whose sites are located south of the Naknek River, which would improve the quality of fish harvested in the area. This is very important as the Alaska wild salmon industry faces continuing competition from farmed salmon.

Harbors and Rivers in Alaska
Survey Report
COE, 1954

A focus on the Bristol Bay and Kodiak region conclusions statement.

"As a result of these studies the District Engineer concludes that the economic development of Southwestern Alaska will derive from its strategic position in the defense of North America and from its principal basic natural resources of fish, minerals, hydroelectric power and recreation. Any improvement of rivers and harbors which may be constructed to aid in the development of these resources will contribute to the welfare of all Alaska and to the United States."



The following evaluation criteria were developed from public comments received at the last public meetings (June 17 and 18 2003), and the Department of Transportation and Public Facilities objectives for the project. Your comments on these criteria will be appreciated. The Team will use this information to evaluate the Naknek Bridge Crossing alternatives (see map on back). The draft report will be released February 2004. Please see the Project Newsletter sent August 2003 for detailed notes on the public meetings held in June (additional copies have been provided for your convenience).

Criteria for Evaluation

1. What will result in the greatest improvements in safety for school children and other travelers? Measure: Qualitative assessment of South Naknek parent's perception of safety as well as air taxi pilots.

2. What will result in improved educational and social benefits for school-age children? Measure: Number of times students arrive late for school or cannot return home under each alternative. Measure: Perception of social benefits of attending a larger school by South Naknek teachers and parents.

3. How can we improve access to hospitals and clinics for residents of South Naknek? Measure: Discussion of reduction in response time and travel time from South Naknek to Naknek, as well as medical evacuations to Anchorage.

4. How can we improve access and response time for emergency services and public safety? Measure: Discussion of reduction in response time and support for public safety and emergency services.

5. What will generate the most economic activity in the Bristol Bay Borough? Measure: Net number of businesses (gains and losses) or business expansions anticipated with each alternative (including effect on air taxi services). Measure: Net number of seasonal and permanent jobs created or lost, by community. Measure: Net tax revenue generated in Bristol Bay Borough

6. What will have the largest net benefit to outlying villages? Measure: Provides easiest access to sub-regional center businesses and facilities in the Bristol Bay Borough.

7. What will have the largest net economic benefit? Measure: Summary of quantitative data developed for each alternative for the above criteria. Measure: Benefit-cost analysis.

8. What will provide the greatest net benefit to general aviation, including floatplanes, operating in the study area? Measure: Number of aircraft parking spaces available. Measure: Reduction in occurrences of wind damage anticipated with each alternative. Measure: Qualitative assessment of improved operational safety at remaining airports under each alternative as perceived by pilots and control tower personnel.

9. What will result in the lowest total annual maintenance costs for ADOT&PF? Measure: Net present value of maintenance costs for airport and bridge alternatives over the 20-year study period.

10. What will have the lowest capital cost? Measure: Net present value of capital costs, including replacement and major refurbishment costs, over the 20-year project study period.

11. What will have the largest effect on reducing costs for other government agencies, local businesses, and residents? Measure: Net present value of changes in capital (including replacement and refurbishment costs) and operating and maintenance costs over the 20-year project study period for each alternative for each major entity and an aggregate estimate for all South Naknek households.

Next Steps

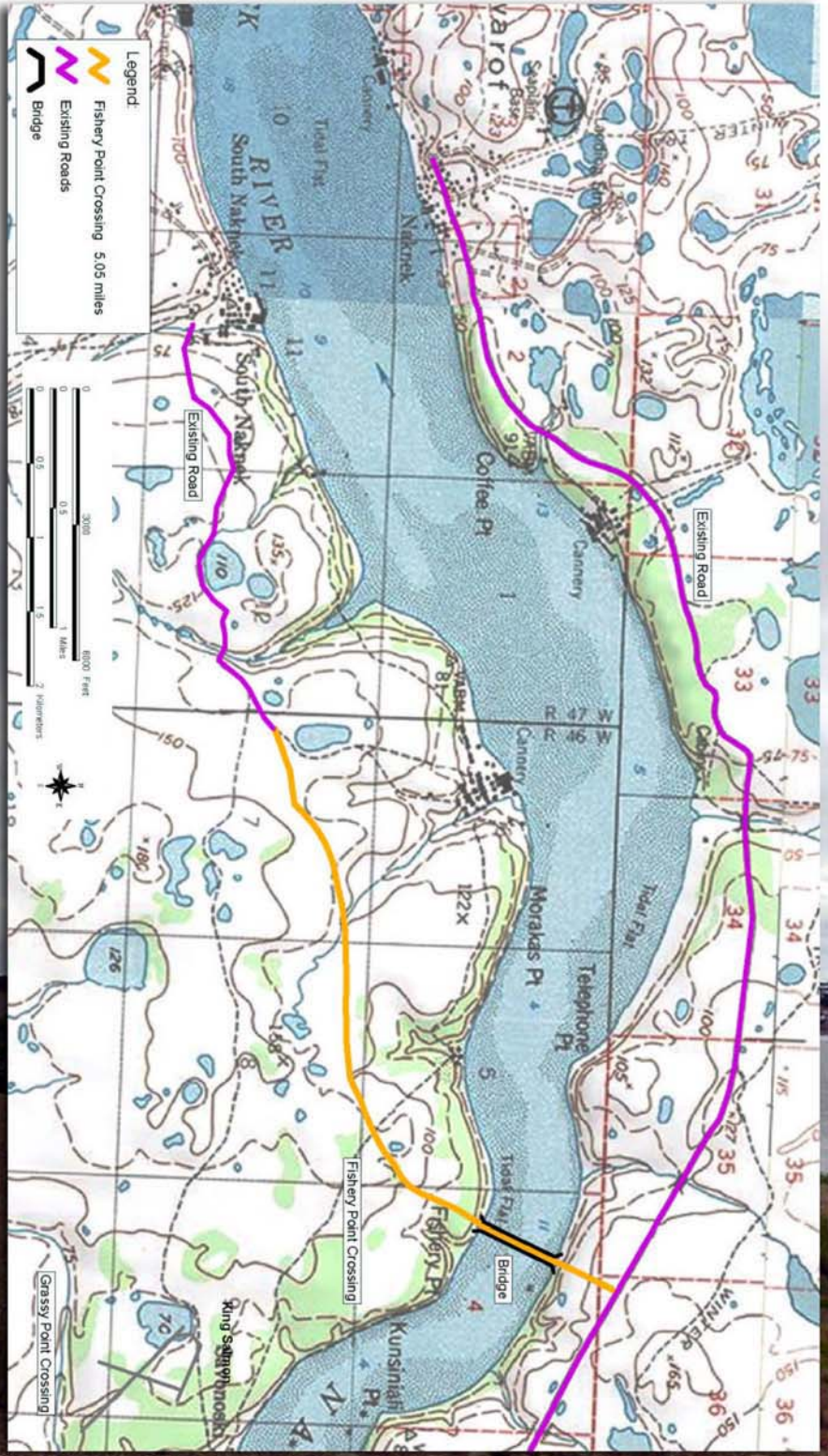
1. DOT and Project Team prepare Draft Report October 2003 thru February 2004.
2. Draft Report open for public review in February 2004 thru March 2004.
3. Final Report will incorporate comments by April 2004.
4. If you have questions or would like additional information please feel free to contact:

Contact Information

Eric Taylor
Area Transportation Plans
Alaska DOT&PF
Division of Statewide Planning
3132 Channel Drive, Room 200
Juneau, Alaska 99801
907.465.8958 PH
907.465.6984 FX
eric_taylor@dot.state.ak.us

Project Website

www.dot.state.ak.us/stwdplng/projectinfo/proj_master.html



Alaska Department of Transportation
and Public Facilities

NAKNEK CROSSING INTERMODAL ECONOMIC IMPACT AND AIRPORT USE STUDY

Public Meetings
October 7-8, 2003

Public and agency comments

Copies of the comments received from the general public on the draft report are presented below.

Comment 1:

I found your address on line and am interested in the name of the person, who I may contact about the bridge from South Naknek to Naknek, scheduled to be built.

Would you be so kind to forward this message to that person if it isn't you:

I have waterfront acreage in Naknek for sale? This could be the acreage on which the Naknek side of the bridge can be built. How soon will land out there be purchased for this bridge? Thank you.

—Christine Nekeferoff

Agency response:

Christine—

Thank you for your email. Yes, I am the Department's point of contact on the Naknek Crossing Study.

To address your concern about property, the study suggests a potential general alignment for the crossing based upon the planning team's observation of the area's topography and the study's objectives. It appears on page 1 of Appendix E in the draft report.

Will this be the final alignment? We don't know. Following the study, the project will be formally identified for inclusion in the Statewide Transportation Improvement Program so that it can be authorized to receive federal transportation funding in the federal fiscal year it is scheduled to begin. Even if that occurs next year, it still must undergo preliminary design and environmental review per the National Environmental Policy Act, a process that could take several months or even years. Once the environmental review process is concluded and a final alignment approved, then the right-of-way phase begins, when the department actively pursues right to public access through the lands traversed by the approved route alignment. So it could be a while before you are approached about this (assuming the final alignment crosses your property).

I can send you a calling-card size CD with the entire draft report if you would like. Or you can access the report on our web pages at
http://www.dot.state.ak.us/stwdplng/projectinfo/naknekcrossing/naknekdraft_pop.html

We are accepting comments on the draft report through July 2. Please let me know if I can be of further assistance.

Eric Taylor

Comment 2:

Eric, I've received your news letter and noticed the comment period for the proposed bridge to the Naknek river ends on July 2nd. Looking at your location is wrong. It should go further up river above Horse shoe bend, we call it Rocky Point.

You know as well as I do that the longer the Bridge spans the more money it costs. We have a source of gravel in that general area. There is a road already on the North shore. You should at least give it some thought. The river is a lot narrower above Rocks Point, and less trecherous (sic) from the constant ice flow in winter. I invite you to come and take a look, I'll even take you there at low water.

—Ralph Angasan , phone 246-6126 fax 246-6411

Agency response:

Dear Mr. Angasan:

Thank you for your comments. They have been made part of the official record for this study and will be reviewed and reconsidered when the project enters the preliminary design phase

Since this was a planning-level study, we tried to pick a reasonable location from which to assess costs and benefits of a bridge crossing in general terms. The study was needed to determine whether it would be a better decision overall for the state to build a bridge or to make major improvements to Naknek Airport. The study indicates a bridge is the better long-term solution, and provides us with a firm rationale for pursuing federal project funding for construction of a bridge. Once federal project funding is made available for the project (the next step in this long process), then preliminary design and environmental review begins, and specific locations and alternatives can be discussed and compared in detail.

For the draft economic study released, we did take into consideration issues of bridge length and the length of the road that would be needed to reach the potential crossing site from South Naknek, as well as the type of terrain that would have to be crossed. And we found, as you might expect, that there is a point of diminishing returns, where the costs in road construction and ongoing road maintenance for a longer overland length more than outweigh the savings in a shorter bridge span. Likewise, as the route lengthens, the overall benefit is diminished. A longer route between Naknek and South Naknek would generate less traffic and fewer potential economic opportunities than a shorter one.

Should you have additional concerns or comments about the Naknek crossing, I encourage you to contact either myself or Allen Kemplen in the DOTPF Central Region planning office, ph 907-269-0509.

Sincerely,
Eric Taylor

Comment 3:

Memo from Office of Habitat Management & Permitting—Next page

MEMORANDUM

Department of Natural Resources
Office of Habitat Management & Permitting

STATE OF ALASKA

TO: Eric Taylor
Division of Program Development, DOT & PF

DATE: July 2, 2004

TELEPHONE: 269-6987
FAX: 269-5673

FROM: Stewart Seaberg
Office of Habitat Management & Permitting

SUBJECT: Naknek Crossing

The Office of Habitat Management and Permitting (OHMP) has reviewed the "Naknek Crossing Internodal Economic and Airport Use Study" report circulated by the Department of Transportation and Public Facilities (DOT) for agency review and public comment. This study addressed some of the economic, social, and environmental concerns associated with various alternatives for road building, bridge construction, and airport closures in the communities of Naknek, South Naknek, and King Salmon.

The Naknek River (Anadromous Stream No. 324-20-10140) supports pink, sockeye, king, coho, and chum salmon, as well as Dolly Varden and Arctic char. Tributaries on the south side of the river may support king and coho spawning and rearing and will need to be surveyed before road building and stream crossing activities take place.

The value of the salmon harvest and its decline in recent years make it especially important to protect salmon habitat and thereby protect the commercial and subsistence salmon fisheries. Approximately 320-pounds of salmon per household are annually harvested in the Naknek area for subsistence purposes 1983). In 2003, salmon harvest were below the 20 yr. averages: The inshore run of sockeye salmon was the seventh smallest inshore run in 20 years, and it was 28% below the 1983 - 2002 average of 36 million. The commercial harvest of Chinook salmon was the eighth smallest catch in the last 20 years and 43% below the 20-year average. The chum salmon harvest was 20% below the 20-year average of 1 million. The low pink salmon harvest of about 178 fish is what is expected for odd-numbered year returns. The coho salmon harvest of approximately 43 thousand fish was well below the 20-year average of 137 thousand.

The calculated exvessel value of the 2003 Bristol Bay salmon fisheries totaled $47.69 million, which is the third lowest exvessel value in over 20 years. It was 62% below the 20-year average exvessel value of $125.35 million.

Based on the assumption that the needs and preferences of the communities mandate construction of a bridge over the Naknek River and the continued operation of 1 to 2 airports, please consider the following recommendations for the protection of fish habitat during the development of project alternatives and in the planning and design processes.

For the design phase:

- Maintaining natural drainage patterns in wetlands, i.e. adequate size, location, and number of culverts under the road; minimizing construction in wetlands.
- For both gravel and paved roads, storm water drainage should prevent the sedimentation and contamination of surface water by run-off.

- A hydrologist should evaluate the Naknek River for bridge and road locations so that protective actions such as rip rapping streambanks or protecting bridge abutments and piles from scour or ice damage are not needed in the future. Also, bridge design and subsequent alteration of flows should not create sediment deposition issues that will need to be corrected by frequent dredging.
- The steel span bridge that requires a smaller number of pilings would cause the least disruption to stream habitats in terms of altering the streambed and blocking light.

For the construction phase:

- In stream work windows may be based on tide, season, or both to minimize interference with in migrating adults and out migrating smolt. For example, pile-driving activities should take place during low tide periods when fewer fish will be in the vicinity of construction and low water levels will limit the dispersal of sound waves underwater.
- Measures, such as the use of bubble curtains, may be required during construction activities to help dissipate damaging sound waves and reduce suspended sediments.

Thank you for the opportunity to comment on this plan, please contact habitat biologist Tammy Massie (907)-269-6936 or tammy_massie@dnr.state.ak.us with any questions or concerns.

Comment 4:

Eric Taylor: We are ready for the bridge connecting all 3 Bristol Bay Borough communities. Please start building soon. Sincerely, Ralph Angasan, Jr., King Salmon Tribe, Administrator

Comment 5:

From: Alan Backford <abackford@bbna.com>

My only comment would be to contact this office (BBNA) if any easements are needed across Native land allotments for a bridge. Thank you.

Appendix C: Community profile

This appendix presents a community profile of the Bristol Bay Borough including information on location and setting, history, government structure, demographics, and economics. There are three communities within the Bristol Bay Borough: King Salmon, Naknek, and South Naknek. Their close proximity, within a 16-mile radius of each other, is one reason why the communities themselves remain unincorporated, with the Borough serving the role of local government. All three communities are located along the Naknek River as shown in Figure 1.

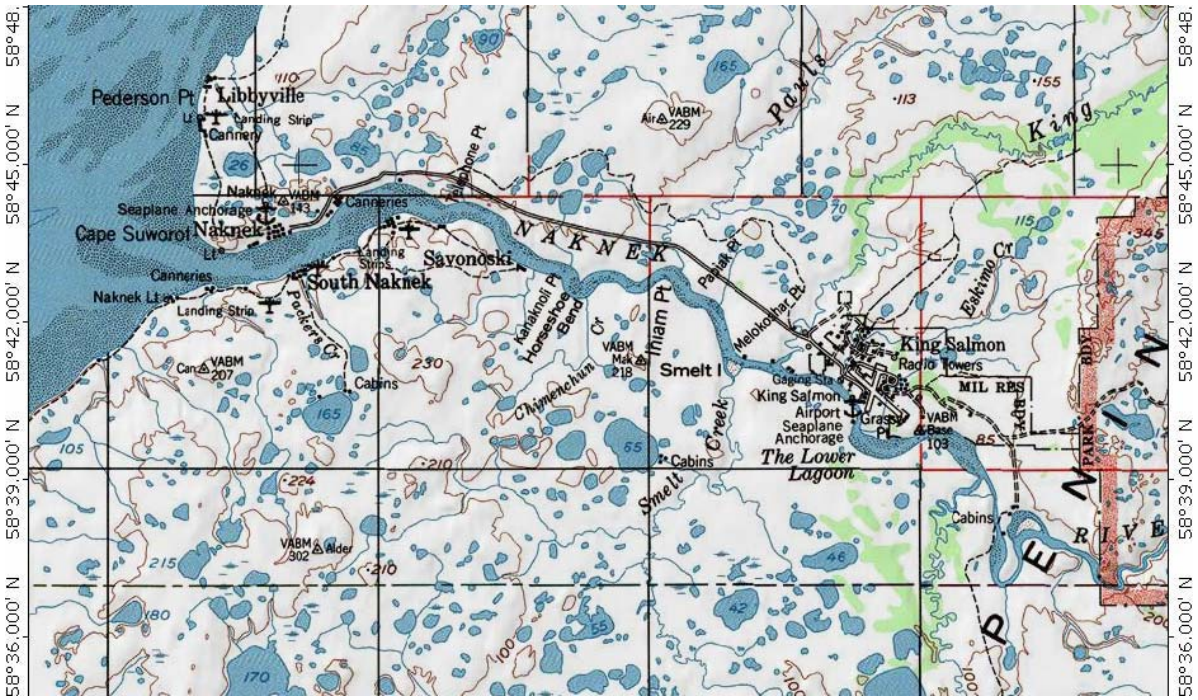


Figure 1. Bristol Bay Borough: Naknek, King Salmon, South Naknek.

Source: U.S. Geologic Survey, National Geographic TOPO! Software.

Regional and community settings

The Bristol Bay Borough is in southwestern Alaska, at the head of Kvichak Bay, an arm of the larger Bristol Bay. It is slightly less than 300 miles southwest of Anchorage. The Bristol Bay Borough is approximately 500 square miles in land area, and is geographically the smallest borough in Alaska. It was incorporated in 1962 (as Alaska's first borough), in part to capture fish taxes generated by local salmon processors (DCED, 2003). The three commercial fishing communities are located on the Alaska Peninsula, extending southwest toward the Aleutian chain.

Naknek had 614 residents in 2003, as estimated by the State Department of Labor and Workforce Development (DOLWD). The village is on the north side of the Naknek River,

which is located at the northeastern end of Bristol Bay. King Salmon had an estimated 385 residents in 2003 (DOLWD). Like Naknek, it is located on the north bank of the Naknek River, approximately 16 miles east of Naknek.

South Naknek, a more traditional community, is located on the south bank of the Naknek River with an estimated 102 residents in 2003 (DOLWD). South Naknek is not connected by road to the other communities.

The regional setting is primarily maritime with cool, humid, and windy weather. Average summer temperatures range from 42 to 63 degrees Fahrenheit with average winter temperatures of 29 to 44 degrees. Extremes range from -46 to 88 degrees. Total precipitation for the three communities is 20 inches annually, including 45 inches of snow.

King Salmon is located at the extreme western boundary of Alaska's forested land. Local trees and biomass provide fuel for campfires but they are insufficient for commercial processing or sustained building heating.

Historical background

Athabascan Indians, Central Yup'ik Eskimos, and Sugpiaq (Aleut-Russian) Eskimos settled this region in pre-historical times. Hunting and fishing camps along the Naknek River date from 3,000 to 4,000 B.C., and are approximately 6,000 years old.

The first Russian traders arrived in 1818 and two years later a Russian settlement was established. A Russian church was built nearby in 1841; Russian activity was strong until the United States purchased Alaska in 1867.

King Salmon. The King Salmon Air Force Base was developed during World War II and was operational until 1993. Since then, the runways have been under State of Alaska control with occasional military use. The long runways have maintained King Salmon as a regional hub for air transport, including passengers and fish cargo.

Naknek. Captain Lt. Vasiliev first noted Naknek in 1821 as the Eskimo village of Naugeik. The village was called Kinuyak in 1880 and was later spelled Naknek by the Russian navy. Russians inhabited the area until 1867. A salmon cannery opened on the Naknek River in 1890 and by 1900 there were approximately 12 canneries in Bristol Bay. A post office was established in 1907. Naknek serves as the center of local government.

South Naknek. South Naknek was settled in modern times around the 1900s due to salmon cannery development. Before then, the area was Sugpiag Aleut territory for about 6,000 years. South Naknek was the seasonal hunting and gathering region for the Sugpiaq Aleuts. Some of its villagers were relocated from New and Old Savonoski near the Valley of Ten Thousand Smokes. South Naknek is also one of the villages were reindeer herds were introduced by the Bureau of Indian Affairs in the 1930s.

Government structure

The Bristol Bay Borough is a second-class borough within the State of Alaska. Borough population in 1970 was 1,147 and was approximately 1,105 people in 2003, based on an estimate by the State Demographer (DOLWD, 2004).

All three communities within the Borough are unincorporated. The three communities are located with the regional boundaries of the Bristol Bay Native Corporation.

The Borough supports the Bristol Bay School District and its students.

The Borough Mayor has a five-person assembly to help govern the area and oversee the Borough Manager. A seven-member planning and zoning commission assists the Borough Assembly. There is also a school board, with five members. Municipal employees include a Police Chief, Fire Chief, Port Administrator, Public Works director, Superintendent of Schools, and other employees to handle tax assessments, legal matters, the landfill and public works. A Community Development Department administers Borough land use functions.

The Borough's current property tax is 13.0 mills (4.14 mills for schools and 8.86 for general services[1]) and there is a 3.0 percent Raw Fish Tax and 10 percent Accommodations Tax from May to October.

Population demographics

Information about population trends and characteristics helps describe the general nature of a community or area. An analysis of population trends can help determine if changes are occurring for specific groups defined by age, gender, race, or education level, thereby influencing the nature of social and economic relationships in the community. The Bristol Bay Borough has some distinct demographic characteristics and trends that will be discussed in this section.

Population

Table 1 shows the population for the Bristol Bay Borough and its three communities at 10-year intervals, 1960 through 2000, along with the estimated population for 2003 (DOWLD), and the percent change between 1990 and 2000 and 2000 and 2003. The Bristol Bay Borough population decline between 1990 and 2000 was driven by the large decline in population experienced by the community of King Salmon. King Salmon's population declined almost 37 percent between 1990 and 2000, and another 12 percent between 2000 and 2003. In contrast, Naknek's population increased almost 18 percent between 1990 and 2000, but then decreased approximately 10 percent between 2000 and 2003. The population of South Naknek remained stable between 1990 and 2000, but dropped over 25 percent between 2000 and 2003.

[1] Bristol Bay Borough, Assembly Meeting Minutes, May 5, 2003.http://www.theborough.com.

Table 1. Population 1960 through 2003 and percent change

	1960	1970	1980	1990	2000	2003	Percent Change Between 1990 and 2000	Percent Change Between 2000 and 2003
King Salmon	227	202	545	696	442	385	-36.5	-13.0
Naknek	249	178	318	575	678	614	17.9	-9.4
South Naknek	142	154	145	136	137	102	-10.7	-25.5
Borough	618	534	1,008	1,407	1,257	1,105	-10.6	-12.1

Source: U.S. Census Bureau. Census 2000 and DOWLD.

Figure 2 shows a graph of population trends for the Bristol Bay Borough and its individual communities from 1890 through 2003. Population in the Bristol Bay Borough reached a peak in 1993. The population then declined significantly with the closure of the U.S. Air Force base at King Salmon in 1994 with continued declines since that time.

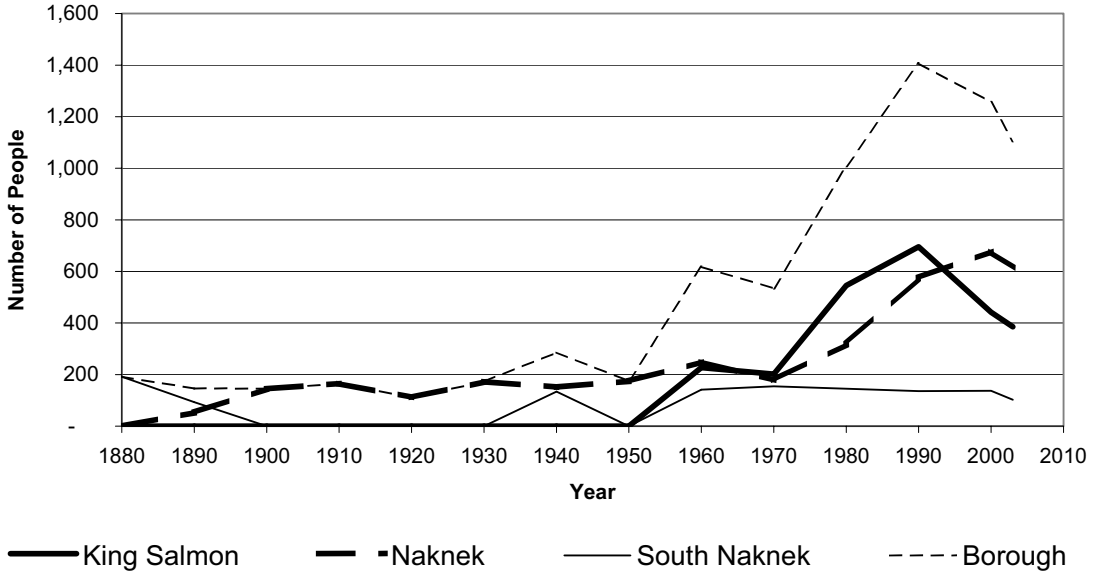


Figure 2. Population trends, King Salmon, Naknek, South Naknek, and Bristol Bay Borough, 1880-2003

Source: Alaska Department of Community and Economic Development, Community Profiles.

Race

A majority of the Bristol Bay Borough is non-Native. U.S. Census figures show that in 2000, approximately 53 percent of Borough residents were white, and 44 percent were Alaska Native or American Indian.

Historic ties exist with the Aleut, Yupik Eskimo, and Athabascan cultures, but commercial fishing opportunities have brought many non-Natives to the Borough. South Naknek is a traditional Sugpiaq village with a fishing and subsistence lifestyle (DCED 2003). A federally recognized tribe is located in the community—the South Naknek Village Council (Quinyang). Almost 84 percent of the population of South Naknek is Alaska Native or part Native.

Table 2. Race, Census 2000

Geographic Area	White	Alaska Native	Black	Asian	Hawaiian	Other Race	Two or More	Percent Native
King Salmon	293	128	5	1	0	1	14	30.1
Naknek	349	307	0	1	5	0	16	47.1
South Naknek	18	115	2	1	1	0	0	83.9
Borough	661	550	7	3	6	1	30	43.7

Source: U.S. Census Bureau, Census 2000, SF-3.

Table 3 shows population and race distribution for the Bristol Bay Borough for 1980, 1990, and 2000. Alaska Native percentages increased from approximately 33 percent in 1980 to 44 percent in 2000. This increase in the Alaska Native population is due in part to a continual increase in the Alaska Native population and a decrease in the number of white residents between 1990 and 2000.

Table 3. Population and race distribution for Bristol Bay Borough, 1980, 1990, and 2000

	1980		1990		2000	
Race	Number	Percent	Number	Percent	Number	Percent
Total Population	1,094	100	1,410	100	1,258	100
Hispanics	30	2.7	33	2.3	7	0.6
White	653	59.7	881	62.5	656	52.2
Black	46	4.2	38	2.7	7	0.6
Alaska Native and American Indian	360	32.9	446	31.6	550	43.7
Asian	5	0.5	12	1.0	3	0.2
Hawaiian and Pacific Islander	-	-	-	-	6	0.5
Two or More Races	-	-	-	-	29	2.3

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).
In 1980 and 1990 "Asians" included Hawaiians and Pacific Islanders.

Age and gender

Age distribution gives an indication of whether the population of a community is generally young or old and growing or declining. It is a predictor of future school enrollments, an indicator of what resources and programs the community may need for specific age groups, and one source of information about the available labor force.

Table 4 shows six cohort groups, median age, and gender for Alaska, the Bristol Bay Borough, King Salmon, Naknek, and South Naknek. The median age for the Bristol Bay Borough and each of its communities is higher than the median age for the state as whole.

The Bristol Bay Borough also has a slightly higher percent of individuals under 18 than Alaska. In terms of individual communities, South Naknek and King Salmon have a smaller percent of individuals under 18 than Alaska statewide averages. In Naknek, where the high school is located, 35 percent of the population is under 18.

Table 4. Total population, age and gender, 2000 Census

Geographic Area	Total Population	Percent of Total Population					Median Age	Males per 100 Females	
		Under 18	18 to 24	25 to 44	45 to 64	65 and Older		All Ages	18 and Over
Alaska	626,932	30.4	9.1	32.5	22.3	5.7	32.4	107.0	107.6
Borough	1,258	31.3	5.9	34.8	24.2	3.8	36.0	119.5	125.6
King Salmon	442	26.2	7.0	35.7	28.1	2.9	37.8	122.1	131.2
Naknek	678	35.0	4.6	34.8	21.8	3.8	34.4	116.6	121.6
South Naknek	137	29.9	8.8	32.1	22.6	6.6	35.8	128.3	128.6

Source: U.S. Census Bureau, Census 2000, GCT-P5.

Figure 3 is a “population pyramid” for Bristol Bay Borough showing the area's age-sex structure and hinting at its patterns of growth. A top-heavy pyramid, suggests negative population growth that might be due to any number of factors, including high death rates, low birth rates, and increased emigration from the area. A bottom heavy pyramid suggests high birthrates, falling or stable death rates, and the potential for rapid population growth. Most areas, however, fall somewhere between these two extremes and have a population pyramid that resembles a square, indicating slow and sustained growth with the birth rate exceeding the death rate, though not by a great margin.

Figure 4 shows the age distribution for Alaska as a whole for comparative purposes. Of note in the Bristol Bay Borough pyramid is the greater number of males in the 10 to 14 age and the 40 to 44 age categories.

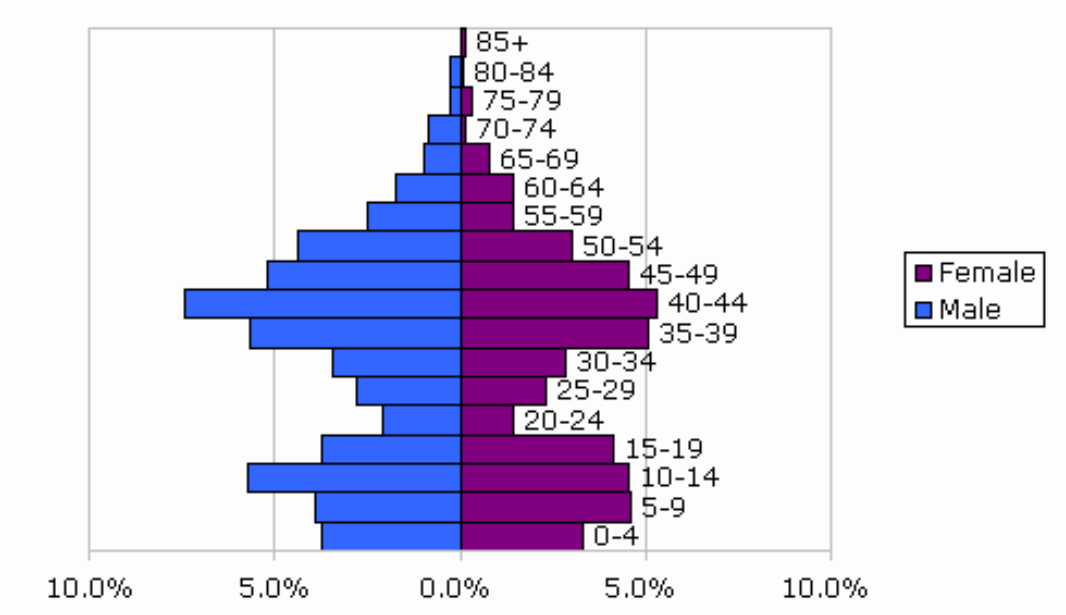


Figure 3. Age distribution, 2000 Census, Bristol Bay Borough

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).

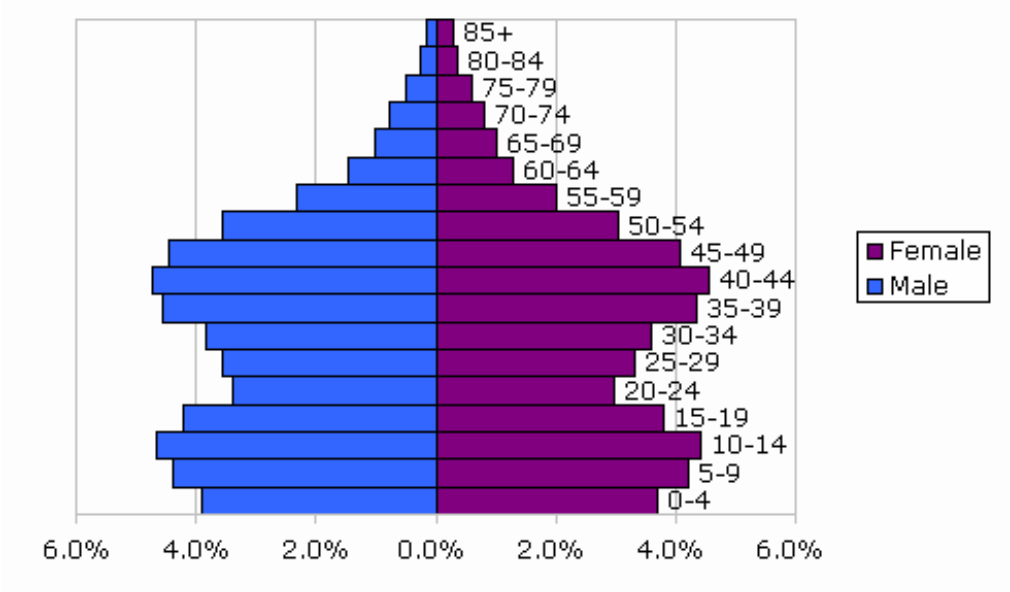


Figure 4. Age distribution, 2000, Alaska

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).

Place of birth, citizenship, and residence

The Census includes all residents of the United States, regardless of their citizenship status. Table 5 shows the place of birth and citizenship for residents of the Bristol Bay Borough. Almost 99 percent of Bristol Bay Borough residents were born in the United States, but half of them are from Outside of Alaska. In 1990, almost 60 percent were born in another state.

At the time of the 2000 Census, 56 percent of the population five years and older in the Bristol Bay Borough lived in the same house that they had lived in 1995 (Table 6 and Figure 5). At the time of the 1990 census only 33 percent of the population lived in the same house they had lived in five years earlier.

Table 5. Place of birth and citizenship status, 1990 and 2000
Bristol Bay Borough

Residence	1990		2000	
	Number	Percent	Number	Percent
Total Population	1,410	100.0	1,258	100.0
Born in U.S.	1,376	97.6	1,241	98.7
Born in Same State	542	38.4	627	49.8
Born in Different State	834	59.6	614	48.8
Born Outside US	13	0.9	10	0.8
Total Foreign Born Population	21	1.5	7	0.6
Naturalized	12	0.9	5	0.4
Non-Naturalized	9	0.6	2	0.2

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).

Table 6. Migration, residence five Years prior to 1990 and 2000 Census
Bristol Bay Borough

Residence	1985		1995	
	Number	Percent	Number	Percent
Same House	417	32.4	656	56.1
Different House	870	67.6	513	43.9
Same Borough	243	18.9	198	16.9
Different Borough	599	46.5	311	26.6
Same State	185	14.4	171	14.6
Different State	414	32.2	140	12.0
Elsewhere in 1995*	28	2.2	4	0.3

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).

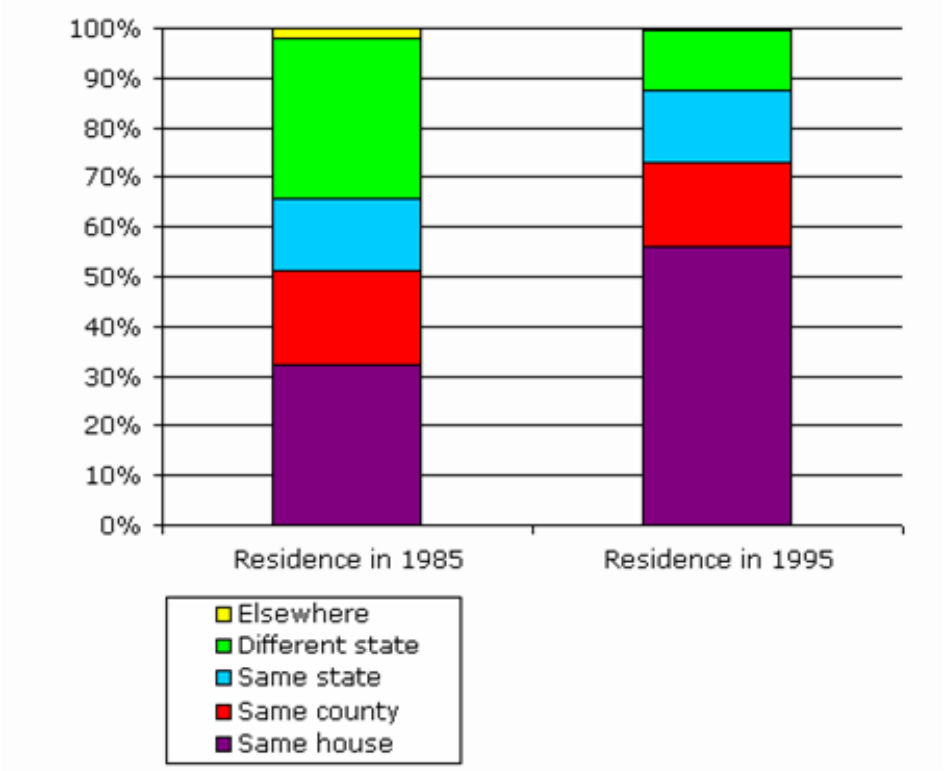


Figure 5. Residence five years prior to 1990 and 2000 Census
Bristol Bay Borough

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).

Households

While the Bristol Bay Borough's population decreased between 1990 and 2000, the number of households increased from 407 to 490. The number of married households with children decreased from 55 percent of total households in 1990 (241) to 49 percent of total households in 2000 (224). Non-family households increased approximately six percent, 135 to 189, between 1990 and 2000.

Table 7. Household types, 1990 and 2000 Bristol Bay Borough

Type of Household	1990		2000	
	Number	Percent	Number	Percent
Total Households	407	100.0	490	100.0
Married Couple	224	55.0	241	49.2
With Children*	142	34.9	142	29.0
Without Children*	82	20.1	99	20.2
Female-Headed	25	6.1	30	6.1
With Children*	16	3.9	21	4.3
Without Children*	9	2.2	9	1.8
Male-Headed	23	5.7	30	6.1
With Children*	12	2.9	24	4.9
Without Children*	11	2.7	6	1.2
Non-Family	135	33.2	189	38.6
Householder Living Alone	110	27.0	153	31.2
Two or More Persons	25	6.1	36	7.3

* For the purposes of this table, "children" are people under age 18.

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).

Economy

The following economic profile describes Bristol Bay Borough's changing economy. Indicators such as total value-added by industry sector, place of work, employment status, occupation, employment by industry, income, and poverty rates are included. The Bristol Bay Borough's economy is highly seasonal and has been based almost entirely on the harvesting and processing of wild sockeye from Bristol Bay.

In recent years, low salmon prices and smaller harvests have severely affected the area's economy. Many fishers have dropped out of the fishery. The number of drift net vessels dropped from more than 1,890 participants in the 1990s to 1,183 in 2002 (DOLWD). A total of 194 Borough residents hold commercial fishing permits (DCED 2003). The Borough's revenues depend upon the fish taxes generated by local processors so a decline of the fisheries leads to adverse budgetary consequences for local government.

Historically, commercial fishing, processing businesses, government jobs, and transportation services have been the mainstays of the Borough's economy. With the downturn in demand for salmon, tourism is becoming a more important segment of the regional economy.

The King Salmon runway is 8,515 feet of pavement and serves as the area's main transportation hub. The Naknek River, next to King Salmon, serves floatplane traffic headed for locations such as Katmai National Park and Preserve, the Brooks Camp, McNeil River

State Game Refuge, and other fishing locations. Currently an FAA control tower is located at the airport.

The communities of Naknek and South Naknek have been service centers for the salmon fishery in Bristol Bay. Fish are trucked about 15 miles from Naknek to King Salmon for jet service to Anchorage and other markets. Trident Seafoods, North Pacific Processors, and Ocean Beauty are the three salmon processors in the community. Naknek is the headquarters of the Bristol Bay Borough.

There are four docks on the Naknek River, operated by the National Park Service, U.S. Fish and Wildlife Service, Alaska State Troopers, and the Bristol Bay Borough. Bulk waterborne cargo is off-loaded at Naknek and trucked to King Salmon by paved road. Under the right conditions, an ice road is often built to South Naknek in winter.

The community of South Naknek has traditionally been fishing dependent. Trident Seafoods is located in South Naknek, but the Wards Cove processing plant closed in 2002.

King Salmon has 92 business licenses, Naknek has 102, and South Naknek has 10 (DCED 2003).

Total value-added

Figure 6 shows the total value-added estimates as derived from IMPLAN[2] for the different sectors of the Bristol Bay Borough economy (aggregated at the 1-digit SIC level).

Figure 7 shows the value added for the different sectors of the Alaska economy so comparisons can be made between the Bristol Bay Borough and the State. At the 1-digit SIC level, it should be noted that value-added totals related to the fishing industry fall into either the "agriculture" sector or the "manufacturing" sector as shown in Table 8.

Commercial Fishing and Agriculture, Forestry, and Fishery Services are both captured in the "agriculture" sector," while canned, cured, prepared fresh, frozen seafoods fall into the "manufacturing" sector.

Value added shows the contributions of various industry sectors to the Bristol Bay Borough economy and helps determine the relative importance of an industry to the Bristol Bay Borough economy. Value-added refers to the total value of payments to the different factors of production and is equivalent to the gross regional product. Value-added can be an important indicator of industry health and success because it is a measure of industry activity derived by subtracting the costs of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments for the products manufactured. Value-added is equal to the value of shipments minus intermediate production inputs, and thus represents the amount available for wages, salaries, and profits in an industry.

[2] IMPLAN, an input-output model, developed by MIG Group, Inc. is an accounting framework for analyzing the flow of goods and services among businesses and between businesses and final consumers. Such a model is useful for defining the relationships and the degree of interdependency between various industries or sectors of an economy. IMPLAN can be used to look at regional differences in the economic contribution by various sectors to the economy and to determine the relative importance of an industry to a regional economy.

Table 8. Value-added for the fishing industry in Bristol Bay Borough, 2000

	Commercial Fishing $Million	Ag., Forestry, and Fishery Services $Million	Canned, Cured Seafood $Million	Prepared Fresh, Frozen Seafood $Million
Value Added				
Employee Compensation	$0.303	$0.179	$4.860	$7.058
Proprietary Income	$2.868	$2.317	$0.020	$0.043
Other Property Type Income	$0.758	$0.593	$1.199	$1.349
Indirect Business Taxes	$0.079	$0.135	$0.162	$0.308
Employment (# of jobs)	259	347	104	301
Total Industry Output	$4.271	$5.906	$16.305	$47.621
Output per Worker	$16,499	$17,019	$156,270	$158,468
Earnings per Worker	$12,252	$7,194	$46,767	$23,631

Source: Economic Diversity—MIG Group, Inc. IMPLAN Model Output based on 2000 IMPLAN Model.

A comparison of the value-added estimates for the Bristol Bay Borough and Alaska as a whole show some striking differences. In the Bristol Bay Borough, the agriculture sector accounts for nine percent of the total Borough value-added, but accounts for only two percent of the state total value-added.

In the Bristol Bay Borough, the manufacturing sector accounts for 19 percent of the total value-added but only four percent of the total state value-added. Government accounts for 22 percent to the value-added for the Bristol Bay Borough and 26 percent for the State.

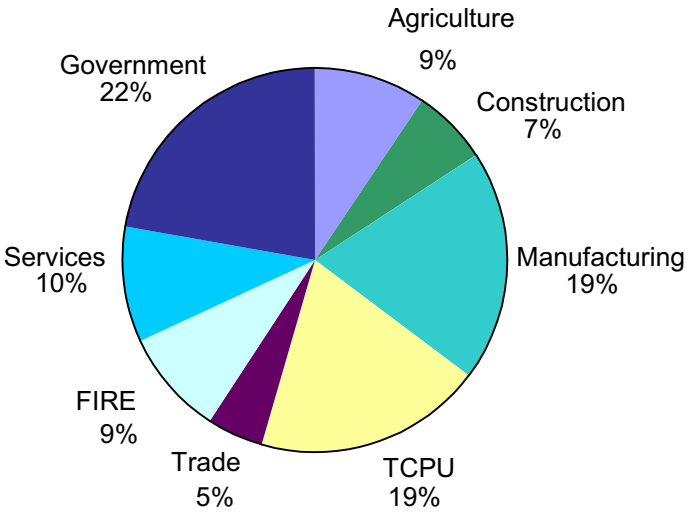


Figure 6. Value-added by major industry sector in the Bristol Bay Borough as percent of total value-added, 2000

Source: Economic Diversity—MIG Group, Inc., IMPLAN Model Output, based on 2000 IMPLAN Model.

Note: FIRE = Finance, insurance, and real estate.

TCPU = Transportation, communications, and public utilities.

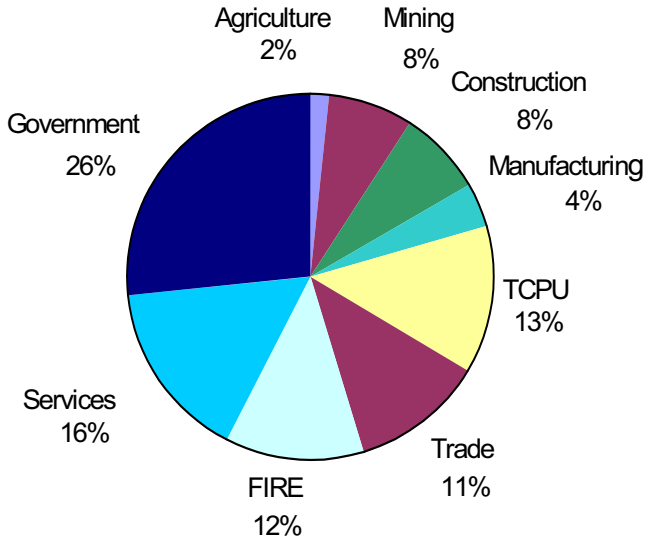


Figure 7. Value-added by major industry sector in Alaska as percent of total value-added, 2000

Source: Economic Diversity—MIG Group, Inc., IMPLAN Model Output, based on 2000 IMPLAN Model.

Note: FIRE = Finance, insurance, and real estate.

TCPU = Transportation, communications, and public utilities.

Salmon fishery and fish processing

Many Bristol Bay Borough residents participate directly in the Bristol Bay salmon fishery either as limited entry permit owners or as crew. Table 9 shows the number of salmon fishery permits held and fished by Borough residents for 1995 through 2001. The number of permits *held* for the Bristol Bay Management Area and for other salmon management areas decreased between 1998 and 2001. The number of permits *fished* decreased between 1999 and 2001 for both categories—the Bristol Bay management area and other salmon management areas fished by Borough residents.

Table 9. Bristol Bay Borough resident salmon permit ownership and activity

	Bristol Bay Management Area		Other Salmon Management Areas	
Year	Held	Fished	Held	Fished
Total	1,375	1,295	1,371	1,315
1995	200	192	198	194
1996	205	194	204	196
1997	199	181	198	189
1998	204	191	203	195
1999	198	194	197	196
2000	182	177	184	179
2001	187	166	187	166

Source: Alaska Commercial Fisheries Entry Commission, Census Area Tables. Accessed at http://www.cfec.state.ak.us/menus/mnus_pmt.htm.

Another indicator of the importance of the salmon fishery to Borough residents is the revenue earned by resident permit holders. Figure 8 shows total adjusted gross revenues earned by Bristol Bay Borough resident setnet and driftnet permit holders for 1990 through 2001. Total adjusted gross revenues decreased from a high in 1990 of $14,432,175 to a low of $2,551,779 in 2001.

The information on number of permits held and fished along with total adjusted gross revenues is provided because conventional employment statistics can be difficult to interpret in areas such as Bristol Bay Borough. Due to the manner in which self-employed fishers are considered, the number of residents practicing a subsistence lifestyle, and the significant number of seasonal, nonresident workers who participate in the local economy.

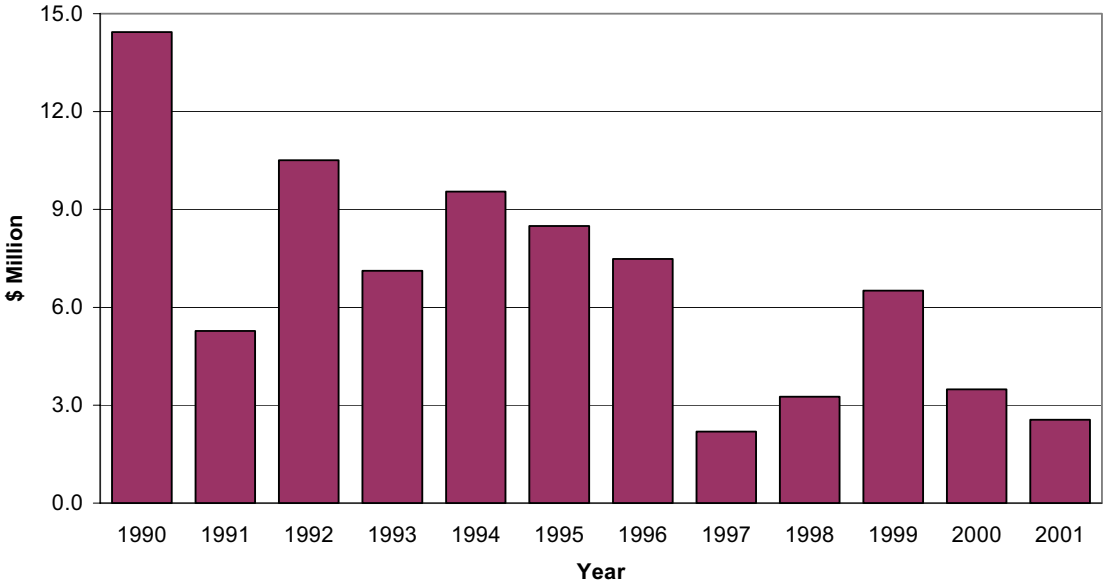


Figure 8. Total adjusted gross revenue earned by Bristol Bay Borough resident setnet and driftnet permit holders, 1990-2001

Source: Alaska Commercial Fisheries Entry Commission, Census Area Tables. Accessed at http://www.cfec.state.ak.us/menus/mnus_pmt.htm.

Employment

Table 10 shows average monthly employment by industry in the Bristol Bay Borough for 1995 through 2001. Employment in manufacturing which includes fish processing experienced a significant drop in employment between 2000 and 2001 from 378 individuals to 123. Employment numbers in the following table do not include self-employed individuals.

Table 10. Bristol Bay Borough average monthly employment by industry, 1995–2001.

Industry Sector	1995	1996	1997	1998	1999	2000	2001
Private Sector							
Construction	24	35	49	33	23	27	33
Manufacturing	361	208	264	279	238	378	123
Trans. Comm. & Util.	142	147	145	142	145	151	151
Wholesale Trade	12	13	19	11	3	3	3
Retail Trade	94	106	103	102	86	72	49
Finance, Insurance, Real Estate.	13	11	11	16	32	29	37
Services	117	119	113	116	113	104	80
Lodging	78	78	70	71	70	59	47
Membership Orgs.	5	8	9	20	26	20	3
Government							
Federal	51	50	51	46	45	41	77
State	30	30	30	29	26	26	30
Local	301	298	321	298	299	302	310

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section, Industry Employment. Accessed at http://almis.labor.state.ak.us/?PAGEID=67&SUBID=185.

A community's labor force provides a measure of how much employment and economic activity a community may have. Labor force is defined as the number of persons 16 years of age or older, the age at which an individual is legally able to work. Employment levels are based on the number of people in the labor force, whereas unemployment levels are based on the number of people in the labor force that are unemployed and looking for employment. Table 11 shows the number and percent of individuals 16 years and older, individuals in this age category in the civilian labor force, and employed and unemployed individuals. Unemployment rates do not take into account those individuals who are underemployed or discouraged workers who have given up hope of finding a job and are not actively seeking employment. In the Bristol Bay Borough approximately 72 percent of the population 16 years and over is in the labor force.

Within the Bristol Bay Borough, the 1999 (U.S. Census) unemployment rate among the population 16 years and over in the labor force ranged from a low of 6.9 percent in King Salmon to a high of 12.5 percent in South Naknek.

Table 11. Employment status of population 16 years and over, Census 2000

Employment Status	Alaska		Bristol Bay Borough		King Salmon		Naknek		South Naknek	
	No.	%	No.	%	No.	%	No.	%	No.	%
Population 16 years and over	458,054	100	908	100	346	100	450	100	112	100
In labor force	326,596	71.3	649	71.5	271	78.3	320	71.1	58	51.8
Civilian labor force	309,485	67.6	649	71.5	271	78.3	320	71.1	58	51.8
Employed	281,532	61.5	581	64	247	71.4	290	64.4	44	39.3
Unemployed	27,953	6.1	68	7.5	24	6.9	30	6.7	14	12.5
Percent of civilian labor force	9	-	10.5	-	8.9	-	9.4	-	24.1	-
Armed Forces	17,111	3.7	0	0	0	0	0	0	0	0
Not in labor force	131,458	28.7	259	28.5	75	21.7	130	28.9	54	48.2

Source: U.S. Census Bureau, Census 2000, SF-3.

Table 12 shows the occupation of the employed civilian population 16 years and over in the Bristol Bay Borough as reported in Census 2000.

Management, professional and related occupations total approximately 34 percent of the employed workforce, followed by sales and office occupations, accounting for almost 25 percent of the employed workforce.

According to U.S. Census data, farming, fishing, and forestry occupations are the smallest component, with less than one percent of the employed civilian population 16 years and over in that profession. However, employment in fishing occupations is under-reported in Census data because of the way census questions are defined and the timing and way data are collected.

Table 12. Occupation of employed civilian population 16 years and over Bristol Bay Borough, Census 2000

Occupation	Number	Percent
Management, professional, and related occupations	198	34.1
Service occupations	99	17
Sales and office occupations	143	24.6
Farming, fishing, and forestry occupations	4	0.7
Construction, extraction, and maintenance occupations	88	15.1
Production, transportation, and material moving occupations	49	8.4

Source: U.S. Census Bureau, Census 2000, SF-3.

Table 13 shows the place of workers for workers 16 years and over. Almost all employed workers that reside in the Borough work within the Borough.

Table 13. Place of work for workers 16 years and over

	King Salmon	Naknek	South Naknek	Borough
Total	237	287	44	568
Worked in state of residence:	237	284	44	565
Worked in borough of residence	237	279	44	560
Worked outside borough of residence	0	5	0	5
Worked outside state of residence	0	3	0	3

Source: U.S. Census Bureau, Census 2000, SF-4.

Data based on a sample.

Table 14 shows Borough employment by occupation according to Census 2000. The largest industry segment is educational, health, and social services at 25 percent. Public administration is the second largest category accounting for 15 percent.

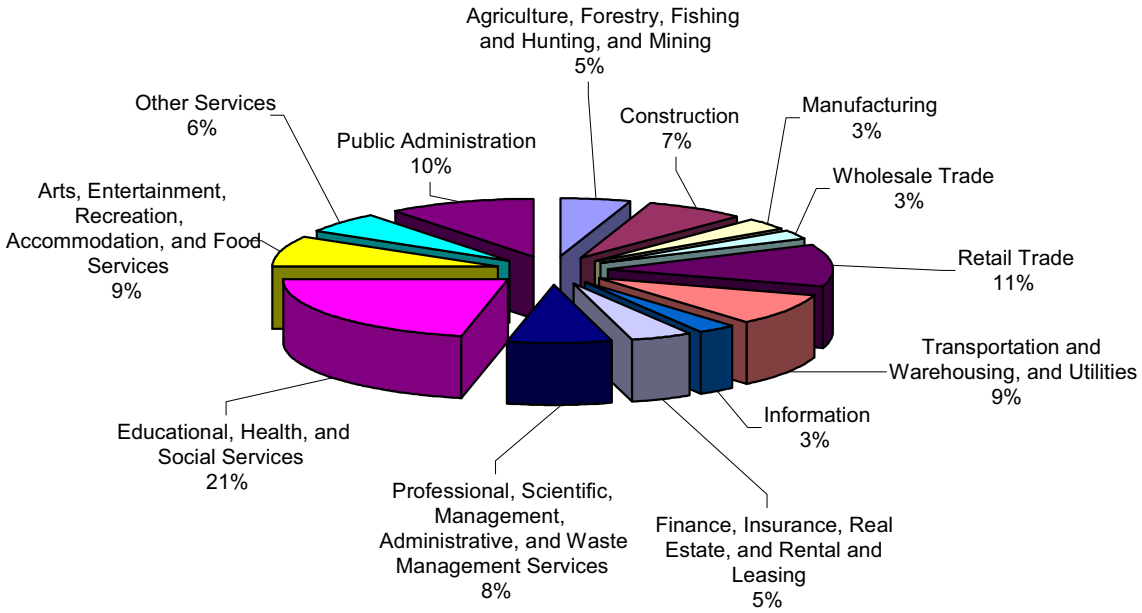


Figure 9. Alaska percent employment by industry Census 2000

Source: U.S. Bureau of the Census, Census 2000 SF-3.

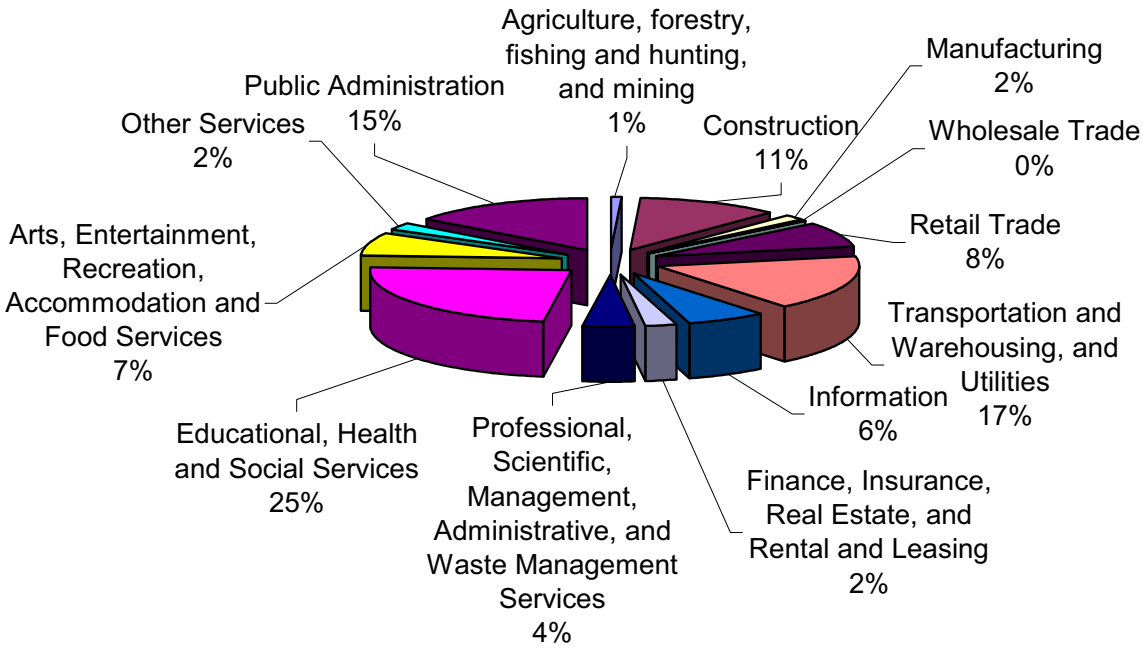


Figure 10. Bristol Bay Borough percent employment by industry Census 2000

Source: U.S. Bureau of the Census, Census 2000 SF-3.

**Table 14. Percent employment by industry
Bristol Bay Borough, Census 2000**

Industry	Number	Percent
Agriculture, forestry, fishing and hunting, and mining	5	0.9
Construction	66	11.4
Manufacturing	9	1.5
Wholesale trade	2	0.3
Retail trade	45	7.7
Transportation and warehousing, and utilities	101	17.4
Information	37	6.4
Finance, insurance, real estate, and rental and leasing	14	2.4
Professional, scientific, management, administrative, and waste management services	24	4.1
Educational, health and social services	137	23.6
Arts, entertainment, recreation, accommodation and food services	42	7.2
Other services (except public administration)	13	2.2
Public administration	86	14.8

Source: U.S. Census Bureau, Census 2000, SF-3.

Table 15 shows the percentage of four different classes of workers: private wage and salary workers, government workers, self-employed workers in their own business who are not incorporated, and unpaid family workers. The government sector is a significant source of employment in the Borough.

Table 15. Class of worker Bristol Bay Borough, 1999

Employment Class	Number	Percent
Private wage and salary workers	332	57.1
Government workers	215	37.0
Self-employed workers in own not incorporated business	34	5.9
Unpaid family workers	0	0

Source: U.S. Census Bureau, Census 2000, SF-3

Income

Personal income is the income received by people from all sources—private sector and government wages, salary disbursements, other labor income, farm and nonfarm self

employment income, rental income of people, personal dividend income, personal interest income, and transfer payments. Personal income does not have taxes subtracted from it.

Per capita personal income is the annual total personal income of residents of an area divided by the number of residents. Per capita personal income is a measure of economic well-being. The amount of goods and services that people can afford is directly related to their personal income.

According to Census 2000, per capita income in the Borough in 1999 was $22,210 while median household income was $52,167. Median earnings for male full-time year-round workers were $44,286 and $35,179 for female full-time year-round workers.

Over half of the households in the Borough earned $50,000 or more in 1999, but at the same time, around eight percent of households earned less than $15,000. Figure 11shows the percent of Borough households in each income category as reported in 1999.

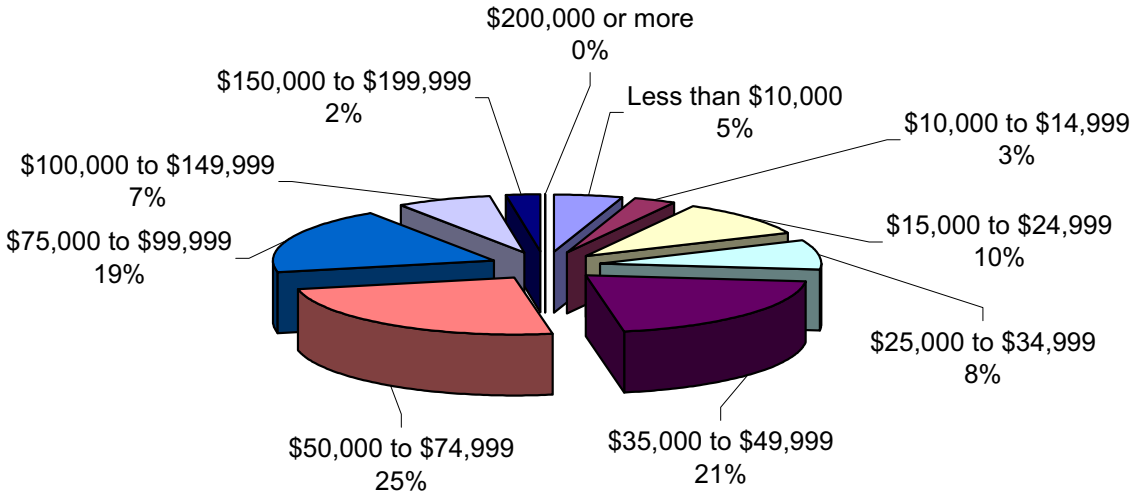


Figure 11. Bristol Bay Borough household income, 1999

Source: U.S. Census Bureau, Census 2000, SF-3.

Table 16. Bristol Bay Borough type of income, 1999

Type of Income	Number	Percent
With earnings	471	95.7
Mean earnings (dollars)	51,020	-
With Social Security income	60	12.2
Mean Social Security income (dollars)	10,875	-
With Supplemental Security Income	12	2.4
Mean Supplemental Security Income (dollars)	6,083	-
With public assistance income	24	4.9
Mean public assistance income (dollars)	3,875	-
With retirement income	52	10.6
Mean retirement income (dollars)	16,448	-

Source: U.S. Census Bureau, Census 2000, SF-3.

The Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is poor. If a family's total income is less than that family's threshold, then that family, and every individual in it, is considered poor. The poverty thresholds do not vary geographically, but they are updated annually for inflation using the Consumer Price Index (CPI-U). The official poverty definition counts money income before taxes but it does not include capital gains or non-cash benefits such as subsistence.

The poverty rate is a commonly used indicator of the level of economic need in a community. Almost every positive personal and community outcome is negatively affected by poverty. Community factors such as the status of resources like affordable housing, transportation, education and training, jobs providing a living wage, health insurance, and availability of child care determine to a large extent an area's poverty rate. Previous research has shown that poverty populations in rural communities are more likely to be long term poor than poverty populations in urban areas.[3]

Table 17. Poverty status, 1999
Bristol Bay Borough

	Percent	
Unit	Bristol Bay Borough	Alaska
Families	6.6	6.7
Individuals	9.5	9.4

Source: U.S. Census Bureau, Census 2000.

[3] Poverty Fact Sheet Series – Rural Poverty, http://ohioline.osu.edu/hyg-fact.

Community facilities

Water distribution and treatment systems, sewers, and wastewater treatment are essential infrastructure for both the Bristol Bay Borough and the seafood processors who process red salmon. From 1992 to 2000, state and federal capital improvements provided $18 million for safe drinking water, rural sanitation and solid waste services improvements within the Borough.

Census 2000 data indicated 979 total housing units in the Borough. Many are only occupied on a seasonal basis.

The borough operates two separate sewer systems for Naknek and King Salmon, with some individuals continuing with on-site septic systems. There is a two-cell, lined, sewage lagoon that serves King Salmon and the airport.

South Naknek resident rely on individual septic systems or honey buckets.

Fuel

The primary fuel storage facilities within the Borough are Chevron's fuel tank farm in Naknek. Diesel, gasoline, heating fuel, and aviation fuel are dispatched from Dutch Harbor, or elsewhere, and delivered by barge. One carrier, Northland Services, makes between seven and nine trips annually.

Residents of King Salmon and Naknek purchase their fuel oil and gasoline in Naknek from Chevron and haul it as needed.

Power

Naknek Electric Association generates power for the Borough, requiring about 1.4 million gallons of diesel each year to generate 20.8 million kilowatt hours. There are 1,140 customers served by Naknek Electric.

Waste heat from the power plant is used to heat the Borough's elementary and high schools, the clinic, a swimming pool, emergency building, the utility building, and five homes. The Alaska Energy Authority ranks the plant and distribution systems as among the most efficient in the state.

Solid waste

King Salmon has one non-municipal solid waste site, while Naknek has a Class 2 municipal site (accepting between 5 to 20 tons of solid waste per day) and one non-municipal site. South Naknek has one Class 3 Village site (less than 5 tons of solid waste per day).

Education

The Bristol Bay School District consists of two schools. There is a Preschool to High School program in Naknek with an enrollment (2003) of 240 students. South Naknek has a Kindergarten to Fifth Grade school with an approximate enrollment of 10 students.

Students from King Salmon are bussed to Naknek for schooling while students from South Naknek, grades 6 to 12, are flown across the Naknek River each day.

The school district employs approximately 50 people: 25 are certified and 25 are classified.

Table 18 shows educational attainment for the population 25 years and over. Educational attainment is one indicator of the human resources available in a community and the level of workforce preparation.

Almost 90 percent of the population 25 years and over has a high school diploma or equivalency, which slightly exceeds the state's high school completion rate. According to Table 18, the percent of population 25 years and over that are high school graduates only has increased from around 26 percent to just over 34 percent.

Of note is that the percent of the population 25 years and over with some college, no degree, associate degrees, and bachelor's degrees has decreased from approximately 56 percent to 47 percent. This information combined with the information portrayed in the age pyramid may signify that a number of individuals in the 20-24 age group are leaving the community for educational or employment opportunities.

The second smallest cohort group in Bristol Bay Borough is the 25 to 29 years old cohort who also may be leaving the community to pursue other employment opportunities elsewhere. If this out migration continues to occur unless there is some change in the economic structure of the region that provides for these younger age groups.

Table 18. Educational attainment in population 25 years and over, 1990-2000
Bristol Bay Borough

	1990		2000	
	Number	Percent	Number	Percent
Total Population Age 25+	889	100.00	782	100.00
Less than 9th grade	55	6.19	35	4.48
Some high school, no diploma	36	4.05	52	6.65
High school graduate*	228	25.65	266	34.02
Some college, no degree	329	37.01	220	28.13
Associate degree	73	8.21	44	5.63
Bachelor's degree	94	10.57	101	12.92
Graduate or professional degree	74	8.32	64	8.18

* "High school graduate" includes people with the G.E.D. and similar equivalents.

Source: Census 2000 analyzed by the Social Science Data Analysis Network (SSDAN).

Medical services

There are three volunteer emergency medical squads each with an ambulance. Ambulance crews provide basic life support services, with 20 year-round emergency medical services volunteers. During the summer, local volunteers are augmented with a hired staff of six to eight emergency medical technicians.

The emergency medical services and fire department (see below) has a paid chief who also serves as an emergency medical services coordinator. Fire and emergency medical services budgets are combined. Volunteers receive stipends for call-outs, medical evacuations and training sessions.

The Borough also maintains the Camai Medical Center in Naknek. The health center is a small rural health center equipped for a variety of services, from routine care to major traumas. The center is staff by the Bristol Bay Area Health Corporation.

Public safety and fire

The Bristol Bay Police Department has nine employees: a chief, two offices (one in South Naknek), and six dispatchers. The department is located at the Air Force Base in King Salmon.

The department's primary responsibility is law enforcement. It also assists state troopers, the state courts, the district attorney, and full time motor vehicle services, acting as a local Department of Motor Vehicles office. There is detention facility at King Salmon.

The Borough also provides Volunteer Fire and Emergency Medical Services in each of the three communities. Each volunteer fire squad is headed by a Battalion Chief. Equipment is stored in each community in heated storage spaces, with the majority of equipment stored at King Salmon.

South Naknek uses part of its equipment storage facility as an emergency medical clinic, with air or vehicle transportation (depending on seasonal ice roads) to the Borough's Camai Medical Center in Naknek if required.

Civic organization and social services

As noted in the King Salmon Airport Master Plan, the following organizations are present in the Bristol Bay Borough: Lion's Club, Elk's Club, Bristol Bay Elders Action Group, several church organizations and a chamber of commerce. The annual *Fishtival*, held each year at the end of commercial fishing season, has brought many community organizations together for the parade, with civic and organizational floats and displays.

Regional organizations

Other organizations within the region include: the Alaska Peninsula Corporation; the South Naknek Village Council, the Naknek Native Village (the tribal government, recognized by the Bureau of Indian Affairs); King Salmon Traditional Native Council; the Bristol Bay Borough School District; Lake and Peninsula Correspondence Schools; the Bristol Bay Area Health Corporation; the Lake and Peninsula Borough; the Bristol Bay Native Corporation; and Paug-Vik Incorporated, Limited.

The Southwest Alaska Comprehensive Economic Development Strategy (CEDS) was released in July 2003. The CEDS fulfills state requirements for the region's designation as an Economic Development District.

Port of Bristol Bay

The Port of Bristol Bay is located in Naknek and serves as a hub for southwestern Alaska, since it started operations in 1983. The Bristol Bay Borough sets rates for services, wharfage, handling, dockage, and other rules. The rates and policies are updated annually.

Docks are open from April into November, with spring dredging by cranes to maintain a constant 16 to 18 feet of water at the zero tide level.

A conventional season will see over 150 barges, up to 450 feet in length, and over 400 other commercial vessels, small ships and tenders. The terminal is open 24 hours a day from early May to mid-August with 10 to 12 hour days during the rest of the season.

The Naknek Cargo Dock is 200 x 300 feet, concrete and steel, with six acres of terminal space. A 4,000 square foot warehouse provides inside storage and distribution for smaller cargo.

The Fisherman's Dock is a 200 x 300 foot sheet pile dock that provides moorage, parking and utilities for commercial fishing vessels. There are no individual berths. Utilities include electricity, potable water, restrooms, trash and used oil disposal.

The South Naknek Dock is 80 x 300 feet of concrete and steel. It can hold 200 to 250 containers with undeveloped acreage nearby for future development. There is an additional 200-foot sheet pile area for fishing vessel moorage. It was opened in 1993 and handles approximately 200 to 400 shipping containers (twenty-foot equivalent units) per season.

Port equipment at Naknek includes cranes with 120 and 80-foot booms, 1 1-ton forklifts, 2 31-ton forklifts and various smaller pieces.

South Naknek equipment includes 70-ton crane and a 26-ton forklift.

Northland Services, Inc. is a regular carrier with cargo hauled from Anchorage and Seattle. The main export is Bristol Bay Salmon with several thousand containers handled each year. Refrigerator barges depart two to three times per week for Dutch Harbor. Northland Services Inc. also provides haulage for 1.5 million gallons of fuel for power generation, heating, etc.

Development plans

The Bristol Bay Borough communities list their development plans in two general categories. First, commercial fishing and processing was the major factor behind most business development in the Bristol Bay Borough. Much planned community development will help support commercial fishing and its associated support services, such as transportation, fuel supply, and communication.

Second, community development plans tend to focus on infrastructure such as utilities, transportation (docks and airports) and roads and bridges.

Table 19 is a listing of capital projects and grants from the Rural Alaska Project Information and Delivery System (RAPIDS) for the 2000-2003, as excerpted from the State's Department of Community and Economic Development web site.

Table 19. Capital projects and grants, by community, lead agency, 2000 – 2003.

Fiscal Year	Community	Lead Agency	Project Description
2003	King Salmon	DCED	Bristol Bay Borough Community Projects and Improvements
2003	King Salmon	DCED	Bristol Bay Borough King Salmon Airport Tower
2003	Naknek	DCED	Bristol Bay Borough Dock Improvement
2003	Naknek	DOT&PF	Airport Snow Removal Equipment
2002	King Salmon	HUD	Indian Housing Block Grant
2002	Naknek	DCED	Cultural Center Feasibility Study
2002	Naknek	HUD	Indian Housing Block Grant
2002	Naknek	DCED	Bristol Bay Borough Landfill Potable Water Supply
2002	South Naknek	ANTHC	EPA Sewer Upgrade
2002	South Naknek	HUD	Indian Block Housing Grant
2002	South Naknek	ANTHC	Renovate washeteria: plan, design, build.
2001	Naknek	HUD/AFHC	Construct four single family units
2001	Naknek	DHSS	Bristol Bay Health Corp Office Equipment
2001	Naknek	DCED	Bristol Bay Borough Fisherman's Dock Engineering and Design
2001	Naknek	DCED	Feasibility Business Plan for Seafood Processing
2001	Naknek	DCED	Bristol Bay Borough Flake Ice Plant Engineering
2000	King Salmon	DCED	Bristol Bay Borough Design and Construct Animal Control Facility
2000	King Salmon	DEC/MGL	Sewer, Phase IIIB, 36 lots, King Salmon Creek
2000	King Salmon	EDA	Southwest Vocational Training Center
2000	Naknek	HUD	Indian Housing Block Grant
2000	Naknek	DOT&PF	Trail construction, pedestrian and bike
2000	South Naknek	ANTHC	Sanitation Design, Assessment

Source: Rural Alaska Project Information and Delivery System, Alaska Department of Community and Economic Development.

Land uses

With only 505 square miles, Bristol Bay Borough is geographically the smallest census area in the state. The largest land owners in the Bristol Bay region are the state and federal governments. The largest private landowners in the Bristol Bay region are the Native corporations formed as a result of the Alaska Native Claims Settlement Act (ANCSA) of 1971. Each of the villages of the region was entitled to select land in its vicinity. The Bristol Bay Native Corporation (BBNC), the regional corporation, was also allowed to select land. BBNC controls the subsurface rights of most land owned by the village corporations, while the village retains surface rights.

Access to the Naknek River for fishing and transportation has determined land use in the Naknek and South Naknek, and still dominates the land use picture. Major canneries still operate in both communities and support services to the canneries and fishing fleet are the dominant commercial enterprises.

The lands in and around Naknek consist of privately owned parcels, native allotments, state owned properties and those parcels owned by the Paug-Vik Village Corporation. Under the Alaska Native Claims Settlement Act (ANCSA) of 1971, Paug-Vik was entitled to selected 124,728 acres of land from the federal government.

The community of King Salmon evolved from an air navigation silo built in 1930, followed by a U.S. Air Force base at the beginning of World War II. The air base was operational until 1993 when it went into caretaker status. In general, local, State, and federal government activities dominated King Salmon land uses. The headquarters of the Katmai National Park is located in King Salmon. The Lake and Peninsula Borough offices are located in King Salmon.

The Katmai National Park is adjacent to the Borough. Visitor interests are related to land use in the area, including volcanic features from the eruption of at Katmai National Park and Preserve, bear viewing at Brooks Camp—30 air miles from King Salmon, and sportfishing and hunting at numerous remote lodges and camps in the region.

Appendix D. Initial environmental evaluation

Physical and biological environment summary

Bristol Bay Borough

for

Naknek Crossing Intermodal Economic Impact and Airport Use Study

An approved component of the Alaska Statewide Transportation Plan
4/25/2005

Naknek Crossing Intermodal Economic Impact and Airport Use Study
Physical and Biological Environment Summary
Bristol Bay Borough

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Summary

Crossing the Naknek River with a bridge and changing the status of airports in the Bristol Bay region will require an examination of the physical, biological, and human environment. Future actions, whether they are airport closures or change in operators, or bridge and road construction, will require action from the Federal Aviation Administration (FAA) for airports and the Federal Highway Administration (FHWA) at a minimum. As federal agencies, the FAA and FHWA are required to comply with the National Environmental Policy Act (NEPA) for all their proposed actions. The NEPA requires federal agencies to consider reasonable alternatives to their proposed action (including "no action") and evaluate the impacts to the human environment for each alternative. The human environment includes the physical (i.e., geology, soils, hydrology); biological (i.e., vegetation, wetlands, wildlife, fish); and human environment (i.e., socioeconomics, land use, noise, visual, subsistence).

An Environmental Assessment (EA) would need to be conducted for actions by the FAA or FHWA (or any other federal agencies that may be involved in the planning, funding, or construction of improvements). If impacts to the human environment are not considered to be significant, the project could move into final design and construction. If significant impacts are identified, an Environmental Impact Statement (EIS) would need to be conducted. The EIS process is more detailed than the EA process and requires additional time.

This Appendix presents a summary of the physical, biological, and human environment within the Bristol Bay Borough. More in-depth and site-specific studies would need to be conducted throughout a bridge and access road planning and design process.

Geology and soils

The Alaska Peninsula was produced by an island arc process. Frequent volcanic and seismic activity is caused by the subducting Pacific Plate and transform faults (i.e., Bruin Bay and Castle Mountain/Lake Clark). The surficial geology of the area is mainly composed of Quaternary age unconsolidated geomorphic deposits. The three main deposits are Quaternary alluvial, glacial moraine, and marine terrace deposits (Wilson et al., 1999). The area has undergone multiple glaciations, which dominate the landscape with till, moraine, glaciofluvial, and glaciolacustrine features.

Marine terraces and glacial outwash plains give the region gentle slopes with some hills of unconsolidated moraines. Alluvial and tidal processes have created cliffs and steep slopes near the banks of the main water channels. River outcrops and surficial geology are absent of bedrock in the project area (Muller, 1952). Soils are composed of glacial gravels, sand, silty sand, loess, volcanic ash, and clays. Some areas have shallow permafrost with areas of intense frost action.

The Soil Conservation Service performed a detailed soil study for the region. Soils were mapped as units depending on soil series, topographic slopes, and land types (Furbush et al., 1970). The study outlined five series of soils and two land types. The soils vary in drainage properties, texture, acidity, structure, and consistency. Some areas are well

drained and are composed of volcanic ash, sand, and gravel. Others are poorly drained with an abundance of clay and thick peaty mats. Because mapped soil units can vary and occur as small patches within other units, detailed mapping must be conducted at site-specific locations.

Geology and soils would need to be studied for bridge and road construction, both from engineering and environmental aspects. Additional material sites would need to be found for transportation improvements at South Naknek. The soils in the area generally consist of gravelly glacial material covered with volcanic ash and often are topped by an excessively thick organic layer. Site-specific information would need to be gathered for each alternative considered.

Surface hydrology and floodplains

The Naknek River drainage area is approximately 3,700 square miles. The watershed includes seven interconnecting lakes. Naknek Lake collects runoff from the volcanoes and mountains to the east, west, and south. The 22-mile Naknek River drains Naknek Lake into Kvichak Bay. The Naknek River is tidally influenced from the mouth to King Salmon. The diurnal range (average difference between mean higher high water and mean lower low water) is 22.6 feet at the mouth and 3.2 feet near King Salmon (NCDC, 1988).

Many small streams and creeks feed into the Naknek River. The U.S. Geological Survey gauged Eskimo Creek (located near the King Salmon airport) from 1973-1984. During those years, daily stream flow averaged 0.5 to 150 cubic feet per second, with highs occurring during spring and fall, and lows occurring during mid-winter. Eskimo Creek and King Salmon Creek (located west of King Salmon) are listed as Tier II on the state impaired waterbody list. Tier II water bodies have had assessments completed and now require Total Maximum Daily Load limits (described according to Section 303(d) of the federal Clean Water Act) or waterbody recovery plans for development projects that may impact the water bodies.

The Naknek River was down-listed from Tier I to Tier III in 1998. Tier III is not 303(d) impaired, but has an implemented waterbody recovery plan. Water quality is tracked and monitored by the Alaska Department of Environmental Conservation (ADEC). Pollutants include petroleum hydrocarbons, toxics, and other substances entering the river from the King Salmon Air Base landfill and fuel storage sites. The U.S. Air Force, the ADEC, and the U.S. Environmental Protection Agency (EPA) continue remedial activities at the Air Base.

Road construction may disrupt surface water hydrology. Further study will be required to determine whether dewatering, or inundation of habitat, are potential impacts of the project. Another area of concern is whether changes in surface water hydrology will compromise soil stability of the road, and/or its underlying substrate or degradation of permafrost elsewhere in the project area.

The effects that a bridge would have on the Naknek River would need to be evaluated. Ice, tidal influences, navigation channels, and/or fish and wildlife migration may affect or be affected by a bridge. Water quality of surface waterbodies, including the Naknek River, will need to be evaluated. Runoff from the bridge deck will need to be evaluated to

prevent storm water runoff from the bridge deck reaching the water. Potential sources of pollution, such as oil from vehicles, construction-related fuel storage and equipment fueling, de-icing compounds, and dust palliatives and their probable impacts need to be identified.

The U.S. Army Corps of Engineers defines flood plains as "lowlands adjoining the channel of a river, stream, or watercourse, or ocean, lake, or other body of standing water, which have been or may be inundated by flood water. The channel of a stream or watercourse is part of the flood plain." The Naknek River bed and the beds of its tributaries would be considered flood plains. Flood plains have not been mapped in the Bristol Bay region. Flooding has not been reported in King Salmon or South Naknek. Naknek is located on a bluff approximately 30 feet above mean sea level, so the flood hazard is low. However, structures located on lower banks may experience high water events. The highest known flood at Naknek occurred in 1917 and another coastal flood occurred in 1991 (USACE, 2004). Potential impacts to the Naknek River floodplain would need to be evaluated.

Geological and physical hazards

Geological and physical hazards in the Naknek River area include erosion, windstorms, flooding, earthquakes, volcanoes, permafrost, ice movement, and fog. The Naknek River flows through a high terrace and the steep banks consisting of unconsolidated silty sand are prone to erosion. Windstorms are rare, but damaging.

The Alaska Peninsula is located on the Pacific "Ring of Fire," a zone of frequent earthquakes and volcanic eruptions. Two major faults (Bruin Bay and Castle Mountain/Lake Clark) are located within 100 miles of the Bristol Bay Borough. However, earthquakes that do occur are at great depths and of low strength (BBB, 1993). Active volcanoes are located nearby, most notably Katmai and the "Valley of 10,000 Smokes."

The Naknek River area is located in a discontinuous permafrost zone. All structures and roads must be designed and built in a way that prevents or avoids subsidence from melting permafrost.

Ice in the Naknek River becomes safe for crossing around the end of November, with a thickness of more than 50 inches. Ice movement in the Naknek River is primarily due to tidal currents with wind speeding or slowing the movement (DMJM, 1983). Ice can move either upstream or downstream, depending on the wind and tide.

Mountains to the east, west, and south produce air currents that create a cloud cover in the Bristol Bay area. Air movements with high levels of moisture create low-level clouds that can cover the area with thick fog.

Climate

Temperature, precipitation, and wind data are collected at a weather station located at the King Salmon airport. Data are available dating back to 1941. The Bristol Bay Borough lies within a maritime climate influenced by the proximity of the Naknek River to the ocean. Seasonal temperatures are limited to a narrow range and vary from 42-63 degrees

Appendix E. Bridge and road access

This appendix was prepared by The Boutet Company and presents descriptions of the design elements for a new bridge and connecting roads. Estimates of project construction and maintenance costs for these elements are also provided.

Figure 1 presents a map of the existing Naknek and South Naknek highways (purple lines), and the proposed bridge and roadways (orange lines). This map also illustrates a potential crossing site for the potential bridge.

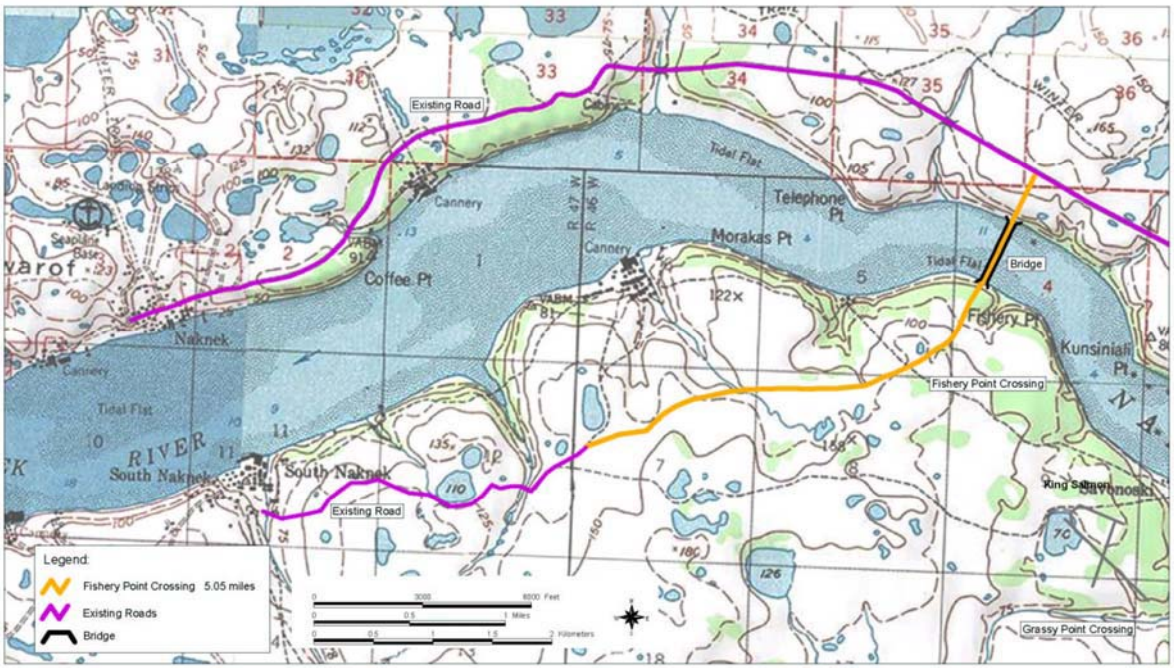

Figure 1. Road and bridge facility concept

Source: The Boutet Company

Capital and operating cost estimates were made for three levels of development. All estimates were based on the Fishery Point bridge alignment as described in the DMJM Bridge Location Study (reference 3.)

Capital costs

High build option

The High Build option was based on constructing a metalized steel girder bridge and 2.75 miles of paved road to connect the existing streets in South Naknek with the Naknek – King Salmon Road. The following design features were taken from the current DOT&PF *Pre-Construction Manual* (reference 4) using **Rural Local Roadway** standards.

Access Road

Design Speed: 50 mph

Length: 14,500 feet (Scaled from reference 14)

Road Width: 24 feet with 3 foot shoulders (Reference 4, Table 1130-3)

4:1 slopes to edge of clear zone (21 feet from centerline)

2:1 slopes to edge of fill

All section in fill

Select Borrow Thickness: 4 feet (minimum)

Crushed Aggregate Base Thickness: 6 inches

Asphalt Concrete Thickness: 4 inches

Drainage: A 52 linear feet X 18-inch culvert for every 250 feet of road

Highway Signs: As necessary

Bridge

Length: 2,300 feet (DMJM Study)

Width: 33 feet

Figure 2 shows an example of a steel span girder bridge. This bridge on the Glenn Highway spans the Matanuska River between Anchorage and the cities of Palmer and Wasilla.

Figure 2. Steel span girder bridge across the matanuska river

Medium build option

The Medium Build option was based on constructing a metalized steel girder bridge and 2.75 miles of gravel road to connect the existing streets in South Naknek with the Naknek – King Salmon Road. The following design features provide for less frost protection with the understanding that maintenance grading will be required at least twice each summer.

Access Road

Design Speed: 50 mph

Length: 14,500 feet (Scaled from reference 14)

Road Width: 24 feet with 3 foot shoulders (Table 1130-3)

4:1 slopes to edge of clear zone (21 feet from centerline)

2:1 slopes to edge of fill

All section in fill

Select Borrow Thickness: 2 feet minimum

Gravel Surface Course Thickness: 6 inches

Drainage: A 48 linear feet X 18 inch culvert for every 250 feet of road

Highway Signs: As necessary

Bridge

Length: 2,300 feet (from reference 3)

Width: 33 feet

Low build option

The Low Build option was based on constructing only a metalized steel girder bridge. The connecting roads would be built by the Bristol Bay Borough to **Local Rural Road** standards.

Bridge

Length: 2,300 feet (from reference 3)

Width: 33 feet

Capital cost estimates

The capital cost estimates for the three options were calculated using quantities from the above criteria and unit prices from DOT&PF bid tabs, with the most emphasis given to unit prices from references 6 and 7, which are contemporaneously under construction.

The largest item for each option is the bridge. The unit price of $182.50 to $300 per square foot of bridge deck was derived from several sources. Initially, the Comparative Bridge Costs, Caltrans, January, 2002 and the STIP Planning Estimate Naknek, River Bridge, DOT&PF, 2002 (references 2 and 3) were used.

The Caltrans table lists a range of $150 to $215 per square foot inclusive, of 10% mobilization and 25% contingency. Factors indicating that the lower range unit prices are applicable include:

- Normal structure height
- No aesthetic issues,
- No bridge skew,
- No cantilever abutment,
- No re-routing of traffic and
- Single stage construction.

Factors indicating the higher range unit prices are applicable include:

- Long spans, environmental constraints
- Small project (compared to Caltrans freeway projects)
- Wet conditions
- Remote location and
- Pile footings.

These factors were considered to be compensating, so the mid-range unit price of $182.50 per square foot was selected. To account for the higher price of construction in bush Alaska, we excluded mobilization and contingency from the unit price and included these items elsewhere in the estimate.

This compared favorably with the unit price of $165 per square foot used in reference 5 and a published Maine Department of Transportation bridge study from 2001 that was also consulted.

Cost estimates for the three options using the unit price of $182.50 per square foot were submitted for review and comment by the project team. In response, we received input from Richard Pratt, Alaska State Bridge Engineer (reference 12). He cited two sources in support of a unit price of $300 per square foot and suggested that the bridge steel be metalized to obviate the need for periodic maintenance painting. This unit price was selected as the upper range. The $182.50 per square foot was selected for the lower range. These prices are reflected in the Recap table below. The itemized details for these estimates are shown in the attached Estimax spreadsheets for each option.

A cost estimate for a 44' X 700' pre-cast concrete bridge being designed for Unalaska/Dutch Harbor was obtained from Tryck, Nyman and Hayes (reference 15). The estimated square foot cost of this bridge is $239. At 40% of the size of the bridge proposed at Fishery Point, it would be dangerous to extrapolate this cost; but it does verify the range of prices given above.

Pre-cast concrete bridges are commonly limited to 150 foot spans, while Steel Girder bridges commonly have spans up to 300 feet. For the Fishery Point Crossing, a pre-cast concrete bridge would require 13 footings in the river, while a steel girder bridge would need 6. Since these footings will be driven into river silt of unknown depth and be required to resist ice scouring in both directions, they are expected to be costly. For this reason, the steel girder bridge was assumed to be the more economical type for this location.

This decision will be re-visited during the Design Study Report stage after foundation field investigations have been performed.

Capital Cost Estimates Recap

High Build Option. New steel girder bridge with 2.75 miles of paved road.

	High Range	Low Range
Construction Contract:	$27,092,100	$18,173,850
Construction Contingency @15%:	$4,063,815	$2,726,078
Design, Construction Admin. & ICAP @30%:	$8,127,630	$5,452,155
Grand Total (say):	$39,500,000	$26,250,000

Mid Build Option. New steel girder bridge with 2.75 miles of gravel road.

	High Range	Low Range
Construction Contract:	$25,356,325	$16,438,075
Construction Contingency @15%:	$3,803,449	$2,465,711
Design, Construction Admin. & ICAP @30%:	$7,606,898	$4,931,423
Grand Total (say):	$37,000,000	$24,000,000

Low Build Option. New steel girder bridge with roads constructed by others.

	High Range	Low Range
Construction Contract:	$24,354,000	$15,435,750
Construction Contingency @15%:	$3,653,100	$2,315,363
Design, Construction Admin. & ICAP @30%:	$7,306,200	$4,630,725
Grand Total (say):	$35,500,000	$22,500,000

Operating costs

Road maintenance costs are difficult to estimate for several reasons:

- Maintenance operations are rarely tracked on a route-specific basis and thus cannot disaggregated by roadway cross-section or surface type;
- O & M organizations are chronically under-funded, so the levels of maintenance "service" vary widely throughout communities because of variability in climate, roadway conditions, and other considerations.
- O & M funding has been declining on a per-mile basis, because of reduced State operating revenues, elimination of revenue sharing with local governments, inflation, and system expansion.

The analysis for this report considered two sources. The cost of gravel road maintenance was calculated using data from a spreadsheet titled "Nelson Island Transportation System Operation and Maintenance Cost Model" provided by Alan Kemplen (reference 10). The cost of paved road maintenance was calculated from summary data for the King Salmon

Maintenance Station provided by Alan Kemplen (reference 10) after deducting costs for contract airport maintenance and King Salmon, Naknek and South Naknek Airports shown elsewhere in this study.

Although there was some variance in the costs derived from these sources, the uncertainties discussed above resulted in a recommendation that O&M costs be considered equal for either an asphalt or gravel surfaced road. The following annual operating and maintenance requirements for the bridge and road are estimated.

Table 1. Operation and Maintenance Summary

Project Element	Maintenance Activity	Elements	Annual Cost
Metalized Steel Girder Bridge	Paved Deck Maintenance	Annual crack-sealing and pothole repair	$3,750 per lane mile
Gravel Road	Ongoing maintenance	Surface grading Replenishment of surface course Culvert and ditch cleaning Snow plowing and culvert thawing	$7,500 per lane mile
Paved Road	Ongoing maintenance	Crack sealing Pothole repair Culvert and ditch cleaning Snow plowing Culvert thawing	$7,500 per lane mile

Total annual operating costs for the bridge and access road are summarized in Table 2.

Table 2. Annual Operating Cost Summary

Build Option	Element	Annual Cost
Low-Build	Bridge Pavement Maintenance	$3,300
	TOTAL	$3,300
Medium Build	Bridge Pavement Maintenance	$3,300
	Gravel Road Maintenance	$41,250
	TOTAL	$44,550
High Build	Bridge Pavement Maintenance	$3,300
	Paved Road Maintenance	$41,250
	TOTAL	$44,550

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Appendix F. Aviation system analysis

for

Naknek Crossing Intermodal Economic Impact and Airport Use Study

December 2004

An approved component of the Alaska Statewide Transportation Plan
4/25/2005

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TABLES

FIGURES

1.0 Summary

The Alaska Department of Transportation and Public Facilities (ADOT&PF) Southwest Alaska Transportation Plan stresses the importance of recognizing the relationships between regional transportation facilities so that the most efficient, economical, and safe facilities can be developed and maintained in the region. This study looks at the effects of building a bridge across the Naknek River on airport facility needs at the King Salmon, Naknek and South Naknek Airports.

Chapters 2 and 3 of this report describe the airports, their aviation activity, and future capital improvements. Chapter 4 discusses airport costs and revenues. Chapter 5 presents airport traffic levels, existing forecasts, and a proposed forecast of aviation activity for each airport.

Chapter 6 presents airport options associated with building and not building a bridge across the Naknek River. Options under Scenario A – Aviation Only Improvements address airport options associated with not building a bridge and Scenario B – Bridge and Aviation Improvements addresses airport options associated with building a bridge. Chapter 7 discusses the operating and capital costs associated with those scenarios/options.

The scenarios and options are listed below.

Scenario A – Aviation Only Improvements

Option A1. Keep all three Airports Open

Option A2. Close Naknek Airport

Scenario B – Bridge and Aviation Improvements

Option B1. Keep all three Airports Open

Option B2. Close Naknek Airport

Option B3. Close South Naknek Airport

Option B4. Close Naknek and South Naknek Airports

Option B5. Bristol Bay Borough Operates Naknek and South Naknek Airports

Option B6. Close Naknek Airport and Borough Operates South Naknek Airport

Operating and capital costs of the above scenarios are also shown in tables in Chapter 7 of this report. The following table shows the considerable amount of annual operating costs and future capital costs associated with continuing to operate all three airports. This study shows how some of these costs might be reduced through closure of airport facilities following construction of a bridge. This information will be used in other studies to complete an overall assessment of costs and benefits of building or not building a bridge.

Table 1: Existing cost data from ADOT&PF and Master Plans

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$19,964,300	$9,985,000	$9,640,000
Naknek	$29,962	$ 9,683,000	$6,320,000	$4,944,000
South Naknek	$19,806	$ 2,260,000	$1,000,000	$ 650,000

2.0 Regional transportation overview

Naknek, South Naknek, and King Salmon are located in the Bristol Bay Borough, as shown in Figure 1. King Salmon and Naknek are on the north side of the Naknek River, and South Naknek is on the south bank. There is a large Regional airport in King Salmon, and Local airports in Naknek and South Naknek. Other than Noluck Road, a 15.5 mile road connecting King Salmon and Naknek, all transportation in the area is by air, water, or ice road.

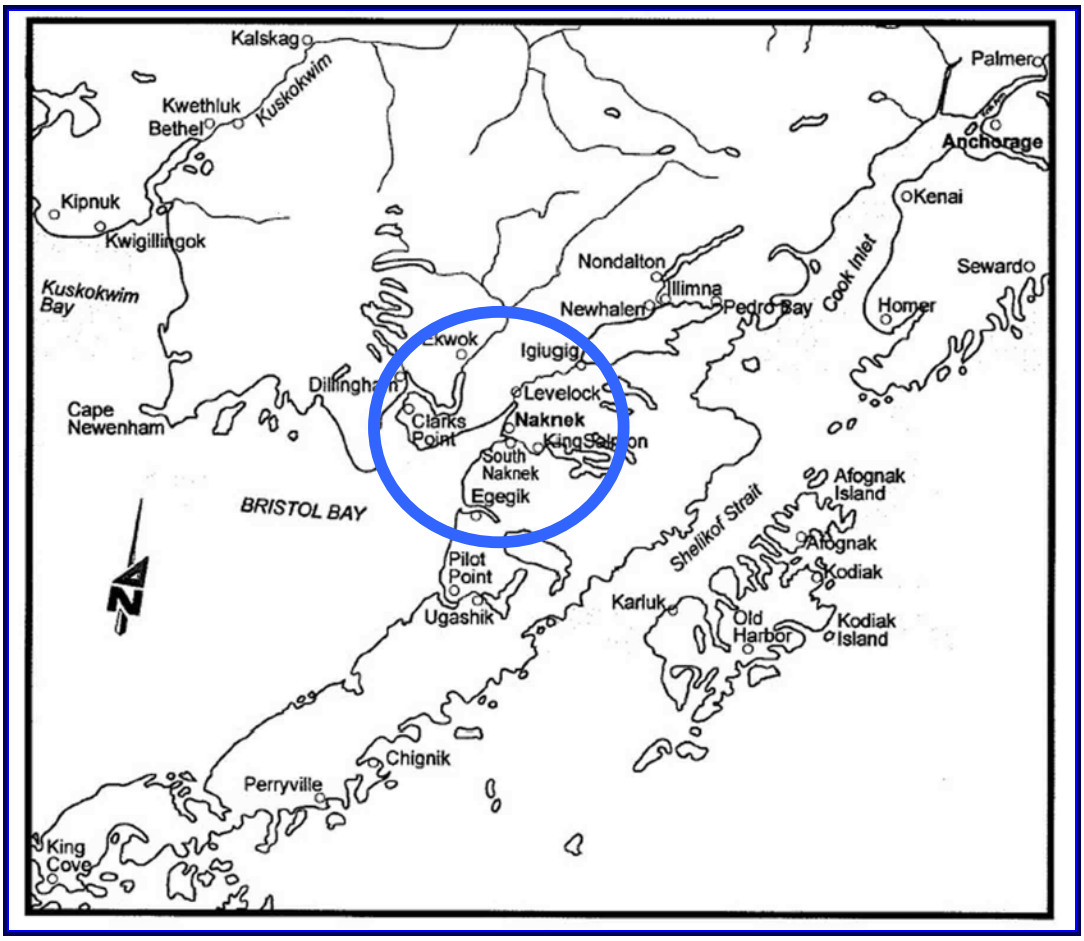


Figure 1: Bristol Bay Area map

Naknek is the economic center of the Borough. Naknek has the regional high school, and has become the hub of the area fish industry. A busy dock, a regional medical center, Borough offices, and service businesses, such as restaurants and grocery stores are centered in Naknek. King Salmon's population has declined since the 1995 closure of the Air Force Base there.

The economy of the Bristol Bay Borough has suffered in recent years with the decline in fisheries, and most fish processors have concentrated their remaining infrastructure to the north (Naknek) side of the River because of the connectivity with road and air service, and subsequent availability of local services. Now there are fewer job opportunities in South Naknek, and most government services are duplicated on both sides of the River, though they are separated only by a mile of water.

Statewide, planning for transportation improvements presents unique challenges because of a decline in State budget revenues and an associated decrease in available *maintenance and operations* funds. At the same time, Federal appropriations for *capital projects* are higher than in the past, for both roads and aviation facilities. The influence of these budgetary trends is to plan to build the most efficient infrastructure that costs less to maintain. In the Bristol Bay Borough, ADOT&PF has identified significant capital improvements for all three airports. Currently, there is a duplication of airport services in King Salmon and Naknek, as they are connected by road. Further, there is a duplication of other public facilities between Naknek and South Naknek, which is necessary because South Naknek is unconnected to the other towns except by air and water.

While many villages in Alaska face the same issues, Naknek Airport has a unique role in education. Because the regional high school and middle school are located in Naknek, South Naknek students in Grades 7-12 have been flown to Naknek Middle and High Schools each day for over 30 years. These flights are conducted in Visual Flight Rules (VFR) conditions. When daylight hours are short, weather is poor and/or the runway lighting at Naknek doesn't work, school days are shortened or cancelled for the students. It also takes several trips to fly the approximately 12 students across. There has been great concern in the community about the students' safety.

Currently the situation is in flux. The State Department of Education changed the formula for pupil transportation funding, so that each student in Alaska is administratively allocated $1,200 annually for this purpose. This funding covers only 20 percent of the cost to maintain the air school bus, so it is possible that this service could end. It further complicates matters that South Naknek no longer has enough students to receive State funding for their elementary school. An upgrade to the Naknek Airport may not help the students if the funding for their air transport is cut.

Historically, an ice road connected Naknek and South Naknek in the winter, but a warming trend in recent years has meant that the river has not frozen reliably enough to support vehicles, nor is it free enough of ice obstacles for boat traffic.

South Naknek retains considerable fish processing infrastructure, an influx of summer commercial fishermen, and a busy 80 x 300-foot dock that has an undeveloped area for future expansion. Recent political discussions about oil and gas lease sales off the southwest coast of Alaska has increased interest in transportation infrastructure in the region, since it could help economic development and subsequently feasibility of the projects.

3.0 Airport facilities and improvements

King Salmon Airport was built in 1941, and was used as a military staging base in World War II. The State of Alaska assumed ownership in 1959, though some military flight operations still occur on the airfield. King Salmon Airport is the most developed in the region. It is a passenger and freight hub for more than 20 villages in the Bristol Bay and Lake and Peninsula Boroughs, and a base for recreational sports fishing guiding and lodging. There is scheduled air service from Anchorage, including jet service. A Master Plan for the Airport was completed in 2001.

A Naknek Airport Master Plan was also completed in 2001. This airport is classified as a Local Airport, but supports about 13,000 operations (operations equal takeoffs plus landings) a year, also in service to outlying communities. About 27 percent of those operations are in daily transport of South Naknek students. This airport is connected by road to King Salmon, but ADOT&PF has identified major upgrades and expansions that will be necessary for the airport to remain operable and up to FAA standards.

A Master Plan has not been conducted for the South Naknek Airport, but it is in relatively good condition and in need of relatively minor surface repairs. It supports about 12,000 operations per year, which are primarily comprised of scheduled air taxi service and the student flights.

Floatplanes operate from Nornak Lake, adjacent to the Naknek Airport and from the Naknek River, adjacent to the King Salmon Airport. Neither airport is owned and operated by ADOT&PF.

Table 2: Summary of King Salmon, Naknek, and South Naknek Airports

Airports		Existing Condition	Improvements Needed
KING SALMON AIRPORT	*road*	Very Good	Parallel taxiway, aprons, resurfacing
NAKNEK AIRPORT	*connected*	Poor	Purchase property, relocate runway, lighting
SOUTH NAKNEK AIRPORT	*unconnected*	Good	Surface Repairs

Source: Master Plans, 5010's, 2003 site visit.

Table 3: Summary of float plane bases

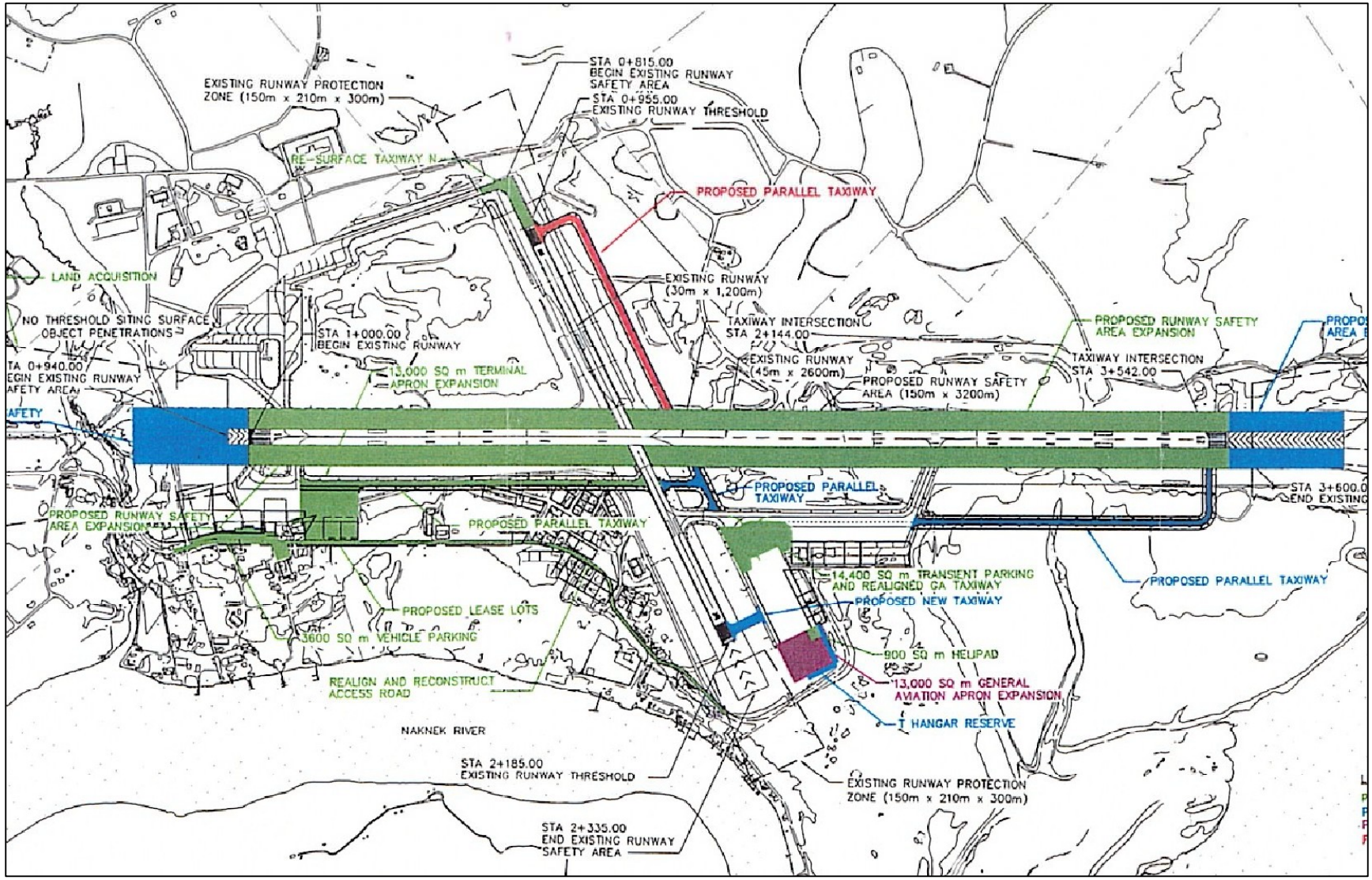
Float Plane Bases	Length	Improvements Needed
NORNAK LAKE *(ADJACENT TO NAKNEK AIRPORT)*	100' x 2,263'	Airspace conflicts with existing Naknek Airport runway; needs extension.
NAKNEK RIVER *(ADJACENT TO KING SALMON AIRPORT)*	500' x 4,000'	Airspace conflicts with existing King Salmon Airport runway, and boaters; needs marked and dedicated waterlane.

Source: Master Plans, 5010's, 2003 site visit.

3.1 King Salmon Airport

An aerial view of King Salmon Airport is shown in Figure 2. A portion of the ADOT&PF Airport Layout Plan, showing the planned upgrades to the Airport is shown in Figure 3.

Figure 2: Aerial view of King Salmon Airport



Source: King Salmon Airport Master Plan 2001

Figure 3: King Salmon Airport development plan

Runways, taxiways, and aprons

King Salmon Airport is situated on 5,277 acres on the north bank of the Naknek River. It includes three landing surfaces, which include primary Runway 11/29 (8,500' x 150') and crosswind Runway 18/36 (4,000' x 100'), both of which have asphalt surfaces in good condition. The third area is a 4,000' x 500' unmarked waterlane on the Naknek River for floatplane use. There are three aprons for commercial and public use. The General Aviation and Terminal aprons, each about 320,000 square feet, are located south of Runway 11/29. The East Apron is used primarily for large freight haul operations, though it allows room for lease lot expansion. The Air Force operates four additional aprons north of Runway 11/29.

Taxiways A and B access the terminal apron from Runway 11/29. Taxiway C accesses the East Apron, and Taxiway D connects C to the General Aviation apron. The military uses three additional taxiways connecting the runways to their aprons north of the runways.

Air traffic control

An FAA control tower is located southwest of the runway intersection. Contract air traffic controllers direct traffic not only at King Salmon Airport, but issue advisories for operations on the Naknek River, Naknek Airport, and South Naknek Airport. In addition, they direct any military operations in the area. They provide separation and direction for aircraft as varied as F-15's, to MD-80's, to C-130's to single-engine Cessnas. Airspace becomes congested in the summer months, with about 21 peak operations per hour on the King Salmon Airport runways alone. Since the airport does not have a full parallel taxiway, capacity is sometimes reduced to about 15 operations per hour, as aircraft take time to exit the runway.

Nevertheless, future funding and operation of the control tower is uncertain. FAA funds contract control towers based on the number of operations at an airport, and operations at King Salmon have fallen below the level that provides 100% federal funding. It should be noted that until very recently, only wheeled-aircraft operations on the King Salmon airfield were measured, and did not include nearby floatplane activity. Floatplane activity was not included in the Tower counts, because there is no dedicated and marked waterlane for aircraft, and the area is currently under US Coast Guard guidance as a publicly-navigable

waterway. For FY 2003, the State of Alaska appropriated (via discretionary funds to the Bristol Bay Borough) matching funds of $275,000 to keep the tower open, but that appropriation has not been renewed for FY 2004. The impending tower closure is under ADOT&PF and FAA review.

Navigational aids, marking, and lighting

The following table shows the navigational aids, marking and lighting at the King Salmon Airport.

Table 4: King Salmon Airport navigational aids, lighting, and markings

HIRL R/W 11/29	High Intensity Runway Edge Lighting
ALSF R/W 11/29	Approach Lighting with Centerline Sequenced Flashers
MALSR R/W 18/36	Medium- Intensity Runway Edge Lighting
Beacon	White and green rotating beacon
Markings	R/W 11/29 and 18/36: non-standard precision instrument markings. Outer and middle markers.
ASOS	Automated Weather Information
DF	Directional Finder
ILS - R/W 11	Instrument Landing System
GS	Glide Slope Indicator
LOC/DME	Localizer/Distance Measuring Equipment
LOM	Locator at Outer Marker
MM	Middle Marker
NDB	Non-Directional Radio Beacon
OM	Outer Marker
PAPI	Precision Approach Path Indicator
RCO-RCAG	Remote Communications Outlet, Air/Ground
RVR	Runway Visual Range
VOR	VHF Omnidirectional Range
VOR/DME	VHF Omnidirectional Range/Distance Measuring Equipment
VORTAC	VOR with Tactical Aircraft Control and Navigation

Source: 2001 King Salmon Airport Master Plan

Airport operators

Peninsula Airways (Penair) operates scheduled air service from Anchorage, and to nine villages in the region, which include Chignik, Dillingham, Egegik, Igiugig, Levelok, Perryville, Pilot Point, Port Heiden, and South Naknek. Alaska Airlines provides scheduled jet service from Anchorage to King Salmon, and shares a terminal with Penair. King Flying Service, based in Naknek, also operates a smaller terminal facility in the same area.

Trident Seafoods and Bristol Bay Contractors operate separate terminal facilities off the East Apron, and are used primarily in the summer for the storage, staging, and hauling of seafood. Lynden Air Cargo, King Salmon Ground Service, and Yute Air operate from another terminal off the East Apron. Egli Air Haul Inc. and Lynn Shawback operate businesses on the General Aviation Apron, and the U.S. Fish and Wildlife Service operates a hangar there as well.

Since the 1995 reduction in the Air Force presence at the Airport, many functions of the base were eliminated or relocated. Basic facilities such as roads, utilities, fuel tanks, and a few storage buildings are still actively maintained, as well as a BAK-12 Aircraft Arresting System and Instrument Landing System on Runway 11/29. Other facilities, such as the headquarters and dormitory buildings, are kept heated for visiting personnel. Military flights are conducted weekly, and training exercises are conducted twice annually.

The King Salmon Airport does not have any public floatplane docking facilities; but there are 17 businesses and private individuals who lease lots along the Naknek River to store and maintain aircraft, or provide other services.

Future development

The following table is a summary of airport improvements recommended in the 2001 King Salmon Airport Master Plan. These recommendations were based on a study of future aviation demand at the airport, and the facilities required to meet the demand and provide additional safety measures. The recommendations are shown in three phases of development, and also show preliminary cost estimates:

Table 5: Recommended King Salmon Airport improvements from the 2001 Airport Master Plan

Project	Phase	Cost
(2) New Wind Cones	I	
Designated Helipad - Strip Land	I	
Land Acquisition for RPZ 11/29	I	
Runway Blast Pad for 11/29 - (300' x 150')	I	
Transient Jet Parking Striping	I	
MITL on T/W N (Medium Intensity Taxiway Lighting)	I	
Survey and Remove Obstructions; Update Chart	I	
Construct New 40,000 SF Parking Area at Terminal Area	I	
Regional Float Plane Study	I	
Relocate, Reconstruct Main Street from Terminal to East Apron	I	
Construct New 140,000 SF Apron Adjacent to Terminal Apron	I	
Utilities to GA and East Apron - Water and Sewer (non-FAA/ADOT&PF)	I	
Parallel Taxiway 11/29 to East Apron (50' x 120') with MITL and Markings	I	
Construct Full 500' RSA Width Along R/W 11/29	I	
Pave Existing Long-Term Parking	I	
Subtotal Phase I		**$19,724,311**
Install GPS Precision Approach to R/W 11	II	
Refurbish, Remodel Old Mark Air Terminal Building	II	
Construct T/W (35' x 350') from GA Apron to R/W 18/36	II	
Install New Approach Control Radar	II	
Rebuild Section from TW H to Threshold of R/W 18 (100' x 500')	II	
Resurface T/W A, B, C, D and E	II	
Construct New 50' x 120' Wide Parallel Taxiway to R/W 29 End, with MITL, Markings	II	
Clear and Survey Lease Lots Southwest of GA Apron for T-Hangars. Realign Security Fencing	II	
Construct T-Hangars (non-FAA/ADOT&PF)	II	
Construct 1000' RSA beyond Runway 29 Approach	II	
Subtotal Phase II		**$9,985,000**
Construct New 140,000 SF Apron Space Adjacent to Existing GA Apron	III	
Resurface R/W 18/36 (100' x 4000')	III	
Resurface R/W 11/29 (150' x 8,015')	III	
Full (35' wide) Parallel Taxiway to R/W 18/36	20+	
Subtotal Phase III		**$9,640,000**
Total, All Phases		**$39,349,311**

Many of the Phase I recommendations have been incorporated into the ADOT&PF's Draft FFY 2002-2007 Airport Improvement Plan Spending Plan, in > FFY 2007 time period, with a cost estimate of $13,150,000. The Regional Float Plane Study, shown in the table above, is recommended for funding in FFY 2006 and FFY 2007.

3.2 Naknek Airport

Runways, taxiways, and aprons

The Naknek Airport consists of two gravel runways: Primary Runway 8/26 (2,112' x 50'), and Crosswind Runway 14/32 (1,835' x 46'.) Both runway surfaces are in a soft and rutted condition. Nornak Lake, which provides a 2,264' x 102' landing area for float planes, is not owned or operated by ADOT&PF. It is located adjacent and parallel to Runway 8/28.

The land surrounding the runways is owned primarily by the Paug'vik Corporation, and there are also a few private parcels, and there is no public apron space or any other public facilities. There is a privately-owned 200' x 400' aircraft parking apron to the west of Runway 8/26. In addition, aircraft park along the edges of Runway 14/32 for most of its length, and within the Runway Safety Area (RSA), as shown in the photograph below. A thicket of alder bushes has grown up there, and shelters the aircraft from the wind. The airport access road parallels Runway 8/26, also within the RSA.

Figure 4: Naknek Airport aircraft parking next to runway

Privately-owned Tibbetts Airfield is also nearby, within the approaches to both runways and Nornak Lake. Tibbetts is no longer used by owner Peninsula Airways, and is for sale. Despite the airspace conflicts, the lack of a clear line of sight between the runways and float plane areas, and the parking intrusions into the runway safety area, the airport has an excellent safety record.

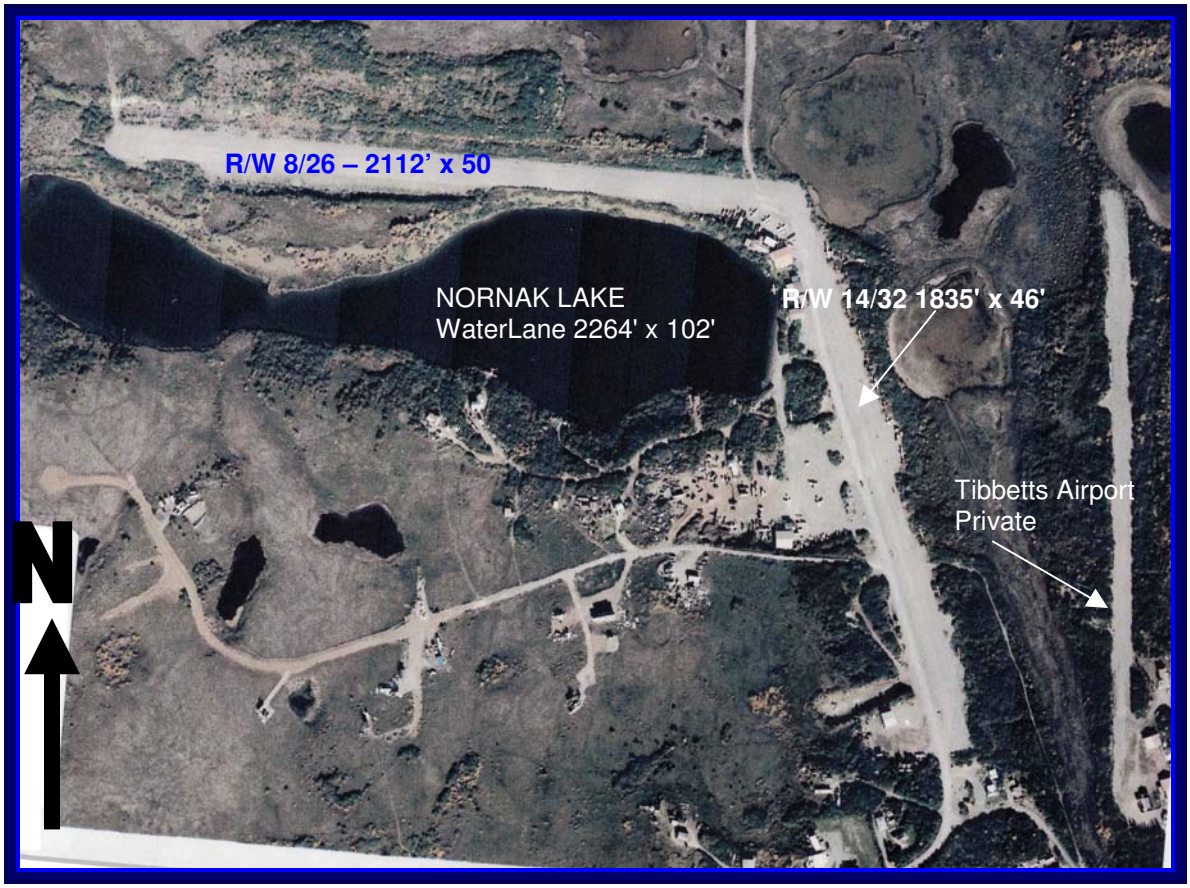


Figure 5: Aerial view of Naknek Airport

The runways are equipped with medium-intensity runway lighting, but it is in poor condition and not always operational. A rotating beacon is located adjacent to Runway 8/26. There are no navigational aids, except for the VORTAC available via the King Salmon Airport.

Airport operators

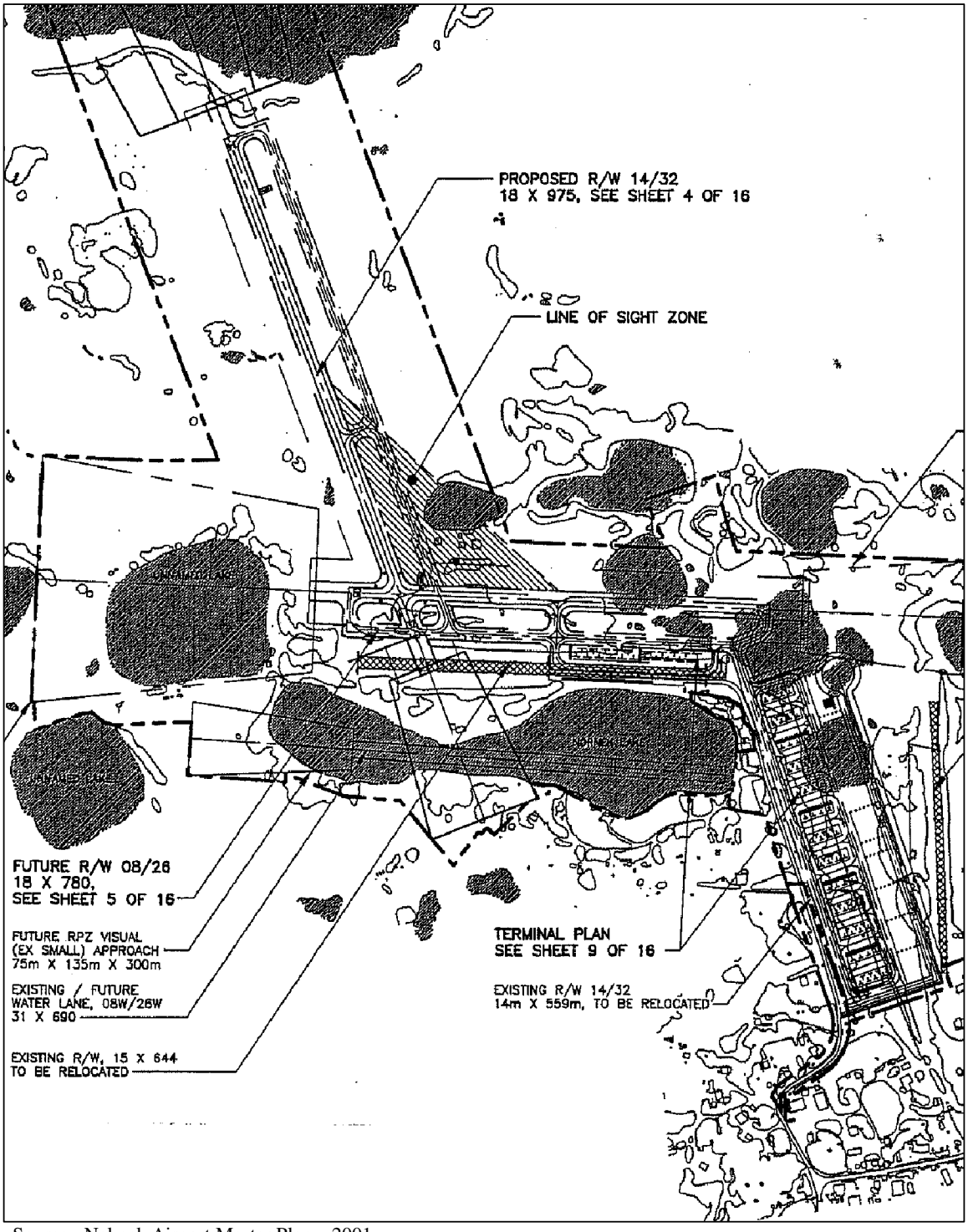
King Air, based at the Naknek Airport, is the contractor who flies the South Naknek children to school in Naknek. Operators based elsewhere, such as Iliamna Air, Yute Air, and Egli Air also use the airport.

Future development

Table 6 and Figure 6 show planned development for Naknek Airport. As stated in the Master Plan, development at Naknek Airport is intended to remedy three primary deficiencies. The first pertains to land status issues, in which ADOT&PF has no right-of-way (ROW) to access the airport or eliminate intrusions into the runway safety areas and imaginary surfaces. In addition there is no ADOT&PF-owned land to develop lease lots or apron areas that meet FAA standards. The second is in regard to airspace conflicts, in which air traffic between the two Naknek runways, Nornak Lake, and nearby Tibbetts Field all overlap with no clear line of sight. The third is in regard to the repair of the facilities, which includes runway surfaces and lighting in poor condition. Under the plan, the Nornak Lake waterlane will remain, though it is about 240 feet shorter than FAA standards. The following Table shows the recommended costs and phasing of the improvements, as shown in the Master Plan.

Table 6: Recommended Naknek Airport improvements from the 2001 Master Plan

Project	Phase	Cost
Acquire Airport Property	I	
Acquire ROW for Public Access	I	
Construct Primary Runway Relocation with MIRL	I	
Remove Terrain Obstructions between Primary and Crosswind R/W	I	
Construct Taxiway, Aircraft Parking, and Aviation Support Areas	I	
Recondition West Access Road	I	
Construct East Access Road	I	
Construct Snow Removal Equipment Building and Acquire Loader with Appurtenances	I	
Phase I Cost		**$9,263,000**
Relocate Crosswind Runway with MIRL	II	
Construct Parallel Taxiway (Adjacent to Crosswind Runway)	II	
Construct Partial Parallel Taxiway (Adjacent to Primary Runway)	II	
Expand Apron Area	II	
Extend Access Road to New Apron Area and Construct Vehicle Parking	II	
Phase II Cost		**$6,320,000**
Construct Taxiway, Aircraft Parking, and Aviation Support Areas	III	
Extend Parallel Taxiway	III	
Resurface Operational Areas as Required	III	
Phase III Costs		**$4,944,000**
Total Costs		**$23,538,000**



Source: Naknek Airport Master Plan – 2001

Figure 6: Naknek Airport development plan

3.3 South Naknek Airport

Facilities

South Naknek Airport's Runway 12/30 is 3,314' x 59', and Runway 4/22 is 2,260' x 59'. Both have a gravel surface. The sandy gravel surface is in fair condition. An aerial view of South Naknek Airport is shown in Figure 7.

Figure 7: South Naknek Airport aerial view

Some of the surface gravel has been pushed to the sides and appears to have contributed to erosion and soft spots on the runways, particularly on the edges near culverts. Runway 12/30 has a significant dip on the southeastern end, as shown below. Runways 12 and 30 have 4-box Visual Approach Slope Indicators (VASIs), and High Intensity Runway Edge Lighting. There is an approximately 200' x 200' apron area to the north of the intersection of the two runways. Two 50' taxiways connect the apron to each runway. This area contains two lease lots, but neither is leased. Airport Street connects the apron to the community road system, passing through the Runway 12 approach area.

Figure 8: South Naknek runway

Future development

ADOT&PF has identified a project to resurface both runways, the taxiways, and apron as a project under the Airport Improvement Plan. It is currently planned for beyond the FY '07 period, and has an estimated cost of $2.2 million. Other improvements shown on the Airport Layout Plan include a road extension around the east side of Runway 4-22 and upgrading the airport to B-II standards. The road extension would eliminate runway incursions from vehicles using the runway to access lands east of the airport.

4.0 Costs and revenues

Naknek Airport maintenance is conducted by ADOT&PF personnel as part of King Salmon Airport and Noluck Road Maintenance. King Salmon Airport receives revenues of approximately $300,000 from the USAF for maintenance, and approximately $120,000 more from leases and fuel charges. For these reasons, the costs and revenues shown in the following table relative to these two airports can only be estimated.

In FY 2003, King Salmon Airport operated at an approximate $320,000 loss, and received the necessary funding from the State's general fund. Losses from 1996-2000 ranged from $220,000 to $2,024,045, but that does not indicate a trend, as reporting sometimes included or excluded capital expenditures by either ADOT&PF or the USAF, and some years required more snow removal and other basic maintenance than others.

South Naknek is maintained separately under private contract. There are no revenues at Naknek or South Naknek Airport.

Table 7: FY 2003 airport maintenance costs and revenues

	Personnel	Travel	Contracts Equipment	Utilities	Supplies	Total
Costs						
King Salmon Airport	$414,968	$9,503	$188,192	$15,632	$106,793	**$737,088**
Naknek Airport	$13,877	$131		$771	$2,183	**$16,962**
South Naknek Airport	$23		$12,000	$6,509	$1,274	**$19,806**
Revenues – King Salmon						
Leases, Fees						**$120,000**
Air Force	$266,282	$0	$4,187		$26,455	**$296,924**

Source: Calculations by ADOT&PF Southwest District Superintendent

ADOT&PF calculates maintenance costs on Airports by lane miles. The following table shows the cost per lane mile at the three airports in 2003. King Salmon Airport is maintained to a more critical standard than other airports in the area, because of USAF runway requirements for their aircraft. Naknek Airport, because Noluck Road connects it to shared King Salmon Airport personnel and equipment, shows a lower apparent cost than South Naknek, which stands alone.

Table 8: Maintenance costs per lane mile

	Cost	Lane Miles	Cost Per Lane Mile
King Salmon Airport (paved)	$737,088	45.6	$16,164.21
Naknek Airport (unpaved)	$16,962	6.2	$2,735.80
South Naknek Airport (unpaved)	$19,806	3.1	$6,389.03

Source: Calculations by ADOT&PF Southwest District Superintendent. Average Cost per lane mile (5,280 'x 12') in the Central Region: $7,784

5.0 Airport traffic forecast

There is great variation in estimates of air traffic and characteristics at King Salmon, Naknek, and South Naknek Airports, and for float plane operations on Nornak Lake and the Naknek River. This is because of the following:

- Forecasts from the Master Plans are higher than actual activity levels because the region's economy and population has declined more rapidly and dramatically than anticipated.

- Beyond the King Salmon Air Traffic Control Tower and certificated air carrier reporting, no recorded data exists.

In this section, the baseline and forecasted air traffic from the 2001 Master Plans, FAA Terminal Area Forecasts, FAA 5010 forms, factors from models generated in the Yukon-Kuskokwim Area Transportation Plan, the Southwest Alaska Transportation Plan, and estimates by area residents and operators are all considered. Conversations with local airport operators have provided the basis for describing types of air travel.

5.1 King Salmon Airport traffic

The following table shows the 2001 Airport Master Plan base year and forecasts through 2019. A median between base year 1996 and 2004 is also shown, as a basis for comparison with Tower Counts for 2001.

Table 9: 2001 King Salmon Airport Master Plan forecasts

	1996	2001	2004	2009	2019
Aircraft Operations	33,284	34,942	36,600	39,316	44,745
Enplaned Passengers	51,707	55,556	59,404	68,694	87,278
Total Based Aircraft	40	40	40	40	42
Air Cargo/Mail (tons)					
Enplaned Freight (tons)	3,500	3,500	3,500	3,500	3,500
Enplaned Mail (tons)	400	500	600	600	1,100

Note: 2001 estimate is the 1996-2004 median.

The FAA's Terminal Area Forecasts are currently updated with historical data provided by the Control Tower through 2001. This operation figure shows 25,926 operations, 9,016 less than the Master Plan estimated for 2001. However, the Master Plan estimates were partly tied to an annual population growth rate of about 2 percent, which is significantly higher than the actual rate of population growth in the Borough.

5.2 Naknek Airport traffic

The forecasts prepared for the 2001 Naknek Airport Master Plan are shown in the following table. There was a wide range of differing estimates for 1996 traffic, from 53,500 operations per year listed in the 1990 FAA Airport Master Record, to the FAA Terminal Area Forecast estimate of 29,000. Local operators estimated 27,000. Responses from a local and non-local pilot survey were also reviewed, and appeared to support the Master Record estimate. Enplaned freight and passengers were not forecast. Air carrier records showed 2,310 commuter passenger enplanements in 1996, which probably did not include about 3,500 student-charter enplanements per year. These results from the 2001 Airport Master Plan are shown below, with an average peak day added to help visualize the activity at Naknek Airport:

Table 10: 2001 Naknek Airport Master Plan forecasts

	1997	2002	2007	2017
Forecasted Operations	53,500	57,464	61,723	71,210
Average Day Peak Month (based on King Salmon proportions)	610	655	704	811
Passenger Enplanements (1996)	5,810			

The 1997 Airport Master Plan base year estimate was derived primarily from the 1990 Airport Master Record. The Naknek Airport Forecasts are revised in this Aviation System Analysis because a variety of factors have changed dramatically since the 1990 Airport Master Record was produced.

These changes include:

- Penair stopped scheduled service to Naknek in 1999, which represented about 10,000 flights. Most of these operations were conducted at adjacent Tibbetts Airfield. However, because Penair uses the descriptive identifier "NNK" (for North Naknek) in their carrier reports, older historical reports of their activity may have been included in "5NK", Naknek Airport.

- Fish-spotting from the air became illegal in 1997, which may account for the historically large number of operations, and relatively low passenger enplanements. These could easily have represented 40 operations a day through the summer months.

- Many of the canneries/fisheries have closed in recent years. Operations on behalf of the canneries once represented about 50 operations a day in the summer. This activity involved the acquisition of goods and services available in Naknek, or transporting workers.

Furthermore, data provided by Penair and King Air indicated current enplanements and operations were significantly less than those forecasted in the Master Plan. Using these lower estimates provides a lower, more conservative estimate of the benefits of building a bridge. Naknek Airport provides secondary air service to the community of Naknek, since Naknek is connected by road to the larger King Salmon Airport. However, it does provide

essential service to South Naknek, both in the transport of schoolchildren, and to South Naknek families traveling to Naknek for goods and services. There are also flights from other towns in nearby Boroughs, such as Egegik, which are primarily trips for supplies available in Naknek, especially for private fish camps.

In addition, the airport provides convenient fueling and maintenance facilities for itinerant aircraft. It also provides wind protection for small aircraft based there, and for exposed aircraft at other airports when a storm is approaching. It is also convenient to load goods directly onto an aircraft from a road vehicle.

An estimate of current air traffic activity from various sources is shown in the following table.

Table 11: Comparison of estimates of current Naknek air traffic

	King Air	Penair	Y-K Plan	FAA 5010	FAA TAF
Total Airport Operations	13,000	10,000		7,700	29,000
Air Taxi	100	1,000		600	12,000
GA Local	10,000	8,000		7,000	7,000
GA Itinerant	2,900	1,000		100	10,000
*Character of Operations**					
A. School Transportation	3,500				
B. Bristol Bay Borough Business	3,500				
C. Fishing	1,500				
D. Itinerant Fueling/Maintenance/ Wind Protection	3,000				
E. South Naknek Resident Personal Business	1,000				
F. Other	500				
Enplanements					
Passenger***	9,380		10/person/ year		
Mail (tons)	0	0			
Freight (tons)**	10		200#/ person/year		

* derived from 1996 Pilot survey, 2003 community meetings, John King.
** derived from South Naknek's population less calculation of freight enplanement to King Salmon
*** 2,880 pupils + 6,500 (2 enplanements x ½ operations, except A, D.)

The Character of Operations shown in the above table can be broken into categories that relate to the type and main purpose of air travel. The categories can be described as follows:

A. School Transportation: Includes daily air busing of students, and air transportation for teachers, school board members, and administrators. Also includes air transportation for students for Bristol Bay Borough-sponsored extracurricular activities such as sports and field trips.

B. Bristol Bay Borough Business: All air transportation related to the construction, maintenance, and supply of public and private utilities and services.

C. Fishing: All transportation related to the supply of commercial fishing, whether a private or business enterprise. Includes equipment, supplies, and transportation of workers.

D. Itinerant Fueling/Maintenance/Wind Protection: Aircraft owners taking advantage of the ease of access at the airport, and temporarily parking aircraft based elsewhere from storms.

E. South Naknek Resident Personal Business: All air activity generated by South Naknek residents traveling for recreation, supplies, and visiting.

F. Other: Includes all else, for example, scheduled or chartered air taxi service from towns outside the Bristol Bay Borough, such as Iliamna or Dillingham.

The following table compares the Master Plan and DOWL estimate for Naknek Airport, as well as the factors used for allocating types and character of operations:

Table 12: Comparison of Master Plan and DOWL estimate

	Master Plan Estimate (2002)	DOWL Estimate
Total Airport Operations	57,464	13,000
Air Taxi	575	100
GA Local	44,247	10,000
GA Itinerant	12,642	2,900
Based Aircraft	70	70
Character of Operations		
A. School Transportation	3,500	3,500
B. Bristol Bay Borough Business	19,967	3,500
C Fishing	8,634	1,500
D. Itinerant Fueling/ Maintenance/Wind Protection	17,268	3,000
E. South Naknek Resident Personal Business	5,936	1,000
F. Other	2,698	500
Passenger Enplanements	6,241	9380
Enplaned Mail	0	0
Enplaned Freight (tons)	10	10

Figure 9 shows the Character of Operations in a chart.

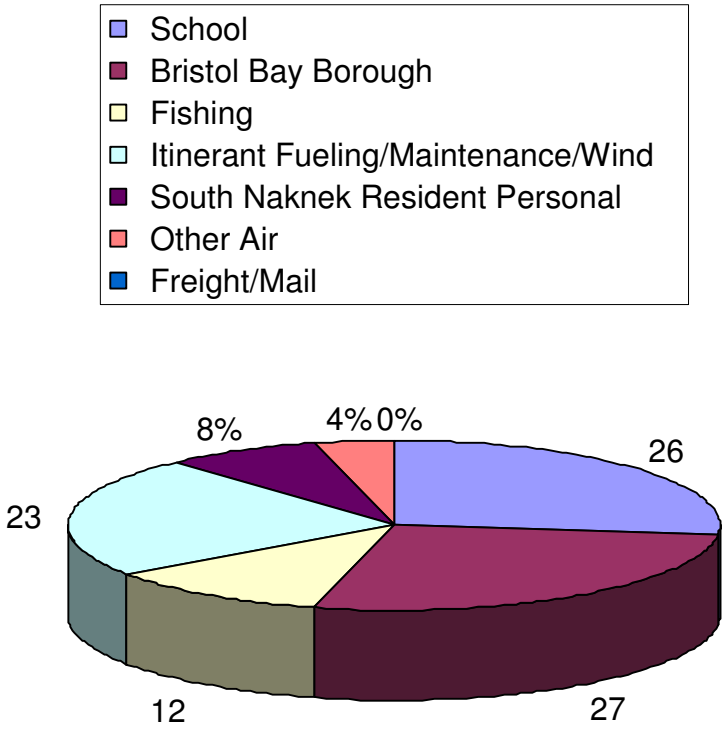


Figure 9: Current Naknek Airport air traffic characteristics

5.3 South Naknek Airport traffic

Though the FAA Terminal Forecasts have not been updated for ten years, estimates of South Naknek operations are supported by air carrier reports filed by Penair. Penair estimates that they represent about 80% of all enplanements at the airport.

Penair operates three scheduled flights a day, for a total of about 2,200 annually, and King Air school-related transportation flights add on another 3,500. There are 10 locally based aircraft that represent about 1,000 flights a year. Various air taxis and private aircraft create about 5,000 operations per year for Borough business, and for South Naknek residents' private business across the River in Naknek. South Naknek Airport is therefore estimated to have 11,700 operations per year, as shown in the following table. Figure 10 shows the Character of Operations in a chart.

Table 13: 2001 South Naknek Airport air traffic characteristics estimates

	Current Estimates*
Total Airport Operations	11,700
Air Taxi	2,200
GA Local	1,000
GA Itinerant	8,500
Based Aircraft	10
Character of Operations	
A. School Transport	3,500
B. Bristol Bay Borough Business	2,500
C. Fishing	1,000
D. Itinerant Fueling/Maintenance/Wind Protection	0
E. South Naknek Resident Personal Business	2,500
F. Air Taxi/Freight Mail	2,000
G. *Other*	200
Enplanements	
Passenger**	8,200
Mail	1
Freight (tons)	2.23

* derived from 2003 community meetings, King Air, Penair

** 2880 pupils + 6500 (2 enplanements x ½ operations, except A,D)

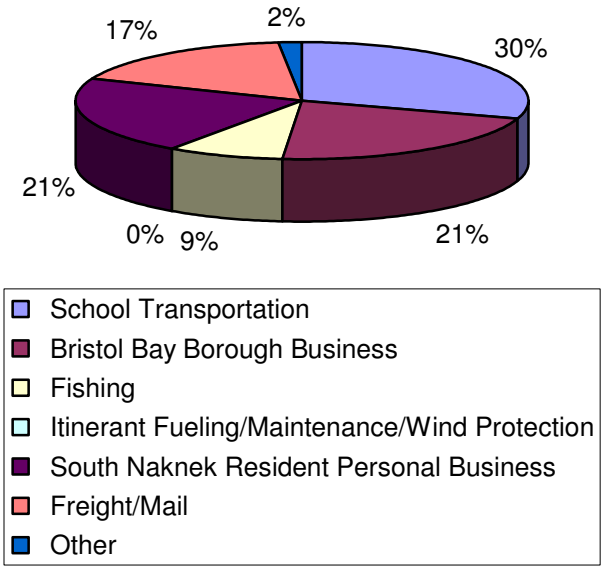


Figure 10: South Naknek Airport character of operations - current

5.4 Floatplane bases

The Floatplane operating areas on the Naknek River adjacent to the King Salmon Airport, and on Nornak Lake adjacent to the Naknek Airport also play a part in the Bristol Bay Borough's aviation system. Operations at Nornak Lake are estimated at 500 per year. Though there is one floatplane based there, the lake is primarily temporarily used for aircraft maintenance for Naknek River operators. Occasionally operators also shelter their aircraft there if extremely windy conditions are anticipated. The Lake is depressed and surrounded by thick bushes.

Naknek River float operations have never been counted, though this is now underway as part of the Air Traffic Control Tower contract process. Preliminary estimates are about 10,000 operations per year. These operations are primarily tourist-related, as access to fishing and hunting areas and lodges. Though not of interest as essential air service, tourism is forecast in several studies to increase in the area, which may be a benefit to the Borough's economy in the future. Floatplane traffic is not expected to be affected by any scenario in this study.

5.5 Forecast summary

The following tables summarize the Base Year (2001) and forecast years (2010, 2019, 2029) air traffic activity levels for the King Salmon, Naknek and South Naknek Airports. Base case population forecasts developed by Northern Economics were used to forecast future activity levels for Naknek and South Naknek. TAF forecasts were used for King Salmon.

Table 14: 2001 base year airport traffic characteristics

	King Salmon Airport	Naknek Airport	South Naknek Airport
Aircraft Operations	25,707	13,000	11,700
Air Carrier	1,315	-	2,200
Commuter/Air Taxi	19,045	100	1,000
General Aviation Local	802	10,000	8,500
General Aviation Itinerant	3,290	2,900	
Peak Month Operations (PMO) (14% of annual)	3,599	1,820	1,638
Average Day Peak Month (ADPM) (2% of PMO)	72	36	33
Character of Operations			
School Transportation	-	3,500	3,500
Bristol Bay Borough Business	-	3,500	2,500
Fishing	-	1,500	1,000
Itinerant Fueling/Maintenance/Wind Protection	-	3,000	-
South Naknek Resident Personal Business	-	1,000	2,500
Other Air Taxi	-	500	200
Freight/Mail	-	-	2,000
Enplaned Passengers	38,460	9,380	8,200
Peak Month (38% annual)	14,615	3,564	3,116
Average Day Peak Month (3% of PM)	438	107	93
Total Based Aircraft	40	70	10
Air Cargo/Mail (tons)			
Enplaned Freight (tons)	3,500	10	2
Enplaned Mail (tons)	500	-	1

Table 15: Forecast summary

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	31,564	15,366	9,435
2029	34,761	16,718	7,737
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	57,002	11,094	6,612
2029	66,171	12,070	5,422

6.0 Scenario development

In developing aviation system scenarios for the Region, some factors are important to consider:

- A dwindling State budget, in which the availability of maintenance funds is expected to decline.
- State policy is being developed which would seek to eliminate duplication of services and facilities, especially in road-connected communities.
- State policy for infrastructure development could be modified with changes in State Administration (over 20 years.)
- Difficulty in applying costs, benefits, and responsibility to other State agencies, which influence and are influenced by transportation projects (i.e. Department of Education.)
- Budget shortfalls throughout the State realistically limit alternative sponsors for airports or any other facilities. However, the Bristol Bay Borough asked for ADOT&PF information about assuming sponsorship of the Naknek Airport.

- FAA's commitment for funding safety improvements, requires also that the sponsor maintain the facility for at least 20 years after the latest grant, under their "Grants Assurances" policy. The State is obligated to maintain South Naknek Airport through 2016, and King Salmon Airport, indefinitely. There is no obligation for Naknek Airport, since no federal funds have been spent there yet.

- If an airport is closed, the unamortized portion of the FAA grant may have to be paid back to the FAA. In some cases, the FAA has considered using these funds to improve other airports in the airport system. Environmental reclamation, if necessary, may also have to be undertaken if the airport is closed or is there is a change in sponsorship.

- All Airports must be safe for public operations.

- Transportation changes unrelated to the proposed bridge may also influence future traffic patterns and capacity. Of note is the King Salmon Control Tower closure, and State pupil transportation policy.

- Possibility of statewide incentives for revenue-generating improvements such as tie-down rentals and other user fees, statewide.

- Possibility that USAF could change M&O funding in support of King Salmon Airport.

- Possibility of improved Float Plane Base Facilities.

In this section, scenarios are developed that describe changes to the Borough's aviation system if a bridge is built across the Naknek River. The scenarios illustrate closures of some airports, and the resulting airport capital and operating cost savings.

Closure of an airport could also mean that another entity assumes sponsorship, control, and the cost of the airport improvements and maintenance, and the airport remains open for public service.

In all scenarios, King Salmon Airport is kept open, maintained, and expanded according to plans already in place.

Scenario A. Aviation Only Improvements

Option A1. Keep all three airports open

Option A2. Close Naknek Airport

Scenario B Bridge and Aviation Improvements

Option B1. Keep all three airports open

Option B2. Close Naknek Airport

Option B3. Close South Naknek Airport

Option B4. Close Naknek and South Naknek Airports

Option B5. Bristol Bay Borough operates Naknek and South Naknek Airports

Option B6. Close Naknek Airport and Borough operates South Naknek Airport

Aviation considerations assumed in each scenario/option are shown in the following table.

Table 16: Aviation considerations in scenario development

	King Salmon Airport	Naknek Airport	South Naknek Airport
Safety/Risk		Requires extensive development to meet minimum FAA and State safety standards.	
Improvement Costs	Requires capital improvements; increased maintenance.	Requires capital improvements; increased maintenance.	Requires capital improvements.
Convenience	15.5 mile road distance to Naknek, approximately 18-mile distance to South Naknek if bridge is built.	Located in the Borough's Population Center; unconstrained access to aircraft.	South Naknek relies on the airport for essential service; if it were closed, and a bridge were built, it could be an 18-mile trip to King Salmon Airport.
School Access	Airport is too far away from South Naknek to accommodate a fly/bus combination to school in Naknek.	Transportation of school children by air to Naknek is expensive and restricts school activities; with a bridge they could be bused.	Relies on airport for transportation of school children; with a bridge they could be bused.
Shift in Air Transportation Demand		Induced relocation of residents and businesses to King Salmon and South Naknek if the airport is closed and/or the bridge is built.	With a bridge, the community thinks that more residents would relocate to South Naknek, and business would be developed there.
Grant Assurances		Improvements to the Airport will trigger 20-year grant assurances to FAA.	The Airport already has grant assurances to the FAA through 2016; if the airport were closed, this may have to be paid back.
King Salmon Control Tower	A shift of more operations to that Airport would bolster sagging operations there, and may trigger FAA/State funding of the Tower.		
Timing		Naknek Airport will need to remain open and may need be improved *before* the time a bridge is built if the school children continue to be flown over from South Naknek.	

6.1 Scenarios-aviation forecasts

The following tables show forecasts of aviation activity for each of the scenarios/options described in section 6.0. The first two tables are for "A" aviation options associated with not building a bridge and the last six tables are for "B" aviation options associated with building a bridge.

Table 17: Option A1 – Keep all three airports open

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	31,564	15,366	9,435
2029	34,761	16,718	7,737
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	57,002	11,094	6,612
2029	66,171	12,070	5,422

Table 18: Option A2 – Close Naknek Airport

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	45,086	0	11,279
2029	49,473	0	9,743
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	66,796	0	7,943
2029	76,841	0	6,870

Table 19: Option B1 – Keep all three airports open

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	31,564	6,289	2,730
2029	34,761	7,006	1,949
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	57,002	4,528	1,966
2029	66,171	5,044	1,403

Table 20: Option B2 – Close Naknek Airport

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	34,709	0	5,875
2029	38,264	0	5,452
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	52,105	0	4,230
2029	54,627	0	3,925

Table 21: Option B3 – Close South Naknek Airport

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	31,564	9,019	0
2029	34,761	8,955	0
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	57,002	6,494	0
2029	66,171	6,447	0

Table 22: Option B4 – Close Naknek and South Naknek Airports

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	40,583	0	0
2029	43,716	0	0
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	63,495	0	0
2029	72,618	0	0

Table 23: Option B5 – Bristol Bay Borough operates Naknek and South Naknek Airports

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	31,564	6,289	2,730
2029	34,761	7,006	1,949
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	57,002	4,528	1,966
2029	66,171	5,044	1,403

Table 24: Option B6 – Close Naknek and Borough operates South Naknek Airport

	King Salmon	Naknek	South Naknek
Operations			
2001	25,707	13,000	11,700
2010	28,939	14,151	11,039
2019	34,709	0	5,875
2029	38,264	0	5,452
Enplanements			
2001	38,460	9,380	8,200
2010	49,841	10,216	7,736
2019	52,105	0	4,230
2029	54,627	0	3,925

7.0 Operating and capital costs for airport scenarios

The following table shows capital costs obtained from the Airport Master Plans and ALPs from each airport and operating costs obtained from ADOT&PF. Also included in capital costs are costs associated with adding wind protection to general aviation tie down areas at each airport.

Table 25: Existing cost data from ADOT&PF and Master Plans

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$19,964,300	$9,985,000	$9,640,000
Naknek	$ 29,962	$ 9,683,000	$6,320,000	$4,944,000
South Naknek	$ 19,806	$ 2,260,000	$1,000,000	$ 650,000

Assumptions:

- By year 10 when most improvements are made at the Naknek Airport operating costs increase by $13,000/year to $29,962 due to increased electrical costs ($5,000/year) and maintenance ($4,000) of a new functional lighting system and increased fuel and manpower costs ($4,000) of maintenance and snow removal of runways, taxiways and aprons. Until then operating costs are $16,962.
- Even though the South Naknek ALP indicates it could be upgraded to B-II standards in the long-term future, for planning purposes it is assumed it can continue to be developed to B-1 standards, similar to the planned standards for the Naknek Airport.
- South Naknek CIP costs from the ALP include $2.2 million in 1 – 5 years for resurfacing, a $1 million road extension around Runway 4-22 in 6 – 10 years, and $650,000 for a new grader and lighting upgrades in 11-20 years.
- Includes wind protection costs not in the Master Plans. If wind protection is provided for general aviation aircraft it will be provided for all general aviation aircraft at each airport.

7.1 Scenario A – Aviation only improvements

The operating and capital costs in the following two tables are for two airport scenarios associated with not building the bridge. One scenario continues to operate all three airports and the other closes the Naknek Airport.

Table 26: Option A1: Without bridge – Keep all three airports open

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$19,964,300	$9,985,000	$9,640,000
Naknek	$ 29,962	$ 9,683,000	$6,320,000	$4,944,000
South Naknek	$ 19,806	$ 2,260,000	$1,000,000	$ 650,000

Table 27: Option A2: Without bridge – Close Naknek Airport

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$21,334,300	$9,985,000	$9,640,000
Naknek	$0	$0	$0	$0
South Naknek	$ 19,806	$ 3,610,000	$1,000,000	$ 650,000

Assumptions:

- Naknek operating costs ($16,962/year) cease to be paid in three to five years when ADOT&PF ceases to operate the airport.
- Additional tie down space is provided at the King Salmon Airport at a cost of $2,800,000. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
- Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.

7.2 Scenario B – Bridge and aviation improvements

The following tables show capital and operating costs for airport scenarios associated with constructing the bridge. They range from keeping all airports open to closing airports, to transferring ownership to the Bristol Bay Borough.

Table 28: Option B1: With bridge – Keep all three airports open

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$19,964,300	$9,985,000	$9,640,000
Naknek	$ 29,962	$ 9,683,000	$6,320,000	$4,944,000
South Naknek	$ 19,806	$ 2,260,000	$1,000,000	$ 650,000

Table 29: Option B2: With bridge – Close Naknek Airport

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$21,334,300	$9,985,000	$9,640,000
Naknek	$0	$0	$0	$0
South Naknek	$ 21,806	$ 3,610,000	$1,000,000	$ 650,000

Assumptions:

- Naknek operating costs ($16,962/year) continue to be paid until the Bridge is open.
- Additional tie down space is provided at the King Salmon and South Naknek Airports at a cost of $1,400,000 for each airport. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
- Additional maintenance and snow removal of general aviation tie downs and access taxiway adds $2,000/year to the South Naknek operating costs when the Bridge is open.
- Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.

Table 30: Option B3: With bridge – Close South Naknek Airport

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$19,724,300	$9,985,000	$9,640,000
Naknek	$ 29,962	$ 9,743,000	$6,320,000	$4,944,000
South Naknek	$0	$0	$0	$0

Assumptions:

- The planned South Naknek Airport Resurfacing project can be eliminated and the existing surface can safely meet needs until the bridge is built.
- South Naknek Airport remains open through 2016 when the FAA grant has been amortized or the FAA and ADOT&PF can work out an arrangement where unamortized grant funding invested in the South Naknek Airport does not need to be paid back or can be applied to the planned investments in the Naknek Airport.
- South Naknek Operating Costs ($19,806/year) continue to be paid until the Bridge is open.

Table 31: Option B4: With bridge – Close Naknek and South Naknek Airports

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$23,004,300	$9,985,000	$9,640,000
Naknek	$0	$0	$0	$0
South Naknek	$0	$0	$0	$0

Assumptions:

- The planned South Naknek Airport Resurfacing project can be eliminated and the existing surface can safely meet needs until the bridge is built.
- Additional tie down space is provided at the King Salmon Airport at a cost of $2,800,000. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
- South Naknek Airport remains open through 2016 when the FAA grant has been amortized or the FAA and ADOT&PF can work out an arrangement where unamortized grant funding invested in the South Naknek Airport does not need to be paid back or can be applied to the planned investments at the King Salmon Airport.
- South Naknek operating costs ($19,806/year) and Naknek operating costs ($16,962/year) continue to be paid until the Bridge is open.
- Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.

Table 32: Option B5: With bridge Bristol Bay Borough operates Naknek and South Naknek Airports

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$19,964,300	$9,985,000	$9,640,000
Naknek	$ 29,962	$ 9,683,000	$6,320,000	$4,944,000
South Naknek	$ 19,806	$ 2,260,000	$1,000,000	$ 650,000

Assumptions:

- Bristol Bay Borough operating costs will be comparable to the State of Alaska's current costs. Some costs could be higher while other costs could be lower.

Table 33: Option B6: With bridge close Naknek Airport and Borough operates South Naknek Airport

	Annual Operating Costs	Capital Costs 1 – 5 Years	Capital Costs 6-10 Years	Capital Costs 11-20 Years
King Salmon	$737,088	$21,334,300	$9,985,000	$9,640,000
Naknek	$0	$0	$0	$0
South Naknek	$ 21,806	$ 3,610,000	$1,000,000	$ 650,000

Assumptions:

- Naknek operating costs ($16,962/year) continue to be paid until the Bridge is open.
- Additional tie down space is provided at the King Salmon and South Naknek Airports at a cost of $1,400,000 for each airport. Costs would include wind protection measures such as berms, slatted fences or vegetation, or a combination of these measures, if possible.
- Additional maintenance and snow removal of general aviation tie downs and access taxiway adds $2,000/year to the South Naknek operating costs when the Bridge is open.
- Addition of general aviation tie downs does not have measurable effect on operating costs at King Salmon.
- Bristol Bay Borough operating costs will be comparable to the State of Alaska's current costs. Some costs could be higher while other costs could be lower.

Appendix G. Benefit-cost analysis

This appendix was prepared by HLB Decision Economics, Inc. It provides an analysis of the scenario/options in comparison to A1 and a description of the benefit-cost framework, assumptions, and theory. The scenario options are evaluated for the low, medium, and high cost bridge estimates using a spreadsheet-based model.

All dollar figures presented in this appendix are expressed in constant 2003 dollars. Costs used as input to the benefits model were converted to standardized 2003 dollars from the dollars of various years as expressed in the airport master plan documents. Inflation rates used in this process are included in Table G-5, which also includes underlying assumptions for the analysis.

The revenue and cost streams occur over multiple years, which have been analyzed in terms of net present value (NPV) using the real discount rate recommended by the Office of Management and Budget for project analysis as listed in Table G-5. The calculation of NPV for each alternative allows the alternatives to be readily compared on a standardized basis over the analysis period of 2004 through 2033.

No-bridge alternatives

Before beginning a discussion of bridge alternatives and the estimation of benefits to bridge users, it is necessary to compare two aviation-only alternatives under Scenario A:

- Option A1: Keep all three airports open; and
- Option A2: Close Naknek Airport in 2006.

Option A1 constitutes the base case against which all other options were evaluated. Option A2 assumes the closure of Naknek Airport in 2006. Expenditures for Operations and Maintenance as well as for Capital Improvements required to continue operations at King Salmon and South Naknek are included in Option A2. Table G-1 presents the net savings of Option A2 over Option A1.

Table G-1. Summary of value of Naknek crossing options

Savings relative to option a1 (full aviation only improvements) (In millions of constant 2003 dollars)					
Option	**Total savings**	**O & M cost savings**	**Capital cost savings**	**Diversion costs**	**Total savings**
Option A2: Close Naknek in 2006	$15.0	$0.4	$14.6	$7.1	$7.9

Diversion costs is an estimate of the added expense for those travelers whose airport of choice, Naknek or South Naknek, might be closed. This cost should be added to account for the inconvenience of accessing the next most convenient airport.

All subsequent estimations of benefits for the variations of bridge Scenario B are also presented *relative to the A1 base case*.

What are "user benefits?"

Direct standard of living and productivity gains to persons making river crossings are called "*user benefits*" to distinguish them from other more indirect benefits, such as economic development, that may accrue to persons who may not cross the river at all or to the community or region as a whole. The primary user benefits of construction of a bridge spanning the Naknek River at Fishery Point will arise in two principal categories. The first category includes those existing travelers who currently make river crossings via the various modes currently available: air taxi, private plane, skiff or other boat, snowmachine and "other vehicles," which includes cars and trucks making the crossing when the river freezes sufficiently to support the vehicle's weight. Time savings and reduction in out-of-pocket travel costs benefit existing travelers as a result of the quicker and less expensive travel provided by the bridge.

Benefits in the second principal category arise in the form of additional trip making to and from South Naknek and neighboring areas by auto and truck users for whom the costs of access prior to the improvement outweighed the value of opportunities on the other side. Such opportunities can include existing draws such as shops, work places, and social and recreational activities. As well, new opportunities can emerge in response to the new cost-to-value travel equation, leading to yet further "*induced demand*." The sum of all projected benefits, by category, is given in Table G-2 through Table G-4. As the tables show, with the net present value of benefits ranging from $33 million to $165 million (in constant 2003 dollars) over the period 2004 to 2033, all the bridge options and under all of the assumptions offer significant net economic gains. Underlying assumptions are presented in Table G-7. Year-by-year net benefits are shown in detail in Tables G-8 through G-10 at the end of the appendix. The three pie charts shown in Figure G-1 demonstrate that the preponderance of benefits in every case comes from induced trips rather than existing trips.

Figure G-2 presents the relationship between the benefits for existing travelers and benefits arising from induced demand. Due to fact that the estimated bridge traffic is up to 34 times greater than estimates for current crossing levels, the benefits from induced demand are in turn many times greater than for existing travelers.

Table G-2. Summary of user benefits by option, high bridge cost

(In millions of constant 2003 dollars)

Relative to OptionA1 (aviation only improvements)

Option	Travel Cost Benefits			Borough Savings from Facility Consolidation (Midpoint Estimate)*	NET Operating Cost Savings (Agency Benefits)	Total Project Benefits	Diversion Cost	Total Incremental Capital Costs	Net Benefits
	Existing Trips	Induced Trips	Grand Total (Consumer Surplus)						
Build Traffic Forecast Assumption				$ 4.39					
Base Case	$ 7.14	$ 134.99	$ 142.14						
Low Case	$ 7.14	$ 50.81	$ 57.96						
High Case	$ 7.14	$ 168.11	$ 175.26						
Option B1: All Airports Open					($ 0.03)			$ 24.47	
Base Case						$ 142.10			$ 117.64
Low Case						$ 57.92			$ 33.46
High Case						$ 175.22			$ 150.76
Option B2: Close Naknek in 2014					$ 0.37		$ 4.59	$ 9.89	
Base Case						$ 142.51			$ 128.02
Low Case						$ 58.33			$ 43.84
High Case						$ 175.63			$ 161.14
Option B3: Close South Naknek in 2016					$ 0.16		$ 1.11	$ 20.92	
Base Case						$ 142.30			$ 120.27
Low Case						$ 58.12			$ 36.09
High Case						$ 175.42			$ 153.39
Option B4: Close Naknek in 2014 and South Naknek in 2016					$ 0.59		$ 5.70	$ 6.51	
Base Case						$ 142.73			$ 130.51
Low Case						$ 58.55			$ 46.33
High Case						$ 175.85			$ 163.63

*Not included in total net benefits since it is already captured in benefits for induced trips.

Table G-3. Summary of user benefits by option, medium bridge cost

(In millions of constant 2003 dollars)

Relative to option A1 (Aviation only improvements)

Option	Travel Cost Benefits			Borough Savings from Facility Consolidation (Midpoint Estimate)*	NET Operating Cost Savings (Agency Benefits)	Total Project Benefits	Diversion Cost	Total Incremental Capital Costs	Net Benefits
	Existing Trips	Induced Trips	Grand Total (Consumer Surplus)						
Build Traffic Forecast Assumption				$ 4.39					
Base Case	$ 7.14	$ 134.99	$ 142.14						
Low Case	$ 7.14	$ 50.81	$ 57.96						
High Case	$ 7.14	$ 168.11	$ 175.26						
Option B1: All Airports Open					($ 0.45)			$ 23.03	
Base Case						$ 141.69			$ 118.66
Low Case						$ 57.51			$ 34.48
High Case						$ 174.81			$ 151.78
Option B2: Close Naknek in 2014					($ 0.05)		$ 4.59	$ 8.45	
Base Case						$ 142.09			$ 129.04
Low Case						$ 57.91			$ 44.86
High Case						$ 175.21			$ 162.16
Option B3: Close South Naknek in 2016					($ 0.25)		$ 1.11	$ 19.49	
Base Case						$ 141.88			$ 121.29
Low Case						$ 57.70			$ 37.11
High Case						$ 175.01			$ 154.41
Option B4: Close Naknek in 2014 and South Naknek in 2016					$ 0.17		$ 5.70	$ 5.08	
Base Case						$ 142.31			$ 131.51
Low Case						$ 58.13			$ 47.35
High Case						$ 175.43			$ 164.65

*Not included in total net benefits since it is already captured in benefits for induced trips.

Table G-4. Summary of user benefits by option, low bridge cost

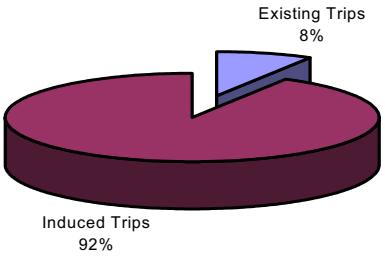
(In millions of constant 2003 dollars)

Relative to option A1 (Aviation only improvements)

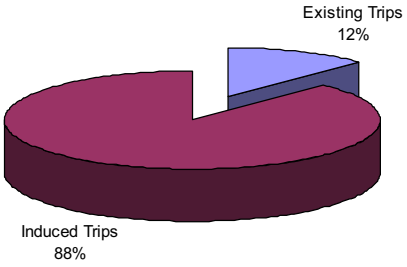
Option	Travel Cost Benefits			Borough Savings from Facility Consolidation (Midpoint Estimate)*	NET Operating Cost Savings (Agency Benefits)	Total Project Benefits	Diversion Cost	Total Incremental Capital Costs	Net Benefits
	Existing Trips	Induced Trips	Grand Total (Consumer Surplus)						
Build Traffic Forecast Assumption				$ 4.39					
Base Case	$ 7.14	$ 134.99	$ 142.14						
Low Case	$ 7.14	$ 50.81	$ 57.96						
High Case	$ 7.14	$ 168.11	$ 175.26						
Option B1: All Airports Open					($ 0.45)			$ 21.92	
Base Case						$ 141.69			$ 119.77
Low Case						$ 57.51			$ 35.59
High Case						$ 174.81			$ 152.89
Option B2: Close Naknek in 2014					($ 0.05)		$ 4.59	$ 7.34	
Base Case						$ 142.09			$ 130.15
Low Case						$ 57.70			$ 45.97
High Case						$ 175.21			$ 163.27
Option B3: Close South Naknek in 2016					($ 0.25)		$ 1.11	$ 18.38	
Base Case						$ 141.88			$ 122.40
Low Case						$ 57.70			$ 38.22
High Case						$ 175.01			$ 155.52
Option B4: Close Naknek in 2014 and South Naknek in 2016					$ 0.17		$ 5.70	$ 3.97	
Base Case						$ 137.50			$ 132.64
Low Case						$ 56.16			$ 48.46
High Case						$ 169.50			$ 165.76

*Not included in total net benefits since it is already captured in benefits for induced trips.

Distribution of Benefits: Base Case



Distribution of Benefits: Low Case



Distribution of Benefits: High Case

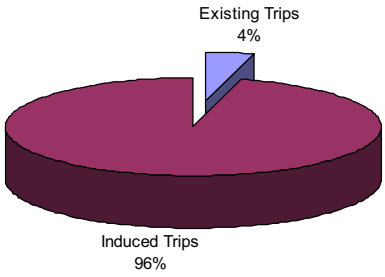


Figure G-1. Distribution of benefits from existing and induced crossings, all cases

Key assumptions

Key assumptions and data sources for the user benefits estimation are shown in Table G-5.

Table G-5. Benefit/cost analysis assumptions and sources

ITEM	VALUE	SOURCE
VALUE OF TIME, $ per HOUR PER PASSENGER		
Personal Cars	$13.86	Federal Highway Administration, *Highway Economic Requirements System Technical Report*, U.S. Department of Transportation, December 2000; U. S. Department of Transportation, "The Value of Saving Travel Time: Departmental Guidance for Conducting Economic Evaluations," April 1997, Table 4.
Trucks	$23.75	
Bristol Bay Salary as a % of National Average	100%	
VEHICLE OPERATING COSTS		
Air Taxi (Fare)	$36.00	Northern Economics / Ivan Moore Research Survey January 2-5, 2004
Personal Cars/Snowachine		Snowmachine costs assumed equivalent to private cars.
Fuel, $ per gallon	$2.00	AAA, Daily Fuel Gauge Report, adjusted for local prices per http://www.state.ak.us/local/akpages/ADMIN/dgs/cam/temppdf/8fuels.pdf
Oil, $ per quart	$4.23	Federal Highway Administration, Highway Economic Requirements System Technical Report, U.S. Department of Transportation, December 2000; J.P. Zaniewski, et.al., Vehicle Operating Costs, Fuel Consumption, and Pavement Type and Condition Factors, Texas Research and Development Foundation, prepared for U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., June 1982, Table 2, p. 7.
Tire, $ per tire	$74.09	
M&R, $	$120.82	
Depreciable Value, $	$21,159.14	Federal Highway Administration, Highway Economic Requirements System Technical Report, U.S. Department of Transportation, December 2000.
Total VOC Per Vehicle Mile	$0.3600	
Trucks		
Fuel, $ per gallon	$2.00	AAA, Daily Fuel Gauge Report.
Oil, $ per quart	$1.69	Federal Highway Administration, Highway Economic Requirements System Technical Report, U.S. Department of Transportation, December 2000; J.P. Zaniewski, et.al., Vehicle Operating Costs, Fuel Consumption, and Pavement Type and Condition Factors, Texas Research and Development Foundation, prepared for U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., June 1982, Table 2, p. 7.
Tire, $ per tire	$487.78	
M&R, $	$421.02	
Depreciable Value, $	$94,933.01	Federal Highway Administration, Highway Economic Requirements System Technical Report, U.S. Department of Transportation, December 2000.
Total VOC Per Vehicle Mile	$0.980	
Private Aircraft - Per Hour, Fuel Price @$2.62/gallon	$163.00	Conkin & Decker Aircraft Cost Evaluator (http://www.aso.com/cda/main/)
Boat/Skiff - Per Hour	$50.00	HLB Decision Economics Estimate
DISCOUNT RATE FOR PRESENT VALUE CALCULATIONS	3.5%	Federal OMB Circular A-94, Appendix C, 30-Year, Revised February 2004 (http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html)

ITEM	VALUE	SOURCE
BRIDGE AND AIRPORT COSTS		
Bridge and Airport Costs in 2003 Dollars		
CONSTRUCTION INFLATION		Average of Construction and Building Cost Indices. Source: McGraw-Hill Construction, Engineering News Record, various dates. http://enr.construction.com/features/conEco/costIndexes/default.asp
1998	1.32%	
1999	2.19%	
2000	2.58%	
2001	1.59%	
2002	2.47%	
2003	2.23%	
O & M INFLATION (GENERAL PRICE INFLATION)		National CPI, All Urban, U.S. Bureau of Labor Statistics, Consumer Price Indices, www.bls.gov
1998	1.60%	
1999	2.20%	
2000	3.40%	
2001	2.60%	
2002	1.30%	
2003	2.50%	
Bridge Project Start Year	2008	
Bridge Completion Year	2013	
Bridge In Service Year	2014	
Analysis End Year	2033	
REAL DISCOUNT RATE	3.50%	OMB Circular A-94, Appendix C, Revised February 2004, 30-year (http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html)
SCENARIO A (NO BUILD)	-2.750%	Annual Growth Rate in Crossings Forecast Equivalent to Low Case Scenario B Forecast
NUMBER OF PASSENGERS PER VEHICLE		Consultant Team Estimate
Air Taxi	1.70	
Private Plane	1.70	
Skiff or Boat	1.70	
Snowmachine	1.20	
Other Vehicle		
Personal Cars	1.70	
Trucks	1.00	
% Truck Traffic of Total (Scenario B - with Bridge)	5%	

Economic framework for measuring user benefits

The primary benefits of most highway and bridge infrastructure projects are benefits that infrastructure users realize through travel time savings and induced demand. The economic framework for measuring these benefits is illustrated in Figure G-2 below. The classic economic demand and supply relationship is illustrated for cross-river travel, with the quantity of trips (Q) demanded at a given level of generalized price per trip (P). The generalized price included vehicle operating costs, airfares, the value of travel time including access and egress and so on. Under the status quo, users of the current modes demand Qb trips across the river at a generalized trip price Pb.

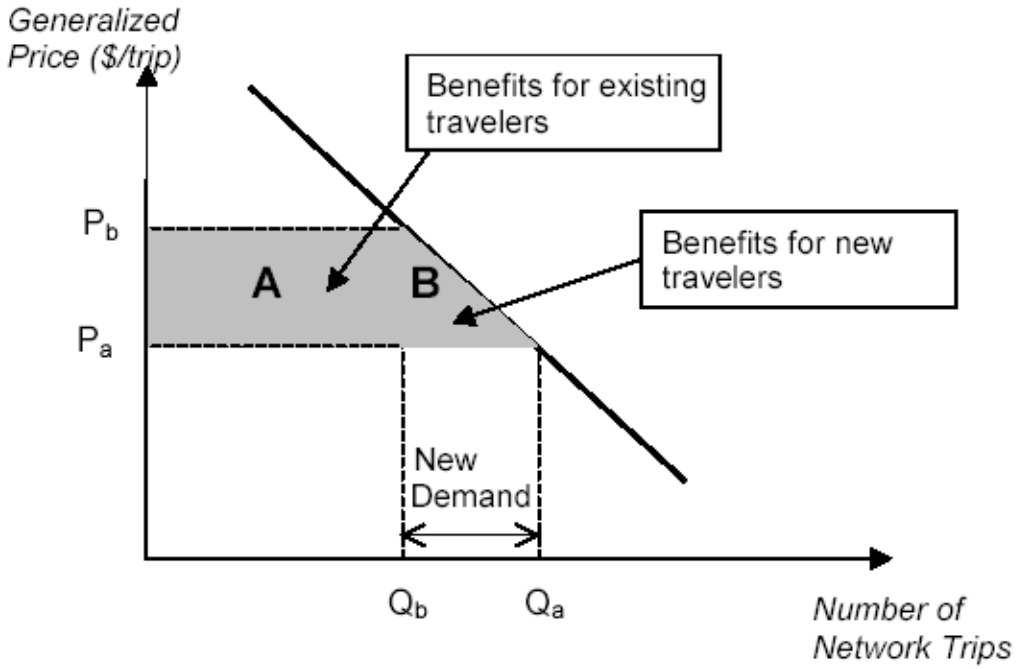


Figure G-2. Methodology for measuring benefits of bridge alternatives

where:

Pb is the generalized trip price of the existing modes for trips that include a river crossing

Pa is the generalized trip price after the implementation of the bridge access

Qb is the number of trips with the existing modes

Qa is number of trips after implementation of the bridge access

Using the assumption that construction of the bridge results in a reduction in the generalized trip price Pa, we see in Figure G-2 that the amount of trips demanded increases to Qa creating two distinct user benefits:

1) Reduced trip cost for existing travelers; and,

2) “Consumer surplus” from the new trips.

The reduced trip costs for existing travelers is represented by rectangular shaded area A of Figure G-2. The consumer surplus from new trips, or the difference between what travelers are willing to pay relative to the amount travelers actually pay for new trips, is represented by triangular shaded area B of Figure G-2.

What is included within consumer surplus and induced demand?

Although the economic benefits (highlighted in areas A and B of Figure G-2) of improved access to South Naknek are measured here in terms of the monetary equivalent value of the time and operating costs to be saved by users of a prospective bridge, and the consumer surplus derived from new trips, it is important to note that the final economic manifestation of such benefits could arise partly in other forms. These other benefits could include stimulation of commercial and housing development on both sides of the river, increases in the value of land, addition of jobs from businesses whose transportation costs are significantly lower, costs savings to the Bristol Bay Borough from consolidation of services currently duplicated in both Naknek and South Nakek and so on. Estimates of the latter benefits have been made and are shown in Table G-2 through Table G-4 alongside the total consumer surplus, because these benefits are in effect already included in the consumer surplus. In fact, the large increase in the number of trips resulting from the bridge is in part due to residents traveling across the river to procure services such as education, library, and post office which no longer need to be provided on both sides of the river. Admittedly, the centralization of services on the north side of the river may mean that a road trip will become necessary for South Naknek residents whereas today *some* of these services may be procured in their own community. Nevertheless the much greater reliability of the bridge link in virtually all weather conditions is of considerable value to a majority of travelers. The considerable number of induced trips forecast for the bridge indicates this reliability delivers significant value as expressed by consumers' choice of the new route. In many cases South Naknek residents who today forego trips altogether to the north side of the river due to the difficulty of crossing will choose to make those trips due to the more convenient alternative.

It is simply analytic convenience that leads transportation economists to measure the development value of better access through the lens of trip volumes, including new demand, and corresponding time savings. We know something of the trip generating effects of a new bridge in particular geographic circumstances. The alternative, namely to forecast the monetization of each acre of land development because of improved access, when, and so forth, requires a great deal more information and, more significantly, is a great deal less accurate.

Detail of benefits estimation methodology

Figure G-3 below illustrates a high-level structure and logic diagram describing the overall benefits framework for the access improvements highlighting the various cost elements that are considered in the analysis. For the both the base case (Scenario A) and the bridge alternative considered, a generalized cost per trip is estimated including travel time costs and vehicle operating costs. The methodology used in estimating each of the user cost components is described in the sections below.

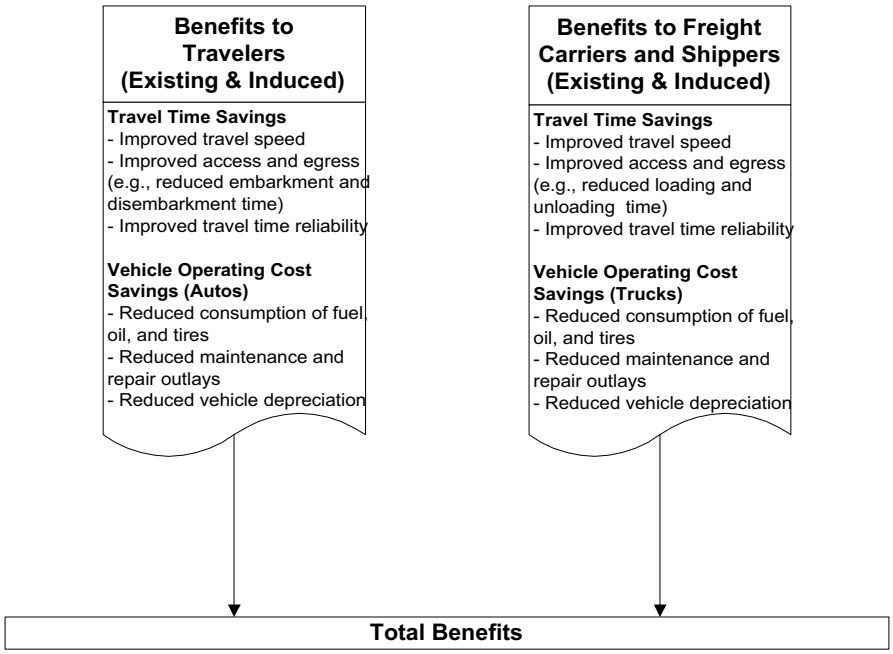


Figure G-3. Benefits estimation methodology

Travel time costs

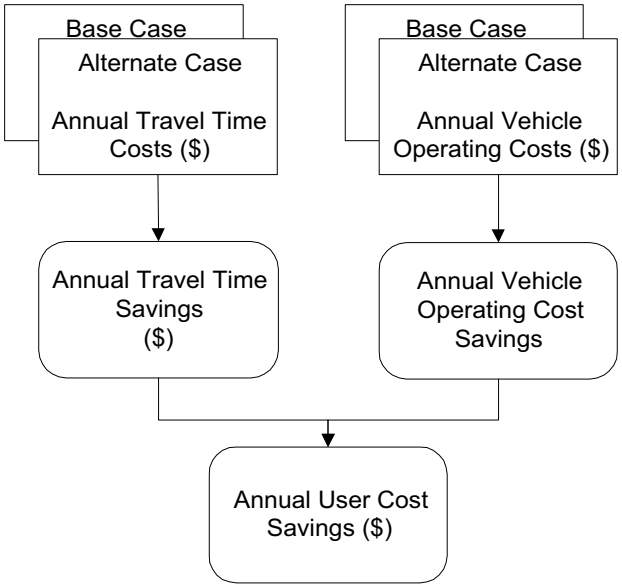


Figure G-4. Calculation of travel time costs

Time costs figure prominently in the economic evaluation of transportation infrastructure projects. The potential time savings from even a minor improvement can translate into significant user cost savings over the life of the investment, depending on the facility type

and traffic characteristics. Travel time costs are derived by first calculating a value of time, for passenger cars and trucks. In urban settings, these values are adjusted for congestion, but in this rural setting it is not necessary to do so. These values of time, in dollars per hour, are then multiplied by the total trip time. These calculations are performed for all trips using the existing modes and included estimates of time to reach the airport, dock, etc.

"Out of pocket" travel expenses

Out of pocket travel expenses consist of vehicle operating costs for roadway traffic, snow machines, and private planes and airfares for crossings in air taxis. The mileages for all the existing modes and bridge traffic were estimated using area maps. Since crossings could have as their northern origin or destination either Naknek, King Salmon or other intermediate point, distances are an average of trips to each of the two major towns.

Truck and passenger car operating costs per mile are estimated for each access alternative using typical roadway speeds and fuel at $2.00 per gallon. Per mile rates are then multiplied by the average roadway trip length to derive a vehicle operating cost estimate per trip. Vehicle operating costs are an integral element of computing roadway user costs. They generally are the most recognized of the user costs because they typically involve the out-of-pocket expenses associated with owning, operating and maintaining a vehicle. The unit costs are marginal costs, net of taxes, subsidies and other transfer payments. There are five cost components associated with operating a vehicle. They include: fuel consumption, oil consumption, maintenance and repairs, tire wear and roadway related vehicle depreciation.

Each component is a unique function of vehicle class and vehicle speed. Fares for air taxis are obtained from the travel survey which was used to estimate the bridge traffic. Operating costs for private planes are derived using an online estimator for a Piper Cherokee 140, selected as a representative aircraft in service between the study communities. For snow machines, it was assumed that the costs were roughly equivalent to automobiles, and skiffs and boats are costed at an estimated composite rate of $50 per hour.

Figure G-5 on the following page shows the structure and logic of the user cost calculation. Table G-6 provides the elements of the calculation of travel cost for both Scenarios A and B.

The estimated elements of current and future travel times and costs were chosen to be as realistic as possible yet not overstate the travel costs. The routing of boat, snow machine, ice road and air travel will vary greatly depending on weather conditions. For example, although the straight-line distance between the airports at Naknek and South Naknek is quite short, varying wind conditions can result in circuitous routings and delays that extend flight times considerably beyond the shortest possible times. Delays and time involved in loading and unloading mail, freight, and passenger baggage, plus the surface travel time between the two airports and the point of origin and ultimate destination also contributes to longer air travel times than envisioned when comparing the distance between the two communities. The time required for crossing the Naknek river on a snow machine also takes longer than might be envisioned because the ice crossing must be upriver beyond the point of tidal influence. The distance to the crossing site, plus the fact that there is no road on the south side of the river, requires a longer travel time than might be expected.

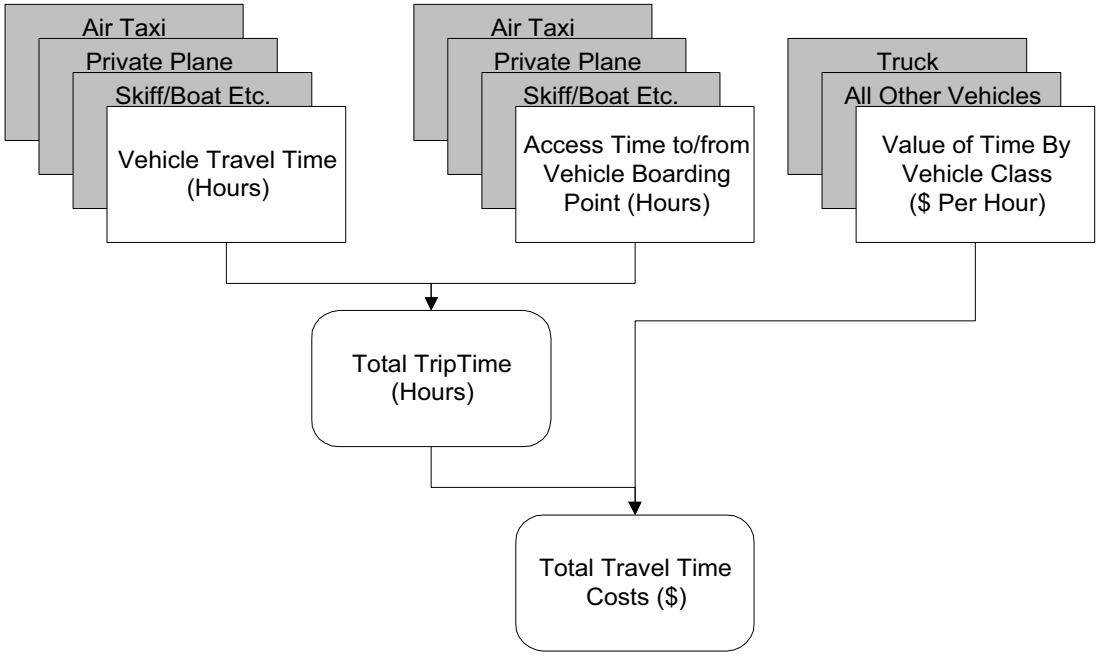


Figure G-5. Calculation of travel costs

Costs of diversion to alternate airport in the event of closure

Under Options B2/B6, B3, and B4, Naknek, South Naknek and both airports respectively will be closed. In addition to the costs and benefits described above some additional cost incurred by those whose airport of choice will be closed should be included to account for the inconvenience of accessing the next most convenient airport. Rough estimates of these costs, listed on a per trip basis in Table G-6, were based on the number of annual 2029 passengers (including pilots) forecast for the particular airport to be closed taken from Option B-1, under which all airports would remain open. For example, total passengers who would have used Naknek Airport in 2029 under Option B-1 are assumed to drive or take a taxi to South Naknek under Options B-2/B-6 in each year after the airport closes. The overall benefit-cost analysis includes the present value of these additional costs from the time the given airport is closed through the end of the projection period.

Table G-6. Additional costs from diversion to nearest open airport, per trip per passenger, including pilot

	Per Trip	Unit Costs	Unit		Source
Average Access Trip Length (miles)	15		Miles		
Average Access Time	0.5		Hours		
Travel Time Costs	$ 6.93	$ 13.86	Per hour	Value of Time	Time Valuation for Other Trip Calculations
Out-of-Pocket Costs	$ 30.00	$ 2.00	Per mile	Taxi/Private Car	HLB Estimate
Accident Costs	$ 0.67	$ .04469	Per mile		HLB - StratBencost
Emissions Costs	$ 0.24	$ .03506	Per mile		HLB - StratBencost
Total Additional Travel Costs	$ 37.84				

Table G-7. Calculation of travel cost

Average Travel Cost per *PASSENGER Trip*, Dollars of 2003
Trips to/from South Naknek From Naknek and King Salmon, Non-weighted Average

Personal Travel	Mode	Travel Time (hours)	Total Trip Length (miles)	Total Time Costs ($)	Average Roadway Vehicle Speed	Unit VOC ($) (Fare or Per Mi or Hr)	Total VOC ($)	Percent Distribution	Total Cost per Trip ($) Per Passenger	Weighted Total Costs ($)	Percentage Change in Costs (%)	Avg. Passenger per Vehicle
Option: Scenario A	Air Taxi*	0.67		$9.24		$36.0000	$36.00	30%	**$45.24**	$13.41		N/A
	Private Plane*	0.58		$8.09		$163.0000	$40.75	24%	**$28.73**	$6.87		1.70
	Skiff or Boat*	0.83		$11.55		$50.0000	$25.00	35%	**$21.50**	$7.56		1.70
	Snowmachine	0.50	15.50	$6.93		$0.3600	$3.28	3%	**$8.51**	$0.28		1.20
	Other Vehicle	0.50	15.50	$6.93		$0.3600	$3.28	8%	**$6.01**	$0.48		1.70
	Weighted Avg.							100%		$28.60		
										Change in Cost		
Scenario B - Base Case	Car**	0.31	15.50	$4.30	50.00	$0.3600	$3.28		**$4.46**	-$24.14	-84.41%	1.70
Scenario B - Low Case	Car**	0.31	15.50	$4.30	50.00	$0.3600	$3.28		**$4.46**			1.70
Scenario B - High Case	Car**	0.31	15.50	$4.30	50.00	$0.3600	$3.28		**$4.46**			1.70

*Includes 20 minutes access time and plane loading and unloading time at beginning and end of trip
**Assumes 50 miles per hour average speed

Commercial / Truck Travel	Mode	Travel Time (hours)	Trip Length (miles)	Total Time Costs ($)	Average Roadway Vehicle Speed	Unit Roadway VOC ($)	Total VOC ($)	Change in Roadway VOC ($)	Total Cost per Trip ($)	Change in Total Costs ($)	Percentage Change in Costs (%)	Avg. Passenger per Vehicle
Option: Scenario A	None											
Scenario B - Base Case	Truck**	0.31	15.50	$7.36	50.00	$0.980	$15.19	Varies	**$22.55**	-$6.05		1.00
Scenario B - Low Case	Truck**	0.31	15.50	$7.36	50.00	$0.980	$15.19		**$22.55**			1.00
Scenario B - High Case	Truck**	0.31	15.50	$7.36	50.00	$0.980	$15.19		**$22.55**			1.00

**Assumes 50 miles per hour average speed

Table G-8. Year-by-year stream of net benefits: bridge, high build option

	NPV 30-Year Period	2004	2005	2006	2007	2008	2009
Option B1: All Airports Open							
Option: B - Base Case	**$117,637,199**	$0	$0	$0	$0	($1,980,000)	($3,300,000)
Option: B - Low Case	**$33,457,054**	$0	$0	$0	$0	($1,980,000)	($3,300,000)
Option: B - High Case	**$150,757,697**	$0	$0	$0	$0	($1,980,000)	($3,300,000)
						Begin bridge Construction	
Option B2: Close Naknek in 2014							
Option: B - Base Case	**$128,021,798**	$13,498	$13,498	$7,173,069	$13,498	($1,966,502)	($3,286,502)
Option: B - Low Case	**$43,841,653**	$13,498	$13,498	$7,173,069	$13,498	($1,966,502)	($3,286,502)
Option: B - High Case	**$161,142,296**	$13,498	$13,498	$7,173,069	$13,498	($1,966,502)	($3,286,502)
		Savings from reduced Naknek O&M until closure		Savings from eliminating Naknek CIP		Begin bridge construction	
Option B3: Close South Naknek in 2016							
Option: B - Base Case	**$120,271,854**	$0	$0	$2,478,119	$0	($1,980,000)	($3,300,000)
Option: B - Low Case	**$36,091,708**	$0	$0	$2,478,119	$0	($1,980,000)	($3,300,000)
Option: B - High Case	**$153,392,351**	$0	$0	$2,478,119	$0	($1,980,000)	($3,300,000)
				Savings from eliminating S. Naknek CIP		Begin bridge construction	
Option B4: Close Naknek in 2014 and South Naknek in 2016							
Option: B - Base Case	**$130,509,510**	$13,498	$13,498	$9,476,214	$13,498	($1,966,502)	($3,286,502)
Option: B - Low Case	**$46,329,365**	$13,498	$13,498	$9,476,214	$13,498	($1,966,502)	($3,286,502)
Option: B - High Case	**$163,630,007**	$13,498	$13,498	$9,476,214	$13,498	($1,966,502)	($3,286,502)
		Savings from reduced Naknek O&M until closure		Savings from eliminating Naknek & S. Naknek CIPs		Begin bridge construction	

Table G-8. Year-by-year stream of net benefits: bridge, high build option (continued)

	2010	2011	2012	2013	2014	2015	2016	2017
Option B1: All Airports Open								
Option: B - Base Case	($1,320,000)	$0	($13,200,000)	($13,200,000)	$13,419,963	$13,501,018	$13,582,052	$13,663,066
Option: B - Low Case	($1,320,000)	$0	($13,200,000)	($13,200,000)	$7,109,238	$6,946,469	$6,783,679	$6,620,870
Option: B - High Case	($1,320,000)	$0	($13,200,000)	($13,200,000)	$13,520,361	$13,988,665	$14,456,948	$14,925,211
				Bridge construction completed	Travel savings, bridge O&M begins			
Option B2: Close Naknek in 2014								
Option: B - Base Case	($1,306,502)	$6,634,019	($13,186,502)	($13,186,502)	$12,992,763	$13,073,817	$13,154,851	$13,235,865
Option: B - Low Case	($1,306,502)	$6,634,019	($13,186,502)	($13,186,502)	$6,682,037	$6,519,268	$6,356,478	$6,193,669
Option: B - High Case	($1,306,502)	$6,634,019	($13,186,502)	($13,186,502)	$13,093,161	$13,561,464	$14,029,747	$14,498,010
		Savings from eliminating Naknek CIP		Bridge construction completed	Naknek closes, travel savings and Bridge O&M begins			
Option B3: Close South Naknek in 2016								
Option: B - Base Case	($1,320,000)	$1,130,296	($13,200,000)	($13,200,000)	$13,419,963	$13,501,018	$13,477,852	$13,558,866
Option: B - Low Case	($1,320,000)	$1,130,296	($13,200,000)	($13,200,000)	$7,109,238	$6,946,469	$6,679,479	$6,516,670
Option: B - High Case	($1,320,000)	$1,130,296	($13,200,000)	($13,200,000)	$13,520,361	$13,988,665	$14,352,748	$14,821,011
		Savings from eliminating S. Naknek CIP		Bridge construction completed	Travel savings, bridge O&M begins		S. Naknek closes	
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	($1,306,502)	$7,764,316	($13,186,502)	($13,186,502)	$12,995,050	$13,076,105	$13,052,939	$13,133,953
Option: B - Low Case	($1,306,502)	$7,764,316	($13,186,502)	($13,186,502)	$6,684,325	$6,521,556	$6,254,566	$6,091,757
Option: B - High Case	($1,306,502)	$7,764,316	($13,186,502)	($13,186,502)	$13,095,448	$13,563,752	$13,927,835	$14,396,098
		Savings from eliminating Naknek and S. Naknek CIPs		Bridge construction completed	Naknek closes, travel savings, bridge O&M begins		S. Naknek closes	

Table G-8. Year-by-year stream of net benefits: bridge, high build option (continued)

	2018	2019	2020	2021	2022	2023	2024	2025
Option B1: All Airports Open								
Option: B - Base Case	$13,744,061	$13,825,038	$13,905,996	$13,986,937	$14,067,860	$14,148,768	$14,229,658	$14,313,402
Option: B - Low Case	$6,458,041	$6,295,194	$6,129,461	$5,963,710	$5,797,941	$5,632,156	$5,466,355	$5,303,407
Option: B - High Case	$15,393,455	$15,861,681	$16,312,677	$16,763,656	$17,214,618	$17,665,563	$18,116,492	$18,581,747
Option B2: Close Naknek in 2014								
Option: B - Base Case	$18,495,952	$13,397,837	$13,478,795	$13,559,736	$13,640,660	$13,721,567	$13,802,458	$13,886,201
Option: B - Low Case	$11,209,932	$5,867,994	$5,702,260	$5,536,509	$5,370,741	$5,204,956	$5,039,155	$4,876,206
Option: B - High Case	$20,145,346	$15,434,480	$15,885,477	$16,336,455	$16,787,417	$17,238,362	$17,689,291	$18,154,547
Option B3: Close South Naknek in 2016								
Option: B - Base Case	$14,374,554	$13,720,837	$13,801,796	$13,882,737	$13,963,660	$14,044,567	$14,125,458	$14,209,202
Option: B - Low Case	$7,088,534	$6,190,994	$6,025,261	$5,859,510	$5,693,741	$5,527,956	$5,362,155	$5,199,207
Option: B - High Case	$16,023,948	$15,757,481	$16,208,477	$16,659,456	$17,110,418	$17,561,363	$18,012,292	$18,477,547
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	$19,128,732	$13,295,924	$13,376,883	$13,457,824	$13,538,747	$13,619,654	$13,700,545	$13,784,289
Option: B - Low Case	$11,842,712	$5,766,081	$5,600,348	$5,434,597	$5,268,828	$5,103,043	$4,937,242	$4,774,294
Option: B - High Case	$20,778,126	$15,332,568	$15,783,564	$16,234,543	$16,685,505	$17,136,450	$17,587,379	$18,052,634

Table G-8. Year-by-year stream of net benefits: bridge, high build option (continued)

	2026	2027	2028	2029	2030	2031	2032	2033
Option B1: All Airports Open								
Option: B - Base Case	$14,397,130	$14,480,844	$14,564,543	$14,648,228	$14,720,425	$14,806,951	$14,893,464	$14,965,623
Option: B - Low Case	$5,140,443	$4,977,465	$4,814,472	$4,651,464	$4,651,949	$4,322,541	$4,165,231	$3,993,566
Option: B - High Case	$19,046,988	$19,512,213	$19,977,424	$20,442,621	$20,902,067	$21,375,843	$21,849,605	$22,309,012
Option B2: Close Naknek in 2014								
Option: B - Base Case	$13,969,930	$14,053,643	$14,137,342	$14,221,027	$14,293,224	$14,379,750	$14,466,264	$14,538,422
Option: B - Low Case	$4,713,243	$4,550,264	$4,387,271	$4,224,264	$4,224,748	$3,895,340	$3,738,030	$3,566,365
Option: B - High Case	$18,619,787	$19,085,013	$19,550,224	$20,015,420	$20,474,867	$20,948,642	$21,422,404	$21,881,812
Option B3: Close South Naknek in 2016								
Option: B - Base Case	$14,292,930	$14,376,644	$14,460,343	$14,544,027	$14,616,225	$14,702,751	$14,789,264	$14,861,422
Option: B - Low Case	$5,036,243	$4,873,265	$4,710,271	$4,547,264	$4,547,749	$4,218,341	$4,061,031	$3,889,365
Option: B - High Case	$18,942,788	$19,408,013	$19,873,224	$20,338,421	$20,797,867	$21,271,643	$21,745,405	$22,204,812
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	$13,868,017	$13,951,731	$14,035,430	$14,119,114	$14,191,311	$14,277,838	$14,364,351	$14,436,509
Option: B - Low Case	$4,611,330	$4,448,352	$4,285,358	$4,122,351	$4,122,836	$3,793,428	$3,636,118	$3,464,452
Option: B - High Case	$18,517,875	$18,983,100	$19,448,311	$19,913,508	$20,372,954	$20,846,730	$21,320,492	$21,779,899

Table G-9. Year-by-year stream of net benefits: bridge, medium build option

	NPV 30-Year Period	2004	2005	2006	2007	2008	2009
Option B1: All Airports Open							
Option: B - Base Case	**$118,656,895**	$0	$0	$0	$0	($1,830,000)	($3,050,000)
Option: B - Low Case	**$34,476,750**	$0	$0	$0	$0	($1,830,000)	($3,050,000)
Option: B - High Case	**$151,777,393**	$0	$0	$0	$0	($1,830,000)	($3,050,000)
						Begin bridge construction	
Option B2: Close Naknek in 2014							
Option: B - Base Case	**$129,041,495**	$13,498	$13,498	$7,173,069	$13,498	($1,816,502)	($3,036,502)
Option: B - Low Case	**$44,861,349**	$13,498	$13,498	$7,173,069	$13,498	($1,816,502)	($3,036,502)
Option: B - High Case	**$162,161,992**	$13,498	$13,498	$7,173,069	$13,498	($1,816,502)	($3,036,502)
		Savings from reduced Naknek O&M until closure		Savings from eliminating Naknek CIP		Begin bridge construction	
Option B3: Close South Naknek in 2016							
Option: B - Base Case	**$121,291,550**	$0	$0	$2,491,617	$0	($1,830,000)	($3,050,000)
Option: B - Low Case	**$37,111,404**	$0	$0	$2,491,617	$0	($1,830,000)	($3,050,000)
Option: B - High Case	**$154,412,047**	$0	$0	$2,491,617	$0	($1,830,000)	($3,050,000)
				Savings from eliminating S. Naknek CIP		Begin bridge construction	
Option B4: Close Naknek in 2014 and South Naknek in 2016							
Option: B - Base Case	**$131,529,206**	$13,498	$13,498	$9,476,214	$13,498	($1,816,502)	($3,036,502)
Option: B - Low Case	**$47,349,061**	$13,498	$13,498	$9,476,214	$13,498	($1,816,502)	($3,036,502)
Option: B - High Case	**$164,649,704**	$13,498	$13,498	$9,476,214	$13,498	($1,816,502)	($3,036,502)
		Savings from reduced Naknek O&M until closure		Savings from eliminating Naknek & S. Naknek CIPs		Begin bridge construction	

Table G-9. Year-by-year stream of net benefits: bridge, medium build option (continued)

	2010	2011	2012	2013	2014	2015	2016	2017
Option B1: All Airports Open								
Option: B - Base Case	($1,220,000)	$0	($12,200,000)	($12,200,000)	$13,337,463	$13,418,518	$13,499,552	$13,580,566
Option: B - Low Case	($1,220,000)	$0	($12,200,000)	($12,200,000)	$7,026,738	$6,863,969	$6,701,179	$6,538,370
Option: B - High Case	($1,220,000)	$0	($12,200,000)	($12,200,000)	$13,437,861	$13,906,165	$14,374,448	$14,842,711
				Bridge construction completed	Travel savings, bridge O&M begins			
Option B2: Close Naknek in 2014								
Option: B - Base Case	($1,206,502)	$6,634,019	($12,186,502)	($12,186,502)	$12,910,263	$12,991,317	$13,072,351	$13,153,365
Option: B - Low Case	($1,206,502)	$6,634,019	($12,186,502)	($12,186,502)	$6,599,537	$6,436,768	$6,273,978	$6,111,169
Option: B - High Case	($1,206,502)	$6,634,019	($12,186,502)	($12,186,502)	$13,010,661	$13,478,964	$13,947,247	$14,415,510
		Savings from eliminating Naknek CIP		Bridge construction completed	Naknek closes, travel savings, bridge O&M begins			
Option B3: Close South Naknek in 2016								
Option: B - Base Case	($1,220,000)	$1,130,296	($12,200,000)	($12,200,000)	$13,337,463	$13,418,518	$13,395,352	$13,476,366
Option: B - Low Case	($1,220,000)	$1,130,296	($12,200,000)	($12,200,000)	$7,026,738	$6,863,969	$6,596,979	$6,434,170
Option: B - High Case	($1,220,000)	$1,130,296	($12,200,000)	($12,200,000)	$13,437,861	$13,906,165	$14,270,248	$14,738,511
		Savings from eliminating S. Naknek CIP		Bridge construction completed	Travel savings, bridge O&M begins		S. Naknek closes	
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	($1,206,502)	$7,764,316	($12,186,502)	($12,186,502)	$12,912,550	$12,993,605	$12,947,785	$13,051,453
Option: B - Low Case	($1,206,502)	$7,764,316	($12,186,502)	($12,186,502)	$6,601,825	$6,439,056	$6,149,412	$6,009,257
Option: B - High Case	($1,206,502)	$7,764,316	($12,186,502)	($12,186,502)	$13,012,948	$13,481,252	$13,822,681	$14,313,598
		Savings from eliminating Naknek & S. Naknek CIPs		Bridge construction completed	Naknek closes, travel savings, bridge O&M begins		S. Naknek closes	

Table G-9. Year-by-year stream of net benefits: bridge, medium build option (continued)

	2018	2019	2020	2021	2022	2023	2024	2025
Option B1: All Airports Open								
Option: B - Base Case	$13,661,561	$13,742,538	$13,823,496	$13,904,437	$13,985,360	$14,066,268	$14,147,158	$14,230,902
Option: B - Low Case	$6,375,541	$6,212,694	$6,046,961	$5,881,210	$5,715,441	$5,549,656	$5,383,855	$5,220,907
Option: B - High Case	$15,310,955	$15,779,181	$16,230,177	$16,681,156	$17,132,118	$17,583,063	$18,033,992	$18,499,247
Option B2: Close Naknek in 2014								
Option: B - Base Case	$18,413,452	$13,315,337	$13,396,295	$13,477,236	$13,558,160	$13,639,067	$13,719,958	$13,803,701
Option: B - Low Case	$11,127,432	$5,785,494	$5,619,760	$5,454,009	$5,288,241	$5,122,456	$4,956,655	$4,793,706
Option: B - High Case	$20,062,846	$15,351,980	$15,802,977	$16,253,955	$16,704,917	$17,155,862	$17,606,791	$18,072,047
Option B3: Close South Naknek in 2016								
Option: B - Base Case	$14,292,054	$13,638,337	$13,719,296	$13,800,237	$13,881,160	$13,962,067	$14,042,958	$14,126,702
Option: B - Low Case	$7,006,034	$6,108,494	$5,942,761	$5,777,010	$5,611,241	$5,445,456	$5,279,655	$5,116,707
Option: B - High Case	$15,941,448	$15,674,981	$16,125,977	$16,576,956	$17,027,918	$17,478,863	$17,929,792	$18,395,047
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	$19,046,232	$13,213,424	$13,294,383	$13,375,324	$13,456,247	$13,537,154	$13,618,045	$13,701,789
Option: B - Low Case	$11,760,212	$5,683,581	$5,517,848	$5,352,097	$5,186,328	$5,020,543	$4,854,742	$4,691,794
Option: B - High Case	$20,695,626	$15,250,068	$15,701,064	$16,152,043	$16,603,005	$17,053,950	$17,504,879	$17,970,134

Table G-9. Year-by-year stream of net benefits: bridge, medium build option (continued)

	2026	2027	2028	2029	2030	2031	2032	2033
Option B1: All Airports Open								
Option: B - Base Case	$14,314,630	$14,398,344	$14,482,043	$14,565,728	$14,637,925	$14,724,451	$14,810,964	$14,883,123
Option: B - Low Case	$5,057,943	$4,894,965	$4,731,972	$4,568,964	$4,569,449	$4,240,041	$4,082,731	$3,911,066
Option: B - High Case	$18,964,488	$19,429,713	$19,894,924	$20,360,121	$20,819,567	$21,293,343	$21,767,105	$22,226,512
Option B2: Close Naknek in 2014								
Option: B - Base Case	$13,887,430	$13,971,143	$14,054,842	$14,138,527	$14,210,724	$14,297,250	$14,383,764	$14,455,922
Option: B - Low Case	$4,630,743	$4,467,764	$4,304,771	$4,141,764	$4,142,248	$3,812,840	$3,655,530	$3,483,865
Option: B - High Case	$18,537,287	$19,002,513	$19,467,724	$19,932,920	$20,392,367	$20,866,142	$21,339,904	$21,799,312
Option B3: Close South Naknek in 2016								
Option: B - Base Case	$14,210,430	$14,294,144	$14,377,843	$14,461,527	$14,533,725	$14,620,251	$14,706,764	$14,778,922
Option: B - Low Case	$4,953,743	$4,790,765	$4,627,771	$4,464,764	$4,465,249	$4,135,841	$3,978,531	$3,806,865
Option: B - High Case	$18,860,288	$19,325,513	$19,790,724	$20,255,921	$20,715,367	$21,189,143	$21,662,905	$22,122,312
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	$13,785,517	$13,869,231	$13,952,930	$14,036,614	$14,108,811	$14,195,338	$14,281,851	$14,354,009
Option: B - Low Case	$4,528,830	$4,365,852	$4,202,858	$4,039,851	$4,040,336	$3,710,928	$3,553,618	$3,381,952
Option: B - High Case	$18,435,375	$18,900,600	$19,365,811	$19,831,008	$20,290,454	$20,764,230	$21,237,992	$21,697,399

Table G-10. Year-by-year stream of net benefits: bridge, low build option

	NPV 30-Year Period	2004	2005	2006	2007	2008	2009
Option B1: All Airports Open							
Option: B - Base Case	**$119,767,447**	$0	$0	$0	$0	($1,740,000)	($2,900,000)
Option: B - Low Case	**$35,587,302**	$0	$0	$0	$0	($1,740,000)	($2,900,000)
Option: B - High Case	**$152,887,945**	$0	$0	$0	$0	($1,740,000)	($2,900,000)
						Begin bridge construction	
Option B2: Close Naknek in 2014							
Option: B - Base Case	**$130,152,047**	$13,498	$13,498	$7,173,069	$13,498	($1,726,502)	($2,886,502)
Option: B - Low Case	**$45,971,901**	$13,498	$13,498	$7,173,069	$13,498	($1,726,502)	($2,886,502)
Option: B - High Case	**$163,272,544**	$13,498	$13,498	$7,173,069	$13,498	($1,726,502)	($2,886,502)
		Savings from reduced Naknek O&M until closure		Savings from eliminating Naknek CIP		Begin bridge construction	
Option B3: Close South Naknek in 2016							
Option: B - Base Case	**$122,402,102**	$0	$0	$2,491,617	$0	($1,740,000)	($2,900,000)
Option: B - Low Case	**$38,221,956**	$0	$0	$2,491,617	$0	($1,740,000)	($2,900,000)
Option: B - High Case	**$155,522,599**	$0	$0	$2,491,617	$0	($1,740,000)	($2,900,000)
				Savings from eliminating S. Naknek CIP		Begin bridge construction	
Option B4: Close Naknek in 2014 and South Naknek in 2016							
Option: B - Base Case	**$132,639,758**	$13,498	$13,498	$9,476,214	$13,498	($1,726,502)	($2,886,502)
Option: B - Low Case	**$48,459,613**	$13,498	$13,498	$9,476,214	$13,498	($1,726,502)	($2,886,502)
Option: B - High Case	**$165,760,256**	$13,498	$13,498	$9,476,214	$13,498	($1,726,502)	($2,886,502)
		Savings from reduced Naknek O&M until closure		Savings from eliminating Naknek & S. Naknek CIPs		Begin bridge construction	

Table G-10. Year-by-year stream of net benefits: bridge, low build option (continued)

	2010	2011	2012	2013	2014	2015	2016	2017
Option B1: All Airports Open								
Option: B - Base Case	($1,160,000)	$0	($11,600,000)	($11,600,000)	$13,337,463	$13,418,518	$13,499,552	$13,580,566
Option: B - Low Case	($1,160,000)	$0	($11,600,000)	($11,600,000)	$7,026,738	$6,863,969	$6,701,179	$6,538,370
Option: B - High Case	($1,160,000)	$0	($11,600,000)	($11,600,000)	$13,437,861	$13,906,165	$14,374,448	$14,842,711
				Bridge construction completed	Travel savings, bridge O&M begins			
Option B2: Close Naknek in 2014								
Option: B - Base Case	($1,146,502)	$6,634,019	($11,586,502)	($11,586,502)	$12,910,263	$12,991,317	$13,072,351	$13,153,365
Option: B - Low Case	($1,146,502)	$6,634,019	($11,586,502)	($11,586,502)	$6,599,537	$6,436,768	$6,273,978	$6,111,169
Option: B - High Case	($1,146,502)	$6,634,019	($11,586,502)	($11,586,502)	$13,010,661	$13,478,964	$13,947,247	$14,415,510
		Savings from eliminating Naknek CIP		Bridge construction completed	Naknek closes, travel savings, bridge O&M begins			
Option B3: Close South Naknek in 2016								
Option: B - Base Case	($1,160,000)	$1,130,296	($11,600,000)	($11,600,000)	$13,337,463	$13,418,518	$13,395,352	$13,476,366
Option: B - Low Case	($1,160,000)	$1,130,296	($11,600,000)	($11,600,000)	$7,026,738	$6,863,969	$6,596,979	$6,434,170
Option: B - High Case	($1,160,000)	$1,130,296	($11,600,000)	($11,600,000)	$13,437,861	$13,906,165	$14,270,248	$14,738,511
		Savings from eliminating S. Naknek CIP		Bridge construction completed	Travel savings, bridge O&M begins		S. Naknek closes	
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	($1,146,502)	$7,764,316	($11,586,502)	($11,586,502)	$12,912,550	$12,993,605	$12,947,785	$13,051,453
Option: B - Low Case	($1,146,502)	$7,764,316	($11,586,502)	($11,586,502)	$6,601,825	$6,439,056	$6,149,412	$6,009,257
Option: B - High Case	($1,146,502)	$7,764,316	($11,586,502)	($11,586,502)	$13,012,948	$13,481,252	$13,822,681	$14,313,598
		Savings from eliminating Naknek & S. Naknek CIPs		Bridge construction completed	Naknek closes, travel savings, bridge O&M begins		S. Naknek closes	

Table G-10. Year-by-year stream of net benefits: bridge, low build option (continued)

	2018	2019	2020	2021	2022	2023	2024	2025
Option B1: All Airports Open								
Option: B - Base Case	$13,661,561	$13,742,538	$13,823,496	$13,904,437	$13,985,360	$14,066,268	$14,147,158	$14,230,902
Option: B - Low Case	$6,375,541	$6,212,694	$6,046,961	$5,881,210	$5,715,441	$5,549,656	$5,383,855	$5,220,907
Option: B - High Case	$15,310,955	$15,779,181	$16,230,177	$16,681,156	$17,132,118	$17,583,063	$18,033,992	$18,499,247
Option B2: Close Naknek in 2014								
Option: B - Base Case	$18,413,452	$13,315,337	$13,396,295	$13,477,236	$13,558,160	$13,639,067	$13,719,958	$13,803,701
Option: B - Low Case	$11,127,432	$5,785,494	$5,619,760	$5,454,009	$5,288,241	$5,122,456	$4,956,655	$4,793,706
Option: B - High Case	$20,062,846	$15,351,980	$15,802,977	$16,253,955	$16,704,917	$17,155,862	$17,606,791	$18,072,047
Option B3: Close South Naknek in 2016								
Option: B - Base Case	$14,292,054	$13,638,337	$13,719,296	$13,800,237	$13,881,160	$13,962,067	$14,042,958	$14,126,702
Option: B - Low Case	$7,006,034	$6,108,494	$5,942,761	$5,777,010	$5,611,241	$5,445,456	$5,279,655	$5,116,707
Option: B - High Case	$15,941,448	$15,674,981	$16,125,977	$16,576,956	$17,027,918	$17,478,863	$17,929,792	$18,395,047
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	$19,046,232	$13,213,424	$13,294,383	$13,375,324	$13,456,247	$13,537,154	$13,618,045	$13,701,789
Option: B - Low Case	$11,760,212	$5,683,581	$5,517,848	$5,352,097	$5,186,328	$5,020,543	$4,854,742	$4,691,794
Option: B - High Case	$20,695,626	$15,250,068	$15,701,064	$16,152,043	$16,603,005	$17,053,950	$17,504,879	$17,970,134

Table G-10. Year-by-year stream of net benefits: bridge, low build option (continued)

	2026	2027	2028	2029	2030	2031	2032	2033
Option B1: All Airports Open								
Option: B - Base Case	$14,314,630	$14,398,344	$14,482,043	$14,565,728	$14,637,925	$14,724,451	$14,810,964	$14,883,123
Option: B - Low Case	$5,057,943	$4,894,965	$4,731,972	$4,568,964	$4,569,449	$4,240,041	$4,082,731	$3,911,066
Option: B - High Case	$18,964,488	$19,429,713	$19,894,924	$20,360,121	$20,819,567	$21,293,343	$21,767,105	$22,226,512
Option B2: Close Naknek in 2014								
Option: B - Base Case	$13,887,430	$13,971,143	$14,054,842	$14,138,527	$14,210,724	$14,297,250	$14,383,764	$14,455,922
Option: B - Low Case	$4,630,743	$4,467,764	$4,304,771	$4,141,764	$4,142,248	$3,812,840	$3,655,530	$3,483,865
Option: B - High Case	$18,537,287	$19,002,513	$19,467,724	$19,932,920	$20,392,367	$20,866,142	$21,339,904	$21,799,312
Option B3: Close South Naknek in 2016								
Option: B - Base Case	$14,210,430	$14,294,144	$14,377,843	$14,461,527	$14,533,725	$14,620,251	$14,706,764	$14,778,922
Option: B - Low Case	$4,953,743	$4,790,765	$4,627,771	$4,464,764	$4,465,249	$4,135,841	$3,978,531	$3,806,865
Option: B - High Case	$18,860,288	$19,325,513	$19,790,724	$20,255,921	$20,715,367	$21,189,143	$21,662,905	$22,122,312
Option B4: Close Naknek in 2014 and South Naknek in 2016								
Option: B - Base Case	$13,785,517	$13,869,231	$13,952,930	$14,036,614	$14,108,811	$14,195,338	$14,281,851	$14,354,009
Option: B - Low Case	$4,528,830	$4,365,852	$4,202,858	$4,039,851	$4,040,336	$3,710,928	$3,553,618	$3,381,952
Option: B - High Case	$18,435,375	$18,900,600	$19,365,811	$19,831,008	$20,290,454	$20,764,230	$21,237,992	$21,697,399

Appendix H. Potential sources for funding

This section describes potential financing and funding alternatives for construction and maintenance of the Naknek bridge and connector roads. It also discusses the funding options or lack of funding options for community operation and maintenance of the airports in South Naknek and/or Naknek.

Financing and funding of bridge and road infrastructure

Funds for building and maintaining roads can be generated in many ways. Federal, state, tribal, local, and private funding sources are identified. Because Alaska is a young state with a small population covering vast geographic areas, the gap between the availability of funds for transportation infrastructure projects and the needs of the state is significant.

A discussion of financing mechanisms is really a discussion of the basic questions of who pays, how much, and when. The construction of funding mechanisms determines how many infrastructure needs are met by the federal government, state government, or others. The structure also determines how many current and future needs are met by current users and taxpayers and how many are met by future users and taxpayers.

Alaska is the only state without a state-funded road construction program, and is therefore almost entirely dependent on funding from the federal government (Denali Commission, 2003). ADOT&PF is more limited than most state departments of transportation because the state does not have a revenue source dedicated to funding of transportation projects. Most states have established highway trust funds supported by state gas taxes, motor vehicle excise taxes, licensing fees, and other transportation-related user fees.

In Alaska, each transportation project and program must compete not only with other transportation projects, but also with the other pressing social and infrastructure needs of the state to qualify for funding. Although the federal government provides most of the funding for transportation projects, most projects require a match with state funds ranging from nine to 20 percent of the cost of the project.

Historically, the state has funded transportation projects on a “pay-as-you-go” basis, paying for construction, maintenance, and administration as money becomes available from user fees and federal grants from the Federal Highway Trust Fund (FHTF), the Federal Transit Administration (FTA), or in some cases, from special appropriations.

The FHTF is funded completely from federal fuel excise taxes and various truck taxes collected from highway users (Office of Don Young, 1998). Alaska, a donee state (one that receives more money from the FHTF than it contributes in federal motor fuel taxes), received an average of $312 million per year during the six-year period, 1998 to 2003, covered by the most recent transportation legislation—the Transportation Equity Act for the 21st Century (TEA-21). That amount represented $5.13 received from the FHTF, for every dollar Alaska contributed in motor fuel taxes, the highest amount of any state.

Although the federal government is the major source of transportation funding in Alaska for capital projects, the state pays for maintenance and operations for state roadways, most Alaska airports, and the Alaska Marine Highway System (AMHS).

ADOT&PF prepares a list of needed transportation projects across the state in three-year increments. The current State Transportation Improvement Plan (STIP) is for 2001 through 2003, but a new "Needs List" for 2004 through 2006 has been released in predraft format. ADOT&PF also maintains an up-to-date online project database of the Needs List. The STIP covers four categories of projects toward which surface transportation investments are directed:

- Bringing the National Highway System (NHS) and the AMHS up to standard
- Upgrading the Secondary Highway System (SHS) and the AMHS connections
- Creating partnerships with local government to develop Community Transportation Plans for construction projects that serve local transportation needs
- Implementing the Trails and Recreational Access for Alaska (TRAAK) to improve recreational access and opportunities for both visitors and residents

The Needs List contains all the projects that state residents, elected officials, and transportation officials have formally proposed; however, the content of the list is constrained by the estimate of available funding and is limited to those projects for which there is reasonable expectation of funding (ADOT&PF, 1999). ADOT&PF retains the selection authority for NHS and SHS projects because of the statewide importance of these projects. In addition, projects may be advanced or delayed to take advantage of specific funding categories (ADOT&PF, 2003).

Public-sector funding available for bridge and road construction

Ownership of public roads is divided among federal, state, and local governments. Local governments own more than 77 percent of public roads in the United States (Government Accounting Office [GAO], 2002a). States own 20 percent, including most of the Interstate Highway System (IHS). Although the federal government owns only three percent of public roads (including roads in national forests, parks, and on military and Indian reservations), it has played a major role in funding the nation's highways. According to a GAO report released in August 2002, the federal government invested more than $370 billion (constant 2001 dollars) in the IHS from 1954 through 2001 (GAO, 2002a).

Of the 13,635 miles of roads in Alaska, the state controls approximately 43 percent and the federal government controls approximately 19 percent. Ownership of nonfederal rural roads consists of about 55 percent by the state, 22 percent by boroughs, and 23 percent by municipal and other categories (National Association of Development Organizations, 2003).

The IHS was completed in the 1980s, and the federal government shifted its focus from construction of the system toward preserving and enhancing its capacity. In terms of public roads, capital expenditures include new construction, resurfacing, rehabilitation, restoration, and reconstruction (GAO, 2002a).

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the TEA-21, enacted on June 9, 1998, created a revolution of sorts in public transportation by providing predictable funding, innovative financing, and investments in new technology. The ISTEA and the TEA-21 were major multiyear acts. Surface transportation acts vary in their scope and duration, as major multiyear bills or as stop-gap funding bills. For example, on

December 1, 1997, the Surface Transportation Extension Act extended funding for surface transportation programs and ensured continued program operation for one year while Congress worked on more comprehensive, multiyear legislation.

The federal highway program is financed through the collection of motor fuel taxes and other levies on highway users. Federal aid for highways is then provided to the states on a largely grant (cash) basis. Grant monies are distributed from the Federal Highway Trust Fund and apportioned to the states based on a series of funding formulas. Most funding is subject to grant matching, which, for most federally funded projects, is 80 percent federal and 20 percent state. With most grant funding, states are obligated to have all of the funds needed for a project in advance. They are reimbursed for project costs as they are incurred.

Federal programs

Federal funding has been the primary funding source in Alaska for construction of surface transportation projects. The state's constitution forbids the use of dedicated funds to supplement federal programs. As a result, most transportation projects in Alaska must compete with other state projects to provide matching funds for federal funding. Although some federal funding has been provided as a lump sum, most federal funding is allocated to specific programs. States with a high percentage of federal land, such as Alaska, are required to make a smaller match. Federal lands highways projects that serve federal and Indian lands receive 100 percent of funding from the federal government (FHWA, 1999). Most of the funding comes to the state through the FHWA and the FTA. Most surface transportation laws that govern the Federal-Aid Highway Program are part of Title 23 of the *U.S. Code* (USC), titled "Highways." This code is amended, as needed each time a new surface transportation authorization is enacted.

Intermodal Surface Transportation Efficiency Act

ISTEA gave state and local officials substantial flexibility by allowing them to shift funding among various surface transportation modes—for example, use of highway funding for transit projects. ISTEA also provided substantial funding for Intelligent Transportation Systems, including the development of "Smart" highways and cars to assist in the provision of safer, cleaner, and more efficient use of the nation's transportation infrastructure. The act expired on September 30, 1997.

Through Title 23 of the USC, ISTEA called for involvement of the public at all stages in the development of state transportation plans.

ISTEA established a new set of program principles covering the following:

- Build partnerships with local and state officials to advance the strategic goals for transportation capital investment
- Use funds in a flexible manner
- Strengthen intermodal connections
- Expand investment in, and deployment of, new information technologies for transportation services

- Heighten sensitivity to the positive impact that transportation has on quality of life and on the shape and character of America's communities

Test and Evaluation Finance Research Project

The Test and Evaluation Finance Research Project of 1994 launched the FHWA Innovative Finance Test and Evaluation (TE-045) Program. TE-045 is a major initiative to identify barriers to highway infrastructure investment and to develop strategies to overcome them. The program was an acknowledgment of the funding gap between traditional government funding sources and the increasingly complex and diverse needs of the nation's transportation infrastructure (FHWA, 2002). The states were asked to provide input on flexible approaches to blending federal and nonfederal highway funds so that existing federal resources could be leveraged. Many innovative techniques proposed under the TE-045 initiative were later enacted into law with passage of the National Highway System Designation Act of 1995.

National Highway System Designation Act

Landmark legislation, the National Highway System Designation Act of 1995 (FHWA, 1996), designated almost 160,955 miles of roads as the NHS, considered the backbone of the national transportation network for the 21st Century. The NHS includes the IHS as well as other roads identified as important to the nation's economy, defense, and mobility. NHS was developed by the U.S. Department of Transportation (USDOT) in cooperation with states, local officials, and metropolitan planning organizations. ISTEA prevented NHS and Interstate Maintenance funds from being released to the states until an NHS was designated (FHWA, 1996).

The National Highway System Designation Act built on important financing options set forth in ISTEA and identified in the TE-045 initiatives (FHWA, 2002). These options are referred to as "innovative finance" by the FHWA and are intended to provide alternatives to traditional highway financing practices. For example, the National Highway System Designation Act expanded the eligibility of debt financing costs for federal-aid reimbursements and enabled states to use a debt finance instrument called Grant Anticipation Revenue Vehicle (GARVEE) bonds to generate up-front capital for major highway projects. The state may be unable to construct the projects in the near term with the use of traditional pay-as-you-go funding approaches.

The National Highway System Designation Act also amended Section 115(d) of Title 23 of the USC to permit the Secretary to approve an application for advance construction consistent with projects included on the STIP. Advance construction allows a state to initiate federally approved projects without a commitment of federal funds. A state may request obligation (commitment) of federal funds at a later date. Before the National Highway System Designation Act, the limitation on advance construction required that an authorization of federal funds be in effect one year beyond the fiscal year for which the project was approved, which eliminated a state's ability to advance construction in the final year of a multiyear authorization act. The amendment provided greater flexibility to the states to engage in advance construction.

Another amendment modified the federal share available for eligible toll projects, replacing the current range of 50 to 80 percent with a uniform federal share of 80 percent. In addition,

the loan provisions have been expanded to cover both toll and non-toll facilities with a dedicated revenue source. Further, the states were given greater flexibility in determining the interest rates for loans and were given the authority to use loan repayments for additional activities.

23 USC 323 was amended to allow states to credit privately donated funds, materials, or services on a specific federal-aid project toward the required state match on the project. Before this change, states could receive credit only for donations of private property incorporated into a federal project or for state and local funds.

23 USC 118(e) (Legal Information Institute, undated) states:

> Funds made available to the State of Alaska and the Commonwealth of Puerto Rico under this title may be expended for construction of access and development roads that will serve resource development, recreational, residential, commercial, industrial, or other like purposes.

The National Highway System Designation Act also allowed 10 states or multistate entities to establish transportation infrastructure banks that may be used to make project loans, enhance credit, subsidize interest rates, and provide other assistance for eligible highway and transit capital projects. The funds from the bank cannot be used as a grant. The recipients of the assistance can be public and private entities.

Surface Transportation Extension Act

On December 1, 1997, the Surface Transportation Extension Act of 1997 (Public Law 105-130; 111 Statute 2552) provided a 6-month extension of highway, highway safety, and transit programs, pending enactment of a law reauthorizing the ISTEA of 1991. The possibility of a stop-gap bill for this funding cycle currently exists, pending reauthorization of TEA-21.

Transportation Equity Act for the 21st Century

TEA-21 was enacted on June 9, 1998, and authorized the federal surface transportation programs for highways, highway safety, and transit for the six-year period,1998 to 2003. The $218 billion program, as amended, expired September 30, 2003. Reauthorization hearings are under way.

TEA-21 is a massive spending program that set federal transportation spending priorities for road, bridge, public transit, bicycle, pedestrian, and other traffic safety projects. When TEA-21 was enacted, several changes affected Alaska, including increased total funding availability, new categories of funds, and new opportunities for providing discretionary or competitive grant funds for transportation projects (ADOT&PF, 1999).

TEA-21 built on the success of its predecessor, ISTEA, but represented a new era in transportation funding decision-making because it linked highway resource levels to motor fuels tax revenues. TEA-21 directly ties user fees or taxes that go into the Highway Trust Fund to the level of program funding provided. States receive funds at a predetermined percentage rate. If tax receipts rise, program spending for highways increases proportionately.

At the same time, TEA-21 established a federal budget mechanism that guaranteed that approximately $200 billion was reserved exclusively for highways, highway safety, and

transit. This spending floor could be increased through the annual budget process if Congress chose to dedicate a portion of the general budget allocation to highways and highway safety.

The fact that TEA-21 was a six-year bill and resource levels were linked to motor fuels tax revenues, promoted state and local planning efforts by providing multiyear resources to state and local governments. TEA-21 also required state and metropolitan governments to incorporate a planning process into their decision-making process and to prepare both short- and long-term transportation plans.

Section 1601 of TEA-21 established the "high priority projects (earmarking) program," which lists 1,850 congressionally designated projects across the United States with a specified dollar authorization for each project (Fischer, 2002). Almost $9.4 billion in authorizations were provided for this program.

Actual federal appropriations may be less than the amount authorized, however. Under TEA-21, $68.8 million of federal funding for Alaska was designated for 15 high-priority projects through 17 high-priority appropriations (ADOT&PF, 1999). According to federal rules, appropriations for high-priority projects must be passed through ADOT&PF before allocation to the project sponsor—a local government or other public agency. Table 6-13 shows the high-priority projects for Alaska contained in TEA-21, along with the funds authorized and the first year of the project.

Table 1. Alaska high priority projects contained in TEA-21

Project name	Total funding ($000)[a]	First year of award
Seward – Spruce Creek Bridge	262.5	2002
Seward AMHS Intermodal Freight and Passenger Facility	4,500.0	1999
Kotzebue Roads	1,762.5	1999
Point MacKenzie Intermodal Facility	6,750.0	1999
Coffman Cover Ferry	2,250.0	1999
Kenai Spur Road Extension	6,000.0	2001
West Douglas Highway Extension	2,475.0	1999
Gravina Island Bridge	15,000.0	1999
Gravina Island Bridge	5,443.0	[b]
Northwest Railroad Access	2,500.0	1999
North Denali Access Route	1,500.0	2002
Prince of Wales Island Marine	750.0	1999
AMHS Ketchikan Ferry Terminal Facilities	2,250.0	1999
Ketchikan Dry Dock Improvements	750.0	[b]
Ship Creek Route	11,943.0	1999
Bradfield Canal	1,000.0	2002

[a] Actual federal appropriations may be less than authorization level shown.
[b] Project funding combined with preceding project.
Source: ADOT&PF, 1999.

TEA-21 contained some innovative provisions (Transportation Infrastructure Finance and Innovation Act of 1998, discussed below) that helped states address the ups and downs of federal spending cycles. Innovative transportation programs allow a state to spread construction costs over several years.

TEA-21 allows states to use federal-aid funds for design-build contracts after receiving FHWA approval. Traditionally, a transportation project has been first designed and then built under separate bids. Now, a single team can submit a plan based on technical factors and price. Because one team performs both the design and construction, construction can start before all design details are finished.

Transportation Infrastructure Finance and Innovation Act

One part of TEA-21, the Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA), helps states pay for large projects that have some funding available but need additional loan money for completion. Under TIFIA, the federal government provides states with credit assistance rather than grant money. TIFIA established a new federal credit program under which USDOT may provide three kinds of credit assistance for surface transportation projects of regional or national significance:

- A state can get a direct loan.
- The federal government can guarantee a loan.
- The federal government can provide a standby line of credit.

The goal of TIFIA is to leverage limited federal resources by attracting nonfederal co-investment in infrastructure improvements. When public agencies speak of "leveraging," they are generally referring to the level of co-investment that occurs in conjunction with federal funds either through matching requirements or through the attraction of new revenue sources (Cambridge Systematics, Inc., 2002). Instead of grants, the federal government provides credit assistance in the form of direct loans, loan guarantees, and standby lines of credit for projects of regional or national significance.

Key objectives of TIFIA include the following (USDOT, 2002):

- Facilitate projects with significant public benefits
- Encourage new revenue streams and private participation
- Fill capital market gaps for secondary and subordinate capital
- Be a flexible, "patient" investor willing to take on investor concerns about investment horizon, liquidity, predictability, and risk
- Limit federal exposure by relying on market discipline
- Some of the major requirements are as follows (USDOT, 2002):
- Large surface transportation projects ($100 million generally; $30 million for Intelligent Transportation Systems)
- TIFIA contribution limited by statute to 33 percent
- Investment grade rating

- Dedicated revenues for repayment
- Applicable federal requirements (Civil Rights, NEPA, Uniform Relocation, Titles 23 and 49)

Eligible sponsors include state government, private firms, special authorities, local governments, and transportation improvement districts. Fees consist of a $30,000 application fee and a credit processing fee of between $100,000 and $300,000, depending on the complexities of the transaction. Bridges are considered eligible projects.

Other innovative finance techniques

In the FHWA primer on techniques for innovative financing, innovative finance is defined broadly as "a combination of specially designed techniques that supplement traditional highway financing methods" (FWHA, 2002). These innovative finance techniques can be classified into four categories that are as listed in Table 2.

Table 2. Innovative finance techniques for transportation projects

Classification	Strategy	Uses
Innovative management of federal funds	Advance construction	Allows a state to begin a project even if the state does not currently have sufficient federal aid obligation authority to cover the federal share of the project costs.
	Partial conversion of advance construction	Allows a state to elect to obligate funds for an advance-constructed project in stages.
	Tapered match	Applies the nonfederal matching requirement to the aggregate cost of a project rather than on a payment-by-payment basis.
	Flexible match	Allows states to substitute private and other donations of funds, materials, land, and services for the nonfederal share of funding for highway projects.
	Toll credits	Allows states to use revenue from toll facilities as a credit toward the nonfederal matching share of certain highway projects.
Debt financing	Grant Anticipation Revenue Vehicles (GARVEEs)	Permit states to pay debt service and other bond-related expenses with future federal aid highway apportionments.
Credit assistance	Section 129 loans	Allows states to use regular federal-aid highway apportionments to fund loans to projects with dedicated revenue streams.
	State Infrastructure	Allow certain states to use regular federal aid highway apportionments to capitalize state-

Classification	Strategy	Uses
	Banks (SIBs)	administered revolving funds. SIBs can offer loans and credit enhancement to both public and private transportation project sponsors. Banks can be capitalized with state funds.
	Transportation Infrastructure Finance and Innovation Act (TIFIA)	Allows USDOT to provide direct credit assistance to sponsors of major transportation projects. Credit assistance can take the form of loans, loan guarantees, or lines of credit; the total amount of credit cannot exceed 33 percent of eligible project costs.
Tolling	General toll provisions	Provide states the discretion to levy tolls on most noninterstate federal aid highways.
	Interstate Reconstruction and Rehabilitation Program	Allows up to three pilot projects to convert reconstructed or rehabilitated free interstate highway segments into tollways.
	Value Pricing Pilot Program	Sponsors the testing and evaluation of road and parking pricing concepts designed to achieve reductions in highway congestion.

Source: FWHA 2002

Although many of these techniques are not new, their application in the transportation sector is new. With the use of the techniques, FHWA is responding to the need to supplement the more standard method of financing highway projects through grants that usually cover about 80 percent of a project. FHWA describes these objectives for innovative finance:

- Maximize the ability of state and other project sponsors to leverage federal capital for needed investment in the nation's transportation system
- More effectively use existing funds
- Move projects into construction more quickly than under traditional financing mechanisms
- Make possible major transportation investments that might not otherwise receive financing

Some of these innovative finance techniques are discussed below. Of note is a recent assessment by the GAO (2002b) comparing four methods of financing $10 billion of infrastructure projects. GAO concluded that although alternative financing mechanisms have accelerated the pace of some surface transportation infrastructure improvement projects and stimulated additional investment and private participation, in the final analysis the mechanisms are different forms of debt financing. In the end, these debts must be repaid with interest.

Congressional appropriation

An appropriation is an act of Congress that generally provides legal authority for federal agencies to incur obligations and spend money for specific purposes, usually through the enactment of 13 separate appropriation bills. In addition to the annual USDOT and Related Agencies Appropriations Act, Congress can earmark a direct appropriation for a specific local project.

Denali Commission

The Denali Commission is a federal-state partnership established by Congress in 1998 to provide critical utilities, infrastructure, and economic support throughout Alaska. Senator Ted Stevens and former Senator Frank Murkowski introduced a measure at the end of the last session of the 107th Congress to provide $440 million to the Denali Commission to fund transportation projects in rural Alaska. Senator Ted Stevens and Senator Lisa Murkowski have introduced a bill in the 108th Congress that would establish a "Denali transportation system" in the State of Alaska. Senator Stevens has said that projects that provide access to resources would be given priority (Bennett, 2003). The March 2003 Denali Commission Update (2003a) states:

This new transportation element could either be enacted independently, or merged into reauthorization of the Transportation Equity Act (TEA-21), a major piece of legislation which authorizes and appropriates funds to build roads, bridges, and other infrastructure. Congressman Young chairs the committee with jurisdiction over the reauthorization and bill and will be a driving force behind how funds will be spent for transportation projects nation-wide over the next six years. In anticipation of this, the Denali Commission has met with a wide variety of agencies and individuals from around the state to gain their perspectives and recommendations on the potential role the Denali Commission could play in the access arena.

If the Denali Commission receives authorization and appropriation for a transportation program, allocation decisions would need to be made. The Denali Commission may place some type of matching criteria on use of these funds. Funding through the Denali Commission might expedite the entire funding and construction process of transportation projects.

State of Alaska programs

The matching funds required for federal highway grants are typically appropriated from the General Fund. The Alaska constitution prohibits the dedication of funds. Although motor fuel taxes are important revenue sources for the state, these revenues go into the General Fund.

Bonds

Three types of bonds are described in the following subsections: general obligation bonds, GARVEE bonds, and revenue bonds. As mentioned above, GAO (2002b) recently completed an assessment of costs that federal, state, and local governments (or special purpose entities they create) would incur to finance $10 billion in infrastructure projects with the use of four current and newly proposed financing mechanisms. To date, most federal funds for highways have come from federal aid highway grants appropriated by Congress from the Highway Trust Fund. This funding mechanism remains the lowest-cost financing method.

The GAO assessment determined that federal highway grants are the lowest-cost finance mechanism in the long term because they are the only alternative that does not involve borrowing from the private sector through the issuance of some type of bond. Private investors must be compensated for the risks they assume in the purchase of bonds. Governments must compensate for these risks in addition to paying back the present value of the bond principal.

For the short term, a five-year period or less, tax-exempt bonds require the least amount of public money up front. These bonds also involve the most borrowing and have the highest combined costs for governments.

General obligation bonds. A general obligation bond is a municipal bond secured by the taxing and borrowing power of the local or state government issuing it. Both the principal and interest are secured by the full faith and credit of the issuer and usually supported by either the issuer's unlimited or limited taxing power. In addition, general obligation bonds must be approved by voters. General obligation bonds are repaid from the tax base of the governmental body issuing the bonds. In other words, a government entity sells the bonds, uses the proceeds to support one-time capital costs, and then allocates a portion of its future annual revenue to pay toward the debt each year.

The principal characteristic differentiating municipal bonds from other capital market securities is that the interest paid to the bond investors is exempt from federal income tax.

GARVEE bonds. GARVEE bonds are debt-financing instruments that enable states to fund transportation projects based on their anticipated future federal funding. Combined with advance construction, GARVEEs enable a state to use federal-aid funds for future debt service payments. The GARVEE bond techniques enable a state to accelerate construction timelines while spreading the cost of a transportation project over its useful life, rather than just the construction period. The use of GARVEEs expands access to capital markets either as an alternative or in addition to general obligation or revenue bonding capabilities. Projects need to be approved by the FHWA. GARVEE bonds were conceived as a tool for accelerating transportation projects at present-day costs. Because federally pledged revenues secure the bonds, they do not increase a state's general bonded indebtedness.

Before TEA-21, states were prohibited from repaying their debt with federal money. TEA-21 removed this hurdle by guaranteeing federal funding levels through Fiscal Year 2003 and included an equity provision ensuring that each state will get back a share of the Highway Trust Fund equal to 90.5 percent of its percentage contribution. A state can then pledge a share of future obligations of federal highway funds toward repayment of bond-related expenses, including a portion of the principal and interest payments, insurance costs, and other costs.

Although GARVEE bonds can be used to speed up construction of transportation projects, they are not state-guaranteed debts. The GARVEE bonds offer an additional source of revenue outside of the General Fund and are subject to annual appropriation by the state legislature.

In November 2002, Alaska voters approved a $227 million portfolio of transportation projects. Eight of the projects approved by voters are anticipated to cost $102.8 million that

will be supported by GARVEEs. The rest of the portfolio of projects will be financed by state general obligation bonds to be repaid with state revenues.

Revenue bonds. Municipal bonds, or "munis", are bonds issued by city, county, or state governments for a variety of projects such as building schools, expanding highways, or constructing a new sewage system. Municipal bonds are normally exempt from federal taxes and sometimes from state and local taxes. Revenue bonds are a type of municipal bonds for which principal and interest are secured by revenues such as charges or rents paid by users of the facility that is built with the proceeds of the bond issue. Projects financed by revenue bonds include highways, airports, and not-for-profit health care and other facilities.

According to the Indian Tribal Government Tax Status Act of 1982 to the *Internal Revenue Code*, Indian tribes have the authority to issue tax-exempt revenue bonds to finance "essential governmental functions." Although a road is usually considered "an essential government function," a private road may not be considered "an essential service" by the Internal Revenue Service.

Alaska Industrial Development and Export Authority

AIDEA is a public corporation and government entity of the State of Alaska that was established by the Alaskan Legislature in 1967 "to promote, develop and advance the general prosperity and economic welfare of the people of Alaska."

AIDEA has established a variety of programs designed to promote economic development in Alaska. The most important program applicable to this study is the Development Finance Program established by the Alaska Legislature in 1980. Through this program, AIDEA owns and finances certain projects (through tax-exempt bonds) that are economically beneficial to Alaska. Projects typically provide infrastructure support for resource utilization and development such as airports and seaports. A project must assist the local economy and be endorsed by the local government.

A project must be considered financially feasible to qualify for this financing. To be considered financially feasible, the revenues from user fees and leases must be sufficient to repay the costs of the project, which include construction costs, planning and permitting costs, cost of issuing the bonds, and direct job-specific costs. Projects requiring more than $10 million in financing must receive authorization from the Alaska Legislature. Some projects financed through the Development Finance Program include the Federal Express Aircraft Maintenance Facility, Healy Clean Coal Project, the Skagway Ore Terminal, the Unalaska Marine Center, and the DMTS—the port and road serving the Red Dog Mine north of Kotzebue.

AIDEA owns the DMTS, and its investment base is approaching $267 million (AIDEA, 2003). The original construction of the project was funded in 1987 by the sale of $103 million in tax-exempt bonds that were sold by AIDEA. Teck Cominco Alaska Incorporated has nonexclusive priority rights to use the system until 2040 and pays a toll for use of the facilities. Teck Cominco is also obligated to operate and maintain DMTS at a commercially reasonable rate of compensation.

Financing through AIDEA is most beneficial to projects that qualify for the tax-exempt bond financing. Those projects that do not qualify may find better financing options elsewhere. Depending on the project specifics, AIDEA financing may not be attractive to projects being

studied in the RTA if they do not qualify for the tax-exempt financing. In the case of the DMTS, Teck Cominco guaranteed the State of Alaska $12 million a year in toll fees, or potentially, $600 million during its projected 50-year life, in return for the state's investment. That figure included a 6.5 percent rate of return on the original state investment of $150 million (Skok, 1991).

State Infrastructure Banks

The State Infrastructure Bank (SIB) is a new FHWA program established by the 1995 National Highway System Designation Act. Through creation of an SIB, transportation providers at the state or regional level can finance capital projects. An SIB can give a state increased flexibility in project selection and financial management. The federal government provides "seed" funds to the SIB so that the bank can make loans and provide other types of credit assistance to both public and private transportation project sponsors. The original seed money to Alaska was $2.5 million. After depositing the seed funding, any match funding, federal-aid highway funding, and possibly other state funds into the bank, a state can use the bank to make loans, back bond issues, and accelerate state and federal-aid highway projects. SIBs can enhance private investment by lowering the financial risk and helping to attract private developers wishing to take an equity interest in projects. As of September 2001, 32 states had SIBS with 245 loan agreements amounting to more than $2.8 billion (FHWA, 2002).

Private-sector funding for construction

Several public-private models for funding transportation construction have been used, including the following:

Build-operate-transfer. A private company or consortium receives a concession to finance, build, and operate a facility for a fixed period of time, after which ownership reverts to the public sector.

Build-operate-own. A private company or consortium is granted a franchise, then designs, finances, builds, and operates the facility it owns by using public support in land acquisition and other related matters.

Buy-rehabilitate-operate. A private group purchases or leases an existing facility from the government and then repairs, refurbishes, or expands it. The investors retain ownership and exercise all responsibilities of ownership, including collecting all revenues and paying taxes on the property.

Lease-rehabilitate-operate. Similar to buy-rehabilitate-operate, under lease-rehabilitate-operate, the private developer operates the facility for a period of years before the property reverts to the public sector at the end of the lease.

Toll roads

Toll roads offer an alternative method of financing for needed highway projects, particularly when the traditional tax-based method of financing roads is no longer sufficient to handle the mobility needs of the state in a timely fashion. Financing projects through the use of tolls adheres to the "user pays" principle in which the individuals who benefit most from the

project pay for the project (FHWA, 2002). Federal highway law now permits tolling on most non-interstate highway projects as long as resulting toll revenues are committed to payment of debt service and the operation and maintenance of the tolled facility. Toll roads have proven to be an effective method to finance an industrial road, as supported by AIDEA's experience with the DMTS.

Toll roads provide a precise way of linking benefits to user costs. If toll facility projects are initiated by a public authority in a state, the state transportation department can request that reimbursements from the federal government are made directly to that public authority (FHWA, 1999).

Right-of-way contribution

Some funding for construction of transportation projects can be obtained by contributions from the private sector for allowing use of the road ROW to build and operate a pipeline.

Title 23 USC 323 allows certain ROW donations to count toward the local funding share of a transportation project. Donations must be from private ownership to public ownership for project purposes. Land that has been acquired previously and is already intended or available for use by the public does not qualify for donation credit.

Maintenance

According to the GAO (2002a), maintenance and rehabilitation of existing infrastructure should be considered an important supplement to and, in some cases, a substitute for building new infrastructure. Maintenance of roads is based on deterioration. Although roads will deteriorate if simply left unused, most deterioration is associated with use. The damage caused by vehicles increases proportionately with size and weight. Therefore, costs associated with maintenance are greater for trips made by heavy vehicles.

Taxes or tolls on users are broadly viewed as being the equitable way to fund road maintenance. From an efficiency perspective, such taxes or tolls are also the most efficient way to generate funding for maintenance. Efficiency effects can only be generated, however, if the costs of maintenance are internalized to road users. Ideally, each vehicle would pay its share of the maintenance costs necessitated by its use—the cost of maintenance would be allocated to those who generate the cost requirement.

Federal funding

When FHWA provides funding for roads, the recipient is responsible for the long-term maintenance of the project because federal funding is not available for operation or maintenance.

BIA distributes funding to tribes and Native organizations on a state-by-state basis using its own administrative criteria for operation and maintenance of tribal roads. In Alaska, however, the BIA funding, which amounts to approximately $14 million per year, is spread among approximately 200 tribes in the state (Denali Commission, 2003b).

State funding

Although the federal government is the major source of transportation funding of capital projects in Alaska, the state pays for maintenance and operations for state roadways. ADOT&PF is more limited than most state departments of transportation because the State of Alaska does not have a revenue source dedicated to funding of transportation projects. The *Vision 2020 Statewide Transportation Policy Plan* (ADOT&PF, 2002) was approved in November 2002. This plan sets the direction for Alaska's 21st century transportation system.

In this plan, three of the 18 policies deal directly with maintenance issues. One of the policies addresses the need to "adequately operate and maintain the transportation system; advocate and develop mechanisms that provide sufficient and stable levels of funding." Five objectives are specified to carry out this policy:

- Advocate for an adequate level of state funding for maintenance and operations of state surface, air, and marine transportation facilities
- Explore an increase in transportation fuel taxes and related fees (such as vehicle and driver registration fees) and seek ways to ensure that these revenues are allocated to transportation capital and operating needs
- Consider maintenance and operating costs during project development to reduce long-term maintenance costs.
- Contract out maintenance work when cost-effective
- Advise the public of personal actions they can take to reduce litter and highway maintenance and to lengthen the useful life of transportation facilities

Contractual arrangements between public and private funding sources

Interest in public-private partnerships for transportation projects has increased, largely because of the growth in the demand for infrastructure and limited public funds to meet current and future needs. Contractual arrangements, or public-private partnerships, can provide for a transfer of a significant level of responsibility and risk from the public to the private sector. The arrangements can be based on performance-based outcomes, rather than on work activities. Several states allow agreements with highway construction contractors, engineering consulting firms, toll facilities, private developers, and the financial community to pay for transportation, construction, and operation. In New Mexico, the private firm that designed and built a major new highway expansion contracted with the state to maintain the road for 20 years.

Potential funding matrix

Table 3 provides a guide to potential funding sources for the potential project. The substantial resources needed to build and maintain a project of this size and complexity would require a funding package that shares the costs, risks, and benefits among public and private entities with an interest in its completion. Agencies or sources listed in the table may

or may not have a role in financing various stages of the project. Separate funding packages may be needed for construction and maintenance of the various phases of the project.

Table 3. Funding matrix for bridge and road

Program	Agency	Use of funds	Total funds available	Comments
Private				
Contributions from processors that might locate in South Naknek	Private	Operating and maintenance costs	To be determined	
Contributions of ROW by existing landowners		In-kind contribution to reduce capital cost	To be determined	
Tolls for use of roads or bridge			To be determined	
Federal				
Public Lands Highway Program	Federal Highway Admin.	Construction	Approx. $75 million in federal funds is authorized annually through Fiscal Year 2003.	
Indian Reservation Roads Program	Bureau of Indian Affairs	Construction and maintenance	BIA funding spread among more than 200 federally recognized tribes in Alaska	
Denali Transportation System	Denali Commission	To be determined by enabling legislation, Denali Commission, or both	Up to $440 million per year	Authorization legislation currently before Congress. Appropriation legislation would also be needed.

Program	Agency	Use of funds	Total funds available	Comments
National Highway System	Federal Highway Admin.	Construction of high-priority highways that connect major communities within and outside of State	Varies	Reauthorization legislation currently before Congress. Eligibility to be determined.
Surface Transportation Program	Federal Highway Admin.	Flexible funding that may be used by states and localities for projects on any federal-aid highway, including the NHS and bridge projects on any public road.	Varies	Reauthorization legislation currently before Congress. Eligibility to be determined.
High Priority Projects	Federal Highway Admin.	To be determined	Varies. Approximately $52 million of projects in Alaska under TEA-21. Nationally, High Priority earmarks accounted for $9.4 billion.	Reauthorization legislation currently before Congress.
GARVEE Bonds	Federal Highway Admin.	To be determined	To be determined	Permit states to pay debt service and other bond-related expenses with future federal-aid highway apportionments.

Program	Agency	Use of funds	Total funds available	Comments
TIFIA	Federal Highway Admin.	Provides credit assistance in the form of direct loans, loan guarantees, and standby lines of credit for projects of regional or national significance	Not a funding source	
Flexible Match	Federal Highway Admin.	Allows states to substitute private and other donations of funds, materials, land, and services for the nonfederal share of funding for highway projects		
State				
Industrial Development Roads	State General Fund	Preliminary work on potential industrial road projects	$5 million (original budget) or $10 million	
General Obligation	State General Fund	To be determined	To be determined	
Revenue Bonds	State	To be determined	To be determined	No revenue stream currently identified.

While capital construction may take place in phases over a longer period of time, initial funding should be found to allow for the environmental permitting process to take place for all phases of the project.

A Congressional earmark may be required for this project. However, earmarks rarely pay the entire cost of a transportation infrastructure project. Some type of bonding may also be required. GARVEE bonds may be an option.

Table 4 identifies potential funding for construction based on understanding of the current priorities of the State of Alaska and potential funding sources for the two sections of the potential project.

Table 4. Potential funding scenario for construction

Section	Type of potential funding
Naknek Crossing Bridge	State Industrial Roads Program
	High Priority Project (earmark)
	Surface Transportation Program and National Highway Program (eligibility to be determined)
	General Obligation or GARVEE Bonds
	Private-sector participation to upgrade bridge to industrial standards
	Transportation Infrastructure Finance and Innovation Act
Road	State Industrial Roads Program
	General Obligation or GARVEE Bonds
	Private-sector participation to upgrade bridge to industrial standards
	State Industrial Roads Program
	Surface Transportation Program
	Transportation Infrastructure Finance and Innovation Act
	Flexible Match
	Denali Commission Transportation Program

Funding options for operation and maintenance of community airports

If a connecting bridge is built between South Naknek and Naknek, the State of Alaska may stop funding for either one or both of these small communities' airports. This could occur because of their close proximity, and with the two communities connected, residents could travel by vehicle more easily to either airport, which could be either Naknek or South Naknek, or the larger King Salmon airport.

However, community members of both South Naknek and Naknek have voiced concerns over their desire that their local airport remain in operation even if the two communities are connected. Unfortunately, there are no known grants available for funding the operation and maintenance of an existing airport. Most funding which is available to airports is through the FAA, and this is limited to capital grants for the construction of an airport or supporting facilities.

Fee-based revenue sources

Since grants are not available for the operation and maintenance of local airports, and there is a good possibility that the state government will not continue to finance either the Naknek or

South Naknek airport, Naknek and South Naknek may need to devise other methods for obtaining funding for the cost of operating and maintaining their airports.

Possible sources of revenues for the airports are leasing revenues and/or fees for tie-downs.

Appendix I. Population projections and trip forecasts with bridge

This appendix describes the approach used for projecting future population estimates under aviation and bridge scenarios, and estimating future vehicle and person trips that may occur annually between South Naknek and Naknek/ King Salmon under the bridge scenario.

A bridge across the Naknek River will provide road access to South Naknek and, compared to the existing situation of trips by aircraft and small boats across the river, increase the number of trips that residents of South Naknek make between Naknek and King Salmon, and the number of trips that residents of the latter two communities make to South Naknek.

Even after construction of this bridge crossing, the three communities will be isolated from other road systems in Alaska. The airport at King Salmon will provide the primary mode for passenger travel to and from other communities in the state and the Lower 48 states, and tugs and barges will be the primary mode for fuel and freight to and from the three communities. A bridge alternative will, however, increase the interaction between the communities by reducing the current cost of travel, whether expressed in terms of dollars (e.g., airfare between King Salmon and South Naknek), or time (e.g., boat crossing between Naknek and South Naknek).

The following sections of this appendix describe the results of a survey of Bristol Bay Borough residents to estimate the current number of trips across the Naknek River, and a methodology to estimate future trips.

Resident survey

The current number of trips between South Naknek and the other two communities in the Bristol Bay Borough is not well documented. Some limited information was found on air transport passenger and freight volumes, but data on travel by skiff, landing craft, tug and barge, automobile, or snowmachine across the river was nonexistent. As a result, a survey of Bristol Bay Borough residents was conducted to determine the number of trips made by local residents in 2003. No information was obtained on the number of trips made by fishers, other seasonal workers, and visitors to the community so the information presented in Table 1 underestimates the total number of trips. The estimate of more than 25,600 trips equates to about 71 trips per day.

Table 1. Roundtrips across the Naknek River by Bristol Bay Borough residents, 2003

Mode of travel	King Salmon	Naknek	South Naknek	Total
Air taxi	1,044	2,489	4,144	7,677
Private plane	3,169	2,774	249	6,192
Skiff or boat	1,683	5,354	2,063	9,100
Snowmachine	210	215	174	599
Other vehicle	921	106	1,046	2,073
Total	**7,027**	**10,948**	**7,676**	**25,651**

The survey provided information on current travel for local residents but the number of future trips was not estimated from survey data. Another methodology, described in the following section, was used.

Estimating travel demand with limited information

There are other communities around the state that are also isolated from connections to the national road system, where each community has an airport or air access (via floatplanes), and where there are road links between two or more of the communities. It was hypothesized that these types of communities have analogous situations where existing travel data could be used to project future travel between South Naknek and the other two Bristol Bay Borough communities once a bridge alternative is in place. Four relevant community-pairs were identified from around the state with annual average daily traffic count information. These community-pairs included:

Naknek – King Salmon
Craig – Klawock
Seldovia – Jakolof Bay
Nome – Teller

A concept often used in projecting vehicle trips and other forms of interactions between communities is the "gravity model." Basically, the concept states that the number of interactions between the communities (e.g., vehicle trips or telephone calls) is a function of the level of attractiveness between the two communities (some factors may be negative and others may be positive), and the cost of that interaction. The size of the communities in terms of population or some other measure is often used as an indicator of attractiveness, and the cost of the interaction can be measured by a number of factors such as distance between the communities, the cost of vehicle travel between the communities, or the cost of a phone call. This basic approach is used in the following analysis to estimate future trips between the three Bristol Bay Borough communities, based on an equation developed from the four community-pairs.

Data for community-pairs

Table 2 shows the sum of 2003 population estimates for each community-pair, the average annual daily traffic (AADT) counts between each community-pair for 2003, and the mileage between each community-pair. Population data are from the Alaska Department of Labor and Workforce Development (ADOLWD) website, except for Jakolof Bay which is from the Alaska Department of Commerce, Community, and Economic Development website. Jakolof Bay population is not reported by ADOLWD. AADT estimates for 2003 are taken from the Annual Traffic Volume reports presented on the Alaska Department of Transportation and Public Facilities (ADOT&PF) website. The AADT counts were selected for a road segment near a mid-point between the community pairs with a goal of minimizing influence of local community travel on the traffic counts. Mileage estimates for the Northern and Central Regions are taken from the Annual Traffic Volume reports, while estimates for the Southeast community-pairs are based on the *Alaska Milepost*.

Table 2. Community-pair data

Community Pairs	Sum of Population	Travel Distance (miles)	Annual Average Daily Traffic
King Salmon – Naknek	999	15.5	1,010
Seldovia – Jakolof Bay	339	11.8	45
Nome – Teller	3,690	72.2	25
Craig – Klawock	2,025	6.2	2,060

Analysis

A multiple regression analysis using SPSS (Statistical Package for the Social Sciences) was employed to estimate AADT based on the population of the community-pair, and the distance between them.[1] The population and travel cost data for each community pair can be substituted into the equation and used to develop an estimate of the AADT that exists

[1] The equation derived from this analysis is:

AADT = 686.187784 + (0.858 * Sum of Population) – (52.051 * Travel Distance)

R^2 = .967 (The R^2 indicates a strong correlation between the independent variables in the equation and the dependent variable of AADT.)

t statistic: Constant = 2.73; Population = 4.24; Travel Distance = –5.39 (The *t* statistic for each of the independent variables (constant, population, and travel distance) is greater than 2, which indicates that the variables are all statistically significant. Furthermore, for variables with a *t* statistic greater than 2, the larger the value of the *t* statistic (positive or negative), the stronger the influence of the variable on the results.)

The equation states that AADT is equal to a constant (686.188) plus the sum of the population for the community pair times a coefficient of 0.858 minus travel distance in miles times a coefficient of 52.051. The constant and the coefficients are estimated by the multiple regression analysis from the community pair data.

between the community pair. Since South Naknek will be interacting with both Naknek and King Salmon, the total population of the latter two communities was used along with a weighted average distance factor of 11.8 miles. The relative population of Naknek and King Salmon is used to adjust the 9.5 miles estimated distance between South Naknek and Naknek, and the estimated 15.5 miles distance between South Naknek and King Salmon.

Comparison of actual traffic levels with estimated traffic levels

The following table compares the actual AADT for the four community pairs with the estimated AADT from the equation, and the estimated AADT for trips between South Naknek and the other two Bristol Bay communities using the equation. If separate AADT estimates are developed for South Naknek-Naknek and South Naknek-King Salmon, the combined estimated AADT are approximately 100 trips greater than shown in Table 3.

Table 3. Actual and estimated average annual daily traffic

Community Pairs	AADT	Estimated AADT
King Salmon – Naknek	1,010	740
Seldovia – Jakolof Bay	45	350
Nome – Teller	25	105
Craig – Klawock	2,060	2,100
South Naknek – Naknek/King Salmon		1.020

A comparison of the actual AADT data with the estimated AADTs suggests that the equation may be an acceptable means for estimating future trips with a bridge alternative. The equation indicates that about 1,020 daily vehicle trips might occur in 2003 if a bridge were available between South Naknek and the other two communities, with the three communities having a total population of 1,101. Recall that in 2003, local residents indicated that they make about 71 round trips (142 one-way trips) per day with the existing situation.

There are several known factors that account for some of the variation between the actual AADT and the AADT estimated by the model. For example, the road links between Seldovia -Jakolof Bay, and Nome-Teller are gravel while the other road links are paved. Also, the Nome-Teller road is maintained only in the summer and is passable by passenger vehicles only during that time. If the roads were paved and maintained on a year-round basis the AADT on these two links would be higher. Since the Naknek River bridge and road connections would be paved and maintained year-round, the actual number of trips could be higher than estimated by the model, similar to the model estimating 740 trips between Naknek and King Salmon while the actual AADT is about 1,010.

The estimated AADT in Table 3 do not include any possible changes in economic conditions or population changes in South Naknek that might occur with a bridge. Such changes are addressed later in the memo. Table 3 shows the number of vehicle trips that would be expected if a bridge were in place with current economic conditions and population levels.

Changes in population with changes in regional economic conditions under the aviation scenarios

The level of traffic will change over time as the population changes so population forecasts are necessary to determine the future level of traffic. This section begins with a forecast of population estimates for the three communities and the Borough under the aviation scenarios. A subsequent section describes the potential changes that may be associated with a bridge across the Naknek River, and provides population forecasts that may be associated with the bridge scenarios.

Population changes will be driven to a large extent by economic opportunities surrounding the fishing industry. As noted in Appendix C, the salmon industry is in a state of flux, and it is difficult to foresee what the future will hold for the local seafood industry and residents. Given the difficulty in reliably forecasting future economic conditions, this study uses a scenario based approach to describe what the future might hold for the region. This scenario-based approach provides a wide range in which the likely future will be found, and enables the analyst to assess the viability of a project or its impacts within this range of futures. In developing these scenarios the consultant team reviewed statewide forecasts prepared by the Institute of Social and Economic Research at the University of Alaska Anchorage, the Alaska Department of Labor and Workforce Development, and studies prepared by Northern Economics on restructuring of the Bristol Bay Salmon Fishery, and other studies conducted by the firm in the region.

The population forecasts used in this study are predicated on changes in local economic conditions. The base case population forecast anticipates continuation of long-term trends described in Appendix C. The low case would see economic conditions deteriorate and the most negative population trends experienced over the past 13 years would be expected. Conversely, the high case would see economic conditions improve and the population would increase in response to those conditions. The turnabout in economic conditions is not expected to occur immediately so the current trends of decreasing population in King Salmon and Naknek would continue until about 2010 when economic conditions would have improved enough that population growth would begin.

These assumptions were converted into population trends expressed in terms of compound annual rates of change for each community. Table 4 shows the annual percentage change in population for the 2003 to 2033 period. The rates of change are constant over the time period for the low and base case. Under the high case King Salmon and South Naknek continue to lose population until 2010 when economic conditions improve.

Table 4. Population trends between 2003 to 2033 by community and scenario

Community	Low Case (%)	Base Case (%)	High Case (%)	
			2003-2009	2010-2033
King Salmon	-2.38	-2.02	-2.38	1.50
Naknek	0.04	1.03	2.16	2.16
South Naknek	-3.07	-1.57	-3.07	1.50

These scenario-derived trends in population were used to develop the population forecasts shown in the following figures. As noted in Figure 1 the communities of King Salmon and South Naknek continue to lose population under the base case, with many local residents moving to Naknek which is the center of the local government and the center of seafood industry employment. The closure of the active U.S. Air Force base in King Salmon in the mid-1990s is expected to result in continuing outmigration from the community as the local residents react to decreased employment opportunities. In South Naknek, the inability to create new jobs because of the higher costs associated with being on the south side of the river is expected to result in a continuation of outmigration from the community. The overall Borough population continues to decline under the base case scenario, albeit a relatively minor decline over the next 30 years.

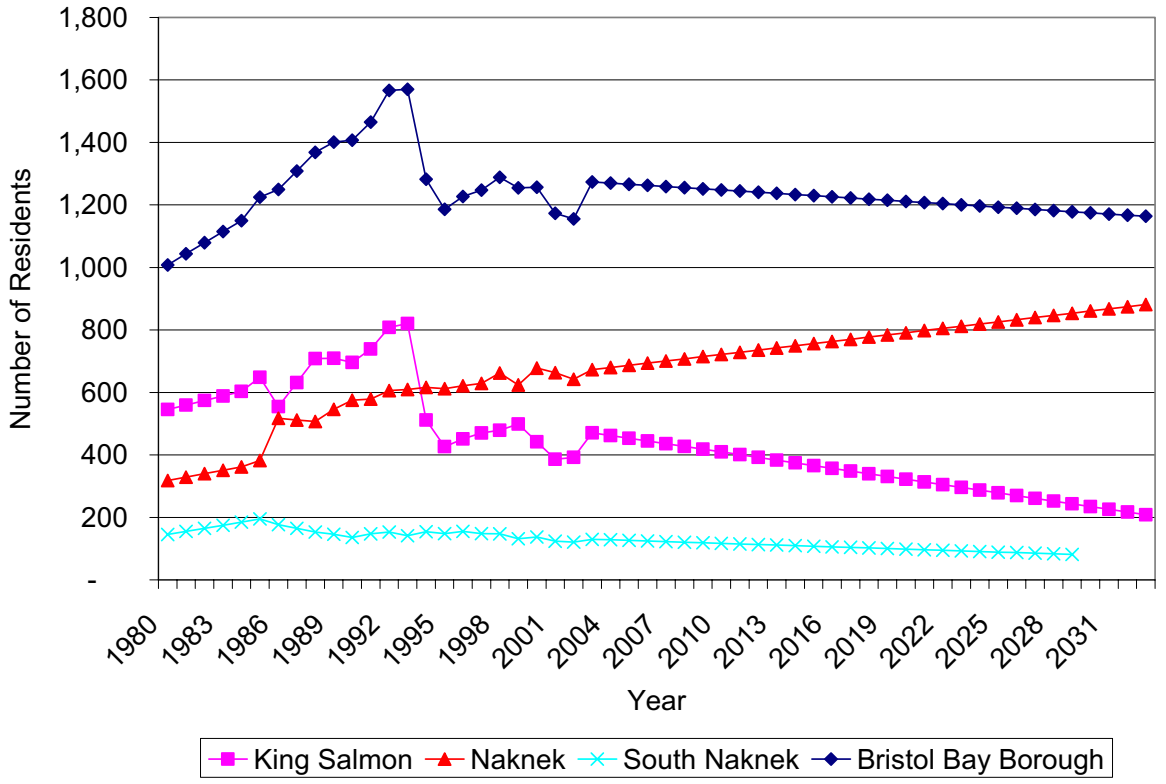


Figure 1. Base case population forecasts by community under aviation alternatives, 2003-2033

The low case scenario (See Figure 2) anticipates even greater losses in population for King Salmon and South Naknek, with Naknek hovering around its present population levels over the time period as poor economic conditions make it difficult for local businesses and residents. The result is a substantial population loss for the Bristol Bay Borough through 2033. It is not necessary in a scenario analysis to identify each potential event or activity and the resulting effect on the local economy, but rather to evaluate the difference from the base case provided by the low scenario assumptions. If the difference seems large enough that it will incorporate likely future conditions, it is sufficient for evaluation and sensitivity testing.

The high case assumes that economic conditions in the region improve (See Figure 3). This situation could occur due to improved statewide economic conditions such as a natural gas pipeline, continued high prices for oil, new oil and gas discoveries, or through improvements that more directly affect the local economy such as improved prices for salmon, oil and gas discoveries on the Alaska Peninsula, the beginning of large-scale mineral production in the region, and other possible events. As noted previously, population in King Salmon and South Naknek is assumed to continue declining at rates associated with the low scenario until 2009 when these future events result in improved economic conditions in the region.

Table 5 presents the actual population data for 2000 through 2002, and for 5-year intervals from 2010 through 2033, for each community under each scenario or case.

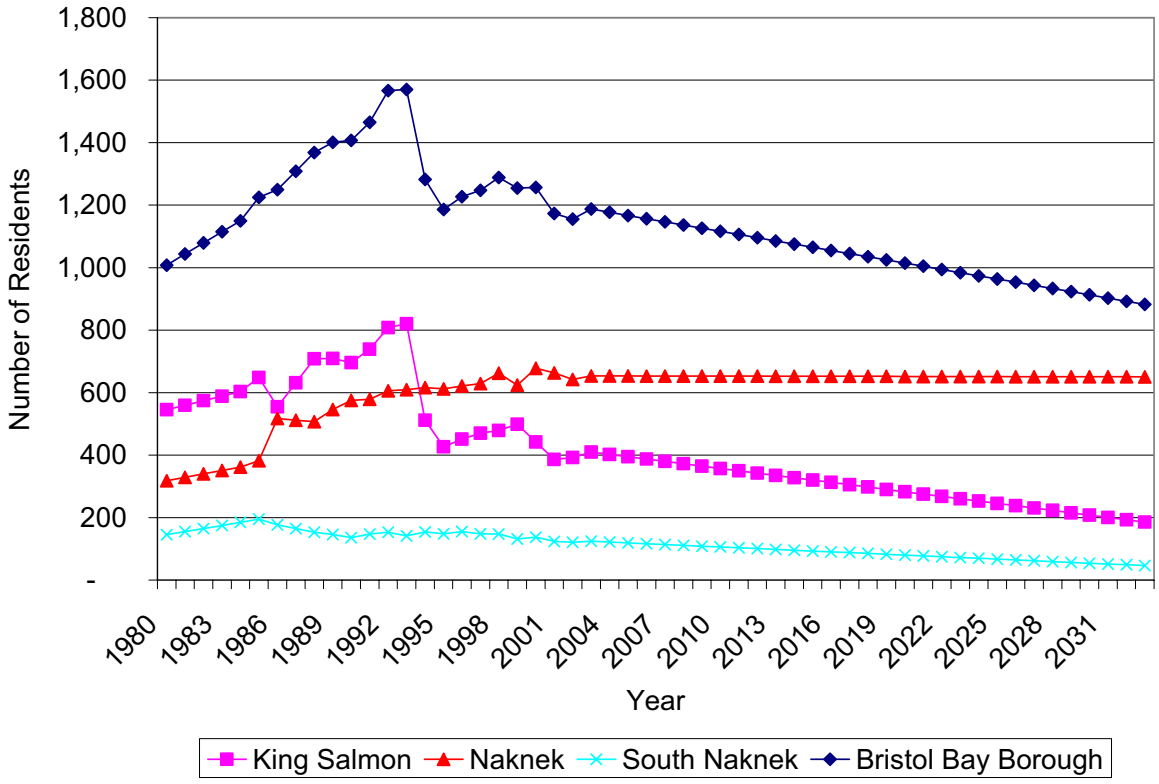


Figure 2. Low case population forecasts by community, 2003-2033

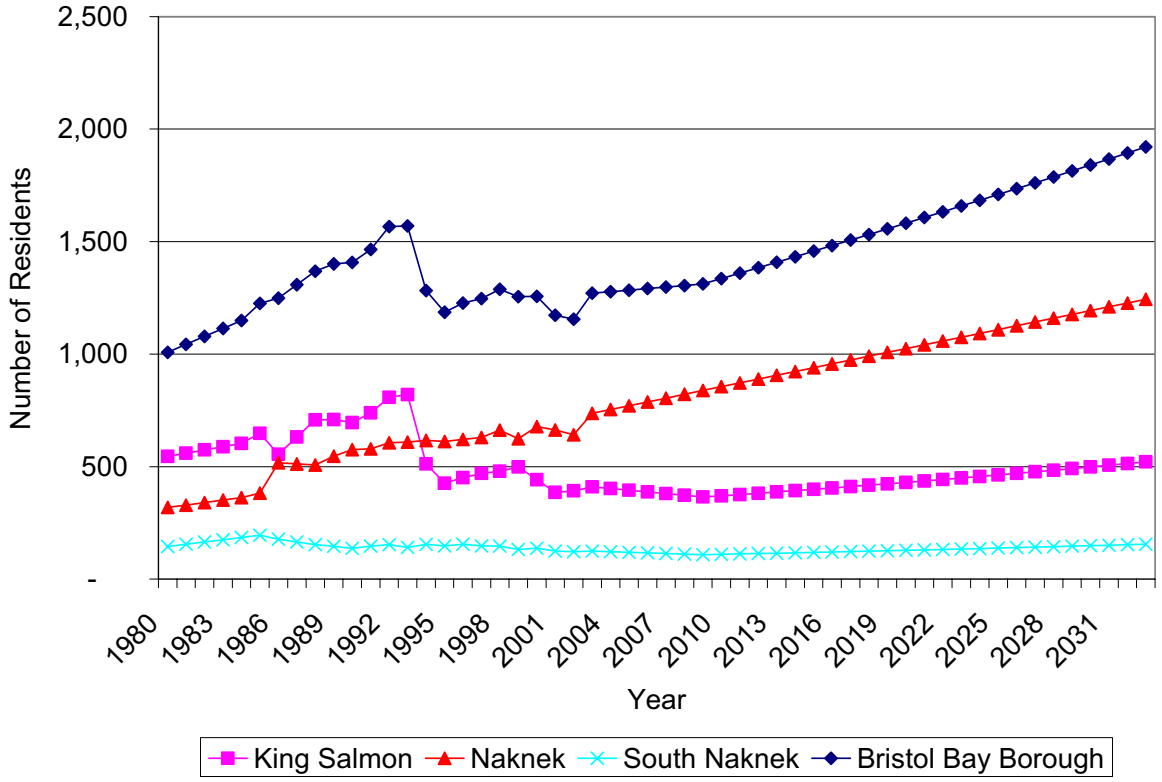


Figure 3. High case population forecasts by community, 2003-2033

Table 5. Population forecasts by community under aviation scenarios

Community	Year								
	2000	2001	2002	2010	2014	2019	2024	2029	2033
Base Case									
King Salmon	442	386	392	409	374	331	287	243	208
Naknek	678	663	642	722	749	784	819	853	881
South Naknek	137	124	121	117	109	100	91	82	74
Bristol Bay Borough	1,257	1,173	1,155	1,248	1,233	1,215	1,197	1,178	1,164
Low Case									
King Salmon	442	386	392	357	327	290	253	215	186
Naknek	678	663	642	653	652	652	651	651	651
South Naknek	137	124	121	106	96	83	70	57	46
Bristol Bay Borough	1,257	1,173	1,155	1,116	1,075	1,025	974	923	882
High Case									
King Salmon	442	386	392	370	393	423	456	491	521
Naknek	678	663	642	855	923	1,007	1,092	1,177	1,244
South Naknek	137	124	121	110	117	126	136	146	155
Bristol Bay Borough	1,257	1,173	1,155	1,336	1,433	1,557	1,684	1,814	1,921

Note: For comparison purposes, the ADOLWD projected that the Bristol Bay Borough population in 2018, the last year of their projection, would be 1,734 under the middle case, 1,413 under the low case, and 2,668 under the high case. These estimates are much higher than used in this report. ISER prepares statewide projections as well as projections for boroughs and census areas in the Railbelt, but projections for the Bristol Bay Borough were not found.

Economic and population changes resulting from the bridge alternative

The availability of a bridge would be expected to result in different economic conditions in the three communities, but particularly in South Naknek. The effect of the bridge on the communities is uncertain, so a range of outcomes is provided in this analysis, similar to those described under the aviation scenarios (See Table 6) using the low, base, and high cases.

Under the low case, it is assumed that the positive influence of the bridge is more than offset by the magnitude of adverse change in the regional economy. The decreasing population

trends in South Naknek and King Salmon continue and population levels are as projected in Table 5.

Under the base case, former residents of South Naknek who currently reside in Naknek because of the proximity to their current jobs return to the community, and the lower transportation costs result in economic growth and additional jobs in South Naknek. The overall population levels in the Bristol Bay Borough under the base case remain the same as shown in Table 5, but there is a shift in future population growth with a greater portion of future growth occurring in South Naknek. This shift begins with construction in 2012 and continues after the bridge opens in 2014.

Under the high case, positive changes in regional economic growth result in population growth in all three communities, and additional employment in the region. The positive economic changes could be associated with restructuring of the salmon fishery, oil and gas development on the Alaska Peninsula, completion of the road to Chignik, or a combination of these and other changes. Former residents of South Naknek return to the community and a significant portion of persons migrating into the region for economic opportunity also settle in South Naknek.

Table 6. Projected population with bridge alternative

Community	Year								
	2000	2001	2002	2010	2014	2019	2024	2029	2033
Base Case									
King Salmon	442	386	392	409	374	331	287	243	208
Naknek	678	663	642	715	735	759	783	808	827
South Naknek	137	124	121	128	135	143	152	161	168
Bristol Bay Borough	1,257	1,173	1,155	1,253	1,244	1,233	1,222	1,212	1,203
Low Case									
King Salmon	442	386	392	357	327	290	253	215	186
Naknek	678	663	642	653	652	652	651	651	651
South Naknek	137	124	121	106	96	83	70	57	46
Bristol Bay Borough	1,257	1,173	1,155	1,116	1,075	1,025	974	923	882
High Case									
King Salmon	442	386	392	397	416	442	470	500	526
Naknek	678	663	642	855	923	1,007	1,092	1,177	1,244
South Naknek	137	124	121	138	165	199	232	264	290
Bristol Bay Borough	1,257	1,173	1,155	1,390	1,504	1,648	1,794	1,941	2,060

Table 7 shows the projected AADT for passenger vehicles across the proposed Naknek River Bridge between South Naknek and the other two communities in the Bristol Bay Borough during the first 20 years of operation. The projected AADT uses the population forecasts for the communities presented above in Table 6. The other data in the equation are the same as those used to estimate AADT in Table 3.

Table 7. Projected average annual daily vehicle traffic across a Naknek river bridge

Scenario	Year				
	2014	2019	2024	2029	2033
Base Case	938	966	994	1,023	1,045
Low Case	498	441	383	326	280
High Case	945	1,105	1,265	1,427	1,557

The number of people traveling across the bridge can be estimated by multiplying the number of vehicle trips (AADT) by the average number of people in a vehicle (vehicle occupancy rate). An occupancy rate specific to the Naknek-King Salmon road is not available so a national average of 1.7 for all trips not in a metropolitan statistical area (Nationwide Personal Transportation Survey, 1990) was used to project the person-trip estimates shown in Table 8.

Table 8. Projected average annual daily person-trips across a Naknek river bridge

Scenario	Year				
	2014	2019	2024	2029	2033
Base Case	1,594	1,642	1,690	1,738	1,777
Low Case	846	749	652	554	476
High Case	1,607	1,878	2,151	2,426	2,647

Appendix J. Survey of Borough residents

As a result of public meetings held in the Borough in October 2003, the Department decided to conduct a survey of Borough residents to determine their support for the bridge and the various options, and to assess current travel patterns. Between January 2 and January 5, 2004, 172 households in King Salmon and Naknek were surveyed by telephone. Respondents were selected through a combination of random-digit-dial methodology and an Internet phone directory number search. Thirty-five households out of 36 households in South Naknek responded to a written survey distributed by the South Naknek Tribal Council in February, 2004. This appendix contains the results of the surveys. At a public meeting in march 2004 it was requested that we provide information on support for the bridge by community. Figure 2 through Figure 4 summarize the information on residents' support for the various scenario/options.

Respondents were asked if they support or oppose the construction of a bridge over the Naknek River under the following conditions:

1) Unconditionally
2) If South Naknek Airport was closed
3) If Naknek Airport was closed
4) If both South Naknek and Naknek Airports were closed
5) If both airports remained open but Bristol Bay Borough provided maintenance and operation costs (respondents were provided an estimate of this amount)

Local residents generally support the bridge, with lesser support if individual airports are closed or the Bristol Bay Borough operates the airports. Only when both airports are closed does public support fall below 50 percent for the Borough as a whole. South Naknek residents support the bridge under any option.

Following the graphics for each community is the information from the telephone survey in King Salmon and Naknek, followed by information on the survey in South Naknek.

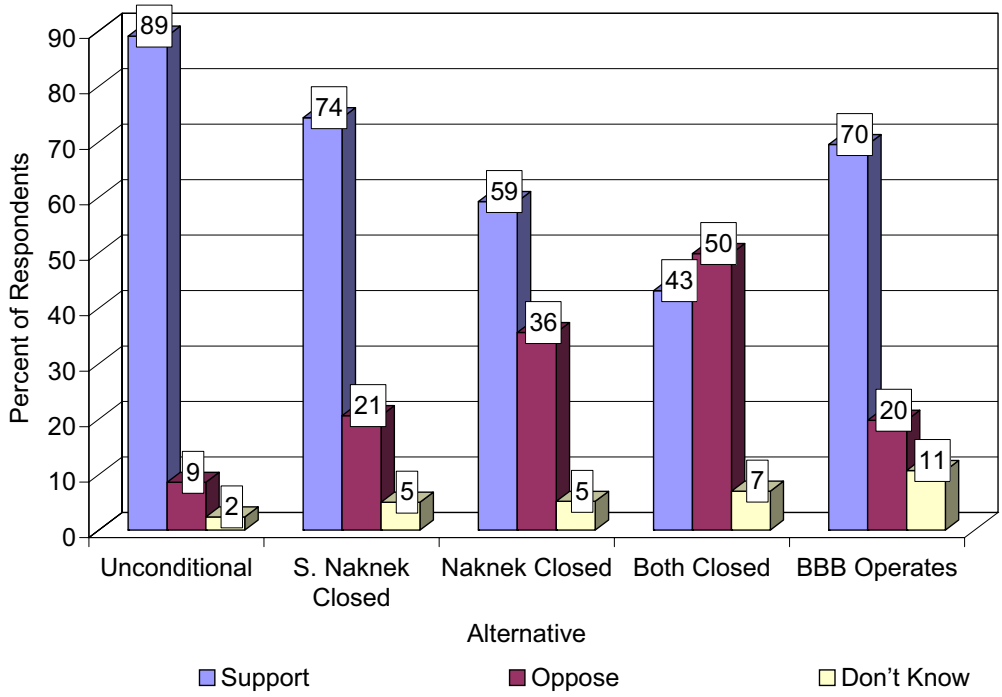


Figure 1. Borough residents support or oppose a bridge if…

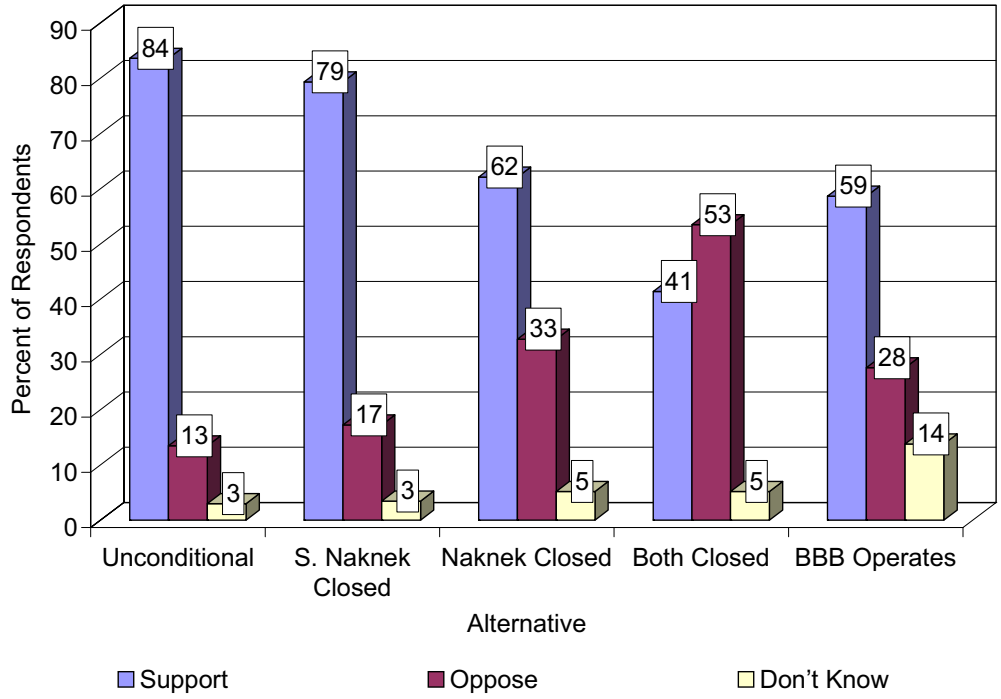


Figure 2. King Salmon residents support or oppose a bridge if…

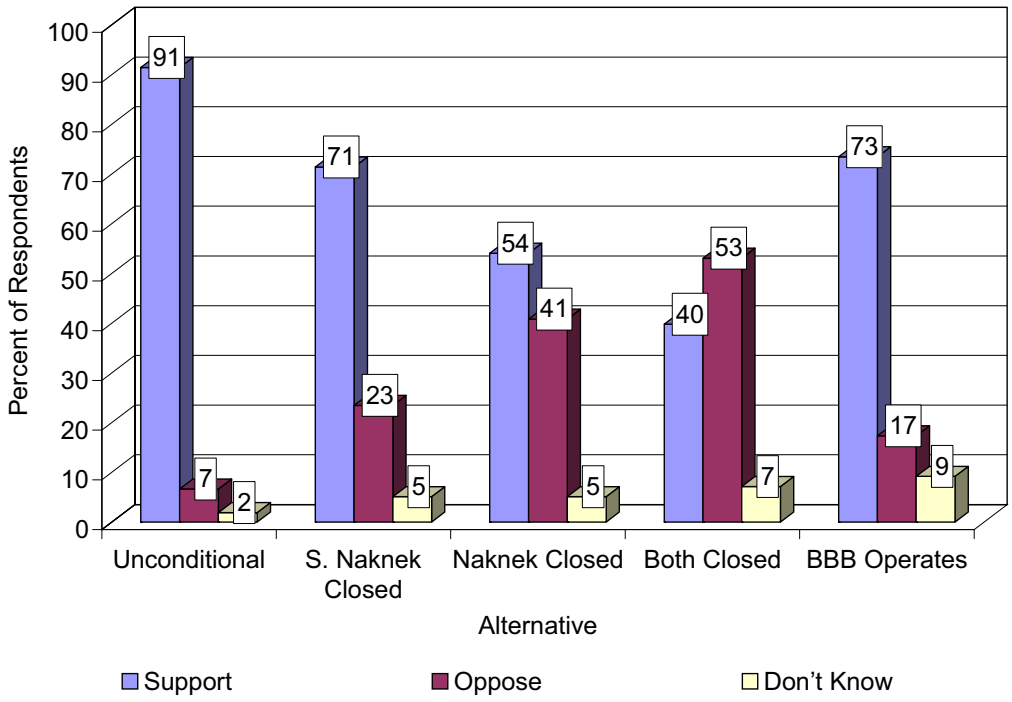


Figure 3. Naknek Residents support or oppose a bridge if…

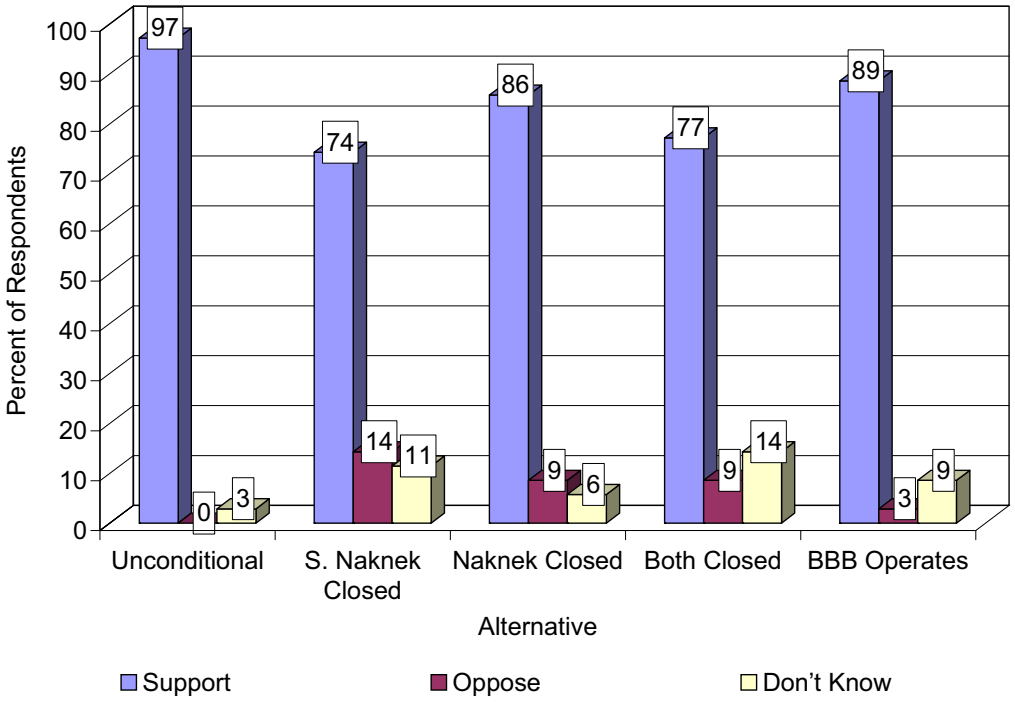


Figure 4. South Naknek residents support or oppose a bridge if…

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